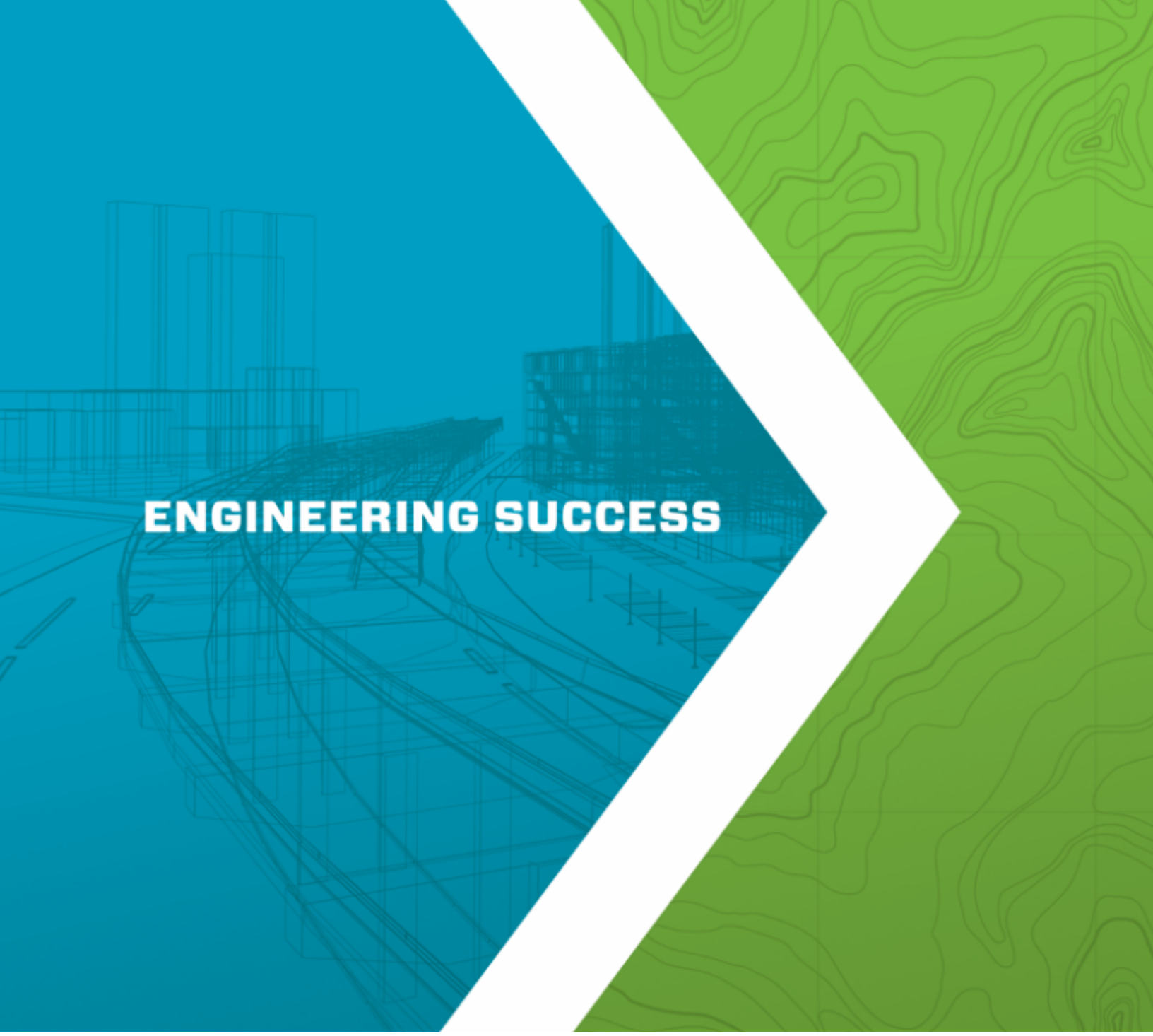


PRELIMINARY HYDRAULIC REPORT FOR

EW-128 (E. Post Oak Road)
Bridge and Approaches over Tributary to Jim Blue Creek
4.25 miles south and 8.25 miles east of Downtown Norman

MKEC
205 NW 63rd Street, Suite 240
Oklahoma City, OK 73116
405.842.8558

EXISTING NBI#:	26914
PROJECT NUMBER:	K-2324-151
DATE:	July 25th, 2024

OKLAHOMA Transportation

Title Page

REPORT INFORMATION:	Hydraulic Report EW-128 (E. Post Oak Road) Bridge and Approaches over Tributary to Jim Blue Creek 4.25 miles south and 8.25 miles east of Downtown Norman Cleveland County, OK
EXISTING NBI#:	26914
PREPARED BY:	MKEC Engineering, Inc. Chase Cole, PE 205 NW 63rd Street, Suite 240 Oklahoma City, OK 73116 T. 405.842.8558 F. 405.842.8553 ccole@mkec.com
MKEC PROJECT #:	2403010281
RISK STATEMENT:	Hydraulic Design is in compliance with “Federal-Aid Policy Guide 23 CFR 650, Subpart A”
REPORT DATE:	July 25th, 2024

Seal on Final Report

Chase R. Cole, PE

Initials	Date
DJG	7/25/2024

Cleveland **County**

Project No. K-2324-151

E. Post Oak Rd. over Trib. Of Jim Blue Creek

NBIS # 26914

Hydraulic Summary

Total Drainage Area = 0.63 sq. mi
Controlled Drainage Area = 0.00 sq. mi
Effective Drainage Area = 0.63 sq. mi

Existing Structure: 32' Steel Girder
C/L Station 113+00.03

L = 32 ft
$Q_{OT} \approx Yr_{freq}$ 58

Low Bm Elev = 1121.76 ft
Low Bm Sta= 112+97.05
$Rdwy_{OT}$ Elev = 1124.00 ft
$Rdwy_{OT}$ Sta = 112+97.05

Proposed Structure: 3-12'x7' RCB
C/L Station 113+00.00

Slope= 0.003 ft/ft
$Q_{OT} \approx Yr_{freq}$ 412

Flowline In= 1115.86 ft
$Rdwy_{OT}$ Elev = 1124.43 ft
$Rdwy_{OT}$ Sta = 112+97.02

Detour Structure:
C/L Station

Slope = ft/ft
$Q_{OT} \approx Yr_{freq}$

Inlet Elev = ft
$Detour_{OT}$ Elev = ft
$Detour_{OT}$ Sta =

Freq.	Q (cfs)	CHW (ft)	V (fps)	Contraction Scour (ft)	Pier Scour (ft)	Total Scour (ft)
2	261	1119.59	2.74			
5	490	1120.46	3.92			
10	688	1121.02	4.81			
25	993	1121.73	6.01			
50	1330	1122.39	7.19			
100	1560	1122.89	7.94			
OT or 500 =Yr_{freq}	2260	1124.45	10.05			
Detour OT =Yr_{freq}						

Notes:
1. Curtain wall depth upstream = 4' downstream 4'

Hydraulic Design is in compliance with
"Federal-Aid Policy Guide 23 CFR 650, Subpart A"

Initials:	Date:
DJG	7/25/2024

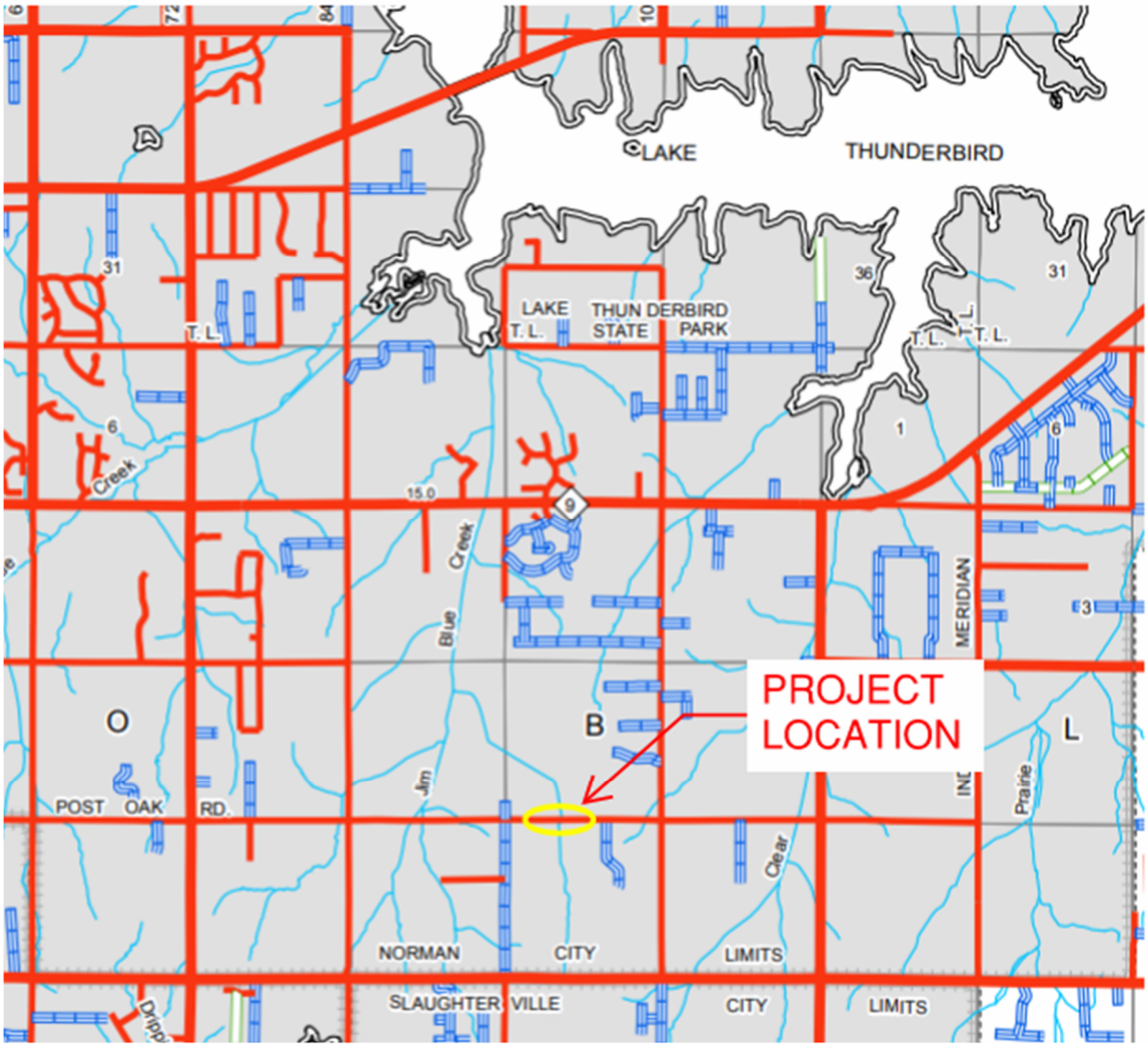
County	Cleveland
Project #	K-2324-151
Highway	E. Post Oak Rd.
Crossing	Trib. To Jim Blue Creek

		NBIS #	26914											
Discharges (CFS)		Computed Water Surface Elev. (FT)									Velocity (FPS)			
		Open Channel	Existing 32' Steel Girder		Backwater	Proposed: 3-12'x7' RCB		Backwater	Proposed Alternative: 45' Concrete Slab Span		Backwater	Open Channel	Existing 32' Steel Girder	Proposed: 3-12'x7' RCB	Proposed Alternative: 45' Concrete Slab Span
			Low Beam (ft)	1121.76		Flowline In (ft)	1115.86		Low Beam (ft)	1122.43					
Q2 =	261	1119.63	1119.60		-0.03	1119.59		-0.04	1119.59		-0.04	6.43	6.12	2.74	4.72
Q5 =	490	1120.44	1120.81		0.37	1120.46		0.02	1120.45		0.01	7.50	9.81	3.92	5.83
Q10 =	688	1120.89	1121.62		0.73	1121.02		0.13	1120.97		0.08	7.95	9.22	4.81	6.48
Q25 =	993	1121.43	1122.72		1.29	1121.73		0.30	1121.70		0.27	8.44	10.40	6.01	7.40
Q50 =	1330	1121.94	1123.84		1.90	1122.39		0.45	1122.50		0.56	9.08	11.49	7.19	8.32
Q100 =	1560	1122.26	1126.11		3.85	1122.89		0.63	1123.00		0.74	9.51	4.29	7.94	8.68
Q500 =	2460	1123.32	1126.77		3.45	1124.79		1.47	1125.20		1.88	11.04	4.15	9.96	11.40
			Overtopping Elev (ft) =	1125.47		Overtopping Elev (ft) =	1124.45		Overtopping Elev (ft) =	1126.56					
			Overtopping Q (cfs) ≈	1365		Overtopping Q (cfs) ≈	2260		Overtopping Q (cfs) ≈	3130					
			Overtopping Freq (yr) ≈	58		Overtopping Freq (yr) ≈	412		Overtopping Freq (yr) ≈	>500					

Table of Contents

Introduction

The scope for this report includes a hydrologic study to obtain the peak flow discharges for the conditions of the bridge structure carrying EW-128 (E. Post Oak Road) over Tributary to Jim Blue Creek, in Cleveland County, Oklahoma. The purpose is to determine the size, type, and location of the new bridge and to replace the existing structure. (Refer to Attachment A - Vicinity Map). The structure to be replaced is located in between Section 15 T-8-N, R-1-W and Section 22 T-8-N, R-1-W. The bridge is in a FEMA Flood Zone A. (Refer to Firmette Map in Appendix B).



Project Vicinity Map
Cleveland County, OK

Attachment A

General

This section discusses the characteristics of Tributary to Jim Blue Creek and the hydrologic data used for the peak flow discharges for the model. The creek flows in a south to north direction at the structure. The creek meanders approximately 1.40 miles from the approximate starting point to the location of the project on Post Oak Road. The bridge is located in a FEMA Zone A (40027C0320H; effective September 26th, 2008) (Refer to Appendix B). Streamstats shows that the drainage area consists of 0.63 sq. miles of unregulated area and 0.00 sq. miles of regulated area, making the total drainage area 0.63 sq. miles (Refer to Appendix B). The average channel slope is 1.65%. The mean annual precipitation is 38.63 inches. The existing channel shape is mostly trapezoidal shaped with 3:1 or steeper bank slopes. The channel is well defined and has a clear meandering flow line. Appendix A includes photos showing both the upstream and downstream of the creek.

Design Flows/Hydrology

E. Post Oak Road is classified as a rural collector with a 10-year storm design event requirement. The total drainage area is taken from Streamstats to be 0.63 square miles (Refer to Appendix B).

Based on the size of the catchment area, basin characteristics, and the peak-stream flow frequency estimates were obtained from Streamstats. Table 1 shows the flowrates found.

Table 1. Streamstats Flowrates.

Design Storm	Flowrate (cfs)
2-yr	261
5-yr	490
10-yr	688
25-yr	993
50-yr	1,330
100-yr	1,560
500-yr	2,460

Hydraulic Analysis

Hydraulic Models were created to investigate and size the new bridge for this location. HEC-RAS 6.3.1 version was used for hydraulic analysis.

The following hydraulic models have been developed for the:

1. Natural: “Natural” flow model of the original channel not constricted by any bridge structure.
2. Existing: “Existing” flow model with the existing 32’ steel girder bridge.
3. Proposed: “Proposed 3-12’x7’ RCB” flow model consists of a custom 3-12’x7’ RCB and proposed roadway conditions.
4. Alternative: “Proposed Slab Span” flow model consists of a 45’ concrete slab span bridge and proposed roadway conditions.

The existing and proposed roadway profiles are modeled respectively to include the existing and new roadway conditions. A D/S and U/S channel slope of 0.01659 ft/ft is used for boundary conditions. The Manning’s “n” values used for the main channel are 0.030 and 0.033 upstream, and 0.033 downstream. This was decided based on “Table 5009.1” (Pg. 86) in the “City of Norman Engineering Design Criteria”; C. Natural Streams; (0.025-0.050). The upstream channel appears to be clear of debris unlike the downstream channel. The Manning’s value used for the banks in this model are 0.035 upstream and 0.100 downstream.

This is based on C. Overbank Areas; (0.030-0.200). The Manning's value used for the downstream banks, accounts for the trees and brush present compared to the upstream banks.

A comparison table including the natural, existing, proposed, and alternative models as well as a rating curve up stream of the bridge are included in the report.

Natural

Based on the creek alignment and geometry, natural cross sections were defined along the existing alignment, perpendicular to the flow (Refer to Appendix C). The cross sections 1000, 1048, and 1112 on the downstream side and 1199, 1262, and 1295 on the upstream side are added to model the channel flow. The cross sections reflect existing topography width up to approximately 2,533 ft to include the flood plain. The peak flow data from the Streamstats report is defined for the 2, 5, 10, 25, 50, 100, and 500-year flood events. A steady flow analysis was performed using the mixed flow method. The upstream water surface elevation during the 100-year storm event is 1122.26 ft. and velocity of 9.51 fps downstream of the bridge station.

Existing Bridge

The existing structure is a bridge with 32 ft. steel girder bridge. The structure was located along the existing centerline and an approximate proposed alignment Sta. 113+00.03. The proposed alignment is similar to existing. The roadway has two 11' - lanes with a current ADT of 220. A steady flow analysis was performed using the mixed flow method for the 2, 5, 10, 25, 50, 100, and 500-year flood events.

The existing 22-foot-wide roadway and structure are added to the natural cross sections (Refer to Appendix D). The structure is modeled at creek Sta. 1154.25. The local low point of the roadway is at the bridge structure at an elevation of 1124.00 ft. at an equivalent proposed alignment station of 112+97.05. The roadway is found to overtop at a 58-year event and equivalent flowrate of 1,365 cfs. resulting in a U/S channel water surface elevation of 1125.47 ft. with a velocity near the bridge of 16.32 fps. The existing bridge structure does meet the 10-year storm design requirement. The water surface elevation upstream of the structure for the 100-year flood event is 1126.11 ft. with 3.85 ft. of backwater compared to the natural condition. There is no available freeboard during the 100-storm year for the existing condition. The velocity during the design storm event near the bridge is 9.22 fps.

Proposed Bridge

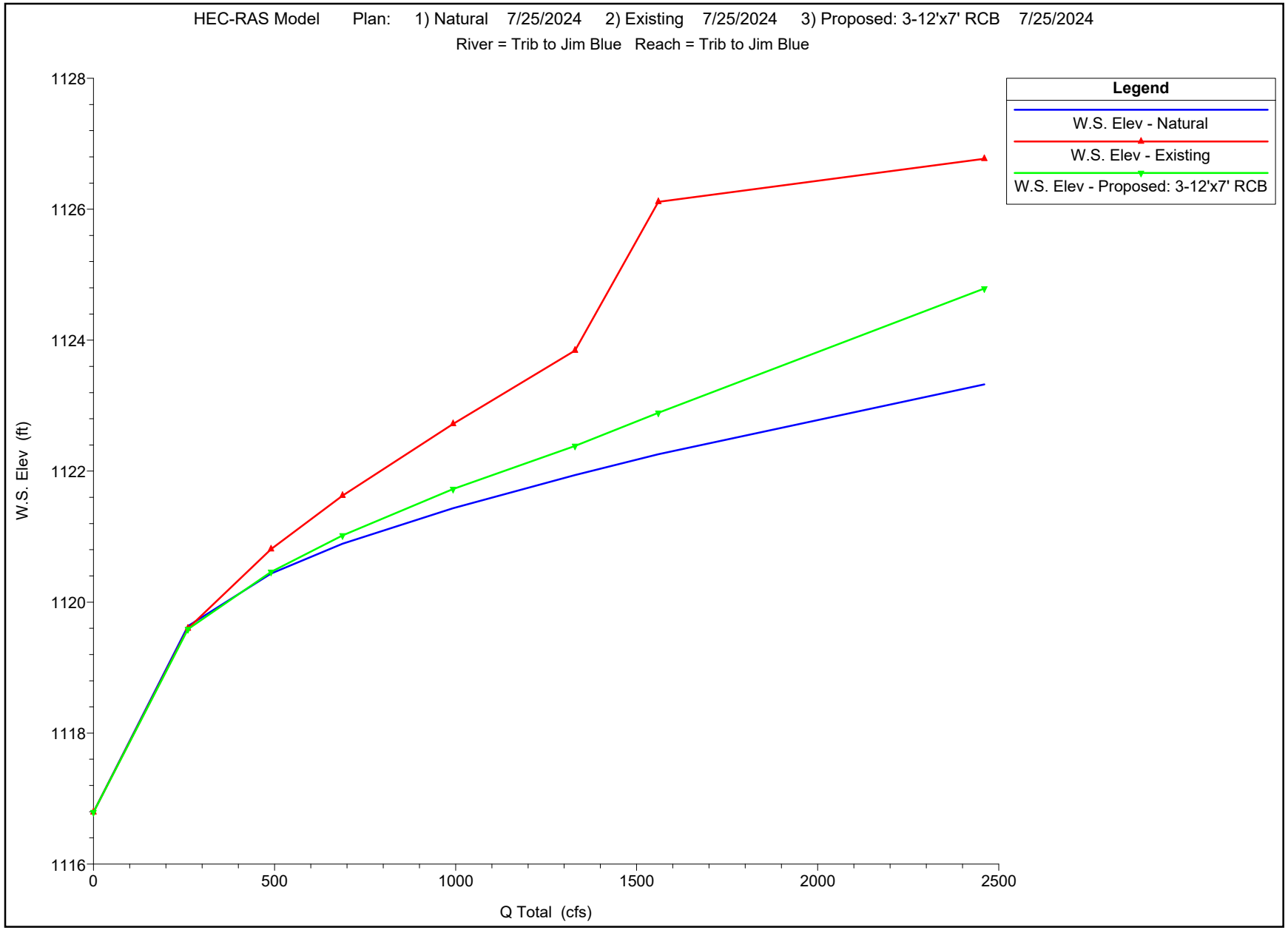
Based on the geometrics of the proposed roadway and hydraulic model, the proposed structure is a custom 3-12'x7' RCB centered at Sta. 113+00.00. The structure meets the 10-year design requirement. The upstream water surface elevation at the 10-year storm event is 1121.02 ft. with a velocity of 4.81 fps, a decrease of 4.41 fps. A mixed flow-steady flow analysis of the proposed bridge indicates that a 412-year peak flow discharge overflows the roadway at an elevation of 1124.43 ft. and flowrate of 2,260 cfs, with an upstream water surface elevation of 1124.45 ft. The water surface elevation upstream of the structure for the 100-year flood event is 1122.89 ft. with 0.63 ft. of backwater compared to natural conditions, meeting FEMA's Zone A backwater requirement. The freeboard during the 100-storm year is 1.41 ft; this compared to no available freeboard during the existing condition.

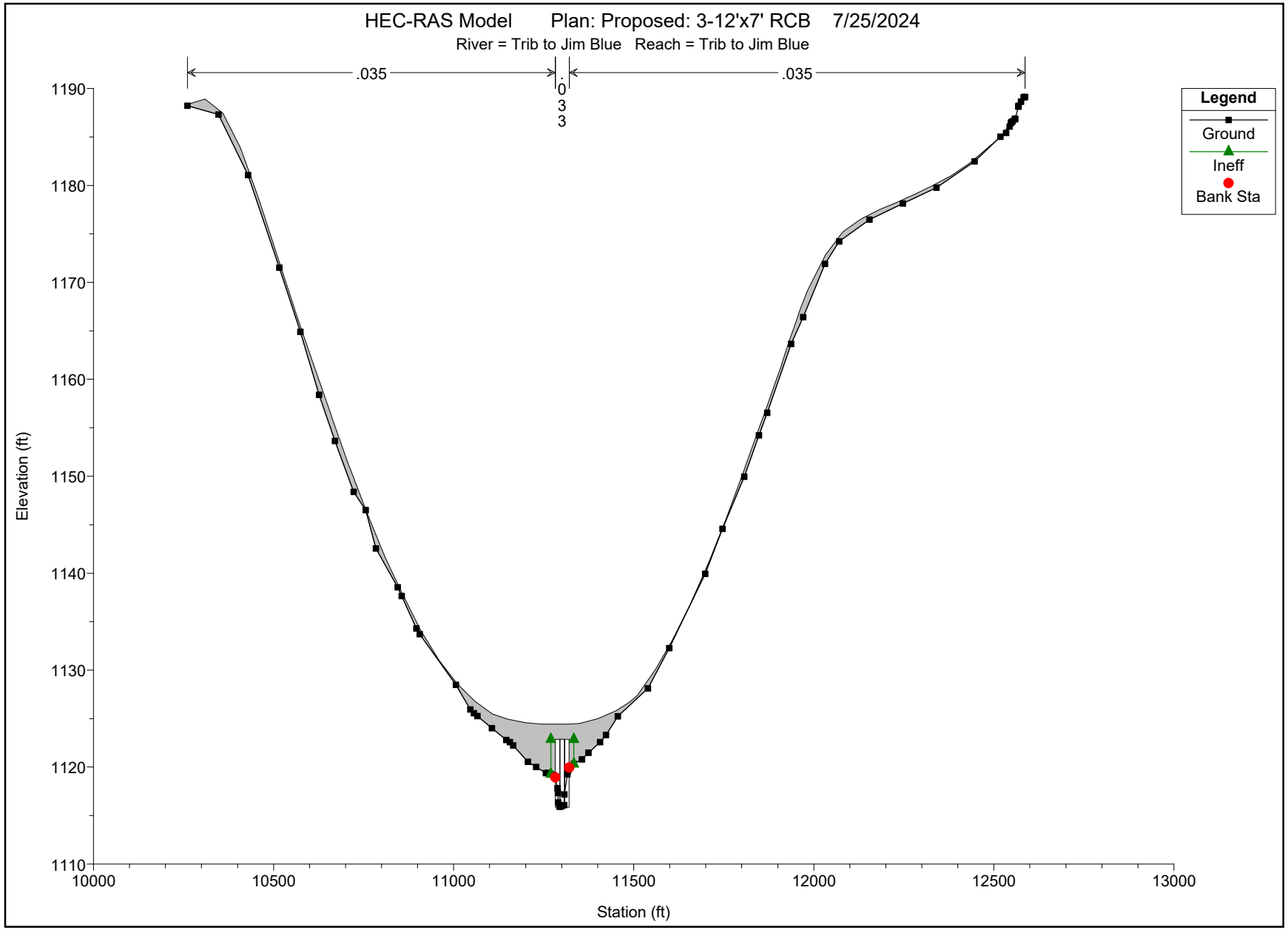
An alternative structure was modeled of a 45' concrete slab span bridge. Results from this model are shown in the accompanying comparison table. This bridge model meets many of the hydraulic bridge requirements. While the model does improve the overtopping frequency, this model does not meet the City of Norman 100-year freeboard requirement (0.80 ft.). MKEC also modeled a smaller box (3-10'x6'-10" RCB). This RCB likewise also meets many of the hydraulic bridge requirements. It does not, however, meet the FEMA Zone A backwater requirement (1.19 ft of backwater). Given all considerations, the proposed 3-12'x7' RCB is chosen as an economical and efficient solution for this project location.

Risk Statement

The 10-year flood stays within the main channel and minimal backwater is created by the proposed bridge compared to existing and natural conditions. Therefore, a potential risk to human life is not anticipated because of the proposed bridge at this location.

Hydraulic Design is in compliance with "Federal-Aid Policy Guide 23 CFR 650, Subpart A".


HEC-RAS Model Plan: 1) Natural 7/25/2024 2) Existing 7/25/2024 3) Proposed: 3-12'x7' RCB 7/25/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
Legend
W.S. Elev - Natural
W.S. Elev - Existing
W.S. Elev - Proposed: 3-12'x7' RCB
W.S. Elev (ft)
1128
1126
1124
1122
1120
1118
1116
0
500
1000
1500
2000
2500
Q Total (cfs)


HEC-RAS Model Plan: Proposed: 3-12'x7' RCB 7/25/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.033
.035
Legend
Ground
Ineff
Bank Sta
Elevation (ft)
1190
1180
1170
1160
1150
1140
1130
1120
1110
10000
10500
11000
11500
12000
12500
13000
Station (ft)

Appendix A – Scope - Photos

Photos

Photo 1. Looking West from Existing Bridge

Photo 2. Looking East from Existing Bridge

Photo 3. Looking North from Existing Bridge (Downstream)

Photo 4. Looking South from Existing Bridge (Upstream)

SCOPE OF SERVICE
City of Norman
Contract No. K-2324-151
Post Oak Road over Tributary to Jim Blue Creek (NBI 26914)
Bridge Replacement
0.2 miles east of 96th Avenue SE
February 13th, 2024

DESCRIPTION OF PROJECT

This project is located on Post Oak Road approximately 0.2 miles east of 96th Avenue SE. The purpose of this project is to replace the existing load posted bridge carrying Post Oak Road over an unnamed tributary to Jim Blue Creek.

1. ROADWAY/STREET

The project length is approximately 0.42 miles. Post Oak Road is classified as a rural collector. The existing roadway is asphalt and is approximately 22' wide. The new roadway section will be 26' wide with unpaved 6' sod shoulders. There will be a paved shoulder taper leading to the bridge deck. The New guardrail systems will be required at the approaches to the bridge. Additional R/W is anticipated for permanent construction. The roadway will be closed to through traffic, but local access will be maintained throughout construction.

Roadway design will follow the City of Norman Engineering Design Criteria as well as the 2018 AASHTO Policy of Geometric Design of Highways and Streets, the 2011 AASHTO Roadside Design Guide, and the 2009 Manual on Uniform Traffic Control Devices (MUTCD). Detailed construction plans shall meet the City of Norman standards for submittal.

2. TRAFFIC

a. Traffic Control

Post Oak Road will be closed to thru traffic during construction of the new bridge. Traffic Control Plans will be prepared with a signed detour.

b. Signing and Striping

Signing and striping plans will be prepared in accordance with the latest City of Norman and ODOT standards.

3. BRIDGE/STRUCTURAL

The existing bridge over the tributary to Jim Blue Creek will be replaced. The clear roadway between the railing will match the required width (pavement plus shoulders) for a rural collector. W-beam guardrail will be used to protect the ends of the bridge railing.

a. Hydraulic Design

The size of the bridge will be determined by a hydrology & hydraulic study in accordance with City of Norman Engineering Design Criteria and the ODOT Drainage Manual. The bridge is located in a FEMA Flood Zone A.

b. Structural Design

The structural design of the bridge will be in accordance with the AASHTO LRFD Bridge Design Specifications, 9th Edition and ODOT Bridge Division policies. ODOT standard bridge railing will be used. The foundation will be designed in accordance with recommendations of the geotechnical report that will be prepared for this site.

4. SURVEY

The survey limits will extend 1,200' west of the existing bridge and 1,200' east of the existing bridge along Post Oak Road. The survey will extend 80' north of the center of the road and 110' south of the center of the road. The survey of the creek will extend 300' upstream and 300' downstream of the existing bridge.

