City-wide Flood Protection Planning Study for the City of Texarkana, Texas
Final Report

Prepared by

HALFF

for the

Texas Water Development Board

January 2012

HALFF

January 31, 2012
27093

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RE: Final Report – City of Texarkana, City-wide Flood Protection Planning Study, TWDB Contract No. 1004831090

Dear Mr. Ortiz:

We are pleased to submit the attached Final Report prepared under the above referenced contract. Included are seven (7) copies of the report and each copy contains a CD in Appendix H, with all digital files, models, and a PDF of the report.

Following our submittal of the draft report, we received TWDB comments dated December 19, 2011. These comments have been addressed and were incorporated into the final report submittal. The TWDB comments and responses are included in the final report as Appendix G.

If you have any questions or comments regarding this final report submittal, please contact me at (817) 847-1422. We appreciate your support of the City of Texarkana on this very important project.

Sincerely,

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City of Texarkana
City-wide Flood Protection
Planning Study
Final Report

Prepared for:

Texas Water Development Board

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List of Acronyms

ASPRS	American Society of Photogrammetry and Remote Sensing
B/C	Benefit Cost
BCAD	Bowie County Appraisal District
cfs	Cubic Feet per Second
CDBG	Community Development Black Grant
CN	Curve Number
D/S	Downstream
DEM	Digital Elevation Model
DFIRM	Digital Flood Insurance Rate Map
FDA	Flood Damage Reduction Analysis
FEMA	Federal Emergency Management Agency
FIPS	Federal Information Processing Standard
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
ft	Feet
GIS	Geographic Information System
HEC	Hydrologic Engineering Center
HMGP	Hazard Mitigation Grant Program
HMS	Hydrologic Modeling System
IP	Individual Permit
LiDAR	Light Detection and Ranging
mi	Miles
NAD83	North American Datum 1983
NAVD88	North American Vertical Datum of 1988
NRCS	Natural Resources Conservation Service
NSSDA	National Standards for Spatial Data Accuracy
NWP	Nationwide Permit
RAS	River Analysis System
RMSE	Root Mean Square Error
SCS	Soil Conservation Service
sq. mi	Square Miles
SSURGO	Soil Survey Geographic database
t_c	Time of Concentration
TCEQ	Texas Commission on Environmental Quality
TNRIS	Texas Natural Resources Information System
TR	Technical Release
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
U/S	Upstream
USACE	United States Army Corps of Engineers
USFW	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
WSEL	Water Surface Elevation

1. Executive Summary

1. Executive Summary

The City of Texarkana located in Bowie County, Texas has experienced chronic flooding due to inadequate drainage systems in the watersheds located within the City. The purpose of the City of Texarkana City-wide Flood Protection Planning Study is to create new hydrologic and hydraulic models and perform a flood damage reduction alternative analysis to aid local officials in planning efforts. The City of Texarkana was awarded a Flood Protection Planning Grant from the Texas Water Development Board (TWDB) to help fund half of the project cost for this study.

New detailed hydrologic and hydraulic modeling was performed on Clear Creek, Corral Creek, Howard Creek, South Wagner Creek, Stream WC-1, Stream WC-2, Swampoodle Creek, Swampoodle Creek East Tributary, Swampoodle Creek West Channel, and Wagner Creek. This analysis was combined with the 2009 City of Texarkana Master Drainage Plan for Cowhorn Creek to create a basin wide study of the Texarkana, Texas watersheds. Detailed Light Detection and Ranging (LiDAR) elevation data, provided by the City of Texarkana, and cross section and bridge/culvert surveys were used to enhance the accuracy of the models. The analysis resulted in updated and more accurate discharges and water surface elevations (WSELs) for the 2-, 5-, 10-, 25-, 50-, 100-, 250-, and 500-year storm events. The resulting hydraulic data was then used to determine the annual flood damages and analyze flood reduction alternatives throughout the City of Texarkana.

Several flood reduction alternatives were identified during the flood damage reduction analysis (FDA). Structural and non-structural options were considered to help reduce flooding in the identified damage reaches. It was concluded from the analysis that detention options are costly and the benefits in flood damage reduction are predicted to be much lower than the cost of the project. Channel widening alternatives were analyzed but only a few damage reaches would realize benefits exceeding the cost of the project. The recommended alternatives that typically produce the highest benefit cost (B/C) ratios are structural acquisitions. The damage reduction (benefits) provided by each alternative over the existing conditions was compared to project costs with a B/C ratio and the results are included in the results section of this report.

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2. Introduction and Background

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2.1. Community and Watershed Description

The City of Texarkana, Texas (the City) is a rapidly developing community that is concerned about the increasing threat of flooding and associated damages due to increased urbanization, specifically in the upstream (northern) portions of the City. The City of Texarkana's future population growth and associated development will require careful planning and management in order to minimize flood damages and to ensure the maximum possible preservation of the City's flood drainage corridors.

The City of Texarkana is located in the eastern portion of Bowie County in the northeast corner of Texas. It is bordered by the Cities of Nash and Wake Village, Texas to the west; Texarkana, Arkansas to the east; and Bowie County unincorporated area to the north, south, and west as shown in Figure 1. Location Map located in Appendix A. The City is the transportation, commercial, and industrial center for the surrounding areas, as well as the hub for portions of Oklahoma and Louisiana. The City has an estimated 2010 population of 36, 411 (Reference 1). Texarkana continues to grow, relying on the vast agricultural industry of the area as well as a variety of commercial and manufacturing facilities.

The City of Texarkana is located in a region of temperate mean climatological conditions, experiencing occasional extremes of temperature and rainfall of relatively short duration. Temperatures range from an average daily minimum of 33 degrees Fahrenheit in December to an average daily maximum of 94 degrees Fahrenheit in August. Average annual rainfall is 52 inches (Reference 2).

There are five (5) main watersheds within the City of Texarkana that encompass a total watershed area of approximately 40.5 square miles: Clear Creek, Cowhorn Creek, Howard Creek, Swampoodle Creek and Wagner Creek. Elevations in the study area range from a high of about 380 feet (ft) in the upper reaches to a low of about 260 feet at the watershed outlet. The existing conditions range from flat non-defined channels to deep, well defined and improved channels. Most of the stream crossings are concrete bridges and culverts. Several stream crossings restrict natural flow and cause water to backup and overflow.

2.2. Purpose of Report

The purpose of this report, "City of Texarkana, City-wide Flood Protection Planning Study," is to provide a comprehensive, updated floodplain management master plan for the City of Texarkana watersheds. This study addresses existing flooding problems within the City and provides planning alternatives and design concepts to help alleviate potential flood damages. The information presented in this report will provide the City with the necessary updated drainage information to coordinate future development and to help minimize existing potential flood damages along major stream corridors within the City.

This report provides a summary of the procedures used to analyze the existing flood problems and presents results and recommendations that were derived from the analyses. Additional information (e.g. field survey notes, photographs, and work maps) and digital files used in the production of this report are located in the Appendices.

2.3. Principal Flooding Problems

The City of Texarkana has experienced chronic flooding for decades due to inadequate drainage systems within the City. Until recently, the City has been forced to construct improvements on a case-by-case basis that included channelization, detention, and other structural improvements. A comprehensive flood study is necessary to determine the overall effect these changes have had on existing and future flood elevations.

Many of the City's flood damages or related problems are caused by inadequate capacity of the existing channels and bridges. Existing development, subject to overbank flooding, is primarily residential, but also includes some commercial property. Primary flooding locations exist near the Howard Creek confluence with Days Creek, Wagner Creek near the confluence with Cowhorn Creek, Stream WC-2, Cowhorn Creek upper reaches, Swampoodle Creek between 5th Street and 14th Street, and Swampoodle East Tributary. The Swampoodle Creek flooding is of particular importance as it impacts structures utilized by many of the City's first responders. The Swampoodle East Tributary is the City's most concentrated area of documented flood losses, as reported by the NFIP.

There are approximately 248 residential structures and 90 commercial structures located within the limits of the current effective 100-year floodplain. Based on 2009 Bowie County Appraisal Data, the estimated value of these structures exceeds $46,000,000. The existing hydrology and hydraulics of the City watersheds are based on studies from the late 1980s and early 1990s. These studies were the basis for the floodplain elevations which were remapped as part of the Federal Emergency Management Agency (FEMA) 2010 Bowie County Flood Insurance Study (FIS) (Reference 3). This FIS Study contained no new studies and is considered to be outdated and unusable for current planning and floodplain management purposes.

Historically, severe damage to existing properties has occurred as a result of heavy rainfall events. The United States Army Corps of Engineers (USACE) produced a document titled "Flood Plain Information Days Creek and Tributaries, Texarkana Arkansas-Texas" in 1970 (Reference 4). This report cited major flooding in the City of Texarkana in 1926, 1930, 1932, 1938, 1940, 1945, 1958, and 1968. The 1968 event is considered the greatest known flood and was the result of 9.29 inches of rainfall in a 24-hour period. Newspaper accounts of the flood describe a number of boating rescues, flooded streets, and property damage. In 1940, a 9.7 inch rainfall was recorded that reportedly left 750 people homeless and required the rescue of a number of citizens stranded by flooded streets and threatened by rising flood waters. More recent flood events were documented in 1976, 1991, 1998, 2001, 2003, and 2009.

2.4. Community Involvement

This project commenced with the first of three public meetings in the City of Texarkana on October 28, 2010. At the meeting, the project scope was discussed with the residents. A breakout session followed where maps were provided and residents voiced their flooding concerns. The second public meeting was held on April 20, 2011. The meeting focused on presenting the results of the hydrologic and hydraulic modeling and the resulting flood hazard mapping. The third and final public meeting was held on November 15, 2011. During the meeting every phase of the project was reviewed and the results of the flood damage assessment and flood reduction alternatives were discussed in detail. Final comments from residents and the TWDB were considered prior to the submittal of this final report.

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3. Study Procedure

3. Study Procedure

3.1. City of Texarkana

This City of Texarkana City-wide Flood Protection Planning study incorporates the detailed hydrology and hydraulics models developed as part of the 2009 Master Drainage Plan for Cowhorn Creek (Reference 5) and includes every major watershed impacting the City. The total study area encompasses approximately 25,950 acres (40.5 square miles (sq. mi.)). The City is divided into five (5) major watersheds: Clear Creek, Cowhorn Creek, Howard Creek, Swampoodle Creek, and Wagner Creek. Two (2) tributaries to Cowhorn Creek that were included in the 2009 study were Cowhorn Creek East Tributary and Cowhorn Creek West Tributary. Two (2) tributaries to Swampoodle Creek that were included in the study were Swampoodle Creek East Tributary and Swampoodle Creek West Tributary. One (1) tributary to Howard Creek included in the study was Corral Creek. Three (3) tributaries to Wagner Creek that were included in the study were Stream WC-1, Stream WC-2, and South Wagner.

Table 1, Study Streams, is a summary of the source and description of each study stream. Figure 2, Study Streams, is a graphical representation of this information.

Table 1. Study Streams

Stream Name	Study	Downstream Limit	Upstream Limit	Length (miles)
Clear Creek	New Detailed	Bringle Lake	Wyatt Lane	1.67
Corral Creek	New Detailed	Confluence with Howard Creek	Texarkana City limits	1.88
Cowhorn Creek	2009 Study	Confluence with Wagner Creek	1,400 feet upstream of Cowhorn Creek Road	3.99
Cowhorn Creek East Trib	2009 Study	Confluence with Cowhorn Creek	Summerhill Road (FM 1397)	0.55
Cowhorn Creek West Trib	2009 Study	Confluence with Cowhorn Creek	500 feet upstream of Saint Michael Drive	0.64
Howard Creek	New Detailed	Confluence with Days Creek	Texarkana City limits	3.79
South Wagner	New Detailed	Confluence with Wagner Creek	300 feet upstream of W 7th Street (US Hwy 59)	2.47

Stream Name	Study	Downstream Limit	Upstream Limit	Length (miles)
Steam WC-1	New Detailed	Confluence with Wagner Creek	350 feet downstream of Richmond Road	1.75
Stream WC-2	New Detailed	Confluence with Wagner Creek	2,300 feet upstream of Concord Place	1.25
Swampoodle Creek	New Detailed	Confluence with Days Creek	750 feet upstream of 40th Street	3.36
Swampoodle Creek East Trib	New Detailed	Confluence with Swampoodle Creek	100 feet upstream of Pine Street	0.46
Swampoodle Creek West Channel	New Detailed	Confluence with Swampoodle Creek	College Drive	0.28
Wagner Creek	New Detailed	Confluence with Days Creek	2,100 feet upstream of McKnight Road	7.88
			Total Length:	**30.0**

3.2. Survey

3.2.1. Site Reconnaissance

Field reconnaissance was performed during multiple site visits to walk the streams and collect structure inventories during the end of 2010 and during the first half of 2011. Photographs of the channels and structures were taken to aid in hydraulic modeling and to assign Manning's channel "n" values.

3.2.2. Survey

The survey task included identifying and establishing survey control, conducting channel and structure surveys, and obtaining the physical dimensions of hydraulic and flood control structures. Survey was conducted by Halff from October 2010 through November 2010 with some additional survey data collected in February and June 2011.

Ninety-five (95) structure surveys and ninety (90) channel surveys (not including channel surveys near structures) were taken. For each surveyed structure, the channel upstream of the structure was surveyed and the cross section downstream of the structure was modeled with the upstream channel survey data adjusted according to a survey shot of the flowline downstream of the structure.

In addition to the survey collected for this study, survey was performed on Cowhorn Creek as part of the 2009 City of Texarkana study performed by Halff. Thirty (30) structure surveys and sixteen (16) channel surveys (not including channel surveys near structures) were taken.

The location and name of all survey data incorporated into this study can be seen in Figure 3 Study Survey Summary. The text file survey point data, photographs, and sketches are included on the CD-ROM in Appendix H.

The field survey was performed using vertical survey datum North American Vertical Datum of 1988 (NAVD88). The survey data included in Appendix H is in State Plane Coordinates, Texas North Central Federal Information Processing Standard (FIPS) 4202 (GRID – feet), North American Datum 1983 (NAD 83).

3.2.3. Topographic Data

The topographic data utilized for this study was the City of Texarkana 2006 Lidar data. The LiDAR data was processed in ESRI's ArcGIS software to create a terrain and Digital Elevation Model (DEM) data set for the project area.

3.2.4. Data Collection

Past studies in the City of Texarkana were received through an External Data Request from the Federal Emergency Management Agency in January 2010. The following is a summary of reports and data collected for the watershed.

Hydrology:

- HEC-1 model – Original Effective FEMA Hydrology (1988)

Hydraulics:

- HEC-2 models - Original Effective FEMA Hydraulics Model (1988)

Reports:

- Flood Plain Information Days Creek and Tributaries, Texarkana, Texas-Arkansas (1970)
- Comprehensive Drainage Report, Texarkana, Texas (1976)
- City of Texarkana FEMA FIS Report (1992)
- Bowie County FEMA FIS Report (2010)
- Texas Department of Transportation (TxDOT) construction plans: Plans of Proposed Highway Improvement Federal Aid Project IMD 0303 (120), etc. Bowie County I.H. 30, From: North 0.6 Miles W of FM 989 to Arkansas State Line, dated April 2006

- Texas Department of Transportation (TxDOT) construction plans: Plans of Proposed State Highway Improvement, Federal Aid Project STP 93 (21) UM Bowie County FM 559, From 0.2 Miles N or FM 2240 to FM 1297, dated November 1992

3.3. Hydrologic Analysis

A detailed hydrologic analysis was performed on four of the five major watersheds within the City of Texarkana which includes Clear Creek, Howard Creek, Swampoodle Creek, and Wagner Creek. The USACE Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS, Version 3.5) was utilized for the hydrologic modeling in this study (Reference 6). The Cowhorn Creek detailed hydrology model prepared as part of the 2009 "Master Drainage Plan for Cowhorn Creek" was combined with this report. Rainfall events selected for this study include the 2-, 5-, 10-, 25-, 50-, 100-, 250-, and 500-year frequency floods.

3.3.1. Drainage Areas

Watershed boundaries were delineated using visual inspection of the 2006 City of Texarkana topographic data. The sub-basin boundaries were adjusted based on visual identification of above ground storm sewer features from 2010 aerial photos obtained from the City of Texarkana as well as field identification. The five (5) main watersheds: Clear Creek, Cowhorn Creek, Howard Creek, Swampoodle Creek and Wagner Creek encompass a total watershed area of approximately 40.5 square miles. The watershed was divided into 133 subbasins with an average subbasin size of 0.30 square miles.

Figure 4 shows the drainage areas that were delineated for this study. A general description of each watershed and the streams contained within each watershed can be found below. Drainage areas include all upstream area draining to the creeks including their tributaries.

Clear Creek Watershed

The Clear Creek watershed is located in the northern portion of the City of Texarkana, Texas. Approximately half of the watershed is located within the limits of the City of Texarkana, Texas and the rest of the watershed is in the Bowie County unincorporated area. The existing upper watershed is heavily developed primarily with residential properties. The entire Clear Creek watershed drains to Bringle Lake located in the lower watershed. The Texas A&M University Texarkana campus is centrally located within the Clear Creek watershed.

There is one studied tributary within the Clear Creek watershed; Clear Creek. Clear Creek is a tributary to Bringle Lake and is approximately 1.67 miles in length through the study area with an average slope of 0.3%. Clear Creek originates just upstream of Wyatt Lane and generally flows north to the confluence with Bringle Lake. The total contributing watershed draining to Clear Creek is about 5.05 square miles or approximately 3,230 acres.

Cowhorn Creek Watershed

The Cowhorn Creek watershed is centrally located in the City of Texarkana, Texas. Nearly the entire watershed is contained within the limits of the City of Texarkana, Texas. The watershed is currently about 80% urbanized. The existing upper watershed, upstream of FM 559, is heavily developed along Interstate 30 with commercial and retail properties which include the mall and Christus St. Michaels Hospital. The central and lower watershed consists of some retail development along the major roadways with a larger percentage of residential properties bordering Cowhorn Creek. Texarkana College is centrally located in the watershed with the water treatment plant and Army Reserve Facilities located farther downstream.

There are three studied tributaries within the Cowhorn Creek watershed; Cowhorn Creek, Cowhorn Creek East Tributary, and Cowhorn Creek West Tributary.

Cowhorn Creek is approximately 3.99 miles in length through the study area with an average slope of 0.3%. Cowhorn Creek originates approximately 1,400 feet northwest of Cowhorn Creek Road and generally flows south to the confluence with Wagner Creek. The total contributing watershed draining to Cowhorn Creek is about 5.52 square miles or approximately 3,530 acres.

Cowhorn Creek East Tributary is approximately 0.55 miles in length through the study area with an average slope of 0.5%. Cowhorn Creek East Tributary originates near Summerhill Road and generally flows southwest before joining Cowhorn Creek just upstream of Saint Michael Drive. The total contributing watershed draining to Cowhorn Creek East Tributary is about 0.62 square miles or approximately 397 acres.

Cowhorn Creek West Tributary is approximately 0.64 miles in length through the study area with an average slope of 0.7%. Cowhorn Creek West Tributary originates approximately 500 feet upstream of Saint Michael Drive and generally flows southeast before joining Cowhorn Creek approximately 460 feet upstream of Kennedy Lane. The total contributing watershed draining to Cowhorn Creek West Tributary is about 0.57 square miles or approximately 365 acres.

Howard Creek Watershed

The Howard Creek watershed is located in the southern portion of the City of Texarkana, Texas. Approximately half of the watershed is located within the limits of the City of Texarkana, Texas and the remaining watershed is located in the City of Wake Village and Bowie County unincorporated areas. The watershed is currently about 40% urbanized. The existing commercial and industrial development is along State Highway 93, Kings Highway and U.S. Highway 67. There is a large residential development in the upper watershed upstream of U.S. Hwy 67. Other residential developments are sporadically located within the watershed. The entire Howard Creek watershed drains to Days Creek.

There are two studied tributaries within the Howard Creek watershed; Howard Creek and Corral Creek.

Howard Creek is approximately 3.79 miles in length through the study area with an average slope of 0.2%. Howard Creek originates just upstream of Brown Dr. and generally flows southeast to the confluence with Days Creek. The detailed study extends from the confluence with Days Creek to Loop 151/Jarvis Parkway (Texarkana City limits). The total contributing watershed draining to Howard Creek is about 7.71 square miles or approximately 4,935 acres.

Corral Creek is approximately 1.88 miles in length through the study area with an average slope of 0.4%. Corral Creek originates just downstream of Wingwright Boulevard and generally flows east to the confluence with Howard Creek. The detailed study extends from the confluence with Howard Creek to Loop 151/Jarvis Parkway (Texarkana City limits). The total contributing watershed draining to Corral Creek is about 1.88 square miles or approximately 1,200 acres.

Swampoodle Creek Watershed

The Swampoodle Creek watershed is located in the eastern portion of the City of Texarkana, Texas. The portion of the Swampoodle watershed east of U.S. Highway 71 is located in the City of Texarkana, Arkansas. The watershed is currently about 90% urbanized. The upper and central existing watershed is heavily developed with residential communities. The lower watershed consists primarily of commercial development in downtown Texarkana, Texas. The entire Swampoodle Creek watershed drains to Days Creek.

There are three studied tributaries within the Swampoodle Creek watershed; Swampoodle Creek, Swampoodle Creek East Tributary, and Swampoodle Creek West Channel.

Swampoodle Creek is approximately 3.36 miles in length through the study area with an average slope of 0.3%. Swampoodle Creek originates approximately 750 feet north of 40th Street and generally flows south to the confluence with Days Creek. The total contributing watershed draining to Swampoodle Creek is about 4.43 square miles or approximately 2,835 acres.

Swampoodle Creek East Tributary is approximately 0.49 miles in length through the study area with an average slope of 0.3%. Swampoodle Creek East Tributary originates near Wood Street and generally flows south before joining Swampoodle Creek approximately 1,560 feet downstream of College Drive. The detailed study extends from the confluence with Swampoodle Creek to approximately 100 feet upstream of Pine Street. The total contributing watershed draining to Swampoodle Creek East Tributary is about 0.95 square miles or approximately 610 acres.

Swampoodle Creek West Channel is approximately 0.28 miles in length through the study area with an average slope of 0.1%. Swampoodle Creek West Channel originates near College Drive and generally flows south before joining Swampoodle Creek approximately 1,220 feet downstream of College Drive. The total contributing watershed draining to Swampoodle Creek West Channel is about 0.66 square miles or approximately 420 acres.

Wagner Creek Watershed

The Wagner Creek watershed is the largest watershed in the City of Texarkana, Texas. Approximately 60% of the watershed is located within the limits of the City of Texarkana, Texas with the remaining portion of the watershed in the Cities of Nash, Wake Village, and Red Lick and Bowie County Unincorporated area. The watershed is currently about 50% urbanized. The existing watershed is heavily developed along major thoroughfares with commercial and industrial properties. There are multiple residential communities scattered throughout the watershed. The entire Wagner Creek watershed drains to Days Creek.

There are four studied tributaries within the Wagner Creek watershed; Wagner Creek, South Wagner Creek, Stream WC-1 and Stream WC-2.

Wagner Creek is approximately 7.88 miles in length through the study area with an average slope of 0.1%. Wagner Creek originates near County Road 2213 in the town of Red Lick and generally flows southeast to the confluence with Days Creek. The detailed study extends from the confluence with Days Creek to approximately 2,100 feet upstream of McKnight Road. The total contributing watershed draining to Wagner Creek is about 23.35 square miles or approximately 14,945 acres.

South Wagner Creek is approximately 2.47 miles in length through the study area with an average slope of 0.3%. South Wagner Creek originates 300 feet upstream of U.S. Highway 59 and generally flows east before joining Wagner Creek approximately 530 feet upstream of State Highway 93. The total contributing watershed draining to South Wagner Creek is about 1.92 square miles or approximately 1,230 acres.

Stream WC-1 is approximately 1.75 miles in length through the study area with an average slope of 0.6%. Stream WC-1 originates 300 feet downstream of Richmond Road and generally flows southwest before joining Wagner Creek approximately 450 feet downstream of Interstate 30. The total contributing watershed draining to Stream WC-1 is about 0.92 square miles or approximately 590 acres.

Stream WC-2 is approximately 1.25 miles in length through the study area with an average slope of 0.6%. Stream WC-2 originates approximately 2,300 feet upstream of Concord Place and generally flows southwest before joining Wagner Creek approximately 1,050 feet upstream of McKnight Road. The total contributing watershed draining to Stream WC-2 is about 0.86 square miles or approximately 550 acres.

3.3.2. Precipitation

The standard 24-hour (hr) duration frequency storm event was used to establish rainfall parameters. Point rainfall depths were obtained from the "United States Geological Survey (USGS) Water Resources Investigation Report Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas 98-4044" (Reference 7). The rainfall data is summarized below in Table 2, Rainfall Data.

Table 2. Rainfall Data (inches (in))

Flood Event		Storm Duration							
Year	%	5 Min	15 Min	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	24 Hr
2	50%	0.50	0.94	1.68	2.22	2.43	2.82	3.24	3.84
5	20%	0.57	1.20	2.18	2.88	3.15	3.78	4.32	5.52
10	10%	0.63	1.39	2.53	3.36	3.66	4.44	5.16	6.48
25	4%	0.72	1.68	3.00	4.00	4.38	5.34	6.36	8.16
50	2%	0.78	1.92	3.38	4.54	4.95	6.12	7.32	9.36
100	1%	0.85	2.20	3.80	5.16	5.61	6.96	8.40	10.56
250	0.4%	0.97	2.63	4.43	6.04	6.60	8.22	10.20	12.72
500	0.2%	1.03	3.01	4.95	6.80	7.44	9.36	11.76	14.16

3.3.3. Rainfall-Runoff Losses

All rainfall-runoff losses were computed using the Soil Conservation Service (SCS) Curve Number (CN) loss method, developed by the Natural Resources Conservation Service (NRCS), formerly SCS. This method is used to predict the direct runoff or infiltration of an area based on the area's land use, aerial photos, hydrologic soil group, hydrologic condition, and ultimate condition.

Land use for the watersheds was determined for existing conditions based on the City of Texarkana 2010 aerial photos and ultimate conditions from the City of Texarkana Zoning Maps. For the purposes of this study, the zoning for office/institutional, retail, and mixed-use development was grouped with commercial land use due to the similar nature of the rainfall runoff characteristics. Residential land use was divided into large-lot low-density, small-lot low-density, small-lot moderate density, and small-lot high-density areas to differentiate between the diverse residential characteristics of the watershed.

Figures 5 and 6 show the Existing conditions and the Ultimate conditions land use, respectively.

Percent impervious is a function of the various land uses within a watershed basin. The City of Texarkana's Comprehensive Drainage Report (Tables VI-2, pg. 114) (Reference 8), along with drainage design information accepted in several comparable Texas communities were used to derive appropriate percent impervious values for each land use. The specific land uses and their corresponding percent impervious values are included in Table 3. A composite percentage of impervious area was computed for each sub-basin for both existing (2010) and ultimate conditions. The percent impervious

values input into the HEC-HMS model represent the corresponding amount of existing or anticipated development.

Table 3. Percent Impervious

Land Use Classification	Characteristic Imperviousness
Brush	1%
Open	1%
Commercial	85%
Industrial	72%
Residential – Large-Lot Low-Density	25%
Residential – Small-Lot Low Density	25%
Residential – Small-Lot Moderate Density	35%
Residential – Small-Lot High Density	45%
Residential – Multi-Family	72%
Pavement	100%

The hydrologic soil types in this study were obtained from the NRCS, Soil Survey Geographic database (SSURGO) for Bowie County (Reference 9). Soil properties influence the relationship between rainfall and runoff so the soils are grouped into four hydrologic soil groups: A, B, C, and D based on runoff potential.

All watersheds studied within this report are predominately Group C soil which indicates moderately fine to fine texture and slow infiltration rates. The stream corridors in these watersheds are a mixture of Group D soils and Group B soils. Group D soils are defined as clayey with slow infiltration rates and a high potential for runoff. Group B soils indicate soils having some content of gravelly sand with moderate infiltration rates and a low/ moderate runoff potential.

Figure 7, Soils Map, shows the hydrologic soil types through the watershed.

The antecedent moisture condition (AMC) defines the soil moisture condition prior to a storm. AMC-II, average soil moisture conditions, was used for the purposes of this study.

3.3.4. Unit Hydrograph Method

The SCS Dimensionless Unit Hydrograph method was used and SCS lag times were computed for each sub-basin to generate runoff hydrographs. Time of concentration was computed separately for existing and ultimate conditions. Both were based on TR-55 (Reference 10) methodology for overland flow (sheet flow and shallow concentrated flow). Overland flow length was limited based on existing and ultimate land use conditions. Overland flow was limited to 100 feet for undeveloped and residential land use and 50 feet for industrial/commercial land use. Ultimate conditions shallow

concentrated flow was assumed to be all paved in areas where future development is anticipated. Travel times for channel flow were based on velocities from the hydraulic model, where available. Channel flows for non-studied reaches were estimated based on Manning's equation. Storm drain velocities were assumed to be 6 feet per second for the purposes of this study.

The time of concentration is the summation of these phases, where:

$$t_c = t_{sheet} + t_{shallow\ concentrated} + t_{storm\ drain} + t_{channel}$$

Lag times were computed using the following equation:

$$T_p = 0.6 * t_c.$$

Tables B.1 and B.2 located in Appendix B contain lag time calculations for existing and ultimate conditions, respectively, for all sub-basins within the study area. Table 4, Summary of Hydrologic Parameters, summarizes the sub-basin area, SCS lag time, and SCS CN for both existing and ultimate conditions for each sub-basin.

3.3.5. Flood Routing

Routing of flood flows through channels and reservoirs is necessary in order to model the amount of valley storage in the stream reaches. This valley storage reduces peak flows at the downstream end of a reach. The Modified Puls routing method was utilized for this study. This method is based on the conservation of mass and the concept that storage is a function of outflow to route flows through a designated stream reach. To establish storage-outflow relationships, volumes through each reach were determined using a range of steady-flow water surface profiles in Hydrologic Engineering Center River Analysis System (HEC-RAS) hydraulic models created as part of this study. These relationships were imported into HEC-HMS and used to calculate discharges at the downstream end of each designated reach based on the inflow and storage in each reach. Storage-outflow relationships were determined for existing channel and floodplain conditions. The Muskingum-Cunge Routing method was utilized in the current effective models and was explored for this study as well. The Muskingum-Cunge assumes a circular, triangular, trapezoidal, rectangular, or a typical eight-point cross section. The valley storage in the streams could not be modeled as accurately using this method. Therefore, the Modified Puls method was selected based on the accuracy on which it approximated the storage through a given reach. This method is the preferred routing method in similar watersheds where detailed hydraulic modeling is performed.

3.3.6. Detention

Six (6) existing detention ponds were identified as part of the study watersheds, as shown in Figure 8: Existing Detention Ponds. Three (3) of the detention ponds were in the Cowhorn Creek watershed, one (1) was in the Clear Creek watershed, and two (2) were in the Swampoodle Creek watershed. Elevation-Area curves were developed from the City of Texarkana 2006 Lidar data. The outlet structures of each pond were surveyed and modeled in HEC-RAS to develop the Elevation-Discharge curves.

Table 4. Hydrologic Parameters

HEC-HMS Basin Name	Area (ac)	Lag Time		% Water	% Soil Type B	% Soil Type C	% Soil Type D	Composite CN		% Impervious	
		Exist (min)	Ultimate (min)					Existing	Ultimate	Existing	Ultimate
Clear Creek											
CC1	131	11	11	0	0	91	9	75	75	36	46
CC2	108	36	36	7	0	70	23	77	77	46	55
CC3	38	11	11	0	0	100	0	74	74	32	49
CC4	243	21	15	1	0	99	0	74	74	35	62
CC5	157	27	16	0	0	95	5	74	74	40	53
CC6	363	36	28	0	1	75	24	75	75	25	55
CC7	31	6	6	0	0	94	6	74	74	30	53
CC8	138	21	19	0	0	61	39	76	76	17	70
CC9	136	27	21	0	27	70	3	71	71	22	61
CC10	109	24	24	0	8	42	50	76	76	17	71
CC11	312	22	20	0	20	50	30	73	73	27	57
CC12	141	19	17	2	43	53	2	69	69	16	46
CC13	314	30	22	0	49	46	5	68	68	12	41
CC14	106	21	14	2	74	24	0	65	65	8	24
CC15	148	12	8	2	68	30	0	66	66	11	37
CC16	752	24	13	30	34	17	19	79	79	33	48
Cowhorn Creek											
COW1	192	38	35	0	4	74	22	74	75	35	60
COW2	83	17	17	0	32	67	1	68	70	43	81
COW3	22	12	10	0	23	52	26	71	73	56	85
COW4	68	15	13	0	63	18	19	67	67	43	88
COW5	64	16	12	0	84	0	16	62	64	21	85
COW6	25	15	11	0	61	3	36	65	68	13	82

HEC-HMS Basin Name	Area (ac)	Lag Time		% Water	% Soil Type B	% Soil Type C	% Soil Type D	Composite CN		% Impervious	
		Exist (min)	Ultimate (min)					Existing	Ultimate	Existing	Ultimate
COW7	37	11	11	0	64	22	14	66	66	35	59
COW8	218	15	15	0	28	60	12	71	71	67	76
COW9	28	6	6	0	0	100	0	74	74	78	82
COW10	139	25	22	0	0	100	0	74	74	34	55
COW11	146	15	14	0	0	90	11	75	75	40	67
COW12	242	14	12	0	10	74	16	74	74	52	66
COW13	206	13	13	0	0	76	24	75	75	45	58
COW14	63	17	16	0	0	100	0	74	74	23	47
COW15	184	19	17	0	0	94	6	74	74	61	73
COW16	109	10	10	0	0	67	33	76	76	55	68
COW17	346	33	33	0	2	77	21	74	75	45	65
CNT1	126	28	25	0	0	81	19	75	75	42	61
CNT2	71	9	8	0	3	79	18	73	75	39	83
CUT1	181	30	25	0	2	92	6	73	74	33	54
CUT2	99	18	17	0	21	79	0	71	71	42	55
CUT3	121	11	11	0	81	16	3	64	64	67	82
CET1	254	34	34	0	22	66	13	71	72	47	63
CET2	142	30	30	0	16	65	19	72	73	55	76
CWT1	265	24	24	0	31	56	14	70	71	42	72
CWT2	100	27	21	0	30	45	25	71	72	65	87
Howard Creek											
HOW1	696	48	41	0	4	84	12	74	74	25	70
HOW2	352	34	24	1	9	90	0	73	73	26	78
HOW3	297	30	29	0	4	95	1	74	74	41	64
HOW4	387	32	32	0	10	87	3	73	73	25	69
HOW5	220	29	21	0	9	91	0	73	73	19	75

HEC-HMS Basin Name	Area (ac)	Lag Time		% Water	% Soil Type B	% Soil Type C	% Soil Type D	Composite CN		% Impervious	
		Exist (min)	Ultimate (min)					Existing	Ultimate	Existing	Ultimate
HOW6	342	32	23	0	8	90	2	73	73	18	73
HOW7	180	18	10	0	10	90	0	73	73	21	74
HOW8	429	31	23	0	9	90	1	73	73	21	69
HOW9	134	18	18	0	13	87	0	72	72	61	78
HOW10	214	28	28	0	19	81	0	72	72	23	54
HOW11	179	34	33	0	24	67	9	71	71	16	46
HOW12	96	18	18	0	24	76	0	71	71	28	63
HOW13	206	25	17	0	24	66	10	71	71	35	73
COC1	271	37	30	0	3	82	15	75	75	19	79
COC2	120	21	20	0	3	79	18	75	75	39	71
COC3	168	23	14	0	5	95	0	73	73	27	67
COC4	153	23	22	4	0	96	0	75	75	43	62
COC5	132	23	19	0	8	92	0	73	73	38	68
COC6	358	25	25	1	5	94	0	74	74	15	60
Swampoodle Creek											
SPC1	79	21	12	0	0	100	0	74	74	45	82
SPC2	25	11	11	0	0	100	0	74	74	55	68
SPC3	98	24	21	7	0	93	0	76	76	32	39
SPC4	55	19	19	0	0	100	0	74	74	55	63
SPC5	12	7	7	0	58	42	0	67	67	27	72
SPC6	24	13	7	0	83	17	0	63	63	20	73
SPC7	70	11	11	0	5	95	0	73	73	54	63
SPC8	90	9	9	0	3	97	0	74	74	38	64
SPC9	52	13	8	0	16	84	0	72	72	53	80
SPC10	83	15	15	0	6	94	0	73	73	62	71

HEC-HMS Basin Name	Area (ac)	Lag Time		% Water	% Soil Type B	% Soil Type C	% Soil Type D	Composite CN		% Impervious	
		Exist (min)	Ultimate (min)					Existing	Ultimate	Existing	Ultimate
SPC11	89	16	15	0	24	76	0	71	71	60	77
SPC12	114	18	13	0	6	94	0	73	73	55	74
SPC13	79	13	9	0	31	69	0	70	70	59	83
SPC14	348	29	29	0	1	99	0	74	74	58	76
SPC15	256	20	20	0	0	100	0	74	74	75	78
SPC16	326	22	22	0	35	65	0	70	70	74	87
SPCET1	79	14	7	0	0	100	0	74	74	70	78
SPCET2	179	16	16	0	0	100	0	74	74	52	58
SPCET3	88	13	13	0	0	100	0	74	74	46	53
SPCET4	143	20	20	0	0	100	0	74	74	53	59
SPCET5	122	13	8	0	9	91	0	73	73	53	64
SPCWC1	232	31	29	0	0	100	0	74	74	41	52
SPCWC2	191	22	18	0	8	92	0	73	73	55	70
Wagner Creek											
WC1	353	28	20	0	10	81	9	73	73	11	68
WC2	244	23	16	1	37	62	0	69	69	21	51
WC3	470	32	25	1	20	74	5	72	72	16	58
WC4	131	30	29	0	18	77	5	72	72	22	51
WC5	279	27	26	0	0	90	10	75	75	26	48
WC6	166	47	43	0	0	97	3	74	74	24	51
WC7	159	35	33	0	25	75	0	71	71	24	50
WC8	586	44	44	0	9	84	7	73	73	27	55
WC9	479	40	39	0	9	89	2	73	73	23	48
WC10	508	50	49	0	16	72	12	73	73	18	79
WC11	733	36	29	0	11	88	1	73	73	29	75
WC12	621	48	48	0	12	88	0	72	72	29	73

HEC-HMS Basin Name	Area (ac)	Lag Time		% Water	% Soil Type B	% Soil Type C	% Soil Type D	Composite CN		% Impervious	
		Exist (min)	Ultimate (min)					Existing	Ultimate	Existing	Ultimate
WC15	318	26	21	0	7	78	15	74	74	29	75
WC16	384	36	27	0	19	77	4	72	72	55	86
WC17	186	29	29	0	0	69	31	76	76	47	82
WC18	278	30	24	0	0	64	36	76	76	23	68
WC19	276	28	28	0	0	77	23	75	75	32	60
WC20	517	38	27	0	9	68	23	74	74	33	61
WC21	129	26	20	0	18	68	14	73	73	29	72
WC22	255	24	23	0	0	100	0	74	74	43	67
WC23	167	29	28	2	40	58	0	69	69	15	34
WC24	433	39	39	0	43	57	0	68	68	39	55
WC25	158	21	16	3	54	35	8	68	68	41	74
WC26	76	19	12	0	93	7	0	62	62	27	74
WC27	260	20	17	0	0	100	0	74	74	61	81
WC28	260	22	22	0	19	75	6	72	72	30	64
WC29	152	33	27	0	2	65	33	76	76	33	66
WC30	465	38	33	0	18	61	21	73	73	31	66
SWC1	237	33	33	0	6	94	0	73	73	49	64
SWC2	141	19	13	0	12	88	0	72	72	48	63
SWC2A	31	15	9	0	12	88	0	72	72	51	82
SWC3	123	15	15	0	18	82	0	72	72	44	74
SWC4	216	18	15	0	35	65	0	69	69	20	73
SWC5	195	24	14	4	30	66	0	71	71	36	61
SWC6	286	32	29	0	14	84	2	72	72	34	60
WC1_1	45	16	9	0	0	97	3	74	74	68	84
WC1_2	111	24	14	2	0	88	10	75	75	36	76
WC1_3	84	21	14	0	0	100	0	74	74	27	76

HEC-HMS Basin Name	Area (ac)	Lag Time		% Water	% Soil Type B	% Soil Type C	% Soil Type D	Composite CN		% Impervious	
		Exist (min)	Ultimate (min)					Existing	Ultimate	Existing	Ultimate
WC1_4	112	27	27	0	6	94	0	73	73	30	58
WC1_5	68	22	14	0	1	99	0	74	74	12	72
WC1_6	102	15	8	0	6	94	0	73	73	14	86
WC1_7	67	11	11	0	0	92	8	74	74	34	87
WC2_1	111	30	27	0	0	97	3	74	74	32	66
WC2_2	73	11	10	0	0	88	12	75	75	29	66
WC2_3	79	27	17	0	0	96	4	74	74	16	50
WC2_4	36	16	7	0	43	57	0	68	68	34	50
WC2_5	170	26	24	0	30	58	12	71	71	15	71
WC2_6	35	12	11	0	41	59	0	69	69	21	62
WC2_7	45	19	16	0	27	73	0	70	70	9	60

Several other ponds were found in the study area but were not modeled as reservoirs due to limited detention volume or the absence of a defined outlet structure. Inline ponds were modeled with cross sections in the hydraulics model and included as part of the Modified Puls routing for the reach.

3.3.7. Aerial Reduction

The rainfall was adjusted utilizing the TP-40 "Depth-Area-Duration Curves" (Reference 11) for each storm area when the contributing drainage area was greater than 9.6 square miles.

3.4. Hydraulic Analysis

A hydraulic analysis was performed utilizing the USACE HEC-RAS software, version 4.1.0 (Reference 12). The purpose of the analysis was to develop flood profiles for the 2-, 5-, 10-, 25-, 50-, 100-, 250-, and 500-year storm events for existing and ultimate conditions. The hydraulic models developed for the 2009 City of Texarkana Cowhorn Creek Master Drainage Plan were incorporated with this study to provide a comprehensive City-wide flood protection report.

3.4.1. Stream Centerlines and Cross Sections

Study stream centerlines from the 2010 Bowie County Digital Flood Insurance Rate Map (DFIRM) Database (Reference 13) were adjusted to reflect survey data and 2006 LiDAR. Hydraulic cross sections used for the study streams' HEC-RAS models were placed at close intervals above and below bridges and culverts, where applicable, in order to compute the significant effective flow and backwater effects of these structures. HEC-GeoRAS software was used to extract geographical data for centerlines and cross sections. Elevation data was extracted from the terrain model created from 2006 City of Texarkana LiDAR for each cross section and imported into HEC-RAS. The cross section profiles were supplemented with field survey where available. Flowlines and channels of non-surveyed hydraulic cross sections were interpolated based on nearby channel surveys when the topographic data was not sufficient to define the channels.

3.4.2. Modeling Variables

Channel roughness factors (Manning's "n") were assigned based on field inspection and aerial photographs. Table 5, Manning's Roughness Coefficients by Type, is a summary of n-values used in this study.

Appropriate expansion and contraction coefficients of 0.3 and 0.5 were applied upstream and downstream of structures to account for natural and structural variation in channel cross section shape.

Ineffective flow areas were entered in the overbanks of the channel upstream and downstream of structures to account for overbank loss of conveyance due to the structures. Ineffective flow limits were also used in situations where there was storage without conveyance in the cross section overbanks.

The starting boundary conditions varied for many of the detailed study streams included in this study. The following streams utilized known water surface elevations based on coincident flow elevations as the starting boundary condition: Cowhorn Creek East Tributary, Cowhorn Creek West Tributary, South Wagner Creek, Swampoodle Creek, Swampoodle Creek East Tributary, Swampoodle Creek West Channel, Stream WC-2, and Wagner Creek. The current effective HEC-2 known water surface elevations were utilized for Swampoodle Creek and Wagner Creek. Normal depth was used as the starting boundary condition when it produced higher starting water surface elevations compared to the coincident flow elevations. The following streams utilized normal depth as the starting boundary condition: Corral Creek, Cowhorn Creek, Howard Creek, and Stream WC-1. The starting boundary conditions for Clear Creek utilized the current effective HEC-2 known water surface elevation from Bringle Lake for the 100-year storm event. All other storm events for Clear Creek utilized starting water surface elevations based on normal depth calculations.

Table 5. Manning's Roughness Coefficients by Type

Description	Channel n-Values	Overbank n-Values
Concrete Clean well kept	0.015	
Concrete with cracks, grass and weeds	0.020	
Gabion	0.025-0.032	
Clean, straight, full, no rifts or deep pools	0.030	
Grassed Lined Channel- No weeds	0.030	
Rock Rip Rap	0.035	
Clean Straight, but more stones and weeds	0.035-0.040	
Clean, winding, some pools and shoals	0.040-0.045	
Clean, winding, some pools and shoals, some weeds and stones	0.045	
Clean, winding, some pools and shoals, some weeds and stones, lower stages, more ineffective slopes and sections	0.050	
Clean, winding, some pools and shoals, with weeds and stones, lower stages, more ineffective slopes and sections	0.055	
Clean, winding, some pools and shoals, with lots of weeds and stones	0.060	
Sluggish reaches, weedy. deep pools	0.070	
Sluggish reaches, weedy, deep pools, heavy weeds brush some trees	0.080-0.090	
Very weedy reaches, deep pools, or floodways with heavy stands of timber and brush	0.100	
Open Grassy Areas well maintained (i.e. Golf		0.035

Description	Channel n-Values	Overbank n-Values
Courses)		
Mainly Asphalt, Some Obstructions, Curbs, Few Trees, Small Amounts of Grass, Hwy Frontage		0.040
Open Grassy Areas, wild		0.040-0.050
Industrial/Commercial with more vegetation		0.050-0.070
Industrial (bldgs, cars, workers)		0.060
Grassy, some bushes, some trees,		0.050-0.070
Woods, Fields (50/50)		0.070-0.080
Open Yards, Fences, Few Trees, Houses		0.070-0.090
Close Residential, Streets		0.080-0.090
Residential, Many Trees		0.090
Heavy Wooded		0.100-0.120

3.5. Results of Hydrologic and Hydraulic Analyses

3.5.1. Peak Discharges

Peak flood discharges calculated for this study include the 2-, 5-, 10-, 25-, 50-, 100-, 250-, and 500-year flood frequencies for both existing land use conditions and projected ultimate land use conditions. Ultimate land use conditions were analyzed with channel flood routing data based on existing channels and bridges. Peak discharges were computed for each sub-basin. Tables 6 and 7 display peak discharges in cubic feet per second (cfs) for existing and ultimate conditions, respectively. Tables C.1 and C.2 in Appendix C display hydrologic output data for all subbasins in the study area.

3.5.2. Water Surface Elevations

Peak WSELs were calculated for the 2-, 5-, 10-, 25-, 50-, 100-, 250-, and 500-year flood frequencies for both existing land use conditions and projected ultimate land use conditions. Flood profiles and HEC-RAS output tables (Existing and Ultimate conditions) are included in Appendix D. The 100- and 500-year existing conditions WSELs were mapped on the 2006 City of Texarkana LiDAR and are shown along with the cross sections on Figure 9, Floodplain Workmaps. Floodways were modeled for all study streams and are also show in the Floodplain Workmaps.

3.5.3. Existing vs. Ultimate Conditions

Peak flood discharges for both the existing and ultimate conditions were compared for the 2-, 5-, 10-, 25-, 50-, 100-, 250-, and 500-year flood frequencies. Table 8, Existing Conditions vs. Ultimate Conditions Peak Discharges, shows the difference in flows for the 100- and 500-year events. Appendix D contains the tabular comparison of WSEL between the existing and ultimate conditions for the 100-year event.

The average change in flows between existing and ultimate conditions was approximately 14% for the 100-year event. The more developed watersheds produced a much smaller change while many of the undeveloped Wagner watersheds had a significant difference between the existing and ultimate conditions. The floodplain shapefiles have been included as part of the digital data. In order to assure that any recommended alternatives could sustain future growth within the City, the flood damage assessment and alternative development phases of the study were based on the ultimate development conditions discharges and water surface elevations.

Table 6. Existing Conditions Peak Flood Discharges

HECHMS Node	DA (sq. mi.)	XS Station	Existing Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
Clear Creek										
J CC 1	0.2	24,488	290	420	510	650	750	870	1,060	1,220
J CC 1A	0.37	23,626	360	530	640	810	940	1,090	1,330	1,520
J CC 2	0.37	22,854	170	330	450	630	790	950	1,160	1,350
J CC 3	0.62	22,133	360	630	840	1,120	1,340	1,580	1,920	2,210
J CC 4	0.68	21,172	370	650	870	1,160	1,410	1,660	2,020	2,330
J CC 5	1.06	20,643	670	1,010	1,370	1,900	2,320	2,760	3,390	3,910
J_CC 6	1.11	19,427	670	1,030	1,380	1,910	2,330	2,770	3,410	3,930
J_CC 7	1.67	18,947	1,050	1,620	2,110	2,840	3,420	4,030	4,910	5,650
J_CC 8	1.89	18,012	1,100	1,720	2,230	3,010	3,640	4,310	5,310	6,100
J_CC 9	2.27	16,484	1,260	2,000	2,570	3,510	4,250	5,070	6,300	7,250
J_CC 10	2.27	15,694	1,250	2,000	2,570	3,500	4,250	5,070	6,300	7,240
OUTLET	5.25	7,900	540	970	1,240	1,830	2,340	2,920	3,900	4,550
Corral Creek										
J_COC2	0.612	9,909	420	640	790	1,010	1,190	1,380	1,680	1,920
J_COC3	0.874	8,112	550	840	1,040	1,330	1,500	1,650	1,860	2,110
J_COC4	1.113	6,933	750	1,130	1,390	1,770	2,050	2,310	2,710	2,990
J_COC5	1.319	4,923	840	1,260	1,500	1,850	2,100	2,310	2,590	2,960
J_COC6	1.878	1,745	1,080	1,710	2,070	2,560	2,940	3,330	3,850	4,240
Cowhorn Creek										
B_Cow1	0.30	21,052	210	320	390	490	580	670	810	920
J_Cow1	0.43	19,760	250	370	460	580	660	770	930	1,060
J_Cow2	0.74	19,408	420	630	790	1,000	1,170	1,360	1,660	1,920

HECHMS Node	DA (sq. mi.)	XS Station	Existing Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
J_Cow3	0.77	17,852	430	650	800	1,020	1,190	1,370	1,690	1,950
J_Cow5	1.50	17,197	920	1,280	1,560	2,000	2,310	2,690	3,190	3,590
J_Cow6	1.60	15,792	940	1,300	1,570	2,020	2,340	2,710	3,280	3,680
J_Cow7	2.22	15,010	1,230	1,670	2,020	2,620	3,050	3,580	4,380	4,940
J_Cow8	2.26	14,569	1,230	1,680	2,020	2,620	3,060	3,580	4,400	4,970
J_Cow9	2.83	14,203	1,580	2,270	2,700	3,350	3,850	4,390	5,280	6,010
J_Cow10	2.89	13,577	1,580	2,270	2,710	3,360	3,860	4,410	5,300	6,050
J_Cow11	3.23	11,945	1,700	2,370	2,760	3,300	3,720	4,260	5,450	6,320
J_Cow14	3.72	10,296	2,030	2,700	3,200	3,780	4,220	4,810	6,050	7,300
J_Cow15	4.10	9,613	2,130	2,830	3,400	4,020	4,630	5,200	6,220	7,380
J_Cow16	4.42	7,410	2,210	2,910	3,400	4,100	4,510	5,050	6,060	6,990
J_Cow18	4.81	6,145	2,350	3,120	3,590	4,390	4,840	5,370	6,230	7,180
J_Cow19	4.98	5,369	2,400	3,170	3,610	4,460	4,940	5,450	6,290	7,250
Cow_Outlet	5.52	2,395	2,570	3,320	3,720	4,530	5,070	5,690	6,510	7,480
Cowhorn Creek East Tributary										
B_CET1	0.4	3,016	320	460	560	700	810	940	1,140	1,300
J_CET1	0.62	1,032	480	670	800	990	1,130	1,270	1,470	1,660
Cowhorn Creek West Tributary										
B_CWT1	0.41	3,395	380	550	680	860	1,010	1,170	1,430	1,640
J_CWT1	0.57	2,392	480	780	940	1,190	1,390	1,610	1,950	2,240
Howard Creek										
J_HOW5	3.584	19,989	1,280	2,110	2,630	3,100	3,350	3,650	3,960	4,190
J_HOW6	3.866	18,119	1,240	2,060	2,580	3,110	3,380	3,640	3,970	4,200
J_HOW7	4.537	15,596	1,250	2,080	2,690	3,250	3,530	3,800	4,320	5,090

HECHMS Node	DA (sq. mi.)	XS Station	Existing Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
J_HOW8	4.747	12,975	1,240	2,090	2,700	3,290	3,580	3,840	4,520	5,320
J_HOW9	5.082	9,598	1,220	2,090	2,700	3,330	3,640	3,910	4,750	5,630
J_HOW10	5.361	5,987	1,210	2,070	2,670	3,330	3,650	3,940	4,760	5,760
J_HOW11	7.239	4,481	1,420	2,310	2,940	3,760	4,480	5,320	6,810	8,850
J_HOW12	7.389	3,801	1,380	2,200	2,860	3,570	4,280	5,370	6,730	8,730
Outlet	7.711	2,373	1,370	2,180	2,850	3,560	4,080	5,250	6,770	8,550
South Wagner										
J_SWC 2	0.27	13,029	310	420	490	610	750	890	1,060	1,220
J_SWC1-1	0.64	12,641	580	840	1,010	1,260	1,470	1,690	2,050	2,340
J_SWC 3	0.83	10,858	560	770	910	1,190	1,440	1,700	2,090	2,410
J_SWC 4	1.17	7,954	590	800	950	1,230	1,460	1,740	2,050	2,320
J_SWC 5	1.47	5,308	690	980	1,160	1,450	1,680	1,900	2,200	2,430
OUTLET	1.92	2,390	700	1,010	1,240	1,710	2,040	2,360	2,840	3,230
Stream WC-1										
B_WC1_1	0.07	9,225	110	150	170	210	240	270	330	370
B_WC2_1	0.244	6,593	140	210	260	330	380	450	540	620
J_WC1_1	0.376	7,891	220	320	430	580	670	780	940	1,070
J_WC1_2	0.551	5,956	170	340	500	730	910	1,080	1,350	1,530
J_WC1_4	0.658	3,310	270	450	590	890	1,120	1,380	1,750	2,000
J_WC1_5	0.818	2,735	350	570	710	960	1,220	1,500	1,930	2,200
Stream WC-2										
B_WC2_1	0.174	6,593	140	210	260	330	380	450	540	620
J_WC2_2	0.288	5,776	200	300	380	490	580	680	840	970
J_WC2_3	0.411	4,699	270	430	530	690	810	960	1,180	1,360

HECHMS Node	DA (sq. mi.)	XS Station	Existing Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
J_WC2_4	0.468	3,361	300	450	550	760	910	1,080	1,340	1,550
J_WC2_5	0.733	2,795	470	720	880	1,230	1,470	1,750	2,170	2,510
J_WC2_6	0.788	2,442	450	680	890	1,280	1,520	1,830	2,270	2,620
Outlet	0.859	944	460	670	890	1,240	1,540	1,850	2,360	2,750
Swampoodle Creek										
B_SPC1	0.123	17,716	140	200	240	300	340	400	480	540
J_SPC1	0.162	17,307	170	240	290	370	430	500	590	660
J_SPC3	0.315	17,057	310	460	550	690	810	940	1,120	1,280
J_SPC4	0.401	15,246	400	580	700	880	1,030	1,190	1,400	1,590
J_SPCWC_DIV1	-	14,208	470	790	1,010	1,320	1,540	1,750	2,060	2,310
J_SPCWC_DIV2	-	13,977	630	950	1,170	1,480	1,710	1,940	2,260	2,520
J_SPC5	0.419	13,576	630	950	1,170	1,490	1,720	1,940	2,270	2,530
J_SPC6	1.08	12,894	990	1,430	1,730	2,170	2,470	2,750	3,090	3,380
J_SPC7	2.033	12,567	1,670	2,340	2,800	3,460	3,940	4,410	5,220	5,900
J_SPC8	2.07	11,858	1,660	2,290	2,770	3,460	3,950	4,430	5,260	5,940
J_SPC9	2.179	10,765	1,710	2,340	2,820	3,540	4,050	4,540	5,390	6,090
J_SPC11	2.32	10,292	1,760	2,400	2,900	3,650	4,180	4,740	5,750	6,600
J_SPC12	2.402	9,854	1,770	2,430	2,940	3,720	4,260	4,840	5,860	6,670
J_SPC14	2.531	9,277	1,840	2,510	3,040	3,860	4,430	5,060	6,090	6,900
J_SPC15	2.67	7,747	1,900	2,580	3,120	3,970	4,590	5,250	6,230	7,060
J_SPC17	2.848	7,237	1,990	2,720	3,270	4,170	4,840	5,600	6,530	7,360
J_SPC18	2.972	5,656	2,030	2,780	3,300	4,230	4,920	5,670	6,640	7,480
J_SPC20	3.916	4,717	2,880	3,990	4,800	6,100	7,020	8,000	9,450	10,510
Outlet	4.426	2,717	2,800	3,700	4,420	5,430	6,190	7,110	8,840	10,010

HECHMS Node	DA (sq. mi.)	XS Station	Existing Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
Swampoodle Creek East Tributary										
J_SPCET3	0.762	2,570	550	770	910	1,130	1,410	1,730	2,250	2,630
J_SPCET4	0.953	1,567	720	940	1,080	1,300	1,480	1,840	2,360	2,770
Swampoodle Creek West Channel										
B_SPCWC1	0.362	1,496	310	450	540	680	800	920	1,110	1,270
SPCWC_DIV1	-	1,338	220	220	220	230	270	340	450	540
SPCWC_DIV2	-	935	70	70	70	70	100	150	250	330
SPCWC_DIV3	0.661	172	390	540	630	740	790	810	850	870
Wagner Creek										
J_WC7	4.481	41,599	1,740	3,080	4,000	5,380	6,450	7,650	9,450	10,960
J_Stream_WC-2	5.34	40,395	1,990	3,680	4,670	6,230	7,390	8,690	10,660	12,340
J_WC8	6.134	35,626	1,700	3,060	3,920	5,270	6,720	8,310	10,650	12,460
J_WC9	7.056	34,191	1,830	3,260	4,140	5,550	7,060	8,740	11,210	13,120
J_WC11	9.171	32,251	2,080	3,660	4,620	6,300	8,170	10,290	13,410	15,830
J_WC12	9.667	29,999	2,100	3,700	4,680	6,360	8,250	10,400	13,580	16,040
J_WC14	10.558	29,154	2,270	3,750	4,780	6,510	8,170	10,380	13,710	16,230
J_WC15	10.992	25,720	2,080	3,660	4,700	6,400	7,950	10,040	13,540	16,130
J_WC17	12.23	22,939	2,240	4,110	5,270	7,160	8,820	10,670	14,380	16,850
J_WC18	12.431	22,112	2,210	3,870	5,080	6,940	8,580	10,410	14,220	16,800
J_WC19	12.83	20,846	2,230	3,910	5,140	7,010	8,680	10,530	14,420	16,950
J_WC20	13.091	19,254	2,220	3,850	5,080	6,960	8,510	10,530	14,120	16,930
J_WC21	13.768	15,547	2,120	3,650	4,730	6,950	8,280	10,040	13,710	16,680
J_WC22	14.015	12,109	2,110	3,650	4,690	6,810	8,290	10,010	13,670	16,600
J_WC23	19.651	10,041	3,060	4,330	5,400	7,940	11,640	13,010	18,240	22,330

HECHMS Node	DA (sq. mi.)	XS Station	Existing Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
J_WC24	20.057	8,838	3,110	4,400	5,460	7,970	11,690	13,060	18,330	22,440
J_WC25	20.463	7,267	3,070	4,430	5,480	7,860	11,510	13,090	18,290	22,420
J_WC26	20.701	5,421	3,030	4,440	5,460	7,720	11,000	13,090	18,290	22,420
J_Swagner	22.622	4,191	3,440	5,200	6,220	7,950	11,450	13,660	18,960	23,220
WC_Outlet	23.349	1,729	3,360	5,010	6,190	7,770	11,230	13,610	18,910	23,020

Table 7. Ultimate Conditions Peak Flood Discharges

HECHMS Node	DA (sq. mi.)	XS Station	Ultimate Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
Clear Creek										
J CC 1	0.2	24,488	320	440	530	670	770	890	1,080	1,230
J CC 1A	0.37	23,626	390	550	660	830	960	1,110	1,350	1,540
J CC 2	0.37	22,854	190	350	470	660	810	970	1,180	1,370
J CC 3	0.62	22,133	440	680	950	1,300	1,590	1,870	2,270	2,620
J CC 4	0.68	21,172	460	720	980	1,360	1,660	1,970	2,410	2,790
J CC 5	1.06	20,643	910	1,280	1,600	2,210	2,700	3,230	3,980	4,590
J_CC 6	1.11	19,427	910	1,290	1,620	2,220	2,710	3,240	4,010	4,630
J_CC 7	1.67	18,947	1,480	2,090	2,570	3,410	4,080	4,810	5,860	6,730
J_CC 8	1.89	18,012	1,550	2,250	2,780	3,640	4,360	5,150	6,320	7,310
J_CC 9	2.27	16,484	1,830	2,680	3,310	4,300	5,150	6,100	7,490	8,700
J_CC 10	2.27	15,694	1,820	2,680	3,310	4,290	5,140	6,100	7,490	8,690
OUTLET	5.25	7,900	770	1,210	1,560	2,210	2,750	3,360	4,270	5,070
Corral Creek										

HECHMS Node	DA (sq. mi.)	XS Station	Ultimate Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
J_COC2	0.612	9,909	700	940	1,100	1,340	1,530	1,740	2,070	2,340
J_COC3	0.874	8,112	800	1,090	1,250	1,430	1,600	1,800	2,090	2,490
J_COC4	1.113	6,933	1,040	1,410	1,660	2,000	2,260	2,540	2,960	3,290
J_COC5	1.319	4,923	1,170	1,530	1,760	2,050	2,260	2,420	2,800	3,250
J_COC6	1.878	1,745	1,640	2,210	2,560	3,040	3,400	3,740	4,220	4,650
Cowhorn Creek										
B_Cow1	0.3	21,052	280	390	460	570	650	750	890	1,010
J_Cow1	0.43	19,760	330	460	550	660	750	860	1,030	1,160
J_Cow02	0.74	19,408	580	800	950	1,170	1,360	1,560	1,860	2,110
J_Cow03	0.77	17,852	590	810	970	1,180	1,360	1,560	1,890	2,130
J_Cow05	1.5	17,197	1,110	1,500	1,820	2,230	2,530	2,940	3,400	3,800
J_Cow06	1.6	15,792	1,130	1,520	1,830	2,250	2,560	2,980	3,490	3,900
J_Cow07	2.22	15,010	1,470	1,940	2,340	2,910	3,330	3,960	4,680	5,260
J_Cow08	2.26	14,569	1,490	1,940	2,340	2,910	3,340	3,960	4,710	5,290
J_Cow09	2.83	14,203	2,040	2,720	3,190	3,840	4,350	4,890	5,700	6,450
J_Cow10	2.89	13,577	2,050	2,730	3,200	3,850	4,370	4,930	5,780	6,500
J_Cow11	3.23	11,945	2,130	2,760	3,160	3,670	4,120	4,770	5,890	6,770
J_Cow14	3.72	10,296	2,420	3,170	3,570	4,110	4,620	5,450	6,820	8,060
J_Cow15	4.1	9,613	2,530	3,330	3,780	4,400	4,910	5,590	6,860	7,940
J_Cow16	4.42	7,410	2,620	3,320	3,820	4,370	4,840	5,450	6,520	7,390
J_Cow18	4.81	6,145	2,780	3,480	4,040	4,650	5,110	5,620	6,690	7,580
J_Cow19	4.98	5,369	2,830	3,490	4,060	4,730	5,170	5,690	6,740	7,650
Cow_Outlet	5.52	2,395	2,980	3,580	4,100	4,840	5,380	5,970	6,890	7,890
Cowhorn Creek East Tributary										

HECHMS Node	DA (sq. mi.)	XS Station	Ultimate Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
B_CET1	0.4	2,892	370	510	610	750	870	990	1,190	1,350
J_CET1	0.62	1,032	560	750	880	1,060	1,190	1,330	1,530	1,720
Cowhorn Creek West Tributary										
B_CWT1	0.41	3,395	500	680	800	980	1,130	1,290	1,540	1,750
J_CWT1	0.57	2,392	700	940	1,110	1,360	1,560	1,770	2,110	2,430
Howard Creek										
J_HOW05	3.584	19,989	2,030	2,740	3,020	3,360	3,630	3,820	4,250	4,670
J_HOW06	3.866	18,119	1,960	2,690	3,030	3,360	3,600	3,810	4,100	4,300
J_HOW07	4.537	15,596	1,960	2,790	3,140	3,480	3,740	4,200	5,350	6,240
J_HOW08	4.747	12,975	1,950	2,800	3,160	3,520	3,780	4,390	5,570	6,520
J_HOW09	5.082	9,598	1,940	2,810	3,200	3,560	3,840	4,560	5,810	6,850
J_HOW10	5.361	5,987	1,930	2,790	3,180	3,570	3,840	4,460	5,860	7,020
J_HOW11	7.239	4,481	2,250	3,120	3,700	4,780	5,590	6,370	8,980	10,900
J_HOW12	7.389	3,801	2,090	2,960	3,490	4,740	5,640	6,420	8,890	10,820
Outlet	7.711	2,373	2,060	2,950	3,490	4,410	5,510	6,450	8,590	10,470
South Wagner										
J_SWC 2	0.27	13,029	400	510	590	790	940	1,070	1,310	1,490
J_SWC 1-1	0.64	12,641	660	920	1,090	1,330	1,530	1,760	2,100	2,400
J_SWC 3	0.83	10,858	630	830	980	1,270	1,510	1,770	2,150	2,470
J_SWC 4	1.17	7,954	780	1,020	1,190	1,430	1,620	1,850	2,220	2,530
J_SWC 5	1.47	5,308	860	1,110	1,290	1,550	1,750	1,980	2,330	2,640
OUTLET	1.92	2,390	890	1,210	1,520	1,920	2,230	2,570	3,140	3,650
Stream WC-1										
B_WC1_1	0.07	9,225	160	200	230	280	310	360	420	480

HECHMS Node	DA (sq. mi.)	XS Station	Ultimate Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
J_WC1_1	0.244	7,891	340	460	600	790	920	1,050	1,260	1,440
J_WC1_2	0.376	5,956	280	550	750	1,020	1,240	1,430	1,770	1,980
J_WC1_3	0.551	4,351	380	600	820	1,140	1,380	1,620	2,010	2,420
J_WC1_4	0.658	3,310	450	660	900	1,240	1,510	1,770	2,190	2,650
J_WC1_5	0.818	2,735	580	790	970	1,330	1,600	1,900	2,330	2,760
Stream WC-2										
B_WC2_1	0.174	6,593	200	270	320	390	450	510	610	690
J_WC2_2	0.288	5,776	280	390	470	590	680	780	940	1,070
J_WC2_3	0.411	4,699	400	560	670	830	970	1,140	1,380	1,590
J_WC2_4	0.468	3,361	400	560	700	880	1,040	1,220	1,490	1,690
J_WC2_5	0.733	2,795	710	960	1,200	1,500	1,760	2,040	2,460	2,800
J_WC2_6	0.788	2,442	620	960	1,260	1,580	1,840	2,130	2,590	2,950
Outlet	0.859	944	640	950	1,190	1,580	1,870	2,210	2,710	3,110
Swampoodle Creek										
B_SPC1	0.123	17,716	230	300	350	430	490	560	660	750
J_SP0C1	0.162	17,307	290	380	450	540	610	690	830	940
J_SPC03	0.315	17,057	440	600	710	870	1,000	1,150	1,380	1,570
J_SPC04	0.401	15,246	540	740	880	1,080	1,250	1,410	1,690	1,920
J_SPCWC_DIV1	-	14,208	640	970	1,200	1,540	1,770	2,000	2,370	2,650
J_SPCWC_DIV2	-	13,977	800	1,130	1,360	1,700	1,940	2,190	2,570	2,860
J_SPC05	0.419	13,576	800	1,140	1,370	1,700	1,940	2,190	2,560	2,860
J_SPC06	1.080	12,894	1,210	1,680	2,000	2,440	2,730	2,990	3,400	3,720
J_SPC07	2.033	12,567	1,890	2,540	3,000	3,640	4,080	4,550	5,400	6,070
J_SPC08	2.070	11,858	1,870	2,470	2,960	3,630	4,080	4,550	5,430	6,100

HECHMS Node	DA (sq. mi.)	XS Station	Ultimate Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
J_SPC09	2.179	10,765	1,920	2,520	3,020	3,720	4,190	4,670	5,560	6,240
J_SPC11	2.320	10,292	1,990	2,590	3,120	3,840	4,330	4,860	5,870	6,700
J_SPC12	2.402	9,854	2,000	2,620	3,160	3,890	4,400	4,940	5,950	6,760
J_SPC14	2.531	9,277	2,070	2,710	3,280	4,060	4,600	5,220	6,210	7,000
J_SPC15	2.670	7,747	2,130	2,790	3,380	4,190	4,790	5,400	6,400	7,200
J_SPC17	2.848	7,237	2,220	3,010	3,560	4,370	5,030	5,810	6,730	7,560
J_SPC18	2.972	5,656	2,260	3,060	3,600	4,430	5,120	5,890	6,850	7,680
J_SPC20	3.916	4,717	3,300	4,450	5,320	6,580	7,500	8,500	9,930	10,960
Outlet	4.426	2,717	3,120	4,010	4,910	5,740	6,560	7,570	9,280	10,410
Swampoodle Creek East Tributary										
J_SPCET3	0.762	2,570	580	790	940	1,300	1,620	1,970	2,490	2,900
J_SPCET4	0.953	1,567	690	920	1,070	1,310	1,650	2,020	2,530	2,960
Swampoodle Creek West Channel										
B_SPCWC1	0.362	1,496	350	490	590	740	850	980	1,180	1,340
SPCWC_DIV1	-	1,338	220	220	220	250	300	370	490	590
SPCWC_DIV2	-	935	70	70	70	80	120	180	280	370
SPCWC_DIV3	0.661	172	460	630	720	790	810	830	860	880
Wagner Creek										
J_WC07	4.480	41,599	2,850	4,280	5,260	6,680	7,820	9,040	10,980	12,490
J_Stream_WC-2	5.340	40,395	3,410	4,950	6,050	7,600	8,810	10,130	12,240	13,900
J_WC08	6.130	35,626	2,750	4,050	4,940	6,740	8,250	9,870	12,170	14,020
J_WC09	7.040	34,191	2,900	4,250	5,180	7,050	8,620	10,300	12,710	14,650
J_WC11	9.150	32,251	3,220	4,690	5,760	8,050	10,020	12,110	15,100	17,480
J_WC12	9.650	29,999	3,250	4,740	5,820	8,110	10,090	12,230	15,250	17,690

HECHMS Node	DA (sq. mi.)	XS Station	Ultimate Peak Discharges (cfs)							
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	250-YR	500-YR
J_WC14	10.560	29,154	3,780	5,380	6,630	8,430	10,060	12,140	15,200	17,770
J_WC15	10.990	25,720	3,660	5,210	6,410	8,240	9,790	11,800	15,050	17,660
J_WC17	12.230	22,939	4,010	5,730	7,040	9,090	10,830	12,440	16,140	18,600
J_WC18	12.430	22,112	3,750	5,520	6,760	8,780	10,450	12,420	16,090	18,560
J_WC19	12.830	20,846	3,780	5,570	6,820	8,860	10,550	12,570	16,340	18,860
J_WC20	13.090	19,254	3,670	5,490	6,750	8,630	10,530	12,280	16,240	18,960
J_WC21	13.770	15,547	3,350	4,760	6,650	8,280	9,690	11,820	15,250	18,190
J_WC22	14.010	12,109	3,310	4,720	6,370	8,270	9,550	11,680	15,250	18,220
J_WC23	19.650	10,041	3,920	5,450	7,170	11,560	12,730	16,110	20,550	24,430
J_WC24	20.060	8,838	3,960	5,500	7,190	11,610	12,780	16,170	20,630	24,530
J_WC25	20.460	7,267	3,960	5,510	7,050	11,490	12,820	16,040	20,640	24,530
J_WC26	20.700	5,421	3,940	5,500	6,940	10,980	12,830	15,940	20,650	24,540
J_Swagner	22.620	4,191	4,440	6,190	7,280	11,390	13,460	16,450	21,360	25,400
WC_Outlet	23.350	1,729	4,280	6,140	7,240	11,160	13,380	16,220	21,250	25,340

Table 8. Existing vs. Ultimate Conditions Peak Flood Discharges

HECHMS Node	DA (sq. mi.)	XS Station	100-YR EXISTING	100-YR ULTIMATE	Delta 100	% Change	500-YR EXISTING	500-YR ULTIMATE	Delta 500	% Change
Clear Creek										
J CC 1	0.2	24,488	870	890	20	2%	1,220	1,230	10	1%
J CC 1A	0.37	23,626	1,090	1,110	20	2%	1,520	1,540	20	1%
J CC 2	0.37	22,854	950	970	20	2%	1,350	1,370	20	1%
J CC 3	0.62	22,133	1,580	1,870	290	18%	2,210	2,620	410	19%
J CC 4	0.68	21,172	1,660	1,970	310	19%	2,330	2,790	460	20%
J CC 5	1.06	20,643	2,760	3,230	470	17%	3,910	4,590	680	17%
J_CC 6	1.11	19,427	2,770	3,240	470	17%	3,930	4,630	700	18%
J_CC 7	1.67	18,947	4,030	4,810	780	19%	5,650	6,730	1,080	19%
J_CC 8	1.89	18,012	4,310	5,150	840	19%	6,100	7,310	1,210	20%
J_CC 9	2.27	16,484	5,070	6,100	1,030	20%	7,250	8,700	1,450	20%
J_CC 10	2.27	15,694	5,070	6,100	1,030	20%	7,240	8,690	1,450	20%
OUTLET	5.25	7,900	2,920	3,360	440	15%	4,550	5,070	520	11%
Corral Creek										
J_COC2	0.612	9,909	1,380	1,740	360	26%	1,920	2,340	420	22%
J_COC3	0.874	8,112	1,650	1,800	150	9%	2,110	2,490	380	18%
J_COC4	1.113	6,933	2,310	2,540	230	10%	2,990	3,290	300	10%
J_COC5	1.319	4,923	2,310	2,420	110	5%	2,960	3,250	290	10%
J_COC6	1.878	1,745	3,330	3,740	410	12%	4,240	4,650	410	10%
Cowhorn Creek										
B_Cow1	0.3	21,052	670	750	80	12%	920	1,010	90	10%
J_Cow1	0.43	19,760	770	860	90	12%	1,060	1,160	100	9%

HECHMS Node	DA (sq. mi.)	XS Station	100-YR EXISTING	100-YR ULTIMATE	Delta 100	% Change	500-YR EXISTING	500-YR ULTIMATE	Delta 500	% Change
J_Cow2	0.74	19,408	1,360	1,560	200	15%	1,920	2,110	190	10%
J_Cow3	0.77	17,852	1,370	1,560	190	14%	1,950	2,130	180	9%
J_Cow5	1.5	17,197	2,690	2,940	250	9%	3,590	3,800	210	6%
J_Cow6	1.6	15,792	2,710	2,980	270	10%	3,680	3,900	220	6%
J_Cow07	2.22	15,010	3,575	3,960	385	11%	4,939	5,260	321	7%
J_Cow8	2.26	14,569	3,580	3,960	380	11%	4,970	5,290	320	6%
J_Cow9	2.83	14,203	4,390	4,890	500	11%	6,010	6,450	440	7%
J_Cow10	2.89	13,577	4,410	4,930	520	12%	6,050	6,500	450	7%
J_Cow11	3.23	11,945	4,260	4,770	510	12%	6,320	6,770	450	7%
J_Cow14	3.72	10,296	4,810	5,450	640	13%	7,300	8,060	760	10%
J_Cow15	4.1	9,613	5,200	5,590	390	8%	7,380	7,940	560	8%
J_Cow16	4.42	7,410	5,050	5,450	400	8%	6,990	7,390	400	6%
J_Cow18	4.81	6,145	5,370	5,620	250	5%	7,180	7,580	400	6%
J_Cow19	4.98	5,369	5,450	5,690	240	4%	7,250	7,650	400	6%
Cow_Outlet	5.52	2,395	5,690	5,970	280	5%	7,480	7,890	410	5%
Cowhorn Creek East Tributary										
B_CET1	0.4	3,016	940	990	50	5%	1,300	1,350	50	4%
J_CET1	0.62	1,032	1,270	1,330	60	5%	1,660	1,720	60	4%
Cowhorn Creek West Tributary										
B_CWT1	0.41	3,395	1,170	1,290	120	10%	1,640	1,750	110	7%
J_CWT1	0.57	2,392	1,610	1,770	160	10%	2,240	2,430	190	8%

HECHMS Node	DA (sq. mi.)	XS Station	100-YR EXISTING	100-YR ULTIMATE	Delta 100	% Change	500-YR EXISTING	500-YR ULTIMATE	Delta 500	% Change
Howard Creek										
J_HOW5	3.584	19,989	3,650	3,820	170	5%	4,190	4,670	480	11%
J_HOW6	3.866	18,119	3,640	3,810	170	5%	4,200	4,300	100	2%
J_HOW7	4.537	15,596	3,800	4,200	400	11%	5,090	6,240	1,150	23%
J_HOW8	4.747	12,975	3,840	4,390	550	14%	5,320	6,520	1,200	23%
J_HOW9	5.082	9,598	3,910	4,560	650	17%	5,630	6,850	1,220	22%
J_HOW10	5.361	5,987	3,940	4,460	520	13%	5,760	7,020	1,260	22%
J_HOW11	7.239	4,481	5,320	6,370	1,050	20%	8,850	10,900	2,050	23%
J_HOW12	7.389	3,801	5,370	6,420	1,050	20%	8,730	10,820	2,090	24%
Outlet	7.711	2,373	5,250	6,450	1,200	23%	8,550	10,470	1,920	22%
South Wagner										
J_SWC 2	0.27	13,029	890	1,070	180	20%	1,220	1,490	270	22%
J_SWC1-1	0.64	12,641	1,690	1,760	70	4%	2,340	2,400	60	3%
J_SWC 3	0.83	10,858	1,699	1,770	71	4%	2,401	2,470	69	3%
J_SWC 4	1.17	7,954	1,740	1,850	110	6%	2,320	2,530	210	9%
J_SWC 5	1.47	5,308	1,900	1,980	80	4%	2,430	2,640	210	9%
OUTLET	1.92	2,390	2,360	2,570	210	9%	3,230	3,650	420	13%
Stream WC-1										
B_WC1_1	0.07	9,225	270	360	90	33%	370	480	110	30%
J_WC1_1	0.244	7,891	780	1,050	270	35%	1,070	1,440	370	35%
J_WC1_2	0.376	5,956	1,080	1,430	350	32%	1,530	1,980	450	29%
J_WC1_3	0.551	4,351	1,230	1,620	391	32%	1,773	2,420	647	36%
J_WC1_4	0.658	3,310	1,380	1,770	390	28%	2,000	2,650	650	33%

HECHMS Node	DA (sq. mi.)	XS Station	100-YR EXISTING	100-YR ULTIMATE	Delta 100	% Change	500-YR EXISTING	500-YR ULTIMATE	Delta 500	% Change
J_WC1_5	0.818	2,735	1,500	1,900	400	27%	2,200	2,760	560	25%
Stream WC-2										
B_WC2_1	0.174	6,593	450	510	60	13%	510	620	110	22%
J_WC2_2	0.288	5,776	680	780	100	15%	780	970	190	24%
J_WC2_3	0.411	4,699	960	1,140	180	19%	1,140	1,360	220	19%
J_WC2_4	0.468	3,361	1,080	1,220	140	13%	1,220	1,550	330	27%
J_WC2_5	0.733	2,795	1,750	2,040	290	17%	2,040	2,510	470	23%
J_WC2_6	0.788	2,442	1,830	2,130	300	16%	2,130	2,620	490	23%
Outlet	0.859	944	1,850	2,210	360	19%	2,210	2,750	540	24%
Swampoodle Creek										
B_SPC01	0.123	17,716	400	560	160	40%	540	750	210	39%
J_SPC01	0.162	17,307	500	690	190	38%	660	940	280	42%
J_SPC03	0.315	17,057	940	1,150	210	22%	1,280	1,570	290	23%
J_SPC04	0.401	15,246	1,190	1,410	220	18%	1,590	1,920	330	21%
J_SPCWC_DIV1	-	14,208	1,750	2,000	250	14%	2,310	2,650	340	15%
J_SPCWC_DIV2	-	13,977	1,940	2,190	256	13%	2,520	2,860	345	14%
J_SPC05	0.419	13,576	1,940	2,190	250	13%	2,530	2,860	330	13%
J_SPC06	1.08	12,894	2,750	2,990	240	9%	3,380	3,720	340	10%
J_SPC07	2.033	12,567	4,410	4,550	140	3%	5,900	6,070	170	3%
J_SPC08	2.07	11,858	4,430	4,550	120	3%	5,940	6,100	160	3%
J_SPC09	2.179	10,765	4,540	4,670	130	3%	6,090	6,240	150	2%
J_SPC11	2.32	10,292	4,740	4,860	120	3%	6,600	6,700	100	2%
J_SPC12	2.402	9,854	4,840	4,940	100	2%	6,670	6,760	90	1%

HECHMS Node	DA (sq. mi.)	XS Station	100-YR EXISTING	100-YR ULTIMATE	Delta 100	% Change	500-YR EXISTING	500-YR ULTIMATE	Delta 500	% Change
J_SPC14	2.531	9,277	5,060	5,220	160	3%	6,900	7,000	100	1%
J_SPC15	2.67	7,747	5,250	5,400	150	3%	7,060	7,200	140	2%
J_SPC17	2.848	7,237	5,600	5,810	210	4%	7,360	7,560	200	3%
J_SPC18	2.972	5,656	5,670	5,890	220	4%	7,480	7,680	200	3%
J_SPC20	3.916	4,717	8,000	8,500	500	6%	10,510	10,960	450	4%
Outlet	4.426	2,717	7,110	7,570	460	6%	10,010	10,410	400	4%
Swampoodle Creek East Tributary										
J_SPCET3	0.762	2,570	1,730	1,970	240	14%	2,630	2,900	270	10%
J_SPCET4	0.953	1,567	1,840	2,020	180	10%	2,770	2,960	190	7%
Swampoodle Creek West Channel										
B_SPCWC1	0.362	1,496	920	980	60	7%	1,270	1,340	70	6%
SPCWC_DIV1	-	1,338	340	370	30	9%	540	590	50	9%
SPCWC_DIV2	-	935	150	180	30	20%	330	370	40	12%
SPCWC_DIV3	0.661	172	810	830	20	2%	870	880	10	1%
Wagner Creek										
J_WC07	4.481	41,599	7,650	9,040	1,390	18%	10,960	12,490	1,530	14%
J_Stream_WC-2	5.34	40,395	8,690	10,130	1,440	17%	12,340	13,900	1,560	13%
J_WC08	6.134	35,626	8,310	9,870	1,560	19%	12,460	14,020	1,560	13%
J_WC09	7.056	34,191	8,740	10,300	1,560	18%	13,120	14,650	1,530	12%
J_WC11	9.171	32,251	10,290	12,110	1,820	18%	15,830	17,480	1,650	10%
J_WC12	9.667	29,999	10,400	12,230	1,830	18%	16,040	17,690	1,650	10%
J_WC14	10.558	29,154	10,380	12,140	1,760	17%	16,230	17,770	1,540	9%
J_WC15	10.992	25,720	10,040	11,800	1,760	18%	16,130	17,660	1,530	9%

HECHMS Node	DA (sq. mi.)	XS Station	100-YR EXISTING	100-YR ULTIMATE	Delta 100	% Change	500-YR EXISTING	500-YR ULTIMATE	Delta 500	% Change
J_WC17	12.23	22,939	10,670	12,440	1,770	17%	16,850	18,600	1,750	10%
J_WC18	12.431	22,112	10,410	12,420	2,010	19%	16,800	18,560	1,760	10%
J_WC19	12.83	20,846	10,530	12,570	2,040	19%	16,950	18,860	1,910	11%
J_WC20	13.091	19,254	10,530	12,280	1,750	17%	16,930	18,960	2,030	12%
J_WC21	13.768	15,547	10,040	11,820	1,780	18%	16,680	18,190	1,510	9%
J_WC22	14.015	12,109	10,010	11,680	1,670	17%	16,600	18,220	1,620	10%
J_WC23	19.651	10,041	13,010	16,110	3,100	24%	22,330	24,430	2,100	9%
J_WC24	20.057	8,838	13,060	16,170	3,110	24%	22,440	24,530	2,090	9%
J_WC25	20.463	7,267	13,090	16,040	2,950	23%	22,420	24,530	2,110	9%
J_WC26	20.701	5,421	13,090	15,940	2,850	22%	22,420	24,540	2,120	9%
J_Swagner	22.622	4,191	13,660	16,450	2,790	20%	23,220	25,400	2,180	9%
WC_Outlet	23.349	1,729	13,610	16,220	2,610	19%	23,020	25,340	2,320	10%

3.5.4 Comparison to Effective Discharges

The 2010 Bowie County FIS Report (Reference 3) includes flows derived from the original study performed in 1988. Table 9, Peak Flow Comparison to Previous Studies, is a comparison of the 10-, 50-, 100- and 500-year peak flood discharges of the 2010 Bowie County FIS Report to the discharges computed for this study. Figure 10, Effective Floodplain Comparison, has the new study 100-year floodplain overlaid on the Effective 2010 Bowie County FIRM panels which show the effective floodplains through the study area.

Table 9 shows the change in flows from the 1988 study to this current study. Many of the changes can be attributed to the more detailed subbasin delineations and better topographic data available for this study. Many watersheds experienced increased discharges due to the increased impervious areas resulting from development. Some basins, such as Howard, actually realized reduced discharges due to the more accurate routing calculations included with this study.

3.6 Flood Damage

3.6.1 Purpose

The main purpose for an economic analysis is to identify and quantify the extent of flood problems and, on a comparable basis, evaluate solutions to reduce flood losses. The USACE Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA, Version 1.2.5) software was utilized in the economic analyses. A base flood damage assessment was developed to represent the expected annual damages if no alternatives are implemented. Estimates of flood damages and benefits presented in this report reflect 2011 dollars using ultimate development conditions.

3.6.2 Inventory of Structures

The economic analysis study area included all properties within the 500-year floodplain limits for the City of Texarkana, Texas. The City of Texarkana provided a buildings shapefile that was intersected with the 500-year floodplain to identify flood prone properties. The Bowie County Appraisal District (BCAD) 2010 parcel data (Reference 14) was used to assign values to structures and property. Where property values were not available, they were approximated based on an average square foot value of structures with similar occupancy types in the surrounding area. Finished floor elevations were extracted for each building based on the City of Texarkana 2006 Lidar data. The 2009 Master Drainage Plan for Cowhorn Creek included finished floor surveys for a selected sample of flood prone structures.

Table 9. Peak Flow Comparison to Previous Studies

Location	10-YR			50-YR			100-YR			500-YR		
	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change
Clear Creek												
Upstream Face of Skyline Road	----			----			820	950	16%	----		
Below confluence with Stream CC-8	----			----			2,270	2,770	22%	----		
Below confluence with Stream CC-9	----			----			3,060	4,030	32%	----		
Above confluence with Stream CC-6	----			----			3,110	4,310	39%	----		
Below confluence with Stream CC-6 above Bringle Lake	----			----			3,350	5,070	51%	----		
Upstream of Bringle Lake	----			----			7,920	,5070	-36%	----		
Below Bringle Lake	----			----			3,180	2,920	-8%	----		
Cowhorn Creek												
Approx. 1,850 feet northwest of north frontage road of Interstate Route 30	320	460	44%	450	660	47%	520	770	48%	670	1,060	58%
Approx. 550 feet upstream of north frontage road of Interstate Route 30	960	800	-17%	1,330	1,190	-11%	1,510	1,370	-9%	1,880	1,950	4%

Location	10-YR			50-YR			100-YR			500-YR		
	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change
At Interstate Route 30	1,390	1,560	12%	1,920	2,310	20%	2,180	2,690	23%	2,750	3,590	31%
Approximately 1,500 feet upstream of Kennedy Lane	1,510	1,570	4%	2,090	2,340	12%	2,370	2,710	14%	2,950	3,680	25%
At College Street	2,640	2,760	5%	3,650	3,720	2%	4,140	4,260	3%	5,200	6,320	22%
At Tucker Street	3,240	3,400	5%	4,380	4,630	6%	4,950	5,200	5%	6,140	7,380	20%
At New Boston Road (USHwy82)	3,910	3,400	-13%	5,200	4,510	-13%	5,850	5,050	-14%	7,200	6,990	-3%
At West 15th	3,980	3,610	-9%	5,240	4,940	-6%	5,870	5,450	-7%	7,200	7,250	1%
At confluence with Wagner Creek	4,100	3,720	-9%	5,300	5,070	-4%	5,900	5,690	-4%	7,200	7,480	4%
Howard Creek												
At Jarvis Parkway	2,500	2,630	5%	3,380	3,350	-1%	3,820	3,650	-4%	5,200	4,190	-19%
At Findley Street	-------	2,580	-------	-------	3,380	-------	-------	3,640	-------	-------	4,200	-------
At Lake Drive	2,970	2,690	-9%	4,020	3,530	-12%	4,550	3,800	-16%	6,200	5,090	-18%
At Flower Acres Road	3,130	2,700	-14%	4,250	3,580	-16%	4,830	3,840	-20%	6,600	5,320	-19%
At a point approximately 4,430	-------	2,700	-------	-------	3,640	-------	-------	3,910	-------	-------	5,630	-------

Location	10-YR			50-YR			100-YR			500-YR		
	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change
feet downstream of Flower Acres Road												
Just upstream of confluence of Corral Creek	3,600	2,670	-26%	4,950	3,650	-26%	5,650	3,940	-30%	7,700	5,760	-25%
Downstream of confluence with Corral Creek	-------	2,940	-------	-------	4,480	-------	-------	5,320	-------	-------	8,850	-------
At Buchanan / FM 558	-------	2,860	-------	-------	4,280	-------	-------	5,370	-------	-------	8,730	-------
Just upstream of confluence with Days Creek	3,600	2,850	-21%	4,950	4,080	-18%	5,650	5,250	-7%	7,700	8,550	11%
South Wagner Creek												
Upstream of US Route 67	240	490	104%	320	750	134%	370	890	141%	440	1,220	177%
At Falvey Street	750	910	21%	1,020	1,440	41%	1,150	1,700	48%	1,400	2,410	72%
At Robison Road	930	950	2%	1,270	1,460	15%	1,450	1,740	20%	1,840	2,320	26%
At Findley Street	950	1,160	22%	1,310	1,680	28%	1,490	1,900	28%	1,900	2,430	28%
At confluence with Wagner Creek	900	1,240	38%	1,300	2,040	57%	1,540	2,360	53%	2,050	3,230	58%

Location	10-YR			50-YR			100-YR			500-YR		
	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change
Stream WC1												
At Interstate Route 30	--		--	--	--	--	1,210	1,380	14%	--	--	--
At a point approximately 0.57 miles upstream of Interstate Route 30	--		--	--	--	--	1,010	1,500	49%	--	--	--
Stream WC2												
Approximately 2,350 feet upstream of Concord Place	--		--	--	--	--	350	450	29%	--	--	--
Upstream of Unnamed Tributary at a point approximately 660 feet downstream of Independence Place	--		--	--	--	--	760	1,080	42%	--	--	--
At Pleasant Grove	--		--	--	--	--	1,280	1,830	43%	--	--	--
At confluence with Wagner Creek	--		--	--	--	--	1,260	1,850	47%	--	--	--
Swampoodle Creek												
At 40th Street	500	550	10%	650	810	25%	730	940	29%	880	1,280	45%
Above confluence of Swampoodle Creek West Channel	590	1,170	98%	810	1,720	112%	910	1,940	113%	1,120	2,530	126%

Location	10-YR			50-YR			100-YR			500-YR		
	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change
Below confluence of Swampoodle Creek East Tributary	1,920	2,800	46%	2,540	3,940	55%	2,860	4,410	54%	3,420	5,900	73%
Above 24th Street / Richmond Road	2,760	2,770	0%	3,670	3,950	8%	4,120	4,430	8%	5,000	5,940	19%
At US Highway 82	3,110	3,040	-2%	4,060	4,430	9%	4,540	5,060	11%	5,600	6,900	23%
At 13th Street	3,260	3,270	0%	4,250	4,840	14%	4,670	5,600	20%	5,700	7,360	29%
Above US Highway 67	3,410	3,300	-3%	4,440	4,920	11%	4,840	5,670	17%	5,800	7,480	29%
At confluence with Days and Nix Creeks	4,600	4,480	-3%	5,930	6,530	10%	6,620	7,570	14%	8,000	10,220	28%
Swampoodle Creek East												
At confluence with Swampoodle Creek	1,330	1,080	-19%	1,740	1,480	-15%	1,950	1,840	-6%	2,400	2,770	15%
Wagner Creek												
Above Stream WC-2	-------	4,000	-------	-------	6,450	-------	4,860	7,650	57%	-------	10,960	-------
Below Stream WC-2	-------	4,670	-------	-------	7,390	-------	5,925	8,690	47%	-------	12,340	-------
Above IH-30	-------	3,920	-------	-------	6,720	-------	5,250	8,310	58%	-------	12,460	-------
Below Stream WC-1 and upstream of IH-30	-------	4,620	-------	-------	8,170	-------	8,460	10,290	22%	-------	15,830	-------

Location	10-YR			50-YR			100-YR			500-YR		
	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change	2010 FEMA FIS	2011 FPP Study	% Change
Approximately 1,200 feet upstream of Westlawn	5,250	4,700	-10%	7,600	7,950	5%	8,800	10,040	14%	11,600	16,130	39%
At East Frontage Road of State Route 151	5,800	5,140	-11%	8,450	8,680	3%	9,750	10,530	8%	12,900	16,950	31%
At Texas Pacific Railroad	5,800	5,080	-12%	8,450	8,510	1%	9,750	10,530	8%	12,900	16,930	31%
At US Route 67	5,800	4,730	-18%	8,450	8,280	-2%	9,750	10,040	3%	12,900	16,680	29%
At confluence of Cowhorn Creek	5,800	5,400	-7%	8,450	11,640	38%	9,750	13,010	33%	12,900	22,330	73%
Just upstream of confluence of South Wagner Creek	5,800	5,460	-6%	9,000	11,000	22%	10,900	13,090	20%	15,000	22,420	49%
At Lake Drive	6,450	6,220	-4%	9,850	11,450	16%	11,900	13,660	15%	16,300	23,220	42%
At confluence with Days Creek	6,450	6,190	-4%	9,850	11,230	14%	11,900	13,610	14%	16,300	23,020	41%

The inventory of structures was divided into damage categories based on the building shapefile provided by the City, as shown in Table 10, Major Damage Categories.

Table 10. Major Damage Categories

Damage Category	Description
Residential	Single-Family Residential
Apartments	Apartments, Townhomes, Duplexes
Commercial	Retail and Wholesale Businesses
Public	Municipal Services
Hospital	Hospital

Damage curves from the USACE database were used for the flood damage analysis since they covered the types of structures found in the study area and were considered as best available data. For commercial structures, the most appropriate of the 87 commercial damage curves from the USACE study was selected according to the type of structure.

Damage reaches were determined by forming logical groupings of structures fully or partially inundated by the 500-year floodplain limits. A total of 30 damage reaches were defined for the study area. Within HEC-FDA, damage reach extents were defined in relation to the corresponding stream stationing. The damage reaches' locations are listed and described in Table 11, Description of Damage Reaches. Figure 12, FDA Damage Reaches and Affected Properties, shows all structures identified and the corresponding FDA damage reach.

Once the current market values of the structures were identified from BCAD parcel data, the value of investment (structures and contents) was estimated for each structure. The value of the contents was estimated to be 50% of the value of the structure. The damage calculations exclude damages to the water treatment plant along Cowhorn Creek. Damage curves were not available for this type of structure. The number of structures and type of structure are shown along with their estimated structure and content values in Table 12, Estimated Value by Damage Reach.

Table 11. Description of Damage Reaches

Stream Name	Damage Reach Name	Beginning Station (Feet)	Ending Station (Feet)	# of Flood Analyzed Structures	Description
Clear	CC1	21,172	24,488	26	Wyatt Lane to Skyline Boulevard
Corral	COR1	6,518	7,784	10	Martha Road to Leopard Drive
Cowhorn	COW1	1,164	4,361	20	U.S. Highway 67 to Lemon Street
Cowhorn	COW2	5,043	5,649	16	Along Lester Street
Cowhorn	COW3	6,145	9,463	53	U.S. Highway 82 to Market Street
Cowhorn	COW4	9,832	11,755	26	College Drive to Richmond Road
Cowhorn	COW5	11,945	13,346	23	Richmond Road to Kennedy Lane
Cowhorn	COW6	13,577	14,438	10	Along Lambeth Road
Cowhorn East	COWET1	682	2,790	23	Interstate 30 to Summerhill Road
Howard	HOW1	3,662	5,380	14	Just Upstream of Buchanan Road
Howard	HOW2	8,797	9,598	9	Along Bender Road
Howard	HOW3	12,159	14,445	5	Flower Acre Road to Lake Drive
South Wagner	SWC1	9,490	10,858	3	Along Falvey Avenue
South Wagner	SWC2	11,897	12,944	8	Waco Street to U.S. Highway 67
Stream WC1	WC1-1	4,890	5,956	3	Along Jonathan Street & Sarah Circle
Stream WC2	WC2-1	3,361	4,699	17	Along Independence Circle
Swampoodle	SPC1	765	3,668	14	Confluence with Days Creek to 5th Street
Swampoodle	SPC2	3,757	7,747	81	5th Street to 16th Street
Swampoodle	SPC3	8,403	9,277	10	Along U.S. Highway 82
Swampoodle	SPC4	11,101	11,858	2	Along Spruce Street
Swampoodle	SPC5	13,576	14,367	8	Just Upstream of College Drive
Swampoodle	SPC6	16,806	17,057	7	Along 40th Street and Terrace Lane
Swampoodle East	SPCET1	837	966	9	Just Downstream of Texas Boulevard
Swampoodle East	SPCET2	1,455	2,570	24	Texas Boulevard to Olive Street
Wagner	WC1	980	2,758	29	Along Buchanan Road
Wagner	WC2	2,994	6,895	56	Lake Drive to Jameson Street
Wagner	WC3	7,926	8,838	20	Along Sulphur Street and Elliot Street
Wagner	WC4	10,041	14,437	36	Confluence of Cowhorn Creek to Robison Road
Wagner	WC5	22,528	22,939	3	Along Elliot Road
Wagner	WC6	39,286	41,599	7	Along Cooper Lane and McKnight Road

Table 12. Estimated Value by Damage Reach

Damage Reach	Damage Category	Number of Structures	Total Estimated Structure Value	Total Estimated Content Value	Total Value Per Reach
CC1	Residential	26	$ 6,300,000	$ 3,150,000	$ 9,450,000
COR1	Residential	10	$ 596,000	$ 298,000	$ 894,000
COW1	Residential	9	$ 304,000	$ 152,000	$ 1,720,000
	Commercial	8	$ 437,000	$ 219,000	
	Apartment	3	$ 405,000	$ 203,000	
COW2	Residential	16	$ 474,000	$ 237,000	$ 711,000
COW3	Residential	44	$ 874,000	$ 437,000	$ 3,324,000
	Commercial	8	$ 1,342,000	$ 671,000	
COW4	Residential	19	$ 1,578,000	$ 789,000	$ 4,772,000
	Commercial	3	$ 569,000	$ 285,000	
	Public	4	$ 1,034,000	$ 517,000	
COW5	Commercial	1	$ 394,000	$ 197,000	$ 5,343,000
	Apartment	22	$ 3,168,000	$ 1,584,000	
COW6	Residential	10	$ 1,491,000	$ 745,000	$ 2,236,000
COWET1	Commercial	10	$ 246,000	$ 123,000	$27,235,000
	Apartment	12	$ 4,013,000	$ 2,006,000	
	Hospital	1	$ 13,898,000	$ 6,949,000	
HOW1	Residential	13	$ 466,000	$ 233,000	$ 747,000
	Commercial	1	$ 32,000	$ 16,000	
HOW2	Residential	9	$ 90,000	$ 45,000	$ 135,000
HOW3	Residential	4	$ 230,000	$ 115,000	$ 387,000
	Commercial	1	$ 28,000	$ 14,000	
SWC1	Commercial	3	$ 4,392,000	$ 2,196,000	$ 6,588,000
SWC2	Residential	5	$ 198,000	$ 99,000	$ 3,217,000
	Commercial	3	$ 1,947,000	$ 973,000	
WC1-1	Residential	3	$ 686,000	$ 343,000	$ 1,029,000
WC2-1	Residential	17	$ 2,490,000	$ 1,245,000	$ 3,735,000
SPC1	Commercial	11	$ 433,000	$ 217,000	$ 3,235,000
	Public	3	$ 1,723,000	$ 862,000	
SPC2	Residential	47	$ 859,000	$ 429,000	$ 4,200,000
	Commercial	25	$ 915,000	$ 457,000	
	Apartment	1	$ 182,000	$ 91,000	
	Public	8	$ 845,000	$ 422,000	
SPC3	Commercial	10	$ 413,000	$ 206,000	$ 619,000
SPC4	Residential	1	$ 7,000	$ 4,000	$ 29,000

Damage Reach	Damage Category	Number of Structures	Total Estimated Structure Value	Total Estimated Content Value	Total Value Per Reach
	Commercial	1	$ 12,000	$ 6,000	
SPC5	Residential	7	$ 572,000	$ 286,000	$ 877,000
	Commercial	1	$ 13,000	$ 6,000	
SPC6	Residential	7	$ 501,000	$ 251,000	$ 752,000
SPCET1	Residential	9	$ 355,000	$ 177,000	$ 532,000
SPCET2	Residential	20	$ 2,000,000	$ 1,000,000	$ 3,827,000
	Commercial	2	$ 163,000	$ 81,000	
	Public	2	$ 389,000	$ 194,000	
WC1	Residential	23	$ 824,000	$ 412,000	$ 2,013,000
	Commercial	6	$ 518,000	$ 259,000	
WC2	Residential	51	$ 1,105,000	$ 553,000	$ 2,051,000
	Commercial	4	$ 78,000	$ 39,000	
	Public	1	$ 184,000	$ 92,000	
WC3	Residential	19	$ 671,000	$ 336,000	$ 1,135,000
	Public	1	$ 85,000	$ 43,000	
WC4	Residential	11	$ 245,000	$ 122,000	$ 4,942,000
	Commercial	25	$ 3,050,000	$ 1,525,000	
WC5	Residential	3	$ 230,000	$ 115,000	$ 345,000
WC6	Residential	7	$ 3,743,000	$ 1,872,000	$ 5,615,000

3.6.3 Evaluation of Flood Damages

The water surface profile elevations for 2-, 5-, 10-, 25-, 50-, 100-, 250-, and 500-year flood events based on existing (2011) channel and bridge conditions with ultimate developed watersheds, were used to evaluate flood damages. Four hundred eleven (411) structures have estimated finished floor elevations below the ultimate 100-year flood elevations.