Within the limits of the survey the following information will be collected:

- Set a minimum of 2 control points/benchmarks for vertical and horizontal purposes derived from GPS static observation, OPUS solution, VRS Network, or existing control if provided.
- Topographical survey will include all the following existing surface features: roads, curbs, drives, sidewalks, buildings, finished floor at thresholds, signs, fences, walls, tree lines, flowerbeds, all visible drainage structures and flow lines, and visible or marked utilities.
- Tree cover will be annotated by coverage being dense or sparse within those areas.
- Trees located on the south side of the road, south of the white fence, within the survey footprint will be individually located.
- All utility companies servicing the project area will be contacted thru "CALL OKIE- 811" 14 days prior to field survey.
- All utility information field collected will be placed in the CAD drawing.
- Storm sewer manholes, sanitary sewer manholes, water valve rims and inverts will be measured for depth (to the connection outside of survey limits).
- Cross-sections at interval grid to produce contours at 1.0' minimum density.
- Right-of-way, property lines and ownerships will be established using a title company.

Staking for the new right-of-way or easements is included in Section 7: Right-of-Way.

5. GEOTECHNICAL

The scope of the geotechnical services is as follows:

a. Advance two (2) abutment borings to a minimum depth of 20 feet into bedrock. The borings will be sampled using the Standard Penetration Test at a maximum of 5 feet intervals beginning at ground level. The borings will be located as close as possible to the proposed abutments.

b. Once bedrock is encountered, the rock hardness will be tested using the Texas Cone

Penetrometer (TCP) on a maximum of 5 feet intervals.

c. Advance four (4) in-place borings in the approaches to the new bridge and obtain soil samples from 0-6 and 6-36 inches below the ground. A composite bulk sample will be obtained to determine the Proctor and Resilient Modulus.

d. About 50% of the bridge soil samples and 100 % of the roadway samples recovered will be tested to determine the soil classification (Atterberg Limits and gradation) and moisture content. Soluble sulfate will be tested on the roadway samples. Proctor and Resilient modulus will be tested on the bulk samples..

e. Groundwater levels will be measured during and 24 hours after completion of the drilling. The borings will be plugged per Oklahoma Water Resources Board (OWRB) requirements.

f. The borings will be located in the field by an Engineer using the plans provided. Vertical control established in the project plans will be used to obtain surface elevations of the borings.

g. The geotechnical services will provide a foundation report containing recommendations for driven piles and, if appropriate, drilled pier foundations. The report will include recommendations for the approach roadway pavement design for HMA and essentially will be performed to verify the City of Norman paving standard is adequate. The report will be prepared under the supervision of and signed by a registered Professional Engineer in the State of Oklahoma.

6. ENVIRONENTAL CLEARANCE

MKEC will provide environmental mitigation measures as required in the plans and provide any support documentation for CC Environmental to obtain all environmental permits or requirements, including 404 permit and OWRB permit as applicable.

7. RIGHT-OF-WAY

It is expected that right-of-way (R/W) will be acquired for this project. The CONSULTANT will prepare right-of-way plans, exhibits and legal descriptions for the acquisition of right-of-way. CONSULTANT will provide R/W staking for the parcels during the acquisition process. The cost for staking R/W will be a unit price per request/mobilization. Right-of-way acquisition services are not included in this contract.

8. UTILITIES

a. Utility Map (color-coded)
CONSULTANT will provide a color-coded set of plan and profile sheets to OWNER for each affected utility company to coordinate the necessary utility relocations.

b. Utility Relocation Coordination
OWNER will coordinate the relocation of utilities as required for the project and will request written approval from all utility companies as to the accuracy of all facilities on the plans.

c. Utility Meetings
CONSULTANT will attend utility relocation meetings with each utility. The meeting will be coordinated by the City of Norman. The OWNER will prepare the meeting minutes.

d. Utility Relocation Plan Review
CONSULTANT will ensure any utility relocation plans meet the requirements of the project.

e. Utility Relocation Design
The design of OWNER owned utility relocations is not anticipated for this project. If the design or relocation of OWNER-owned utilities is necessary, services will be added to the agreement by written amendment.

9. CONSTRUCTION

a. Bidding
The OWNER will assume primary responsibility for the bidding/award process for the project. The CONSULTANT will serve the OWNER in a support role during the bidding/award process. Additionally, the CONSULTANT shall answer questions from possible contractors, including the development of written responses to questions received.

b. Construction Support
CONSULTANT shall attend any scheduled Pre-Construction Meeting and will be available throughout construction to answer questions, including formal Requests for Information (RFIs) and assist the OWNER as necessary, helping to resolve any complications or conflicts that may arise. If shop drawings are to be produced during construction, CONSULTANT will be available to assist the OWNER in review. CONSULTANT shall attend regularly scheduled progress meetings, as required.

c. Construction Management/Testing
Construction Management and Testing are not included in this contract.

d. Record Drawings
Record Drawings will be prepared and submitted to the OWNER based upon field documents provided by the construction administrator.

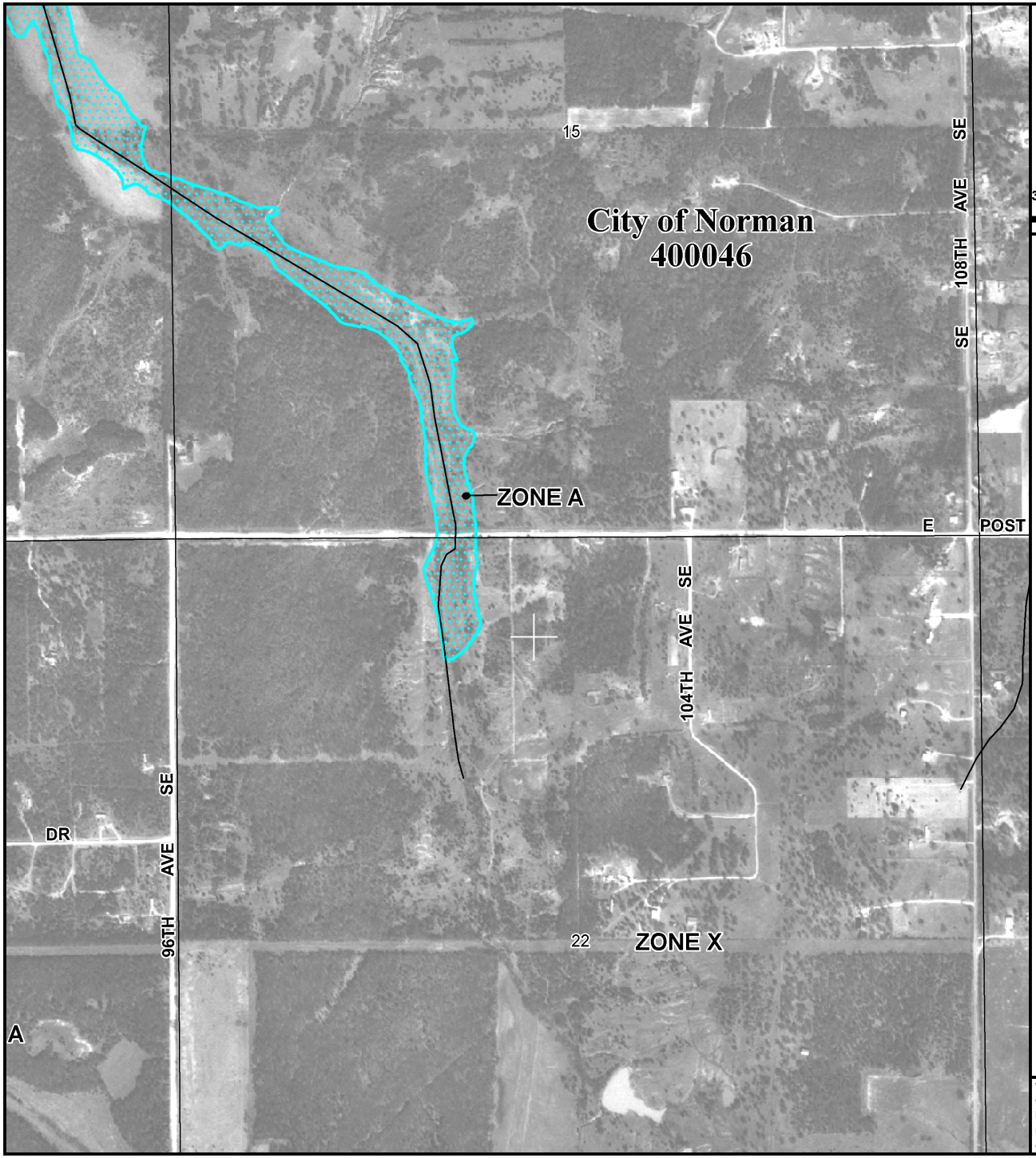
MEETINGS

The consultant shall schedule monthly design progress meetings or conference calls with the OWNER to discuss current project status, upcoming milestones, and any issues arising on the project.

DESIGN CRITERIA

The design and plans shall conform to current (at the time of bidding) Federal, State of Oklahoma, City of Norman, and American Association of State Highway and Transportation Officials (AASHTO) polices and standards unless modified in writing at the direction of the OWNER. It is expected that this project will be bid and awarded by the City of Norman.

Appendix B – Hydrology – Drainage Maps



MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0320H

FIRM

FLOOD INSURANCE RATE MAP

CLEVELAND COUNTY OKLAHOMA

AND INCORPORATED AREAS

PANEL 320 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLEVELAND COUNTY, UNINCORPORATED AREAS	400475	0320	H
NORMAN, CITY OF	400046	0320	H
SLAUGHTERVILLE, TOWN OF	400539	0320	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

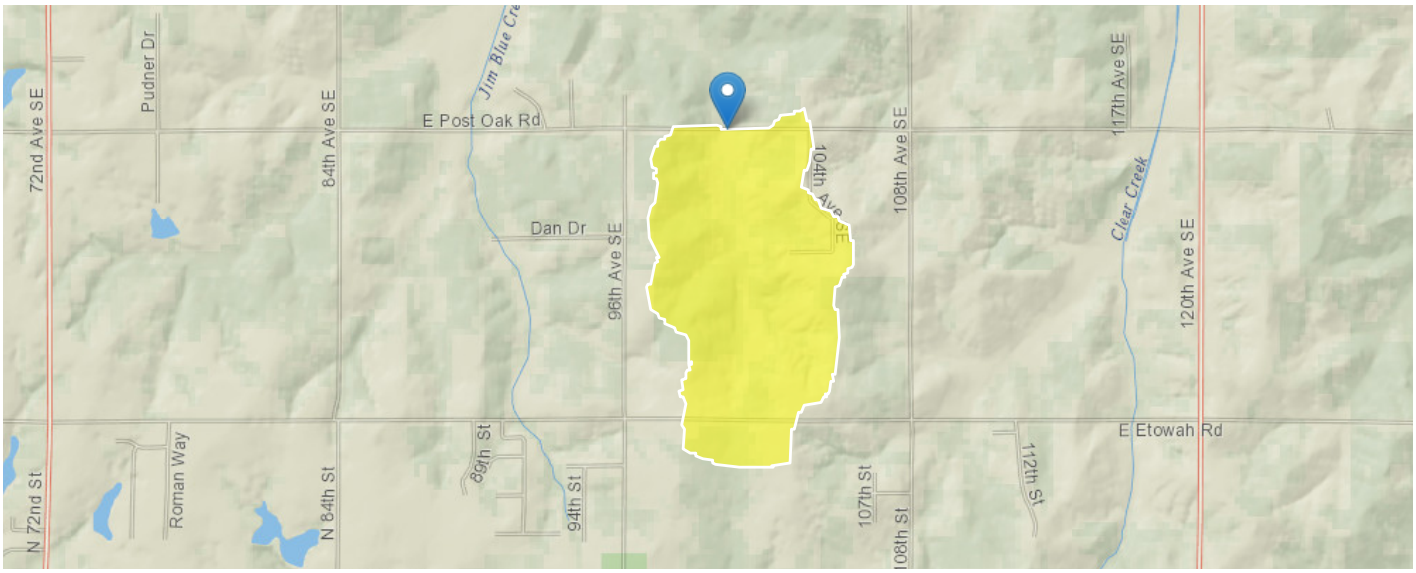
MAP NUMBER
40027C0320H

MAP REVISED
SEPTEMBER 26, 2008

Federal Emergency Management Agency

Post Oak Road over Trib to Jim Blue Creek

Region ID: OK
Workspace ID: OK20240122200255886000
Clicked Point (Latitude, Longitude): 35.16035, -97.29404
Time: 2024-01-22 14:03:24 -0600



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CANOPY_PCT	Percentage of drainage area covered by canopy as described in OK SIR 2009_5267	46.25	percent
CONTDA	Area that contributes flow to a point on a stream	0.63	square miles
CSL10_85fm	Change in elevation between points 10 and 85 percent of length along main channel to basin divide divided by length between points ft per mi	87.6	feet per mi
DAUNREG	Unregulated drainage area used in OK regulated equations	0.63	square miles
ELEV	Mean Basin Elevation	1180	feet
PRECIPOUT	Mean annual precip at the stream outlet (based on annual PRISM precip data in inches from 1971-2000)	38.63	inches

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Region 2 Unregulated 2019 5143]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CONTDA	Contributing Drainage Area	0.63	square miles	0.1	2510
CSL10_85fm	Stream Slope 10 and 85 Method ft per mi	87.6	feet per mi	1.98	342

Peak-Flow Statistics Parameters [Peak Region 2 NRCS Regulated 2019 5143]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DAUNREG	Unregulated Drainage Area	0.63	square miles	0.1	2510
CSL10_85fm	Stream Slope 10 and 85 Method ft per mi	87.6	feet per mi	1.98	342

Peak-Flow Statistics Flow Report [Peak Region 2 Unregulated 2019 5143]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp	Equiv. Yrs.
50-percent AEP flood	261	ft^3/s	46.9	2
20-percent AEP flood	490	ft^3/s	36.2	5
10-percent AEP flood	688	ft^3/s	35	8
4-percent AEP flood	993	ft^3/s	39.9	9
2-percent AEP flood	1330	ft^3/s	37.1	11
1-percent AEP flood	1560	ft^3/s	39.9	12
0.2-percent AEP flood	2460	ft^3/s	50.7	12

Peak-Flow Statistics Flow Report [Peak Region 2 NRCS Regulated 2019 5143]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp	Equiv. Yrs.
Regulated 50-percent AEP flood	261	ft^3/s	46.9	2
Regulated 20-percent AEP flood	490	ft^3/s	36.2	5
Regulated 10-percent AEP flood	688	ft^3/s	35	8
Regulated 4-percent AEP flood	993	ft^3/s	39.9	9
Regulated 2-percent AEP flood	1330	ft^3/s	37.1	11
Regulated 1-percent AEP flood	1560	ft^3/s	39.9	12
Regulated 0.2-percent AEP flood	2460	ft^3/s	50.7	12

Peak-Flow Statistics Flow Report [Area-Averaged]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp	Equiv. Yrs.
50-percent AEP flood	261	ft^3/s	46.9	2
20-percent AEP flood	490	ft^3/s	36.2	5
10-percent AEP flood	688	ft^3/s	35	8
4-percent AEP flood	993	ft^3/s	39.9	9
2-percent AEP flood	1330	ft^3/s	37.1	11
1-percent AEP flood	1560	ft^3/s	39.9	12
0.2-percent AEP flood	2460	ft^3/s	50.7	12
Regulated 50-percent AEP flood	261	ft^3/s	46.9	2
Regulated 20-percent AEP flood	490	ft^3/s	36.2	5
Regulated 10-percent AEP flood	688	ft^3/s	35	8
Regulated 4-percent AEP flood	993	ft^3/s	39.9	9
Regulated 2-percent AEP flood	1330	ft^3/s	37.1	11
Regulated 1-percent AEP flood	1560	ft^3/s	39.9	12

Statistic	Value	Unit	ASEp	Equiv. Yrs.
Regulated 0.2-percent AEP flood	2460	ft^3/s	50.7	12

Peak-Flow Statistics Citations

Lewis, J.M., Hunter, S.L., and Labriola, L.G.,2019, Methods for estimating the magnitude and frequency of peak streamflows for unregulated streams in Oklahoma developed by using streamflow data through 2017: U.S. Geological Survey Scientific Investigations Report 2019–5143, 39 p. (https://doi.org/10.3133/sir20195143)

Flow-Duration Statistics

Flow-Duration Statistics Parameters [Duration Region 3 2009 5267]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CONTDA	Contributing Drainage Area	0.63	square miles	8	2296
ELEV	Mean Basin Elevation	1180	feet	625	1527
CANOPY_PCT	Percent Area Under Canopy	46.25	percent	8.41	83.5
PRECIPOUT	Mean Annual Precip at Gage	38.63	inches	38	58

Flow-Duration Statistics Disclaimers [Duration Region 3 2009 5267]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Flow-Duration Statistics Flow Report [Duration Region 3 2009 5267]

Statistic	Value	Unit
20 Percent Duration	0.106	ft^3/s
50 Percent Duration	0.014	ft^3/s
80 Percent Duration	0	ft^3/s
90 Percent Duration	0	ft^3/s
95 Percent Duration	0	ft^3/s

Flow-Duration Statistics Citations

Esralew, R.A., Smith, S.J.,2009, Methods for estimating flow-duration and annual mean-flow statistics for ungaged streams in Oklahoma: U.S. Geological Survey Scientific Investigations Report 2009-5267, 131 p. (http://pubs.usgs.gov/sir/2009/5267/)

Application Version: 4.19.3
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–Cleveland County, Oklahoma														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
37—Harrah fine sandy loam, 5 to 8 percent slopes, moderately eroded														
Harrah, moderately eroded	75	B	0-5	Fine sandy loam	SC, CL, SC-SM	A-4, A-6, A-2-4	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	83-93-100	33-43-55	22-27 -33	6-9 -12
			5-10	Fine sandy loam, loamy fine sand	SC-SM, SC, SM	A-2-4, A-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	84-96-100	21-28-44	17-25 -33	2-7 -12
			10-60	Sandy clay loam, fine sandy loam	CL, SC	A-6, A-7-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	79-87-99	41-51-63	28-38 -46	12-19-25
			60-71	Sandy clay loam, fine sandy loam	SC, CL	A-6, A-7-6, A-2-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	85-94-100	34-42-56	28-30 -46	12-13-25
			71-80	Fine sandy loam, sandy clay loam	CL, SC	A-6, A-7-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	79-87-99	41-51-63	28-38 -46	12-19-25

Engineering Properties–Cleveland County, Oklahoma														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
92—Port fine sandy loam, 0 to 1 percent slopes, occasionally flooded														
Port, occasionally flooded	93	B	0-9	Fine sandy loam	SC-SM, SC	A-6, A-4	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	87-95-100	44-49-60	25-30 -37	7-9 -13
			9-27	Silt loam	CL, CL-ML	A-6, A-7-6, A-4	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	94-100-100	85-94-100	25-33 -42	7-12-18
			27-42	Silty clay loam, clay loam, loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	92-100-100	84-96-100	30-38 -47	13-19-25
			42-72	Silty clay loam, clay loam, loam, silt loam	CL	A-7-6, A-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	92-100-100	84-96-100	28-36 -47	12-17-25

Engineering Properties–Cleveland County, Oklahoma														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
SEND—Stephenville-Darnell-Newalla complex, 3 to 8 percent slopes														
Stephenville	45	C	0-5	Loamy fine sand	SC-SM, SM	A-2-4	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	86-94-99	24-30-38	19-23 -31	3-4 -9
			5-15	Fine sandy loam, loamy fine sand	SM, SC-SM	A-4, A-2-4	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	89-97-100	31-39-47	16-22 -28	1-6 -10
			15-33	Fine sandy loam, sandy clay loam	SC, CL	A-6, A-7-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	93-99-100	40-47-54	28-38 -43	12-19-24
			33-51	Bedrock	—	—	—	—	—	—	—	—	—	—
Darnell	30	D	0-8	Fine sandy loam	CL-ML, CL, SC-SM	A-4	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	82-93-100	45-51-55	22-26 -31	6-7 -9
			8-10	Fine sandy loam	CL-ML, SM, CL	A-4	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	81-93-100	43-51-56	16-21 -26	2-6 -10
			10-16	Fine sandy loam	SM, SC-SM, SC	A-2-4, A-4	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	81-93-100	33-41-50	18-23 -26	3-7 -10
			16-26	Bedrock	—	—	—	—	—	—	—	—	—	—
Newalla	15	D	0-2	Fine sandy loam	SC, SC-SM, SM	A-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	87-99-100	31-39-43	22-35 -41	6-11-13
			2-5	Loamy fine sand, fine sandy loam	SM	A-2-4, A-4	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	86-99-100	26-33-38	0-22 -28	NP-3 -6
			5-11	Clay loam, sandy clay loam	CL	A-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	90-99-100	47-54-60	30-38 -49	13-18-24
			11-16	Silty clay, clay	CH	A-7-6, A-7	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	93-99-100	70-76-90	48-59 -69	28-35-43
			16-30	Clay, silty clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	93-99-100	72-79-92	49-61 -71	29-36-44
			30-51	Clay, silty clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	93-99-100	75-84-95	49-67 -71	29-42-44

Engineering Properties–Cleveland County, Oklahoma														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
			51-58	Very parachannery clay, parachannery clay, very parachannery silty clay, parachannery silty clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	92-100-100	82-93-100	48-58-70	28-36-44
			58-80	Silty clay, clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	91-99-100	75-84-98	49-55-70	29-33-44

Engineering Properties–Cleveland County, Oklahoma														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
SEND4—Stephenville-Darnell-Newalla complex, 3 to 8 percent slopes, gullied														
Stephenville, gullied	55	C	0-3	Fine sandy loam	SC-SM, SM	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-97-100	32-39-46	19-25-31	3-6 -9
			3-8	Loamy fine sand, fine sandy loam	SC-SM, SM	A-4, A-2-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	89-97-100	31-39-47	16-22-28	1-6 -10
			8-19	Fine sandy loam, sandy clay loam	SC, CL	A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	93-99-100	40-47-54	29-37-39	12-20-24
			19-26	Fine sandy loam, sandy clay loam	SC, CL	A-6	0- 0- 0	0- 0- 0	87-93-100	86-93-100	76-92-100	31-43-53	28-38-39	12-20-24
			26-36	Bedrock	—	—	—	—	—	—	—	—	—	—
Darnell, gullied	15	D	0-4	Fine sandy loam	SC-SM, CL, CL-ML	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	82-93-100	45-51-55	22-26-31	6-7 -9
			4-12	Fine sandy loam	SM, SC-SM, SC	A-2-4, A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	81-93-100	33-41-50	18-23-26	3-7 -10
			12-22	Bedrock	—	—	—	—	—	—	—	—	—	—
Newalla, gullied	14	D	0-3	Fine sandy loam	SC-SM, SM, SC	A-6, A-7-6, A-2-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	87-99-100	31-39-43	22-35-41	6-11-13
			3-6	Loamy fine sand, fine sandy loam	SC-SM	A-4, A-2-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	86-99-100	26-33-38	0-22 -28	NP-5 -6
			6-11	Sandy clay loam, clay loam	CL	A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-99-100	47-54-60	30-39-50	13-18-25
			11-16	Silty clay, clay	CH	A-7-6, A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	93-99-100	70-76-90	48-60-71	29-37-44

Engineering Properties–Cleveland County, Oklahoma														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
			16-30	Silty clay, clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	93-99-100	72-79-92	50-61-72	29-36-44
			30-51	Clay, silty clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	93-99-100	75-84-95	50-68-72	29-41-44
			51-58	Very parachannery silty clay, parachannery clay, parachannery silty clay, very parachannery clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-100-100	84-93-100	48-58-71	28-35-44
			58-80	Silty clay, clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	91-99-100	75-84-98	50-55-71	29-33-44

Data Source Information

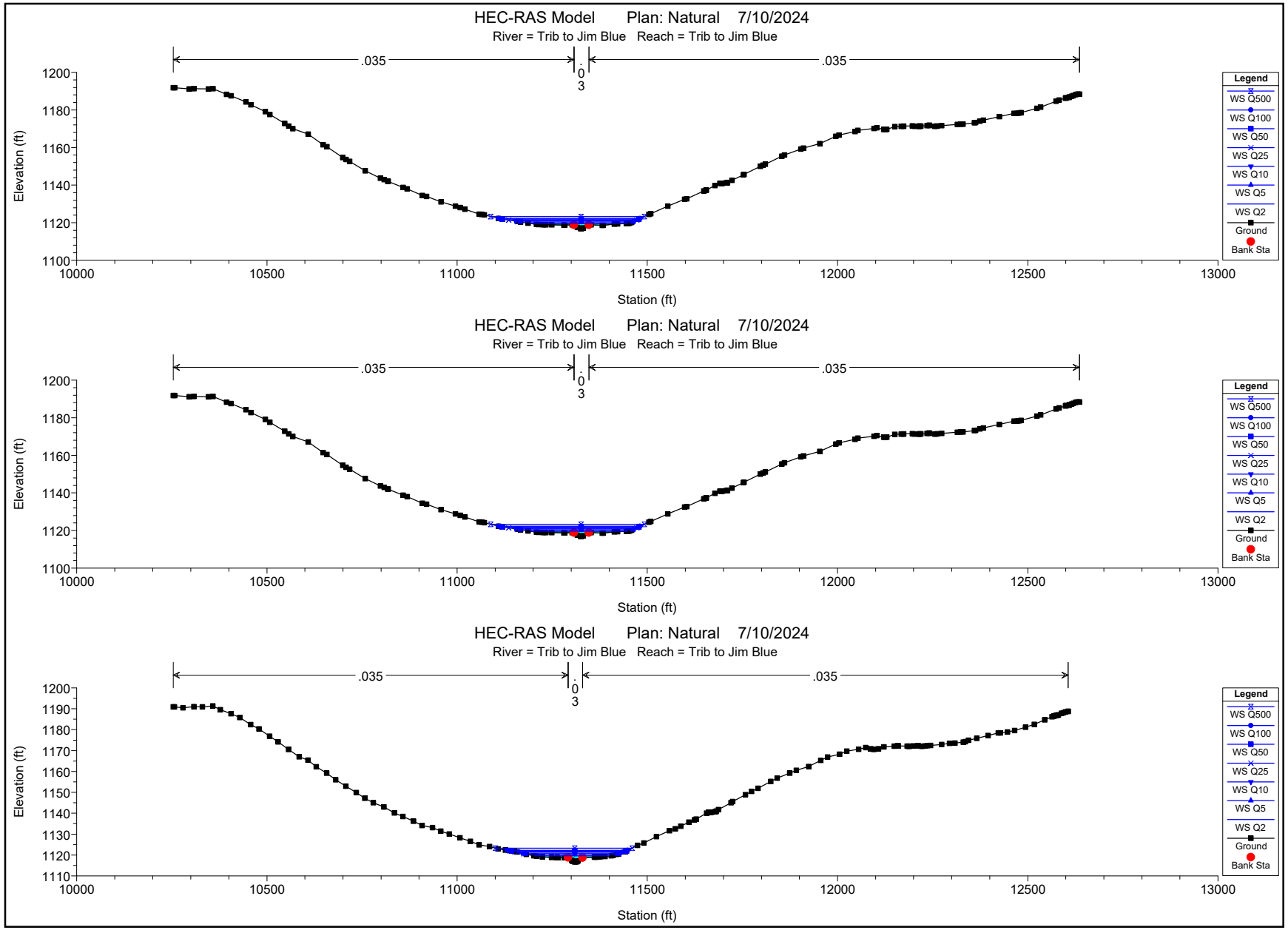
Soil Survey Area: Cleveland County, Oklahoma
Survey Area Data: Version 21, Sep 7, 2023