Table 13, Affected Structures per Flood Event Year, shows the number of structures affected by each flood event, and the value of the structures that were affected.

Once the expected damages per event were determined, FDA generated the expected annual damages. This value is a weighted average of the expected damages per flood event multiplied by the probability of the flood event occurring; taking into account uncertainty in discharges, damages curves, and stage-damage relationships.

In addition to the structures, a majority of the roadways that cross the study streams are inundated during even small events. Figure 11, Inundated Roadways, illustrates the flood event when the crossing, or a portion of, could be inundated in a given storm

event. Table 14 shows the minimum elevation of each roadway crossing (related to Figure 11 by the Structure ID) and the corresponding water surface elevation for each flood event calculated at the upstream face of the structure.

Table 13. Affected Structures per Flood Event Year

Flood Event Year	Affected Structures	Value of Affected Structures	Value of Affected Content	Total Estimated Damage
2-Year	85	$ 5,479,002	$ 2,739,501	$ 498,641
5-Year	157	$ 11,658,394	$ 5,829,197	$ 1,397,098
10-Year	210	$ 29,133,017	$ 14,566,509	$ 2,024,394
25-Year	280	$ 32,910,098	$ 16,455,049	$ 3,321,578
50-Year	342	$ 39,314,315	$ 19,657,158	$ 4,508,949
100-Year	411	$102,879,126	$ 51,439,563	$ 6,184,134
250-Year	474	$112,561,590	$ 56,280,795	$ 8,979,436
500-Year	510	$117,835,586	$ 58,917,793	$ 11,943,100

Table 14. Inundated Road Crossings

ID Location	River Station	Roadway Crossing	Minimum Top of Road Elevation	50 % Event WSEL	20 % Event WSEL	10 % Event WSEL	4 % Event WSEL	2 % Event WSEL	1 % Event WSEL
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
Howard Creek									
1	3,662	Buchanan / FM 558	268.6	263.62	265.37	266.7	268.37	269.87	270.36
2	12,329	Flower Acres	280.2	280.83	281.62	282.01	282.34	282.49	282.61
3	14,699	State Route 93 / Lake Drive	286.5	285.24	286.91	287.3	287.56	287.68	287.79
4	17,532	Findley	287.5	289.83	290.7	291.18	291.61	291.83	292.01
5	17,606	RR Bridge	301.0	290.46	291.76	292.51	293.21	293.56	293.89
6	19,897	Jarvis Parkway / Loop 151	307.0	293.76	295.91	297.11	299.03	300.05	301.28
Corral Creek									
7	4,316	Loop 151 - East / West	283.6	276.91	278.5	279.32	280.49	282.21	284.02
8	4,878	Chelf	282.6	279.33	280.87	281.71	283.08	284.22	284.92
9	6,450	Martha	286.5	287.25	287.51	287.62	287.82	288.03	288.2
10	8,021	Leopard	294.0	290.65	291.92	292.71	293.96	294.39	294.58
11	9,795	Loop 151-Jarvis - North / South	305.7	296.13	297.21	298.09	300.48	301.66	302.25
Wagner Creek									
12	2,994	RR Bridge	268	266.08	267.15	267.82	268.62	269.36	270.56
13	3,848	Lake Drive	270.1	267 75	269.09	270.02	271.08	271.75	272.05
14	4,797	Garber	268.44	270.01	271.06	271.52	272.37	273.28	273.76
15	6,449	Findley	270.15	271.89	272.81	273.31	274.2	275.3	275.78
16	7,013	RR Bridge	277.9	272.69	273.63	274.18	275.23	276.62	277.18
17	7,635	Jameson	272.57	273.74	275.09	275.85	277.04	278.11	278.61

ID Location	River Station	Roadway Crossing	Minimum Top of Road Elevation	50 % Event WSEL	20 % Event WSEL	10 % Event WSEL	4 % Event WSEL	2 % Event WSEL	1 % Event WSEL
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
18	7,751	RR Bridge	274.2	274.19	275.53	276.13	277.31	278.35	278.81
19	14,110	US Hwy 67	284.8	281.21	283.23	284.21	284.5	285.54	286.94
20	14,302	Robison	285.19	281.66	284.2	285.84	286.18	286.89	288.05
21	18,279	RR Bridge	292.4	285.76	287.93	289.1	289.95	290.11	291.25
22	21,181	Piney	293.9	289.7	292.08	293.13	295.01	296.24	297.49
23	21,343	Loop 151	311.64	289.97	292.45	293.84	295.85	296.79	297 71
24	21,481	Loop 151	311.72	290.54	293.17	294.46	296.17	297.09	297.99
25	21,869	Westlawn	294.02	290.54	293.17	294.46	296.17	297.09	297.99
26	29,075	US Hwy 82	300.6	300.28	301.41	301.84	302.37	302.77	303.23
27	33,743	I30	309.41	304.88	306.65	307.58	309.53	310.23	310.5
28	33,882	I30 Frontage	308.39	305.26	307.59	309.05	310.25	310.84	311.18
29	39,568	FM 2878	311.58	312.81	313.66	314.08	314.93	315.61	316.31
South Wagner									
30	710	Buchanan	267.88	269.44	269.87	270.15	270.62	271.07	271.52
31	2,282	West	273.42	273.39	274.32	274.65	275.04	275.19	275.28
32	2,911	Garber	277.2	275.81	277.19	277.6	277.92	278.11	278.26
33	4,453	Findley	280.9	277.27	278.32	278.83	279.52	280.06	280.85
34	4,524	RR Bridge	289.8	277.94	279.05	279.62	280.43	281.02	281.73
35	6,829	Robison	291.11	285.4	286.32	286.92	287.96	288.75	289.85
36	9,708	Falvey	298.2	296.99	298.02	298.58	299.01	299.24	299.51
37	10,652	Kilgore	301.44	300.04	300.83	301.34	302.05	302.31	302.57
38	11,028	Abandoned RR	301.4	300.69	301.76	302.05	302.33	302.47	302.62
39	11,803	Waco	300.9	302.40	302.68	302.84	303.05	303.27	303.49
40	12,622	Private Access Drive	304.8	305.90	306.34	306.56	306.83	307.00	307.16
41	12,842	US Hwy 67	307.49	306.99	307.84	307.98	308.12	308.23	308.37

ID Location	River Station	Roadway Crossing	Minimum Top of Road Elevation	50 % Event WSEL	20 % Event WSEL	10 % Event WSEL	4 % Event WSEL	2 % Event WSEL	1 % Event WSEL
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
Stream WC-1									
42	2,057	University	310.69	306.46	307.23	307 74	308.52	309.1	309.78
43	3,216	Gibson	318.77	314.96	315.59	316.03	316.85	317.42	318.32
44	5,571	Jonathan	327.36	327.55	328	328.17	328.38	328.5	328.65
45	6,858	McKnight	334.73	334.86	334.96	335.11	335.23	335.3	335.38
46	8,363	Arista	343.11	338.34	338.61	339.03	339.59	339.9	340.23
Stream WC-2									
47	2,097	Pleasant Grove / FM 2878	321.66	320.11	321.95	322.37	322.78	322.97	323.14
48	3,489	Independence Circle	327.45	325.61	327.15	327 75	327.99	328.1	328.22
49	3,936	Lexington Place	329.53	327 72	329.22	329.92	330.2	330.37	330.48
50	4,340	Concord Place	330.71	329.86	330.71	331.00	331.10	331.12	331.38
Cowhorn									
51	1,350	Hwy 67	282.1	281.76	282.63	283.13	284.11	284.48	284.74
52	2,273	Railroad	284.42	282.74	283.84	284.95	285.47	285.87	286.21
53	4,988	West 15th Street	290.08	287.82	288.85	289.38	290.71	290.9	291.24
54	6,704	US Hwy 82	295.91	292.01	293.16	294.00	295.51	296.27	297.43
55	8,952	Tucker Street	297.29	297.93	298.51	298.78	299.02	299.25	299.54
56	9,592	Martine Street	299.76	300.54	300.92	301.15	301.31	301.46	301.61
57	10,956	College Drive	302.84	303.39	304.79	305.34	305.3	305.55	305.88
58	11,910	FM 559 / Richmond Road	310.52	305.92	307.24	307.82	308.59	309.15	309.84
59	13,538	Kennedy Lane	311.14	311.51	312.39	312.67	312.99	313.2	313.39
60	16,699	IH 30 Frontage Road / Mall Drive	326.58	323.10	324.49	325.74	327.18	327.56	327.94
61	17,038	IH30	331.44	323.52	324.95	326.21	327 73	328.3	328.96

ID Location	River Station	Roadway Crossing	Minimum Top of Road Elevation	50 % Event WSEL	20 % Event WSEL	10 % Event WSEL	4 % Event WSEL	2 % Event WSEL	1 % Event WSEL
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
62	17,175	Saint Michael Drive	327.39	324.36	326.31	328.01	329.08	329.47	329.87
63	18,139	Private Drive	330.26	326.66	327.64	329.1	330.65	331.03	331.3
64	18,339	Pedestrian Bridge	327.58	327.32	328.16	329.34	330.71	331.1	331.37
65	18,601	Michael Meagher	330.15	328.38	329.18	330.4	331.25	331.52	331.73
66	19,719	Cowhorn Creek Road	334.71	332.64	333.26	333.62	334.07	334.4	334.85
Cowhorn Creek West Tributary									
67	2,691	IH 30	334.57	326.78	328.07	328.96	330.11	331.01	331.93
68	3,001	Saint Michael / IH30 Frontage	331.1	327.11	328.48	329.6	331.16	331.61	332.04
Cowhorn Creek East Tributary									
69	496	Private Drive	330.3	325.89	327.1	328.92	330.6	331	331.27
70	850	Michael Meagher	330.14	327.28	328.25	330.04	330.93	331.15	331.36
71	1,883	Morris Lane	333.43	331.07	332.94	331.72	331.91	332.16	332.45
72	2,310	Apartment Culvert	333.8	334.08	334.54	334.82	335.15	335.4	335.68
73	2,373	Northwood	335.1	334.21	334.86	335.3	335.72	335.97	336.19
Swampoodle Creek									
74	1,460	Railroad	284.88	275.24	276.44	277.38	278.55	279.41	282
75	1,828	Railroad	285.15	278.32	279.72	281.45	282.54	283.94	286.26
76	2,080	Railroad	285.6	279.15	280.61	282.22	283.49	284.91	286.91
77	2,299	Texas Viaduct	308.66	279.31	280.87	282.49	283.8	285.18	286.95
78	2,574	Broad Street	280.95	280.87	282.26	283.37	284.29	285.25	286.97
79	2,924	W 3rd Street - Texas Viaduct Rd	288.89	281.89	283.13	284.03	284.97	285.81	287.29
80	3,081	W 3rd Street	284.19	282.61	284.23	285.34	286.45	287.41	288.41
81	3,284	Viaduct / W 4th Street	283.74	283.04	284.96	285.78	286.77	287.5	288.54

ID Location	River Station	Roadway Crossing	Minimum Top of Road Elevation	50 % Event WSEL	20 % Event WSEL	10 % Event WSEL	4 % Event WSEL	2 % Event WSEL	1 % Event WSEL
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
82	3,362	W 4th Street (North)	283.41	283.81	285.46	286.12	287.03	287 72	288.67
83	3,757	W 5th Street	282.38	284.24	285.59	286.26	287.16	287.9	288.81
84	4,567	W 7th Street	284.93	286.22	286.78	287.11	287.58	288.16	289
85	4,944	M L King / 8th Street	293.59	286.86	287.69	288.2	288.88	289.34	289.89
86	7,116	W 13th Street	293.91	288.96	290.13	290.86	291.92	292.4	293.61
87	8,290	W 17th Street	294.58	291.37	294.33	294.9	295.09	295.47	295.76
88	9,180	US Highway 82	296.65	296.71	297.8	298.74	299.37	299.58	299.75
89	11,101	Richmond	305.13	302.34	304.68	306.00	306.72	307.07	307.35
90	14,310	College	308.18	313.17	314.64	315.22	315.78	316.16	316.57
91	17,013	W 40th Street	324.61	325.49	326.36	326.62	326.82	326.91	327.49
Swampoodle Creek West Channel									
92	134	Railroad	315.5	309.65	311.34	312.26	313.32	314.06	314.37
93	1,439	College	309.31	311.1	312.17	312.83	313.62	314.21	314.51
Swampoodle Creek East Trib									
94	1,134	Texas Blvd / State Loop 14	313.02	313.17	313.19	313.41	313.69	314.04	314.40
95	1,959	Main Street	315	315.26	315.77	315.83	315.89	316.45	316.95
96	2,206	Pedestrian Bridge	315.3	316.20	317.43	317.62	317.97	318.27	318.68
97	2,341	Pine Street	315.96	316.60	317.48	317.66	318.1	318.40	318.80
Clear Creek									
98	22,839	Skyline	329.12	325.87	329.29	329.66	329.89	330.05	330.2
99	24,477	Wyatt	333.7	334.27	334.81	335.02	335.22	335.41	335.51

4. Flood Mitigation Alternatives

4. Flood Mitigation Alternatives

4.1. Alternative Objectives

Alternatives were developed considering the following objectives:

- Reduce or prevent damages to structures and their contents along the studied reaches within the City of Texarkana.
- Reduce the flood risk to human health and safety associated with inundation, high velocities, and/or overtopping of roads and bridges.
- Reduce flood damages to public facilities, such as roads, bridges, utilities, schools, and churches, within Texarkana.
- Reduce the public and private costs associated with flood fighting and recovery.
- Reduce business and commercial losses resulting from a loss of production and/or economic activity due to flooding.
- Improve the overall health, safety, and quality of life of the citizens of Texarkana

In the development of flood damage alternatives, the following limitations were identified:

- Alternatives were focused on alleviating flood damages for the citizens residing within the City of Texarkana political limits. Benefits of these alternatives may also impact the surrounding communities, but these effects were not examined.
- The formulation of alternatives that reduce flood damages and costs in one area should not result in measurable increases in the extent and magnitude of flooding in another area.
- The formulations of alternatives should avoid adverse impacts to structures.
- Total annual benefits should equal or exceed total annual costs for a plan to be recommended. It is understood that not all benefits are quantifiable.

4.2. Alternative Concepts

In general, five concepts were considered for this project:

- Storm Water Detention Pond Facilities
- Channel Modifications
- Culvert/Bridge Structure Upgrade
- Property Buyouts / Acquisition
- "Do Nothing" Alternative

Storm Water Detention Pond Facilities were explored to minimize flood damages along the downstream reaches of Wagner Creek The City is conscious of the negative impact that prior unmitigated development in the upper watersheds has had on downstream structures. Although the benefits did not exceed the cost of the project, the City may decide to investigate a large regional type detention facility as a means to provide flood damage relief to structures in the lower Wagner Creek watershed.

The main hydraulic function of a detention basin is twofold. The first is reducing the peak flow and releasing it slowly. The second is attenuating the peaks. Usually the most significant results are obtained by offsetting the timing of peak discharges to impact the timing of peak flows downstream. Therefore flow timing was another factor taken into consideration when analyzing the detention facilities.

Channel Modifications were explored in areas where the growth of the brush was obstructing the conveyance of the stream. A clearing alternative considers removing the brush within the lower channel banks of the streams. This provides a "smoother" channel which increases the conveyance within the channel and reduces the water surface. Channelization was explored in areas where the existing terrain allowed for enough grade and horizontal space to modify the channel. The concept of channelization considers a new channel to convey flow. The City currently maintains a number of previously improved concrete channels. Along Swampoodle Creek East Tributary and Stream WC-2, specifically, the improved channels do not have the capacity to convey larger storm events and resizing of these channels was included in the alternative analysis for these streams. Maintenance and reconstruction of these existing channels is a task that the City may have to undertake in the future; therefore, the project was included with the proposed alternatives even though the benefit to cost was not always favorable.

Culvert/Bridge Structure Upgrades were taken into account in those areas where there was a viable, hydraulically practical, and economical solution, especially for those structures owned by the City or within City right-of-way. Structure sizing for the selected damage reaches are included with the alternatives.

Structure re-sizing information for the ultimate 100-year flood event is provided in Table 15 for selected roadway crossings in the City. These improvements do not take into account downstream impacts but the information is provided to assist the City in budgeting future improvements. The roadways were selected based on feasibility of improvements. In some cases, the improvements and impacts to surrounding road grades would be so extensive that a detailed study of the crossing and feasibility of alternative sizing would need to be investigated by the City before moving forward with sizing. These structures are not included in the table. Structural identifiers in the table correspond to Figure 11.

Property Buyouts / Acquisition in flood prone areas are necessary for those streams where other alternatives explored yield a very low benefit cost ratio. If the City of Texarkana would like to pursue Property Buyouts as a solution, once the land is purchased and the structure removed, this area should be utilized as green space.

"Do Nothing" concept is an alternative where economical, political or other factors play a role. In areas where the benefit/cost ratio is low, surrounding structures are minimal, and flooded area covers empty or undeveloped land, the "do nothing" (no-action) concept could be a suggested option.

Table 15. Re-sized Roadway Structures

Stream Name	ID	Roadway	Approx. River Station	100-Year Ultimate Discharge	Existing Crossing	Minimum Top of Road Elevation		Approx. Bridge Span/ Improvement
						Existing	Proposed	
				(cfs)		(ft)	(ft)	
Clear Creek	CC-BR01	Skyline	22,788	980	3-42" RCP	329.12	332	30' Span
Corral Creek	COR-BR01	Chelf	4,815	2,420	3-9'x7' RCB	282.59	285	100' Span
Corral Creek	COR-BR02	Martha	6,423	2,540	5-36" RCP	286.49	289.5	100' Span
Corral Creek	COR-BR03	Leopard	7,952	1,800	3-9'x5' RCB	293.98	293.98	Add 2-9'x5' RCB
Howard Creek	HOW-BR01	Buchanan	3,544	6,590	150' Span	268.6	272	Raise Road in LOB
Howard Creek	HOW-BR02	Flower Acres	12,304	4,300	5-9'x9' RCB	280.2	285	200' Span
Howard Creek	HOW-BR03	Lake Drive	14,609	4,120	5-8'x6' RCB	286.47	289	300' Span
Howard Creek	HOW-BR04	Findley	17,469	3,810	6-8'x4' RCB	287.54	294	200' Span
South Wagner	SWC-BR02	West	2,226	2,570	3-8'x6' RCB	273.42	276.5	200' Span
South Wagner	SWC-BR03	Garber	2,845	1,980	3-8'x6' RCB	277.2	280	100' Span
South Wagner	SWC-BR04	Findley	4,407	1,980	40' Span	280.9	282	100' Span
South Wagner	SWC-BR07	Falvey	9,613	1,770	4-8'x5' RCB	298.2	299	75' Span
South Wagner	SWC-BR08	Kilgore	10,582	1,770	4-8'x4' RCB	301.44	303	75' Span
South Wagner	SWC-BR10	Waco	11,721	1,760	5-5'x3' RCB	300.9	305	200' Span
Stream WC1	SWC1-BR01	University	2,010	1,900	6-10'x4' RCB	310.69	310.69	Add 1-10'x4'
Stream WC1	SWC1-BR02	Gibson	3,175	1,770	5-10'x3.5' RCB	318.77	318.77	Add 1-10'x3.5' RCB
Stream WC1	SWC1-BR03	Jonathan	5,540	1,430	3-36" RCP	327.36	331	6-9'x6' RCB
Stream WC1	SWC1-BR04	McKnight	6,831	1,050	4-36" RCP	334.37	337	6-9'x6' RCB
Stream WC2	SWC2-BR01	Pleasant Grove	2,050	2,130	3-60" RCP	321.66	323	5-8'x6' RCB
Stream WC2	SWC2-BR02	Independence	3,452	1,140	2-6'x4' RCB	327.45	328	Add 3-6'x4' RCB
Stream WC2	SWC2-BR03	Lexington	3,909	1,140	2-6'x4' RCB	329.53	331	Add 3-6'x4' RCB
Stream WC2	SWC2-BR04	Concord	4,308	1,140	2-6'x4' RCB	330.71	332	40' Span

Stream Name	ID	Roadway	Approx. River Station	100-Year Ultimate Discharge	Existing Crossing	Minimum Top of Road Elevation		Approx. Bridge Span/ Improvement
						Existing	Proposed	
				(cfs)		(ft)	(ft)	
Swampoodle	SPC-BR06	Texas Viaduct	2,880	8,500	Super Elevated	286.08	288	Raise Road in LOB
Swampoodle	SPC-BR10	5th Street	3,705	8,500	75' Span	282.38	290.5	250' Span
Swampoodle	SPC-BR13	14th Street	7,055	5,810	70' Span	293	294	Raise Road in LOB
Swampoodle	SPC-BR14	17th Street	8,241	5,220	50' Span	294.58	300	200' Span
Swampoodle	SPC-BR16	Richmond	11,049	4,550	2-10'x9' RCB	305.13	307	100' Span
SwampEast	SPCET-BR01	State Loop 14	1,060	2,020	2-6'x6' RCB	313.02	317	75' Span
SwampEast	SPCET-BR02	Main	1,874	1,970	2-6'x6' RCB	315	320	7-9'x9' RCB
SwampEast	SPCET-BR03	Pine	2,308	1,970	Arch Span	315.96	323	50' Span
Wagner Creek	WC-BR02	Lake Drive	3,743	16,900	110' Span	270.1	275	500' Span
Wagner Creek	WC-BR03	Garber	4,679	16,320	105' Span	268.44	276.5	450' Span
Wagner Creek	WC-BR04	Findley	6,400	16,350	100' Span	270.15	279	425' Span
Wagner Creek	WC-BR06	Jameson	7,586	16,410	105' Span	272.57	281.5	400' Span
Wagner Creek	WC-BR08	US Hwy 67	14,054	11,990	75' Span	284.8	290	300' Span
Wagner Creek	WC-BR09	Robison	14,224	11,990	75' Span	285.19	290	300' Span
Wagner Creek	WC-BR15	US Hwy 82	29,020	12,140	70' Span	300.6	306.5	400' Span
Wagner Creek	WC-BR16	I30	33,616	10,290	5-11'x9' RCB	309.41	309.41	Add 15-11'x9' RCB
Wagner Creek	WC-BR17	I30 Frontage	33,812	10,290	6-11'x7' RCB	308.39	310	Add 14-11'x7' RCB
Wagner Creek	WC-BR18	FM 2878	39,488	10,070	4-8'x5' RCB	311.58	318.5	250' Span

Note: Bridge Spans / Improvements are approximate and do not take into account downstream impacts or potential mitigation required to offset the negative impacts to surrounding structures. This table is intended only to provide some comparison for future budgeting and planning of improved roadway structures.

4.3. Alternative Hydrology and Hydraulics

A hydrologic and hydraulic model was created for each alternative based on the ultimate land use conditions models developed as part of this study. The alternative storage discharge relationships from the HEC-RAS models were exported and inserted into the alternative hydrologic (HEC-HMS) models to create the alternative hydrology. This was done to ensure that there were no adverse impacts downstream due to the reduction of storage and the change in timing that can be caused by the addition of structural alternatives.

4.4. Damage Center Alternatives

In general, all of the previous described concepts were explored for the City of Texarkana. During the analysis, eight (8) damage centers were identified as the focus of the alternatives. These damage centers represent areas where concentrated flood damages during relatively frequent flood events could potentially justify the costs of structural improvements. The damage centers are shown in Figure 12, FDA Damage Reaches and Affected Properties.

4.4.1. Damage Center I (DCI)

Damage Center I is located in the lower reach of Wagner Creek between the confluence with Days Creek and the confluence with Cowhorn Creek. This area has significant flooding in multiple neighborhoods along Wagner Creek as well as many commercial properties along Lake Drive. This area has 75 structures inundated by the 100-year event worth approximately $2,315,00. Table 16 summarizes DCI affected property.

Table 16. DCI Affected Property Summary

Storm Event	Total Number of Structures Affected	Total Value of Affected Structures	Total Value of Affected Contents
2-year	21	$752,000	$376,000
5-year	28	$946,000	$473,000
10-year	34	$1,174,000	$587,000
25-year	50	$1,654,000	$827,000
50-year	56	$1,865,000	$933,000
100-year	75	$2,315,000	$1,158,000
250-year	89	$2,624,000	$1,312,000
500-year	98	$3,258,000	$1,629,000

4.4.2. Damage Center I Alternative I (DCI-ALTI)

Damage Center I Alternative I consists of an approximate 400'-450' wide clearing corridor along Wagner Creek to increase the conveyance capacity of flood waters. The proposed clearing would involve the removal of all trees and brush within the proposed corridor followed by maintaining the cleared area by mowing 3 times a year. The proposed improvements are shown in Figure 13, Alternative Sites Explored.

4.4.3. Damage Center I Alternative II (DCI-ALTII)

Damage Center I Alternative II was developed independently of the structural solutions of DCI-ALTI. This alternative includes a buyout of all residential structures identified within the 10-year floodplain.

4.4.4. Damage Center II (DCII)

Damage Center II is located along Swampoodle Creek from U.S. Highway 67 to approximately 800' upstream of West 14th Street. Multiple municipal structures are affected by flood waters within the reach that includes the City's first responder equipment. There are also numerous residential structures that experience significant flooding in this location. This area has 57 structures inundated by the 100-year event worth approximately $1,907,000. Table 17 summarizes DCII affected property.

Table 17. DCII Affected Property Summary

Storm Event	Total Number of Structures Affected	Total Value of Affected Structures	Total Value of Affected Contents
2-year	9	$156,000	$78,000
5-year	16	$625,000	$312,000
10-year	23	$787,000	$394,000
25-year	39	$1,478,000	$739,000
50-year	48	$1,592,000	$796,000
100-year	57	$1,907,000	$954,000
250-year	71	$2,307,000	$1,153,000
500-year	78	$2,744,000	$1,372,000

4.4.5. Damage Center II Alternative I (DCII-ALTI)

Damage Center II Alternative I consists of the following proposed improvements and can be seen in Figure 13, Alternative Sites Explored:

- 2,900 LF 3:1 grass-lined shelf cut just beyond the limits of the stream's ordinary high water mark from stream stations 41+30 to 70+03.

4.4.6. Damage Center II Alternative II (DCII-ALTII)

Damage Center II Alternative II consists of the following proposed improvements and can be seen in Figure 13, Alternative Sites Explored:

- 2,900 LF 3:1 grass-lined shelf cut just beyond the limits of the stream's ordinary high water mark from stream stations 41+30 to 70+03.
- Replace all 6'x8' reinforced concrete box culverts at 7th Street (U.S. Highway 67) with a 75' wide bridge opening.

Damage Center II Alternative III (DCII-ALTIII)

Damage Center II Alternative III was developed independently of the structural solutions of DCII-ALTI and DCII-ALTII. This alternative includes a buyout of all residential structures identified within the 10-year floodplain.

4.4.7. Damage Center III (DCIII)

Damage Center III is located along Swampoodle Creek East Tributary from Texas Boulevard to Olive Street. This area has significant flooding for multiple residential properties along the creek. The existing concrete lined U-shaped channel does not contain the existing 2-year flood event in many locations according to the hydraulic analysis performed as part of this study. The majority of the City's repetitive loss properties, as documented by FEMA, are located along Stream WC-2. This area has 14 structures inundated by the 100-year event worth approximately $1,353,000. Table 18 summarizes DCIII affected property.

Table 18. DCIII Affected Property Summary

Storm Event	Total Number of Structures Affected	Total Value of Affected Structures	Total Value of Affected Contents
2-year	7	$782,000	$391,000
5-year	8	$904,000	$452.000
10-year	9	$1,047,000	$524,000
25-year	9	$1,047,000	$524,000
50-year	13	$1,257,000	$629,000
100-year	14	$1,353,000	$677,000
250-year	16	$1,561,000	$781,000
500-year	19	$1913,000	$956,000

The options for alternatives through DCIII are restricted due to multiple residential structures almost directly adjacent to the existing concrete lined channel. If channel improvements are pursued, it is expected that at least 4 properties would need to be bought out to allow for channel widening.

4.4.8. Damage Center III Alternative I (DCIII-ALTI)

Damage Center III Alternative I consists of the following proposed improvements and can be seen in Figure 13, Alternative Sites Explored:

- Widen the existing concrete lined U-channel to 20' maintaining a constant 8' depth for approximately 1450 LF from stream stations 11+34 to 25+70.
- Remove pedestrian bridge at stream station 21+96.
- Buyout four (4) properties in order to widen channel.
- Replace both 6'x6' reinforced concrete box culverts at Main Street with 2-5'x9' reinforced concrete box culverts.
- Replace arch opening at Pine Street with 2-4'x9' reinforced concrete box culverts.

4.4.9. Damage Center III Alternative II (DCIII-ALTII)

Damage Center III Alternative II consists of the following proposed improvements and can be seen in Figure 13, Alternative Sites Explored:

- Remove the existing concrete lined U-channel and replace it with a 50' wide 1450 LF 3:1 grass-lined channel from stream stations 11+34 to 25+70
- Remove pedestrian bridge at stream station 21+96.
- Buyout four (4) properties in order to widen channel.
- Replace both 6'x6' reinforced box culverts at State Loop 14 with a 55' wide bridge opening.
- Replace both 6'x6' reinforced concrete box culverts at Main Street with 2-6'x8' reinforced concrete box culverts.
- Replace arch opening at Pine Street with a 45' wide bridge opening.

4.4.10. Damage Center III Alternative III (DCIII-ALTIII)

Damage Center III Alternative III was developed independently of the structural solutions of DCIII-ALTI and DCIII-ALTII. This alternative includes a buyout of all residential structures identified within the 5-year floodplain.

4.4.11. Damage Center IV (DCIV)

Damage Center IV is located along Cowhorn Creek from approximately 520' downstream of College Drive to Richmond Road. This area has significant flooding for multiple residential properties just upstream of College Drive. This area has 22 structures, which include several commercial and public properties, inundated by the 100-year event worth approximately $3,012,000. Table 19 summarizes DCIV affected property.

Table 19. DCIV Affected Property Summary

Storm Event	Total Number of Structures Affected	Total Value of Affected Structures	Total Value of Affected Contents
2-year	12	$929,000	$26,000
5-year	18	$2,594,000	$1,297,000
10-year	18	$2,594,000	$1,297,000
25-year	19	$2,697,000	$1,348,000
50-year	21	$2,905,000	$1,452,000
100-year	22	$3,012,000	$1,506,000
250-year	23	$3,052,000	$1,526,000
500-year	23	$3,052,000	$1,526,000

4.4.12. Damage Center IV Alternative I (DCIV-ALTI)

Damage Center IV Alternative I consists of the following proposed improvements and can be seen in Figure 13, Alternative Sites Explored:

- 520 LF 3:1 grass-lined shelf cut just beyond the ordinary high water mark from stream stations 102+96 to 108+10.
- New bridge construction at College Drive to widen the bridge opening.

4.4.13. Damage Center IV Alternative II (DCIV-ALTII)

Damage Center IV Alternative II consists of the following proposed improvements and can be seen in Figure 13, Alternative Sites Explored:

- 520 LF 3:1 grass-lined shelf cut just beyond the ordinary high water mark from stream stations 102+96 to 108+10.
- New bridge construction at College Drive to widen the bridge opening.

- 800 LF 3:1 grass-lined shelf cut just beyond the limits of the stream's ordinary high water mark (stream stations 109+56 to 117+55).

4.4.14. Damage Center IV Alternative III (DCIV-ALTIII)

Damage Center IV Alternative III consists of the following proposed improvements and can be seen in Figure 13, Alternative Sites Explored:

- New bridge construction at College Drive to widen the bridge opening.

4.4.15. Damage Center IV Alternative IV (DCIV-ALTIV)

Damage Center IV Alternative IV was developed independently of the structural solutions of DCIV-ALTI, DCIV-ALTII, and DCIV-ALTIII. This alternative includes a buyout of all residential structures identified within the 10-year floodplain.

4.4.16. Damage Center V (DCV)

Damage Center V is located along Cowhorn Creek just upstream of Kennedy Lane. This area has significant flooding for multiple residential properties along Lambeth Road in the left overbank of Cowhorn Creek. This area has 10 structures inundated by the 100-year event worth approximately $1,491,000. Table 20 summarizes DCV affected property.

Table 20. DCV Affected Property Summary

Storm Event	Total Number of Structures Affected	Total Value of Affected Structures	Total Value of Affected Contents
2-year	2	$267,000	$133,000
5-year	8	$1,158,000	$579,000
10-year	9	$1,361,000	$680,000
25-year	10	$1,491,000	$745,000
50-year	10	$1,491,000	$745,000
100-year	10	$1,491,000	$745,000
250-year	10	$1,491,000	$745,000
500-year	10	$1,491,000	$745,000

4.4.17. Damage Center V Alternative I (DCV-ALTI)

Damage Center V Alternative I consists of the following proposed improvements and can be seen in Figure 13, Alternative Sites Explored:

- West bank clearing upstream of Kennedy Lane (stream stations 135+38 to 144+38). The proposed clearing would involve the removal of approximately 5 acres of trees and brush followed by maintaining the cleared area by mowing 3 times a year.

- Two additional 9'x5' concrete box culverts at Kennedy Lane.

4.4.18. Damage Center V Alternative II (DCV-ALTII)

Damage Center V Alternative II consists of the following proposed improvements and can be seen in Figure 13, Alternative Sites Explored:

- West bank clearing upstream of Kennedy Lane (stream stations 135+38 to 144+38). The proposed clearing would involve the removal of approximately 5 acres of trees and brush followed by maintaining the cleared area by mowing 3 times a year.

4.4.19. Damage Center V Alternative III (DCV-ALTIII)

Damage Center V Alternative III was developed independently of the structural solutions of DCV-ALTI and DCV-ALTII. This alternative includes a buyout of all residential structures identified within the 10-year floodplain.

4.4.20. Damage Center VI (DCVI)

Damage Center VI is located along Cowhorn Creek East Tributary from Morris Lane to Northwood Avenue. There are several multi-family buildings that have the potential to experience flooding. This area has 20 structures inundated by the 100-year event worth approximately $3,590,000. Table 21 summarizes DCVI affected property.

Table 21. DCVI Affected Property Summary

Storm Event	Total Number of Structures Affected	Total Value of Affected Structures	Total Value of Affected Contents
2-year	2	$669,000	$334,000
5-year	15	$1,918,000	$959,000
10-year	17	$2,587,000	$1,293,000
25-year	19	$3,256,000	$1,628,000
50-year	20	$3,590,000	$1,795,000
100-year	20	$3,590,000	$1,795,000
250-year	20	$3,590,000	$1,795,000
500-year	21	$3,924,000	$1,962,000

4.4.21. Damage Center VI Alternative I (DCVI-ALTI)

Damage Center VI Alternative I consists of the following proposed improvements and can be seen in Figure 13, Alternative Sites Explored:

- Five 9'x4' concrete box culverts at Morris Lane (already constructed and not included in the cost estimate) and remove low-water crossing upstream.

- 370 LF grass-lined shelf cut just beyond the limits of the stream's ordinary high-water mark and sloped 3:1 up to the edge of the apartments. Grass-lined channel will be supplemented with turf reinforcement mat (stream stations 18+83 to 22+49).

4.4.22. Damage Center VII (DCVII)

Damage Center VII is located along Stream WC-2 from Independence Circle to Concord Place. This area has significant flooding for multiple residential properties along the stream. This area has 14 structures inundated by the 100-year event worth approximately $2,007,000. Table 22 summarizes DCVII expected damages.

Table 22. DCVII Affected Property Summary

Storm Event	Total Number of Structures Affected	Total Value of Affected Structures	Total Value of Affected Contents
2-year	3	$445,000	$223,000
5-year	7	$1,001,000	$500,000
10-year	7	$1,001,000	$500,000
25-year	9	$1,297,000	$649,000
50-year	12	$1,702,000	$851,000
100-year	14	$2,007,000	$1,003,000
250-year	16	$2,313,000	$1,156,000
500-year	16	$2,313,000	$1,156,000

4.4.23. Damage Center VII Alternative I (DCVII-ALTI)

Damage Center VI Alternative I consists of the following proposed improvements and can be seen in Figure 13, Alternative Sites Explored:

- Replace existing 2-6'x4' box culverts at Independence Circle with a 60' wide bridge opening.
- Replace existing 2-6'x4' box culverts at Lexington Place with a 40' wide bridge opening.

4.4.24. Damage Center VII Alternative II (DCVII-ALTII)

Damage Center VII Alternative II was developed independently of the structural solutions of DCVII-ALTI. This alternative includes a buyout of all residential structures identified within the 10-year floodplain.

4.4.25. Damage Center VIII (DCVIII)

Damage Center VIII is located along Howard Creek just upstream of Buchanan Road. This area has significant flooding for multiple residential and commercial properties

along the stream. This area has 14 structures inundated by the 100-year event worth approximately $497,00. Table 23 summarizes DCVIII affected property.

Table 23. DCVIII Affected Property Summary

Storm Event	Total Number of Structures Affected	Total Value of Affected Structures	Total Value of Affected Contents
2-year	5	$162,000	$82,000
5-year	12	$364,000	$182,000
10-year	13	$408,000	$204,000
25-year	14	$497,000	$249,000
50-year	14	$497, 000	$249,000
100-year	14	$497, 000	$249,000
250-year	14	$497, 000	$249,000
500-year	14	$497, 000	$249,000

4.4.26. Damage Center VIII Alternative I (DCVIII-ALTI)

Damage Center VIII Alternative I was developed as a non-structural solution to eliminate flood damages to all analyzed structures within Damage Center VIII. DCVIII-ALTI proposes to buyout all residential properties and one commercial property located just upstream of Buchanan Road along Howard Creek.

4.4.27. Damage Center VIII Alternative II (DCVIII-ALTII)

Damage Center VIII Alternative II was developed as a non-structural solution to eliminate flood damages to analyzed structures within the 5-year floodplain only for Damage Center VIII. DCVIII-ALTII proposes to buyout twelve (12) residential properties located just upstream of Buchanan Road along Howard Creek.

4.5. Construction Costs

Probable construction costs were determined for each alternative including costs associated with the design and construction of the alternative. Standard practices were used to develop the cost estimates. TXDOT bid tabs and recent construction bids were both utilized. Alternative probable construction costs include the following:

- Construction cost
- Engineering and Survey (15 percent)
- Contingencies (20 percent)

Right-of-way acquisition costs were determined for each alternative based on the parcels impacted by the alternative. Property appraised values were obtained from BCAD. Due to the conceptual level of the study, all excavation computations are based on 2006 City of Texarkana LiDAR data. No survey information was obtained for the

alternatives section of this study. Appendix E contains itemized probable construction cost tables for all proposed alternatives.

4.6 Permitting

Possible permitting requirements were identified for the structural alternatives.

USACE, acting under Section 404 of the Clean Water Act, regulates the discharge of dredge or fill material into waters of the United States. Waters of the United States include any part of the surface water tributary system down to the smallest of streams, any lake, pond, or other water body on those streams, and adjacent wetlands. Activities requiring a permit from the USACE under Section 404 of the Clean Water Act may be permitted by Nationwide Permit (NWP) or Individual Permit (IP). Stream features associated with the proposed project are likely considered waters of the United States under current guidance and are subject to USACE jurisdiction.

The USACE utilizes NWPs to authorize the discharge of dredged and fill material into waters of the United States when the discharge is expected to result in less than minimal adverse impacts to the aquatic environment. It is likely that on-channel detention alternatives would exceed the NWP program criteria; therefore authorization under an IP would be required. Individual permits are issued for activities that have more than minimal adverse impacts to waters of the United States. The evaluation of the IP application involves a more thorough review of the potential environmental and socioeconomic effects of the proposed activity.

While the USACE is responsible for the final decision, various natural resource agencies have an important role in the regulatory program. Assistance to the USACE on the permit process is provided by the Environmental Protection Agency (EPA), United States Fish and Wildlife Service (USFW), and state agencies. A detailed delineation of waters of the United States, historical resources review, threatened and/or endangered species evaluation, and public comment period are also a components of the IP process. Unavoidable impacts such as the loss of streams, wetlands, or other open waters would be compensated through a mitigation plan.

Section 401 of the Clean Water Act requires that an applicant for a federal permit provide a State certification that any discharges from the facility would comply with the Act, including water quality standard requirements. The Texas Commission on Environmental Quality (TCEQ), the state delegated agency for compliance of Section 401 of the Clean Water Act, has a two tiered process to determine potential impacts to waters of the state. Tier I certification is applicable to projects with direct impacts less than three acres or 1,500 linear feet of streams. Tier II certification authorizes impacts greater than the Tier I threshold. Since most channel alternatives could impact greater than 1,500 linear feet of streams, Tier II certification would apply. Tier II certification involves a complete description of impacts to waters of the United States, discussion of water quality impacts, and a detailed alternatives analysis. The Section 401 permitting process is applied in conjunction with the Section 404 permitting process.

4.7 Benefit Cost Analysis

A Benefit to Cost (B/C) analysis was conducted to determine which alternative provides the best benefit considering probable construction cost and the value of properties all or partially removed from the high risk flood areas. HEC-FDA model runs were created for each alternative from water surface profiles generated by the alternative HEC-RAS model. Average annual benefits were computed by subtracting the alternative (improved) channel conditions average annual damages from the existing channel conditions average annual damages. A B/C ratio was determined by dividing the average annual benefits by the alternative probable construction annualized costs. The B/C ratio was used to determine the economic strength of a project. Alternatives with B/C ratios greater than 1.0 have annual benefits that outweigh the reduction in annual damage and represent a feasible alternative.

The primary benefit, to be derived from a proposed plan of improvement, is a reduction in flood damages. Social, environmental, and other intangible benefits are not quantified in monetary terms and were not considered in this B/C analysis.

The average annual costs and benefits were calculated for a 50-year period of analysis. Benefit and cost accruals were made comparable by conversion to an equivalent annual basis using an interest rate of 5.50 percent (Assumed Average Current Federal Discount Rate).

4.8 Results

4.8.1. Damage Center I

A Benefit to Cost (B/C) Analysis was performed for both alternatives in DCI. Table 24 is a summary of the cost and the overall B/C ratio of each DCI alternative considered.

Table 24. DCI Alternative Analysis

Alternative	Total Cost	Annual Cost	Reduction in Annual Damages	B/C
DCI-ALTI	$897,000	$71,000	$41,400	0.58
DCI-ALTII	$1,871,000	$111,000	$119,500	1.08

No structures downstream of the proposed alternatives were identified that would experience significant negative flooding impacts due to the proposed alternatives.

- **DCI-ALTI** – The proposed clearing corridor along the lower reach of Wagner Creek would increase the hydraulic conductivity and flow capacity resulting in a decrease in water surface elevations of approximately 0.5-1.0 feet throughout the reach.

- **DCI-ALTII –** Buyout - The buyout alternative is more costly than DCI-ALTI but does provide a higher B/C ratio compared DCI-ALTI. Note the buyout option does not provide any relief from flooding beyond the selected structures.

4.8.2 Damage Center II

A Benefit to Cost (B/C) Analysis was performed for all alternatives in DCII. Table 25 is a summary of the cost and the overall B/C ratio of each DCII alternative considered.

Table 25. DCII Alternative Analysis

Alternative	Total Cost	Annual Cost	Reduction in Annual Damages	B/C
DCII-ALTI	$1,005,000	$70,000	$10,100	0.14
DCII-ALTII	$1,726,000	$113,000	$19,500	0.17
DCII-ALTIII	$126,000	$7,400	$3,700	0.50

The unmitigated flood elevations resulting from the proposed alternatives show some rise for the lower frequency events downstream of 7th street. Detention (approximately 4 ac-ft) upstream of the improvements is necessary to compensate for the valley storage loss for DCII-ALTI and DCII-ALTII.

- **DCII-ALTI** – Two alternatives were considered for Damage Center II along Swampoodle Creek which includes the City of Texarkana first responder structures/equipment and many residential properties. DCII-ALTI proposed cutting a shelf in both overbanks to provide additional conveyance capacity through the reach. The shelf cut reduced water surface elevations upstream of 7th Street benefiting multiple residential properties and the City's first responder location. However, the shelf cut also adversely affected the 7th Street bridge crossing by increasing water surface elevations across 7th Street.
- **DCII-ALTII** – In order to compensate for the additional discharge through Damage Center II at 7th Street, DCII-ALTII proposes to widen the bridge opening at 7th Street in conjunction with the shelf cut. The proposed increase in flow capacity at 7th Street would lower the water surface elevations across 7th Street compared to existing conditions and provide an additional decrease in water surface elevations upstream of 7th Street compared to DCII-ALTI. Access to the first responder location during a major flood event would be hindered by the 7th Street bridge crossing which is currently overtopped by the 2-year flood event. The Railroad crossing just west of the 7th Street bridge crossing at Swampoodle Creek prohibits raising the road deck in this location. 7th Street would have to be super-elevated similar to 8th Street if the road deck were to be raised. A hydraulic analysis was performed with 7th Street super-elevated, however it provided no additional benefits for flood mitigation throughout Damage Center II and would be economically unfeasible from a benefit to cost standpoint. Super-elevating 7th Street could beneficial for access to the first responder location but not for flood mitigation.

- **DCII-ALTIII** – Buyout - The buyout alternative is the least costly and provides the greatest B/C ratio. However, the buyout option does not provide any relief from flooding beyond the selected structures.

4.8.3. Damage Center III

A Benefit to Cost (B/C) Analysis was performed for all alternatives in DCIII. Table 26 is a summary of the cost and the overall B/C ratio of each DCIII alternative considered.

Table 26. DCIII Alternative Analysis

Alternative	Total Cost	Annual Cost	Reduction in Annual Damages	B/C
DCIII-ALTI	$3,617,000	$217,600	$95,300	0.44
DCIII-ALTII	$3,070,000	$185,800	$89,500	0.48
DCIII-ALTIII	$1,596,000	$94,000	$95,700	1.02

The unmitigated flood elevations resulting from the proposed alternatives show some rise for the lower frequency events downstream of Texas Boulevard. Detention (approximately 8 ac-ft) upstream of the improvements is necessary to compensate for the valley storage loss for DCIII-ALTI and DCIII-ALTII.

- **DCIII-ALTI** – This alternative significantly lowers the water surface elevations throughout Damage Center III resulting in a significant reduction in expected annual damages. However, replacing the concrete U-channel with a larger U-channel presents continued high channel velocities and hydraulic instability. The size and depth of the proposed concrete U-channel could also present numerous safety concerns to the public. The bridge improvements at Main Street and Pine Street would provide increased conveyance capacity lowering water surface elevations throughout the reach.
- **DCIII-ALTII** – Alternative II also significantly lowers the water surface elevations throughout Damage Center III resulting in a significant reduction in expected annual damages. The grass-lined channel option reduced channel velocities and provided hydraulic stability throughout the reach. The water surface elevations did not lower as much compared to the concrete U-channel options for the more frequent flood events but the grass lined channel provided greater benefits for the less frequent events. The bridge improvements at Texas Boulevard, Main Street, and Pine Street would provide increased conveyance capacity lowering water surface elevations throughout the reach.
- **DCIII-ALTIII** – Buyout - The buyout alternative is the least costly and provides the greatest B/C ratio. However, the buyout option does not provide any relief from flooding beyond the selected structures.

4.8.4. Damage Center IV

A Benefit to Cost (B/C) Analysis was performed for all alternatives in DCIV Table 27 is a summary of the cost and the overall B/C ratio of each DCIV alternative considered.

Table 27. DCIV Alternative Analysis

Alternative	Total Cost	Annual Cost	Reduction in Annual Damages	B/C
DCIV-ALTI	$791,000	$49,800	$63,700	1.28
DCIV-ALTII	$936,000	$61,000	$81,300	1.33
DCIV-ALTIII	$690,000	$41,300	$47,300	1.15
DCIV-ALTIV	$2,544,000	$150,000	$77,100	0.51

No structures downstream of the proposed alternatives were identified that would experience significant negative flooding impacts due to the proposed alternatives.

- **DCIV-ALTI, ALTII, & ALTIII** – All three alternatives considered for Damage Center IV produced a positive benefit to cost ratio. The resizing of the bridge at College Drive is integral to any successful structural measures at this particular location. Additional benefits could be realized by improving the channel downstream of College Drive (DCIV-ALTI) or upstream and downstream of College Drive (DCIV-ALTIII). Both channel improvements would be grass lined with minimal impacts below the stream's ordinary high water mark.
- **DCIV-ALTIV –** Buyout - The buyout alternative is the most costly and provides the lowest B/C ratio. The buyout option does not provide any relief from flooding beyond the selected structures and is not recommended given the high B/C ratios for the structural solutions.

4.8.5. Damage Center V

A Benefit to Cost (B/C) Analysis was performed for all alternatives in DCV Table 28 is a summary of the cost and the overall B/C ratio of each DCV alternative considered.

Table 28. DCV Alternative Analysis

Alternative	Total Cost	Annual Cost	Reduction in Annual Damages	B/C
DCV-ALTI	$347,000	$27,200	$24,700	0.91
DCV-ALTII	$153,000	$16,200	$23,700	1.46
DCV-ALTIII	$2,601,000	$154,000	$45,300	0.29

No structures downstream of the proposed alternatives were identified that would experience significant negative flooding impacts due to the proposed alternatives.

- **DCV-ALTI** – Damage Center V Alternative I would involve the clearing and maintenance of the property upstream of Kennedy Lane and West of Cowhorn Creek as well as installing two additional culverts at the Kennedy Lane crossing. The increased hydraulic conveyance would create a slight decrease in water surface elevation of approximately 0.5 feet that provides a benefit of approximately $24,700 annually.

- **DCV-ALTII** – Damage Center V Alternative II involves only the clearing and maintenance of the west bank upstream of Kennedy Lane, which creates a benefit of approximately $23,700. Both alternatives remove three (3) structures from the 100-year floodplain, but the clearing seems to be the effective improvement.
- **DCV-ALTIII** – Buyout - The buyout alternative is the most costly and provides the lowest B/C ratio. The buyout option does not provide any relief from flooding beyond the selected structures and is not recommended given the high B/C ratios for the structural solutions.

4.8.6. Damage Center VI

A Benefit to Cost (B/C) Analysis was performed for Alternative I in DCVI. Table 29 is a summary of the cost and the overall B/C ratio for DCVI-ALTI.

Table 29. DCVI Alternative Analysis

Alternative	Total Cost	Annual Cost	Reduction in Annual Damages	B/C
DCVI-ALTI	$71,000	$5,100	$21,300	4.18

The unmitigated flood elevations resulting from the proposed alternatives show some rise for the higher frequency events downstream. However, no structures downstream of the proposed alternatives were identified that would experience significant negative flooding impacts due to the proposed alternatives.

- **DCVI-ALTI** – Proposed improvements through Damage Center VI, from Northwood Avenue to Morris Lane would remove three (3) residential structures from the 100-year future floodplain. DCV-ALTI proposed conceptual solutions reduce the expected annual damages by approximately $21,300. The conceptually improved channel top of slope would be very close to the edge of the existing apartment buildings. The final design of any improvements would need to consider the structural integrity of the buildings as well as the functionality of the apartment complex.

4.8.7. Damage Center VII

A Benefit to Cost (B/C) Analysis was performed for all alternatives in DCVII. Table 30 is a summary of the cost and the overall B/C ratio of each DCVII alternative considered.

Table 30. DCVII Alternative Analysis

Alternative	Total Cost	Annual Cost	Reduction in Annual Damages	B/C
DCVII-ALTI	$446,000	$26,000	$30,000	1.15
DCVII-ALTII	$1,727,000	$102,000	$36,000	0.35

The unmitigated flood elevations resulting from the proposed alternatives show some rise for the higher frequency events downstream. However, no structures downstream

of the proposed alternatives were identified that would experience significant negative flooding impacts due to the proposed alternatives.

- **DCVII-ALTI** – Proposed improvements through Damage Center VII would remove six (6) residential structures from the 100-year future floodplain. The inadequate flow capacities of the existing bridge openings at Independence Circle and Lexington Place cause a backwater effect upstream of each structure resulting in the potential for flooding. Water surface elevations would be greatly reduced by widening both bridge openings proposed in DCVII-ALTI. The existing level of protection at Independence Circle and Lexington Place is currently estimated as the 5-year flood event. If the proposed improvements for DCVII-ALT1 were implemented, Independence Circle would achieve 50-year flood event protection and Lexington Place would achieve 100-year flood protection.
- **DCVII-ALTII** – Buyout - The buyout alternative is more costly than DCVII-ALTI and does not provide a higher B/C ratio compared DCVII-ALTI. Note the buyout option does not provide any relief from flooding beyond the selected structures.

4.8.8. Damage Center VIII

A Benefit to Cost (B/C) Analysis was performed for Alternative I in DCVIII. Table 31 is a summary of the cost and the overall B/C ratio for DCVIII-ALTI.

Table 31. DCVIII Alternative Analysis

Alternative	Total Cost	Annual Cost	Reduction in Annual Damages	B/C
DCVIII-ALTI	$858,000	$51,000	$37,000	0.73
DCVIII-ALTII	$629,000	$37,000	$35,000	0.95

- **DCVIII-ALTI** – Buyout – Two buyout options were considered for Damage Center VIII. DCVIII-ALTI considered the buyout of all structures that experience flooding within Damage Center VIII. This non-structural solution was designed to eliminate flood damages to all analyzed structures within Damage Center VIII and provided a B/C ratio of 0.73.
- **DCVIII-ALTII** – Buyout – This alternative considered the buyout of structures only within the 5-year floodplain. The 5-year buyout option provides a higher B/C ratio than DCVIII-ALTI, however, the B/C ratio is still less than 1. Note the buyout option does not provide any relief from flooding beyond the selected structures.

5. Recommendations

5. Recommendations

5.1. Damage Center I

Based on the Alternative Analysis, the channel clearing alternative would not provide enough reduction in annual damages to warrant the expense of such a large project. Therefore, the DCI - ALTII - Buyout option is recommended for Damager Center I. The buyouts of all properties impacted by the 10-year flood event would be a significant expense, but would significantly reduce flood damage in the area and provide benefits to the residents. A phased approach, beginning with the properties impacted by the most frequent events is recommended.

5.2. Damage Center II

Based on the Alternative Analysis, any structural or buyout alternative would not provide enough reduction in annual damages to warrant the expense. All three alternatives would provide a benefit to critical first responder facilities, but no alternatives can be recommended based solely on the flood reduction benefits of the project.

5.3. Damage Center III

Based on the Alternative Analysis, any structural alternative would not provide enough reduction in annual damages to warrant the expense. The DCIII-ALTIII buyout option produced a benefit to cost ratio greater than 1. As always is the case with buyouts, the City will need to take into account the impact to residents and the neighborhood.

Based on the condition of the existing channel, it is anticipated that future maintenance or reconstruction of the channel will be required for the channel to continue to operate even at its current capacity. At which point it is recommended that either DCIII-ALTI or DCIII-ALTII be implemented to reduce flood damages through the DCIII reach.

5.4. Damage Center IV

The improvements to the College Drive crossing along with channel improvements upstream and downstream of the roadway (DCIV-II) produced favorable benefits compared to the cost of the project. It is recommended that DCIV-II be implemented to reduce the flooding impacts in the DCIV reach.

5.5. Damage Center V

The clearing alternative evaluated in DCV-ALTII produced favorable benefits compared to the cost of the project. It is recommended this alternative be implemented to reduce the flooding impacts in the DCV reach.

5.6. Damage Center VI

The channel improvements evaluated in DCVI-ALTI produced favorable benefits compared to the cost of the project. The project could impact the adjacent property owners and coordination with these residents should be considered prior to implementation. It is recommended this alternative be pursued to reduce the flooding impacts in the DCVI reach.

5.7 Damage Center VII

The improvements to the existing roadway crossings at Independence Circle and Lexington Place evaluated in DCVII-ALTI produced favorable benefits compared to the cost of the project. The alternative would significantly reduce flooding potential in the DCVII reach and it is recommended this alternative be implemented.

5.8. Damage Center VIII

Based on the Alternative Analysis, the DCVIII-ALTI buyout alternative would not provide enough reduction in annual damages to warrant the expense. DCVIII-ALTII would be a more favorable option in terms of the flood reduction benefits and project costs. However, DCVIII-ALTII would leave two properties in this area that were not considered in the buyout, which could have a very negative impact on the remaining residents. It is recommended that the City consider DCVIII-ALTI and offer buyouts to all properties impacated by flooding in this area.

5.9. Funding

The City of Texarkana is in the process of implemented a storm water utility fee to fund storm water management and improvements. The City also plans to research a number of funding sources to assist in the implementation of the recommended alternative for flood protection. Funding sources that will be researched include:

- FEMA's Hazard Mitigation Grant Program (HMGP)
- FEMA's Flood Mitigation Assistance (FMA)
- U.S Army Corps of Engineers' Section 205, Small Flood Control Projects Program
- TWDB Financial Assistance Programs

5.10 Preventative Alternatives

In addition to the recommended structural and buyout alternatives, the following non-structural alternatives are strongly recommended in order to reduce increases in annual flood damages.

5.10.1. Land Use Zoning and Subdivision Regulations

One means of preventing flood damage is to keep industrial, commercial, and residential structures from being built within the floodplain. Floodplain zoning restricts floodplain utilization to uses that can sustain floods without endangering life or valuable property. Regulatory ordinances are intended to secure the maximum benefits and productivity of flood-prone land by allowing floodplains to convey the design flood; promoting the public's health, safety, and general welfare; and minimizing potential flood losses.

Non-structural measures such as land use zoning and subdivision regulations allow a community to regulate development within the floodplain. As participants in the National Flood Insurance Program, the City of Texarkana has adopted regulations that equal or exceed the minimum FEMA requirements of regulating the existing 100-year floodplain.

5.10.2. Construction Regulations

Construction regulations constitute an important means of preventing flood damage in a developing watershed. Some cities have building codes that contain general flood protection provisions whereby the building inspector tries to route all building-permit applications in flood prone areas through the City Engineer. The City Engineer should then carefully review each application to determine if the proposed building may be flooded and ensure that all buildings adjacent to a flood-hazard area are built with a ground elevation that is at least one (1) foot above, and a finished floor elevation that is at least two (2) feet above the fully urbanized 100-year flood elevation. The City should require that all finished floor elevations be specified on the final plat of each new subdivision to help ensure all new structures are built above 100-year floodplain elevations.

To limit erosion and downstream sediment, construction projects should be phased to limit the land area that is bare at any one time, and vegetation should be left undisturbed wherever possible. Other practices, such as proper placement of erosion and sedimentation protection should also be required. Graded areas should be replanted as soon as possible, and mulches should be used during periods that are not suitable for replanting.

5.10.3. Informing the Public

Studies have indicated that most flood-related deaths in Texas occur at undersized bridges that are either overtopped or washed out by floodwaters. Using the hydrologic and hydraulic methods discussed in this report, the frequency of flooding and the elevation of water overtopping each roadway was calculated. Figure 11, Inundated Roadway, shows the calculated flood capacity of each roadway and flood profiles that supplement this report also show this information.

An alternative to improving dangerous bridges and culverts is to install flood warning signs, barricades, or other systems to inform and alert motorists of hazardous crossings.

The City should consider the need for a flood warning sign at all crossings that are overtopped by water during the 100-year and more frequent floods.

Flood warning systems can be passive or active. A passive system would be a warning sign, such as "BEWARE OF HIGH WATER", which would notify people using the bridge that flooding may occur. A gage with easy-to-read depth markings, measured in feet, should show motorists the height of water over the roadway. Guardrails can be installed to prevent vehicles from being washed off a dangerous road crossing, and can be used to identify the edge of the road surface where it may be obscured by floodwater.

Passive warning systems are feasible on lightly traveled residential streets where the motorists are familiar with the area, and are used at crossings with minor flooding. Installation of a passive warning system would be relatively inexpensive. Features include warning signs, staff gages, and guardrails.

Active warning systems use a sensing device which monitors the water level in the channel and alerts motorists before the water is actually flowing over the roadway. The active system could be an automatic unfolding warning sign with flashing lights and sirens, or a relayed signal that would alert city workers to barricade the crossings. An active system could also be used to alert local residents of rising floodwaters and to evacuate prior to the flood. Active warning systems are necessary on heavily traveled thoroughfares or at crossings which are extremely hazardous, but these systems typically require a minimum lead time in order to be effective. Wagner Creek is the only watershed anticipated to provide enough time between rainfall and peak flood elevations to allow an active warning system to be feasible.

The National Weather Service uses radar to locate severe and turbulent weather. The Weather Service declares a flash-flood watch when potentially severe storms are likely. A flash-flood warning is issued when a severe storm has developed and flooding is imminent. The warning is sent to weather wire services, counties and municipalities in the area, and to local Civil Defense authorities. Flood-prediction and early-warning systems usually give populated areas time to prepare flood defenses, evacuate flood-hazard areas, and close dangerous stream crossings.

A City of Texarkana flood warning system could be used to alert city officials to barricade flood prone streets in the City that become treacherous when overtopped. This system would not reduce or prevent property inundation or flood damages; however, it would increase public safety.

Many developed areas are flood prone, even if floods have not occurred within the memory of local residents. Flood hazard maps delineating flood prone areas, such as those included with this report, have been prepared by the FEMA and by USACE. Dissemination of such flood hazard information helps landowners to understand the need for compliance with floodplain zoning regulations. It also gives residents in dangerous flood prone areas evidence of the need to consider relocating their families and businesses.

This report, by accurately updating and delineating the flood prone areas, identifies dangerous flood prone stream crossings, informs residents of local flood hazards, and will assist the city and the public to evaluate proposed plans to minimize existing and future flood problems.

5.10.4. Watershed Management

The reduction of runoff in a watershed lowers peak discharges and flood stages. Soil conservation and the maintenance of vegetative ground cover retain water on the soil's surface, allowing infiltration into the soil. Urban development increases the percentage of impervious surfaces in an area, which generally increases the runoff potential. The preservation of trees, the maintenance of lawns, and the discharge of roof drains into vegetated areas increase the infiltration of storm water into soils in developed areas.

Bare soils are easily eroded, resulting in transportation of sediment through water courses. The flood carrying capacity of creeks and the storage capacity of flood control reservoirs are greatly reduced by deposits of this sediment. To limit erosion, vegetation should be left undisturbed wherever possible.

5.10.5. Debris Removal

The accumulation of trees, brush, sediment, and other debris at bridges, culverts, or other obstructions can have dangerous consequences. Obstructions to flow could cause higher flood stage elevations upstream of the crossing. In addition, masses of debris can break loose as flood flows increase, producing a destructive wall of water and debris that surges downstream. The force of water on the upstream side of a bridge plugged by debris may exceed the structural capacity of the bridge, causing it to fail. Prevention of debris obstructions can reduce flood damage and potential hazards.

The City should designate a maintenance division responsible for creek debris removal. This department could inspect bridges quarterly, or upon request, and remove debris from bridge openings. It is not always economically practical for the city to take responsibility for debris removal on private property especially in Texarkana where a significant portion of the floodplain land is privately owned. The removal of debris is an essential flood reduction technique.

Creeks should be inspected periodically to identify, cut, and remove dead trees or trees whose root systems have been undermined by erosion. An inspection program of this type should be aimed at the prevention of stream obstructions before they occur. Erosion-prevention measures should be instituted in areas where significant trees would be in danger of being uprooted by floodwaters. The inspection program should also identify areas in which siltation and debris could significantly decrease the flood-carrying capacity of the stream channel or the waterway under a bridge.

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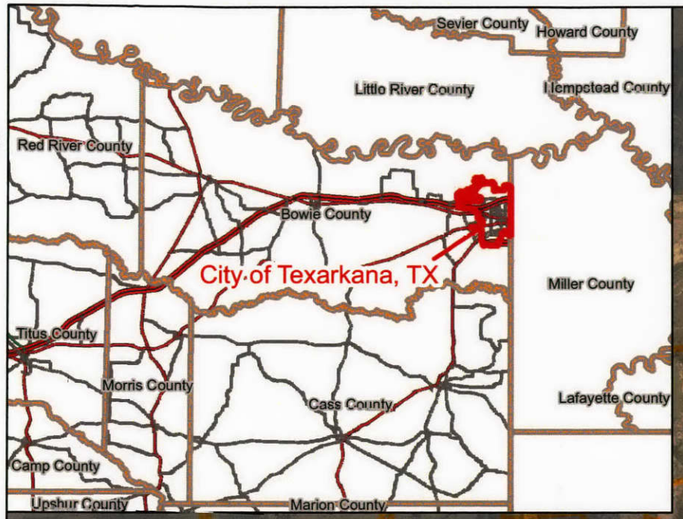
Appendix A
Figures



MILLER COUNTY

RED LICK

CITY OF LEARY

BOWIE COUNTY

TEXARKANA, TX

TEXARKANA, AR

NASH

BOWIE COUNTY

WAKE VILLAGE

MILLER COUNTY

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 1
Location Map

Legend

- Other Political Areas
- Texarkana, TX

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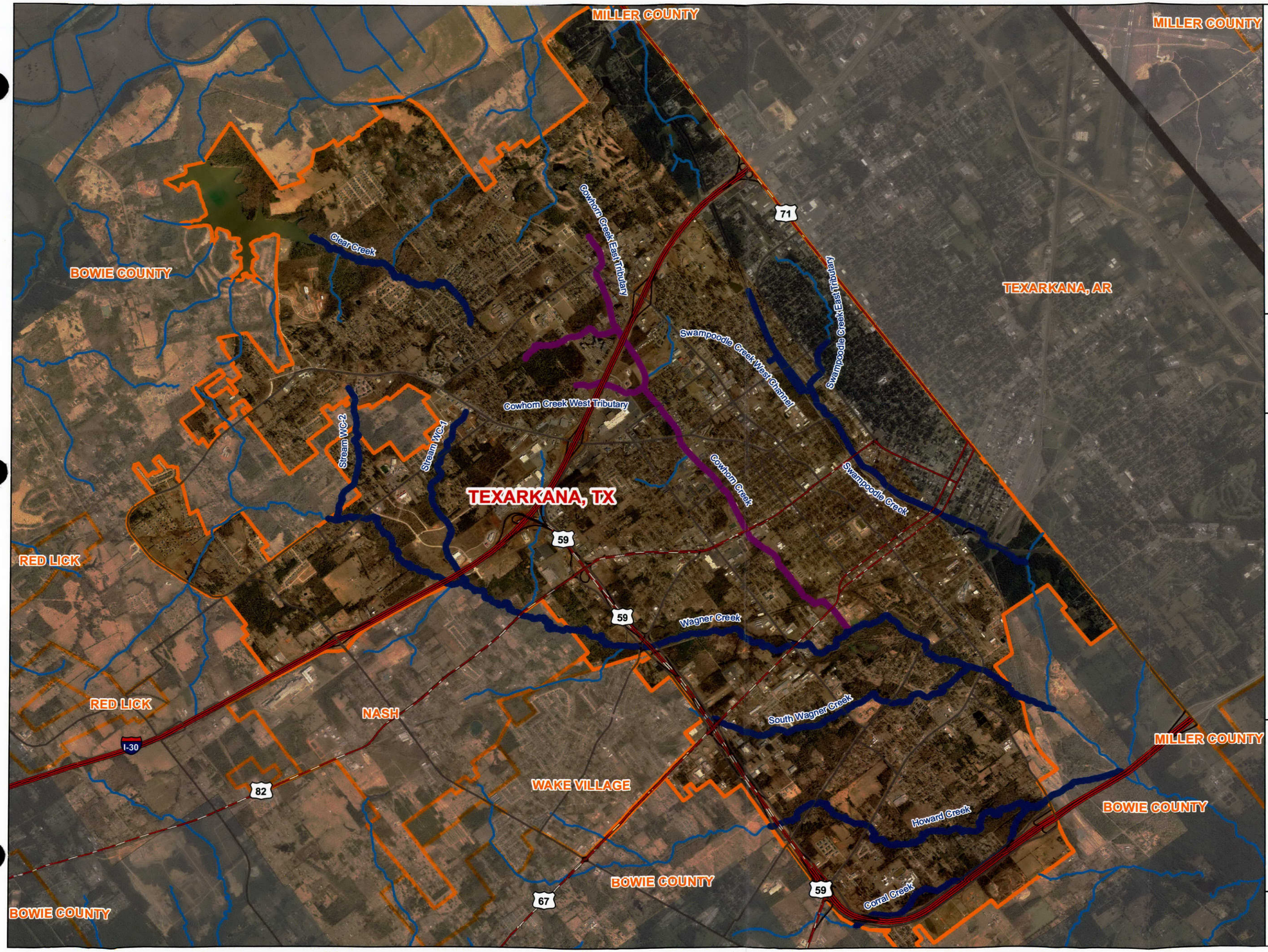

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 2
Study Streams

Legend

- Other Bowie County Streams
- New Detailed
- 2009 Cowhorn Creek Study
- Texarkana, TX

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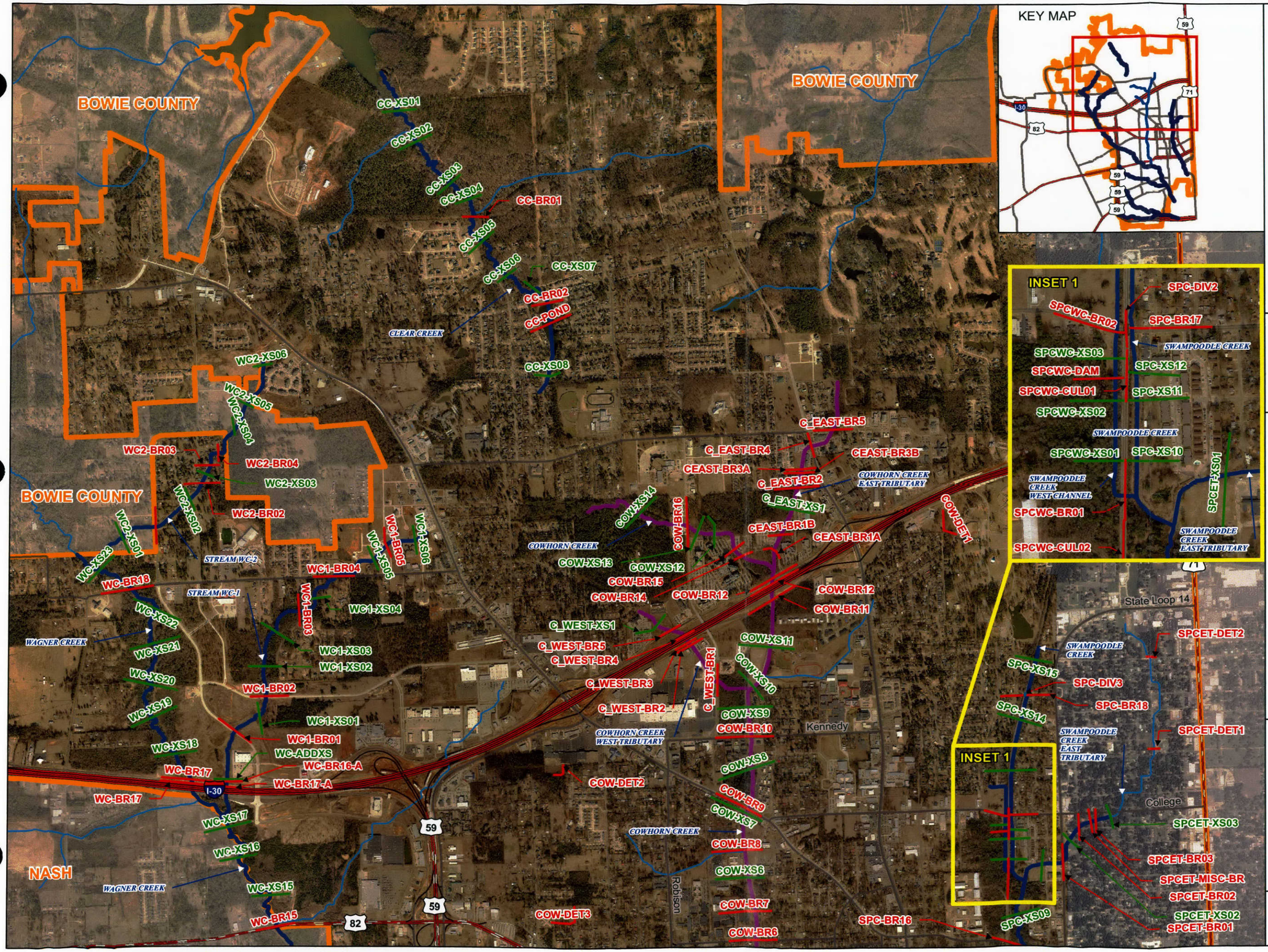

City of Texarkana
City-wide Flood Protection Planning Study

Figure 3
Study Survey Summary Map 1

Legend

- Survey Structures
- Survey Cross Sections
- New Detailed Study
- 2009 City of Texarkana Study
- Other Bowie County Streams

Political Areas

- Texarkana, TX
- Other Political Areas

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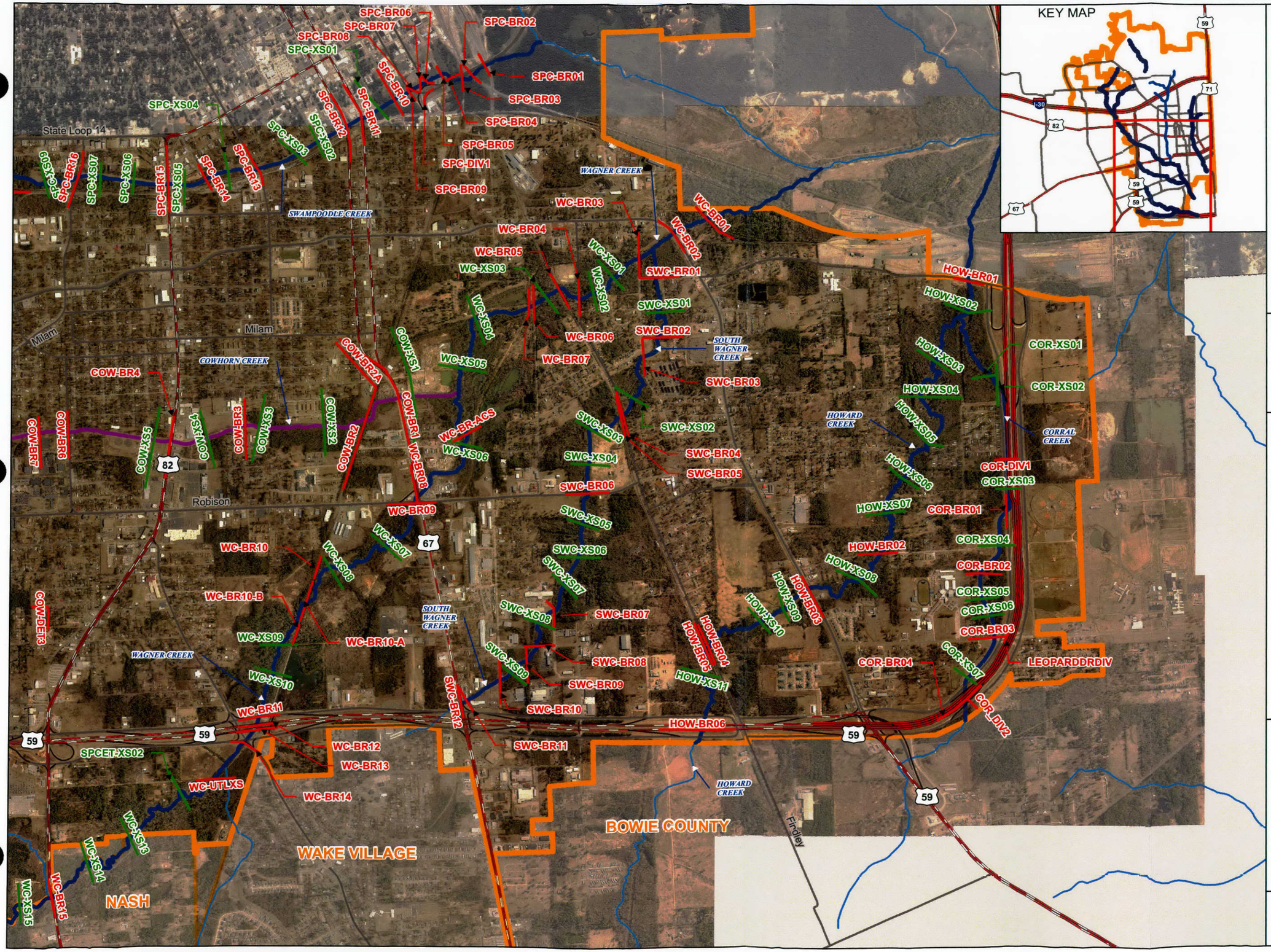

City of Texarkana
City-wide Flood Protection Planning Study

Figure 3
Study Survey Summary Map 2

Legend

- Survey Structures
- Survey Cross Sections
- New Detailed Study
- 2009 City of Texarkana Study
- Other Bowie County Streams

Political Areas

- Texarkana,TX
- Other Political Areas

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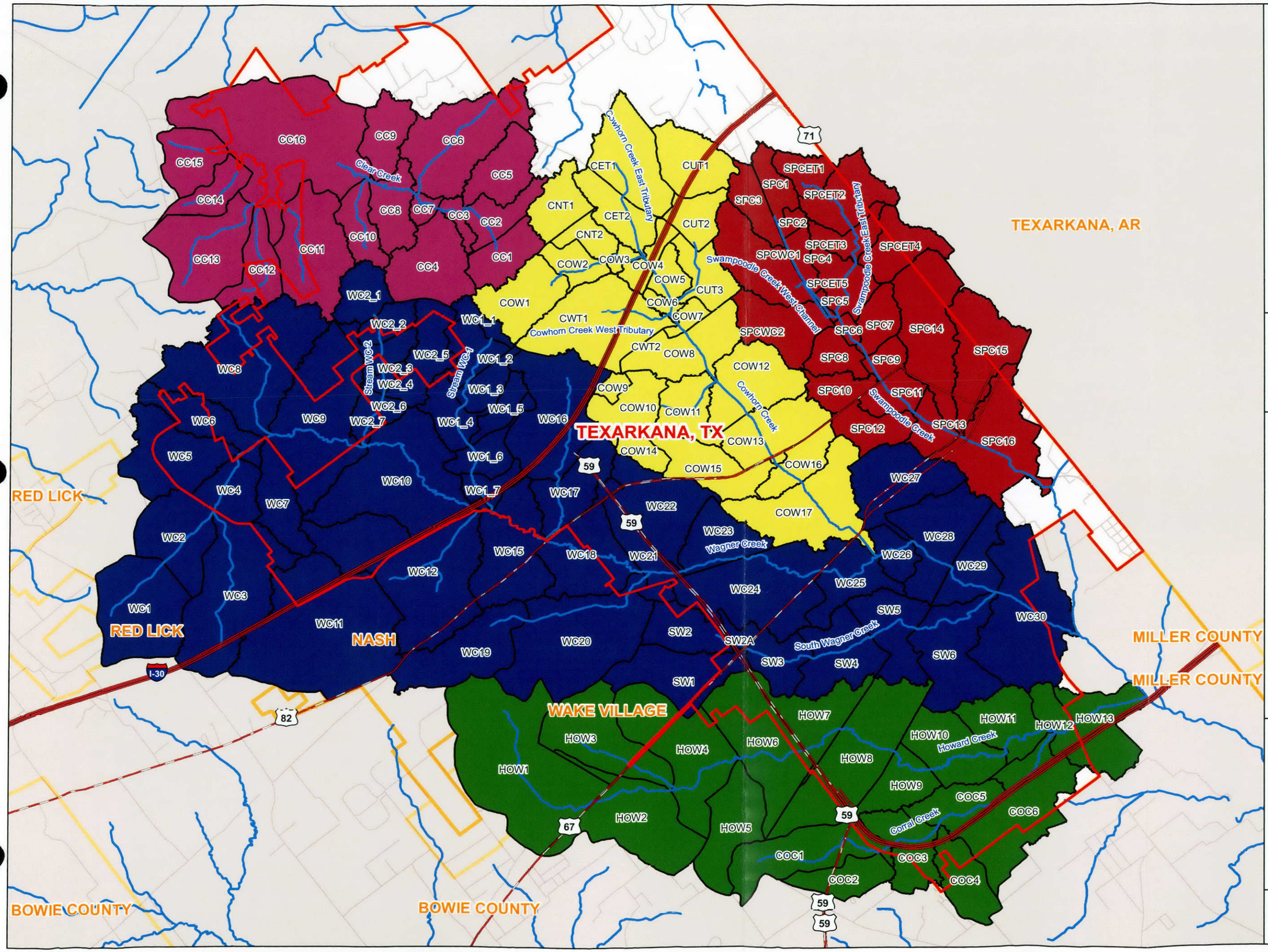

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 4
Drainage Areas

Legend

- Texarkana, TX
- Bowie County Streams
- Clear
- Cowhorn
- Howard
- Wagner
- Swampoodle

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Feet

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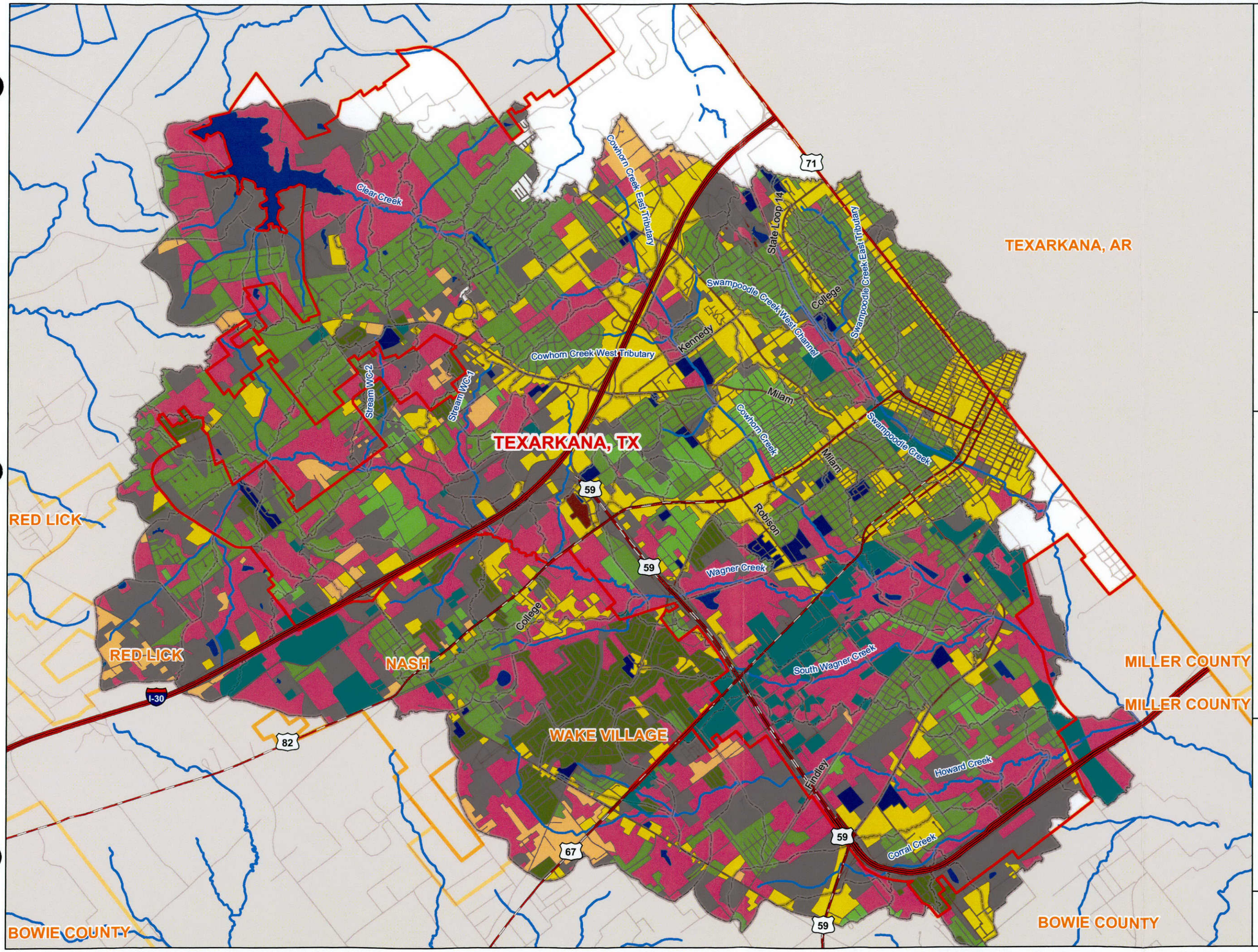

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 5
Existing Land Use

Legend

- Texarkana, TX
- Drainage Areas
- Open
- Brush
- Residential Large-Lot Low-Density
- Residential Small-Lot High-Density
- Residential Small-Lot Mod-Density
- Residential Small-Lot Low-Density
- Multi-Family Residential
- Commercial
- Industrial
- Pavement
- Water

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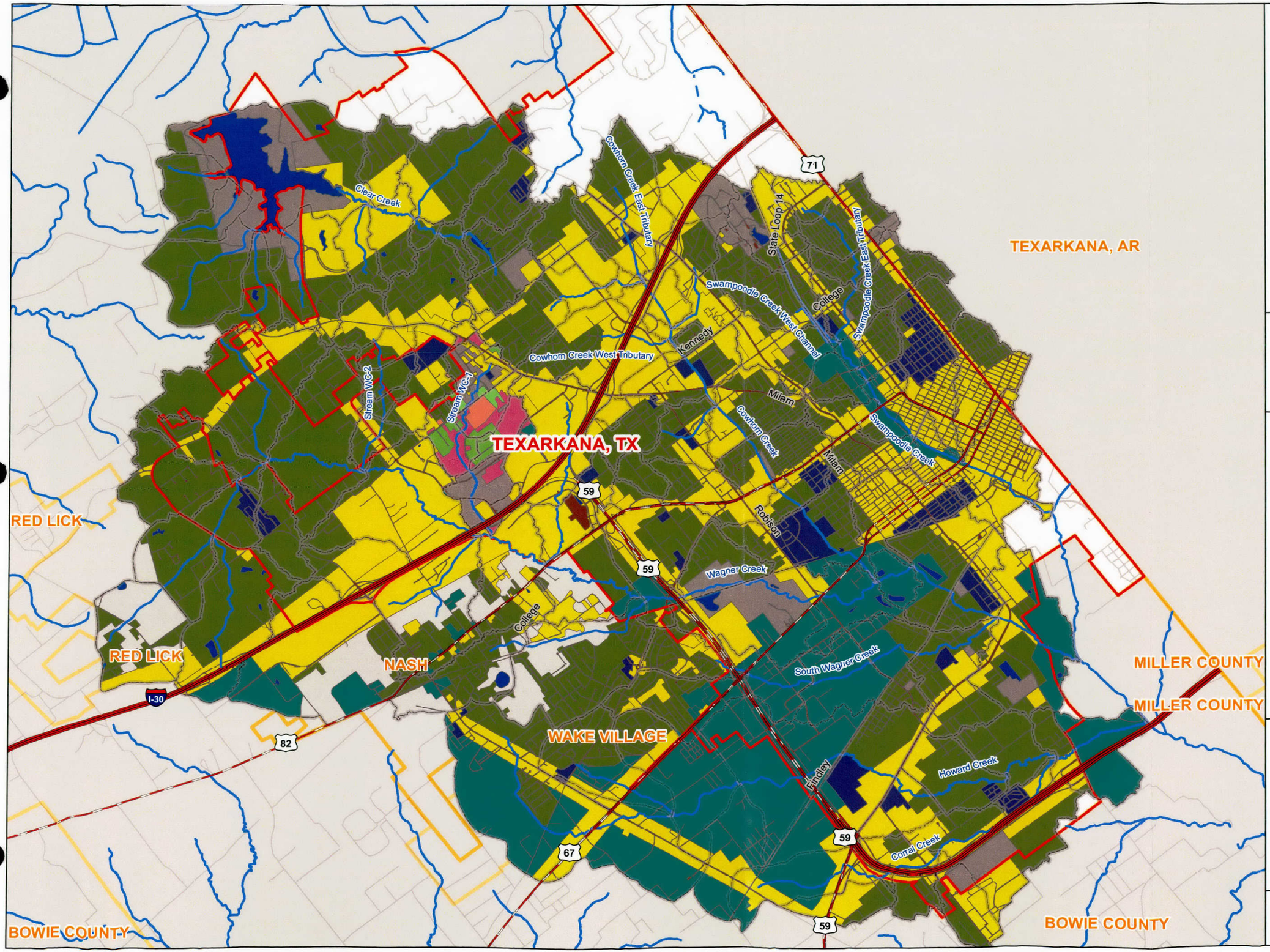

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 6
Ultimate Land Use

Legend

- Open
- Brush
- Residential Large - Lot Low Density
- Residential Small - Lot Low - Density
- Residential Small- Lot Mod Density
- Residential Small-Lot High Density
- Multi-Family Residential
- Commercial
- Industrial
- Pavement
- Water
- Unknown
- Texarkana, TX
- Drainage Areas

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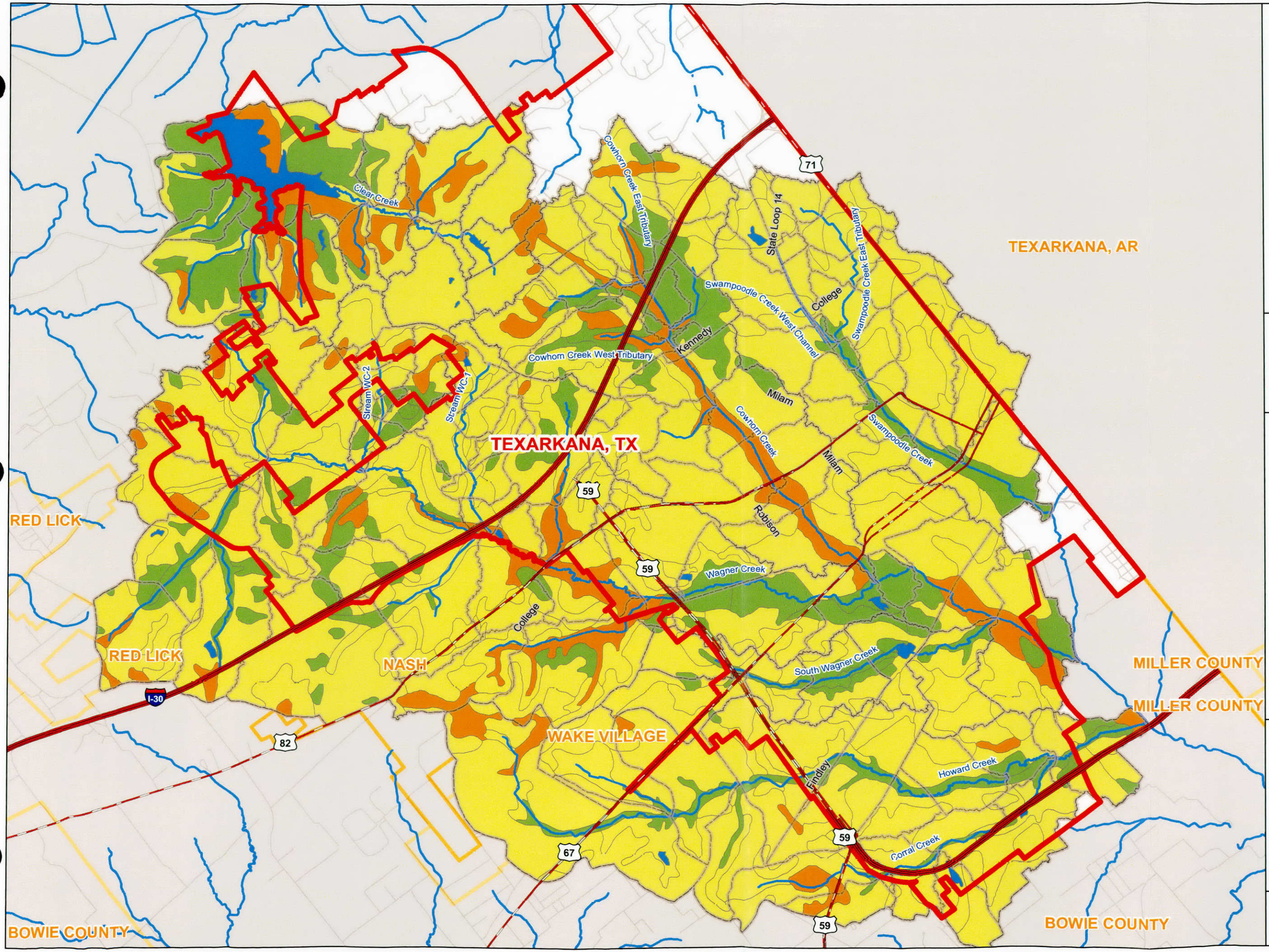

City of Texarkana
City-wide Flood Protection Planning Study

Figure 7
Soils Map

Legend

- Bowie County Streams
- Texarkana, TX
- Drainage Areas

SOIL GROUP

- B
- C
- D
- WATER

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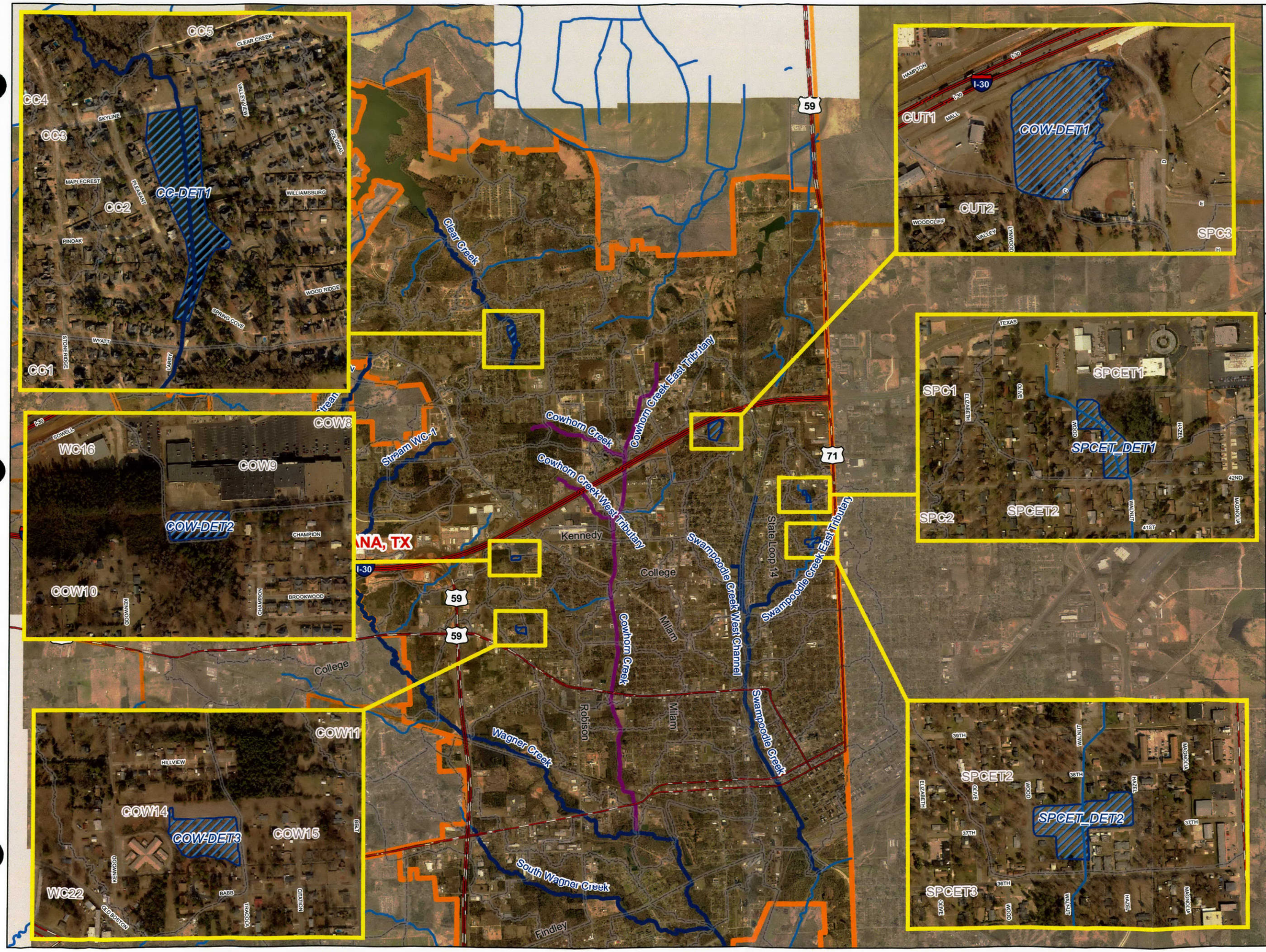

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 8
Existing Detention Ponds

Legend

- Existing Detention Ponds
- Drainage Areas
- Other Bowie County Streams
- New Detailed
- 2009 Cowhorn Creek Study
- Political Boundaries

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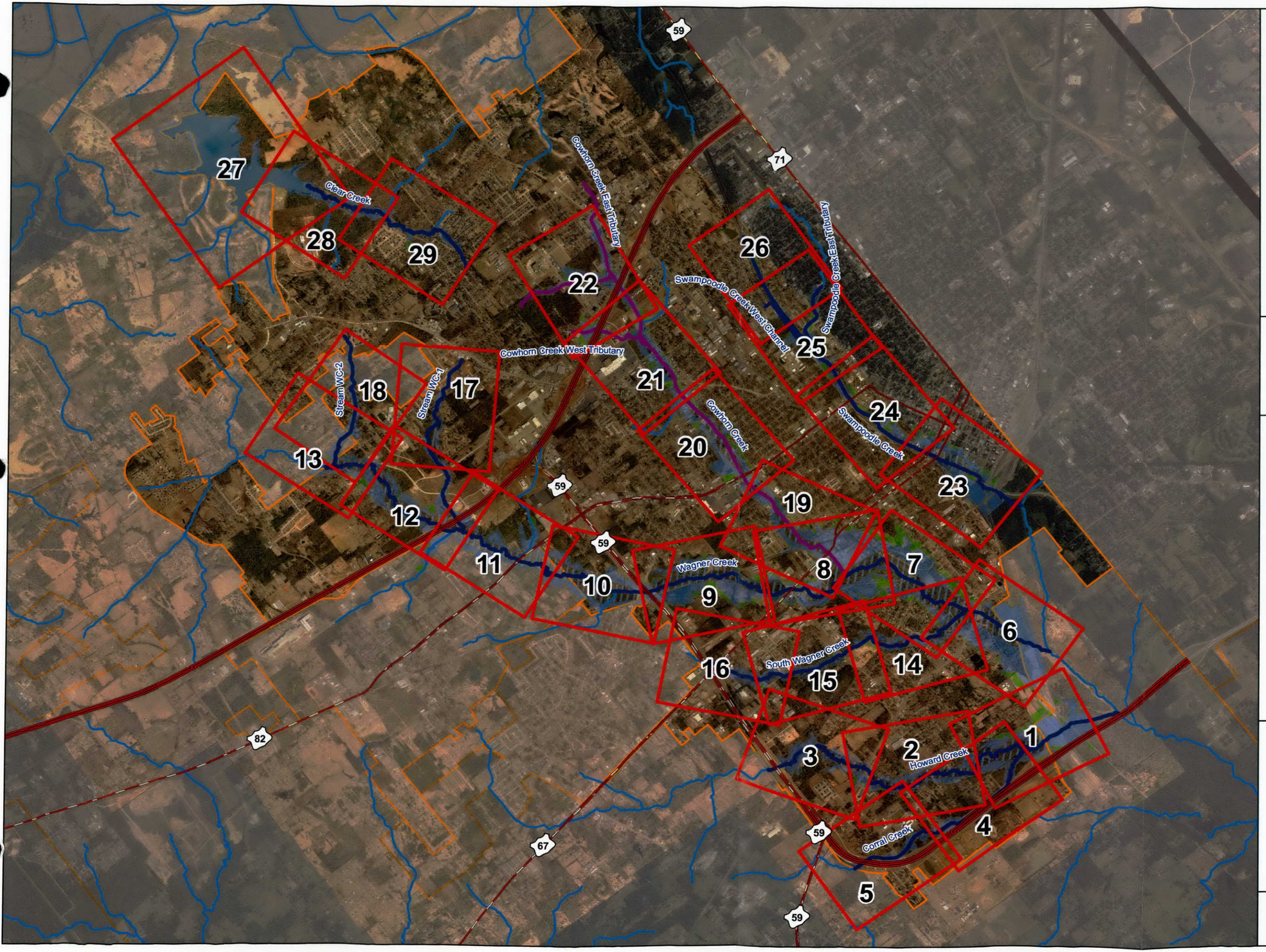