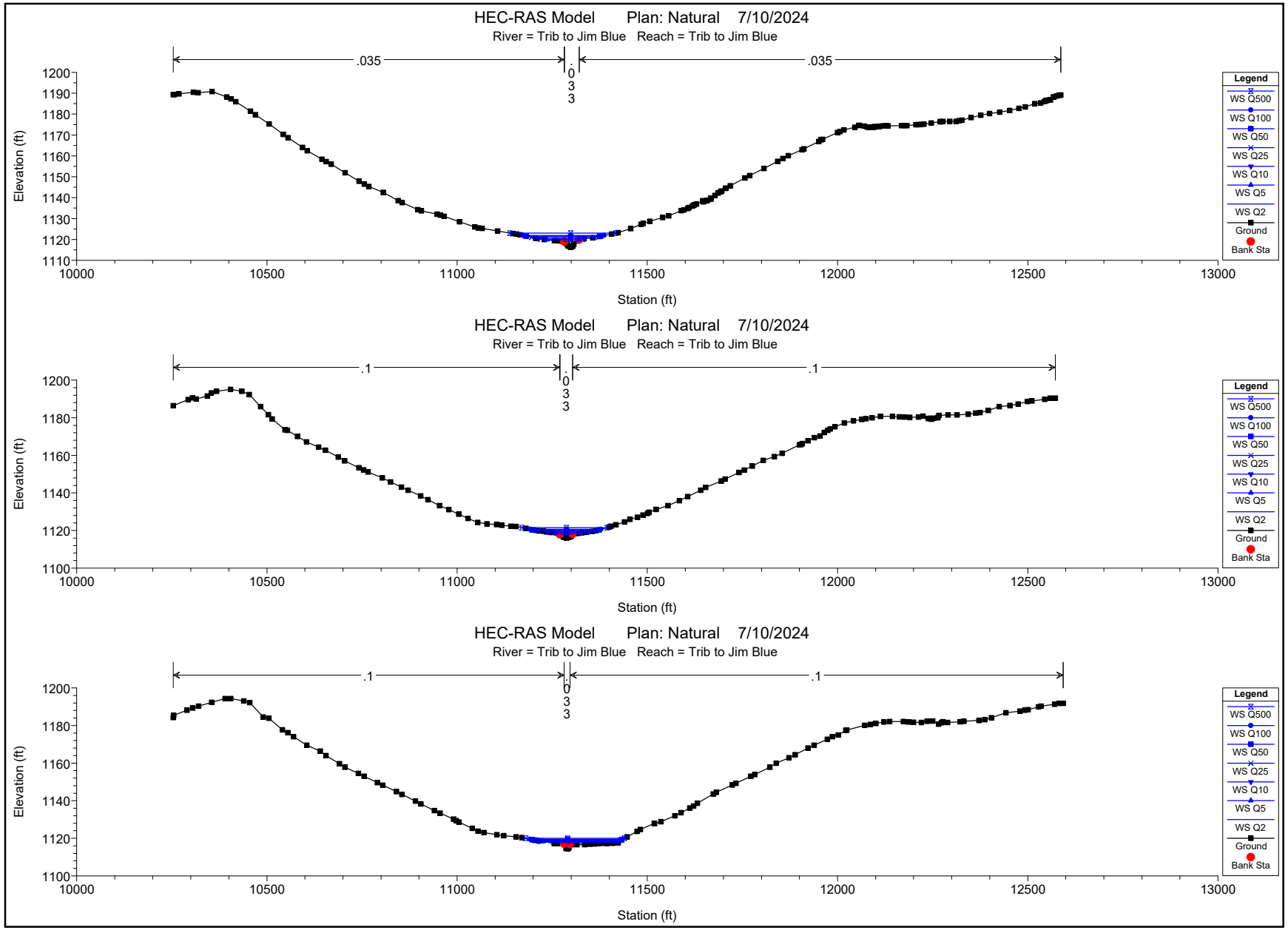

SEND
E Post Oak Rd
37
SEND4
E Post Oak Rd
92

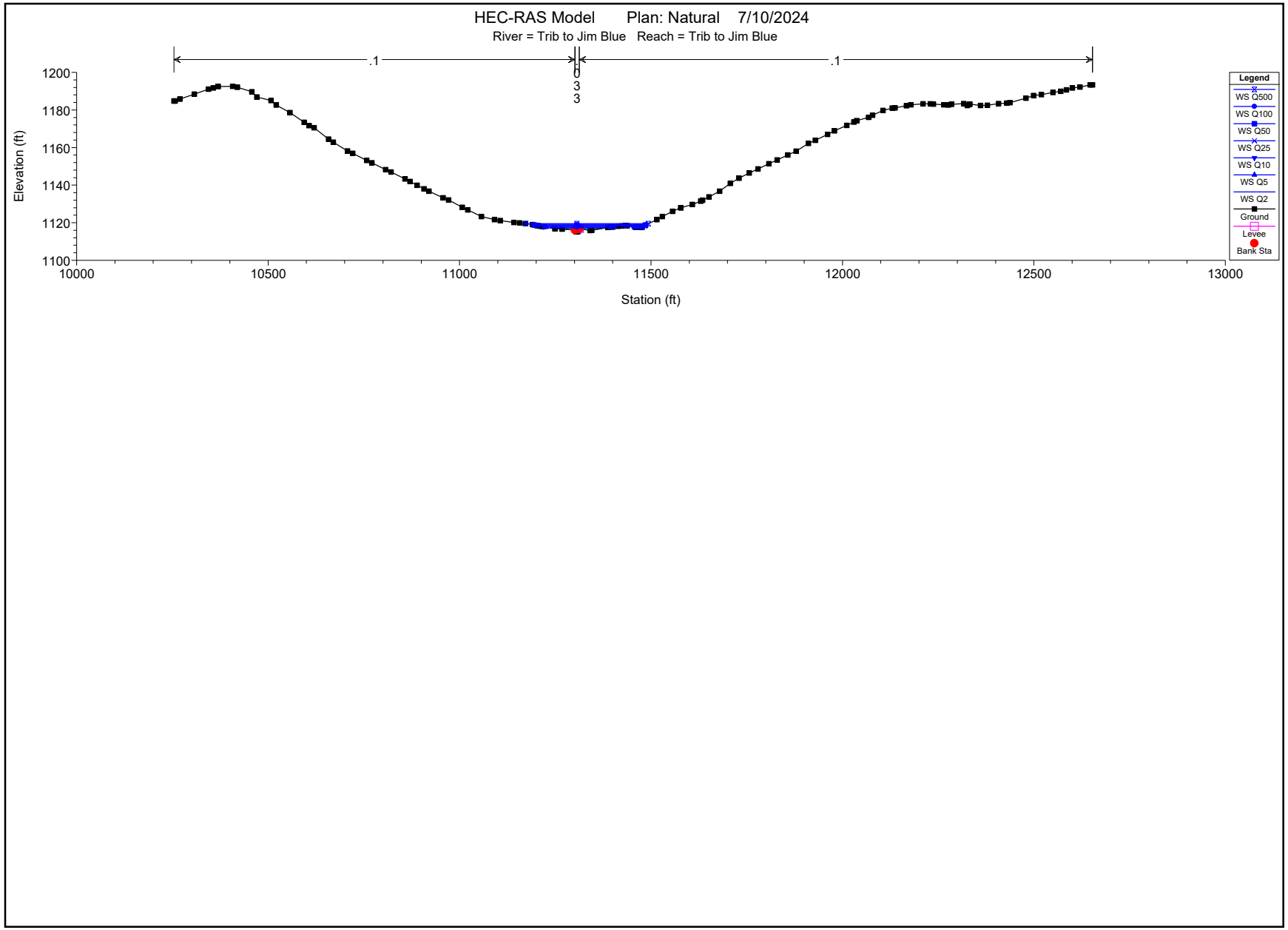
Appendix C – Hydraulic Model – Natural Stream

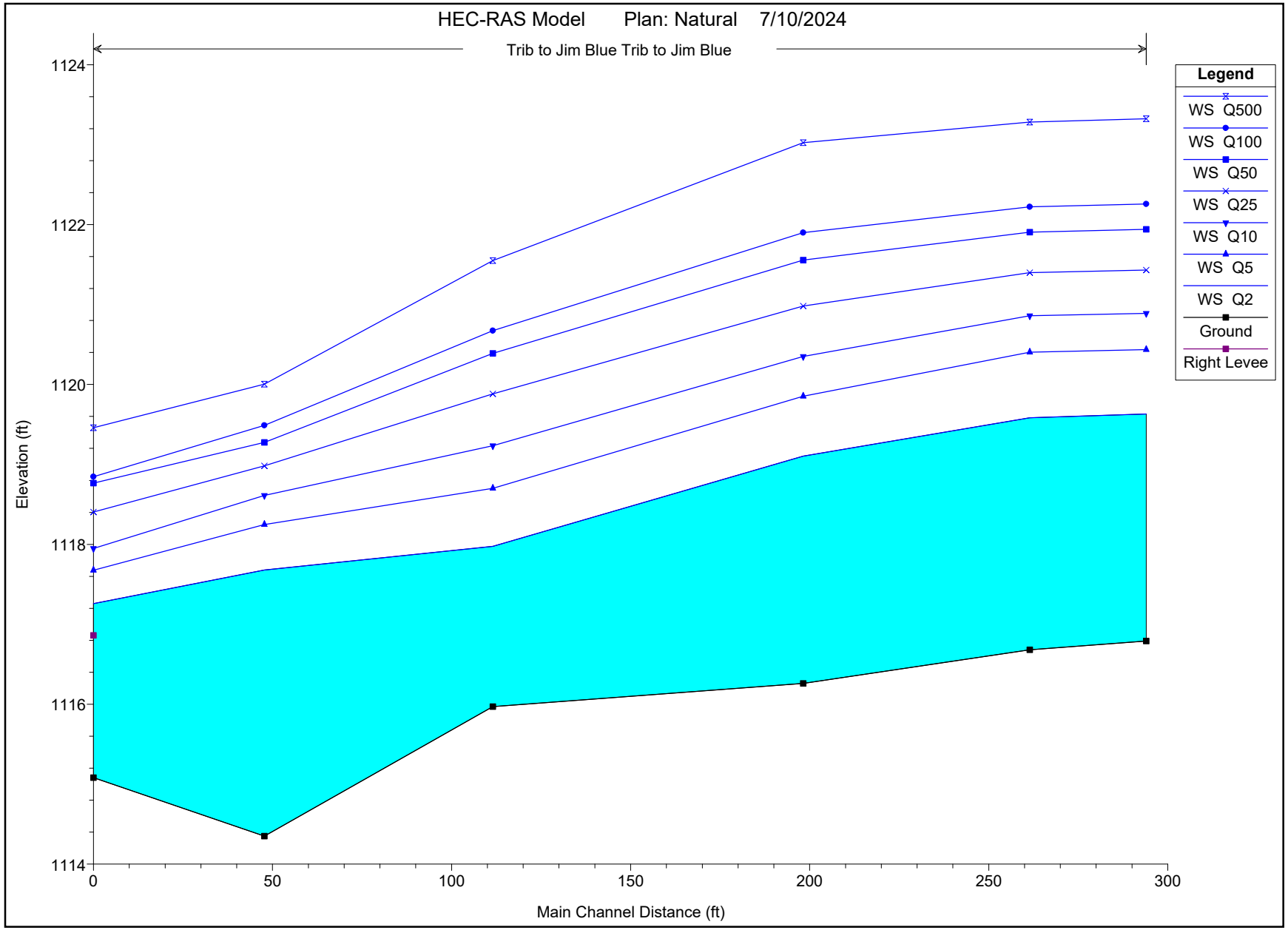
HEC-RAS Plan: Natural River: Trib to Jim Blue Reach: Trib to Jim Blue

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib to Jim Blue	1295 U/S FAR	Q2	261.00	1116.79	1119.63	1119.02	1119.67	0.000670	1.98	212.33	255.90	0.25
Trib to Jim Blue	1295 U/S FAR	Q5	490.00	1116.79	1120.44	1119.33	1120.46	0.000336	1.77	435.51	296.24	0.19
Trib to Jim Blue	1295 U/S FAR	Q10	688.00	1116.79	1120.89	1119.55	1120.92	0.000299	1.85	573.78	313.02	0.18
Trib to Jim Blue	1295 U/S FAR	Q25	993.00	1116.79	1121.43	1119.76	1121.47	0.000289	2.02	749.97	336.70	0.18
Trib to Jim Blue	1295 U/S FAR	Q50	1330.00	1116.79	1121.94	1119.95	1121.98	0.000283	2.18	927.02	358.90	0.19
Trib to Jim Blue	1295 U/S FAR	Q100	1560.00	1116.79	1122.26	1120.06	1122.30	0.000278	2.26	1042.75	372.04	0.19
Trib to Jim Blue	1295 U/S FAR	Q500	2460.00	1116.79	1123.32	1120.45	1123.37	0.000260	2.51	1456.32	404.36	0.19
Trib to Jim Blue	1262 U/S	Q2	261.00	1116.68	1119.59		1119.65	0.000834	2.29	172.22	196.95	0.28
Trib to Jim Blue	1262 U/S	Q5	490.00	1116.68	1120.40		1120.45	0.000471	2.16	353.48	241.55	0.22
Trib to Jim Blue	1262 U/S	Q10	688.00	1116.68	1120.86		1120.91	0.000429	2.27	467.54	259.39	0.22
Trib to Jim Blue	1262 U/S	Q25	993.00	1116.68	1121.40		1121.45	0.000419	2.48	613.25	279.97	0.22
Trib to Jim Blue	1262 U/S	Q50	1330.00	1116.68	1121.91		1121.97	0.000416	2.69	760.73	302.75	0.23
Trib to Jim Blue	1262 U/S	Q100	1560.00	1116.68	1122.22		1122.29	0.000411	2.80	858.48	316.94	0.23
Trib to Jim Blue	1262 U/S	Q500	2460.00	1116.68	1123.28		1123.36	0.000385	3.10	1219.52	359.43	0.23
Trib to Jim Blue	1199 U/S BRIDGE	Q2	261.00	1116.26	1119.10	1118.71	1119.50	0.006948	5.02	52.23	36.69	0.71
Trib to Jim Blue	1199 U/S BRIDGE	Q5	490.00	1116.26	1119.85	1119.64	1120.33	0.006343	5.75	98.68	84.50	0.71
Trib to Jim Blue	1199 U/S BRIDGE	Q10	688.00	1116.26	1120.35	1120.05	1120.80	0.004997	5.82	148.93	119.95	0.65
Trib to Jim Blue	1199 U/S BRIDGE	Q25	993.00	1116.26	1120.98	1120.56	1121.36	0.003510	5.66	240.72	165.49	0.56
Trib to Jim Blue	1199 U/S BRIDGE	Q50	1330.00	1116.26	1121.56	1120.92	1121.89	0.002666	5.52	343.87	194.53	0.51
Trib to Jim Blue	1199 U/S BRIDGE	Q100	1560.00	1116.26	1121.90		1122.21	0.002323	5.47	414.03	212.91	0.48
Trib to Jim Blue	1199 U/S BRIDGE	Q500	2460.00	1116.26	1123.03		1123.30	0.001646	5.42	689.62	278.04	0.42
Trib to Jim Blue	1112 D/S BRIDGE	Q2	261.00	1115.97	1117.98	1117.98	1118.62	0.015060	6.43	40.58	31.98	1.01
Trib to Jim Blue	1112 D/S BRIDGE	Q5	490.00	1115.97	1118.70	1118.70	1119.57	0.011626	7.50	73.05	66.54	0.95
Trib to Jim Blue	1112 D/S BRIDGE	Q10	688.00	1115.97	1119.23	1119.23	1120.17	0.009454	7.95	118.65	106.17	0.89
Trib to Jim Blue	1112 D/S BRIDGE	Q25	993.00	1115.97	1119.88	1119.88	1120.87	0.007815	8.44	202.20	151.01	0.84
Trib to Jim Blue	1112 D/S BRIDGE	Q50	1330.00	1115.97	1120.39	1120.39	1121.45	0.007392	9.08	285.05	174.63	0.84
Trib to Jim Blue	1112 D/S BRIDGE	Q100	1560.00	1115.97	1120.67	1120.67	1121.80	0.007341	9.51	336.30	186.50	0.85
Trib to Jim Blue	1112 D/S BRIDGE	Q500	2460.00	1115.97	1121.55	1121.55	1122.92	0.007546	11.04	516.28	224.33	0.89
Trib to Jim Blue	1048 D/S	Q2	261.00	1114.35	1117.68	1117.45	1117.99	0.004789	5.25	131.74	177.78	0.61
Trib to Jim Blue	1048 D/S	Q5	490.00	1114.35	1118.25	1118.02	1118.59	0.004880	6.12	238.78	198.99	0.63
Trib to Jim Blue	1048 D/S	Q10	688.00	1114.35	1118.61	1118.32	1118.98	0.005064	6.75	313.85	213.48	0.66
Trib to Jim Blue	1048 D/S	Q25	993.00	1114.35	1118.98	1118.68	1119.44	0.005953	7.86	395.60	225.74	0.73
Trib to Jim Blue	1048 D/S	Q50	1330.00	1114.35	1119.28	1119.01	1119.85	0.007160	9.08	463.09	235.10	0.81
Trib to Jim Blue	1048 D/S	Q100	1560.00	1114.35	1119.49	1119.19	1120.11	0.007541	9.65	514.09	242.15	0.84
Trib to Jim Blue	1048 D/S	Q500	2460.00	1114.35	1120.01	1119.86	1120.94	0.010510	12.32	643.36	259.38	1.01
Trib to Jim Blue	1000 D/S FAR	Q2	261.00	1115.08	1117.26	1117.26	1117.63	0.013139	6.92	115.30	143.77	0.96
Trib to Jim Blue	1000 D/S FAR	Q5	490.00	1115.08	1117.68	1117.68	1118.19	0.015294	8.70	180.77	178.77	1.08
Trib to Jim Blue	1000 D/S FAR	Q10	688.00	1115.08	1117.95	1117.93	1118.55	0.016594	9.86	234.73	213.43	1.15
Trib to Jim Blue	1000 D/S FAR	Q25	993.00	1115.08	1118.41	1118.41	1119.00	0.014488	10.40	345.98	269.84	1.10
Trib to Jim Blue	1000 D/S FAR	Q50	1330.00	1115.08	1118.77	1118.77	1119.38	0.013872	11.04	447.99	290.14	1.10
Trib to Jim Blue	1000 D/S FAR	Q100	1560.00	1115.08	1118.85	1118.55	1119.59	0.016618	12.29	470.96	292.56	1.21
Trib to Jim Blue	1000 D/S FAR	Q500	2460.00	1115.08	1119.46	1119.43	1120.29	0.016594	13.81	658.64	320.27	1.25


HEC-RAS Model Plan: Natural 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta
HEC-RAS Model Plan: Natural 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta
HEC-RAS Model Plan: Natural 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta


HEC-RAS Model Plan: Natural 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.035
.033
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta
HEC-RAS Model Plan: Natural 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.1
.1
.033
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta
HEC-RAS Model Plan: Natural 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.1
.1
.033
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta


HEC-RAS Model Plan: Natural 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.1
.1
Elevation (ft)
1200
1180
1160
1140
1120
1100
10000
10500
11000
11500
12000
12500
13000
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Levee
Bank Sta


HEC-RAS Model Plan: Natural 7/10/2024
Trib to Jim Blue Trib to Jim Blue
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Right Levee
Elevation (ft)
1124
1122
1120
1118
1116
1114
0
50
100
150
200
250
300
Main Channel Distance (ft)

HEC-RAS HEC-RAS 6.3.1 September 2022
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: HEC-RAS Model
Project File : Post Oak Rd.prj
Run Date and Time: 7/10/2024 2:39:05 PM

Project in English units

Project Description:
CRS Info=<SpatialReference> <CoordinateSystem Code="2268"
Unit="US_survey_Foot" AcadCode="OK83-SF" /></SpatialReference>

PLAN DATA

Plan Title: Natural
Plan File : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05
Civil\Docs\Drainage\Models\Post Oak Rd.p01

Geometry Title: Natural Geometry
Geometry File : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05
Civil\Docs\Drainage\Models\Post Oak Rd.g01

Flow Title   : Steady Flow
Flow File   : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05
Civil\Docs\Drainage\Models\Post Oak Rd.f01

Plan Description:
Natural scenario w/o road and bridge

Plan Summary Information:
Number of: Cross Sections =   6   Multiple Openings =   0
Culverts   =   0   Inline Structures =   0
Bridges   =   0   Lateral Structures =   0

Computational Information
    Water surface calculation tolerance = 0.01
    Critical depth calculation tolerance = 0.01
    Maximum number of iterations   = 20
    Maximum difference tolerance   = 0.33
    Flow tolerance factor   = 0.001

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

FLOW DATA

Flow Title: Steady Flow
Flow File : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05 Civil\Docs\Drainage\Models\Post Oak Rd.f01

Flow Data (cfs)

River	Reach	RS	Q2	Q5	Q10	Q25	Q50	Q100	Q500
Trib to Jim Blue	Trib to Jim Blue	1295	261	490	688	993	1330	1560	2460

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Trib to Jim Blue	Trib to Jim Blue	Q2	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q5	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q10	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q25	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q50	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q100	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q500	Normal S = 0.01659	Normal S = 0.01659

GEOMETRY DATA

Geometry Title: Natural Geometry
Geometry File : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05 Civil\Docs\Drainage\Models\Post Oak Rd.g01

CROSS SECTION

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1295

INPUT
Description:
Station Elevation Data   num=   157

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10254	1191.82	10257.4	1191.82	10295.92	1191.14	10308.14	1191.37	10346.66	1191.18
10358.46	1191.36	10393.7	1188.31	10405.63	1187.48	10444.75	1184.21	10457.78	1182.72
10496	1179.05	10507.8	1177.59	10547.09	1172.75	10557.51	1171.37	10568.03	1170.06
10608.82	1167.18	10647.78	1161.49	10657.59	1160.44	10699.27	1154.62	10708.43	1153.61
10717.63	1152.59	10758.32	1147.64	10798.43	1143.71	10808.06	114	310817.55	1142.03
10818.64	1141.95	10858.11	1138.84	10868.56	1137.98	10908.37	1134.49	10919.43	1134.06
10957.95	1131.11	10995.66	1128.82	11007.82	1128.03	11020.36	1127.24	11058.45	1124.59
11064.49	1124.41	11071.59	1124.17	11108.76	1122.27	11119.24	1121.93	11158.19	1120.75
11166.56	1120.39	11186.81	1119.79	11208.74	1119.14	11214.36	1119.01	11226.37	1118.93
11233.37	1118.89	11248.86	1118.84	11280.92	1118.73	11283.04	1118.72	11302.51	1118.88
11307.56	1118.89	11309.64	1118.58	11316.42	1117.51	11324.57	1116.89	11325.84	1116.79
11330.06	1117.11	11330.26	1117.13	11331.11	1117.14	11343.99	1118.55	11346.43	1118.86
11351.95	1118.91	11381.21	1118.71	11383.78	1118.68	11413.45	1119.32	11422.07	1119.38
11445.02	1119.54	11449.64	1119.68	11450.78	1119.73	11452.22	1119.79	11453.91	1119.86
11458.59	1120.14	11503.77	1124.38	11508.87	1124.75	11553.52	1128.86	11597.93	1132.48
11603.37	1132.78	11648.12	1136.92	11653.77	1137.34	11655.31	1137.46	11677.72	1139.79
11690.88	1140.91	11694.89	1140.91	11695.44	1140.83	11695.57	1140.75	11695.66	1140.82
11707	1141.22	11710.58	1141.35	11710.65	1141.35	11710.72	1141.39	11722.47	1142.53
11752.38	1145.49	11754.05	1145.71	11797.44	1149.95	11803.85	1150.57	11810.31	1151.16
11854.06	1155.47	11860.72	1156.11	11903.79	1159.22	11910.64	1159.74	11953.59	1162.1
11995.94	1165.97	12003.62	1166.66	12045.95	1168.48	12053.47	1169.11	12095.75	1170.18
12103.47	1170.54	12121.17	1169.67	12124.51	1169.56	12129.32	1169.68	12150.81	1171.13
12167.55	1171.33	12173.33	1171.34	12173.63	1171.35	12196.38	1171.57	12202.05	1171.33
12214.13	1171.42	12215.29	1171.29	12215.36	1171.31	12216.73	1171.43	12219.13	1171.47
12235.12	1171.7	12240	1171.74	12241.4	1171.73	12241.41	1171.75	12255.92	1171.31
12259.39	1171.39	12261.97	1171.44	12273.75	1171.64	12314.92	1172.23	12323.52	1172.48
12329.7	1172.48	12359.95	1173.16	12362.54	1173.28	12373.88	1174.11	12383.35	1174.52
12425.54	1176.49	12463.94	1178.19	12472.07	1178.27	12477.04	1178.38	12482.1	1178.55
12523.98	1180.85	12534.21	1181.48	12574.09	1184.61	12582.47	1185.27	12599.1	1186.31
12599.94	1186.36	12600.55	1186.36	12600.76	1186.37	12608.67	1186.71	12609.13	1186.84
12609.52	1186.81	12615.59	1187.32	12619.61	1187.67	12625.89	1188.13	12628.73	1188.3
12631.81	1188.43	12635.85	1188.43						

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
10254	.035	11307.56	.03	11346.43	.035

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      11307.5611346.43             32.57   32.57   32.57              .1       .3

CROSS SECTION


RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1262

INPUT
Description:
Station Elevation Data    num=     154
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   10254 1190.92 10257.2 1190.9210279.71 1190.5210307.89 1191.0510330.19 1190.93
10357.67 1191.3710378.01  1189.610405.87 1187.6910428.51  1185.810457.57 1182.46
10479.24 1180.3710507.43 1176.8910529.58 1174.1610557.03 1170.5110584.97 1167.02
10607.91 1165.3910629.62 1162.2110657.25 1159.2310680.55 1155.9710707.62 1152.99
10735.06 1149.9410757.58  1147.210779.56 1145.0410807.42 1142.9710835.11 1140.17
10857.44 1138.4210885.28 1136.1310907.62 1134.1810935.26 1133.1110957.36 1131.41
10979.69 1130.0411007.33 1128.2411034.93  1126.511057.73  1124.911085.52 1124.04
11107.86 1122.9411126.71 1122.3811136.06  1122.111150.72 1121.6811157.66 1121.48
11181.65 1120.3211201.38 1119.6811209.09 1119.4311223.95 1119.0211248.38 1118.86
11262.39 1118.7711263.22 1118.7511265.14 1118.76 11282.1 1118.7811291.95 1118.79
   11301 1117.4511302.63  1117.211304.55 1117.0511309.54 1116.6811310.54 1116.76
11313.86  1116.811314.64 1116.8111317.34  1117.111330.11 1118.72   11361 1118.99
11366.24 1118.9611372.95  1119.111377.13 1119.1411388.71 1119.2611404.93 1119.68
11410.33 1119.8211420.09 1120.3411424.33 1120.5411441.56 1121.5311474.13 1124.58
11490.92 1125.7911523.98 1128.8411558.29 1131.6311573.87 1132.52 11587.8 1133.81
11608.99 1135.7811624.28 1136.9111628.45 1137.2311655.92 1140.0811661.01 1140.45
11665.47 1140.44 11665.5 1140.4211665.64 1140.3311669.49 1140.4611677.38 1140.74
11681.35 1140.89 11681.4 1140.9311681.47 1140.97 11686.7 1141.73 11720.1 1145.04
11724.47 1145.5711757.98 1148.8511774.38 1150.4411791.01 1151.9611824.38 1155.24
11841.45 1156.8611874.16 1159.2311891.74 1160.5911924.12 1162.3711955.85 1165.27
 11974.1  1166.912005.63 1168.2612024.04 1169.7912055.26  1170.612073.92 1171.46
12086.88 1170.8312095.32 1170.5612107.49 1170.8712121.69 1171.8312149.32 1172.17
12156.94 1172.1812157.75  1172.212159.32 1172.2112159.69 1172.2112182.78 1172.14
12186.39 1172.1412188.39 1172.04 12199.1 1172.19 12210.9 1172.3112211.82  1172.3
12211.83 1172.3412221.41 1172.0512229.72 1172.2512235.91 1172.3612244.38 1172.51
12273.86 1172.9412294.16 1173.5312308.83 1173.5412330.25 1174.0312336.32 1174.32
12344.34  1174.912365.84 1175.86 12395.5 1177.2512422.31 1178.4412427.96  1178.5
12446.49 1178.9112465.51 1179.5512494.34 1181.1412517.42 1182.5812544.54  1184.7
12563.63 1186.2212568.79 1186.5412568.97 1186.5412569.46 1186.59 12574.8 1186.81
12577.59 1186.9312577.75 1186.9712578.55 1186.9112580.62 1187.0812588.98 1187.83
12593.47 1188.1512599.46 1188.5212605.99 1188.7812606.04 1188.78

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   10254    .03511291.95     .0311330.11    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      11291.9511330.11             63.23   63.23   63.23              .1       .3