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps
INDEX

Legend

- Other Bowie County Streams
- New Detailed
- 2009 Cowhorn Creek Study
- Floodplain Workmap Index
- Political Boundaries

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City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 1

HOWARD CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 2

HOWARD CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
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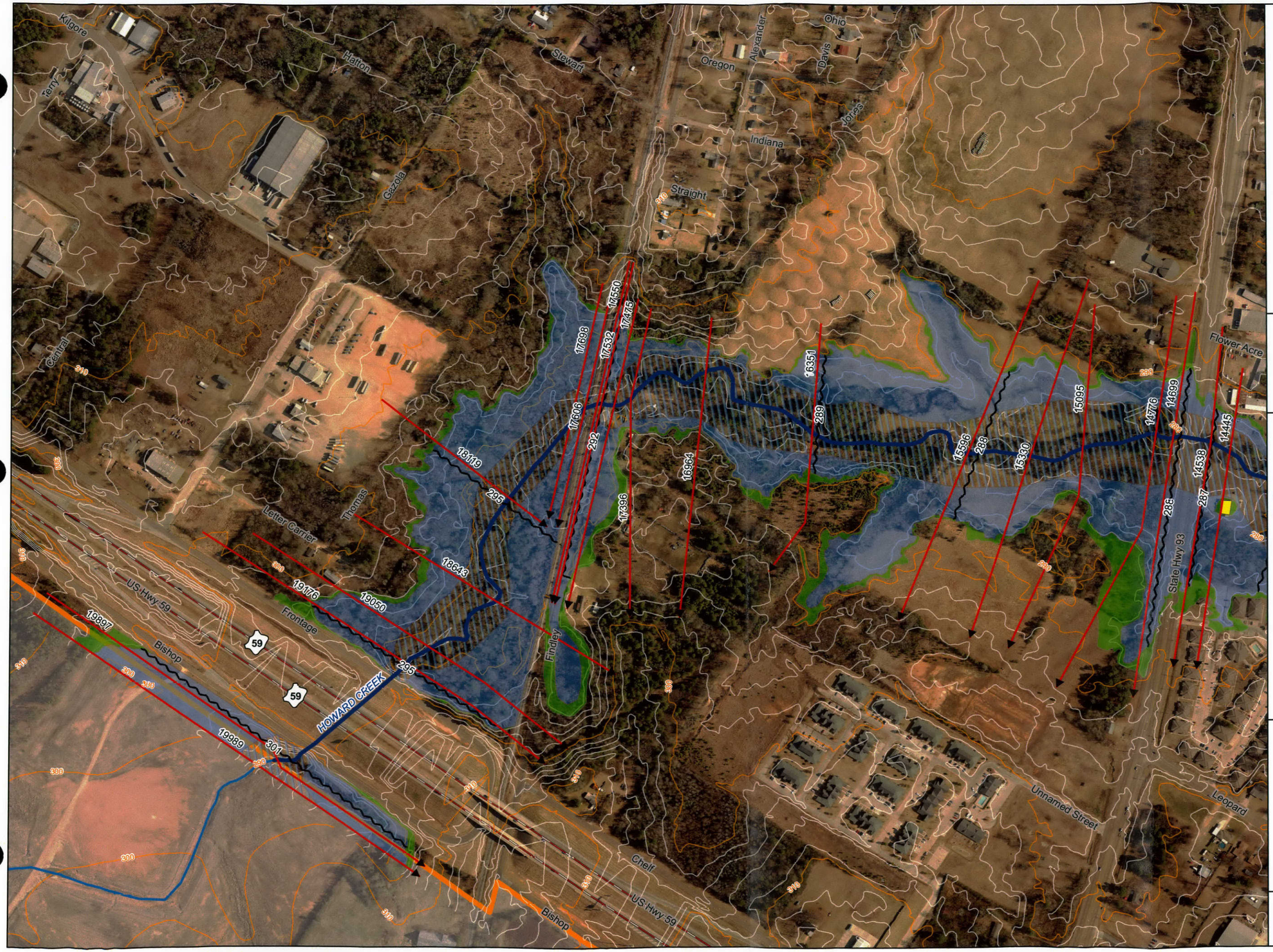

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 3

HOWARD CREEK MAP 3

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

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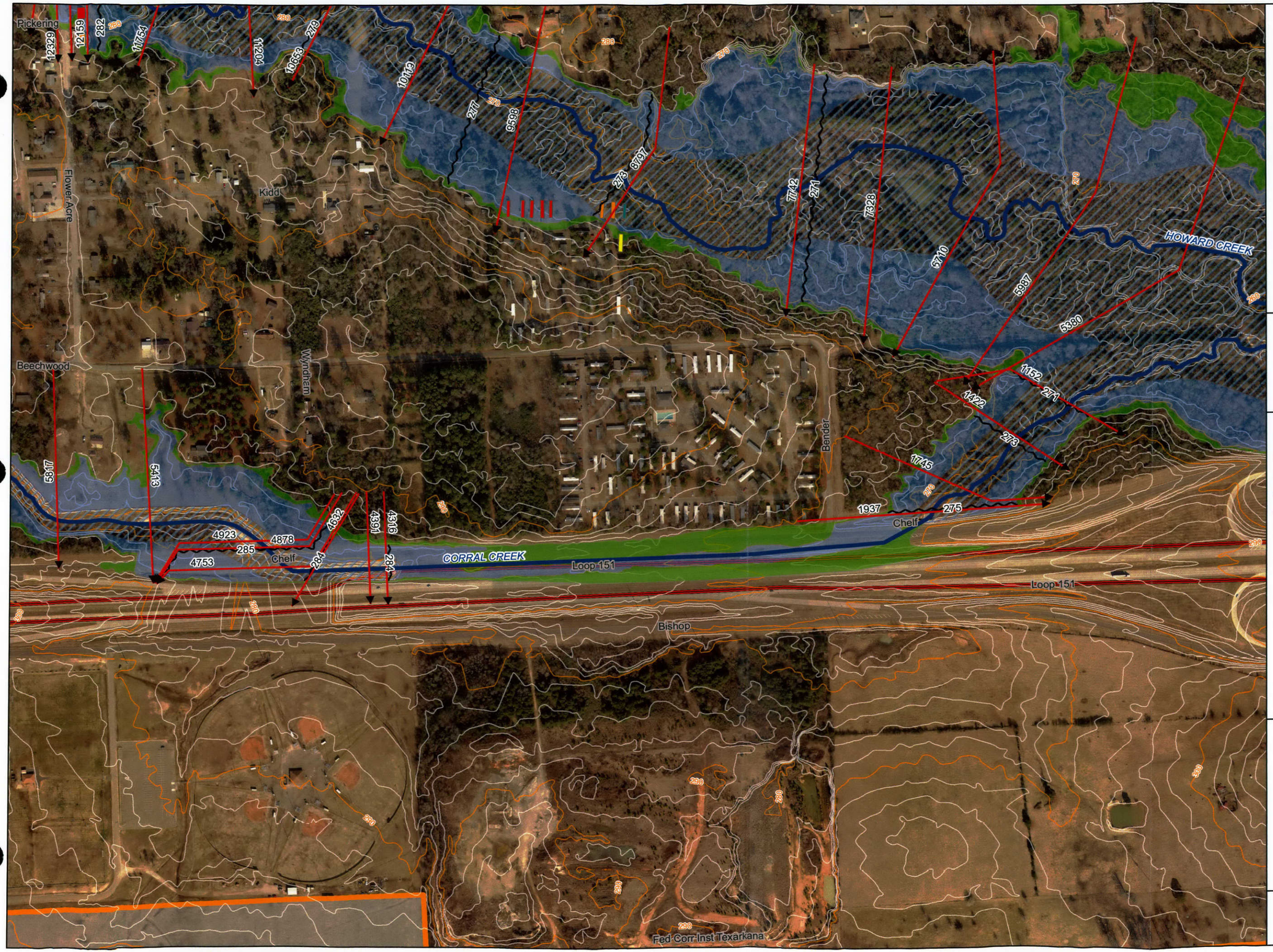

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 4

CORRAL CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

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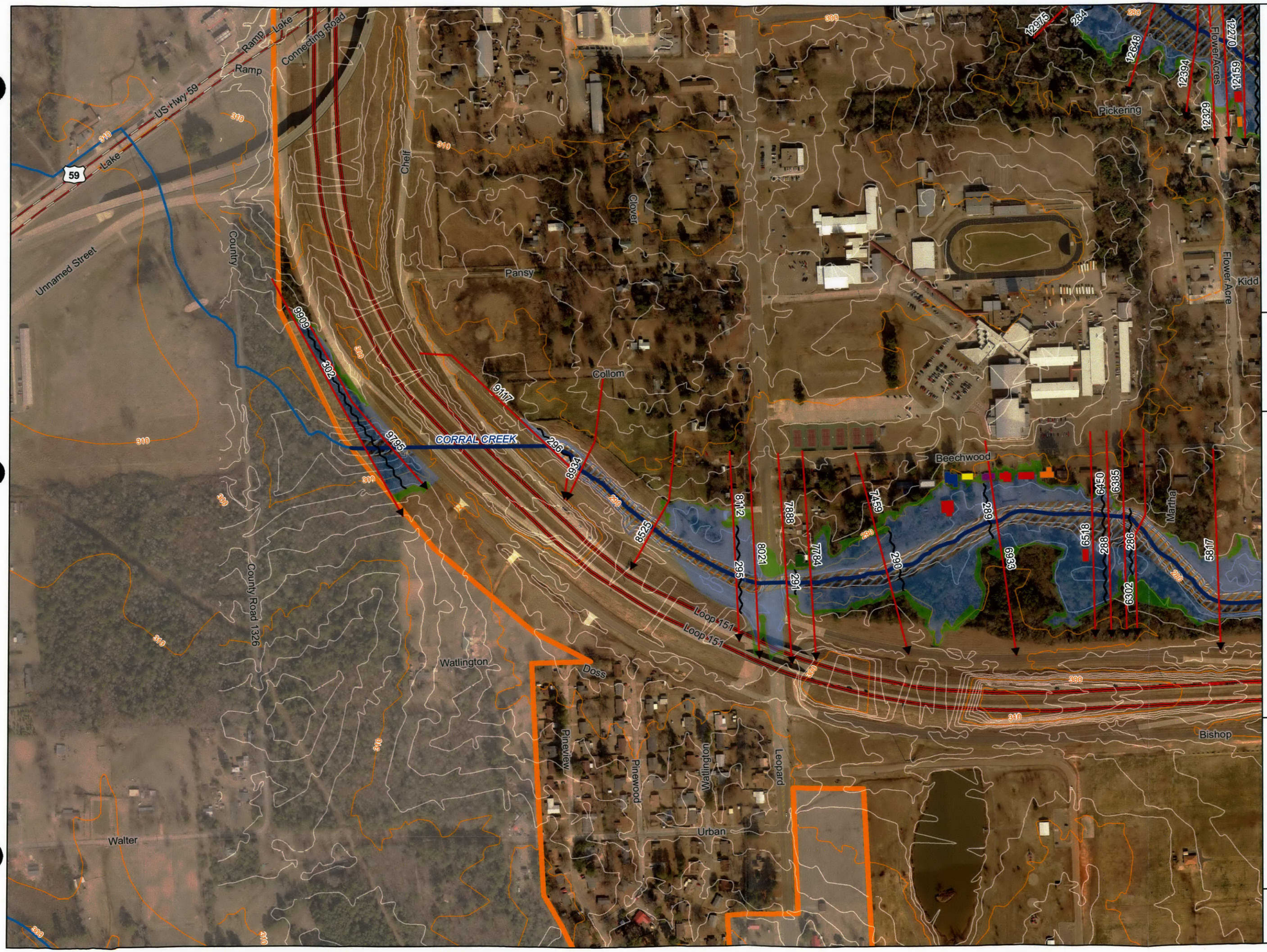

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 5

CORRAL CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

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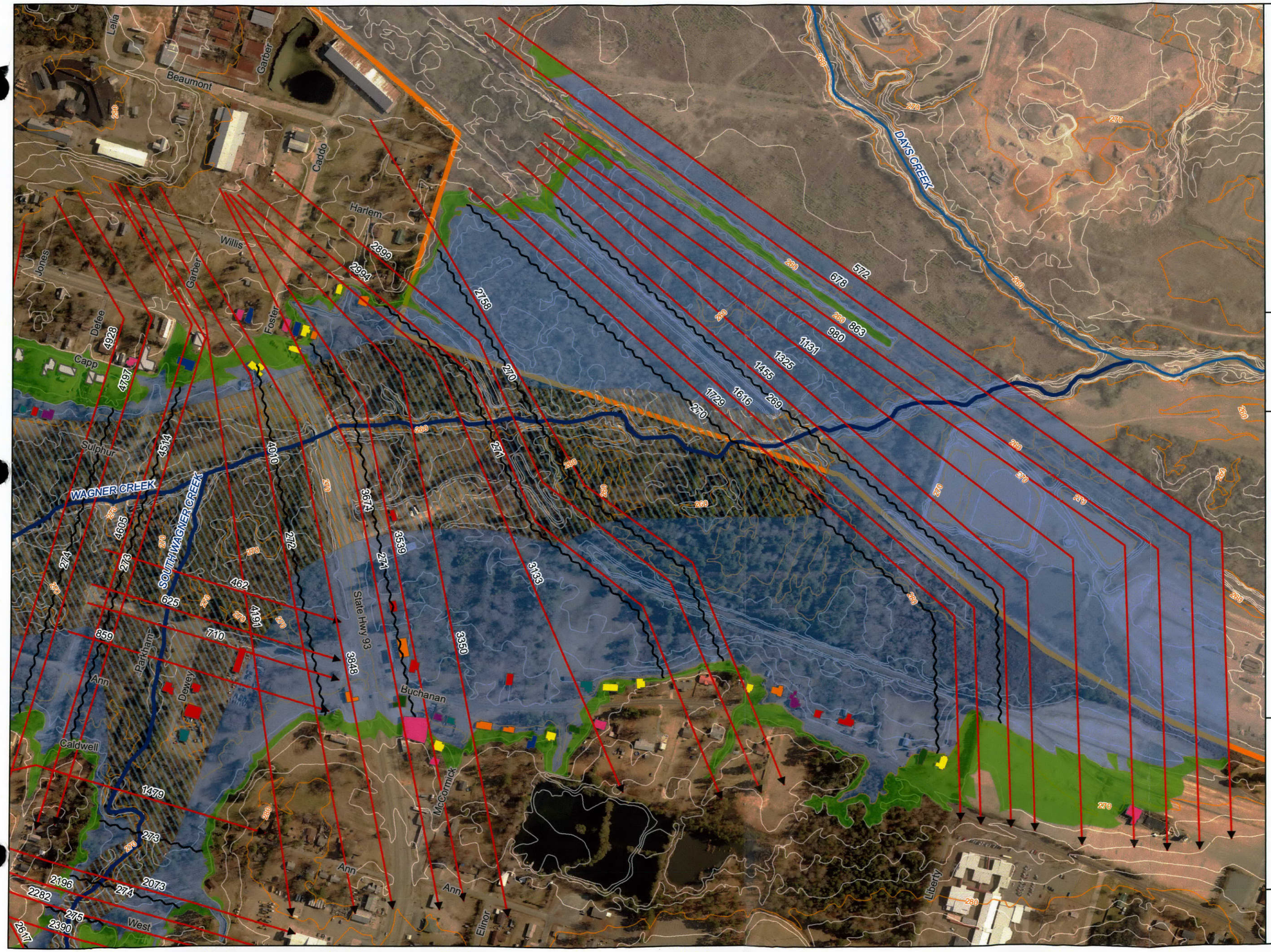

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 6

WAGNER CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

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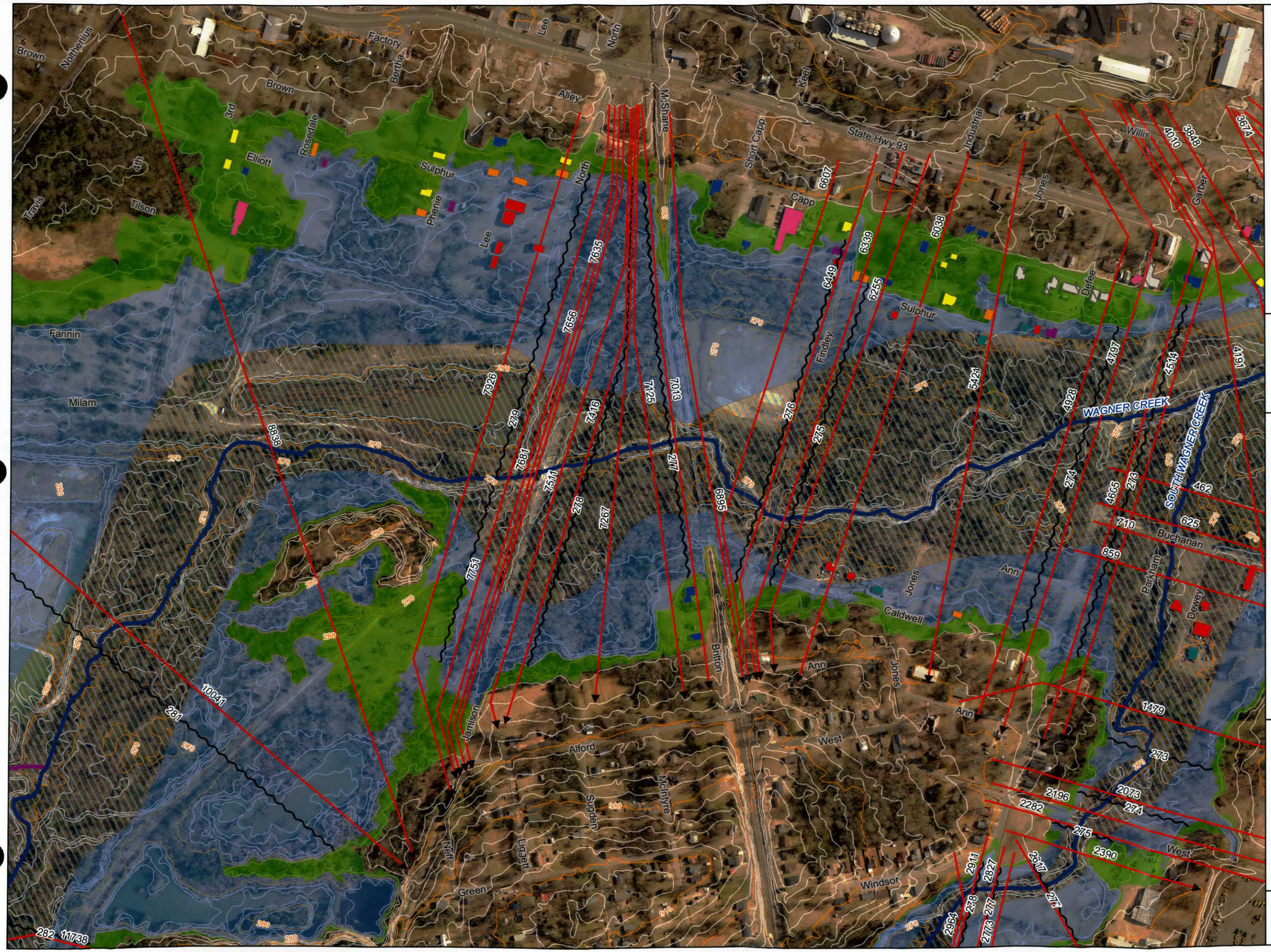

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 7

WAGNER CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
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- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 8

WAGNER CREEK MAP 3

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
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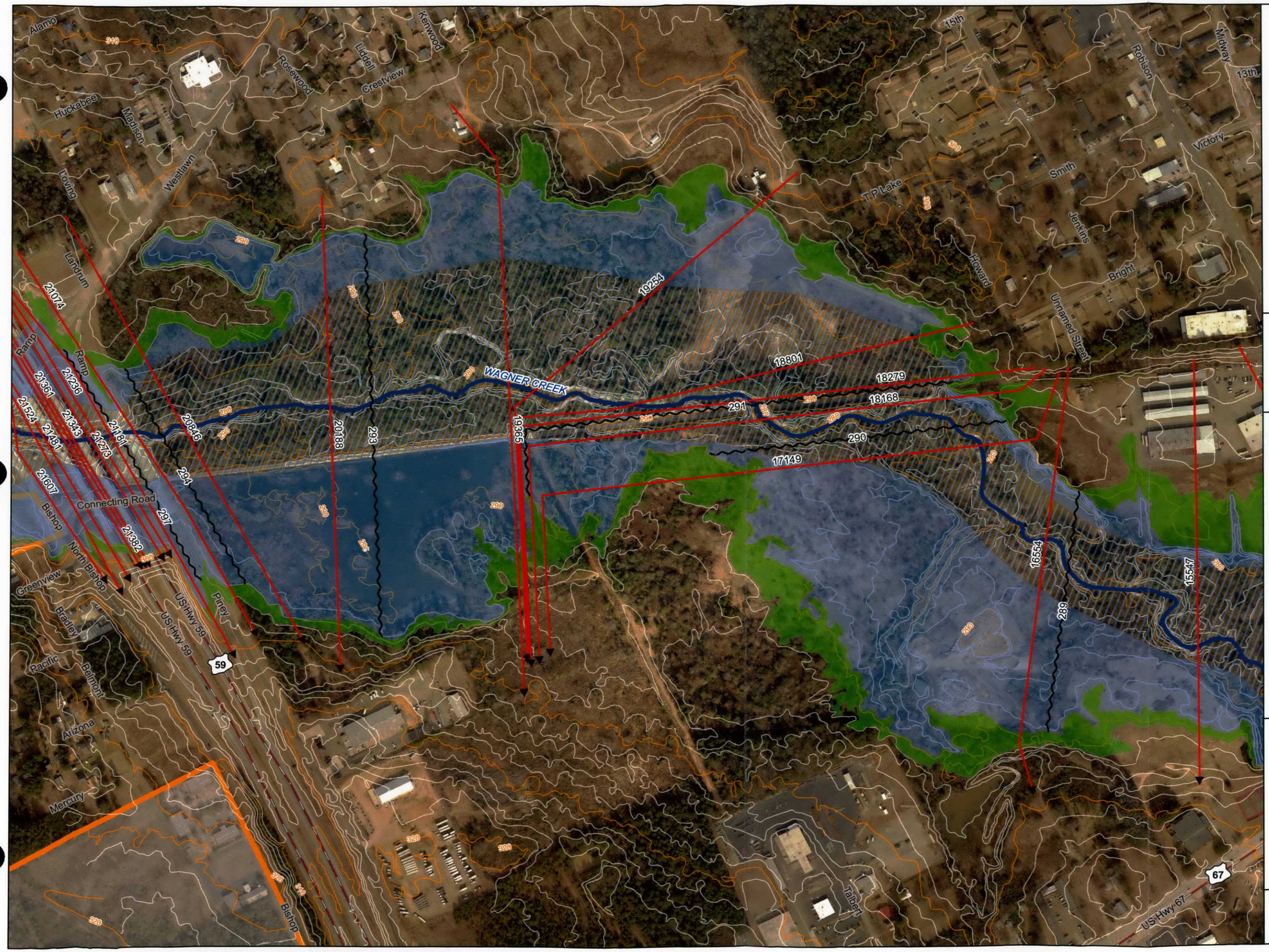

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 9

WAGNER CREEK MAP 4

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
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- 10 year
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- 2 year
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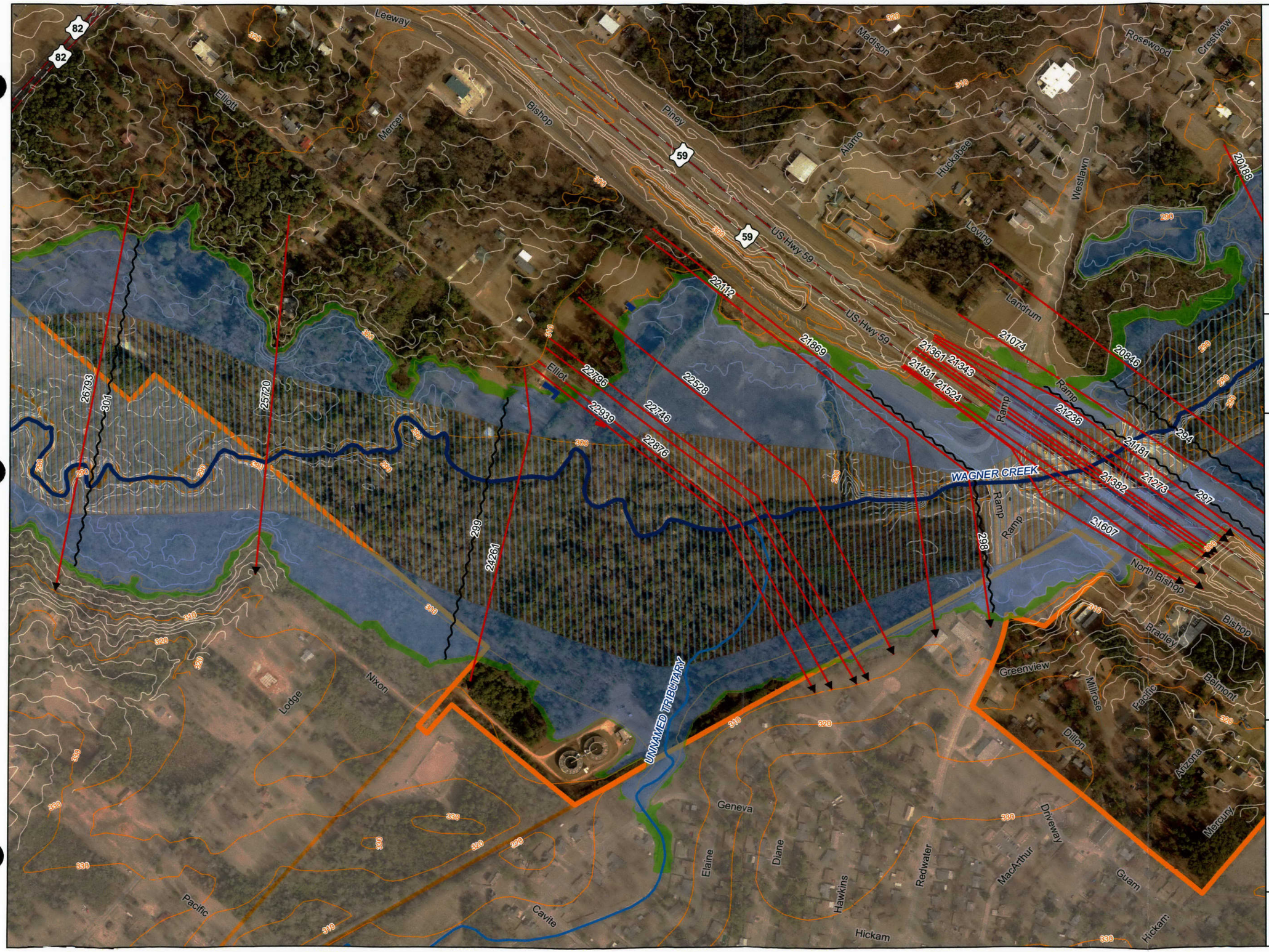

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 10

WAGNER CREEK MAP 5

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
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- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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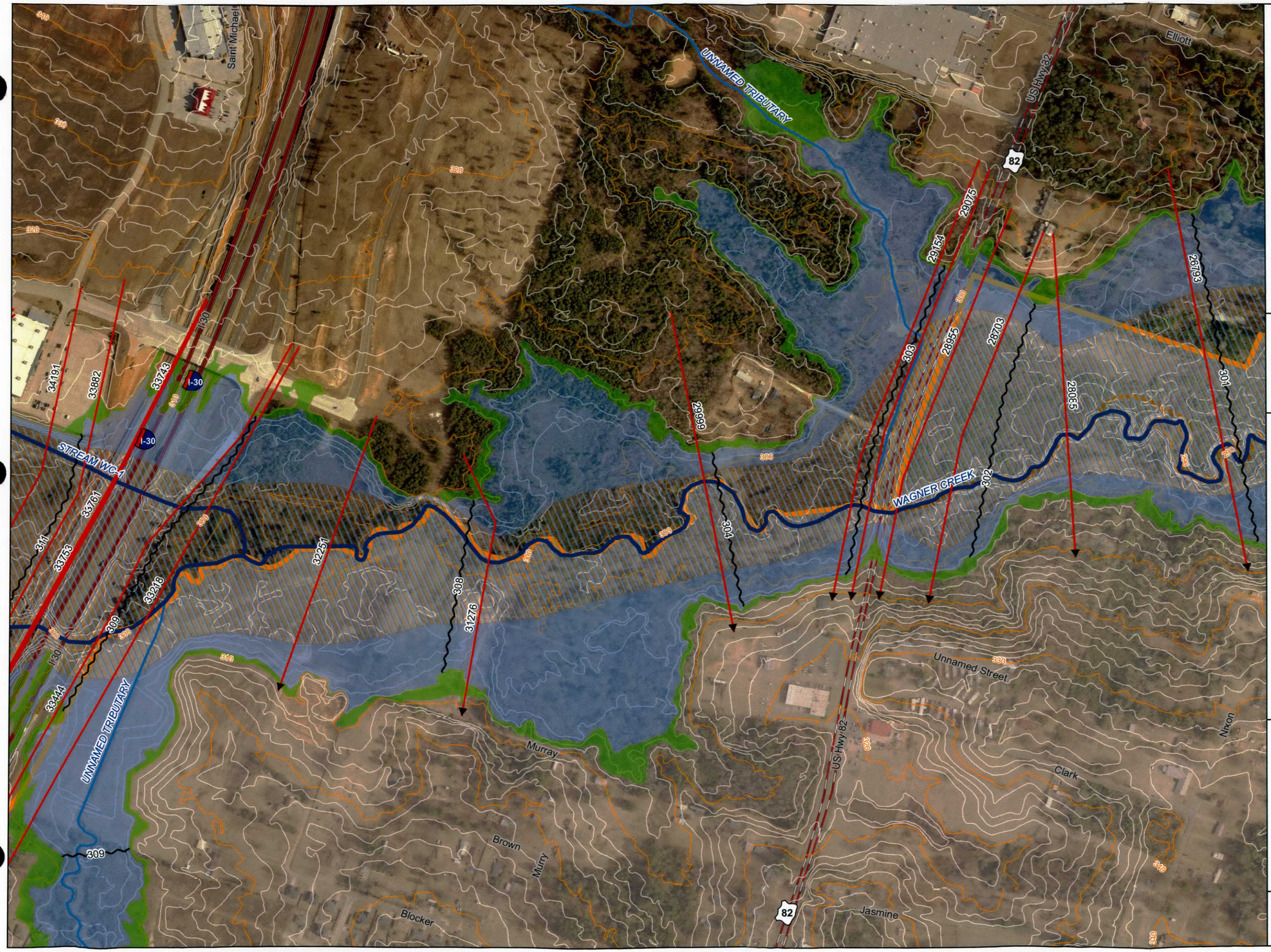

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 11

WAGNER CREEK MAP 6

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
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- 10 year
- 5 year
- 2 year
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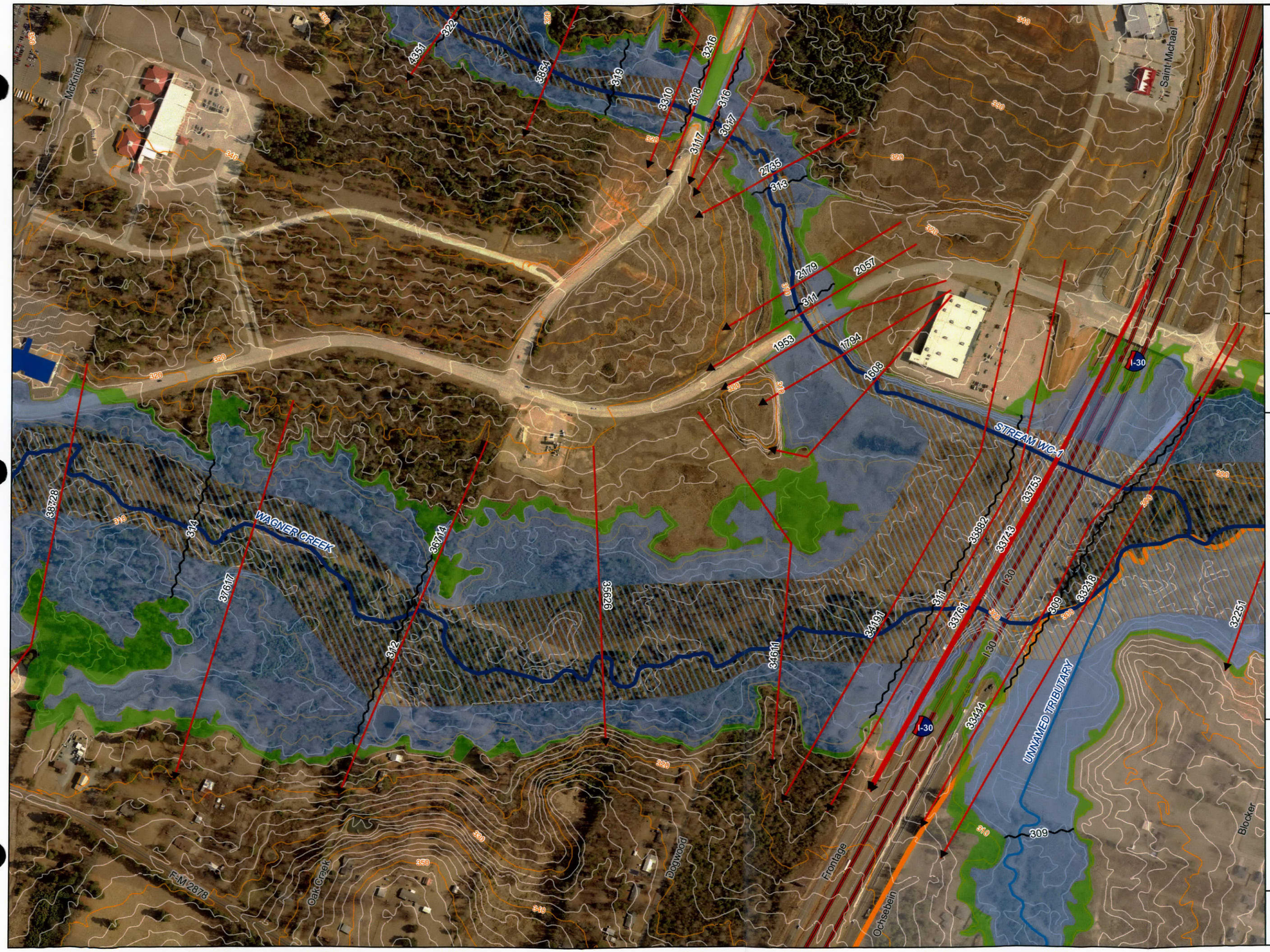

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 12

WAGNER CREEK MAP 7

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

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City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 13

WAGNER CREEK MAP 8

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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Feet

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City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 14
SOUTH WAGNER CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

N E S W

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Figure 9
Floodplain Workmaps

Panel 15

SOUTH WAGNER CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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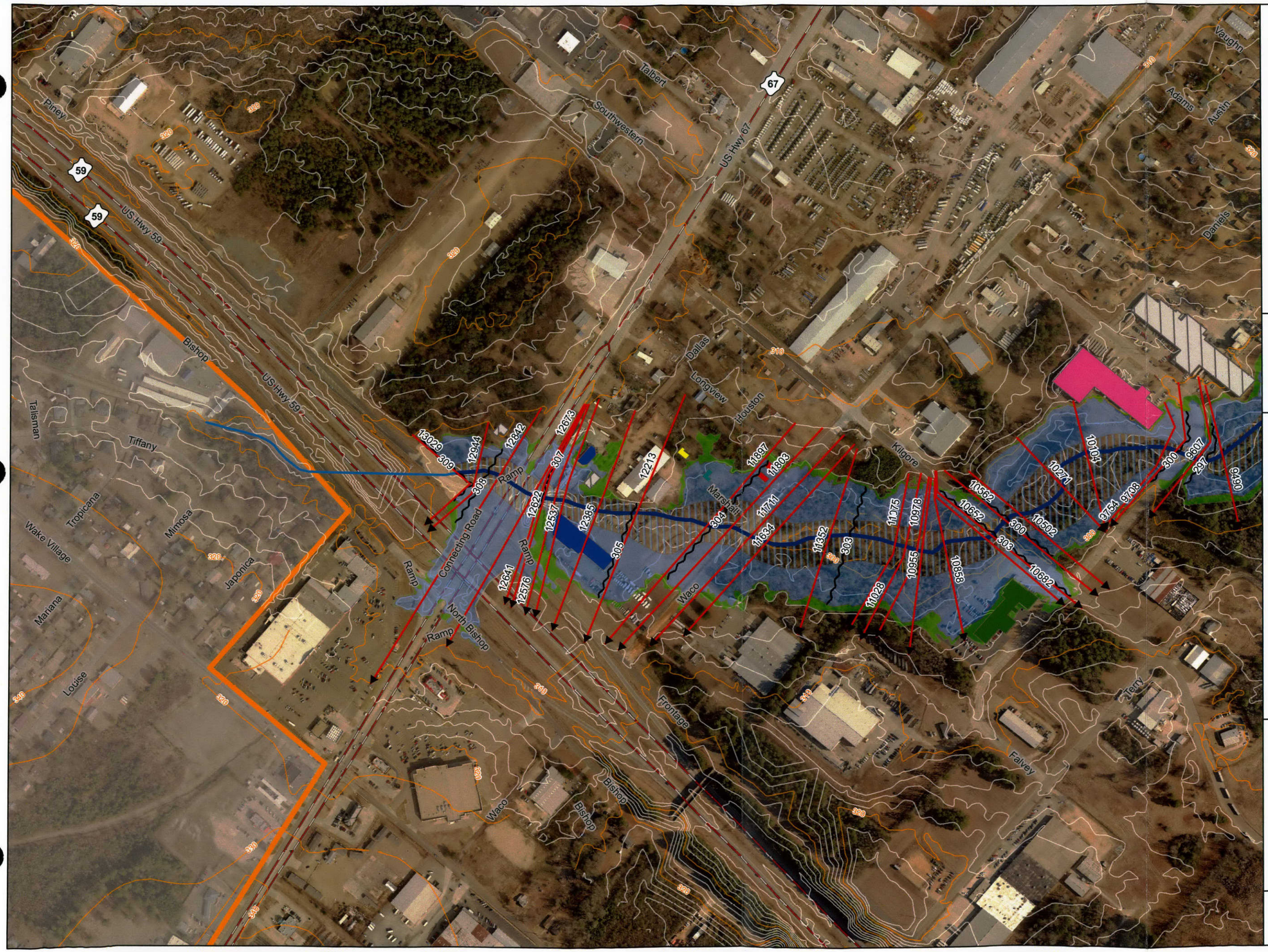

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Planning Study

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Floodplain Workmaps

Panel 16

SOUTH WAGNER CREEK MAP 3

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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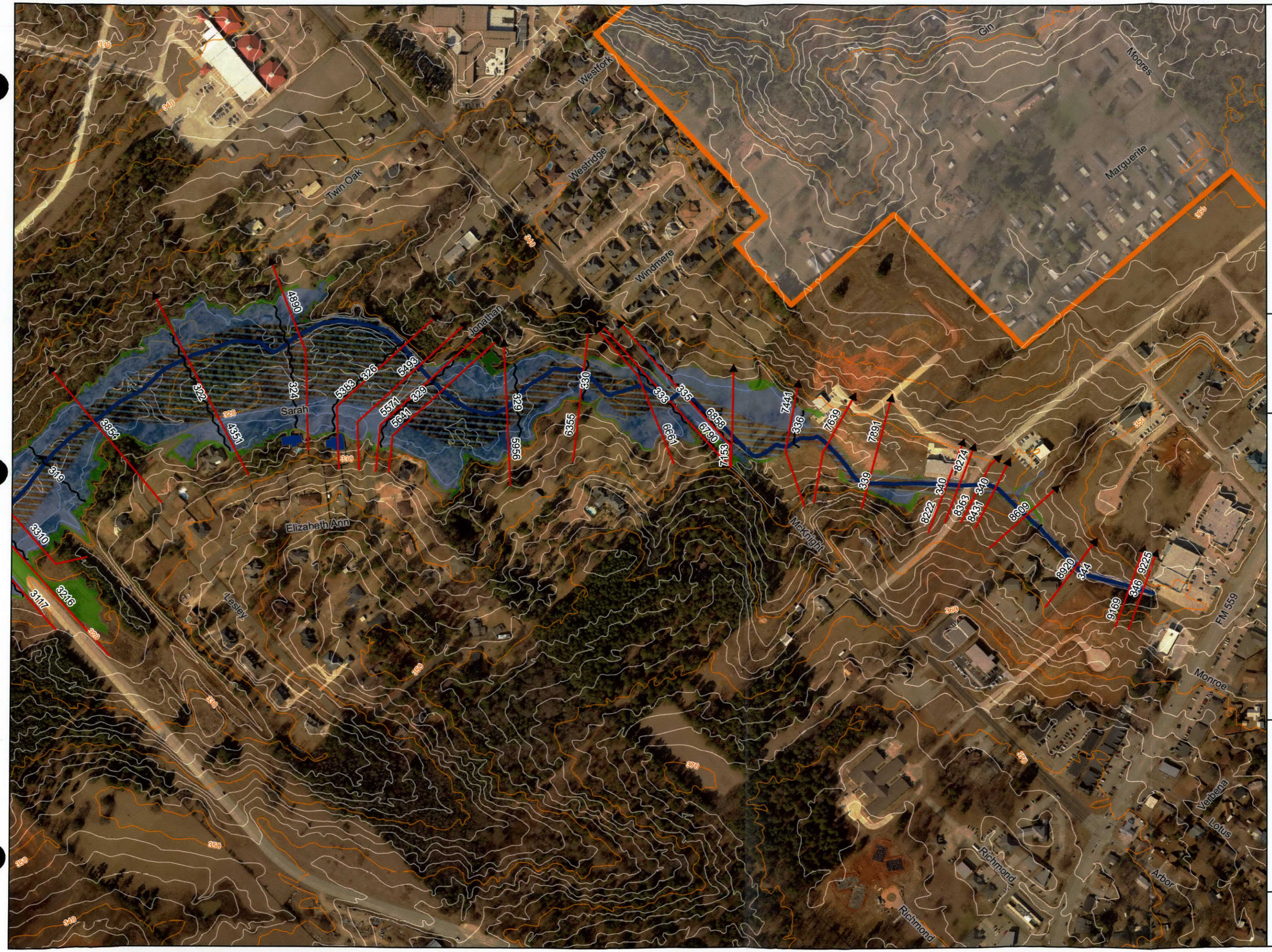

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Floodplain Workmaps

Panel 17

STREAM WC-1 MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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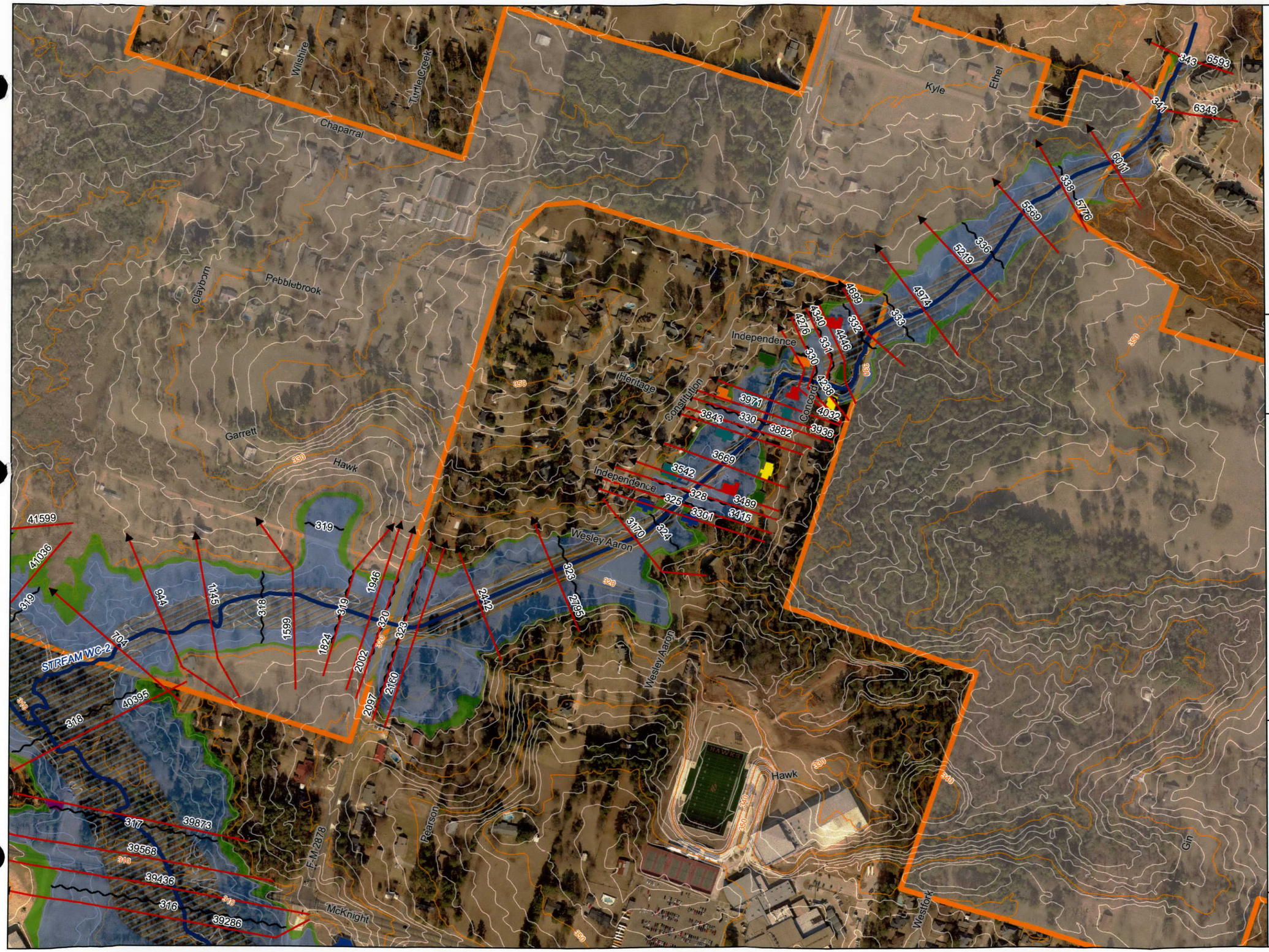

City of Texarkana
City-wide Flood Protection Planning Study

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Floodplain Workmaps

Panel 18

STREAM WC-2 MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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Floodplain Workmaps

Panel 19

COWHORN CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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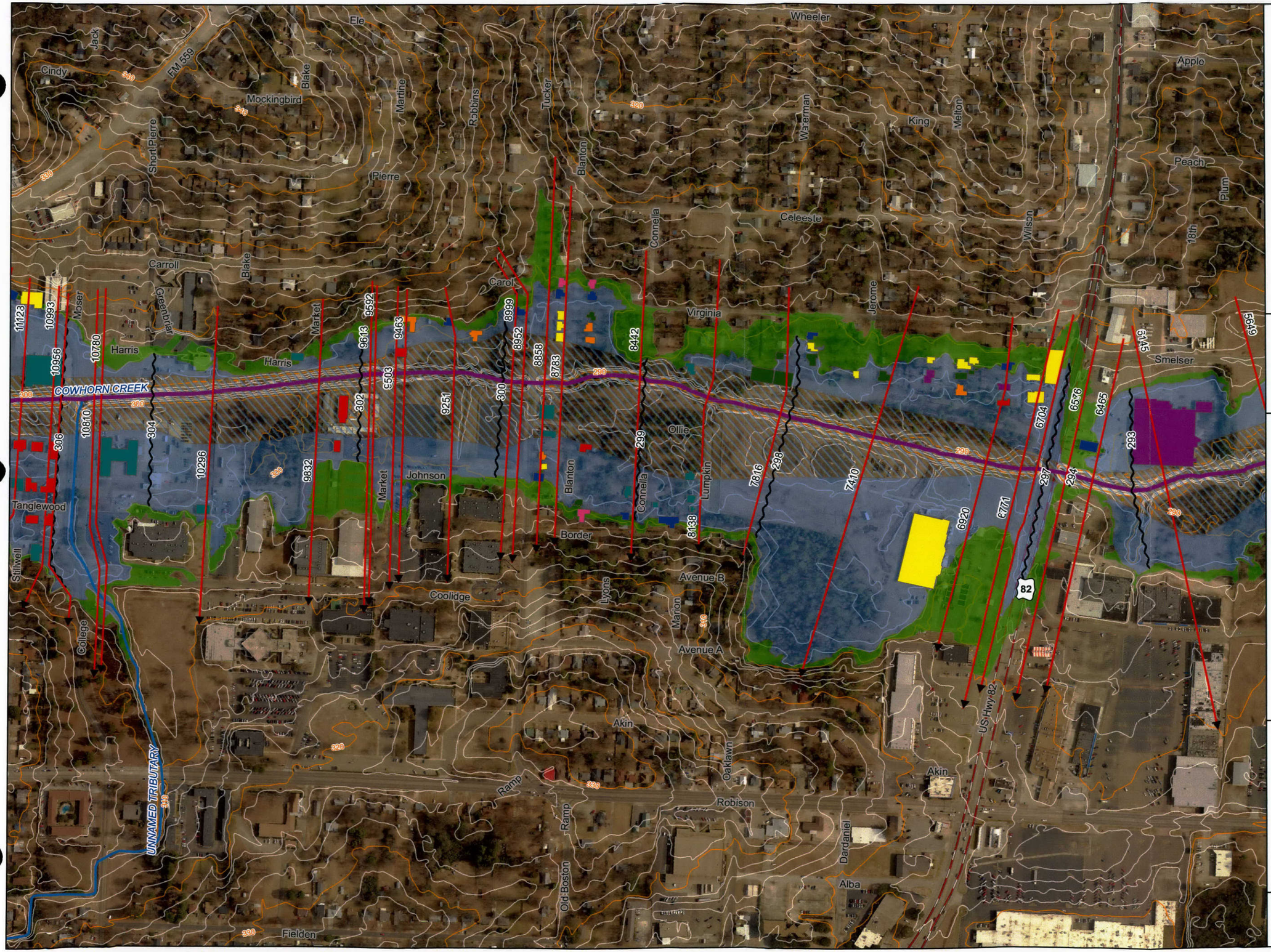