CROSS SECTION
```

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1199

INPUT
Description:
Station Elevation Data   num=   174
     Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev
   10254 1189.3310256.27 1189.3310269.03 1189.7210306.68 1190.4310319.32 1190.2
10355.97 1190.810394.32 1188.2110405.69 1187.3110418.07 1185.94 10456.5 1181.45
10469.66 1179.7510506.22 1175.2410543.46 1170.3110555.81 1168.7710593.57 1164.03
10606.07 1162.5110644.43 1158.410656.12 1157.2810669.06 1155.9810705.93 1151.91
10742.12 1147.8910755.96 1146.5210767.69 1145.3110805.95 1142.4910844.95 1138.54
10855.94 1137.65 10896.8 1134.3   10906 1133.7210947.96 1132.0910955.96 1131.62
10965.73 1131.1211006.13 1128.4911046.49 1125.9411056.15 1125.5511066.01 1125.27
11106.15 1124.0211146.34 1122.7911156.05 1122.5811165.65 1122.23 11206.3 1120.55
11229.03 1120.0111255.93 1119.3811261.59 1119.3911271.38 1119.2611276.65 1119.19
11282.15 1118.9311288.08 1117.8211291.93 1116.9711296.51 1116.6111298.66 1116.26
11300.15 1116.5511303.08 1116.7711303.82 1116.8211306.58 1117.5811316.05 1119.26
11318.25 1119.6511321.11 1119.9511333.63 1120.3311356.37 1120.7911374.34 1121.48
11406.41 1122.5811423.24 1123.31 11456.2 1125.2411483.65 1127.2411489.41 1127.66
11506.42 1128.6611540.17 1130.5711556.27 1131.2811589.54 1133.7611596.13 1134.19
11606.61 1134.811609.29 1135.2411618.09 1135.9111621.79 1136.2811623.43 1136.49
11629.24 1136.9311646.07 1138.3611646.08 1138.3711646.21 1138.4411646.25 1138.45
11646.64 1138.4711646.67 1138.4211646.87 1138.0411654.98 1138.511656.25 1138.57
 11657.7 1138.6711666.62 1139.2711666.65 1139.3311666.84 1139.6911666.89 1139.69
11667.28 1139.68 11667.3 1139.6811667.41 1139.6611677.83 1141.111685.71 1142.15
11691.81 1142.7911693.98 1142.9911695.74 1143.2111705.97 1144.4911706.64 1144.55
11718.18 1145.74 11756.7 1149.46 11769.1 1150.6111806.18 1153.9411842.69 1157.43
11856.19 1158.7411870.35 1160.0811906.57 1162.8811911.83 1163.3711951.11 1166.89
 11956.4 1167.6511960.72 1167.9312000.15 1171.1812006.49 1171.712016.88 1172.42
 12045.2 1173.7112056.12 1174.6112057.25 1174.66 12070.6 1174.2212077.74 1173.76
12082.53 1173.6612087.45 1173.7112093.15 1173.7512093.97 1173.8512094.74 1173.93
12097.05 1173.9412097.65 1173.9112100.36 1173.9512106.19   117412108.07 1174.03
 12108.6 1174.0512109.91 1174.1212118.42 1174.3312127.82 1174.5512132.53 1174.42
12168.24 1174.5412175.44 1174.4912182.57 1174.512206.02 1174.9212211.64 1174.99
12218.68 1175.0512226.89 1175.1912246.65 1175.7212269.52 1176.3812271.39 1176.28
12276.78 1176.4912295.18 1176.5312311.96 1176.5312319.91 1176.8212326.43 1177.13
12351.24 1178.3312376.39 1179.4412399.46 1180.3112426.39 1180.9212452.25 1181.79
12476.45 1182.7312493.62 1183.4712518.48 1185.0312534.19 1185.4112543.77 1186.08
12547.64 1186.4512548.07 1186.4712548.36 1186.4912551.86 1186.6112558.27 1186.82
12558.75 1186.8512559.21 1186.8712567.82 1188.1112568.28 1188.1712568.95 1188.22
12575.38 1188.6412582.34 1189.0612583.59 1189.1112586.77 1189.11

Manning's n Values   num=   3
     Sta   n Val   Sta   n Val   Sta   n Val
   10254   .03511282.15   .03311321.11   .035

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.
      11282.1511321.11   86.7   86.7   86.7   .1   .3

CROSS SECTION

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1112

INPUT
Description:
Station Elevation Data num= 133

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10254	1186.4	10293.3	1189.71	10304.06	1190.57	10314.07	1189.91	10343.23	1191.56
10354.06	1193.24	10367.48	1194.03	10404.24	1195.07	10434.28	1194.02	10453.72	1192.31
10483.73	1185.86	10504.18	1181.55	10513.91	1179.36	10547.9	1173.54	10554.11	1173.28
10580.53	1170.08	10604.14	1167.08	10635.7	1164.32	10654.04	1162.66	10687.54	1159.11
10704.17	1157.11	10741.93	1153.36	10753.93	1152.27	10765.89	1151.11	10803.56	1147.95
10825.45	1145.87	10853.97	1143.12	10871.03	1141.42	10903.92	1138.42	10923.69	1136.41
10953.85	1133.25	10978.52	1131.11	11004.25	1128.76	11028.34	1126.46	11054.16	1124.29
11078.26	1123.53	11103.89	1123.2	11117.6	1122.77	11141.98	1122.3	11154.1	1122.16
11181.07	1121.13	11203.9	1120.16	11215.65	1119.79	11226.87	1119.65	11234.81	1119.33
11247.16	1119.05	11249.87	1118.97	11261.71	1118.62	11270.34	1118.06	11272.61	1117.76
11278.49	1116.58	11282.33	1116.33	11287.75	1115.97	11292.33	1116.31	11296.07	1116.6
11298.15	1116.74	11299.7	1117.08	11303.62	1118.16	11306.53	1118.25	11310.36	1118.44
11318.41	1118.52	11327.46	1118.75	11335.04	1118.97	11339.86	1119.11	11354.87	1119.46
11364.69	1119.93	11400.38	1121.88	11404.27	1122.32	11417.63	1123.04	11439.92	1124.55
11454.44	1125.98	11474.18	1127.12	11488.37	1128.17	11501.07	1129.11	11504.55	1129.7
11523.57	1131.19	11554.6	1133.29	11584.23	1135.87	11605.89	1138.08	11640.3	1141.45
11653.25	1142.98	11694.22	1146.35	11704.71	1147.34	11741.2	1150.86	11754.63	1152.15
11775.67	1154.23	11804.67	1157.29	11833.86	1159.29	11854.29	1161.08	11899.94	1165.56
11904.12	1165.75	11907.31	1166.28	11922.02	1167.81	11938.84	1169.39	11954.19	1170.23
11965.16	1172.22	11974.72	1173.25	11980.98	1174	11993	1175.15	12017.9	1177.19
12041.41	1178.38	12063.17	1179.06	12074.52	1179.42	12090.94	1180.03	12112.78	1180.76
12144.43	1180.74	12162.79	1180.51	12174.74	1180.35	12189.59	1180.24	12212.58	1180.39
12224.42	1180.89	12238.05	1179.65	12243.33	1179.75	12244.4	1179.38	12247.54	1179.17
12252.55	1179.73	12262.77	1180.01	12263.59	1180.15	12266.03	1181.19	12290.36	1181.48
12314.45	1181.51	12343.27	1181.83	12363.2	1182.52	12374.43	1182.8	12396.3	1183.87
12424.98	1185.86	12453.2	1186.57	12474.54	1187.26	12499	1188.64	12511.18	1188.94
12544.3	1189.83	12559.2	1190.49	12572.76	1190.49				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
10254	.11	12703	.34	11303.62	.1

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

11270.34	11303.62	63.77	63.77	63.77	.1	.3

CROSS SECTION

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue RS: 1048

INPUT
Description:
Station Elevation Data num= 132

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10254	1184.23	10254.97	1185.41	10289.95	1188.21	10305.08	1189.26	10320.18	1190.31
10355	1192.28	10390.09	1194.35	10405.29	1194.37	10439.5	1193.12	10454.76	1192.15
10490.52	1184.57	10505.22	1183.83	10540.71	1177.75	10555.1	1176.14	10569.74	1174.07
10605.01	1169.57	10640.57	1166.35	10655.36	1163.94	10690.77	1159.68	10705.29	1157.83
10740.75	1154.59	10755.34	1153.07	10790	1149.68	10804.33	1148.25	10840.48	1144.8

10855.03 1143.3610890.57 1139.8210905.04 1138.2710940.13 1134.7110954.98 1133.32
10990.37 1130.2310998.44 1129.3611005.12 1128.6411039.64 1125.3511054.97 1123.81
11070.53 1123.04 11104.6 1121.93 11122.5 1121.3811154.86 1120.7311170.21 1120.44
11202.72 1119.0411205.16 1118.9611214.51 1118.59   11255 1117.36 11255.5 1117.35
11257.24 1117.2911264.04 1117.2511281.01 1117.0811286.77 1114.7911286.99 1114.72
11287.13 1114.7111290.47 1114.3511290.81 1114.411293.48 1114.8811295.03 1115.91
11296.15 1116.6511296.57 1116.8211300.27 1116.6811314.72 1116.5911335.17 1116.66
11348.69 1116.8311360.75 1116.9611371.53 1117.2711375.41 1117.3511379.77 1117.44
11384.64 1117.5111393.32 1117.2411404.03 1117.45 11409.1 1117.3711415.95 1117.54
11419.95 1117.6311422.26 1117.6711424.07 1118.1511432.58 1119.3111447.07 1120.73
11472.85 1123.7411481.55 1124.65 11518.3 1127.9811518.97 1127.8711535.54 1128.82
11572.37 1131.9311588.76 1133.6611611.94 1136.0911621.95 1137.19 11631.8 1138.66
 11673.5 1143.5811681.53 1144.4111722.84 1148.3 11733.2 1149.311772.39 1153.04
11782.07 1153.9611821.94 1157.7811838.75 1159.9511872.17 1162.8411888.69 1164.45
11922.22 1167.9511938.52 1169.4711972.98 1172.7111986.09 1174.1112001.77 1174.93
12022.02 1177.4 12024.5 1177.6212071.81 1180.1112086.22 1180.5612100.54 1181.1
12121.96 1181.8712136.62 1182.1 12172.7 1182.1 12186.8 1181.9112199.52 1181.74
12220.17 1181.58 12235.2 1182.212249.93 1182.3412265.85 1180.712273.51 1181.54
12276.84 1182.0312289.33 1181.6712322.53 1181.9612332.55 1182.2512372.28 1182.76
12372.36 1182.7712387.03 1183.1512404.76 1184.15 12442.6 1186.7712479.95 1187.69
12492.26 1188.1312500.73 1188.39 12528.2 1189.9512534.93 1190.3512570.93 1191.29
12582.28 1191.79 12592.8 1191.79

Manning's n Values   num=   3
     Sta   n Val   Sta   n Val   Sta   n Val
   10254   .111281.01   .03311296.57   .1

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.
      11281.0111296.57   47.73   47.73   47.73   .1   .3

CROSS SECTION

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1000

INPUT
Description:
Station Elevation Data   num=   131
     Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev
   10254 1184.7910257.13 1184.7910269.88 1185.8210307.23 1188.410344.43 1191.01
 10356.9 1191.7110369.48 1192.4610407.33 1192.5110420.04 1192.0510457.33 1189.66
 10470.6 1186.8510507.51 1184.9710520.96 1182.6710557.18 1178.6210593.98 1173.4
 10607.1 1171.7210620.35 1170.52 10657.8 1164.4310670.51 1162.9 10707.3 1158.22
10720.85 1156.9810757.48 1153.1710770.94 1151.8510806.96 1148.2510820.92 1146.92
 10857.3 1143.310870.86 1141.9510889.38 1139.97 10907.1 1138.0810920.33 1136.74
10957.17 1133.2910971.19 1132.0711007.32 1128.211021.49 1126.8611057.13 1123.3
11091.27 1121.6411106.18 1121.1811141.79 1120.1311156.75 1119.8511171.96 1119.48
11190.81 1119.0111202.33 1118.4511205.57 1118.3411212.18 1118.1811215.28 1118.08
11218.99 1117.9611248.78 1116.7911268.19 1116.61 11301.2 1116.1611301.53 1116.16
11301.61 1116.1311304.56 1115.2611306.41 1115.0811308.26 1115.3311309.43 1115.49
 11309.5 1115.5211310.97 1116.1111312.84 1116.8611316.78 1116.7111341.27 1115.84
11345.26 1115.9611387.51 1117.5111396.27 1117.7311398.25 1117.81 11400.1 1117.87
11413.68 1118.0811423.38 1118.2311432.67 1118.5611438.39 1118.3911460.76 1117.67
11468.48 1117.6911473.17 1117.6211476.64 1117.5411484.87 1118.6611515.34 1121.65

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11529.92 1123.3411556.19 1126.0711577.83 1128.0211578.21 1127.9711608.15 1129.68
11629.71 1131.4811634.91 1132.0311651.44 1133.7611679.33 1136.8111707.08 1140.93
11729.97 1143.6411756.88 1146.4211779.69 1148.57 11808.2 1151.3311829.33 1153.34
11857.26    115611879.13  1158.111911.08 1162.2311929.31 1163.82 11961.3 1166.94
11979.47 1168.8412011.22 1171.8212030.01 1173.5912037.12 1174.3512068.42 1176.01
12078.64 1177.2512106.22 1179.67 12130.1 1180.9412137.31 1181.1612167.02 1182.29
 12179.1 1182.7312210.16 1183.2112229.88 1183.2212237.54 1183.1112265.09 1182.77
12276.31 1182.6812284.43 1183.0212316.93 1183.3512326.25  1182.412330.73 1182.89
12332.67 1183.1712360.85 1182.3812378.58 1182.53 12407.5 1183.3812429.12 1183.66
12437.05 1183.8712479.23 1186.2612499.47 1187.6612519.36 1188.1512549.59 1189.24
12570.47 1189.8912584.98 1190.7112600.88 1191.64 12620.1 1192.1512647.23 1193.34
12653.13 1193.34

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   10254      .111301.53    .03311312.84      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      11301.5311312.84                0       0       0             .1       .3
Right Levee     Station=11312.84      Elevation= 1116.86
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SUMMARY OF MANNING'S N VALUES

River:Trib to Jim Blue

Reach	River Sta.	n1	n2	n3
Trib to Jim Blue	1295	.035	.03	.035
Trib to Jim Blue	1262	.035	.03	.035
Trib to Jim Blue	1199	.035	.033	.035
Trib to Jim Blue	1112	.1	.033	.1
Trib to Jim Blue	1048	.1	.033	.1
Trib to Jim Blue	1000	.1	.033	.1

SUMMARY OF REACH LENGTHS

River: Trib to Jim Blue

Reach	River Sta.	Left	Channel	Right
Trib to Jim Blue	1295	32.57	32.57	32.57
Trib to Jim Blue	1262	63.23	63.23	63.23
Trib to Jim Blue	1199	86.7	86.7	86.7
Trib to Jim Blue	1112	63.77	63.77	63.77
Trib to Jim Blue	1048	47.73	47.73	47.73
Trib to Jim Blue	1000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Trib to Jim Blue

Reach	River Sta.	Contr.	Expan.
Trib to Jim Blue	1295	.1	.3
Trib to Jim Blue	1262	.1	.3
Trib to Jim Blue	1199	.1	.3
Trib to Jim Blue	1112	.1	.3
Trib to Jim Blue	1048	.1	.3
Trib to Jim Blue	1000	.1	.3

Appendix D – Hydraulic Model – Existing Bridge

HEC-RAS Plan: Existing River: Trib to Jim Blue Reach: Trib to Jim Blue

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib to Jim Blue	1295 U/S FAR	Q2	261.00	1116.79	1119.60	1119.02	1119.64	0.000749	2.07	203.22	253.51	0.26
Trib to Jim Blue	1295 U/S FAR	Q5	490.00	1116.79	1120.81	1119.33	1120.82	0.000173	1.38	547.87	309.39	0.14
Trib to Jim Blue	1295 U/S FAR	Q10	688.00	1116.79	1121.62	1119.55	1121.64	0.000109	1.28	815.22	345.06	0.11
Trib to Jim Blue	1295 U/S FAR	Q25	993.00	1116.79	1122.72	1119.76	1122.73	0.000071	1.22	1218.12	386.15	0.10
Trib to Jim Blue	1295 U/S FAR	Q50	1330.00	1116.79	1123.84	1119.95	1123.85	0.000051	1.18	1669.71	420.00	0.08
Trib to Jim Blue	1295 U/S FAR	Q100	1560.00	1116.79	1126.11	1120.06	1126.12	0.000017	0.85	2706.06	487.10	0.05
Trib to Jim Blue	1295 U/S FAR	Q500	2460.00	1116.79	1126.77	1120.45	1126.78	0.000031	1.20	3032.76	503.75	0.07
Trib to Jim Blue	1262 U/S	Q2	261.00	1116.68	1119.54		1119.61	0.000932	2.39	164.23	194.11	0.30
Trib to Jim Blue	1262 U/S	Q5	490.00	1116.68	1120.79		1120.82	0.000243	1.69	449.62	256.75	0.16
Trib to Jim Blue	1262 U/S	Q10	688.00	1116.68	1121.61		1121.63	0.000155	1.57	673.53	289.34	0.14
Trib to Jim Blue	1262 U/S	Q25	993.00	1116.68	1122.71		1122.73	0.000104	1.50	1018.92	338.61	0.12
Trib to Jim Blue	1262 U/S	Q50	1330.00	1116.68	1123.83		1123.85	0.000073	1.43	1421.64	376.45	0.10
Trib to Jim Blue	1262 U/S	Q100	1560.00	1116.68	1126.11		1126.12	0.000024	1.01	2374.72	453.89	0.06
Trib to Jim Blue	1262 U/S	Q500	2460.00	1116.68	1126.77		1126.78	0.000042	1.41	2678.38	470.80	0.08
Trib to Jim Blue	1199 U/S BRIDGE	Q2	261.00	1116.26	1118.96	1118.72	1119.43	0.009290	5.54	47.13	32.75	0.81
Trib to Jim Blue	1199 U/S BRIDGE	Q5	490.00	1116.26	1120.46	1119.54	1120.75	0.002768	4.45	116.24	129.85	0.49
Trib to Jim Blue	1199 U/S BRIDGE	Q10	688.00	1116.26	1121.27	1119.97	1121.58	0.002041	4.58	158.88	180.16	0.44
Trib to Jim Blue	1199 U/S BRIDGE	Q25	993.00	1116.26	1122.65	1120.53	1122.71	0.000393	2.52	589.90	255.39	0.20
Trib to Jim Blue	1199 U/S BRIDGE	Q50	1330.00	1116.26	1123.80	1121.02	1123.84	0.000231	2.23	919.76	318.09	0.16
Trib to Jim Blue	1199 U/S BRIDGE	Q100	1560.00	1116.26	1126.10	1121.34	1126.11	0.000056	1.36	1781.33	424.04	0.08
Trib to Jim Blue	1199 U/S BRIDGE	Q500	2460.00	1116.26	1126.75	1121.77	1126.78	0.000091	1.83	2063.37	443.26	0.11
Trib to Jim Blue	1154.25		Bridge									
Trib to Jim Blue	1112 D/S BRIDGE	Q2	261.00	1115.97	1117.98	1117.98	1118.62	0.014864	6.40	40.77	32.05	1.00
Trib to Jim Blue	1112 D/S BRIDGE	Q5	490.00	1115.97	1118.60	1118.71	1119.57	0.013894	7.92	66.40	59.74	1.03
Trib to Jim Blue	1112 D/S BRIDGE	Q10	688.00	1115.97	1118.76	1119.17	1120.35	0.020724	10.21	74.36	70.62	1.27
Trib to Jim Blue	1112 D/S BRIDGE	Q25	993.00	1115.97	1119.14	1119.76	1121.37	0.023233	12.15	94.33	98.10	1.39
Trib to Jim Blue	1112 D/S BRIDGE	Q50	1330.00	1115.97	1119.51	1120.34	1122.38	0.024980	13.88	113.66	125.74	1.47
Trib to Jim Blue	1112 D/S BRIDGE	Q100	1560.00	1115.97	1119.28	1120.70	1124.11	0.046950	17.94	101.55	110.18	1.99
Trib to Jim Blue	1112 D/S BRIDGE	Q500	2460.00	1115.97	1120.67	1121.87	1125.12	0.025059	17.55	173.42	186.11	1.57
Trib to Jim Blue	1048 D/S	Q2	261.00	1114.35	1117.68	1117.44	1117.99	0.004789	5.25	131.74	177.78	0.61
Trib to Jim Blue	1048 D/S	Q5	490.00	1114.35	1118.25	1118.02	1118.59	0.004881	6.12	238.75	198.99	0.63
Trib to Jim Blue	1048 D/S	Q10	688.00	1114.35	1118.61	1118.32	1118.98	0.005067	6.75	313.78	213.47	0.66
Trib to Jim Blue	1048 D/S	Q25	993.00	1114.35	1118.99	1118.68	1119.44	0.005932	7.85	396.15	225.83	0.73
Trib to Jim Blue	1048 D/S	Q50	1330.00	1114.35	1119.28	1119.01	1119.85	0.007157	9.08	463.15	235.11	0.81
Trib to Jim Blue	1048 D/S	Q100	1560.00	1114.35	1119.50	1119.19	1120.11	0.007488	9.63	515.51	242.34	0.83
Trib to Jim Blue	1048 D/S	Q500	2460.00	1114.35	1120.01	1119.86	1120.94	0.010516	12.32	643.23	259.36	1.01
Trib to Jim Blue	1000 D/S FAR	Q2	261.00	1115.08	1117.26	1117.26	1117.63	0.013139	6.92	115.30	143.77	0.96
Trib to Jim Blue	1000 D/S FAR	Q5	490.00	1115.08	1117.68	1117.68	1118.19	0.015294	8.70	180.77	178.77	1.08
Trib to Jim Blue	1000 D/S FAR	Q10	688.00	1115.08	1117.95	1117.93	1118.55	0.016594	9.86	234.73	213.43	1.15
Trib to Jim Blue	1000 D/S FAR	Q25	993.00	1115.08	1118.41	1118.41	1119.00	0.014488	10.40	345.98	269.84	1.10
Trib to Jim Blue	1000 D/S FAR	Q50	1330.00	1115.08	1118.77	1118.77	1119.38	0.013872	11.04	447.99	290.14	1.10
Trib to Jim Blue	1000 D/S FAR	Q100	1560.00	1115.08	1118.85	1118.55	1119.59	0.016618	12.29	470.96	292.56	1.21
Trib to Jim Blue	1000 D/S FAR	Q500	2460.00	1115.08	1119.46	1119.43	1120.29	0.016594	13.81	658.64	320.27	1.25

Plan: Existing Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Profile: Q2

E.G. US. (ft)	1119.43	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1118.96	E.G. Elev (ft)	1119.36	1119.21
Q Total (cfs)	261.00	W.S. Elev (ft)	1118.88	1118.63
Q Bridge (cfs)	261.00	Crit W.S. (ft)	1118.02	1118.03
Q Weir (cfs)		Max Chl Dpth (ft)	2.96	2.71
Weir Sta Lft (ft)		Vel Total (ft/s)	5.54	6.12
Weir Sta Rgt (ft)		Flow Area (sq ft)	47.08	42.68
Weir Submerg		Froude # Chl	0.58	0.66
Weir Max Depth (ft)		Specif Force (cu ft)	112.26	104.90
Min El Weir Flow (ft)	1124.01	Hydr Depth (ft)	2.85	2.57
Min El Prs (ft)	1121.76	W.P. Total (ft)	21.77	23.94
Delta EG (ft)	0.81	Conv. Total (cfs)	3545.4	2898.0
Delta WS (ft)	0.97	Top Width (ft)	16.52	16.58
BR Open Area (sq ft)	120.84	Frctn Loss (ft)	0.14	0.59
BR Open Vel (ft/s)	6.12	C & E Loss (ft)	0.01	0.01
BR Sluice Coef		Shear Total (lb/sq ft)	0.73	0.90
BR Sel Method	Energy only	Power Total (lb/ft s)	4.06	5.52

Plan: Existing Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Profile: Q5

E.G. US. (ft)	1120.75	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1120.46	E.G. Elev (ft)	1120.55	1120.56
Q Total (cfs)	490.00	W.S. Elev (ft)	1119.06	1119.07
Q Bridge (cfs)	490.00	Crit W.S. (ft)	1119.06	1119.07
Q Weir (cfs)		Max Chl Dpth (ft)	3.14	3.15
Weir Sta Lft (ft)		Vel Total (ft/s)	9.80	9.81
Weir Sta Rgt (ft)		Flow Area (sq ft)	50.01	49.94
Weir Submerg		Froude # Chl	0.97	0.98
Weir Max Depth (ft)		Specif Force (cu ft)	225.12	225.06
Min El Weir Flow (ft)	1124.01	Hydr Depth (ft)	3.02	3.01
Min El Prs (ft)	1121.76	W.P. Total (ft)	22.23	26.51
Delta EG (ft)	1.18	Conv. Total (cfs)	3867.0	3589.3
Delta WS (ft)	1.86	Top Width (ft)	16.56	16.59
BR Open Area (sq ft)	120.84	Frctn Loss (ft)		
BR Open Vel (ft/s)	9.81	C & E Loss (ft)		
BR Sluice Coef		Shear Total (lb/sq ft)	2.26	2.19
BR Sel Method	Momentum	Power Total (lb/ft s)	22.10	21.50

Plan: Existing Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Profile: Q10

E.G. US. (ft)	1121.58	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1121.27	E.G. Elev (ft)	1121.43	1121.44
Q Total (cfs)	688.00	W.S. Elev (ft)	1120.11	1120.12
Q Bridge (cfs)	688.00	Crit W.S. (ft)	1120.11	1120.12
Q Weir (cfs)		Max Chl Dpth (ft)	4.19	4.20
Weir Sta Lft (ft)		Vel Total (ft/s)	9.22	9.21
Weir Sta Rgt (ft)		Flow Area (sq ft)	74.58	74.69
Weir Submerg		Froude # Chl	0.79	0.79
Weir Max Depth (ft)		Specif Force (cu ft)	337.20	336.97
Min El Weir Flow (ft)	1124.01	Hydr Depth (ft)	2.67	2.68
Min El Prs (ft)	1121.76	W.P. Total (ft)	37.02	43.45
Delta EG (ft)	1.23	Conv. Total (cfs)	5356.7	5131.5
Delta WS (ft)	2.52	Top Width (ft)	27.89	27.91
BR Open Area (sq ft)	120.84	Frctn Loss (ft)		0.38
BR Open Vel (ft/s)	9.22	C & E Loss (ft)		0.00

Plan: Existing Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Profile: Q10 (Continued)

BR Sluice Coef		Shear Total (lb/sq ft)	2.07	1.93
BR Sel Method	Energy only	Power Total (lb/ft s)	19.14	17.77

Plan: Existing Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Profile: Q25

E.G. US. (ft)	1122.71	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1122.65	E.G. Elev (ft)	1122.54	1122.55
Q Total (cfs)	993.00	W.S. Elev (ft)	1120.86	1120.86
Q Bridge (cfs)	993.00	Crit W.S. (ft)	1120.86	1120.86
Q Weir (cfs)		Max Chl Dpth (ft)	4.94	4.94
Weir Sta Lft (ft)		Vel Total (ft/s)	10.40	10.40
Weir Sta Rgt (ft)		Flow Area (sq ft)	95.50	95.51
Weir Submerg		Froude # Chl	0.82	0.82
Weir Max Depth (ft)		Specif Force (cu ft)	524.44	524.25
Min El Weir Flow (ft)	1124.01	Hydr Depth (ft)	3.40	3.40
Min El Prs (ft)	1121.76	W.P. Total (ft)	40.03	47.90
Delta EG (ft)	1.34	Conv. Total (cfs)	7676.9	7368.1
Delta WS (ft)	3.51	Top Width (ft)	28.05	28.06
BR Open Area (sq ft)	120.84	Frctn Loss (ft)		0.38
BR Open Vel (ft/s)	10.40	C & E Loss (ft)		0.00
BR Sluice Coef		Shear Total (lb/sq ft)	2.49	2.26
BR Sel Method	Energy only	Power Total (lb/ft s)	25.91	23.51

Plan: Existing Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Profile: Q50

E.G. US. (ft)	1123.84	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1123.80	E.G. Elev (ft)	1123.63	1123.64
Q Total (cfs)	1330.00	W.S. Elev (ft)	1121.58	1121.60
Q Bridge (cfs)	1330.00	Crit W.S. (ft)	1121.58	1121.60
Q Weir (cfs)		Max Chl Dpth (ft)	5.66	5.67
Weir Sta Lft (ft)		Vel Total (ft/s)	11.49	11.46
Weir Sta Rgt (ft)		Flow Area (sq ft)	115.71	116.08
Weir Submerg		Froude # Chl	0.85	0.85
Weir Max Depth (ft)		Specif Force (cu ft)	754.54	754.41
Min El Weir Flow (ft)	1124.01	Hydr Depth (ft)	4.10	4.12
Min El Prs (ft)	1121.76	W.P. Total (ft)	42.92	52.27
Delta EG (ft)	1.46	Conv. Total (cfs)	10092.1	9759.3
Delta WS (ft)	4.28	Top Width (ft)	28.20	28.21
BR Open Area (sq ft)	120.84	Frctn Loss (ft)		0.40
BR Open Vel (ft/s)	11.49	C & E Loss (ft)		0.00
BR Sluice Coef		Shear Total (lb/sq ft)	2.92	2.57
BR Sel Method	Energy only	Power Total (lb/ft s)	33.60	29.50

Plan: Existing Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Profile: Q100

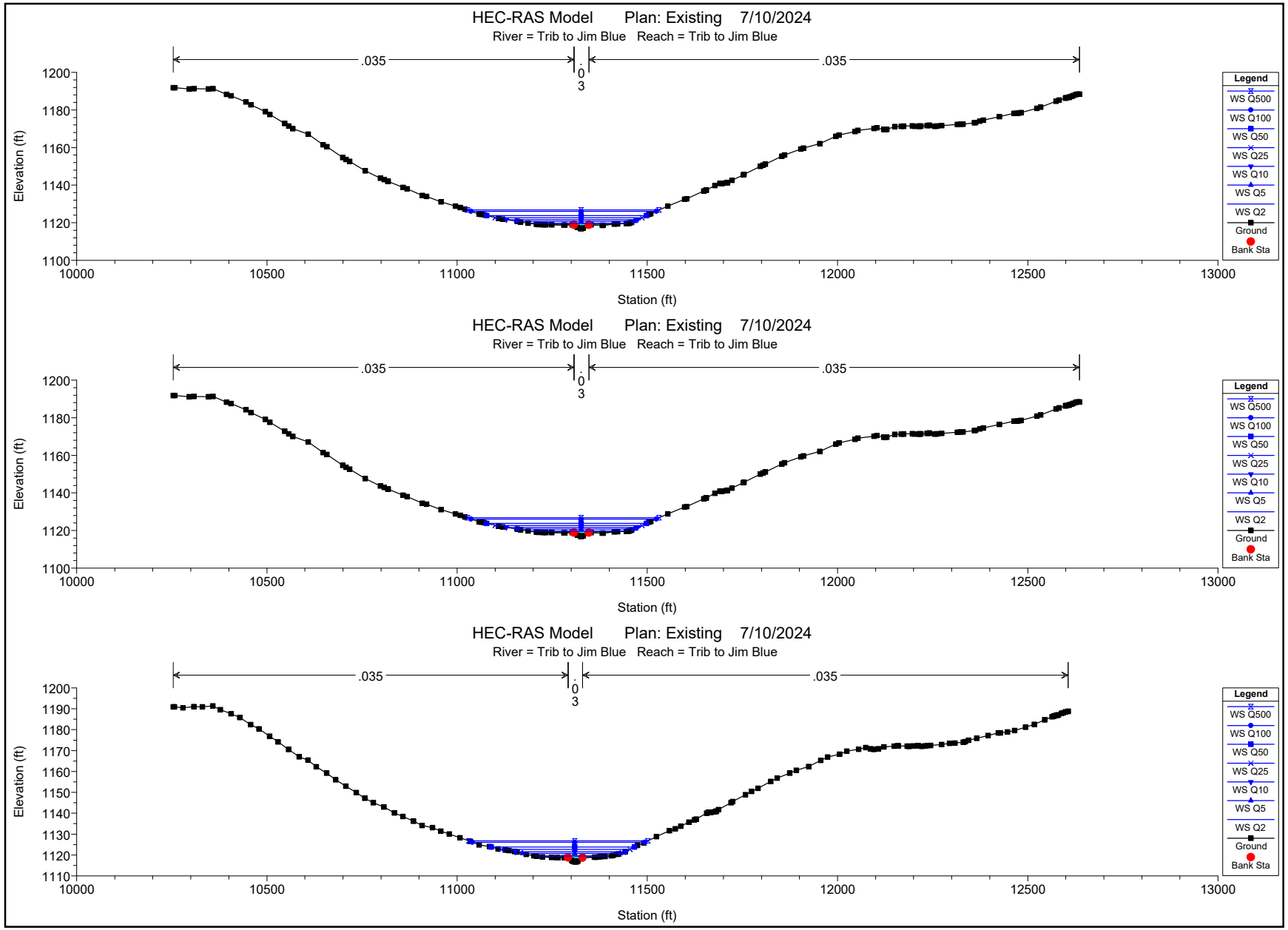
E.G. US. (ft)	1126.11	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1126.10	E.G. Elev (ft)	1126.10	1125.95
Q Total (cfs)	1560.00	W.S. Elev (ft)	1126.01	1125.21
Q Bridge (cfs)	340.44	Crit W.S. (ft)	1125.07	1125.21
Q Weir (cfs)		Max Chl Dpth (ft)	10.09	9.29
Weir Sta Lft (ft)		Vel Total (ft/s)	2.45	4.29
Weir Sta Rgt (ft)		Flow Area (sq ft)	635.82	364.06
Weir Submerg		Froude # Chl	0.14	0.40
Weir Max Depth (ft)		Specif Force (cu ft)	1340.48	1147.72
Min El Weir Flow (ft)	1124.01	Hydr Depth (ft)	1.68	1.18
Min El Prs (ft)	1121.76	W.P. Total (ft)	449.76	389.65

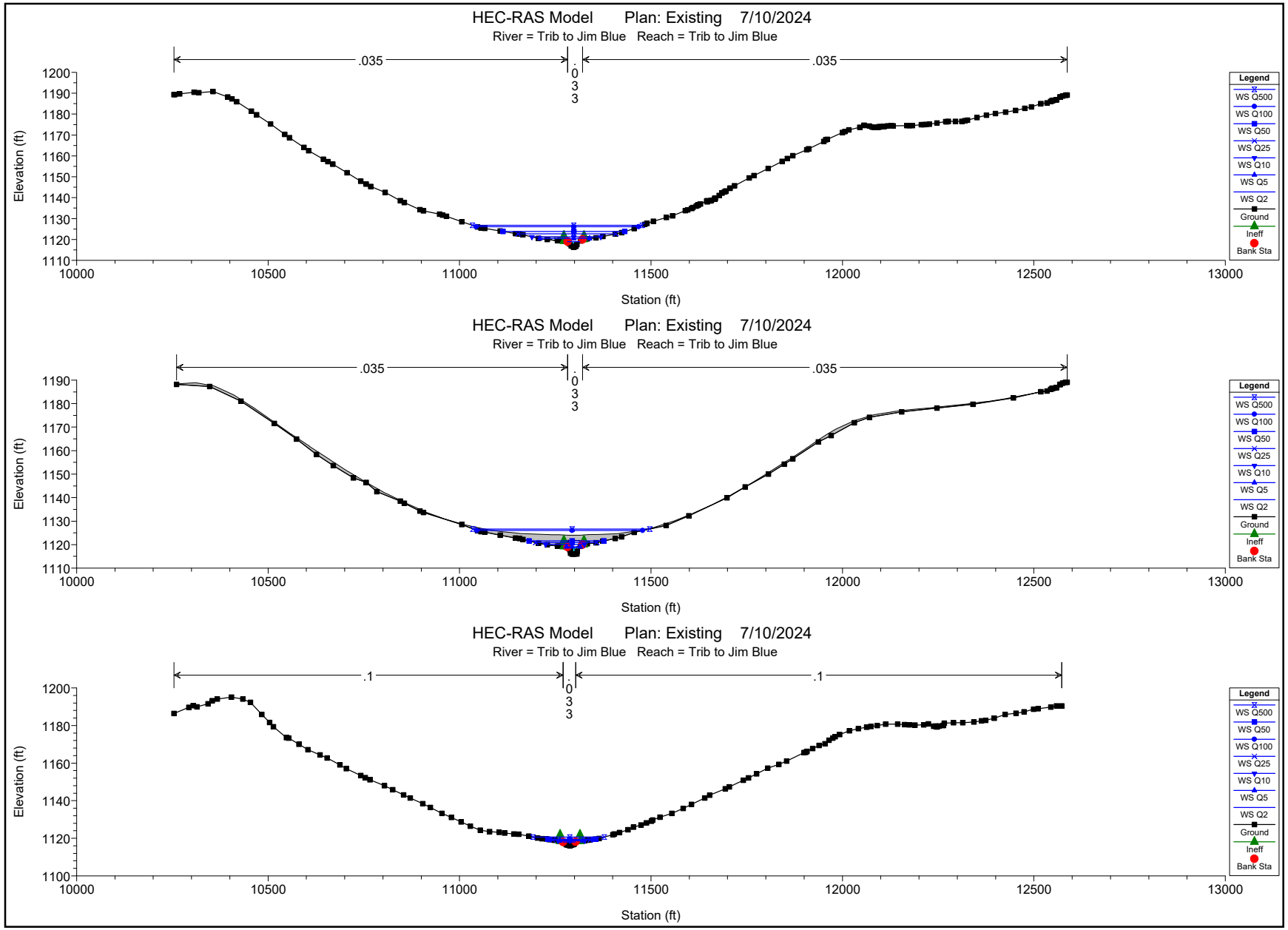
Plan: Existing Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Profile: Q100 (Continued)

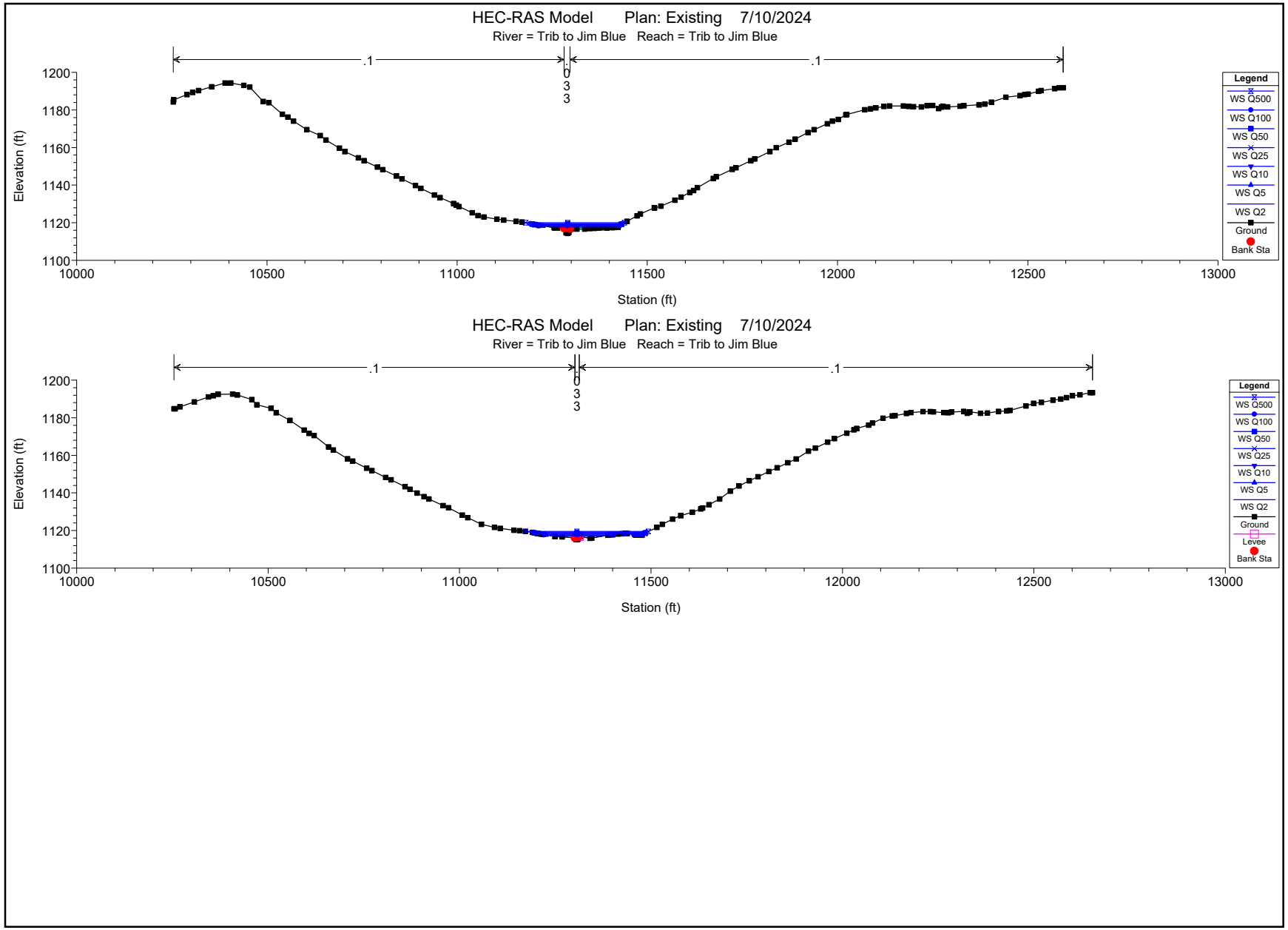
Delta EG (ft)	2.00	Conv. Total (cfs)	35194.0	12148.9
Delta WS (ft)	6.82	Top Width (ft)	377.84	307.47
BR Open Area (sq ft)	120.84	Frctn Loss (ft)	0.10	0.68
BR Open Vel (ft/s)	2.82	C & E Loss (ft)	0.06	0.10
BR Sluice Coef		Shear Total (lb/sq ft)	0.17	0.96
BR Sel Method	Energy only	Power Total (lb/ft s)	0.43	4.12

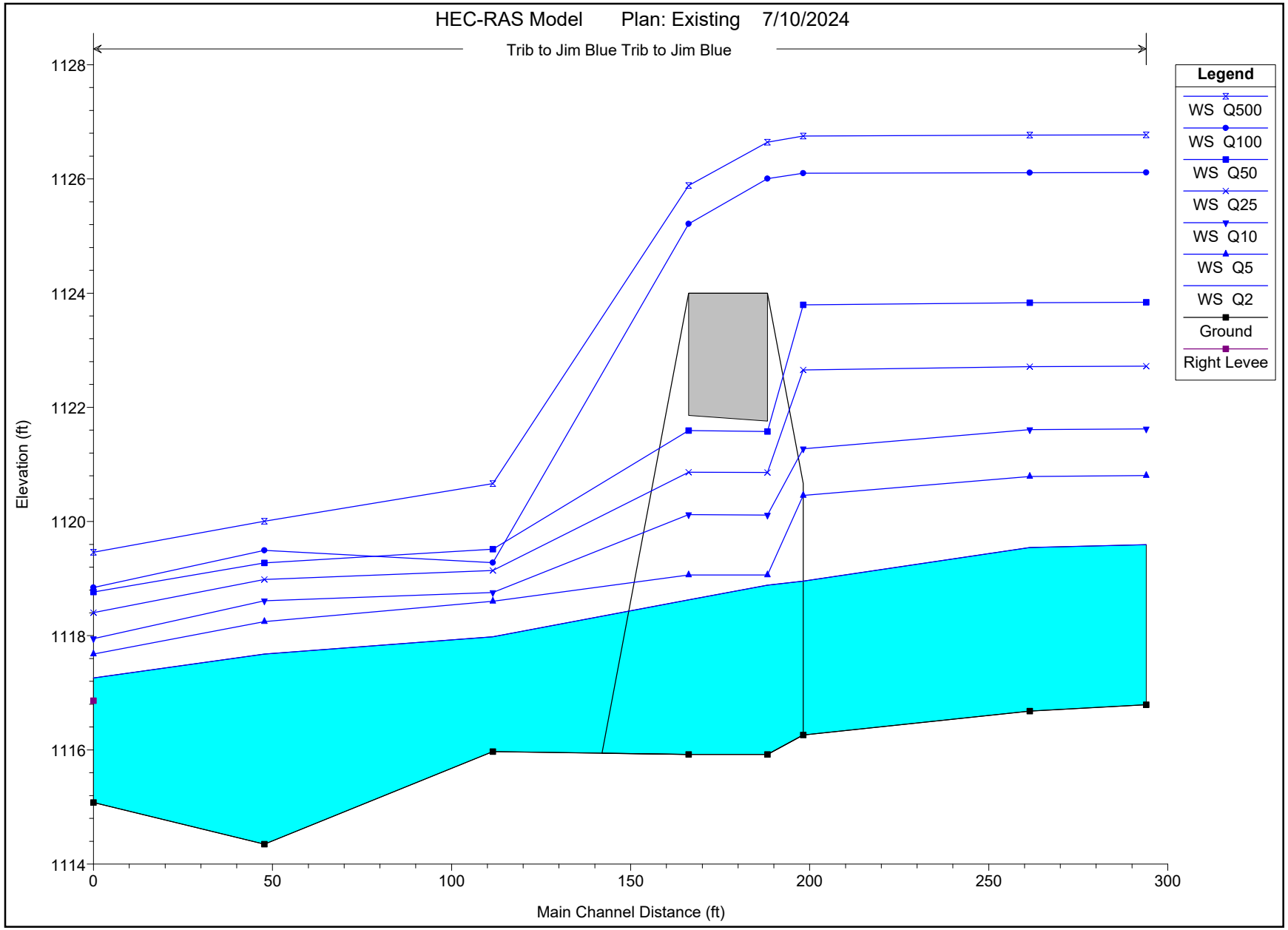
Plan: Existing Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Profile: Q500

E.G. US. (ft)	1126.78	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1126.75	E.G. Elev (ft)	1126.77	1126.61
Q Total (cfs)	2460.00	W.S. Elev (ft)	1126.65	1125.88
Q Bridge (cfs)	328.64	Crit W.S. (ft)	1125.45	1125.88
Q Weir (cfs)		Max Chl Dpth (ft)	10.72	9.96
Weir Sta Lft (ft)		Vel Total (ft/s)	2.76	4.15
Weir Sta Rgt (ft)		Flow Area (sq ft)	891.59	592.94
Weir Submerg		Froude # Chl	0.15	0.38
Weir Max Depth (ft)		Specif Force (cu ft)	1917.96	1625.55
Min El Weir Flow (ft)	1124.01	Hydr Depth (ft)	2.11	1.61
Min El Prs (ft)	1121.76	W.P. Total (ft)	494.45	451.31
Delta EG (ft)	1.66	Conv. Total (cfs)	57124.1	18913.1
Delta WS (ft)	6.09	Top Width (ft)	422.50	369.12
BR Open Area (sq ft)	120.84	Frctn Loss (ft)	0.09	0.50
BR Open Vel (ft/s)	2.72	C & E Loss (ft)	0.06	0.04
BR Sluice Coef		Shear Total (lb/sq ft)	0.21	1.39
BR Sel Method	Energy only	Power Total (lb/ft s)	0.58	5.76


HEC-RAS Model Plan: Existing 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta
HEC-RAS Model Plan: Existing 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta
HEC-RAS Model Plan: Existing 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta


HEC-RAS Model Plan: Existing 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.033
.035
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Ineff
Bank Sta
HEC-RAS Model Plan: Existing 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.033
.035
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Ineff
Bank Sta
HEC-RAS Model Plan: Existing 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.1
.033
.1
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q50
WS Q100
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Existing 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.1
.1
0
3
3
Elevation (ft)
1200
1180
1160
1140
1120
1100
10000
10500
11000
11500
12000
12500
13000
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta
HEC-RAS Model Plan: Existing 7/10/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.1
.1
0
3
3
Elevation (ft)
1200
1180
1160
1140
1120
1100
10000
10500
11000
11500
12000
12500
13000
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Levee
Bank Sta


HEC-RAS Model Plan: Existing 7/10/2024
Trib to Jim Blue Trib to Jim Blue
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Right Levee
Elevation (ft)
1128
1126
1124
1122
1120
1118
1116
1114
0
50
100
150
200
250
300
Main Channel Distance (ft)

HEC-RAS HEC-RAS 6.3.1 September 2022
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
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PROJECT DATA
Project Title: HEC-RAS Model
Project File : Post Oak Rd.prj
Run Date and Time: 7/10/2024 9:32:52 AM

Project in English units

Project Description:
CRS Info=<SpatialReference> <CoordinateSystem Code="2268"
Unit="US_survey_Foot" AcadCode="OK83-SF" /></SpatialReference>

PLAN DATA

Plan Title: Existing
Plan File : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05
Civil\Docs\Drainage\Models\Post Oak Rd.p02

Geometry Title: Existing
Geometry File : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05
Civil\Docs\Drainage\Models\Post Oak Rd.g02

Flow Title   : Steady Flow
Flow File   : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05
Civil\Docs\Drainage\Models\Post Oak Rd.f01

Plan Description:
Existing scenario w/32' Steel Girder bridge

Plan Summary Information:
Number of: Cross Sections =   6   Multiple Openings =   0
Culverts   =   0   Inline Structures =   0
Bridges   =   1   Lateral Structures =   0

Computational Information
    Water surface calculation tolerance = 0.01
    Critical depth calculation tolerance = 0.01
    Maximum number of iterations   = 20
    Maximum difference tolerance   = 0.33
    Flow tolerance factor   = 0.001

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

FLOW DATA

Flow Title: Steady Flow
Flow File : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05 Civil\Docs\Drainage\Models\Post Oak Rd.f01

Flow Data (cfs)

River	Reach	RS	Q2	Q5	Q10	Q25	Q50	Q100	Q500
Trib to Jim Blue	Trib to Jim Blue	1295	261	490	688	993	1330	1560	2460

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Trib to Jim Blue	Trib to Jim Blue	Q2	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q5	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q10	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q25	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q50	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q100	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q500	Normal S = 0.01659	Normal S = 0.01659

GEOMETRY DATA

Geometry Title: Existing
Geometry File : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05 Civil\Docs\Drainage\Models\Post Oak Rd.g02

CROSS SECTION

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1295

INPUT
Description:
Station Elevation Data   num=   157

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10254	1191.82	10257.4	1191.82	10295.92	1191.14	10308.14	1191.37	10346.66	1191.18
10358.46	1191.36	10393.7	1188.31	10405.63	1187.48	10444.75	1184.21	10457.78	1182.72
10496	1179.05	10507.8	1177.59	10547.09	1172.75	10557.51	1171.37	10568.03	1170.06
10608.82	1167.18	10647.78	1161.49	10657.59	1160.44	10699.27	1154.62	10708.43	1153.61
10717.63	1152.59	10758.32	1147.64	10798.43	1143.71	10808.06	1143	10817.55	1142.03
10818.64	1141.95	10858.11	1138.84	10868.56	1137.98	10908.37	1134.49	10919.43	1134.06
10957.95	1131.11	10995.66	1128.82	11007.82	1128.03	11020.36	1127.24	11058.45	1124.59
11064.49	1124.41	1071.59	1124.17	11108.76	1122.27	11119.24	1121.93	11158.19	1120.75
11166.56	1120.39	11186.81	1119.79	11208.74	1119.14	11214.36	1119.01	11226.37	1118.93
11233.37	1118.89	11248.86	1118.84	11280.92	1118.73	11283.04	1118.72	11302.51	1118.88
11307.56	1118.89	11309.64	1118.58	11316.42	1117.51	11324.57	1116.89	11325.84	1116.79
11330.06	1117.11	11330.26	1117.13	11331.11	1117.14	11343.99	1118.55	11346.43	1118.86
11351.95	1118.91	11381.21	1118.71	11383.78	1118.68	11413.45	1119.32	11422.07	1119.38
11445.02	1119.54	11449.64	1119.68	11450.78	1119.73	11452.22	1119.79	11453.91	1119.86
11458.59	1120.14	11503.77	1124.38	11508.87	1124.75	11553.52	1128.86	11597.93	1132.48
11603.37	1132.78	11648.12	1136.92	11653.77	1137.34	11655.31	1137.46	11677.72	1139.79
11690.88	1140.91	11694.89	1140.91	11695.44	1140.83	11695.57	1140.75	11695.66	1140.82
11707	1141.22	11710.58	1141.35	11710.65	1141.35	11710.72	1141.39	11722.47	1142.53
11752.38	1145.49	11754.05	1145.71	11797.44	1149.95	11803.85	1150.57	11810.31	1151.16
11854.06	1155.47	11860.72	1156.11	11903.79	1159.22	11910.64	1159.74	11953.59	1162.1
11995.94	1165.97	12003.62	1166.66	12045.95	1168.48	12053.47	1169.11	12095.75	1170.18
12103.47	1170.54	12121.17	1169.67	12124.51	1169.56	12129.32	1169.68	12150.81	1171.13
12167.55	1171.33	12173.33	1171.34	12173.63	1171.35	12196.38	1171.57	12202.05	1171.33
12214.13	1171.42	12215.29	1171.29	12215.36	1171.31	12216.73	1171.43	12219.13	1171.47
12235.12	1171.7	12240	1171.74	12241.4	1171.73	12241.41	1171.75	12255.92	1171.31
12259.39	1171.39	12261.97	1171.44	12273.75	1171.64	12314.92	1172.23	12323.52	1172.48
12329.7	1172.48	12359.95	1173.16	12362.54	1173.28	12373.88	1174.11	12383.35	1174.52
12425.54	1176.49	12463.94	1178.19	12472.07	1178.27	12477.04	1178.38	12482.1	1178.55
12523.98	1180.85	12534.21	1181.48	12574.09	1184.61	12582.47	1185.27	12599.1	1186.31
12599.94	1186.36	12600.55	1186.36	12600.76	1186.37	12608.67	1186.71	12609.13	1186.84
12609.52	1186.81	12615.59	1187.32	12619.61	1187.67	12625.89	1188.13	12628.73	1188.3
12631.81	1188.43	12635.85	1188.43						

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
10254	.035	11307.56	.03	11346.43	.035

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      11307.5611346.43             32.57   32.57   32.57              .1       .3

CROSS SECTION


RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1262

INPUT
Description:
Station Elevation Data    num=     154
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   10254 1190.92 10257.2 1190.9210279.71 1190.5210307.89 1191.0510330.19 1190.93
10357.67 1191.3710378.01  1189.610405.87 1187.6910428.51  1185.810457.57 1182.46
10479.24 1180.3710507.43 1176.8910529.58 1174.1610557.03 1170.5110584.97 1167.02
10607.91 1165.3910629.62 1162.2110657.25 1159.2310680.55 1155.9710707.62 1152.99
10735.06 1149.9410757.58  1147.210779.56 1145.0410807.42 1142.9710835.11 1140.17
10857.44 1138.4210885.28 1136.1310907.62 1134.1810935.26 1133.1110957.36 1131.41
10979.69 1130.0411007.33 1128.2411034.93  1126.511057.73  1124.911085.52 1124.04
11107.86 1122.9411126.71 1122.3811136.06  1122.111150.72 1121.6811157.66 1121.48
11181.65 1120.3211201.38 1119.6811209.09 1119.4311223.95 1119.0211248.38 1118.86
11262.39 1118.7711263.22 1118.7511265.14 1118.76 11282.1 1118.7811291.95 1118.79
   11301 1117.4511302.63  1117.211304.55 1117.0511309.54 1116.6811310.54 1116.76
11313.86  1116.811314.64 1116.8111317.34  1117.111330.11 1118.72   11361 1118.99
11366.24 1118.9611372.95  1119.111377.13 1119.1411388.71 1119.2611404.93 1119.68
11410.33 1119.8211420.09 1120.3411424.33 1120.5411441.56 1121.5311474.13 1124.58
11490.92 1125.7911523.98 1128.8411558.29 1131.6311573.87 1132.52 11587.8 1133.81
11608.99 1135.7811624.28 1136.9111628.45 1137.2311655.92 1140.0811661.01 1140.45
11665.47 1140.44 11665.5 1140.4211665.64 1140.3311669.49 1140.4611677.38 1140.74
11681.35 1140.89 11681.4 1140.9311681.47 1140.97 11686.7 1141.73 11720.1 1145.04
11724.47 1145.5711757.98 1148.8511774.38 1150.4411791.01 1151.9611824.38 1155.24
11841.45 1156.8611874.16 1159.2311891.74 1160.5911924.12 1162.3711955.85 1165.27
 11974.1  1166.912005.63 1168.2612024.04 1169.7912055.26  1170.612073.92 1171.46
12086.88 1170.8312095.32 1170.5612107.49 1170.8712121.69 1171.8312149.32 1172.17
12156.94 1172.1812157.75  1172.212159.32 1172.2112159.69 1172.2112182.78 1172.14
12186.39 1172.1412188.39 1172.04 12199.1 1172.19 12210.9 1172.3112211.82  1172.3
12211.83 1172.3412221.41 1172.0512229.72 1172.2512235.91 1172.3612244.38 1172.51
12273.86 1172.9412294.16 1173.5312308.83 1173.5412330.25 1174.0312336.32 1174.32
12344.34  1174.912365.84 1175.86 12395.5 1177.2512422.31 1178.4412427.96  1178.5
12446.49 1178.9112465.51 1179.5512494.34 1181.1412517.42 1182.5812544.54  1184.7
12563.63 1186.2212568.79 1186.5412568.97 1186.5412569.46 1186.59 12574.8 1186.81
12577.59 1186.9312577.75 1186.9712578.55 1186.9112580.62 1187.0812588.98 1187.83
12593.47 1188.1512599.46 1188.5212605.99 1188.7812606.04 1188.78

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   10254    .03511291.95     .0311330.11    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      11291.9511330.11             63.23   63.23   63.23              .1       .3

CROSS SECTION
```