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Panel 20

COWHORN CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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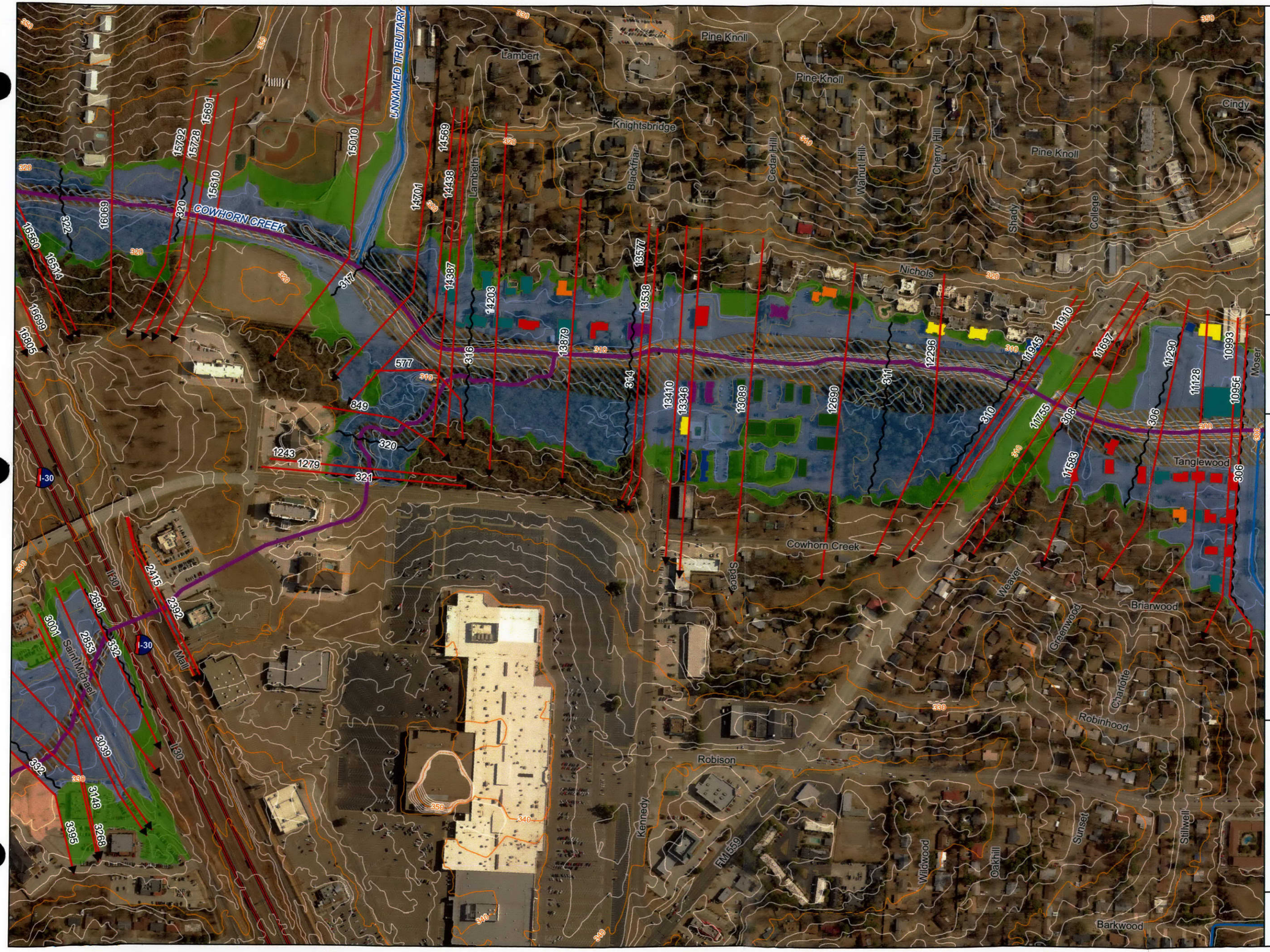
UNNAMED TRIBUTARY
COWHORN CREEK
Lambert
Pine Knoll
Knightsbridge
Blackfriar
Lambeth
Cedar Hill
Walnut Hill
Cherry Hill
Shady
College
Cindy
Nichols
Moser
Tanglewood
Cowhorn Creek
Space
Weaver
Greenwood
Briarwood
Charlotte
Robinhood
Robison
Kennedy
FM 559
Wildwood
Oakhill
Sunset
Stillwell
Barkwood
Saint Michael
Mall
I-30
15792
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15691
15610
15010
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14438
14701
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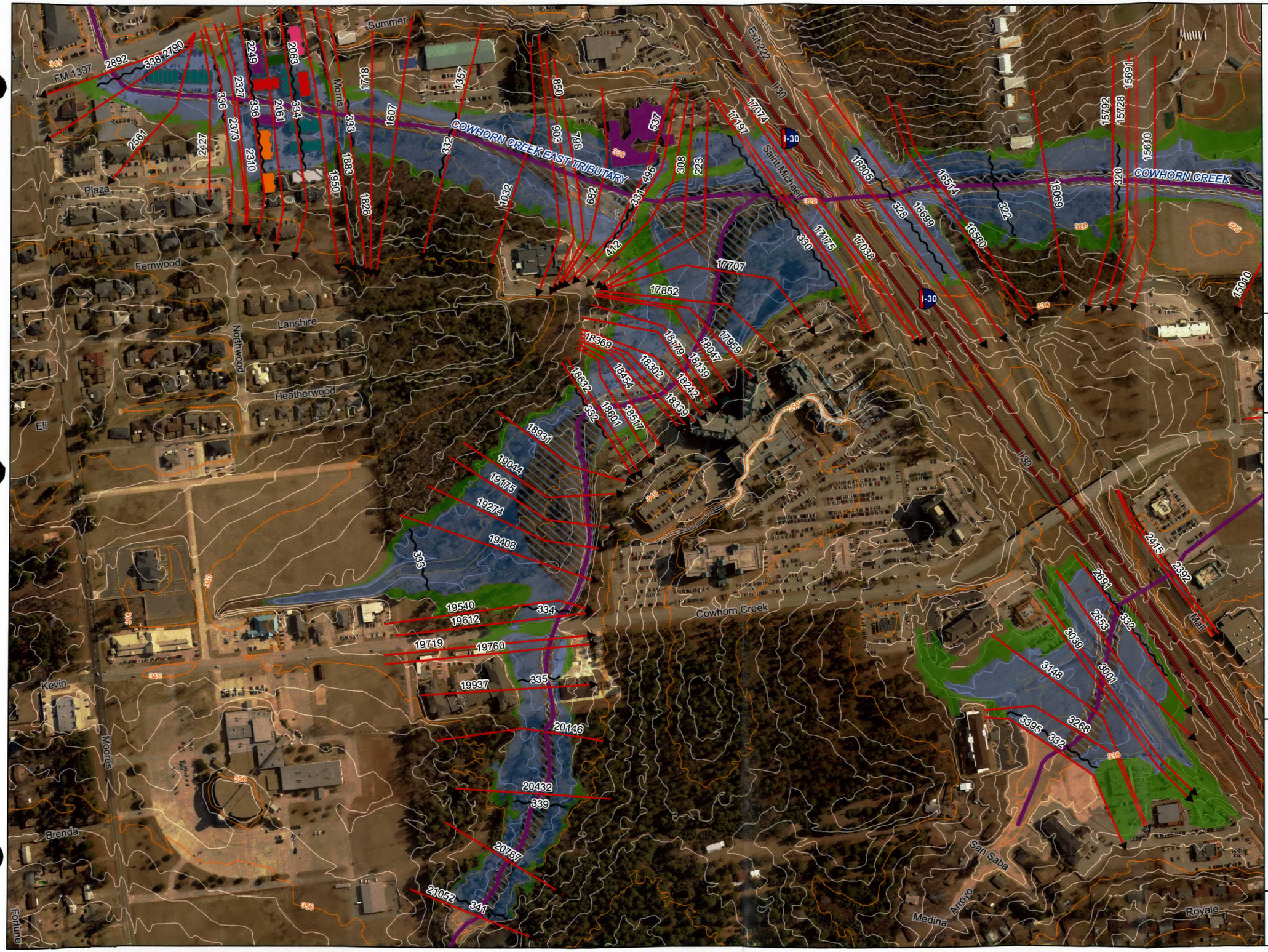

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 22

COWHORN CREEK MAP 4

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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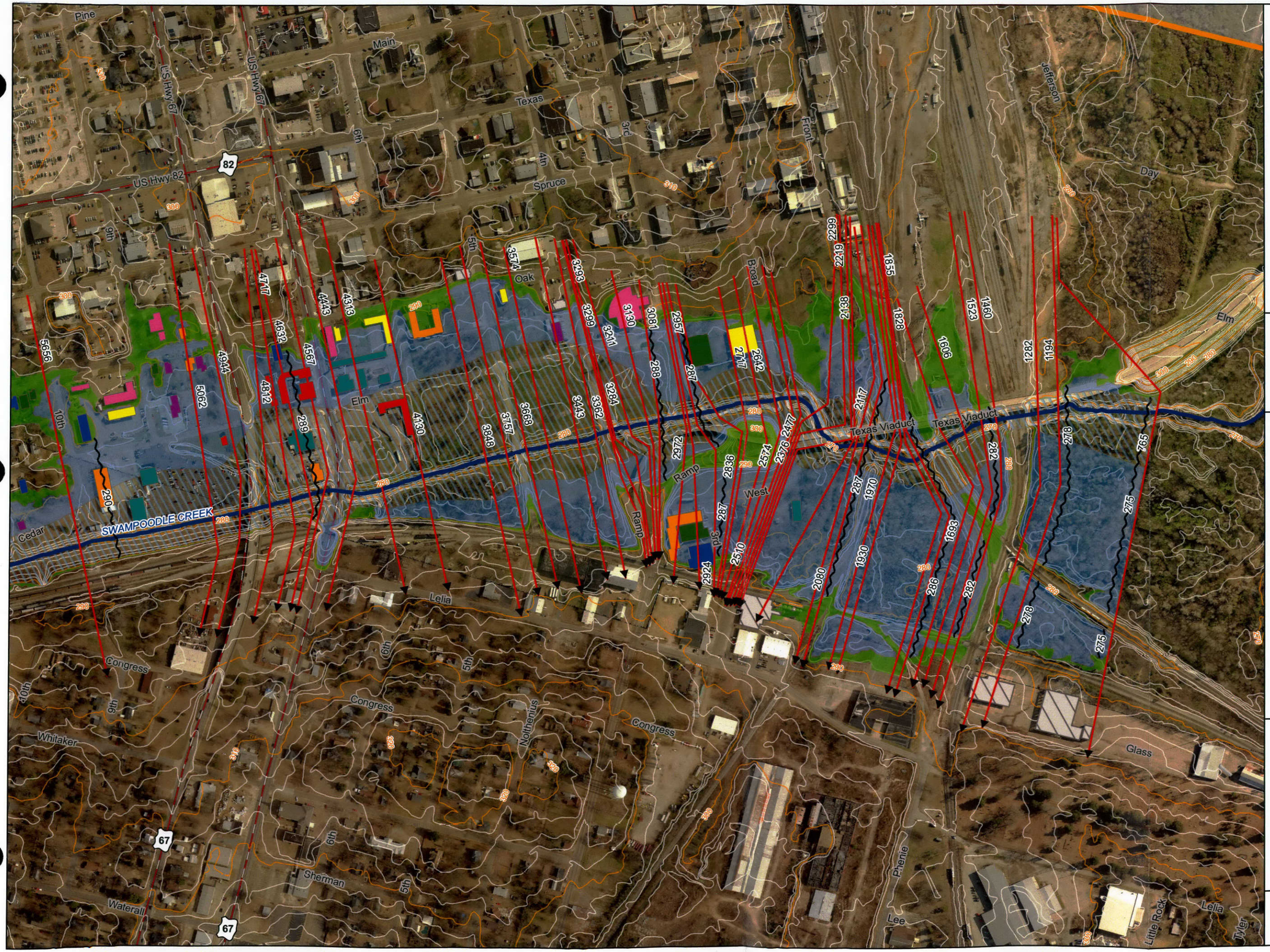

City of Texarkana
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Figure 9
Floodplain Workmaps

Panel 23

SWAMPOODLE CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

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Figure 9
Floodplain Workmaps

Panel 24

SWAMPOODLE CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

N E S W

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Feet

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Figure 9
Floodplain Workmaps

Panel 25

SWAMPOODLE CREEK MAP 3

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

N W E S

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Feet

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City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 26

SWAMPOODLE CREEK MAP 4

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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CITY OF TEXARKANA 1873

TEXAS WATER DEVELOPMENT BOARD

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 9
Floodplain Workmaps

Panel 27

BRINGLE LAKE

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Toxarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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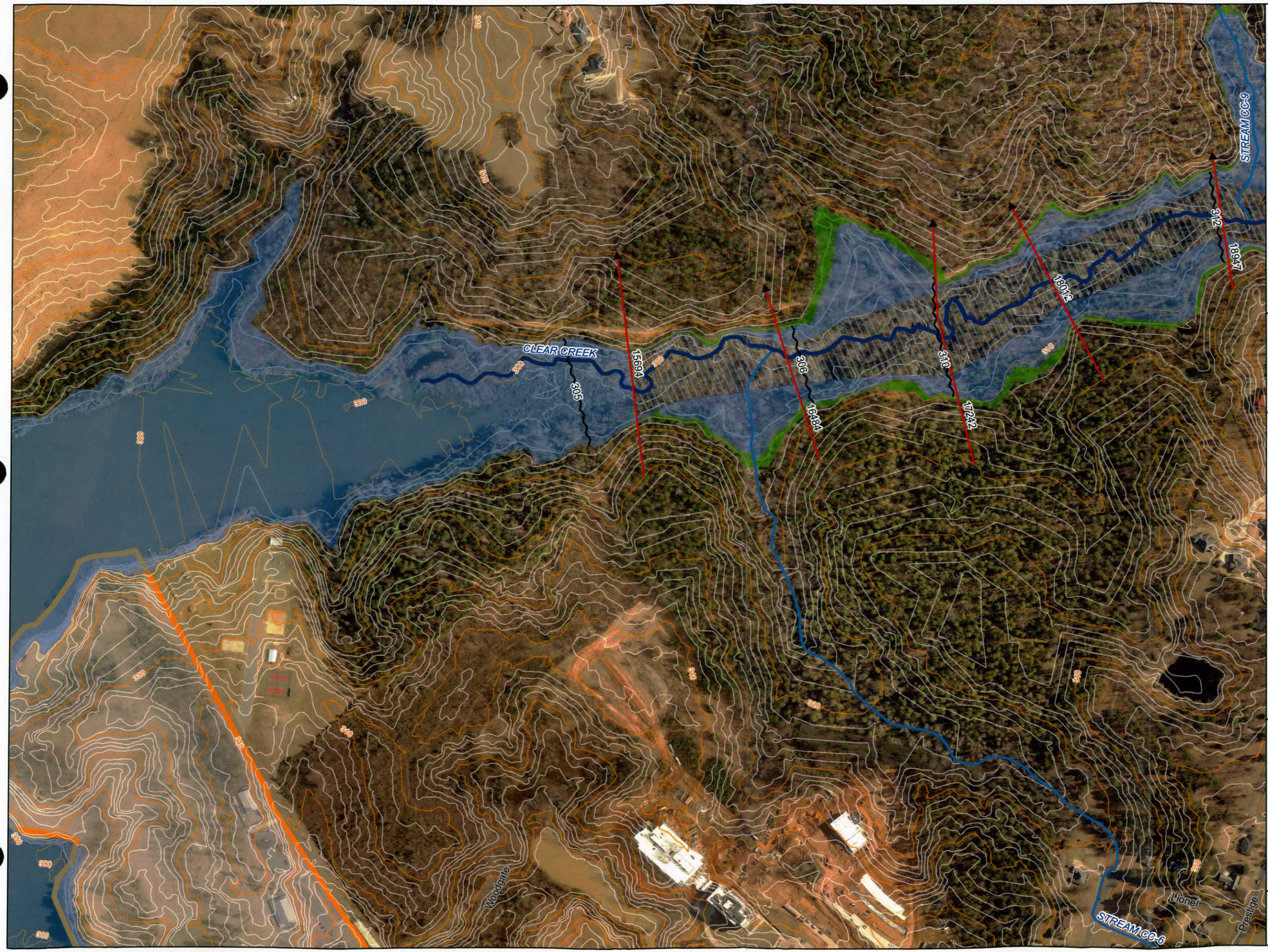

City of Texarkana
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Figure 9
Floodplain Workmaps

Panel 28

CLEAR CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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Figure 9
Floodplain Workmaps

Panel 29

CLEAR CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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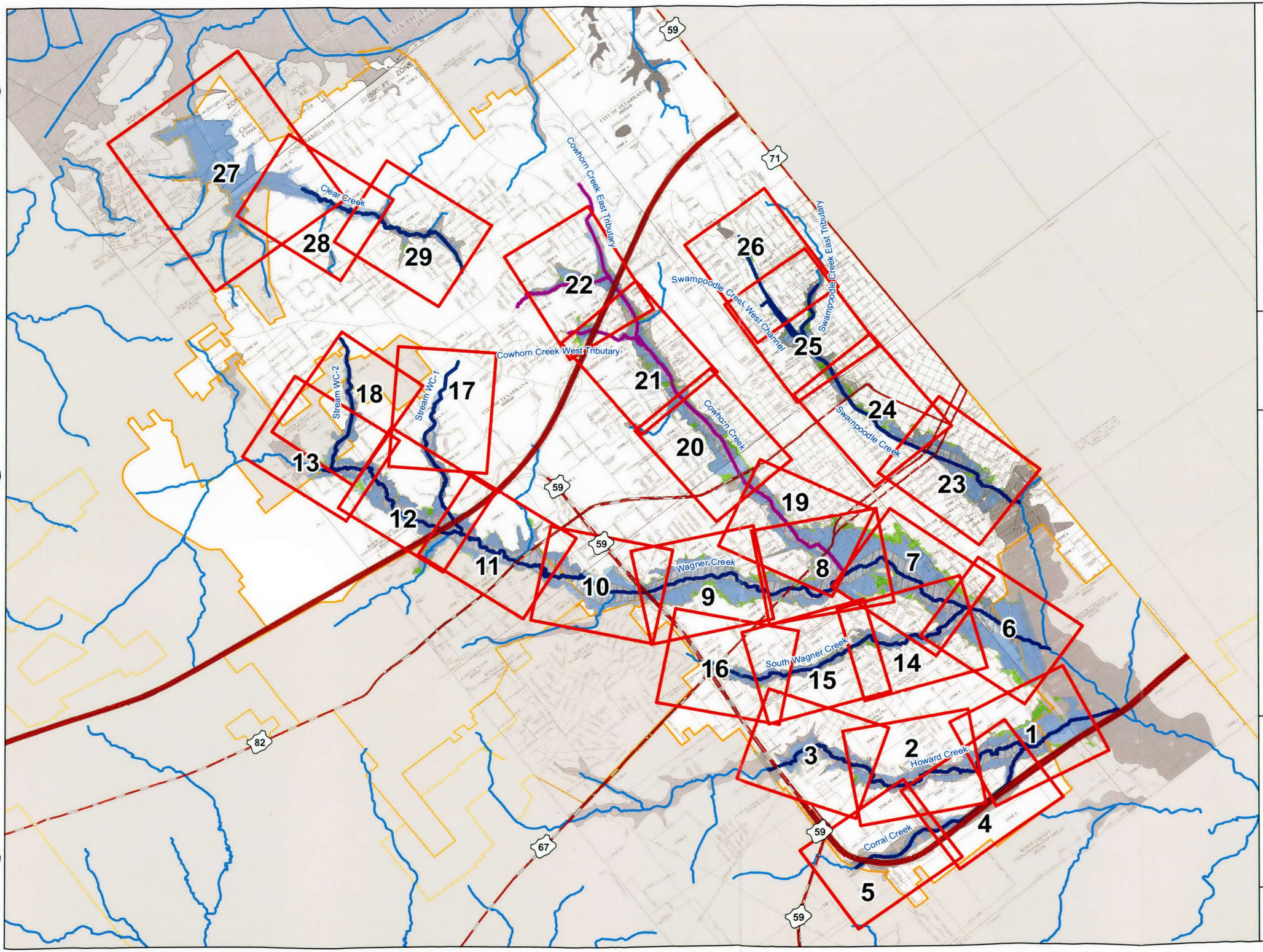

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Planning Study

Figure 10 Effective Floodplain Comparison
INDEX

Legend

- Other Bowie County Streams
- New Detailed
- 2009 Cowhorn Creek Study
- Floodplain Workmap Index
- Political Boundaries

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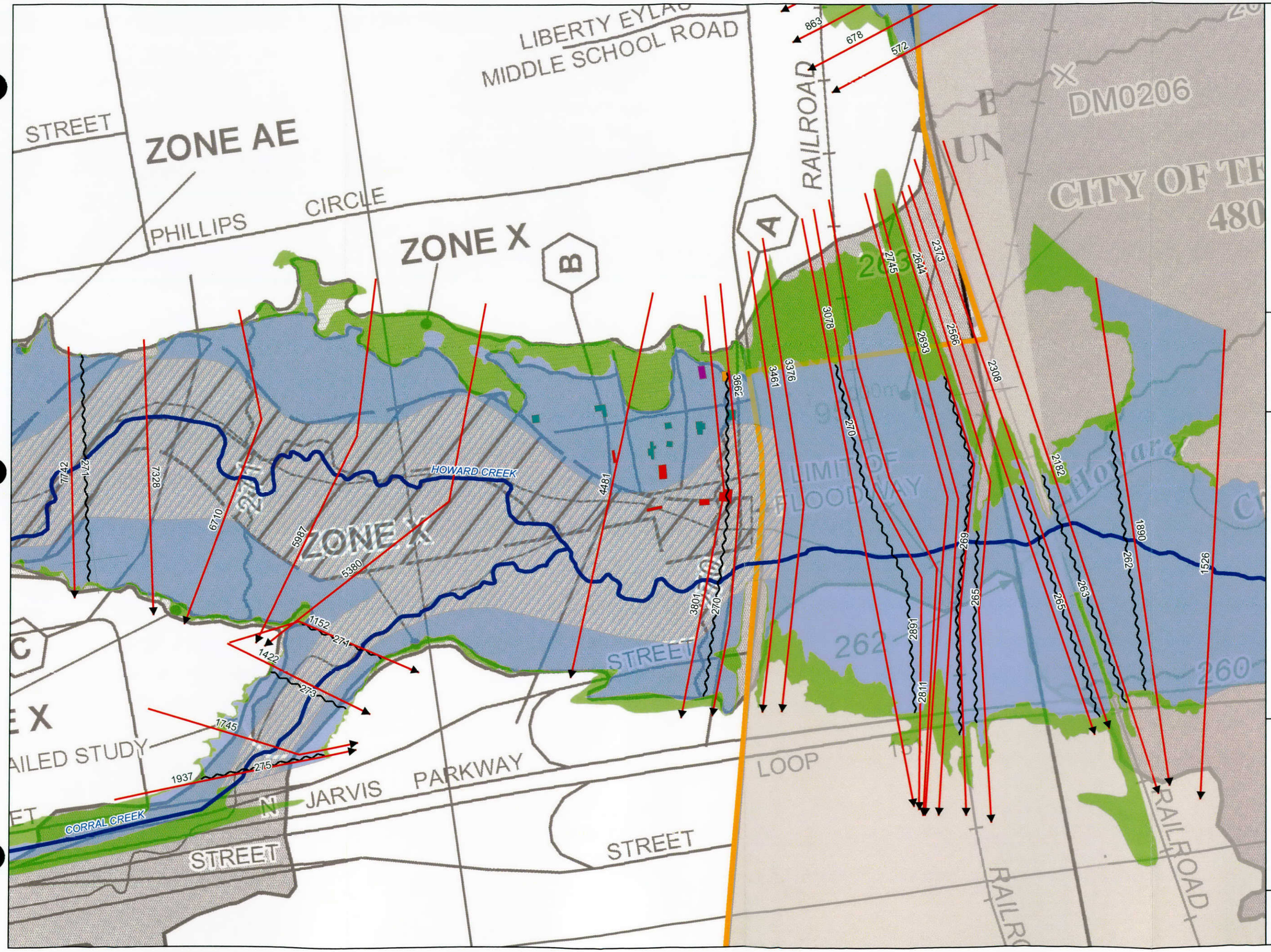

City of Texarkana
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Figure 10 - Effective Floodplain Comparison

Panel 1

HOWARD CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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City of Texarkana
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Figure 10 - Effective Floodplain Comparison

Panel 2

HOWARD CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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City of Texarkana
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Figure 10 - Effective Floodplain Comparison

Panel 3

HOWARD CREEK MAP 3

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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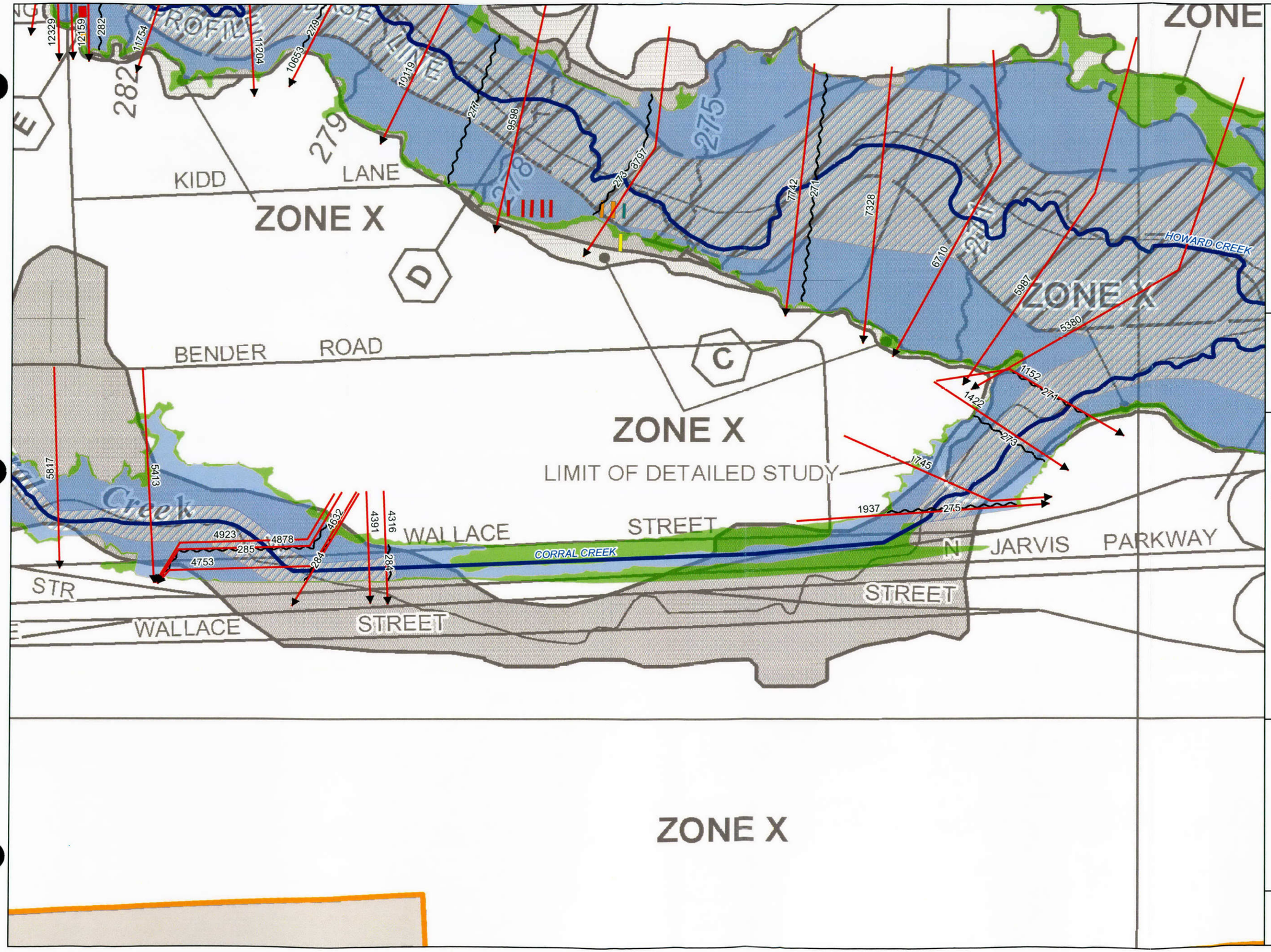

City of Texarkana
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Figure 10 - Effective Floodplain Comparison

Panel 4

CORRAL CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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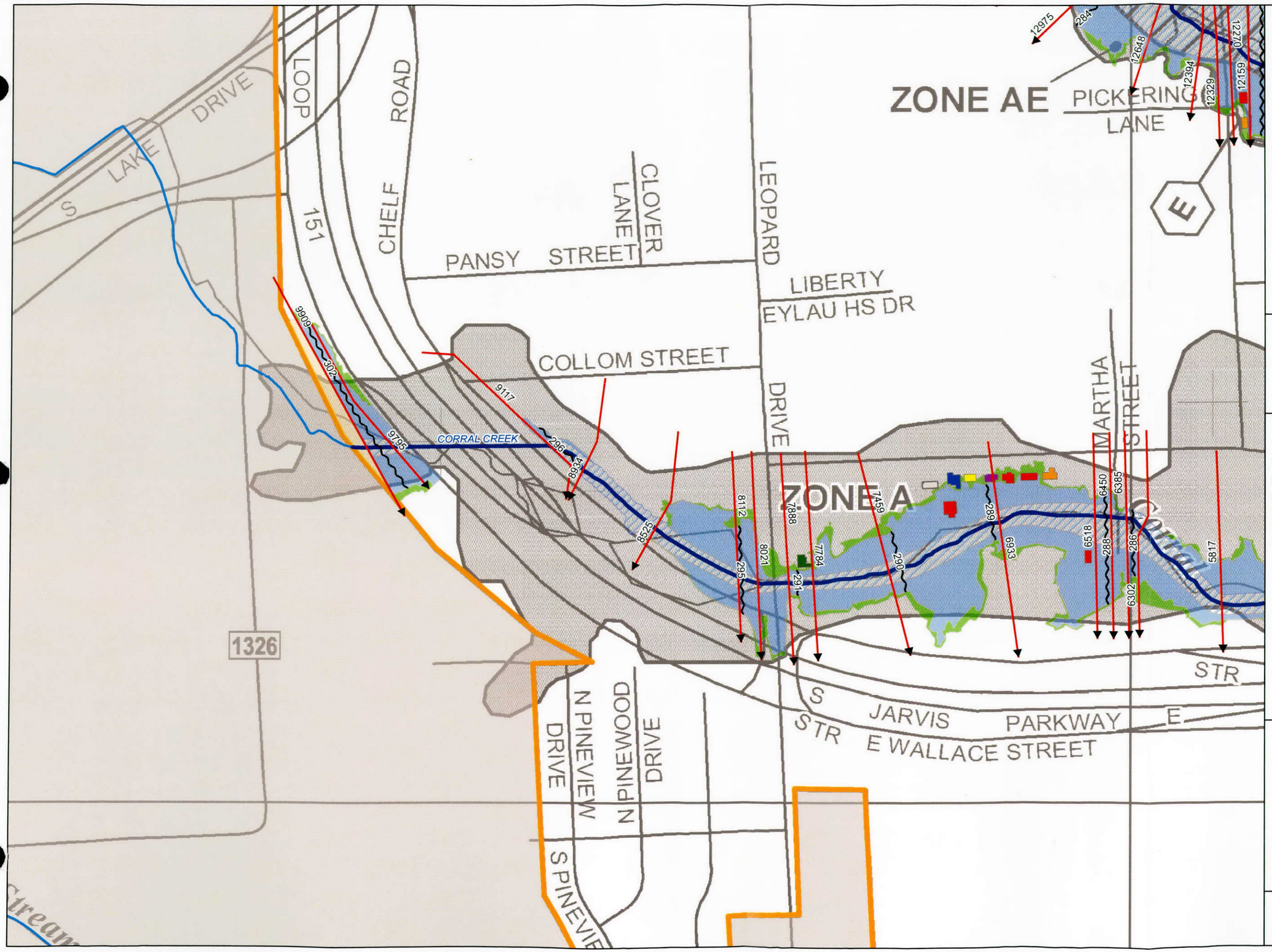

City of Texarkana
City-wide Flood Protection Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 5

CORRAL CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N/A

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Feet

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Figure 10 - Effective Floodplain Comparison

Panel 6

WAGNER CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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Feet

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City of Texarkana
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Figure 10 - Effective Floodplain Comparison

Panel 7

WAGNER CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Othor Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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Feet

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Panel 8

WAGNER CREEK MAP 3

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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Feet

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City of Texarkana
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Panel 9

WAGNER CREEK MAP 4

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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Feet

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Figure 10 - Effective Floodplain Comparison

Panel 10

WAGNER CREEK MAP 5

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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Feet

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Panel 11

WAGNER CREEK MAP 6

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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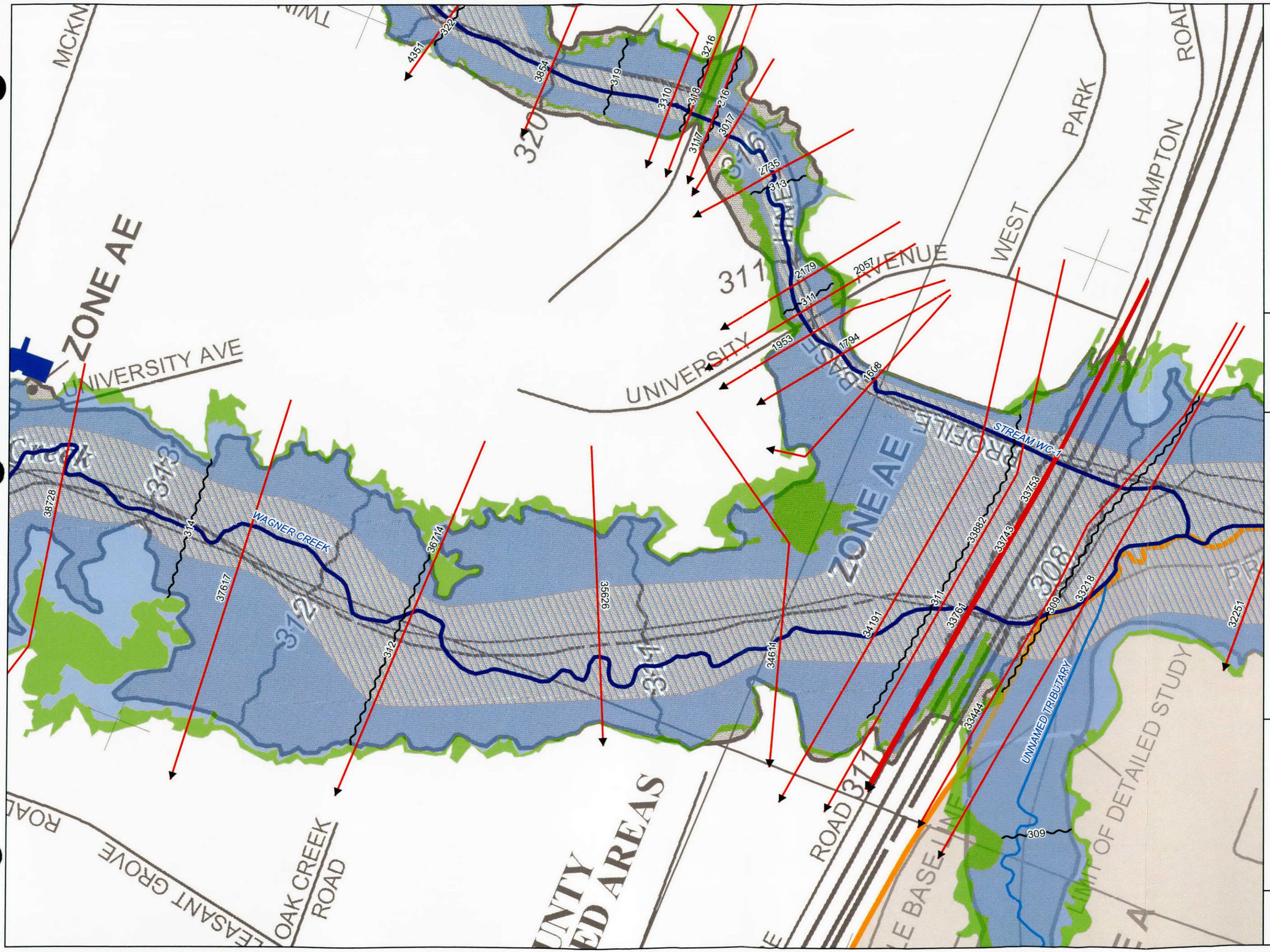

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Panel 12

WAGNER CREEK MAP 7

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- ? year
- N\A

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City of Texarkana
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Panel 13

WAGNER CREEK MAP 8

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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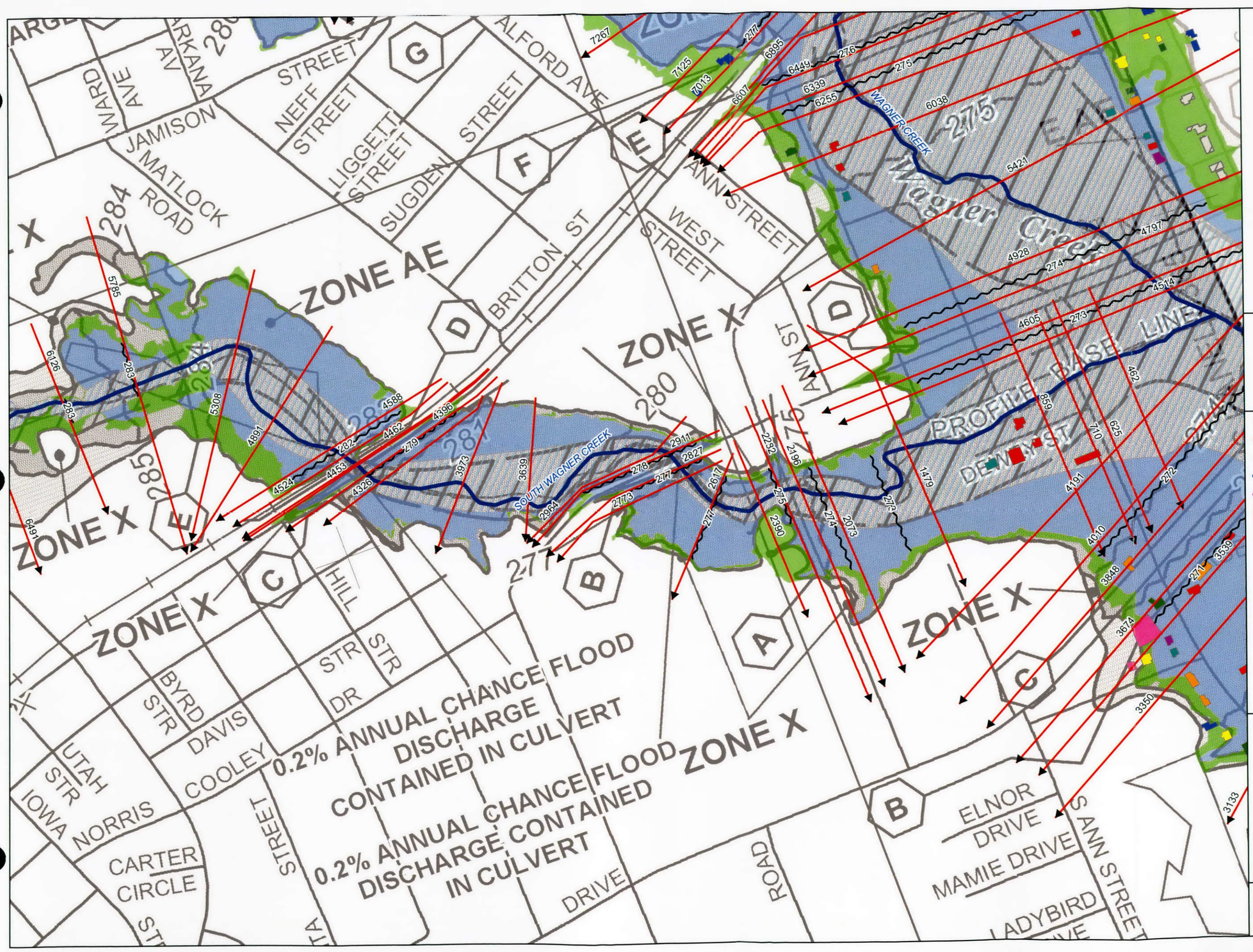

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Panel 14

SOUTH WAGNER CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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Feet

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City of Texarkana
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Figure 10 - Effective Floodplain Comparison

Panel 15

SOUTH WAGNER CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

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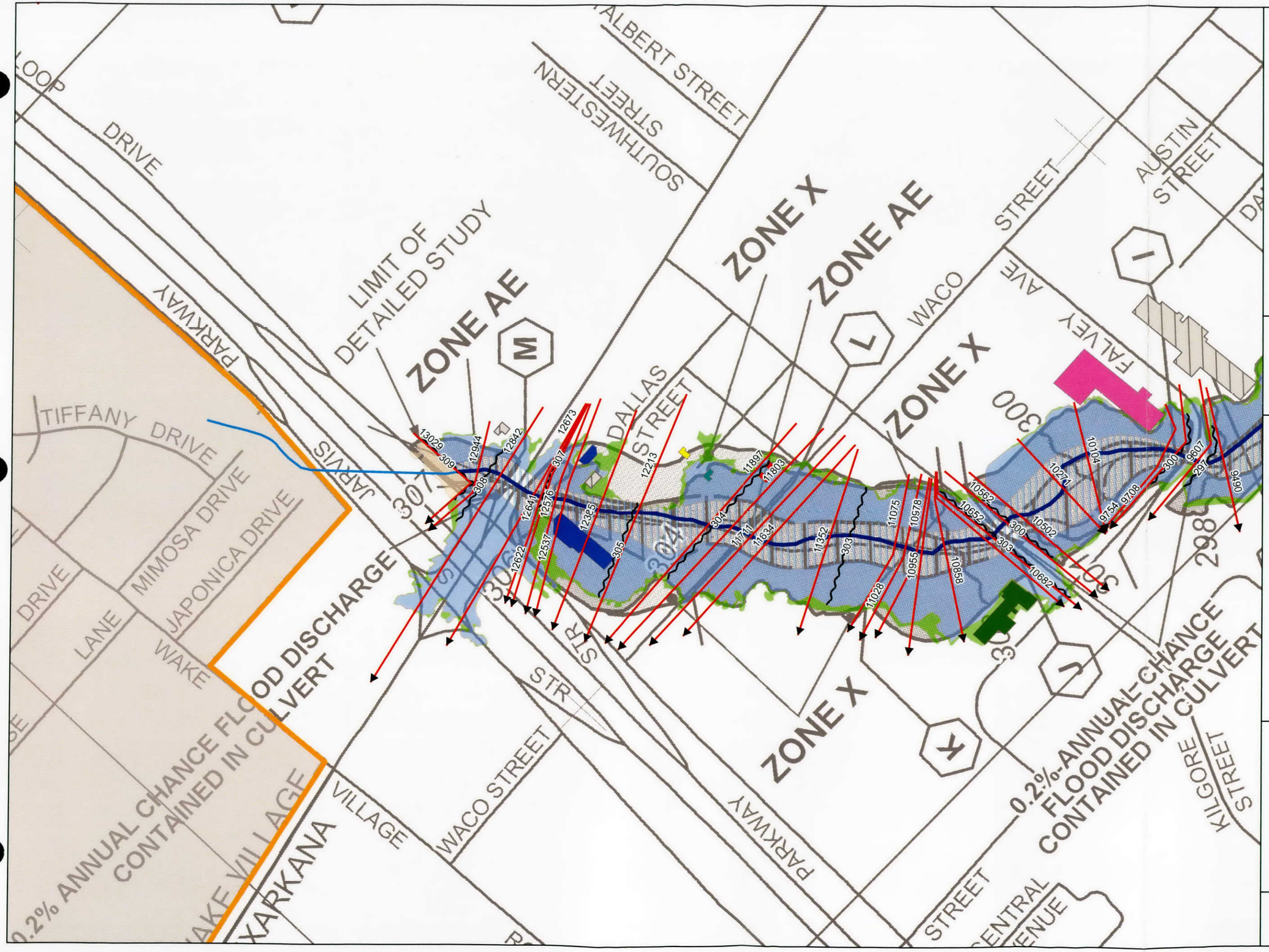

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Figure 10 - Effective Floodplain Comparison

Panel 16

SOUTH WAGNER CREEK MAP 3

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 17

STREAM WC-1 MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowlhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

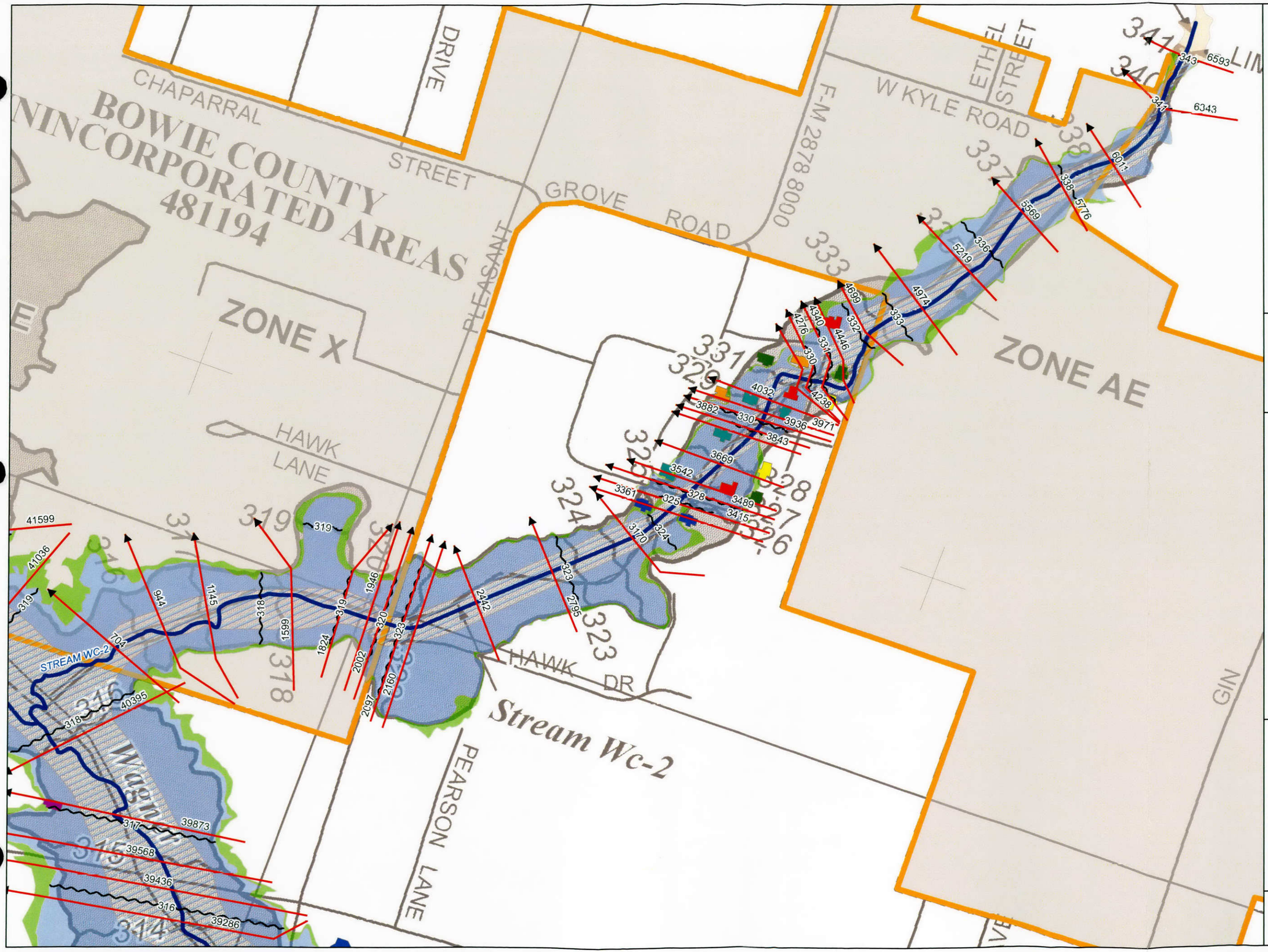
Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF



City of Texarkana
City-wide Flood Protection
Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 18