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1199

INPUT
Description:
Station Elevation Data   num=   174
     Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev
   10254 1189.3310256.27 1189.3310269.03 1189.7210306.68 1190.4310319.32 1190.2
10355.97 1190.810394.32 1188.2110405.69 1187.3110418.07 1185.94 10456.5 1181.45
10469.66 1179.7510506.22 1175.2410543.46 1170.3110555.81 1168.7710593.57 1164.03
10606.07 1162.5110644.43 1158.410656.12 1157.2810669.06 1155.9810705.93 1151.91
10742.12 1147.8910755.96 1146.5210767.69 1145.3110805.95 1142.4910844.95 1138.54
10855.94 1137.65 10896.8 1134.3   10906 1133.7210947.96 1132.0910955.96 1131.62
10965.73 1131.1211006.13 1128.4911046.49 1125.9411056.15 1125.5511066.01 1125.27
11106.15 1124.0211146.34 1122.7911156.05 1122.5811165.65 1122.23 11206.3 1120.55
11229.03 1120.0111255.93 1119.3811261.59 1119.3911271.38 1119.2611276.65 1119.19
11282.15 1118.9311288.08 1117.8211291.93 1116.9711296.51 1116.6111298.66 1116.26
11300.15 1116.5511303.08 1116.7711303.82 1116.8211306.58 1117.5811316.05 1119.26
11318.25 1119.6511321.11 1119.9511333.63 1120.3311356.37 1120.7911374.34 1121.48
11406.41 1122.5811423.24 1123.31 11456.2 1125.2411483.65 1127.2411489.41 1127.66
11506.42 1128.6611540.17 1130.5711556.27 1131.2811589.54 1133.7611596.13 1134.19
11606.61 1134.811609.29 1135.2411618.09 1135.9111621.79 1136.2811623.43 1136.49
11629.24 1136.9311646.07 1138.3611646.08 1138.3711646.21 1138.4411646.25 1138.45
11646.64 1138.4711646.67 1138.4211646.87 1138.0411654.98 1138.511656.25 1138.57
 11657.7 1138.6711666.62 1139.2711666.65 1139.3311666.84 1139.6911666.89 1139.69
11667.28 1139.68 11667.3 1139.6811667.41 1139.6611677.83 1141.111685.71 1142.15
11691.81 1142.7911693.98 1142.9911695.74 1143.2111705.97 1144.4911706.64 1144.55
11718.18 1145.74 11756.7 1149.46 11769.1 1150.6111806.18 1153.9411842.69 1157.43
11856.19 1158.7411870.35 1160.0811906.57 1162.8811911.83 1163.3711951.11 1166.89
 11956.4 1167.6511960.72 1167.9312000.15 1171.1812006.49 1171.712016.88 1172.42
 12045.2 1173.7112056.12 1174.6112057.25 1174.66 12070.6 1174.2212077.74 1173.76
12082.53 1173.6612087.45 1173.7112093.15 1173.7512093.97 1173.8512094.74 1173.93
12097.05 1173.9412097.65 1173.9112100.36 1173.9512106.19   117412108.07 1174.03
 12108.6 1174.0512109.91 1174.1212118.42 1174.3312127.82 1174.5512132.53 1174.42
12168.24 1174.5412175.44 1174.4912182.57 1174.512206.02 1174.9212211.64 1174.99
12218.68 1175.0512226.89 1175.1912246.65 1175.7212269.52 1176.3812271.39 1176.28
12276.78 1176.4912295.18 1176.5312311.96 1176.5312319.91 1176.8212326.43 1177.13
12351.24 1178.3312376.39 1179.4412399.46 1180.3112426.39 1180.9212452.25 1181.79
12476.45 1182.7312493.62 1183.4712518.48 1185.0312534.19 1185.4112543.77 1186.08
12547.64 1186.4512548.07 1186.4712548.36 1186.4912551.86 1186.6112558.27 1186.82
12558.75 1186.8512559.21 1186.8712567.82 1188.1112568.28 1188.1712568.95 1188.22
12575.38 1188.6412582.34 1189.0612583.59 1189.1112586.77 1189.11

Manning's n Values   num=   3
     Sta   n Val   Sta   n Val   Sta   n Val
   10254   .03511282.15   .03311321.11   .035

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.
      11282.1511321.11   86.7   86.7   86.7   .1   .3
Ineffective Flow   num=   2
   Sta L   Sta R   Elev Permanent
   1025411272.72 1121.76   F
11325.0712586.77 1121.76   F

BRIDGE

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1154.25

INPUT
Description:
Distance from Upstream XS =   10
Deck/Roadway Width   =   22
Weir Coefficient   =   2.6
Upstream Deck/Roadway Coordinates
    num=   119
     Sta Hi Cord Lo Cord   Sta Hi Cord Lo Cord   Sta Hi Cord Lo Cord
10259.59 1188.33   10260.7 1188.35   10309.56 1188.89
10309.74 1188.89   10310.97 1188.86   10311.35 1188.85
10359.07 1187.46   10359.67 1187.44   10405.76 1184.07
10409.71 1183.75   10455.83 1178.95   10459.73 1178.55
10463.49 1178.11   10509.68 1172.83   10558.51 1167.25
 10559.6 1167.12   10579.26 1164.99   10608.94 1161.77
10609.29 1161.73   10659.7 1156.33   10659.7 1156.33
10660.24 1156.27   10708.81 1151.15   10709.53 1151.08
10710.27 1151.01   10759.73 1146.19   10805.87 1141.98
 10808.9 1141.71   10809.06 1141.69   10827.75 1140.23
10859.26 1137.77   10859.52 1137.75   10909.23 1134.06
10909.65 1134.03   10959.14 1131.04   10959.76   1131
10959.96 1130.99   10960.39 1130.97   11009.66 1128.62
   11011 1128.57   11059.7 1126.78   11109.44 1125.52
11109.71 1125.51   11143.83 1124.99   11159.18 1124.76
 11159.7 1124.75   11208.67 1124.4   11209.42 1124.4
11209.75 1124.4   11241.21 1124.25   11259.41 1124.16
11259.79 1124.16   11282.72   1124 1121.7611315.07   1124 1121.76
11339.73 1124.3   11339.99 1124.3   11359.68 1124.33
11409.22 1124.61   11409.81 1124.61   11458.83 1125.71
11459.64 1125.72   11467.64 1125.99   11508.38 1127.33
11509.86 1127.39   11557.46 1129.91   11559.78 1130.03
11608.14 1133.18   11609.78 1133.29   11610.36 1133.33
11658.81 1136.94   11660.01 1137.03   11661.26 1137.14
11709.11 1141.18   11709.74 1141.24   11758.84 1145.86
11760.35   1146   11808.92 1150.89   11809.91   1151
11848.67   1155   11859.73 1156.13   11860 1156.16
11860.29 1156.19   11900.2 1160.42   11909.86 1161.44
11909.92 1161.45   11911.71 1161.65   11934.79 1164.26
11950.63 1165.98   11959.64 1166.95   11970.07 1167.97
11980.27 1168.96   11980.78   1169   11994.52 1170.03
12030.14 1172.69   12031.43 1172.76   12080.44 1175.2
12082.81 1175.27   12130.35 1176.53   12131.53 1176.55
12180.15 1177.48   12228.69 1178.22   12229.87 1178.24
12275.47   1179   12279.55 1179.07   12280.32 1179.08
12328.95 1179.96   12330.41 1179.99   12378.22 1180.94
12380.21 1180.97   12427.77 1182.16   12430.14 1182.21
12477.82 1183.72   12480.23 1183.8   12517.41 1184.95
12518.49 1184.98   12564.07 1187.36   12565.35 1187.42
 12565.9 1187.46   12579.84 1187.46

Upstream Bridge Cross Section Data

Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10261.05	1188.22	10347.32	1187.31	10429.27	1181.07	10516.12	1171.52	10574.3	1164.9
10626.19	1158.41	10670.34	1153.64	10722.63	1148.39	10755.96	1146.52	10784.21	1142.54
10844.95	1138.54	10855.94	1137.65	10896.8	1134.3	10906	1133.72	11006.13	1128.49
11046.49	1125.94	11056.15	1125.55	11066.01	1125.27	11106.15	1124.02	11146.34	1122.79
11156.05	1122.58	11165.65	1122.23	11206.3	1120.55	11229.03	1120.01	11255.93	1119.38
11261.59	1119.39	11271.38	1119.26	11276.65	1119.19	11282.15	1118.93	11288.08	1117.82
11289.96	1117.33	11290.06	1116.35	11294.17	1115.92	11298.44	1115.93	11302.31	1116.05
11306.67	1116.08	11307.1	1117.18	11316.05	1119.26	11318.25	1119.65	11321.11	1119.95
11333.63	1120.33	11356.37	1120.79	11374.34	1121.48	11406.41	1122.58	11423.24	1123.31
11456.2	1125.24	11539.49	1128.11	11598.75	1132.26	11698.68	1139.95	11746.32	1144.58
11806.74	1149.95	11848	1154.22	11870.51	1156.54	11937.11	1163.66	11970.58	1166.42
12031	1171.91	12070.6	1174.22	12154.61	1176.48	12247.07	1178.14	12340.98	1179.76
12446.38	1182.49	12518.48	1185.03	12534.19	1185.41	12543.77	1186.08	12547.64	1186.45
12548.07	1186.47	12548.36	1186.49	12551.86	1186.61	12558.27	1186.82	12558.75	1186.85
12559.21	1186.87	12567.82	1188.11	12568.28	1188.17	12568.95	1188.22	12575.38	1188.64
12582.34	1189.06	12583.59	1189.11	12586.77	1189.11				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
10261.05	.035	11282.15	.033	11321.11	.035

Bank Sta: Left Right Coeff Contr. Expan.

11282.15	11321.11	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
10261.05	11272.72	1121.76	F
11325.07	12586.77	1121.76	F

Downstream Deck/Roadway Coordinates num= 118

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
10249.94	1188.35		10298.8	1188.89		10298.98	1188.89	
10300.21	1188.86		10300.59	1188.85		10348.31	1187.46	
10348.91	1187.44		10395	1184.07		10398.95	1183.75	
10445.07	1178.95		10448.97	1178.55		10452.73	1178.11	
10498.92	1172.83		10547.75	1167.25		10548.84	1167.12	
10568.5	1164.99		10598.18	1161.77		10598.53	1161.73	
10648.94	1156.33		10648.94	1156.33		10649.48	1156.27	
10698.05	1151.15		10698.77	1151.08		10699.51	1151.01	
10748.97	1146.19		10795.11	1141.98		10798.14	1141.71	
10798.3	1141.69		10816.99	1140.23		10848.5	1137.77	
10848.76	1137.75		10898.47	1134.06		10898.89	1134.03	
10948.38	1131.04		10949	1131		10949.2	1130.99	
10949.63	1130.97		10998.9	1128.62		11000.24	1128.57	
11048.94	1126.78		11098.68	1125.52		11098.95	1125.51	
11133.07	1124.99		11148.42	1124.76		11148.94	1124.75	
11197.91	1124.4		11198.66	1124.4		11198.99	1124.4	
11230.45	1124.25		11248.65	1124.16		11249.03	1124.16	
11272.02	1124	1121.86	11304.65	1124	1121.86	11328.97	1124.3	
11329.23	1124.3		11348.92	1124.33		11398.46	1124.61	
11399.05	1124.61		11448.07	1125.71		11448.88	1125.72	
11456.88	1125.99		11497.62	1127.33		11499.1	1127.39	
11546.7	1129.91		11549.02	1130.03		11597.38	1133.18	

```
11599.02 1133.29         11599.6 1133.33        11648.05 1136.94
11649.25 1137.03         11650.5 1137.14        11698.35 1141.18
11698.98 1141.24        11748.08 1145.86        11749.59    1146
11798.16 1150.89        11799.15    1151        11837.91    1155
11848.97 1156.13        11849.24 1156.16        11849.53 1156.19
11889.44 1160.42         11899.1 1161.44        11899.16 1161.45
11900.95 1161.65        11924.03 1164.26        11939.87 1165.98
11948.88 1166.95        11959.31 1167.97        11969.51 1168.96
11970.02    1169        11983.76 1170.03        12019.38 1172.69
12020.67 1172.76        12069.68  1175.2        12072.05 1175.27
12119.59 1176.53        12120.77 1176.55        12169.39 1177.48
12217.93 1178.22        12219.11 1178.24        12264.71    1179
12268.79 1179.07        12269.56 1179.08        12318.19 1179.96
12319.65 1179.99        12367.46 1180.94        12369.45 1180.97
12417.01 1182.16        12419.38 1182.21        12467.06 1183.72
12469.47  1183.8        12506.65 1184.95        12507.73 1184.98
12553.31 1187.36        12554.59 1187.42        12555.14 1187.46
12569.08 1187.46

Downstream Bridge Cross Section Data
Station Elevation Data    num=      70
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
10252.13 1188.1310288.61 1187.9410308.15 1187.3510373.36 1183.6910405.17  1182.3
10436.99 1178.6910518.54 1167.6910572.33 1162.1910635.08 1155.3910686.63 1150.94
10753.87 1145.1810843.54  1137.310909.97 1131.6911028.34 1126.4611054.16 1124.29
11078.26 1123.5311103.89  1123.2 11117.6 1122.7711141.98  1122.3 11154.1 1122.16
11181.07 1121.13 11203.9 1120.1611215.65 1119.7911226.87 1119.6511234.81 1119.33
11247.16 1119.0511249.87 1118.9711261.71 1118.6211270.34 1118.0611272.61 1117.76
11278.49 1116.5811279.46 1116.3111283.46 1116.11 11283.8 1115.9211289.85 1115.93
11291.63 1116.0511295.91 1116.0711296.07  1116.611298.15 1116.74 11299.7 1117.08
11303.62 1118.1611306.53 1118.2511310.36 1118.4411318.41 1118.5211327.46 1118.75
11335.04 1118.9711339.86 1119.1111354.87 1119.4611364.69 1119.9311400.38 1121.88
11404.27 1122.3211417.63 1123.0411439.92 1124.5511454.44 1125.9811532.81 1128.56
 11632.4 1133.8811681.35 1138.5911748.88  1143.311836.65 1151.0711937.93  1160.9
12000.39  1167.5 12069.6 1170.5712130.37 1173.4312181.01 1174.8712277.22 1174.87
12368.38 1178.9612461.22 1183.67 12544.3 1189.83 12559.2 1190.4912572.76 1190.49

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
10252.13      .111270.34    .03311303.62      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
      11270.3411303.62             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
10252.1311262.72 1121.86       F
11314.6512572.76 1121.86       F

Upstream Embankment side slope              =       3 horiz. to 1.0 vertical
Downstream Embankment side slope            =       3 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested
```

Number of Abutments = 2

Abutment Data
Upstream   num=   9
     Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev
11282.07 1121.8611284.82 1121.8611284.87 1120.8711284.91 1119.7111287.58 1119.54
11290.17 1119.43 11290.2 1118.0711290.24 1116.3111294.23 1115.92
Downstream   num=   9
     Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev
11272.02 1121.8611274.06 1121.8611274.11 1120.8711274.15 1119.7111276.82 1119.54
11279.41 1119.4311279.44 1118.0711279.48 1116.3111283.47 1116.11

Abutment Data
Upstream   num=   9
     Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev
11302.31 1116.0511306.66 1116.0711306.69 1117.7411306.71 1119.2211309.59 1119.4
11312.65 1119.5811312.87 1120.611313.08 1121.8111315.07 1121.81
Downstream   num=   9
     Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev
11291.55 1116.05 11295.9 1116.0711295.93 1117.7411295.95 1119.2211298.83 1119.4
11301.89 1119.5811302.11 1120.611302.32 1121.8611304.65 1121.86

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

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

CROSS SECTION

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1112

INPUT
Description:
Station Elevation Data   num=   133
     Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev
   10254 1186.4 10293.3 1189.7110304.06 1190.5710314.07 1189.9110343.23 1191.56
10354.06 1193.2410367.48 1194.0310404.24 1195.0710434.28 1194.0210453.72 1192.31
10483.73 1185.8610504.18 1181.5510513.91 1179.36 10547.9 1173.5410554.11 1173.28
10580.53 1170.0810604.14 1167.08 10635.7 1164.3210654.04 1162.6610687.54 1159.11
10704.17 1157.1110741.93 1153.3610753.93 1152.2710765.89 1151.110803.56 1147.95
10825.45 1145.8710853.97 1143.1210871.03 1141.4210903.92 1138.4210923.69 1136.41

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10953.85 1133.2510978.52  1131.111004.25 1128.7611028.34 1126.4611054.16 1124.29
11078.26 1123.5311103.89  1123.2 11117.6 1122.7711141.98  1122.3 11154.1 1122.16
11181.07 1121.13 11203.9 1120.1611215.65 1119.7911226.87 1119.6511234.81 1119.33
11247.16 1119.0511249.87 1118.9711261.71 1118.6211270.34 1118.0611272.61 1117.76
11278.49 1116.5811282.33 1116.3311287.75 1115.9711292.33 1116.3111296.07  1116.6
11298.15 1116.74 11299.7 1117.0811303.62 1118.1611306.53 1118.2511310.36 1118.44
11318.41 1118.5211327.46 1118.7511335.04 1118.9711339.86 1119.1111354.87 1119.46
11364.69 1119.9311400.38 1121.8811404.27 1122.3211417.63 1123.0411439.92 1124.55
11454.44 1125.9811474.18 1127.1211488.37 1128.1711501.07 1129.1111504.55  1129.7
11523.57 1131.19 11554.6 1133.2911584.23 1135.8711605.89 1138.08 11640.3 1141.45
11653.25 1142.9811694.22 1146.3511704.71 1147.34 11741.2 1150.8611754.63 1152.15
11775.67 1154.2311804.67 1157.2911833.86 1159.2911854.29 1161.0811899.94 1165.56
11904.12 1165.7511907.31 1166.2811922.02  1167.811938.84 1169.3911954.19 1170.23
11965.16 1172.2211974.72 1173.2511980.98    1174   11993 1175.15 12017.9 1177.19
12041.41 1178.3812063.17 1179.0612074.52 1179.4212090.94 1180.0312112.78 1180.76
12144.43 1180.7412162.79  1180.512174.74 1180.3512189.59 1180.2412212.58 1180.39
12224.42 1180.8912238.05 1179.6512243.33 1179.75 12244.4 1179.3812247.54 1179.17
12252.55 1179.7312262.77 1180.0112263.59 1180.1512266.03 1181.1912290.36 1181.48
12314.45 1181.5112343.27 1181.83 12363.2 1182.5212374.43  1182.8 12396.3 1183.87
12424.98 1185.86 12453.2 1186.5712474.54 1187.26   12499 1188.6412511.18 1188.94
 12544.3 1189.83 12559.2 1190.4912572.76 1190.49

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   10254      .111270.34    .03311303.62      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      11270.3411303.62            63.77   63.77   63.77             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   1025411262.72 1121.86       F
11314.6512572.76 1121.86       F

CROSS SECTION


RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1048

INPUT
Description:
Station Elevation Data    num=     132
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   10254 1184.2310254.97  1185.410289.95 1188.2110305.08 1189.2610320.18 1190.31
   10355 1192.2810390.09 1194.3510405.29 1194.37 10439.5 1193.1210454.76 1192.15
10490.52 1184.5710505.22 1183.8310540.71 1177.75 10555.1 1176.1410569.74 1174.07
10605.01 1169.5710640.57 1166.3510655.36 1163.9410690.77 1159.6810705.29 1157.83
10740.75 1154.5910755.34 1153.07   10790 1149.6810804.33 1148.2510840.48  1144.8
10855.03 1143.3610890.57 1139.8210905.04 1138.2710940.13 1134.7110954.98 1133.32
10990.37 1130.2310998.44 1129.3611005.12 1128.6411039.64 1125.3511054.97 1123.81
11070.53 1123.04 11104.6 1121.93 11122.5 1121.3811154.86 1120.7311170.21 1120.44
11202.72 1119.0411205.16 1118.9611214.51 1118.59   11255 1117.36 11255.5 1117.35
11257.24 1117.2911264.04 1117.2511281.01 1117.0811286.77 1114.7911286.99 1114.72
11287.13 1114.7111290.47 1114.3511290.81  1114.411293.48 1114.8811295.03 1115.91
11296.15 1116.6511296.57 1116.8211300.27 1116.6811314.72 1116.5911335.17 1116.66
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11348.69 1116.8311360.75 1116.9611371.53 1117.2711375.41 1117.3511379.77 1117.44
11384.64 1117.5111393.32 1117.2411404.03 1117.45 11409.1 1117.3711415.95 1117.54
11419.95 1117.6311422.26 1117.6711424.07 1118.1511432.58 1119.3111447.07 1120.73
11472.85 1123.7411481.55 1124.65 11518.3 1127.9811518.97 1127.8711535.54 1128.82
11572.37 1131.9311588.76 1133.6611611.94 1136.0911621.95 1137.19 11631.8 1138.66
 11673.5 1143.5811681.53 1144.4111722.84  1148.3 11733.2  1149.311772.39 1153.04
11782.07 1153.9611821.94 1157.7811838.75 1159.9511872.17 1162.8411888.69 1164.45
11922.22 1167.9511938.52 1169.4711972.98 1172.7111986.09 1174.1112001.77 1174.93
12022.02  1177.4 12024.5 1177.6212071.81 1180.1112086.22 1180.5612100.54  1181.1
12121.96 1181.8712136.62  1182.1 12172.7  1182.1 12186.8 1181.9112199.52 1181.74
12220.17 1181.58 12235.2  1182.212249.93 1182.3412265.85  1180.712273.51 1181.54
12276.84 1182.0312289.33 1181.6712322.53 1181.9612332.55 1182.2512372.28 1182.76
12372.36 1182.7712387.03 1183.1512404.76 1184.15 12442.6 1186.7712479.95 1187.69
12492.26 1188.1312500.73 1188.39 12528.2 1189.9512534.93 1190.3512570.93 1191.29
12582.28 1191.79 12592.8 1191.79

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   10254      .111281.01    .03311296.57      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      11281.0111296.57            47.73   47.73   47.73             .1       .3

CROSS SECTION


RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1000

INPUT
Description:
Station Elevation Data    num=     131
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   10254 1184.7910257.13 1184.7910269.88 1185.8210307.23  1188.410344.43 1191.01
 10356.9 1191.7110369.48 1192.4610407.33 1192.5110420.04 1192.0510457.33 1189.66
 10470.6 1186.8510507.51 1184.9710520.96 1182.6710557.18 1178.6210593.98  1173.4
 10607.1 1171.7210620.35 1170.52 10657.8 1164.4310670.51  1162.9 10707.3 1158.22
10720.85 1156.9810757.48 1153.1710770.94 1151.8510806.96 1148.2510820.92 1146.92
 10857.3  1143.310870.86 1141.9510889.38 1139.97 10907.1 1138.0810920.33 1136.74
10957.17 1133.2910971.19 1132.0711007.32  1128.211021.49 1126.8611057.13  1123.3
11091.27 1121.6411106.18 1121.1811141.79 1120.1311156.75 1119.8511171.96 1119.48
11190.81 1119.0111202.33 1118.4511205.57 1118.3411212.18 1118.1811215.28 1118.08
11218.99 1117.9611248.78 1116.7911268.19 1116.61 11301.2 1116.1611301.53 1116.16
11301.61 1116.1311304.56 1115.2611306.41 1115.0811308.26 1115.3311309.43 1115.49
 11309.5 1115.5211310.97 1116.1111312.84 1116.8611316.78 1116.7111341.27 1115.84
11345.26 1115.9611387.51 1117.5111396.27 1117.7311398.25 1117.81 11400.1 1117.87
11413.68 1118.0811423.38 1118.2311432.67 1118.5611438.39 1118.3911460.76 1117.67
11468.48 1117.6911473.17 1117.6211476.64 1117.5411484.87 1118.6611515.34 1121.65
11529.92 1123.3411556.19 1126.0711577.83 1128.0211578.21 1127.9711608.15 1129.68
11629.71 1131.4811634.91 1132.0311651.44 1133.7611679.33 1136.8111707.08 1140.93
11729.97 1143.6411756.88 1146.4211779.69 1148.57 11808.2 1151.3311829.33 1153.34
11857.26    115611879.13  1158.111911.08 1162.2311929.31 1163.82 11961.3 1166.94
11979.47 1168.8412011.22 1171.8212030.01 1173.5912037.12 1174.3512068.42 1176.01
12078.64 1177.2512106.22 1179.67 12130.1 1180.9412137.31 1181.1612167.02 1182.29
 12179.1 1182.7312210.16 1183.2112229.88 1183.2212237.54 1183.1112265.09 1182.77
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12276.31 1182.6812284.43 1183.0212316.93 1183.3512326.25 1182.412330.73 1182.89
12332.67 1183.1712360.85 1182.3812378.58 1182.53 12407.5 1183.3812429.12 1183.66
12437.05 1183.8712479.23 1186.2612499.47 1187.6612519.36 1188.1512549.59 1189.24
12570.47 1189.8912584.98 1190.7112600.88 1191.64 12620.1 1192.1512647.23 1193.34
12653.13 1193.34

Manning's n Values   num=   3
     Sta   n Val   Sta   n Val   Sta   n Val
   10254   .111301.53   .03311312.84   .1

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.
      11301.5311312.84   0   0   0   .1   .3
Right Levee   Station=11312.84   Elevation= 1116.86

SUMMARY OF MANNING'S N VALUES

River:Trib to Jim Blue

Reach	River Sta.	n1	n2	n3
Trib to Jim Blue	1295	.035	.03	.035
Trib to Jim Blue	1262	.035	.03	.035
Trib to Jim Blue	1199	.035	.033	.035
Trib to Jim Blue	1154.25	Bridge		
Trib to Jim Blue	1112	.1	.033	.1
Trib to Jim Blue	1048	.1	.033	.1
Trib to Jim Blue	1000	.1	.033	.1

SUMMARY OF REACH LENGTHS

River: Trib to Jim Blue

Reach	River Sta.	Left	Channel	Right
Trib to Jim Blue	1295	32.57	32.57	32.57
Trib to Jim Blue	1262	63.23	63.23	63.23
Trib to Jim Blue	1199	86.7	86.7	86.7
Trib to Jim Blue	1154.25	Bridge		
Trib to Jim Blue	1112	63.77	63.77	63.77
Trib to Jim Blue	1048	47.73	47.73	47.73
Trib to Jim Blue	1000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Trib to Jim Blue

Reach	River Sta.	Contr.	Expan.

Trib to Jim Blue	1295		.1	.3
Trib to Jim Blue	1262		.1	.3
Trib to Jim Blue	1199		.1	.3
Trib to Jim Blue	1154.25	Bridge		
Trib to Jim Blue	1112		.1	.3
Trib to Jim Blue	1048		.1	.3
Trib to Jim Blue	1000		.1	.3

Appendix E – Hydraulic Model – Proposed Bridge

HEC-RAS Plan: Proposed: 3-12'x7' RCB River: Trib to Jim Blue Reach: Trib to Jim Blue

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib to Jim Blue	1295 U/S FAR	Q2	261.00	1116.79	1119.59	1119.02	1119.63	0.000768	2.09	201.12	252.96	0.27
Trib to Jim Blue	1295 U/S FAR	Q5	490.00	1116.79	1120.46	1119.33	1120.49	0.000319	1.74	443.15	297.12	0.18
Trib to Jim Blue	1295 U/S FAR	Q10	688.00	1116.79	1121.02	1119.55	1121.04	0.000246	1.72	614.14	318.60	0.17
Trib to Jim Blue	1295 U/S FAR	Q25	993.00	1116.79	1121.73	1119.76	1121.75	0.000202	1.77	850.66	349.52	0.16
Trib to Jim Blue	1295 U/S FAR	Q50	1330.00	1116.79	1122.39	1119.95	1122.41	0.000177	1.84	1090.47	376.03	0.15
Trib to Jim Blue	1295 U/S FAR	Q100	1560.00	1116.79	1122.89	1120.06	1122.92	0.000151	1.82	1284.45	391.31	0.14
Trib to Jim Blue	1295 U/S FAR	Q500	2460.00	1116.79	1124.79	1120.45	1124.81	0.000093	1.76	2083.44	453.70	0.12
Trib to Jim Blue	1262 U/S	Q2	261.00	1116.68	1119.53		1119.60	0.000957	2.42	162.36	193.44	0.30
Trib to Jim Blue	1262 U/S	Q5	490.00	1116.68	1120.43		1120.47	0.000447	2.12	360.10	242.69	0.22
Trib to Jim Blue	1262 U/S	Q10	688.00	1116.68	1120.99		1121.03	0.000351	2.11	502.36	264.46	0.20
Trib to Jim Blue	1262 U/S	Q25	993.00	1116.68	1121.70		1121.74	0.000291	2.18	699.96	293.46	0.19
Trib to Jim Blue	1262 U/S	Q50	1330.00	1116.68	1122.36		1122.41	0.000259	2.27	903.57	323.15	0.18
Trib to Jim Blue	1262 U/S	Q100	1560.00	1116.68	1122.87		1122.91	0.000223	2.24	1073.30	345.65	0.17
Trib to Jim Blue	1262 U/S	Q500	2460.00	1116.68	1124.77		1124.81	0.000132	2.12	1792.55	415.01	0.14
Trib to Jim Blue	1199 U/S BRIDGE	Q2	261.00	1116.26	1118.72	1118.72	1119.39	0.014587	6.54	39.89	29.77	1.00
Trib to Jim Blue	1199 U/S BRIDGE	Q5	490.00	1116.26	1119.54	1119.54	1120.32	0.011066	7.16	71.64	68.60	0.92
Trib to Jim Blue	1199 U/S BRIDGE	Q10	688.00	1116.26	1119.99	1119.99	1120.88	0.010897	7.75	93.89	92.58	0.93
Trib to Jim Blue	1199 U/S BRIDGE	Q25	993.00	1116.26	1120.55	1120.55	1121.59	0.009501	8.45	127.99	138.53	0.90
Trib to Jim Blue	1199 U/S BRIDGE	Q50	1330.00	1116.26	1121.04	1121.04	1122.24	0.008993	9.18	159.28	168.62	0.90
Trib to Jim Blue	1199 U/S BRIDGE	Q100	1560.00	1116.26	1121.88	1121.32	1122.79	0.005064	8.05	212.93	212.01	0.71
Trib to Jim Blue	1199 U/S BRIDGE	Q500	2460.00	1116.26	1124.71	1122.28	1124.79	0.000370	3.10	1231.39	363.21	0.21
Trib to Jim Blue	1154.25		Culvert									
Trib to Jim Blue	1112 D/S BRIDGE	Q2	261.00	1115.97	1117.98	1117.98	1118.62	0.014864	6.40	40.77	32.05	1.00
Trib to Jim Blue	1112 D/S BRIDGE	Q5	490.00	1115.97	1118.74	1118.74	1119.56	0.010911	7.35	75.13	69.04	0.92
Trib to Jim Blue	1112 D/S BRIDGE	Q10	688.00	1115.97	1119.20	1119.20	1120.18	0.010046	8.12	104.74	102.95	0.92
Trib to Jim Blue	1112 D/S BRIDGE	Q25	993.00	1115.97	1119.76	1119.76	1120.99	0.009804	9.21	140.84	143.21	0.94
Trib to Jim Blue	1112 D/S BRIDGE	Q50	1330.00	1115.97	1120.30	1120.30	1121.77	0.009628	10.19	175.53	170.99	0.95
Trib to Jim Blue	1112 D/S BRIDGE	Q100	1560.00	1115.97	1120.62	1120.62	1122.26	0.009725	10.85	195.81	184.24	0.97
Trib to Jim Blue	1112 D/S BRIDGE	Q500	2460.00	1115.97	1121.81	1121.81	1123.98	0.009244	12.65	271.95	235.80	0.99
Trib to Jim Blue	1048 D/S	Q2	261.00	1114.35	1117.68	1117.44	1117.99	0.004789	5.25	131.74	177.78	0.61
Trib to Jim Blue	1048 D/S	Q5	490.00	1114.35	1118.25	1118.02	1118.59	0.004881	6.12	238.75	198.99	0.63
Trib to Jim Blue	1048 D/S	Q10	688.00	1114.35	1118.61	1118.32	1118.98	0.005064	6.75	313.85	213.48	0.66
Trib to Jim Blue	1048 D/S	Q25	993.00	1114.35	1118.98	1118.68	1119.44	0.005953	7.86	395.60	225.74	0.73
Trib to Jim Blue	1048 D/S	Q50	1330.00	1114.35	1119.28	1119.01	1119.85	0.007138	9.07	463.64	235.17	0.81
Trib to Jim Blue	1048 D/S	Q100	1560.00	1114.35	1119.50	1119.19	1120.11	0.007490	9.63	515.45	242.33	0.83
Trib to Jim Blue	1048 D/S	Q500	2460.00	1114.35	1120.01	1119.86	1120.94	0.010518	12.32	643.17	259.35	1.01
Trib to Jim Blue	1000 D/S FAR	Q2	261.00	1115.08	1117.26	1117.26	1117.63	0.013139	6.92	115.30	143.77	0.96
Trib to Jim Blue	1000 D/S FAR	Q5	490.00	1115.08	1117.68	1117.68	1118.19	0.015294	8.70	180.77	178.77	1.08
Trib to Jim Blue	1000 D/S FAR	Q10	688.00	1115.08	1117.95	1117.93	1118.55	0.016594	9.86	234.73	213.43	1.15
Trib to Jim Blue	1000 D/S FAR	Q25	993.00	1115.08	1118.41	1118.41	1119.00	0.014488	10.40	345.98	269.84	1.10
Trib to Jim Blue	1000 D/S FAR	Q50	1330.00	1115.08	1118.77	1118.77	1119.38	0.013872	11.04	447.99	290.14	1.10
Trib to Jim Blue	1000 D/S FAR	Q100	1560.00	1115.08	1118.85	1118.55	1119.59	0.016618	12.29	470.96	292.56	1.21
Trib to Jim Blue	1000 D/S FAR	Q500	2460.00	1115.08	1119.46	1119.43	1120.29	0.016594	13.81	658.64	320.27	1.25

Plan: Proposed: 3-12'x7' RCB Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Culv Group: Triple RCB Profile: Q2

Q Culv Group (cfs)	261.00	Culv Full Len (ft)	
# Barrels	3	Culv Vel US (ft/s)	2.74
Q Barrel (cfs)	87.00	Culv Vel DS (ft/s)	2.61
E.G. US. (ft)	1118.68	Culv Inv El Up (ft)	1115.86
W.S. US. (ft)	1118.72	Culv Inv El Dn (ft)	1115.74
E.G. DS (ft)	1118.62	Culv Frctn Ls (ft)	0.01
W.S. DS (ft)	1117.98	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.06	Culv Entr Loss (ft)	0.06
Delta WS (ft)	0.74	Q Weir (cfs)	
E.G. IC (ft)	1117.69	Weir Sta Lft (ft)	
E.G. OC (ft)	1118.68	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1118.51	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1118.51	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.05	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.18	Min El Weir Flow (ft)	1124.44

Plan: Proposed: 3-12'x7' RCB Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Culv Group: Triple RCB Profile: Q5

Q Culv Group (cfs)	490.00	Culv Full Len (ft)	
# Barrels	3	Culv Vel US (ft/s)	3.92
Q Barrel (cfs)	163.33	Culv Vel DS (ft/s)	3.78
E.G. US. (ft)	1119.69	Culv Inv El Up (ft)	1115.86
W.S. US. (ft)	1119.54	Culv Inv El Dn (ft)	1115.74
E.G. DS (ft)	1119.56	Culv Frctn Ls (ft)	0.01
W.S. DS (ft)	1118.74	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.13	Culv Entr Loss (ft)	0.12
Delta WS (ft)	0.81	Q Weir (cfs)	
E.G. IC (ft)	1118.67	Weir Sta Lft (ft)	
E.G. OC (ft)	1119.69	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1119.34	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1119.34	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.59	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.79	Min El Weir Flow (ft)	1124.44

Plan: Proposed: 3-12'x7' RCB Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Culv Group: Triple RCB Profile: Q10

Q Culv Group (cfs)	688.00	Culv Full Len (ft)	
# Barrels	3	Culv Vel US (ft/s)	4.81
Q Barrel (cfs)	229.33	Culv Vel DS (ft/s)	4.66
E.G. US. (ft)	1120.37	Culv Inv El Up (ft)	1115.86
W.S. US. (ft)	1119.99	Culv Inv El Dn (ft)	1115.74
E.G. DS (ft)	1120.18	Culv Frctn Ls (ft)	0.02
W.S. DS (ft)	1119.20	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.20	Culv Entr Loss (ft)	0.18
Delta WS (ft)	0.79	Q Weir (cfs)	
E.G. IC (ft)	1119.41	Weir Sta Lft (ft)	
E.G. OC (ft)	1120.37	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1119.83	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1119.84	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.98	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.25	Min El Weir Flow (ft)	1124.44

Plan: Proposed: 3-12'x7' RCB Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Culv Group: Triple RCB Profile: Q25

Q Culv Group (cfs)	993.00	Culv Full Len (ft)	
# Barrels	3	Culv Vel US (ft/s)	6.01
Q Barrel (cfs)	331.00	Culv Vel DS (ft/s)	5.85
E.G. US. (ft)	1121.29	Culv Inv El Up (ft)	1115.86
W.S. US. (ft)	1120.55	Culv Inv El Dn (ft)	1115.74
E.G. DS (ft)	1120.99	Culv Frctn Ls (ft)	0.02
W.S. DS (ft)	1119.76	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.30	Culv Entr Loss (ft)	0.28
Delta WS (ft)	0.79	Q Weir (cfs)	
E.G. IC (ft)	1120.43	Weir Sta Lft (ft)	
E.G. OC (ft)	1121.29	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1120.45	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1120.46	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.54	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.87	Min El Weir Flow (ft)	1124.44

Plan: Proposed: 3-12'x7' RCB Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Culv Group: Triple RCB Profile: Q50

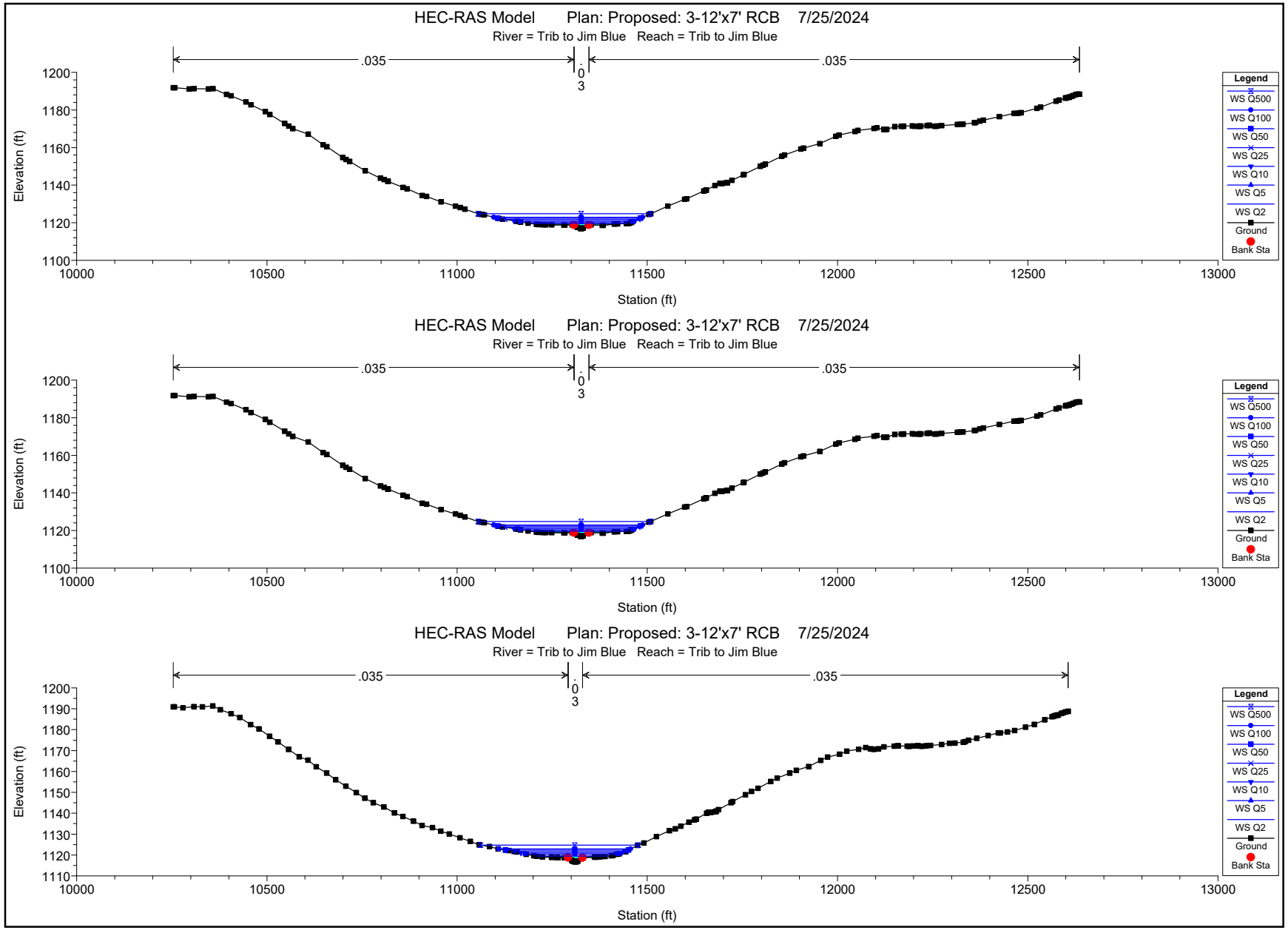
Q Culv Group (cfs)	1330.00	Culv Full Len (ft)	
# Barrels	3	Culv Vel US (ft/s)	7.19
Q Barrel (cfs)	443.33	Culv Vel DS (ft/s)	7.01
E.G. US. (ft)	1122.20	Culv Inv El Up (ft)	1115.86
W.S. US. (ft)	1121.04	Culv Inv El Dn (ft)	1115.74
E.G. DS (ft)	1121.77	Culv Frctn Ls (ft)	0.03
W.S. DS (ft)	1120.30	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.43	Culv Entr Loss (ft)	0.40
Delta WS (ft)	0.74	Q Weir (cfs)	
E.G. IC (ft)	1121.44	Weir Sta Lft (ft)	
E.G. OC (ft)	1122.20	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1121.00	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1121.01	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.10	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	3.49	Min El Weir Flow (ft)	1124.44