STREAM WC-2 MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

N W E S

0 400 800

Feet

HALFF

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 19

COWHORN CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 20

COWHORN CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 21

COWHORN CREEK MAP 3

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 22

COWHORN CREEK MAP 4

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

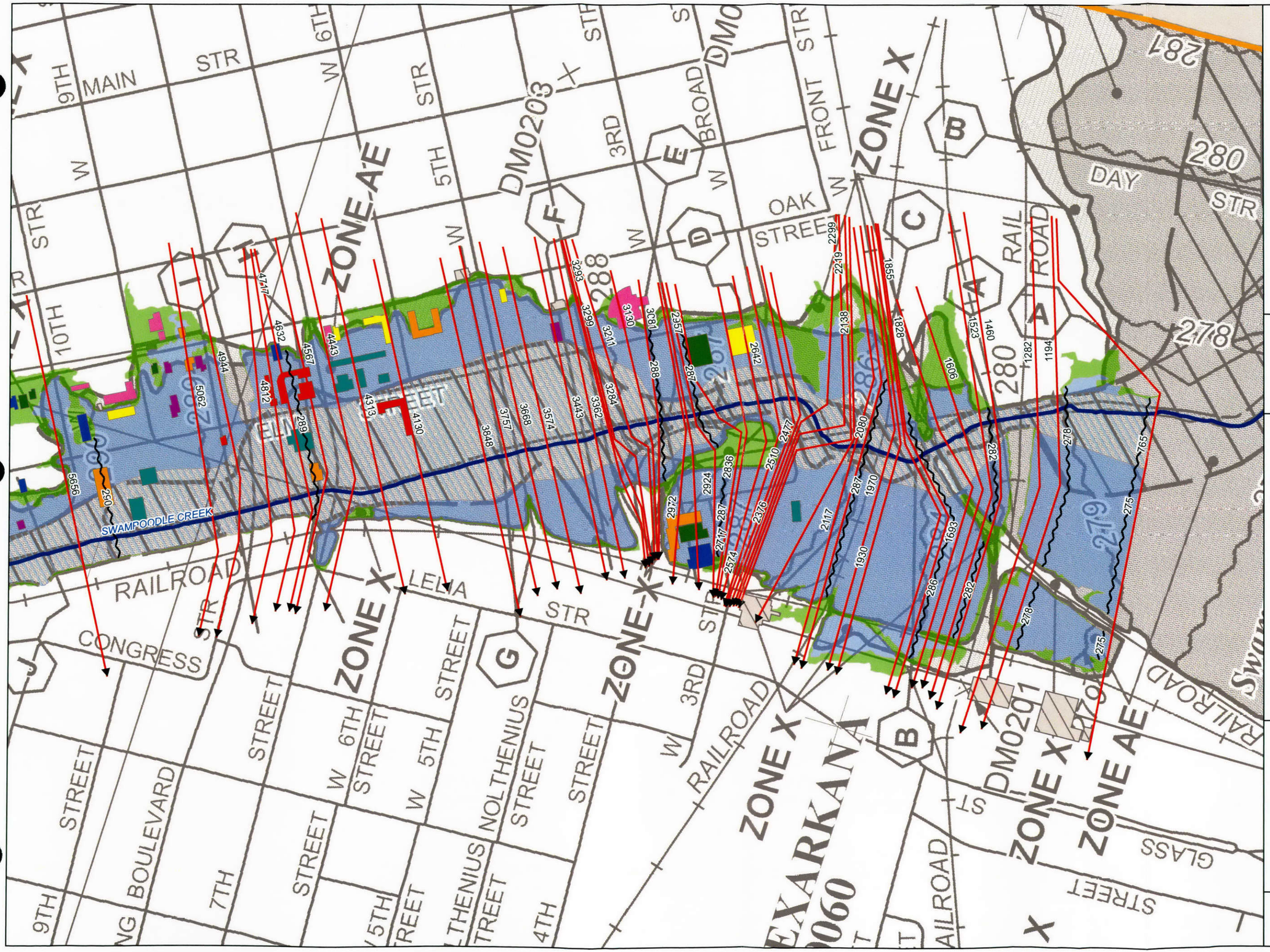
Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF



City of Texarkana
City-wide Flood Protection Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 23

SWAMPOODLE CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 24

SWAMPOODLE CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 25

SWAMPOODLE CREEK MAP 3

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N/A

0 400 800

Feet

HALFF

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 26

SWAMPOODLE CREEK MAP 4

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

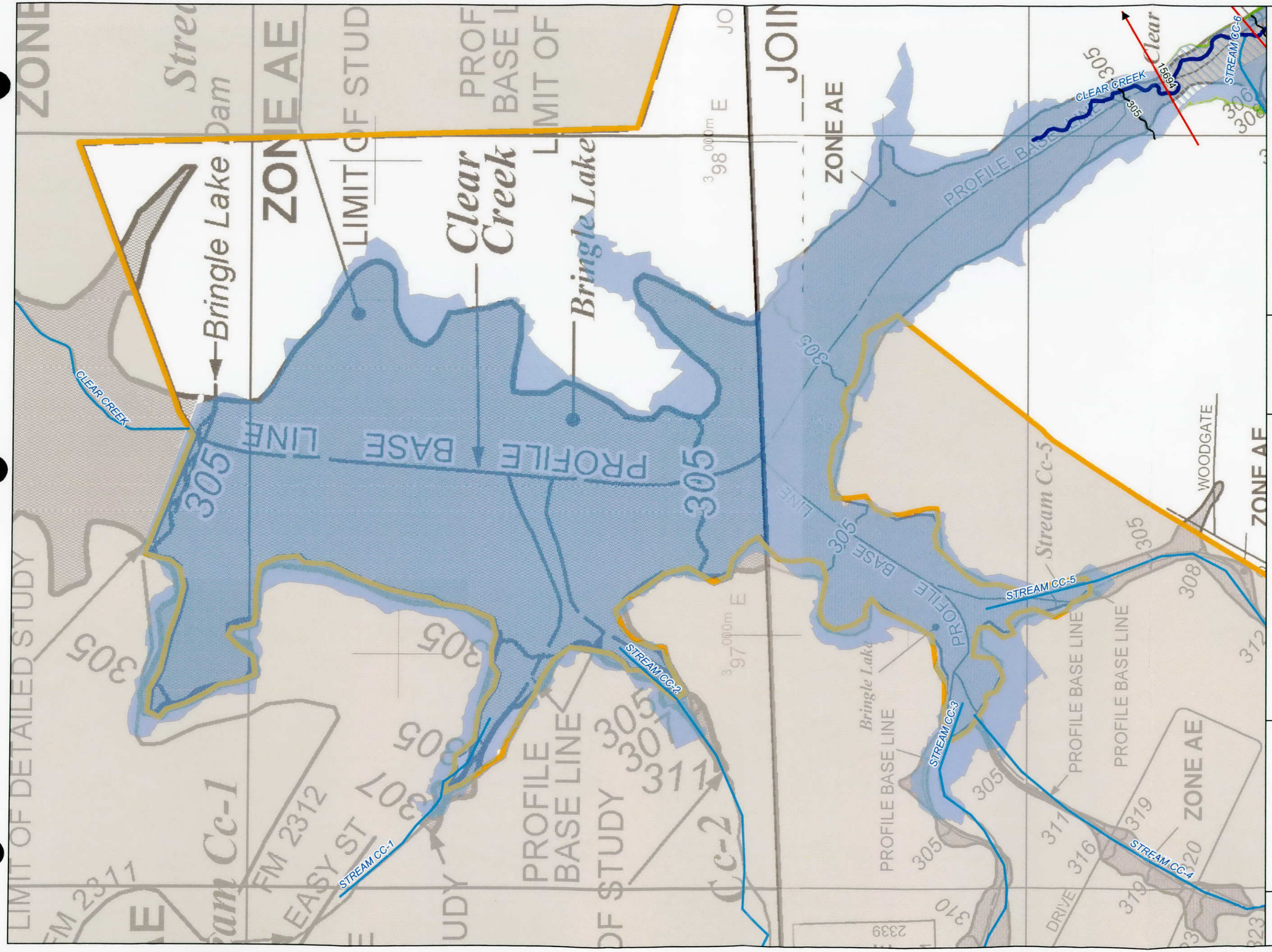
Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF



City of Texarkana
City-wide Flood Protection Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 27

BRINGLE LAKE

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

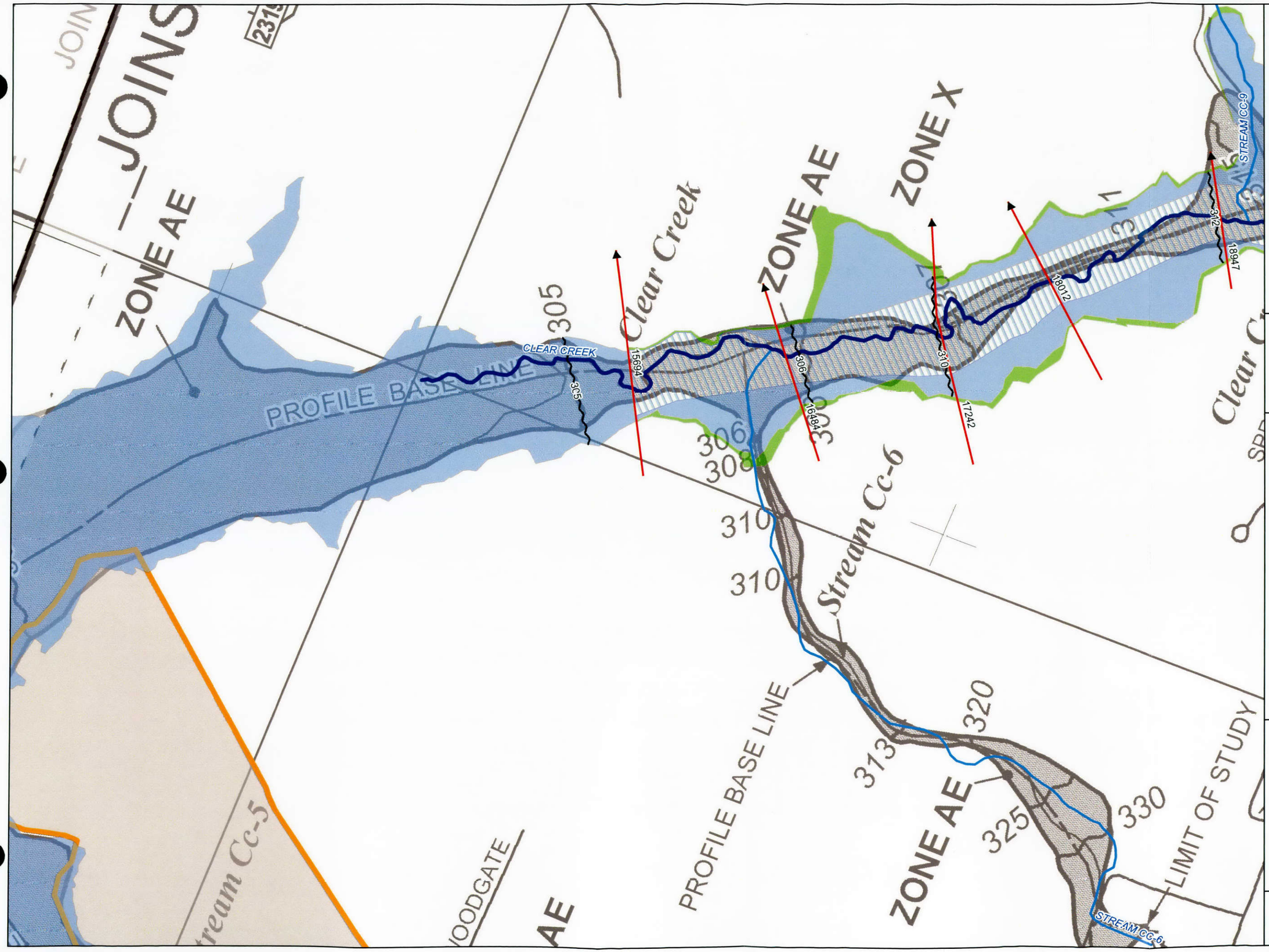
Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF



City of Texarkana
City-wide Flood Protection
Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 28

CLEAR CREEK MAP 1

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

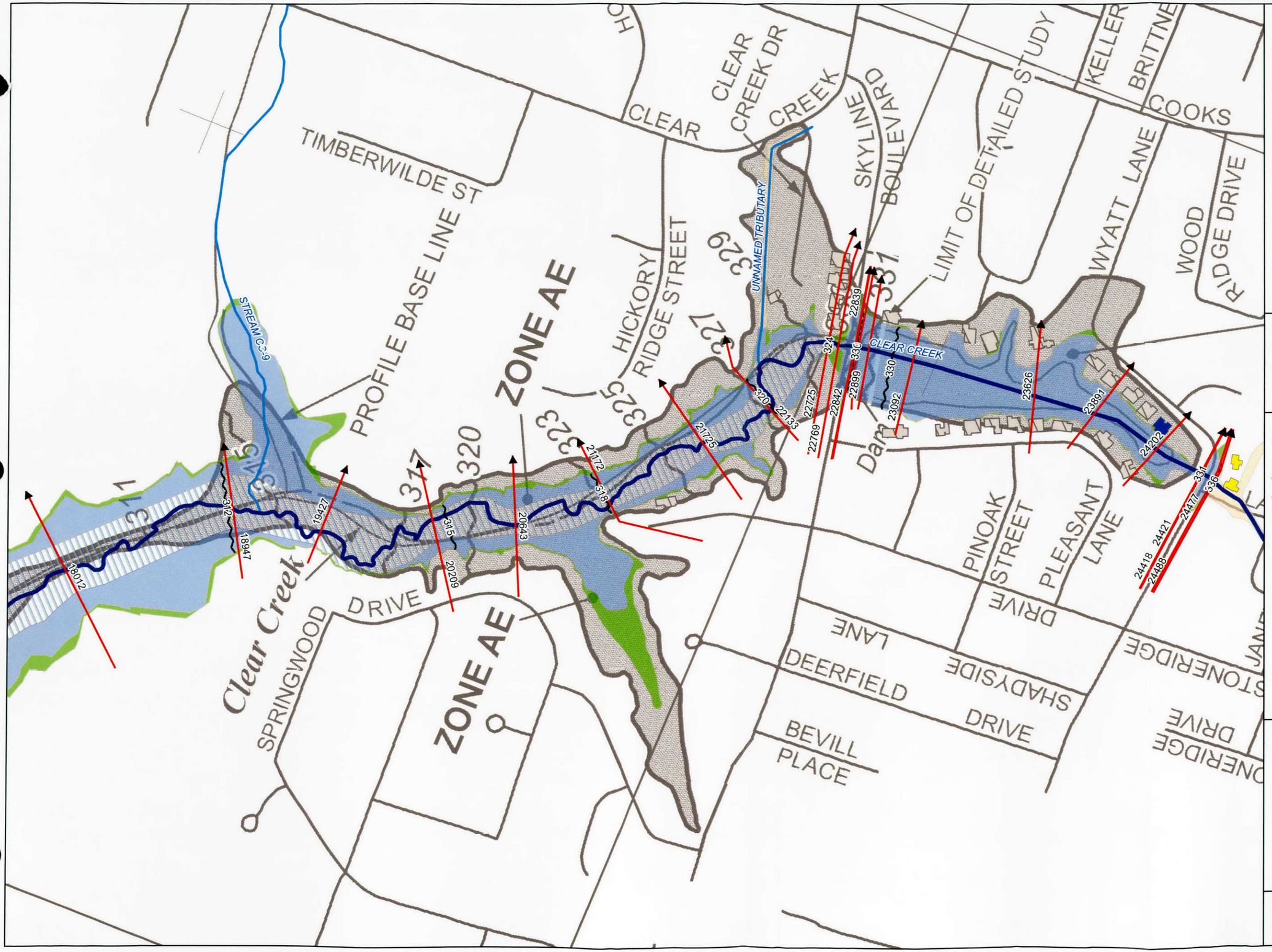
Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF



City of Texarkana
City-wide Flood Protection
Planning Study

Figure 10 - Effective Floodplain Comparison

Panel 29

CLEAR CREEK MAP 2

Legend

- Cross Sections
- Base Flood Elevation
- New Detailed
- 2009 Cowhorn Study
- Texarkana, TX
- Other Political Areas
- Floodway
- Zone A
- Zone AE
- Zone X
- 2010 Effective FIRM Panels

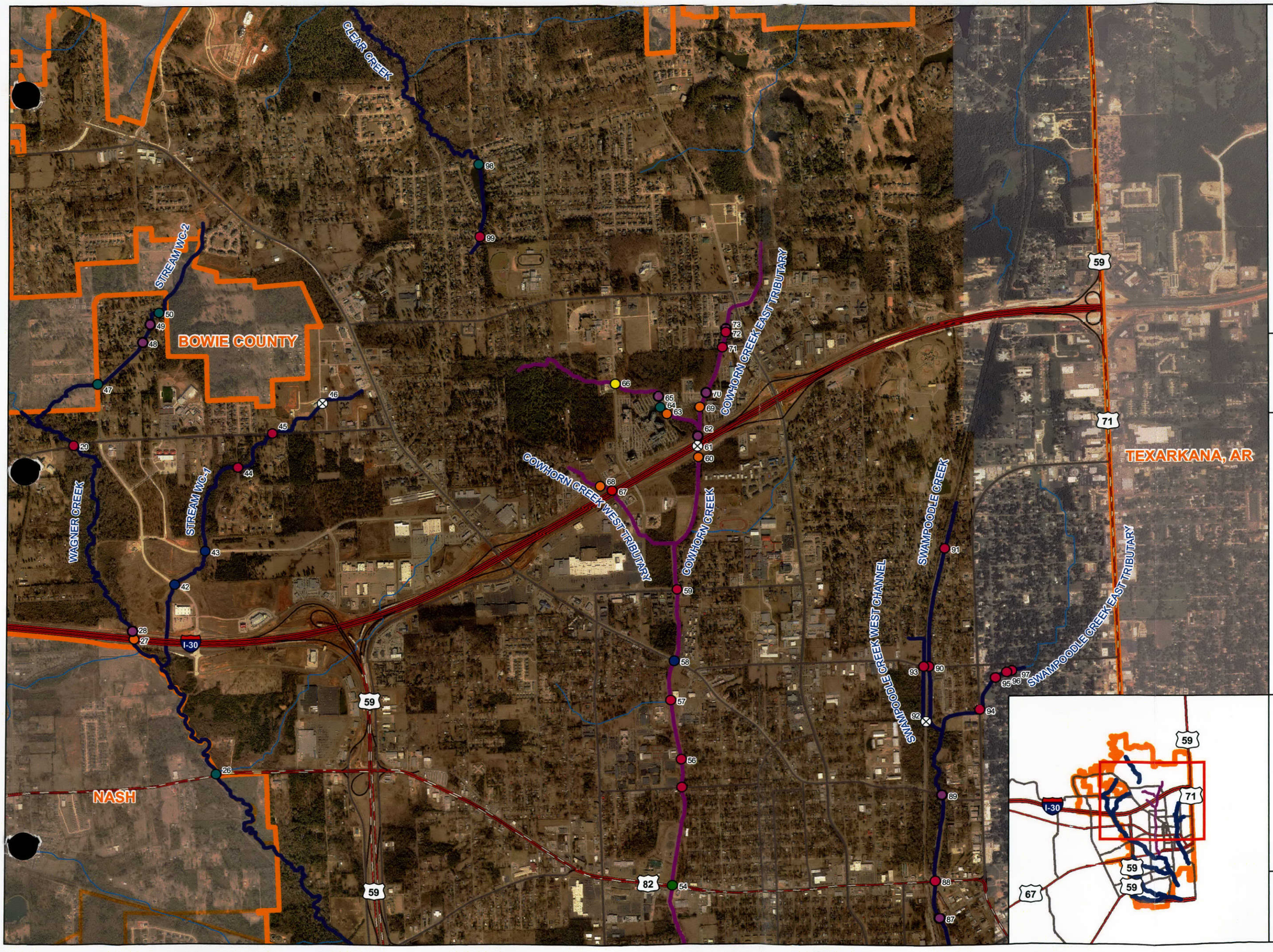
Flooded By

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- N\A

0 400 800

Feet

HALFF



City of Texarkana
City-wide Flood Protection
Planning Study

Figure 11
Inundated Roadways
Map 1

Legend

- New Detailed Study
- 2009 City of Texarkana Study
- Other Bowie County Streams
- Texarkana,TX

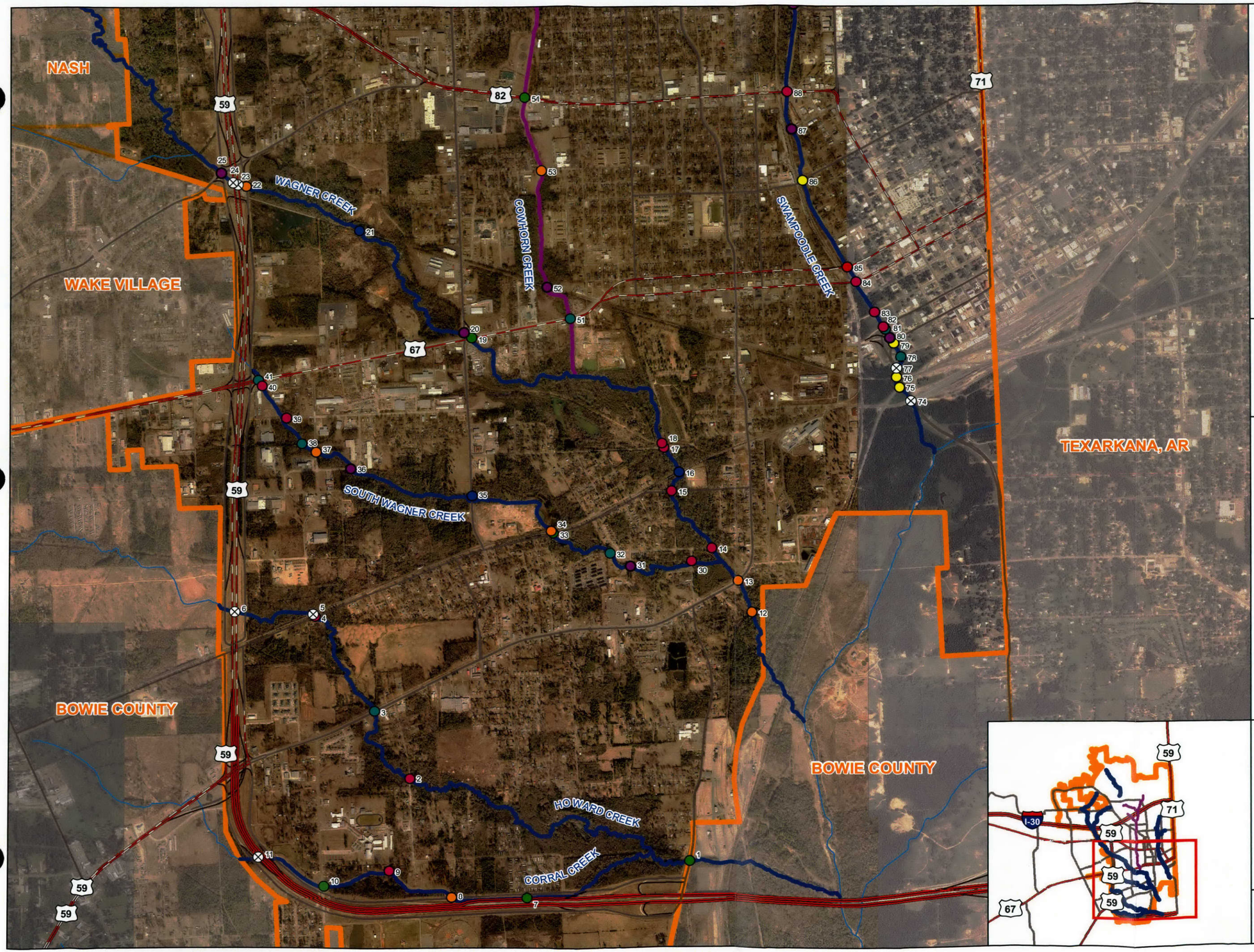
Flood Overtops Structure

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- Not Overtopped

N
W E
S

0 2,000 4,000
Feet

HALFF



City of Texarkana
City-wide Flood Protection
Planning Study

Figure 11
Inundated Roadways
Map 2

Legend

- New Detailed Study
- 2009 City of Texarkana Study
- **Other Bowie County Streams**
- Texarkana,TX

Flood Overtops Structure

- 500 year
- 250 year
- 100 year
- 50 year
- 25 year
- 10 year
- 5 year
- 2 year
- Not Overtopped

N
W E
S

0 2,000 4,000
Feet

HALFF

City of Texarkana
City-wide Flood Protection
Planning Study

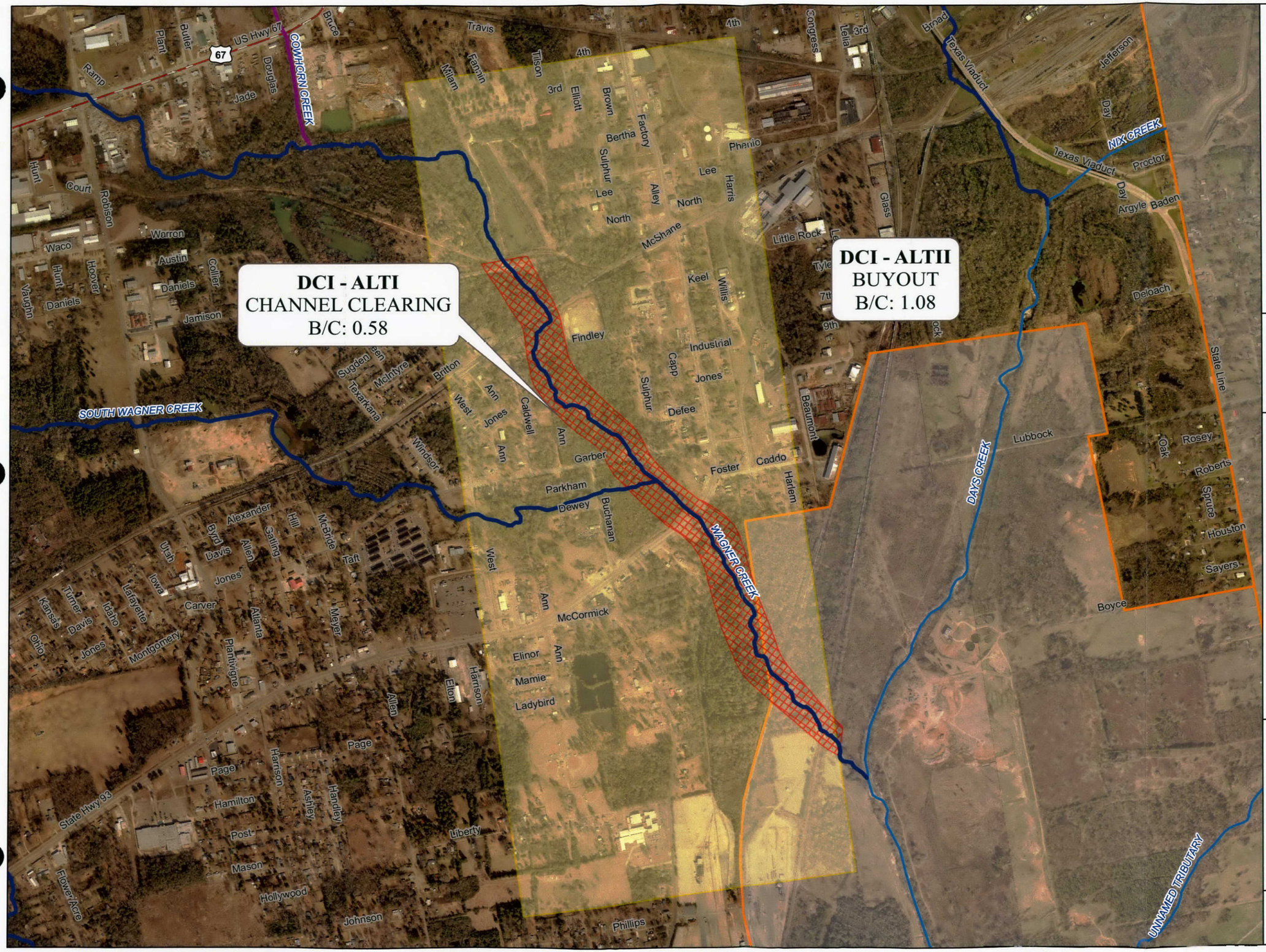
Figure 12
FDA Damage Reaches and Affected Properties

Legend

- Other Bowie County Streams
- New Detailed
- 2009 Study
- Texarkana, TX
- Other Political Areas
- FDA Damage Reach
- FDA Damage Center
- Flood Analyzed Structures

0 3,000 6,000
Feet

HALFF



City of Texarkana
City-wide Flood Protection
Planning Study

Figure 13
Alternative Sites Explored
Damage Center I

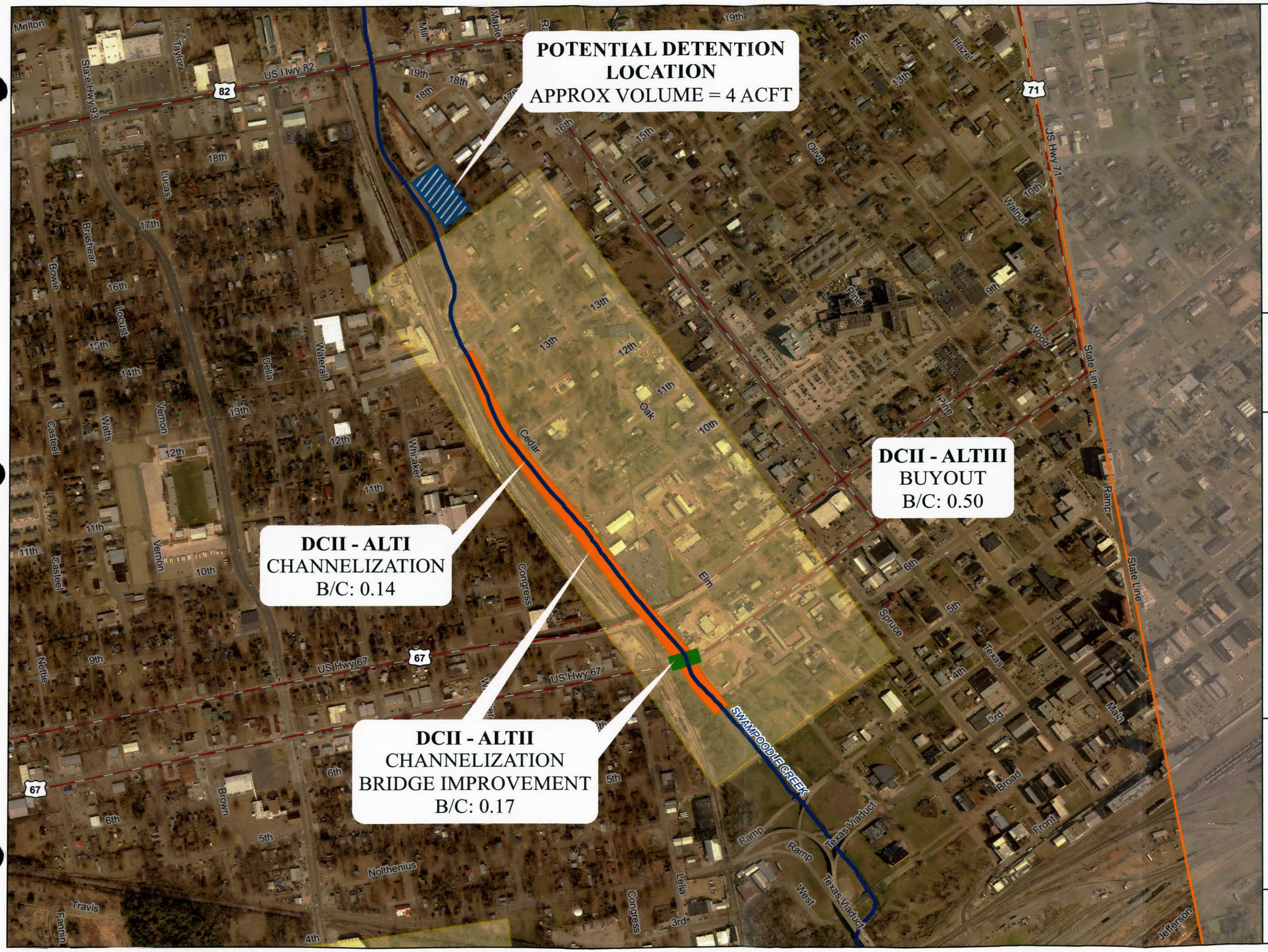
Legend

- New Detailed
- 2009 Cowhorn Study
- FDA Damage Center
- Texarkana, TX
- Other Political Areas
- Clearing Improvement

N
W E
S

0 1,000 2,000
Feet

HALFF



City of Texarkana
City-wide Flood Protection
Planning Study

Figure 13
Alternative Sites Explored
Damage Center II

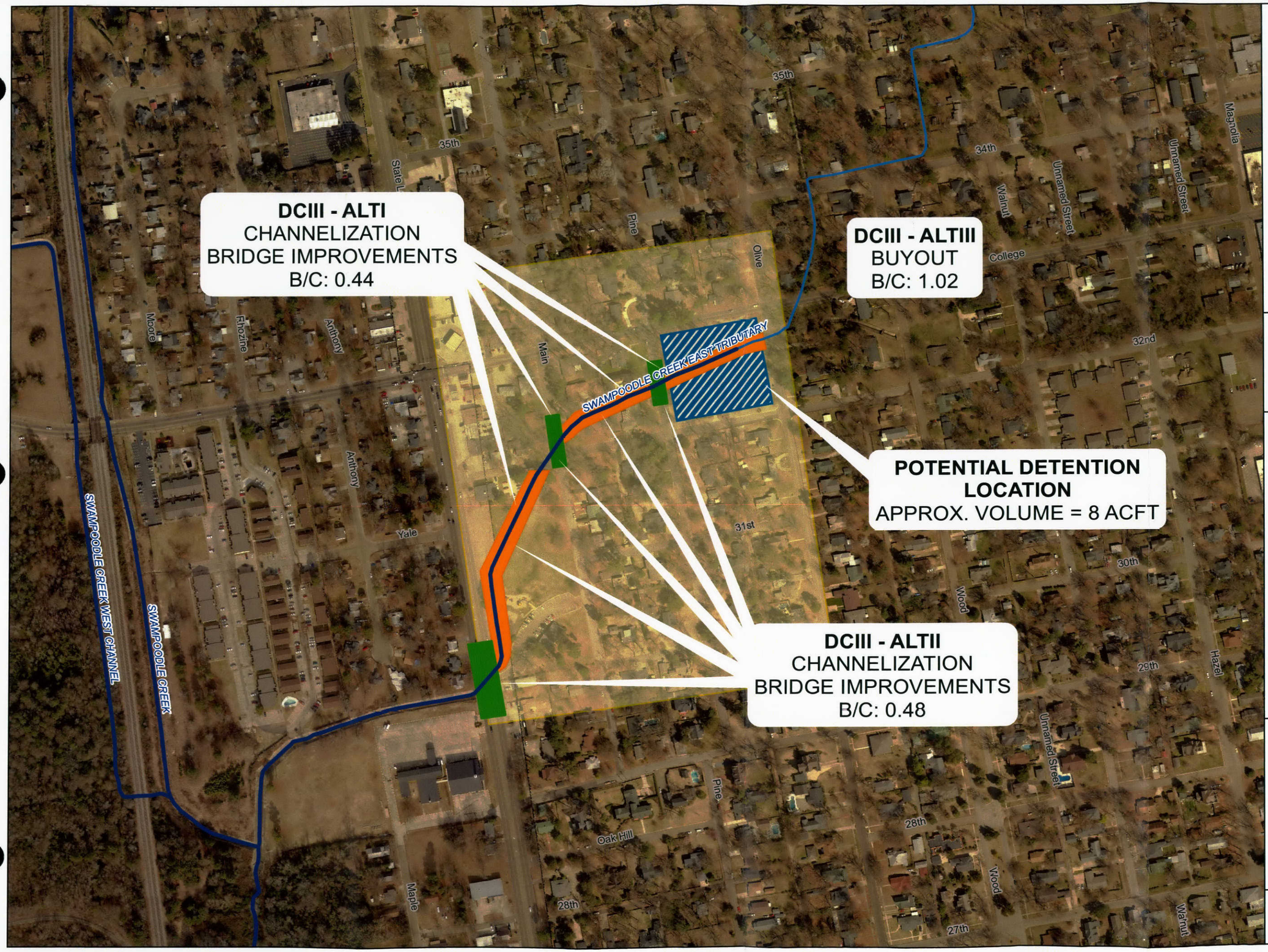
Legend

- New Detailed
- 2009 Cowhorn Study
- FDA Damage Center
- Texarkana, TX
- Other Political Areas
- Detention Location
- Bridge Improvement
- Channel Improvement

N
W
E
S

0 600 1,200
Feet

HALFF



City of Texarkana
City-wide Flood Protection
Planning Study

Figure 13
Alternative Sites Explored
Damage Center III

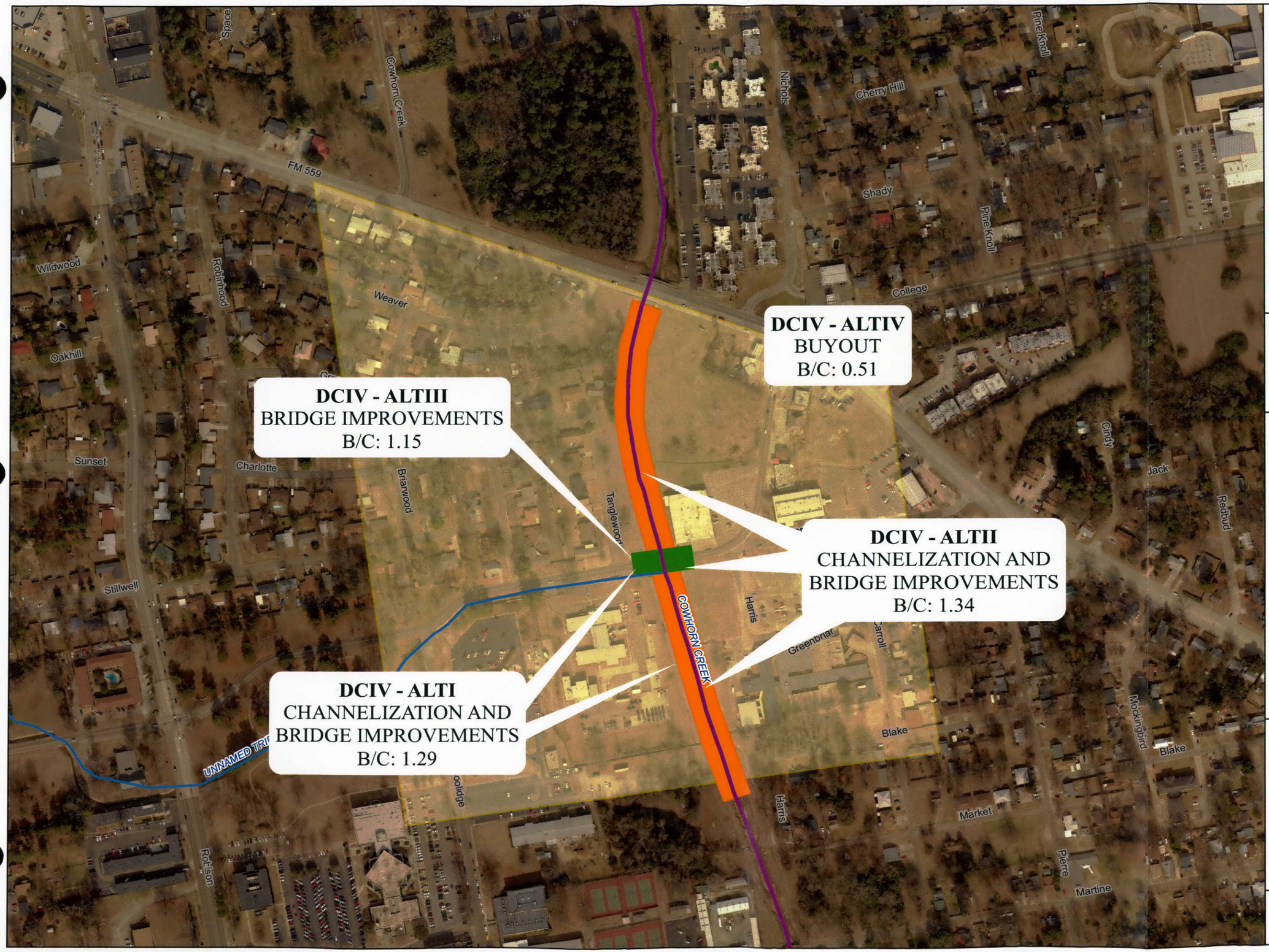
Legend

- New Detailed
- 2009 Cowhorn Study
- FDA Damage Center
- Texarkana, TX
- Other Political Areas
- Detention Location
- Bridge Improvement
- Channel Improvement

N
W E
S

0 300 600
Feet

HALFF



City of Texarkana
City-wide Flood Protection
Planning Study

Figure 13
Alternative Sites Explored
Damage Center IV

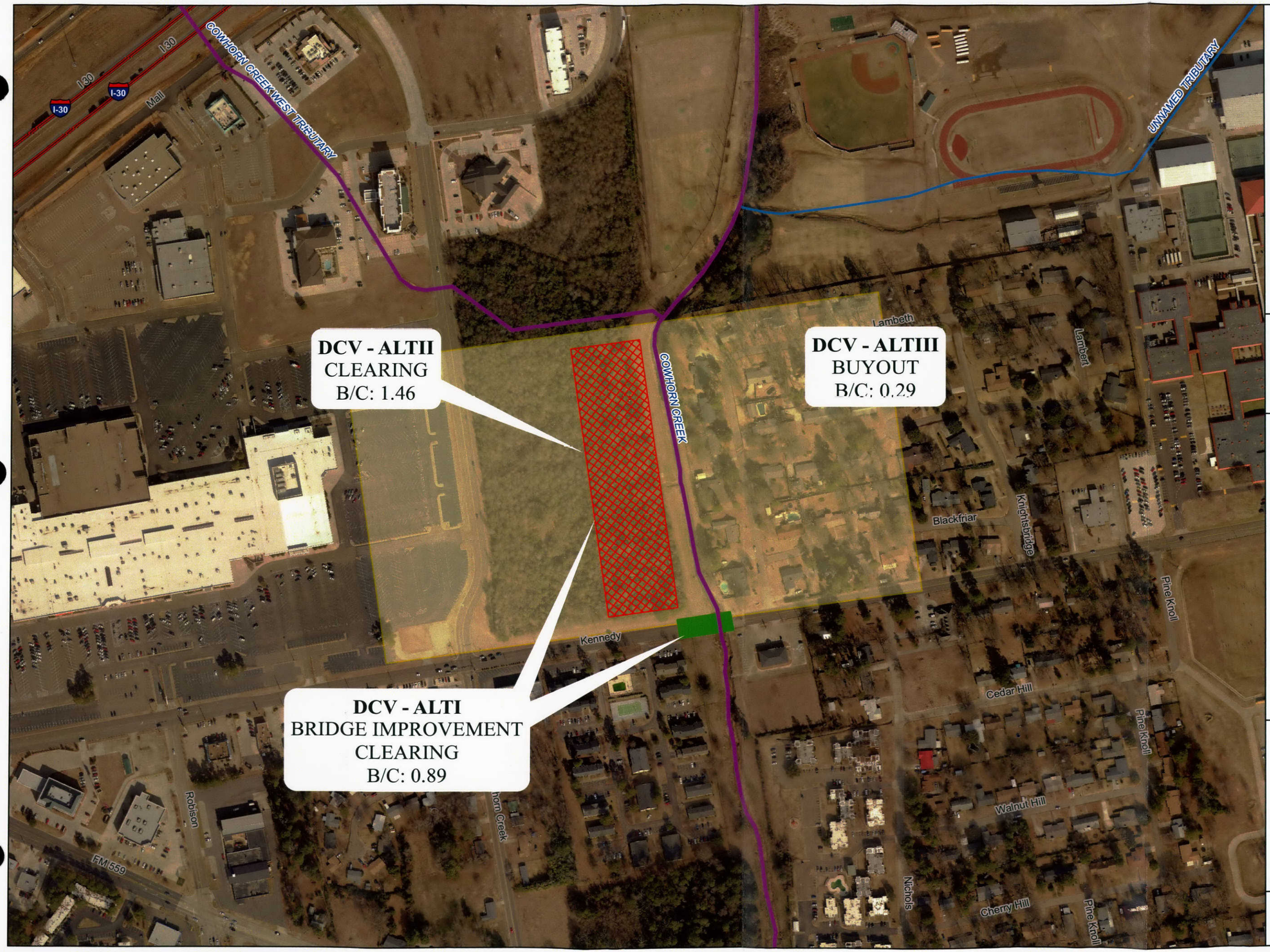
Legend

- New Detailed
- 2009 Cowhorn Study
- FDA Damage Center
- Texarkana, TX
- Other Political Areas
- Bridge Improvement
- Channel Improvement

N
W E
S

0 300 600
Feet

HALFF



City of Texarkana
City-wide Flood Protection
Planning Study

Figure 13
Alternative Sites Explored
Damage Center V

Legend

- New Detailed
- 2009 Cowhorn Study
- FDA Damage Center
- Texarkana, TX
- Other Political Areas
- Bridge Improvement
- Clearing Improvement

N
W
E
S

0 300 600
Feet

HALFF

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 13
Alternative Sites Explored
Damage Center VI

Legend

- New Detailed
- 2009 Cowhorn Study
- FDA Damage Center
- Texarkana, TX
- Other Political Areas
- Bridge Improvement
- Channel Improvement

N
W E
S

0 200 400
Feet

HALFF

City of Texarkana
City-wide Flood Protection
Planning Study

Figure 13
Alternative Sites Explored
Damage Center VII

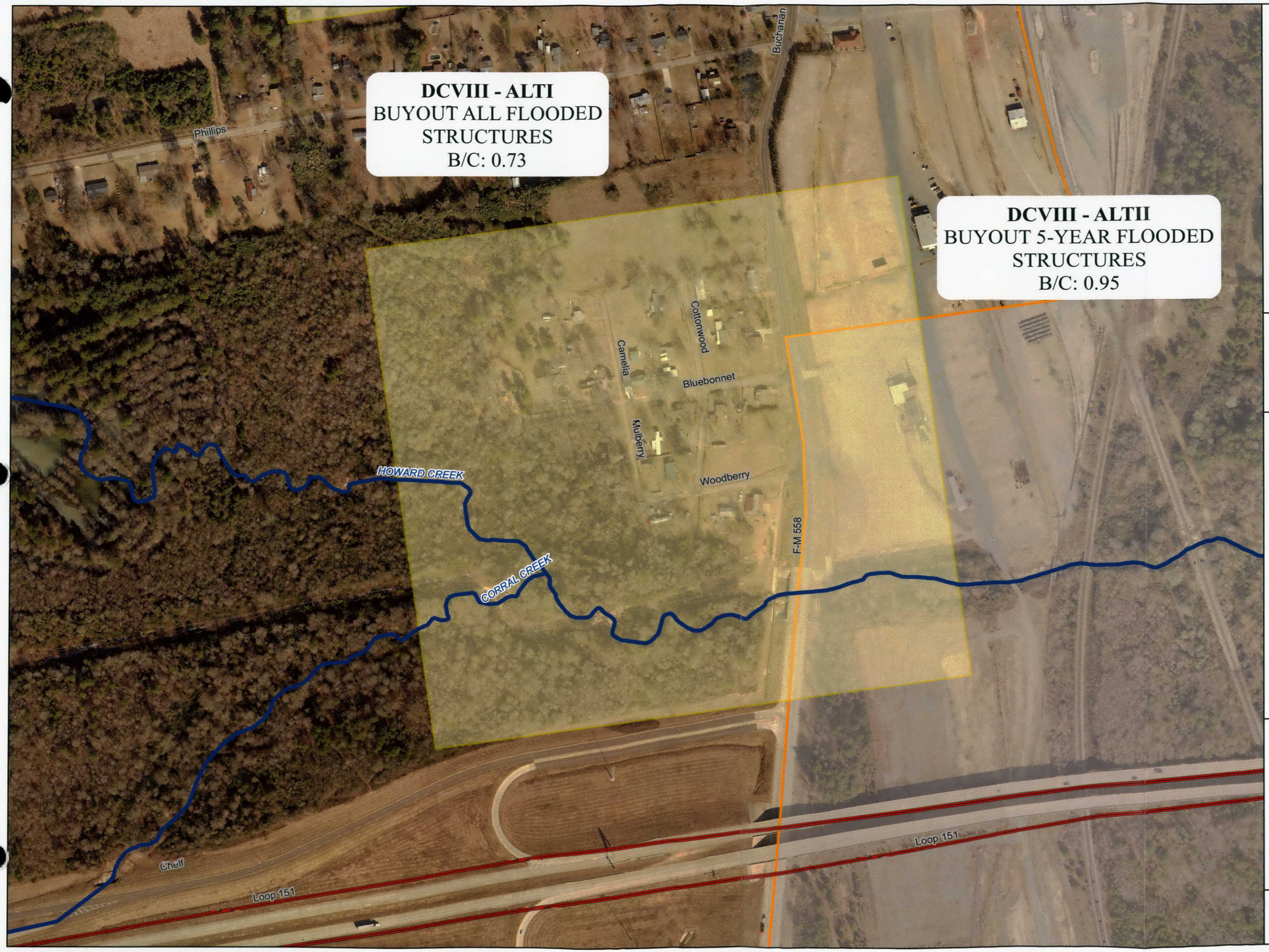
Legend

- New Detailed
- 2009 Cowhorn Study
- FDA Damage Center
- Texarkana, TX
- Other Political Areas
- Bridge Improvement

N
W E
S

0 300 600
Feet

HALFF



City of Texarkana
City-wide Flood Protection Planning Study

Figure 13
Alternative Sites Explored
Damage Center VIII

Legend

- New Detailed
- 2009 Cowhorn Study
- FDA Damage Center
- Texarkana, TX
- Other Political Areas