Plan: Proposed: 3-12'x7' RCB Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Culv Group: Triple RCB Profile: Q100

Q Culv Group (cfs)	1560.00	Culv Full Len (ft)	
# Barrels	3	Culv Vel US (ft/s)	7.94
Q Barrel (cfs)	520.00	Culv Vel DS (ft/s)	7.75
E.G. US. (ft)	1122.79	Culv Inv El Up (ft)	1115.86
W.S. US. (ft)	1121.88	Culv Inv El Dn (ft)	1115.74
E.G. DS (ft)	1122.26	Culv Frctn Ls (ft)	0.03
W.S. DS (ft)	1120.62	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.52	Culv Entr Loss (ft)	0.49
Delta WS (ft)	1.26	Q Weir (cfs)	
E.G. IC (ft)	1122.09	Weir Sta Lft (ft)	
E.G. OC (ft)	1122.79	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1121.32	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1121.33	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.47	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	3.88	Min El Weir Flow (ft)	1124.44

Plan: Proposed: 3-12'x7' RCB Trib to Jim Blue Trib to Jim Blue RS: 1154.25 Culv Group: Triple RCB Profile: Q500

Q Culv Group (cfs)	2375.74	Culv Full Len (ft)	
# Barrels	3	Culv Vel US (ft/s)	9.96
Q Barrel (cfs)	791.91	Culv Vel DS (ft/s)	9.76
E.G. US. (ft)	1124.80	Culv Inv El Up (ft)	1115.86
W.S. US. (ft)	1124.71	Culv Inv El Dn (ft)	1115.74
E.G. DS (ft)	1123.98	Culv Frctn Ls (ft)	0.05
W.S. DS (ft)	1121.81	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.82	Culv Entr Loss (ft)	0.77
Delta WS (ft)	2.90	Q Weir (cfs)	84.26
E.G. IC (ft)	1124.53	Weir Sta Lft (ft)	11170.08
E.G. OC (ft)	1124.80	Weir Sta Rgt (ft)	11379.64
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	1122.49	Weir Max Depth (ft)	0.37
Culv WS Outlet (ft)	1122.50	Weir Avg Depth (ft)	0.28
Culv Nml Depth (ft)	4.69	Weir Flow Area (sq ft)	58.47
Culv Crt Depth (ft)	5.13	Min El Weir Flow (ft)	1124.44


HEC-RAS Model Plan: Proposed: 3-12'x7' RCB 7/25/2024
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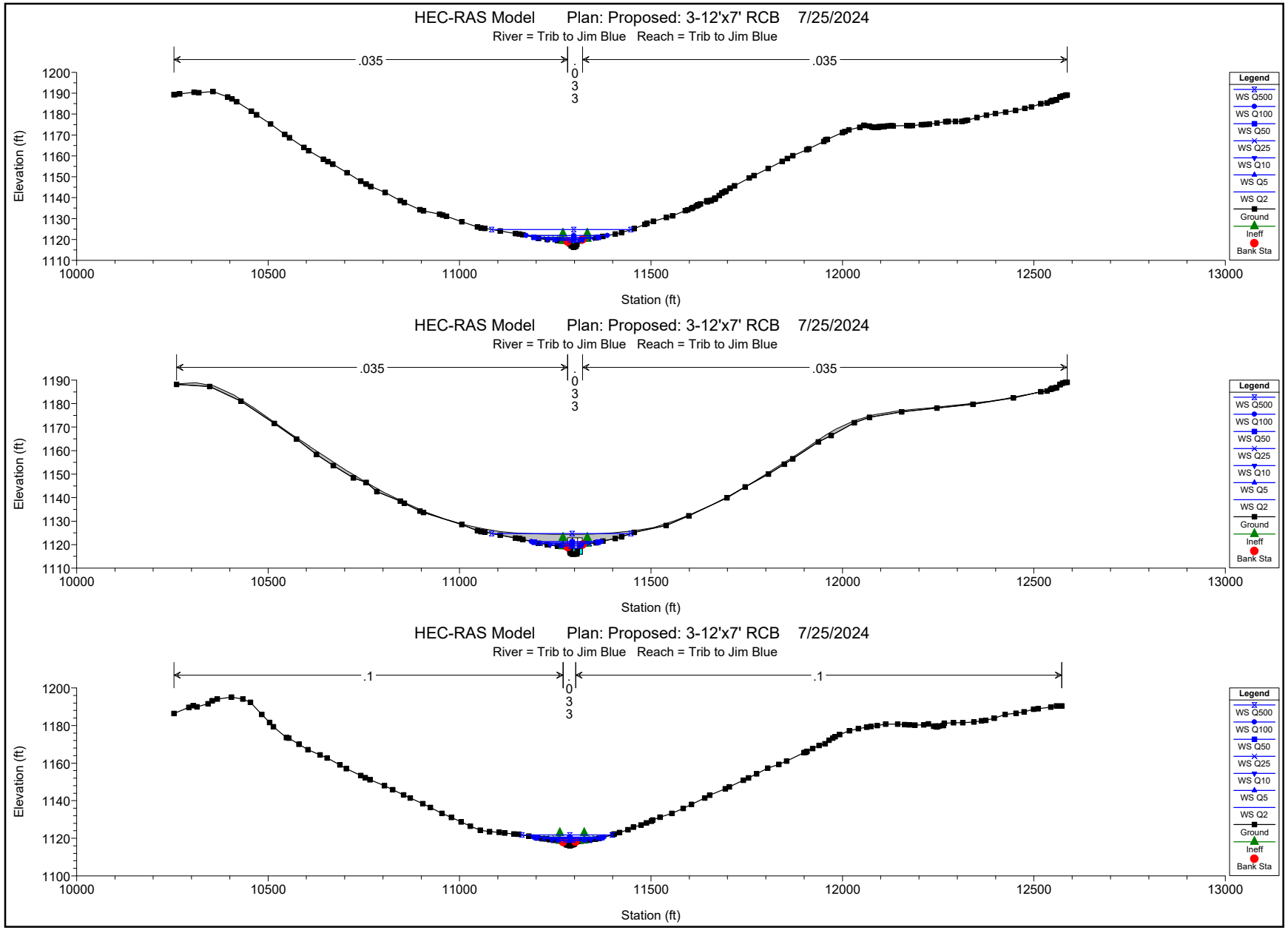
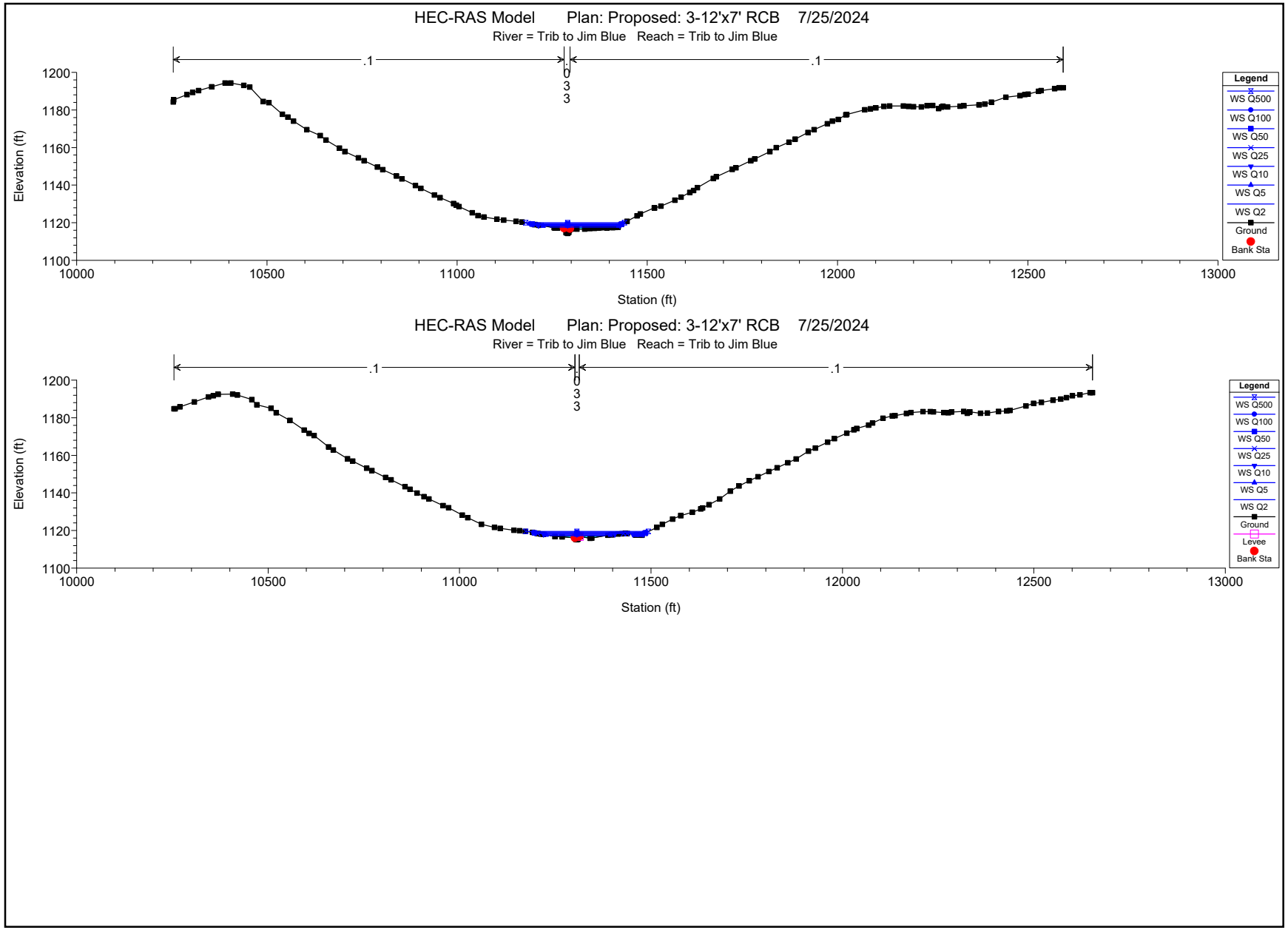
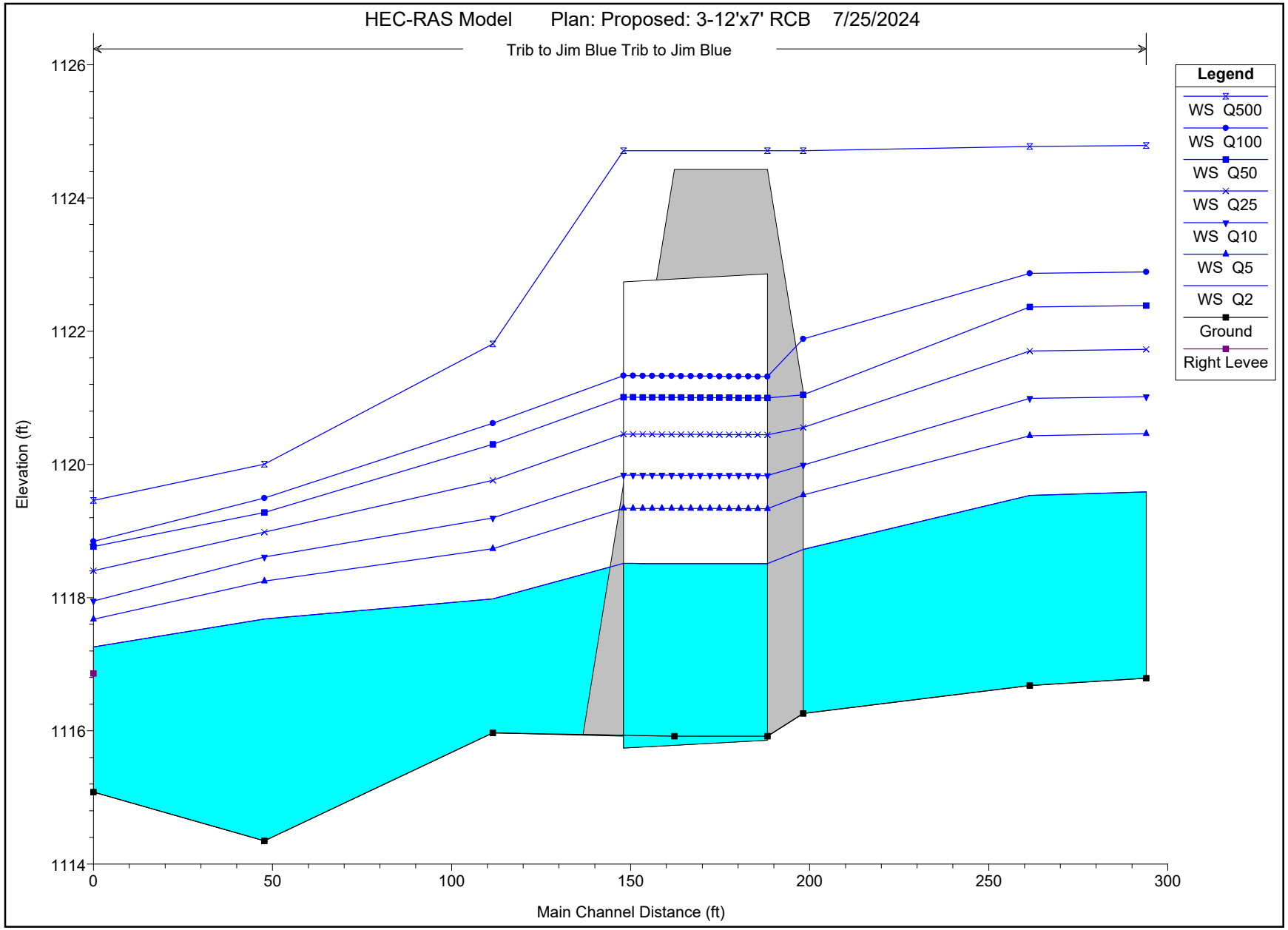
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta
HEC-RAS Model Plan: Proposed: 3-12'x7' RCB 7/25/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta
HEC-RAS Model Plan: Proposed: 3-12'x7' RCB 7/25/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta


HEC-RAS Model Plan: Proposed: 3-12'x7' RCB 7/25/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.035
.033
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Ineff
Bank Sta
HEC-RAS Model Plan: Proposed: 3-12'x7' RCB 7/25/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.035
.035
.033
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Ineff
Bank Sta
HEC-RAS Model Plan: Proposed: 3-12'x7' RCB 7/25/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.1
.1
.033
Elevation (ft)
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed: 3-12'x7' RCB 7/25/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.1
0
3
3
.1
Elevation (ft)
1200
1180
1160
1140
1120
1100
10000
10500
11000
11500
12000
12500
13000
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Bank Sta
HEC-RAS Model Plan: Proposed: 3-12'x7' RCB 7/25/2024
River = Trib to Jim Blue Reach = Trib to Jim Blue
.1
0
3
3
.1
Elevation (ft)
1200
1180
1160
1140
1120
1100
10000
10500
11000
11500
12000
12500
13000
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Levee
Bank Sta


HEC-RAS Model Plan: Proposed: 3-12'x7' RCB 7/25/2024
Trib to Jim Blue Trib to Jim Blue
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q5
WS Q2
Ground
Right Levee
Elevation (ft)
1126
1124
1122
1120
1118
1116
1114
0
50
100
150
200
250
300
Main Channel Distance (ft)

HEC-RAS HEC-RAS 6.3.1 September 2022
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
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X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
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PROJECT DATA
Project Title: HEC-RAS Model
Project File : Post Oak Rd.prj
Run Date and Time: 7/25/2024 1:53:58 PM

Project in English units

Project Description:
CRS Info=<SpatialReference> <CoordinateSystem Code="2268"
Unit="US_survey_Foot" AcadCode="OK83-SF" /></SpatialReference>

PLAN DATA

Plan Title: Proposed: 3-12'x7' RCB
Plan File : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05
Civil\Docs\Drainage\Models\Post Oak Rd.p11

Geometry Title: Proposed: 3-12'x7' RCB
Geometry File : G:\projects\2024\2403010281_City of Norman_Post Oak
Bridge\05 Civil\Docs\Drainage\Models\Post Oak Rd.g07

Flow Title   : Steady Flow
Flow File   : G:\projects\2024\2403010281_City of Norman_Post Oak
Bridge\05 Civil\Docs\Drainage\Models\Post Oak Rd.f01

Plan Description:
Proposed scenario w/3-12'x6'-10" RCB

Plan Summary Information:
Number of: Cross Sections =   6   Multiple Openings =   0
            Culverts   =   1   Inline Structures =   0
            Bridges   =   0   Lateral Structures =   0

Computational Information
    Water surface calculation tolerance = 0.01
    Critical depth calculation tolerance = 0.01
    Maximum number of iterations   = 20
    Maximum difference tolerance   = 0.33
    Flow tolerance factor   = 0.001

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

FLOW DATA

Flow Title: Steady Flow
Flow File : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05 Civil\Docs\Drainage\Models\Post Oak Rd.f01

Flow Data (cfs)

River	Reach	RS	Q2	Q5	Q10	Q25	Q50	Q100	Q500
Trib to Jim Blue	Trib to Jim Blue	1295	261	490	688	993	1330	1560	2460

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Trib to Jim Blue	Trib to Jim Blue	Q2	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q5	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q10	Normal S = 0.01659	Normal S = 0.01659
Trib to Jim Blue	Trib to Jim Blue	Q25	Normal S = 0.01659	

Normal S = 0.01659
  Trib to Jim BlueTrib to Jim BlueQ50 Normal S = 0.01659
Normal S = 0.01659
  Trib to Jim BlueTrib to Jim BlueQ100 Normal S = 0.01659
Normal S = 0.01659
  Trib to Jim BlueTrib to Jim BlueQ500 Normal S = 0.01659
Normal S = 0.01659

GEOMETRY DATA

Geometry Title: Proposed: 3-12'x7' RCB
Geometry File : G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05 Civil\Docs\Drainage\Models\Post Oak Rd.g07

CROSS SECTION

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue RS: 1295

INPUT
Description:
Station Elevation Data num= 157

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10254	1191.82	10257.4	1191.82	10295.92	1191.14	10308.14	1191.37	10346.66	1191.18
10358.46	1191.36	10393.7	1188.31	10405.63	1187.48	10444.75	1184.21	10457.78	1182.72
10496	1179.05	10507.8	1177.59	10547.09	1172.75	10557.51	1171.37	10568.03	1170.06
10608.82	1167.18	10647.78	1161.49	10657.59	1160.44	10699.27	1154.62	10708.43	1153.61
10717.63	1152.59	10758.32	1147.64	10798.43	1143.71	10808.06	114310817.55		1142.03
10818.64	1141.95	10858.11	1138.84	10868.56	1137.98	10908.37	1134.49	10919.43	1134.06
10957.95	1131.11	10995.66	1128.82	11007.82	1128.03	11020.36	1127.24	11058.45	1124.59
11064.49	1124.41	1071.59	1124.17	11108.76	1122.27	11119.24	1121.93	11158.19	1120.75
11166.56	1120.39	11186.81	1119.79	11208.74	1119.14	11214.36	1119.01	11226.37	1118.93
11233.37	1118.89	11248.86	1118.84	11280.92	1118.73	11283.04	1118.72	11302.51	1118.88
11307.56	1118.89	11309.64	1118.58	11316.42	1117.51	11324.57	1116.89	11325.84	1116.79
11330.06	1117.11	11330.26	1117.13	11331.11	1117.14	11343.99	1118.55	11346.43	1118.86
11351.95	1118.91	11381.21	1118.71	11383.78	1118.68	11413.45	1119.32	11422.07	1119.38
11445.02	1119.54	11449.64	1119.68	11450.78	1119.73	11452.22	1119.79	11453.91	1119.86
11458.59	1120.14	11503.77	1124.38	11508.87	1124.75	11553.52	1128.86	11597.93	1132.48
11603.37	1132.78	11648.12	1136.92	11653.77	1137.34	11655.31	1137.46	11677.72	1139.79
11690.88	1140.91	11694.89	1140.91	11695.44	1140.83	11695.57	1140.75	11695.66	1140.82
11707	1141.22	11710.58	1141.35	11710.65	1141.35	11710.72	1141.39	11722.47	1142.53
11752.38	1145.49	11754.05	1145.71	11797.44	1149.95	11803.85	1150.57	11810.31	1151.16
11854.06	1155.47	11860.72	1156.11	11903.79	1159.22	11910.64	1159.74	11953.59	1162.1
11995.94	1165.97	12003.62	1166.66	12045.95	1168.48	12053.47	1169.11	2095.75	1170.18
12103.47	1170.54	12121.17	1169.67	12124.51	1169.56	12129.32	1169.68	12150.81	1171.13

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12631.81 1188.4312635.85 1188.43

Manning's n Values   num=   3
     Sta   n Val   Sta   n Val   Sta   n Val
   10254   .03511307.56   .0311346.43   .035

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.
      11307.5611346.43   32.57   32.57   32.57   .1   .3

CROSS SECTION

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1262

INPUT
Description:
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10357.67 1191.3710378.01 1189.610405.87 1187.6910428.51 1185.810457.57 1182.46
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12446.49 1178.9112465.51 1179.5512494.34 1181.1412517.42 1182.5812544.54 1184.7
12563.63 1186.2212568.79 1186.5412568.97 1186.5412569.46 1186.59 12574.8 1186.81
12577.59 1186.9312577.75 1186.9712578.55 1186.9112580.62 1187.0812588.98 1187.83
12593.47 1188.1512599.46 1188.5212605.99 1188.7812606.04 1188.78

Manning's n Values   num=   3
     Sta   n Val   Sta   n Val   Sta   n Val
   10254   .03511291.95   .0311330.11   .035

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.
      11291.9511330.11   63.23   63.23   63.23   .1   .3

CROSS SECTION

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1199

INPUT
Description:
Station Elevation Data   num=   174
     Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev
   10254 1189.3310256.27 1189.3310269.03 1189.7210306.68 1190.4310319.32 1190.2
10355.97 1190.810394.32 1188.2110405.69 1187.3110418.07 1185.94 10456.5 1181.45
10469.66 1179.7510506.22 1175.2410543.46 1170.3110555.81 1168.7710593.57 1164.03
10606.07 1162.5110644.43 1158.410656.12 1157.2810669.06 1155.9810705.93 1151.91
10742.12 1147.8910755.96 1146.5210767.69 1145.3110805.95 1142.4910844.95 1138.54
10855.94 1137.65 10896.8 1134.3   10906 1133.7210947.96 1132.0910955.96 1131.62
10965.73 1131.1211006.13 1128.4911046.49 1125.9411056.15 1125.5511066.01 1125.27
11106.15 1124.0211146.34 1122.7911156.05 1122.5811165.65 1122.23 11206.3 1120.55
11229.03 1120.0111255.93 1119.3811261.59 1119.3911271.38 1119.2611276.65 1119.19
11282.15 1118.9311288.08 1117.8211291.93 1116.9711296.51 1116.6111298.66 1116.26
11300.15 1116.5511303.08 1116.7711303.82 1116.8211306.58 1117.5811316.05 1119.26
11318.25 1119.6511321.11 1119.9511333.63 1120.3311356.37 1120.7911374.34 1121.48
11406.41 1122.5811423.24 1123.31 11456.2 1125.2411483.65 1127.2411489.41 1127.66
11506.42 1128.6611540.17 1130.5711556.27 1131.2811589.54 1133.7611596.13 1134.19
11606.61 1134.811609.29 1135.2411618.09 1135.9111621.79 1136.2811623.43 1136.49
11629.24 1136.9311646.07 1138.3611646.08 1138.3711646.21 1138.4411646.25 1138.45
11646.64 1138.4711646.67 1138.4211646.87 1138.0411654.98 1138.511656.25 1138.57
 11657.7 1138.6711666.62 1139.2711666.65 1139.3311666.84 1139.6911666.89 1139.69
11667.28 1139.68 11667.3 1139.6811667.41 1139.6611677.83 1141.111685.71 1142.15
11691.81 1142.7911693.98 1142.9911695.74 1143.2111705.97 1144.4911706.64 1144.55
11718.18 1145.74 11756.7 1149.46 11769.1 1150.6111806.18 1153.9411842.69 1157.43
11856.19 1158.7411870.35 1160.0811906.57 1162.8811911.83 1163.3711951.11 1166.89
 11956.4 1167.6511960.72 1167.9312000.15 1171.1812006.49 1171.712016.88 1172.42

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 12045.2 1173.7112056.12 1174.6112057.25 1174.66 12070.6 1174.2212077.74 1173.76
12082.53 1173.6612087.45 1173.7112093.15 1173.7512093.97 1173.8512094.74 1173.93
12097.05 1173.9412097.65 1173.9112100.36 1173.9512106.19    117412108.07 1174.03
 12108.6 1174.0512109.91 1174.1212118.42 1174.3312127.82 1174.5512132.53 1174.42
12168.24 1174.5412175.44 1174.4912182.57  1174.512206.02 1174.9212211.64 1174.99
12218.68 1175.0512226.89 1175.1912246.65 1175.7212269.52 1176.3812271.39 1176.28
12276.78 1176.4912295.18 1176.5312311.96 1176.5312319.91 1176.8212326.43 1177.13
12351.24 1178.3312376.39 1179.4412399.46 1180.3112426.39 1180.9212452.25 1181.79
12476.45 1182.7312493.62 1183.4712518.48 1185.0312534.19 1185.4112543.77 1186.08
12547.64 1186.4512548.07 1186.4712548.36 1186.4912551.86 1186.6112558.27 1186.82
12558.75 1186.8512559.21 1186.8712567.82 1188.1112568.28 1188.1712568.95 1188.22
12575.38 1188.6412582.34 1189.0612583.59 1189.1112586.77 1189.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   10254    .03511282.15    .03311321.11    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      11282.1511321.11             86.7    86.7    86.7             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   1025411269.89 1122.86       F
11333.8512586.77 1122.86       F

CULVERT


RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1154.25

INPUT
Description:
Distance from Upstream XS =      10
Deck/Roadway Width        =      26
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=     107
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
10259.59 1188.33         10260.7 1188.35        10309.56 1188.89
10309.74 1188.89        10310.97 1188.86        10311.35 1188.85
10359.07 1187.46        10359.67 1187.44        10405.76 1184.07
10409.71 1183.75        10455.83 1178.95        10459.73 1178.55
10463.49 1178.11        10509.68 1172.83        10558.51 1167.25
 10559.6 1167.12        10579.26 1164.99        10608.94 1161.77
10609.29 1161.73         10659.7 1156.33         10659.7 1156.33
10660.24 1156.27        10708.81 1151.15        10709.53 1151.08
10710.27 1151.01        10759.73 1146.19        10805.87 1141.98
 10808.9 1141.71        10809.06 1141.69        10827.75 1140.23
10859.26 1137.77        10859.52 1137.75        10909.23 1134.06
10909.65 1134.03        10959.14 1131.04        10959.76    1131
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10959.96 1130.99        10960.39 1130.97        11009.66 1128.62
   11011 1128.57         11059.7 1126.78        11107.88 1125.49
 11150.1 1124.95         11200.1 1124.57        11244.95 1124.43
11316.46 1124.43        11350.45 1124.51         11400.1    1125
 11450.1  1125.8        11487.32 1126.69        11508.38 1127.33
11509.86 1127.39        11557.46 1129.91        11559.78 1130.03
11608.14 1133.18        11609.78 1133.29        11610.36 1133.33
11658.81 1136.94        11660.01 1137.03        11661.26 1137.14
11709.11 1141.18        11709.74 1141.24        11758.84 1145.86
11760.35    1146        11808.92 1150.89        11809.91    1151
11848.67    1155        11859.73 1156.13           11860 1156.16
11860.29 1156.19         11900.2 1160.42        11909.86 1161.44
11909.92 1161.45        11911.71 1161.65        11934.79 1164.26
11950.63 1165.98        11959.64 1166.95        11970.07 1167.97
11980.27 1168.96        11980.78    1169        11994.52 1170.03
12030.14 1172.69        12031.43 1172.76        12080.44  1175.2
12082.81 1175.27        12130.35 1176.53        12131.53 1176.55
12180.15 1177.48        12228.69 1178.22        12229.87 1178.24
12275.47    1179        12279.55 1179.07        12280.32 1179.08
12328.95 1179.96        12330.41 1179.99        12378.22 1180.94
12380.21 1180.97        12427.77 1182.16        12430.14 1182.21
12477.82 1183.72        12480.23  1183.8        12517.41 1184.95
12518.49 1184.98        12564.07 1187.36        12565.35 1187.42
 12565.9 1187.46        12579.84 1187.46

Upstream Bridge Cross Section Data
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
10261.05 1188.2210347.32 1187.3110429.27 1181.0710516.12 1171.52 10574.3  1164.9
10626.19  1158.410670.34 1153.6410722.63 1148.3910755.96 1146.5210784.21 1142.54
10844.95 1138.5410855.94 1137.65 10896.8  1134.3   10906 1133.7211006.13 1128.49
11046.49 1125.9411056.15 1125.5511066.01 1125.2711106.15 1124.0211146.34 1122.79
11156.05 1122.5811165.65 1122.23 11206.3 1120.5511229.03 1120.0111255.93 1119.38
11261.59 1119.3911271.38 1119.2611276.65 1119.1911282.15 1118.9311288.08 1117.82
11289.96 1117.3311290.06 1116.3511294.17 1115.9211298.44 1115.9311302.31 1116.05
11306.67 1116.08 11307.1 1117.1811316.05 1119.2611318.25 1119.6511321.11 1119.95
11333.63 1120.3311356.37 1120.7911374.34 1121.4811406.41 1122.5811423.24 1123.31
 11456.2 1125.2411539.49 1128.1111598.75 1132.2611698.68 1139.9511746.32 1144.58
11806.74 1149.95   11848 1154.2211870.51 1156.5411937.11 1163.6611970.58 1166.42
   12031 1171.91 12070.6 1174.2212154.61 1176.4812247.07 1178.1412340.98 1179.76
12446.38 1182.4912518.48 1185.0312534.19 1185.4112543.77 1186.0812547.64 1186.45
12548.07 1186.4712548.36 1186.4912551.86 1186.6112558.27 1186.8212558.75 1186.85
12559.21 1186.8712567.82 1188.1112568.28 1188.1712568.95 1188.2212575.38 1188.64
12582.34 1189.0612583.59 1189.1112586.77 1189.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
10261.05    .03511282.15    .03311321.11    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
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      11282.1511321.11             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
10261.0511269.89 1122.86       F
11333.8512586.77 1122.86       F

Downstream  Deck/Roadway Coordinates
    num=     108
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
10249.94 1188.35         10298.8 1188.89        10298.98 1188.89
10300.21 1188.86        10300.59 1188.85        10348.31 1187.46
10348.91 1187.44           10395 1184.07        10398.95 1183.75
10445.07 1178.95        10448.97 1178.55        10452.73 1178.11
10498.92 1172.83        10547.75 1167.25        10548.84 1167.12
 10568.5 1164.99        10598.18 1161.77        10598.53 1161.73
10648.94 1156.33        10648.94 1156.33        10649.48 1156.27
10698.05 1151.15        10698.77 1151.08        10699.51 1151.01
10748.97 1146.19        10795.11 1141.98        10798.14 1141.71
 10798.3 1141.69        10816.99 1140.23         10848.5 1137.77
10848.76 1137.75        10898.47 1134.06        10898.89 1134.03
10948.38 1131.04           10949    1131         10949.2 1130.99
10949.63 1130.97         10998.9 1128.62        11000.24 1128.57
11048.94 1126.78        11098.68 1125.52        11098.95 1125.51
11107.88 1125.49         11150.1 1124.95         11200.1 1124.57
11244.95 1124.43        11316.46 1124.43        11350.45 1124.51
 11400.1    1125         11450.1  1125.8        11487.32 1126.69
11497.62 1127.33         11499.1 1127.39         11546.7 1129.91
11549.02 1130.03        11597.38 1133.18        11599.02 1133.29
 11599.6 1133.33        11648.05 1136.94        11649.25 1137.03
 11650.5 1137.14        11698.35 1141.18        11698.98 1141.24
11748.08 1145.86        11749.59    1146        11798.16 1150.89
11799.15    1151        11837.91    1155        11848.97 1156.13
11849.24 1156.16        11849.53 1156.19        11889.44 1160.42
 11899.1 1161.44        11899.16 1161.45        11900.95 1161.65
11924.03 1164.26        11939.87 1165.98        11948.88 1166.95
11959.31 1167.97        11969.51 1168.96        11970.02    1169
11983.76 1170.03        12019.38 1172.69        12020.67 1172.76
12069.68  1175.2        12072.05 1175.27        12119.59 1176.53
12120.77 1176.55        12169.39 1177.48        12217.93 1178.22
12219.11 1178.24        12264.71    1179        12268.79 1179.07
12269.56 1179.08        12318.19 1179.96        12319.65 1179.99
12367.46 1180.94        12369.45 1180.97        12417.01 1182.16
12419.38 1182.21        12467.06 1183.72        12469.47  1183.8
12506.65 1184.95        12507.73 1184.98        12553.31 1187.36
12554.59 1187.42        12555.14 1187.46        12569.08 1187.46

Downstream Bridge Cross Section Data
Station Elevation Data    num=      70
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
10252.13 1188.1310288.61 1187.9410308.15 1187.3510373.36 1183.6910405.17  1182.3
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10436.99 1178.6910518.54 1167.6910572.33 1162.1910635.08 1155.3910686.63 1150.94
10753.87 1145.1810843.54  1137.310909.97 1131.6911028.34 1126.4611054.16 1124.29
11078.26 1123.5311103.89  1123.2 11117.6 1122.7711141.98  1122.3 11154.1 1122.16
11181.07 1121.13 11203.9 1120.1611215.65 1119.7911226.87 1119.6511234.81 1119.33
11247.16 1119.0511249.87 1118.9711261.71 1118.6211270.34 1118.0611272.61 1117.76
11278.49 1116.5811279.46 1116.3111283.46 1116.11 11283.8 1115.9211289.85 1115.93
11291.63 1116.0511295.91 1116.0711296.07  1116.611298.15 1116.74 11299.7 1117.08
11303.62 1118.1611306.53 1118.2511310.36 1118.4411318.41 1118.5211327.46 1118.75
11335.04 1118.9711339.86 1119.1111354.87 1119.4611364.69 1119.9311400.38 1121.88
11404.27 1122.3211417.63 1123.0411439.92 1124.5511454.44 1125.9811532.81 1128.56
 11632.4 1133.8811681.35 1138.5911748.88  1143.311836.65 1151.0711937.93  1160.9
12000.39  1167.5 12069.6 1170.5712130.37 1173.4312181.01 1174.8712277.22 1174.87
12368.38 1178.9612461.22 1183.67 12544.3 1189.83 12559.2 1190.4912572.76 1190.49

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
10252.13      .111270.34    .03311303.62      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
      11270.3411303.62             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
10252.1311261.73 1122.74       F
11325.7512572.76 1122.74       F

Upstream Embankment side slope              =       3 horiz. to 1.0 vertical
Downstream Embankment side slope            =       3 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Triple RCB           Box       7      12
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 10   40.19     .011     .011        0                   .5
      1
Number of Barrels =  3
Upstream   Elevation =  1115.86
Centerline Stations
    Sta.    Sta.    Sta.
11288.63 11301.611314.59
Downstream Elevation =  1115.74
```

Centerline Stations
    Sta.   Sta.   Sta.
11280.9511293.9611306.96

CROSS SECTION

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1112

INPUT
Description:
Station Elevation Data   num=   133
     Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev   Sta   Elev
   10254 1186.4 10293.3 1189.7110304.06 1190.5710314.07 1189.9110343.23 1191.56
10354.06 1193.2410367.48 1194.0310404.24 1195.0710434.28 1194.0210453.72 1192.31
10483.73 1185.8610504.18 1181.5510513.91 1179.36 10547.9 1173.5410554.11 1173.28
10580.53 1170.0810604.14 1167.08 10635.7 1164.3210654.04 1162.6610687.54 1159.11
10704.17 1157.1110741.93 1153.3610753.93 1152.2710765.89 1151.110803.56 1147.95
10825.45 1145.8710853.97 1143.1210871.03 1141.4210903.92 1138.4210923.69 1136.41
10953.85 1133.2510978.52 1131.111004.25 1128.7611028.34 1126.4611054.16 1124.29
11078.26 1123.5311103.89 1123.2 11117.6 1122.7711141.98 1122.3 11154.1 1122.16
11181.07 1121.13 11203.9 1120.1611215.65 1119.7911226.87 1119.6511234.81 1119.33
11247.16 1119.0511249.87 1118.9711261.71 1118.6211270.34 1118.0611272.61 1117.76
11278.49 1116.5811282.33 1116.3311287.75 1115.9711292.33 1116.3111296.07 1116.6
11298.15 1116.74 11299.7 1117.0811303.62 1118.1611306.53 1118.2511310.36 1118.44
11318.41 1118.5211327.46 1118.7511335.04 1118.9711339.86 1119.1111354.87 1119.46
11364.69 1119.9311400.38 1121.8811404.27 1122.3211417.63 1123.0411439.92 1124.55
11454.44 1125.9811474.18 1127.1211488.37 1128.1711501.07 1129.1111504.55 1129.7
11523.57 1131.19 11554.6 1133.2911584.23 1135.8711605.89 1138.08 11640.3 1141.45
11653.25 1142.9811694.22 1146.3511704.71 1147.34 11741.2 1150.8611754.63 1152.15
11775.67 1154.2311804.67 1157.2911833.86 1159.2911854.29 1161.0811899.94 1165.56
11904.12 1165.7511907.31 1166.2811922.02 1167.811938.84 1169.3911954.19 1170.23
11965.16 1172.2211974.72 1173.2511980.98   1174   11993 1175.15 12017.9 1177.19
12041.41 1178.3812063.17 1179.0612074.52 1179.4212090.94 1180.0312112.78 1180.76
12144.43 1180.7412162.79 1180.512174.74 1180.3512189.59 1180.2412212.58 1180.39
12224.42 1180.8912238.05 1179.6512243.33 1179.75 12244.4 1179.3812247.54 1179.17
12252.55 1179.7312262.77 1180.0112263.59 1180.1512266.03 1181.1912290.36 1181.48
12314.45 1181.5112343.27 1181.83 12363.2 1182.5212374.43 1182.8 12396.3 1183.87
12424.98 1185.86 12453.2 1186.5712474.54 1187.26   12499 1188.6412511.18 1188.94
 12544.3 1189.83 12559.2 1190.4912572.76 1190.49

Manning's n Values   num=   3
     Sta   n Val   Sta   n Val   Sta   n Val
   10254   .111270.34   .03311303.62   .1

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.
      11270.3411303.62   63.77   63.77   63.77   .1   .3
Ineffective Flow   num=   2
   Sta L   Sta R   Elev Permanent

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   1025411261.73 1122.74       F
11325.7512572.76 1122.74       F

CROSS SECTION


RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1048

INPUT
Description:
Station Elevation Data    num=     132
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   10254 1184.2310254.97  1185.410289.95 1188.2110305.08 1189.2610320.18 1190.31
   10355 1192.2810390.09 1194.3510405.29 1194.37 10439.5 1193.1210454.76 1192.15
10490.52 1184.5710505.22 1183.8310540.71 1177.75 10555.1 1176.1410569.74 1174.07
10605.01 1169.5710640.57 1166.3510655.36 1163.9410690.77 1159.6810705.29 1157.83
10740.75 1154.5910755.34 1153.07   10790 1149.6810804.33 1148.2510840.48  1144.8
10855.03 1143.3610890.57 1139.8210905.04 1138.2710940.13 1134.7110954.98 1133.32
10990.37 1130.2310998.44 1129.3611005.12 1128.6411039.64 1125.3511054.97 1123.81
11070.53 1123.04 11104.6 1121.93 11122.5 1121.3811154.86 1120.7311170.21 1120.44
11202.72 1119.0411205.16 1118.9611214.51 1118.59   11255 1117.36 11255.5 1117.35
11257.24 1117.2911264.04 1117.2511281.01 1117.0811286.77 1114.7911286.99 1114.72
11287.13 1114.7111290.47 1114.3511290.81  1114.411293.48 1114.8811295.03 1115.91
11296.15 1116.6511296.57 1116.8211300.27 1116.6811314.72 1116.5911335.17 1116.66
11348.69 1116.8311360.75 1116.9611371.53 1117.2711375.41 1117.3511379.77 1117.44
11384.64 1117.5111393.32 1117.2411404.03 1117.45 11409.1 1117.3711415.95 1117.54
11419.95 1117.6311422.26 1117.6711424.07 1118.1511432.58 1119.3111447.07 1120.73
11472.85 1123.7411481.55 1124.65 11518.3 1127.9811518.97 1127.8711535.54 1128.82
11572.37 1131.9311588.76 1133.6611611.94 1136.0911621.95 1137.19 11631.8 1138.66
 11673.5 1143.5811681.53 1144.4111722.84  1148.3 11733.2  1149.311772.39 1153.04
11782.07 1153.9611821.94 1157.7811838.75 1159.9511872.17 1162.8411888.69 1164.45
11922.22 1167.9511938.52 1169.4711972.98 1172.7111986.09 1174.1112001.77 1174.93
12022.02  1177.4 12024.5 1177.6212071.81 1180.1112086.22 1180.5612100.54  1181.1
12121.96 1181.8712136.62  1182.1 12172.7  1182.1 12186.8 1181.9112199.52 1181.74
12220.17 1181.58 12235.2  1182.212249.93 1182.3412265.85  1180.712273.51 1181.54
12276.84 1182.0312289.33 1181.6712322.53 1181.9612332.55 1182.2512372.28 1182.76
12372.36 1182.7712387.03 1183.1512404.76 1184.15 12442.6 1186.7712479.95 1187.69
12492.26 1188.1312500.73 1188.39 12528.2 1189.9512534.93 1190.3512570.93 1191.29
12582.28 1191.79 12592.8 1191.79

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   10254      .111281.01    .03311296.57      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      11281.0111296.57            47.73   47.73   47.73             .1       .3

CROSS SECTION
```

RIVER: Trib to Jim Blue
REACH: Trib to Jim Blue   RS: 1000

INPUT
Description:
Station Elevation Data   num=   131

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10254	1184.79	10257.13	1184.79	10269.88	1185.82	10307.23	1188.41	10344.43	1191.01
10356.9	1191.71	10369.48	1192.46	10407.33	1192.51	10420.04	1192.05	10457.33	1189.66
10470.6	1186.85	10507.51	1184.97	10520.96	1182.67	10557.18	1178.62	10593.98	1173.4
10607.1	1171.72	10620.35	1170.52	10657.8	1164.43	10670.51	1162.9	10707.3	1158.22
10720.85	1156.98	10757.48	1153.17	10770.94	1151.85	10806.96	1148.25	10820.92	1146.92
10857.3	1143.31	10870.86	1141.95	10889.38	1139.97	10907.1	1138.08	10920.33	1136.74
10957.17	1133.29	10971.19	1132.07	11007.32	1128.21	11021.49	1126.86	11057.13	1123.3
11091.27	1121.64	11106.18	1121.18	11141.79	1120.13	11156.75	1119.85	11171.96	1119.48
11190.81	1119.01	11202.33	1118.45	11205.57	1118.34	11212.18	1118.18	11215.28	1118.08
11218.99	1117.96	11248.78	1116.79	11268.19	1116.61	11301.2	1116.16	11301.53	1116.16
11301.61	1116.13	11304.56	1115.26	11306.41	1115.08	11308.26	1115.33	11309.43	1115.49
11309.5	1115.52	11310.97	1116.11	11312.84	1116.86	11316.78	1116.71	11341.27	1115.84
11345.26	1115.96	11387.51	1117.51	11396.27	1117.73	11398.25	1117.81	11400.1	1117.87
11413.68	1118.08	11423.38	1118.23	11432.67	1118.56	11438.39	1118.39	11460.76	1117.67
11468.48	1117.69	11473.17	1117.62	11476.64	1117.54	11484.87	1118.66	11515.34	1121.65
11529.92	1123.34	11556.19	1126.07	11577.83	1128.02	11578.21	1127.97	11608.15	1129.68
11629.71	1131.48	11634.91	1132.03	11651.44	1133.76	11679.33	1136.81	11707.08	1140.93
11729.97	1143.64	11756.88	1146.42	11779.69	1148.57	11808.2	1151.33	11829.33	1153.34
11857.26	1156	11879.13	1158.11	11908.08	1162.23	11929.31	1163.82	11961.3	1166.94
11979.47	1168.84	12011.22	1171.82	12030.01	1173.59	12037.12	1174.35	12068.42	1176.01
12078.64	1177.25	12106.22	1179.67	12130.1	1180.94	12137.31	1181.16	12167.02	1182.29
12179.1	1182.73	12210.16	1183.21	12229.88	1183.22	12237.54	1183.11	12265.09	1182.77
12276.31	1182.68	12284.43	1183.02	12316.93	1183.35	12326.25	1182.41	12330.73	1182.89
12332.67	1183.17	12360.85	1182.38	12378.58	1182.53	12407.5	1183.38	12429.12	1183.66
12437.05	1183.87	12479.23	1186.26	12499.47	1187.66	12519.36	1188.15	12549.59	1189.24
12570.47	1189.89	12584.98	1190.71	12600.88	1191.64	12620.1	1192.15	12647.23	1193.34
12653.13	1193.34								

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
10254	.11	11301.53	.03	11312.84	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
11301.53	11312.84	0	0	0	.1	.3

Right Levee   Station=11312.84   Elevation= 1116.86

SUMMARY OF MANNING'S N VALUES

River:Trib to Jim Blue

Reach	River Sta.	n1	n2	n3
Trib to Jim Blue	1295	.035	.03	.035
Trib to Jim Blue	1262	.035	.03	.035
Trib to Jim Blue	1199	.035	.033	.035
Trib to Jim Blue	1154.25	Culvert		
Trib to Jim Blue	1112	.1	.033	.1
Trib to Jim Blue	1048	.1	.033	.1
Trib to Jim Blue	1000	.1	.033	.1

SUMMARY OF REACH LENGTHS

River: Trib to Jim Blue

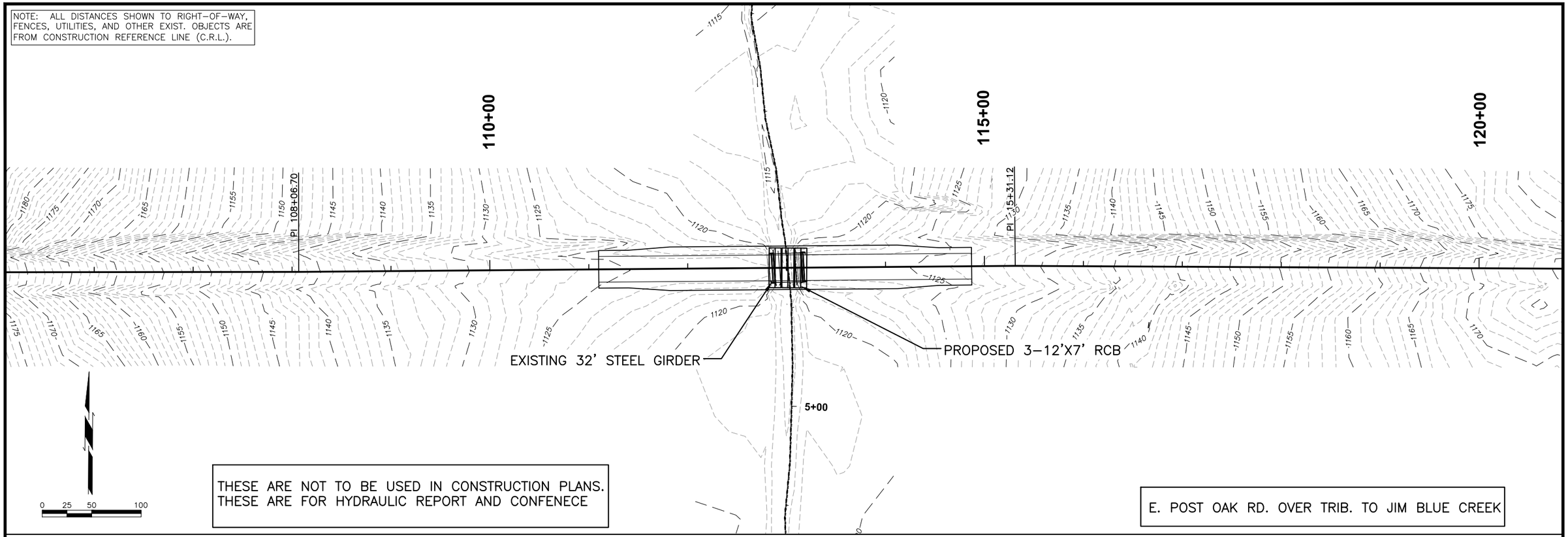
Reach	River Sta.	Left	Channel	Right
Trib to Jim Blue	1295	32.57	32.57	32.57
Trib to Jim Blue	1262	63.23	63.23	63.23
Trib to Jim Blue	1199	86.7	86.7	86.7
Trib to Jim Blue	1154.25	Culvert		
Trib to Jim Blue	1112	63.77	63.77	63.77
Trib to Jim Blue	1048	47.73	47.73	47.73
Trib to Jim Blue	1000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Trib to Jim Blue

Reach	River Sta.	Contr.	Expan.
Trib to Jim Blue	1295	.1	.3
Trib to Jim Blue	1262	.1	.3
Trib to Jim Blue	1199	.1	.3
Trib to Jim Blue	1154.25	Culvert	
Trib to Jim Blue	1112	.1	.3
Trib to Jim Blue	1048	.1	.3
Trib to Jim Blue	1000	.1	.3

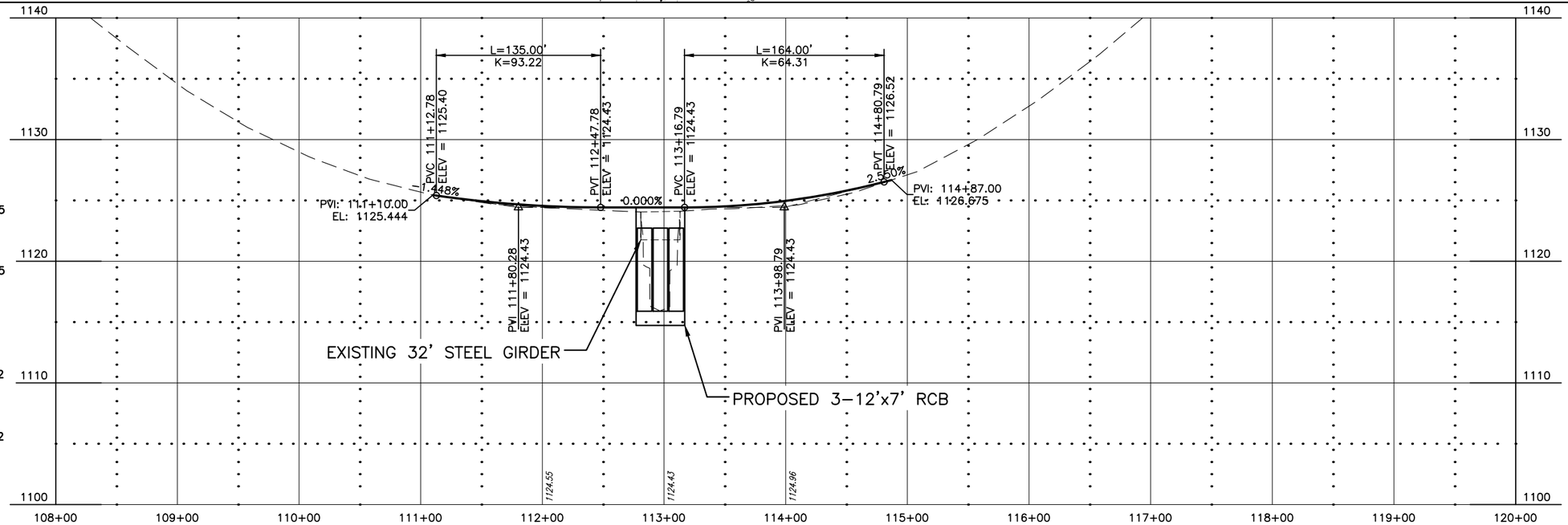
Appendix H – Hydraulic P&P – Creek Flowline Profile

NOTE: ALL DISTANCES SHOWN TO RIGHT-OF-WAY, FENCES, UTILITIES, AND OTHER EXIST. OBJECTS ARE FROM CONSTRUCTION REFERENCE LINE (C.R.L.).



THESE ARE NOT TO BE USED IN CONSTRUCTION PLANS.
THESE ARE FOR HYDRAULIC REPORT AND CONFENECE

E. POST OAK RD. OVER TRIB. TO JIM BLUE CREEK



EXISTING STRUCTURE
32' STEEL GIRDER

Proposed Alignment =	Sta. 112+97.05
Creek Sta. =	Sta. 1154.25
Bridge Length=	32 ft.
Low Beam =	1121.76 ft.
RDWAY OT Elev.=	1124.00 ft.
RDWAY OT STA.=	Sta. 112+97.05

PROPOSED STRUCTURE
3-12'X7' RCB

Proposed Alignment =	Sta. 112+97.02
Creek Sta.=	Sta. 1107.74
Culvert Length=	40'-2" ft.
FL In=	1115.86 ft.
RDWAY OT Elev.=	1124.43 ft.
RDWAY OT STA.=	Sta. 112+97.02

DESIGN	DJG
DRAWN	DJG
CHECKED	XXX
MKEC	

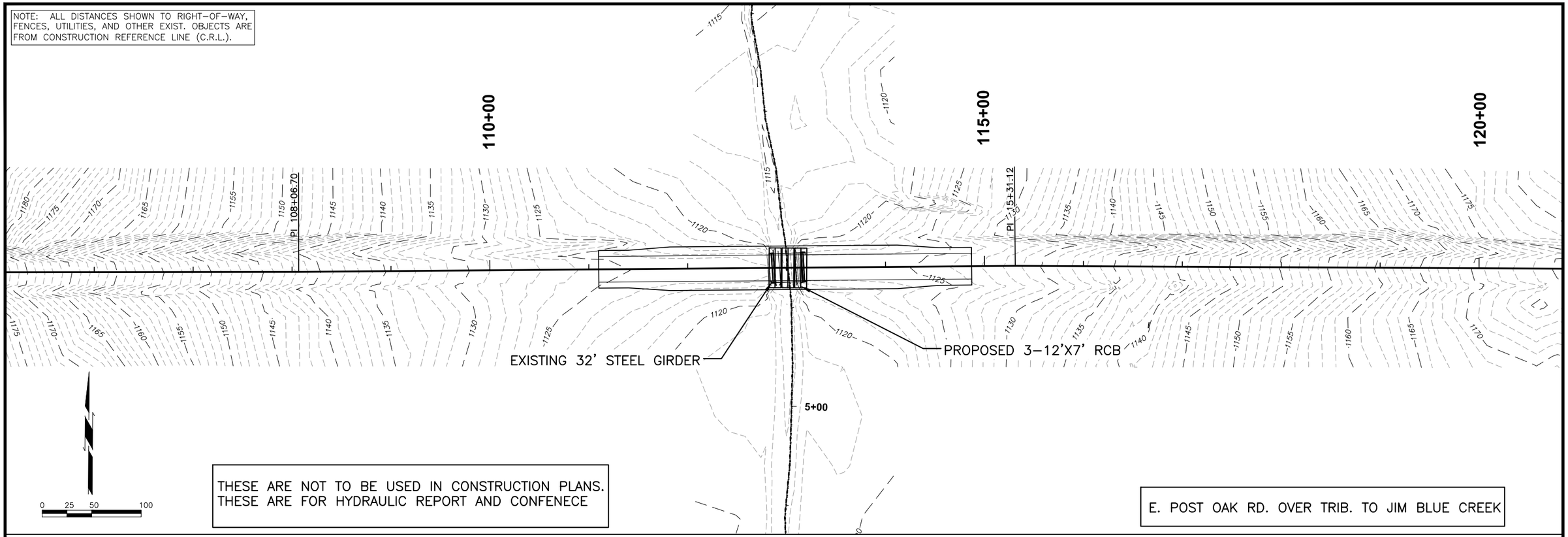
E. POST OAK RD. CLEVELAND COUNTY

HYDRAULIC PLAN & PROFILE

JOB PIECE NO. K-2324-151 Sheet No. 1

PLOTTED: Thursday, July 25, 2024 @ 03:27PM
G:\projects\2024\2403012\81-City of Norman_Post Oak Bridge\05 Civil\Docs\Drainage\Drawing\Hydraulic Plan & Profile.dwg

NOTE: ALL DISTANCES SHOWN TO RIGHT-OF-WAY, FENCES, UTILITIES, AND OTHER EXIST. OBJECTS ARE FROM CONSTRUCTION REFERENCE LINE (C.R.L.).



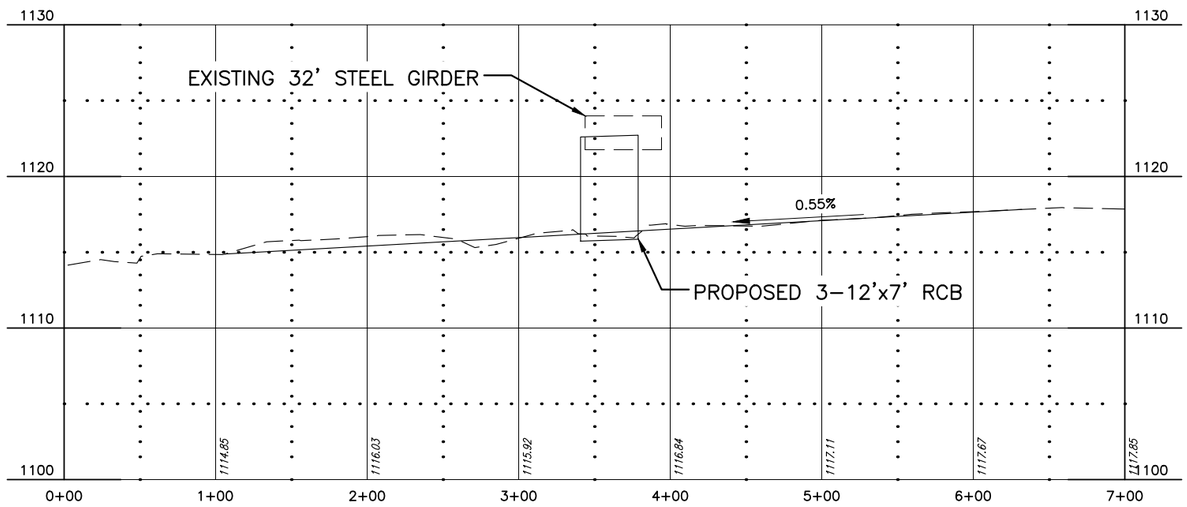
0 25 50 100

THESE ARE NOT TO BE USED IN CONSTRUCTION PLANS.
THESE ARE FOR HYDRAULIC REPORT AND CONFENECE

E. POST OAK RD. OVER TRIB. TO JIM BLUE CREEK

EXISTING STRUCTURE
32' STEEL GIRDER
Proposed Alignment = Sta. 112+97.05
Creek Sta. = Sta. 1154.25
Bridge Length= 32 ft.
Low Beam = 1121.76 ft.
RDWAY OT Elev.= 1124.00 ft.
RDWAY OT STA.= Sta. 112+97.05

PROPOSED STRUCTURE
3-12'X7' RCB
Proposed Alignment = Sta. 112+97.02
Creek Sta.= Sta. 1107.74
Culvert Length= 40'-2" ft.
FL In= 1115.86 ft.
RDWAY OT Elev.= 1124.43 ft.
RDWAY OT STA.= Sta. 112+97.02



DESIGN	DJG	E. POST OAK RD. CLEVELAND COUNTY
DRAWN	DJG	**CREEK FLOWLINE PROFILE**
CHECKED	XXX	
MKEC		JOB PIECE NO. K-2324-151 Sheet No. 2

PLOTTED: Thursday, July 25, 2024 @ 03:29PM G:\projects\2024\2403010281_City of Norman_Post Oak Bridge\05 Civil\Docs\Drainage\Drawing\Hydraulic Plan & Profile.dwg