N
W E
S

0 300 600
Feet

HALFF

Appendix B
Hydrologic Parameter Calculations

Table B.1
Existing Time of Concentration

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
CC 1	2460	50	0.011	Smooth Surface	0.50	3.84	66	1717	0.90	1.93	paved	890	693	1.10	Main Channel	4.00	173			
						T_O Total	66				**Ts Total**	890				**Tc Total**	173	19		
CC 2	4952	100	0.150	Short grass	0.50	3.84	934	1496	1.00	2.03	paved	736	1817	0.90	Main Channel	4.60	395			
													1539	0.90		1.00	1539			
						T_O Total	934				**Ts Total**	736				**Tc Total**	1934	60	36	10
CC 3	3101	50	0.011	Smooth Surface	1.00	3.84	50	1560	1.45	2.45	paved	637	1491	1.00	Main Channel	4.00	373			
						T_O Total	50				**Ts Total**	637				**Tc Total**	373	18	11	3
CC 4	4937	100	0.150	Short grass	1.00	3.84	708	847	1.20	2.23	paved	380	3990	0.90	Main Channel	4.00	998			
						T_O Total	708				**Ts Total**	380				**Tc Total**	998	35	21	6
CC 5	4563	100	0.150	Short grass	0.50	3.84	934	1987	1.00	1.61	Unpaved	1232	952	0.60	Main Channel	5.00	190			
													1524	1.44	Main Channel	4.00	381			
						T_O Total	934				**Ts Total**	1232				**Tc Total**	571	46	27	8
CC 6	7707	100	0.150	Short Grass	1.00	3.84	708	1539	1.18	1.75	unpaved	878	6068	0.68	Main Channel	3.00	2023			
						T_O Total	708				**Ts Total**	878				**Tc Total**	2023	60	36	10
CC 7	1986	50	0.011	Smooth Surface	0.50	3.84	66	669	3.50	3.80	paved	176	1267	0.95	Main Channel	4.00	317			
						T_O Total	66				**Ts Total**	176				**Tc Total**	317	9	6	2
CC 8	4437	100	0.150	Short Grass	1.00	3.84	708	1349	1.00	1.61	Unpaved	836	1772	0.60	Main Channel	4.00	443			
													1216	1.00	Off Channel	9.00	135			
						T_O Total	708				**Ts Total**	836				**Tc Total**	578	35	21	6
CC 9	5192	100	0.150	Short Grass	1.00	3.84	708	2630	1.48	1.96	unpaved	1340	2462	0.98	Main Channel	3.70	665			
						T_O Total	708				**Ts Total**	1340				**Tc Total**	665	45	27	8
CC 10	4845	100	0.150	Short Grass	0.50	3.84	934	1693	1.65	2.61	Paved	648	3052	0.81	Main Channel	3.89	785			
						T_O Total	934				**Ts Total**	648				**Tc Total**	785	39	24	7
CC 11	5872	50	0.011	Paved Area	0.90	3.84	52	1488	1.40	1.91	Unpaved	779	4334	0.73	Main Channel	3.18	1363			
						T_O Total	52				**Ts Total**	779				**Tc Total**	1363	37	22	6
CC 12	5639	50	0.011	Smooth Surface	3.00	3.84	32	1146	1.20	1.77	Unpaved	648	4443	1.00	Open Channel	3.77	1179			
						T_O Total	32				**Ts Total**	648				**Tc Total**	1179	31	19	5
CC 13	6213	100	0.150	Short Grass	2.70	3.84	476	3011	1.30	1.84	unpaved	1637	3102	0.60	Open Channel	3.50	886			
						T_O Total	476				**Ts Total**	1637				**Tc Total**	886	50	30	9
CC 14	3886	100	0.150	Short Grass	4.00	3.84	407	2864	1.30	1.84	unpaved	1557	922	1.30	Open Channel	6.00	154			
						T_O Total	407				**Ts Total**	1557				**Tc Total**	154	35	21	6
CC 15	3078	100	0.150	Short Grass	4.00	3.84	407	863	2.50	2.55	unpaved	338	2115	1.30	Open Channel	4.71	449			
						T_O Total	407				**Ts Total**	338				**Tc Total**	449	20	12	3
CC 16	4123	100	0.150	Short Grass	0.50	3.84	934	2063	1.70	2.10	unpaved	981	1960	0.90	Open Channel	4.46	439			
						T_O Total	934				**Ts Total**	981				**Tc Total**	439	39	24	7

Table B.1 -- Cowhorn Creek -- Existing Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow							
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length 1 (ft) (8)	Slope 1 (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcC1 (sec) (12)	Length 2 (ft) (13)	Slope 2 (%) (14)	V2 (ft/s) (18)	TcC2 (sec) (19)	TcC (sec) (20)	Final Tc (min) (21)	Tlag (min) (22)	Tlag (hr)
CET1	5936	100	0.150	Dense Grass	0.75	3.84	796	4141	0.78	1.79	Paved	2312	1695	0.50	5.53	307	2619	57	34	0.57
						T_O Total	796				**Ts Total**									
CET2	6148	100	0.240	Woods - Light Underbrush	1.84	3.84	809	2460	0.84	1.86	Paved	1322	3588	0.62	4.35	825	2147	49	30	0.49
						T_O Total	809													
CNT1	4409	100	0.150	Dense Grass	1.28	3.84	642	3284	0.66	1.65	Paved	1995	1025	0.50	6.66	154	2149	47	28	0.47
						T_O Total	642													
CNT2	3687	50	0.011	Paved Area	2.13	3.84	37	1018	1.54	2.00	Unpaved	508	2619	0.50	6.66	393	901	16	9	0.16
						T_O Total	37													
COW1	4990	100	0.150	Dense Grass	1.07	3.84	689	4218	0.50	1.44	Paved	2934	672	0.50	4.35	154	3089	63	38	0.63
						T_O Total	689													
COW2	4089	100	0.150	Dense Grass	1.67	3.84	577	1326	1.50	2.49	Paved	532	2663	0.51	4.35	612	1144	29	17	0.29
						T_O Total	577													
COW3	1918	100	0.240	Woods - Light Underbrush	6.54	3.84	487	539	2.98	2.78	Unpaved	194	1279	0.50	2.27	563	757	21	12	0.21
						T_O Total	487													
COW4	2815	50	0.011	Paved Area	2.35	3.84	36	1340	1.32	1.86	Unpaved	722	1425	1.90	1.93	738	1460	25	15	0.25
						T_O Total	36													
COW5	3137	100	0.240	Woods-Light/Dense Underbrusl	2.20	3.84	753	1435	3.42	2.99	Unpaved	481	1602	0.50	4.78	335	816	26	16	0.26
						T_O Total	753													
COW6	2695	100	0.150	Dense Grass	2.11	3.84	525	1794	1.59	2.04	Unpaved	881	801	0.50	6.60	121	1003	25	15	0.25
						T_O Total	525													
COW7	2885	50	0.011	Paved Area	4.98	3.84	26	2165	1.18	2.21	Paved	979	670	1.06	5.98	112	1091	19	11	0.19
						T_O Total	26													
COW8	5854	50	0.011	Paved Area	3.00	3.84	32	1029	0.73	1.74	Paved	592	4775	0.87	5.49	870	1461	25	15	0.25
						T_O Total	32													
COW9	2326	50	0.011	Paved Area	1.81	3.84	40	982	2.31	3.09	Paved	318	1294	0.74	4.50	288	605	11	6	0.11
						T_O Total	40													
COW10	4362	100	0.240	Woods - Light Underbrush	2.28	3.84	741	2829	1.30	1.84	Unpaved	1540	1433	0.50	6.87	209	1748	41	25	0.41
						T_O Total	741													
COW11	4499	100	0.150	Dense Grass	2.27	3.84	510	1466	2.73	2.67	Unpaved	549	2933	0.67	6.91	424	974	25	15	0.25
						T_O Total	510													
COW12	3994	100	0.150	Dense Grass	1.70	3.84	572	1456	2.48	3.20	Paved	455	2438	1.19	5.86	416	871	24	14	0.24
						T_O Total	572													
COW13	4757	50	0.011	Paved Area	0.50	3.84	66	2174	1.80	2.73	Paved	796	2533	1.05	5.98	424	1220	21	13	0.21
						T_O Total	66													
COW14	3275	100	0.240	Woods - Light Underbrush	2.53	3.84	712	1312	1.07	1.67	Unpaved	785	1863	1.06	7.83	238	1023	29	17	0.29
						T_O Total	712													

Table B.1 -- Cowhorn Creek -- Existing Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (21)	Tlag (min) (22)	Tlag (hr)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length 1 (ft) (8)	Slope 1 (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcC1 (sec) (12)	Length 2 (ft) (13)	Slope 2 (%) (14)	V2 (ft/s) (18)	TcC2 (sec) (19)	TcC (sec) (20)			
COW15	7309	100	0.150	Dense Grass	2.32	3.84	506	1435	1.99	2.28	Unpaved	630	5774	0.76	7.83	737	1367	31	19	0.31
						T_O Total	506													
COW16	4301	50	0.011	Paved Area	0.50	3.84	66	1357	2.20	3.01	Paved	450	2894	1.24	5.96	486	936	17	10	0.17
						T_O Total	66													
COW17	8875	100	0.150	Dense Grass	1.439	3.84	612	3049	0.94	1.97	Paved	1549	5726	0.50	4.96	1154	2703	55	33	0.55
						T_O Total	40													
CUT1	4087	100	0.150	Dense Grass	1.958	3.84	541	2779	0.56	1.20	Unpaved	2307	1208	0.50	6.99	173	2480	50	30	0.50
						T_O Total	541													
CUT2	3639	100	0.150	Dense Grass	0.500	3.84	934	1222	2.11	2.34	Unpaved	522	2317	0.53	6.99	331	853	30	18	0.30
						T_O Total	934													
CUT3	1511	50	0.011	Paved Area	1.220	3.84	46	1109	1.86	2.77	Paved	400	3352	1.02	5.40	621	1021	18	11	0.18
						T_O Total	46													
CWT1	5468	50	0.011	Paved Area	0.747	3.84	57	3906	1.00	2.03	Paved	1922	1512	0.57	3.97	381	2303	39	24	0.39
						T_O Total	57													
CWT2	5302	100	0.150	Dense Grass	1.112	3.84	679	2750	1.09	1.69	Unpaved	1632	2452	0.72	6.47	379	2011	45	27	0.45
						T_O Total	679													

Table B.1 -- Howard Creek -- Existing Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
COC1	8998	100	0.150	Short Grass	1.00	3.84	708	1277	1.60	2.04	Unpaved	626	7621	0.52	Open Channel	3.17	2404			
		ASSUMED 1' CHANGE IN ELEVATION																		
						T_O Total	708				Ts Total	626				Tc Total	2404	62	37	11
COC2	5637	50	0.011	Smooth Surface	1.00	3.84	50	434	1.31	2.33	Paved	187	3709	0.51	Open Channel	3.36	1104			
		ASSUMED 1' CHANGE IN ELEVATION						1444	1.31	1.85	Unpaved	782								
						T_O Total	50				Ts Total	968				Tc Total	1104	35	21	6
COC3	4171	100	0.150	Short Grass	0.50	3.84	934	75	2.01	2.29	Unpaved	33	3996	0.78	Open Channel	3.08	1297			
						T_O Total	934				Ts Total	33				Tc Total	1297	38	23	7
COC4	5404	100	0.150	Short Grass	1.00	3.84	708	282	1.00	1.61	Unpaved	175	4088	1.19	Open Channel	3.51	1165			
		ASSUMED 1' CHANGE IN ELEVATION							Assumed				443	0.23	Stormdrain	6.00	74			
													491	1.28	Open Channel	3.08	159			
						T_O Total	708				Ts Total	175				Tc Total	1398	38	23	7
COC5	5244	100	0.150	Short Grass	2.73	3.84	474	421	0.71	1.71	Paved	246	4339	0.70	Open Channel	2.93	1481			
													384	0.24	Stormdrain	6.00	64			
						T_O Total	474				Ts Total	246				Tc Total	1545	38	23	7
COC6	9224	100	0.150	Short Grass	1.00	3.84	708	53	1.23	1.79	Unpaved	30	5943	0.98	Open Channel	5.81	1023			
		ASSUMED 1' CHANGE IN ELEVATION						109	1.23	2.25	Paved	48	1047	0.22	Stormdrain	6.00	175			
													1972	0.43	Open Channel	4.11	480			
						T_O Total	708				Ts Total	78				Tc Total	1677	41	25	7
HOW1	10663	100	0.150	Short Grass	1.00	3.84	708	489	1.00	1.61	Unpaved	303	2746	0.24	Open Channel	2.15	1277			
		ASSUMED 1' CHANGE IN ELEVATION							Assumed				7328	0.42	Main Channel	2.89	2534			
						T_O Total	708				Ts Total	303				Tc Total	3812	80	48	14
HOW2	6103	100	0.240	Woods	1.00	3.84	1031	491	1.00	1.61	Unpaved	304	1895	0.91	Open Channel	3.69	514			
		ASSUMED 1' CHANGE IN ELEVATION							Assumed				3617	0.33	Main Channel	2.30	1572			
						T_O Total	1031				Ts Total	304				Tc Total	2085	57	34	10
HOW3	7271	100	0.150	Short Grass	1.00	3.84	708	500	1.00	1.61	Unpaved	310	6055	0.59	Open Channel	3.63	1668			
		ASSUMED 1' CHANGE IN ELEVATION						616	1.00	2.03	Paved	303								
									Assumed											
						T_O Total	708				Ts Total	613				Tc Total	1668	50	30	9
HOW4	7243	100	0.150	Short Grass	1.00	3.84	708	909	1.27	2.29	Paved	397	4749	0.63	Open Channel	3.18	1493			
		ASSUMED 1' CHANGE IN ELEVATION											1485	0.20	Main Channel	2.32	640			
						T_O Total	708				Ts Total	397				Tc Total	2133	54	32	9
HOW5	6761	100	0.150	Short Grass	1.00	3.84	708	1192	1.00	1.61	Unpaved	739	5469	0.79	Open Channel	3.68	1486			
		ASSUMED 1' CHANGE IN ELEVATION							Assumed											
						T_O Total	708				Ts Total	739				Tc Total	1486	49	29	8

Table B.1 -- Howard Creek -- Existing Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
HOW6	6777	68	0.150	Short Grass	1.00	3.84	520	559	1.82	2.18	Unpaved	257	3959	0.88	Open Channel	3.95	1002			
		32	0.240	Woods - Dense	1.00	3.84	414						1893	0.32	Main Channel	1.89	1000			
		ASSUMED 1' CHANGE IN ELEVATION											266	0.43	Stormdrain	6.00	44			
						T_O Total	935				**Ts Total**	257				**Tc Total**	2047	54	32	9
HOW7	2940	100	0.150	Short Grass	0.75	3.84	794	957	0.89	1.52	Unpaved	629	1784	1.02	Open Channel	4.53	394			
													99	1.52	Main Channel	3.94	25			
						T_O Total	794				**Ts Total**	629				**Tc Total**	419	31	18	5
HOW8	7219	100	0.150	Short Grass	1.00	3.84	708	1029	1.85	2.19	Unpaved	469	2134	0.75	Open Channel	2.92	731			
		ASSUMED 1' CHANGE IN ELEVATION											498	0.36	Stormdrain	6.00	83			
													2412	0.95	Open Channel	3.55	679			
													1046	0.07	Main Channel	2.72	385			
						T_O Total	708				**Ts Total**	469				**Tc Total**	1878	51	31	9
HOW9	5896	50	0.011	Smooth Surface	0.50	3.84	66	714	0.75	1.76	Paved	406	2917	0.99	Open Channel	3.79	770			
													2215	0.24	Main Channel	4.25	521			
						T_O Total	66				**Ts Total**	406				**Tc Total**	1291	29	18	5
HOW10	7120	100	0.150	Short Grass	0.50	3.84	934	156	5.45	3.77	Unpaved	41	2898	0.60	Open Channel	3.25	892			
								614	1.38	2.39	Paved	257	3185	0.33	Main Channel	4.95	644			
								167	2.22	2.40	Unpaved	70								
						T_O Total	934				**Ts Total**	368				**Tc Total**	1536	47	28	8
HOW11	6190	100	0.150	Short Grass	1.99	3.84	538	27	3.70	3.10	Unpaved	9	1878	1.05	Open Channel	4.15	453			
								984	1.20	2.23	Paved	442	1120	0.12	Main Channel	1.23	911			
								374	1.64	2.07	Unpaved	181	1707	0.29	Main Channel	2.01	851			
						T_O Total	538				**Ts Total**	632				**Tc Total**	2214	56	34	10
HOW12	3322	100	0.150	Short Grass	1.00	3.84	708	468	1.81	2.17	Unpaved	216	2661	1.27	Open Channel	3.05	872			
													93	0.43	Main Channel	2.32	40			
						T_O Total	708				**Ts Total**	216				**Tc Total**	913	31	18	5
HOW13	5294	100	0.240	Woods	1.79	3.84	817	485	3.03	2.81	Unpaved	173	2415	0.82	Open Channel	3.66	660			
													2294	0.12	Main Channel	2.59	884			
						T_O Total	817				**Ts Total**	173				**Tc Total**	1544	42	25	7

Table B.1 -- Swampoodle Creek -- Existing Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
SPC1	4042	100	0.150	Short Grass	0.56	3.84	893	1237	1.95	2.25	Unpaved	549	2705	0.73	Main Channel	3.87	699			
						T_O Total	893				**Ts Total**	549				**Tc Total**	699	36	21	6
SPC2	1806	100	0.150	Short Grass	1.95	3.84	542	1040	2.68	3.33	Paved	313	666	1.78	Main Channel	3.21	207			
						T_O Total	542				**Ts Total**	313				**Tc Total**	207	18	11	3
SPC3	4419	100	0.150	Short Grass	2.98	3.84	458	2821	1.38	1.90	Unpaved	1488	1498	0.77	Open Channel	3.39	442			
						T_O Total	458				**Ts Total**	1488				**Tc Total**	442	40	24	7
SPC4	4546	100	0.150	Short Grass	2.54	3.84	488	668	1.51	2.50	Paved	267	1113	2.06	Stormdrain	6.00	186			
													2665	0.55	Main Channel	2.75	969			
						T_O Total	488				**Ts Total**	267				**Tc Total**	1155	32	19	6
SPC5	1845	50	0.011	Smooth Surface	6.10	3.84	24	547	0.76	1.77	Paved	309	1091	0.63	Main Channel	3.80	287			
								157	6.36	4.07	Unpaved	39								
						T_O Total	24				**Ts Total**	347				**Tc Total**	287	11	7	2
SPC6	1788	100	0.150	Short Grass	1.91	3.84	547	1000	1.24	1.80	Unpaved	557	688	0.12	Main Channel	3.34	206			
						T_O Total	547				**Ts Total**	557				**Tc Total**	206	22	13	4
SPC7	4137	50	0.011	Smooth Surface	1.93	3.84	39	1933	1.86	2.77	Paved	697	1736	1.47	Stormdrain	6.00	289			
													418	0.43	Main Channel	4.52	92			
						T_O Total	39				**Ts Total**	697				**Tc Total**	382	19	11	3
SPC8	3454	50	0.011	Smooth Surface	1.47	3.84	43	620	1.96	2.85	Paved	218	1700	2.03	Stormdrain	6.00	283			
													1084	1.18	Open Channel	3.21	338			
						T_O Total	43				**Ts Total**	218				**Tc Total**	621	15	9	3
SPC9	2826	100	0.150	Short Grass	1.42	3.84	615	811	1.18	2.21	Paved	367	1915	1.33	Stormdrain	6.00	319			
						T_O Total	615				**Ts Total**	367				**Tc Total**	319	22	13	4
SPC10	3455	100	0.150	Short Grass	1.04	3.84	697	539	2.75	2.68	Unpaved	201	1062	1.74	Stormdrain	6.00	177			
													879	0.70	Open Channel	3.23	272			
													875	1.55	Stormdrain	6.00	146			
						T_O Total	697				**Ts Total**	201				**Tc Total**	595	25	15	4
SPC11	3443	100	0.150	Short Grass	1.31	3.84	636	1118	1.73	2.67	Paved	418	1435	0.31	Main Channel	5.08	282			
								790	3.84	3.16	Unpaved	250								
						T_O Total	636				**Ts Total**	668				**Tc Total**	282	26	16	5
SPC12	4441	100	0.150	Short Grass	1.58	3.84	590	919	1.63	2.60	Paved	354	1614	1.08	Stormdrain	6.00	269			
													1050	0.58	Open Channel	2.23	471			
													758	2.46	Stormdrain	6.00	126			
						T_O Total	590				**Ts Total**	354				**Tc Total**	866	30	18	5
SPC13	2877	100	0.150	Short Grass	4.32	3.84	394	1454	2.21	3.02	Paved	481	941	0.31	Main Channel	3.32	283			
								382	2.95	2.77	Unpaved	138								
						T_O Total	394				**Ts Total**	619				**Tc Total**	283	22	13	4

Table B.1 -- Swampoodle Creek -- Existing Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
SPC14	11052	100	0.150	Short Grass	1.24	3.84	650	1330	1.85	2.76	Paved	481	4830	0.49	Stormdrain	6.00	805			
													1185	0.81	Open Channel	3.44	344			
													3042	0.79	Stormdrain	6.00	507			
													565	0.95	Open Channel	4.52	125			
						T_O Total	650				**Ts Total**	481				**Tc Total**	1781	49	29	8
SPC15	8045	100	0.150	Short Grass	3.02	3.84	455	1455	2.16	2.99	Paved	487	6490	0.72	Stormdrain	6.00	1082			
						T_O Total	455				**Ts Total**	487				**Tc Total**	1082	34	20	6
SPC16	8420	50	0.011	Smooth Surface	1.57	3.84	42	592	2.43	3.17	Paved	187	4377	0.31	Stormdrain	6.00	730			
													3401	1.42	Main Channel	2.68	1269			
						T_O Total	42				**Ts Total**	187				**Tc Total**	1999	37	22	6
SPCET1	2362	100	0.150	Short Grass	0.68	3.84	826	974	1.53	2.51	Paved	387	804	1.17	Stormdrain	6.00	134			
													484	2.32	Open Channel	5.87	82			
						T_O Total	826				**Ts Total**	387				**Tc Total**	216	24	14	4
SPCET2	3465	100	0.150	Short Grass	0.99	3.84	711	1672	1.82	2.74	Paved	610	701	1.08	Open Channel	4.78	147			
													515	1.31	Stormdrain	6.00	86			
													477	0.80	Open Channel	6.87	69			
						T_O Total	711				**Ts Total**	610				**Tc Total**	302	27	16	5
SPCET3	3325	100	0.150	Short Grass	1.45	3.84	610	812	2.25	3.05	Paved	266	1600	1.30	Stormdrain	6.00	267			
													313	1.22	Open Channel	4.24	74			
													500	1.14	Main Channel	4.24	118			
						T_O Total	610				**Ts Total**	266				**Tc Total**	458	22	13	4
SPCET4	5305	100	0.150	Short Grass	1.65	3.84	580	1170	0.63	1.61	Paved	725	2490	0.93	Stormdrain	6.00	415			
													1545	1.09	Open Channel	5.64	274			
						T_O Total	580				**Ts Total**	725				**Tc Total**	689	33	20	6
SPCET5	3936	100	0.150	Short Grass	2.12	3.84	524	521	2.09	2.94	Paved	177	2200	1.66	Stormdrain	6.00	367			
													1115	1.14	Main Channel	6.05	184			
						T_O Total	524				**Ts Total**	177				**Tc Total**	551	21	13	4
SPCWC1	7041	100	0.150	Short Grass	1.67	3.84	577	2056	1.70	2.10	Unpaved	977	1619	0.51	Open Channel	4.31	376			
													1919	0.75	Open Channel	4.25	452			
													1347	0.69	Main Channel	2.00	674			
						T_O Total	577				**Ts Total**	977				**Tc Total**	1501	51	31	9
SPCWC2	5611	100	0.150	Short Grass	2.73	3.84	474	1346	0.58	1.55	Paved	869	3361	1.05	Stormdrain	6.00	560			
													804	0.55	Open Channel	2.89	278			
						T_O Total	474				**Ts Total**	869				**Tc Total**	838	36	22	6

Table B.1 -- Wagner Creek -- Existing Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
SW-1	6884	50	0.011	Smooth Surface	1.00	3.84	50	2513	0.40	1.29	Paved	1955	3609	0.65	Open Channel	3.00	1203			
		ASSUMED 1' CHANGE IN ELEVATION											712	0.68	Stormdrain	6.00	119			
						T_O Total	50				**Ts Total**	1955				**Tc Total**	1322	55	33	10
SW-2	3561	100	0.150	Short Grass	1.00	3.84	708	1192	0.83	1.85	Paved	644	2269	0.52	Open Channel	4.00	567			
													USGS TOPO ONLY SOURCE - 4 FPS ASSUMED							
						T_O Total	708				**Ts Total**	644				**Tc Total**	567	32	19	6
SW-2A	2208	100	0.150	Short Grass	1.00	3.84	708	639	0.70	1.70	Paved	376	1048	0.74	Stormdrain	6.00	175			
													421	1.60	Open Channel	1.70	248			
						T_O Total	708				**Ts Total**	376				**Tc Total**	422	25	15	4
SW-3	4017	50	0.011	Smooth Surface	0.50	3.84	66	936	1.20	2.23	Paved	420	3031	1.62	Open Channel	3.00	1010			
															RAS MODEL					
						T_O Total	66				**Ts Total**	420				**Tc Total**	1010	25	15	4
SW-4	4525	50	0.011	Smooth Surface	2.50	3.84	35	2631	1.92	2.24	Unpaved	1177	1844	0.37	Open Channel	3.40	542			
															RAS MODEL					
						T_O Total	35				**Ts Total**	1177				**Tc Total**	542	29	18	5
SW-5	3664	100	0.240	Woods	1.60	3.84	855	2032	1.30	1.84	Unpaved	1105	1532	0.26	Main Channel	3.20	479			
															RAS MODEL					
						T_O Total	855				**Ts Total**	1105				**Tc Total**	479	41	24	7
SW-6	7329	50	0.011	Smooth Surface	1.00	3.84	50	2232	0.84	1.48	Unpaved	1509	5047	0.50	Main Channel	3.04	1660			
															RAS MODEL					
						T_O Total	50				**Ts Total**	1509				**Tc Total**	1660	54	32	9
WC1	6220	100	0.150	Short Grass	1.00	**3.84**	708	855	0.47	1.11	**Unpaved**	773	1280	0.31	Open Channel	4	320			
													1730	0.46	Open Channel	4	433			
													2255	0.58	Main Channel	4.12	547			
						TO Total	708				**Ts Total**	773				**Tc Total**	1300	46	28	8
WC2	4745	100	0.150	Short Grass	1.00	3.84	708	460	1.52	1.99	Unpaved	231	1865	1.13	Open Channel	4.00	466			
													2320	0.40	Main Channel	2.70	859			
						T_O Total	708				**Ts Total**	231				**Tc Total**	1326	38	23	7
WC3	9145	100	0.150	Short Grass	1.00	3.84	708	465	0.86	1.50	Unpaved	311	1815	0.88	Open Channel	4.00	454			
													6765	0.43	Open Channel	4.00	1691			
						T_O Total	708				**Ts Total**	311				**Tc Total**	2145	53	32	9
WC4	4520	100	0.150	Short Grass	1.10	3.84	682	440	2.16	2.37	Unpaved	186	1610	1.55	Open Channel	3.05	528			
													2370	0.22	Main Channel	1.50	1580			
						T_O Total	682				**Ts Total**	186				**Tc Total**	2108	50	30	9
WC5	6105	100	0.150	Short Grass	1.77	3.84	564	1085	0.70	1.35	Unpaved	804	2565	0.82	Open Channel	3.69	695			
													2355	0.46	Open Channel	3.53	667			
						T_O Total	564				**Ts Total**	804				**Tc Total**	1362	45	27	8
WC6	7195	100	0.240	Woods	1.68	3.84	838	1240	0.14	0.60	Unpaved	2054	1345	0.76	Open Channel	6.00	224			
													4510	0.63	Open Channel	2.86	1577			
						T_O Total	838				**Ts Total**	2054				**Tc Total**	1801	78	47	14

Table B.1 -- Wagner Creek -- Existing Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
WC7	6270	100	0.150	Short Grass	0.72	3.84	808	860	0.83	1.47	Unpaved	585	5310	0.86	Open Channel	2.56	2074			
						T_O Total	808				**Ts Total**	585				**Tc Total**	2074	58	35	10
WC8	7985	50	0.011	Smooth Surface	0.71	3.84	58	205	0.60	1.57	Paved	130	3260	0.54	Open Channel	2.37	1376			
													4470	0.43	Open Channel	1.55	2884			
						T_O Total	58				**Ts Total**	130				**Tc Total**	4259	74	44	13
WC9	7850	100	0.150	Short Grass	1.50	3.84	602	745	0.76	1.41	Unpaved	530	3070	0.88	Open Channel	2.68	1146			
													2445	0.48	Open Channel	2.39	1023			
													1490	0.25	Main Channel	2.10	710			
						T_O Total	602				**Ts Total**	530				**Tc Total**	2878	67	40	12
WC10	11520	100	0.150	Short Grass	1.02	3.84	703	875	2.36	2.48	Unpaved	353	4385	0.84	Open Channel	2.35	1866			
													6160	0.07	Main Channel	2.95	2088			
						T_O Total	703				**Ts Total**	353				**Tc Total**	3954	83	50	15
WC11	8310	100	0.150	Short Grass	1.00	3.84	708	690	0.73	1.38	Unpaved	501	4110	0.81	Open Channel	5.00	822			
													3410	0.46	Open Channel	2.16	1579			
						T_O Total	708				**Ts Total**	501				**Tc Total**	2401	60	36	10
WC12	10550	100	0.150	Short Grass	1.70	3.84	573	435	2.19	2.39	Unpaved	182	5405	0.81	Open Channel	2.76	1958			
													4610	0.20	Open Channel	2.16	2134			
						T_O Total	573				**Ts Total**	182				**Tc Total**	4093	81	48	14
WC13	8835	100	0.240	Woods	0.49	3.84	1372	1880	0.40	1.02	Unpaved	1842	3200	0.72	Open Channel	4.36	734			
													3655	0.49	Open Channel	2.22	1646			
						T_O Total	1372				**Ts Total**	1842				**Tc Total**	2380	93	56	16
WC14	4745	100	0.150	Short Grass	2.12	3.84	524	75	11.20	5.40	Unpaved	14	1560	1.54	Stormdrain	6.00	260			
													3010	0.47	Open Channel	4.89	616			
						T_O Total	524				**Ts Total**	14				**Tc Total**	876	24	14	4
WC15	5765	100	0.150	Short Grass	2.38	3.84	501	465	1.86	2.20	Unpaved	211	3480	0.90	Open Channel	2.92	1192			
													1720	0.22	Main Channel	2.60	662			
						T_O Total	501				**Ts Total**	211				**Tc Total**	1853	43	26	7
WC16	9315	100	0.150	Short Grass	0.57	3.84	887	500	0.41	1.03	Unpaved	484	4495	0.88	Stormdrain	6.00	749			
								645	0.39	1.27	Paved	508	3575	0.54	Open Channel	3.86	926			
						T_O Total	887				**Ts Total**	992				**Tc Total**	1675	59	36	10
WC17	6625	100	0.150	Short Grass	2.70	3.84	476	360	1.73	2.12	Unpaved	170	2855	0.79	Stormdrain	6.00	476			
								790	1.65	2.61	Paved	303	2520	0.45	Open Channel	1.67	1509			
						T_O Total	476				**Ts Total**	472				**Tc Total**	1985	49	29	9
WC18	6695	100	0.150	Short Grass	1.12	3.84	677	305	2.07	2.32	Unpaved	131	1620	1.69	Stormdrain	6.00	270			
													2575	1.22	Open Channel	3.20	805			
													2095	0.14	Main Channel	1.80	1164			
						T_O Total	677				**Ts Total**	131				**Tc Total**	2239	51	30	9
WC19	6870	100	0.150	Short Grass	2.24	3.84	513	200	0.38	0.99	Unpaved	201	6570	0.58	Open Channel	3.09	2126			
						T_O Total	513				**Ts Total**	201				**Tc Total**	2126	47	28	8

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
WC20	10050	100	0.240	Woods	0.98	3.84	1040	1065	1.32	1.85	Unpaved	575	3965	0.61	Open Channel	4.00	991			
													4920	0.68	Open Channel	4.00	1230			
						T_O Total	1040				**Ts Total**	575					**Tc Total**	2221	64	38	11
WC21	6070	100	0.150	Short Grass	1.35	3.84	628	595	0.80	1.44	Unpaved	412	2900	0.60	Open Channel	5.85	496			
								595	1.06	2.09	Paved	284	1880	0.68	Main Channel	2.35	800			
						T_O Total	628				**Ts Total**	697					**Tc Total**	1296	44	26	8
WC22	6720	100	0.150	Short Grass	1.48	3.84	605	1240	2.08	2.33	Unpaved	533	690	1.16	Stormdrain	6.00	115			
													1365	1.20	Open Channel	2.27	601			
													3325	0.84	Stormdrain	6.00	554			
						T_O Total	605				**Ts Total**	533					**Tc Total**	1270	40	24	7
WC23	4545	100	0.150	Short Grass	0.65	3.84	841	1120	0.64	1.63	Paved	689	2740	0.81	Open Channel	2.43	1128			
								585	2.34	2.47	Unpaved	237								
						T_O Total	841				**Ts Total**	926					**Tc Total**	1128	48	29	8
WC24	8140	100	0.240	Woods	7.03	3.84	473	425	5.26	3.70	Unpaved	115	3485	0.51	Open Channel	2.73	1277			
													4130	0.14	Main Channel	2.00	2065			
						T_O Total	473				**Ts Total**	115					**Tc Total**	3342	65	39	11
WC25	5140	100	0.150	Short Grass	1.90	3.84	548	1000	1.09	2.12	Paved	471	1205	1.51	Stormdrain	6.00	201			
													2835	0.64	Open Channel	3.16	897			
						T_O Total	548				**Ts Total**	471					**Tc Total**	1098	35	21	6
WC26	2955	100	0.150	Short Grass	1.42	3.84	615	1330	1.18	1.75	Unpaved	759	1525	0.13	Main Channel	2.70	565			
						T_O Total	615				**Ts Total**	759					**Tc Total**	565	32	19	6
WC27	6710	100	0.150	Short Grass	3.98	3.84	408	1140	1.23	2.25	Paved	506	3300	0.81	Stormdrain	6.00	350			
													2170	0.63	Open Channel	3.82	568			
						T_O Total	408				**Ts Total**	506					**Tc Total**	1118	34	20	6
WC28	6145	50	0.011	Smooth Surface	0.56	3.84	63	965	1.59	2.56	Paved	376	1670	1.14	Open Channel	2.39	699			
													860	0.60	Stormdrain	6.00	143			
													2600	0.49	Open Channel	2.89	900			
						T_O Total	63				**Ts Total**	376					**Tc Total**	1742	36	22	6
WC29	6470	100	0.150	Short Grass	2.26	3.84	511	1430	1.29	1.83	Unpaved	780	830	0.84	Stormdrain	6.00	138			
													1535	0.95	Open Channel	3.42	449			
													2575	0.08	Main Channel	1.75	1471			
						T_O Total	511				**Ts Total**	780					**Tc Total**	2059	56	33	10
WC30	7825	100	0.150	Short Grass	1.75	3.84	566	345	3.82	3.15	Unpaved	109	1220	0.73	Open Channel	3.06	399			
													335	0.69	Stormdrain	6.00	56			
													5825	0.46	Open Channel	2.17	2684			
						T_O Total	566				**Ts Total**	109					**Tc Total**	3139	64	38	11
WC1_1	2915	100	0.150	Short Grass	0.87	3.84	749	505	0.65	1.64	Paved	308	370	0.51	Open Channel	2.00	185			
													1940	0.62	Storm Drain	6.00	323			
						T_O Total	749				**Ts Total**	308					**Tc Total**	508	26	16	5
WC1_2	2705	100	0.150	Short Grass	0.34	3.84	1090	330	0.92	1.55	Unpaved	213	845	1.70	Storm Drain	6.00	141			
								625	0.89	1.92	Paved	326	1430	0.57	Main Channel	2.30	622			
						T_O Total	1090				**Ts Total**	539					**Tc Total**	763	40	24	7

Table B.1 -- Wagner Creek -- Existing Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
WC1_3	3790	100	0.150	Short Grass	1.03	3.84	700	230	1.60	2.04	Unpaved	113	2210	1.86	Open Channel	3.50	631			
													1250	0.42	Main Channel	2.00	625			
						T_O Total	700				**Ts Total**	113				**Tc Total**	1256	34	21	6
WC1_4	2985	100	0.240	Woods	0.67	3.84	1211	145	1.49	1.97	Unpaved	74	1520	1.14	Open Channel	2.35	647			
								780	1.35	2.36	Paved	330	1220	0.69	Main Channel	2.75	444			
						T_O Total	1211				**Ts Total**	404				**Tc Total**	1090	45	27	8
WC1_5	4115	100	0.240	Woods	1.69	3.84	836	630	2.88	2.74	Unpaved	230	1565	0.98	Open Channel	2.06	760			
													1820	1.41	Open Channel	4.54	401			
						T_O Total	836				**Ts Total**	230				**Tc Total**	1161	37	22	6
WC1_6	2565	100	0.150	Short Grass	0.82	3.84	767	450	5.29	3.71	Unpaved	121	945	1.42	Open Channel	2.47	383			
													1070	0.68	Main Channel	5.08	211			
						T_O Total	767				**Ts Total**	121				**Tc Total**	593	25	15	4
WC1_7	3375	50	0.011	Smooth Surface	0.55	3.84	64	555	2.31	3.09	Paved	180	2040	1.39	Open Channel	2.97	687			
													730	0.55	Main Channel	5.00	146			
						T_O Total	64				**Ts Total**	180				**Tc Total**	833	18	11	3
WC2_1	3257	100	0.150	Short Grass	0.25	3.84	1233	1814	0.51	1.15	Unpaved	1574	1343	0.45	Stormdrain	6.00	224			
						T_O Total	1233				**Ts Total**	1574				**Tc Total**	224	51	30	9
WC2_2	3005	50	0.011	Smooth Surface	0.25	3.84	88	357	0.24	0.79	Unpaved	452	1873	1.00	Open Channel	5.10	367			
													725	0.35	Main Channel	4.33	167			
						T_O Total	88				**Ts Total**	452				**Tc Total**	535	18	11	3
WC2_3	4112	100	0.150	Short Grass	0.50	3.84	934	500	0.35	0.95	Unpaved	524	3080	0.88	Open Channel	2.76	1116			
													432	0.23	Chaneliztion	4.11	105			
						T_O Total	934				**Ts Total**	524				**Tc Total**	1221	45	27	8
WC2_4	2311	100	0.240	Woods	1.53	3.84	870	699	2.72	2.66	Unpaved	263	924	1.30	Open Channel	3.35	276			
													588	0.51	Main Channel	3.99	147			
						T_O Total	870				**Ts Total**	263				**Tc Total**	423	26	16	5
WC2_5	6227	50.00	0.011	Smooth Surface	0.25	3.84	88	984	0.34	0.94	Unpaved	1046	5193	0.67	Open Channel	3.50	1484			
						T_O Total	88				**Ts Total**	1046				**Tc Total**	1484	44	26	8
WC2_6	1502	100	0.150	Short Grass	1.25	3.84	648	1163	3.22	2.90	Unpaved	402	239	0.63	Main Channel	2.17	110			
						T_O Total	648				**Ts Total**	402				**Tc Total**	110	19	12	3
WC2_7	3420	100	0.150	Short Grass	0.74	3.84	799	502	1.69	2.10	Unpaved	239	885	2.46	Open Channel	2.38	372			
													1933	0.41	Main Channel	3.67	527			
						T_O Total	799				**Ts Total**	239				**Tc Total**	899	32	19	6

Table B.2
Ultimate Time of Concentration

Table B.2 -- Clear Creek -- Ultimate Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
CC 1	2460	50	0.011	Smooth Surface	0.50	3.84	66	1717	0.90	1.93	paved	890	693	1.10	Main Channel	4.00	173			
						T_O Total	66				**Ts Total**	890				**Tc Total**	173	19	11	3
CC 2	4952	100	0.150	Short grass	0.50	3.84	934	1496	1.00	2.03	paved	736	1817	0.90	Main Channel	4.60	395			
													1539	0.90		1.00	1539			
						T_O Total	934				**Ts Total**	736				**Tc Total**	1934	60	36	10
CC 3	3101	50	0.011	Smooth Surface	1.00	3.84	50	1560	1.45	2.45	paved	637	1491	1.00	Main Channel	4.00	373			
						T_O Total	50				**Ts Total**	637				**Tc Total**	373	18	11	3
CC 4	4937	50	0.011	Smooth Surface	1.00	3.84	50	897	1.20	2.23	paved	403	3990	0.90	Main Channel	4.00	998			
						T_O Total	50				**Ts Total**	403				**Tc Total**	998	24	15	4
CC 5	4563	50	0.011	Smooth Surface	0.50	3.84	66	2037	1.00	2.03	paved	1002	952	0.60	Main Channel	5.00	190			
													1524	1.44	Main Channel	4.00	381			
						T_O Total	66				**Ts Total**	1002				**Tc Total**	571	27	16	5
CC 6	7707	50	0.011	Smooth Surface	1.00	3.84	50	1589	1.18	2.21	paved	720	6068	0.68	Main Channel	3.00	2023			
						T_O Total	50				**Ts Total**	720				**Tc Total**	2023	47	28	8
CC 7	1986	50	0.011	Smooth Surface	0.50	3.84	66	669	3.50	3.80	paved	176	1267	0.95	Main Channel	4.00	317			
						T_O Total	66				**Ts Total**	176				**Tc Total**	317	9	6	2
CC 8	4437	100	0.150	Short Grass	1.00	3.84	708	1349	1.00	2.03	paved	664	1772	0.60	Main Channel	4.00	443			
													1216	1.00	Off Channel	9.00	135			
						T_O Total	708				**Ts Total**	664				**Tc Total**	578	32	19	6
CC 9	5192	50	0.011	Smooth Surface	1.00	3.84	50	2680	1.48	1.96	unpaved	1365	2462	0.98	Main Channel	3.70	665			
						T_O Total	50				**Ts Total**	1365				**Tc Total**	665	35	21	6
CC 10	4845	100	0.150	Short Grass	0.50	3.84	934	1693	1.65	2.61	paved	648	3052	0.81	Main Channel	3.89	785			
						T_O Total	934				**Ts Total**	648				**Tc Total**	785	39	24	7
CC 11	5872	50	0.011	Paved Area	0.90	3.84	52	1488	1.40	2.41	paved	619	4334	0.73	Main Channel	3.18	1363			
						T_O Total	52				**Ts Total**	619				**Tc Total**	1363	34	20	6
CC 12	5639	50	0.011	Smooth Surface	3.00	3.84	32	1146	1.20	2.23	paved	515	4443	1.00	Open Channel	3.77	1179			
						T_O Total	32				**Ts Total**	515				**Tc Total**	1179	29	17	5
CC 13	6213	50	0.011	Smooth Surface	2.70	3.84	34	3061	1.30	2.32	paved	1321	3102	0.60	Open Channel	3.50	886			
						T_O Total	34				**Ts Total**	1321				**Tc Total**	886	37	22	6
CC 14	3886	50	0.011	Smooth Surface	4.00	3.84	29	2914	1.30	2.32	paved	1257	922	1.30	Open Channel	6.00	154			
						T_O Total	29				**Ts Total**	1257				**Tc Total**	154	24	14	4
CC 15	3078	50	0.011	Smooth Surface	4.00	3.84	29	913	2.50	3.21	paved	284	2115	1.30	Open Channel	4.71	449			
						T_O Total	29				**Ts Total**	284				**Tc Total**	449	13	8	2
CC 16	4123	50	0.011	Smooth Surface	0.50	3.84	66	2113	1.70	2.65	paved	797	1960	0.90	Open Channel	4.46	439			
						T_O Total	66				**Ts Total**	797				**Tc Total**	439	22	13	4

Table B.2 -- Cowhorn Creek -- Ultimate Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (21)	Tlag (min) (22)	Tlag (hr)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length 1 (ft) (8)	Slope 1 (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcC1 (sec) (12)	Length 2 (ft) (13)	Slope 2 (%) (14)	V2 (ft/s) (18)	TcC2 (sec) (19)	TcC (sec) (20)			
CET1	5886	100	0.150	Dense Grass	0.75	3.84	796	4141	0.78	1.79	Paved	2312	1695	0.50	5.53	307	2619	57	34	0.51
						T_O Total	796													
CET2	6098	100	0.240	Woods-Light Underbrush	1.84	3.84	809	2460	0.84	1.86	Paved	1322	3588	0.62	4.35	825	2147	49	30	0.44
						T_O Total	809													
CNT1	4359	50	0.150	Paved Area	1.28	3.84	368	3334	0.66	1.65	Paved	2026	1025	0.50	6.66	154	2180	42	25	0.42
						T_O Total	368													
CNT2	3637	50	0.011	Paved Area	2.13	3.84	37	1018	1.54	2.52	Paved	403	2619	0.50	6.66	393	797	14	8	0.14
						T_O Total	37													
COW1	4940	50	0.150	Paved Area	1.07	3.84	395	4268	0.50	1.44	Paved	2969	672	0.50	4.35	154	3124	59	35	0.58
						T_O Total	395													
COW10	4312	100	0.240	Woods-Light Underbrush	2.28	3.84	741	2829	1.30	2.31	Paved	1222	1433	0.50	6.87	209	1431	36	22	0.31
						T_O Total	741													
COW11	4449	100	0.150	Dense Grass	2.27	3.84	510	1466	2.73	3.36	Paved	436	2933	0.67	6.91	424	861	23	14	0.19
						T_O Total	510													
COW12	3944	50	0.150	Paved Area	1.70	3.84	329	1506	2.48	3.20	Paved	471	2438	1.19	5.86	416	887	20	12	0.20
						T_O Total	329													
COW13	4707	50	0.011	Paved Area	0.50	3.84	66	2174	1.80	2.73	Paved	796	2533	1.05	5.98	424	1220	21	13	0.21
						T_O Total	66													
COW14	3225	100	0.240	Woods-Light Underbrush	2.53	3.84	712	1312	1.07	2.11	Paved	623	1863	1.06	7.83	238	861	26	16	0.21
						T_O Total	712													
COW15	7259	100	0.150	Dense Grass	2.32	3.84	506	1435	1.99	2.87	Paved	500	5774	0.76	7.83	737	1237	29	17	0.26
						T_O Total	506													
COW16	4251	50	0.011	Paved Area	0.50	3.84	66	1357	2.20	3.01	Paved	450	2894	1.24	5.96	486	936	17	10	0.16
						T_O Total	66													
COW17	8825	100	0.150	Dense Grass	1.439	3.84	612	3049	0.94	1.97	Paved	1549	5726	0.50	4.96	1154	2703	55	33	0.51
						T_O Total	612													
COW2	4039	100	0.150	Dense Grass	1.67	3.84	577	1326	1.50	2.49	Paved	532	2663	0.51	4.35	612	1144	29	17	0.25
						T_O Total	577													
COW3	1868	50	0.240	Paved Area	6.54	3.84	279	589	2.98	3.51	Paved	168	1279	0.50	2.27	563	731	17	10	0.17
						T_O Total	279													
COW4	2765	50	0.011	Paved Area	2.35	3.84	36	1340	1.32	2.34	Paved	573	1425	1.90	1.93	738	1311	22	13	0.22
						T_O Total	36													
COW5	3087	50	0.240	Paved Area	2.20	3.84	432	1485	3.42	3.76	Paved	395	1602	0.50	4.78	335	730	19	12	0.19
						T_O Total	432													

Table B.2 -- Cowhorn Creek -- Ultimate Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (21)	Tlag (min) (22)	Tlag (hr)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length 1 (ft) (8)	Slope 1 (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcC1 (sec) (12)	Length 2 (ft) (13)	Slope 2 (%) (14)	V2 (ft/s) (18)	TcC2 (sec) (19)	TcC (sec) (20)			
COW6	2645	50	0.150	Paved Area	2.11	3.84	301	1844	1.59	2.57	Paved	719	801	0.50	6.60	121	840	19	11	0.19
						T_O Total	301													
COW7	2835	50	0.011	Paved Area	4.98	3.84	26	2165	1.18	2.21	Paved	979	670	1.06	5.98	112	1091	19	11	0.18
						T_O Total	26													
COW8	5804	50	0.011	Paved Area	3.00	3.84	32	1029	0.73	1.74	Paved	592	4775	0.87	5.49	870	1461	25	15	0.24
						T_O Total	32													
COW9	2276	50	0.011	Paved Area	1.81	3.84	40	982	2.31	3.09	Paved	318	1294	0.74	4.50	288	605	11	6	0.10
						T_O Total	40													
CUT1	4037	100	0.150	Dense Grass	1.958	3.84	541	2779	0.56	1.52	Paved	1831	1208	0.50	6.99	173	2004	42	25	0.39
						T_O Total	541													
CUT2	3589	100	0.150	Dense Grass	0.500	3.84	934	1222	2.11	2.95	Paved	414	2317	0.53	6.99	331	745	28	17	0.21
						T_O Total	934													
CUT3	4461	50	0.011	Paved Area	1.220	3.84	46	1109	1.86	2.77	Paved	400	3352	1.02	5.40	621	1021	18	11	0.18
						T_O Total	46													
CWT1	5418	50	0.011	Paved Area	0.747	3.84	57	3906	1.00	2.03	Paved	1922	1512	0.57	3.97	381	2303	39	24	0.39
						T_O Total	57													
CWT2	5252	50	0.150	Paved Area	1.112	3.84	390	2800	1.09	2.12	Paved	1318	2452	0.72	6.47	379	1697	35	21	0.34
						T_O Total	390													

Table B.2 -- Howard Creek -- Ultimate Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
COC1	8998	50	0.011	Smooth Surface	1.00	3.84	50	1327	1.60	2.57	Paved	516	7621	0.52	Open Channel	3.17	2404			
		ASSUMED 1' CHANGE IN ELEVATION																		
						T_O Total	50				**Ts Total**	516				**Tc Total**	2404	50	30	9
COC2	5637	50	0.011	Smooth Surface	1.00	3.84	50	434	1.31	2.33	Paved	187	3709	0.51	Open Channel	3.36	1104			
		ASSUMED 1' CHANGE IN ELEVATION						1444	1.31	2.33	Paved	621								
						T_O Total	50				**Ts Total**	807				**Tc Total**	1104	33	20	6
COC3	4171	50	0.011	Smooth Surface	0.50	3.84	66	125	2.01	2.88	Paved	43	3996	0.78	Open Channel	3.08	1297			
						T_O Total	66				**Ts Total**	43				**Tc Total**	1297	23	14	4
COC4	5404	100	0.150	Short Grass	1.00	3.84	708	282	1.00	2.03	Paved	139	4088	1.19	Open Channel	3.51	1165			
		ASSUMED 1' CHANGE IN ELEVATION							Assumed				443	0.23	Stormdrain	6.00	74			
													491	1.28	Open Channel	3.08	159			
						T_O Total	708				**Ts Total**	139				**Tc Total**	1398	37	22	6
COC5	5244	50	0.011	Smooth Surface	2.73	3.84	34	471	0.71	1.71	Paved	275	4339	0.70	Open Channel	2.93	1481			
													384	0.24	Stormdrain	6.00	64			
						T_O Total	34				**Ts Total**	275				**Tc Total**	1545	31	19	6
COC6	9224	100	0.150	Short Grass	1.00	3.84	708	53	1.23	2.25	Paved	24	5943	0.98	Open Channel	5.81	1023			
		ASSUMED 1' CHANGE IN ELEVATION						109	1.23	2.25	Paved	48	1047	0.22	Stormdrain	6.00	175			
													1972	0.43	Open Channel	4.11	480			
						T_O Total	708				**Ts Total**	72				**Tc Total**	1677	41	25	7
HOW1	10663	50	0.011	Smooth Surface	1.00	3.84	50	539	1.00	2.03	Paved	265	2746	0.24	Open Channel	2.15	1277			
		ASSUMED 1' CHANGE IN ELEVATION							Assumed				7328	0.42	Main Channel	2.89	2534			
						T_O Total	50				**Ts Total**	265				**Tc Total**	3812	69	41	12
HOW2	6103	50	0.011	Smooth Surface	1.00	3.84	50	541	1.00	2.03	Paved	266	1895	0.91	Open Channel	3.69	514			
		ASSUMED 1' CHANGE IN ELEVATION							Assumed				3617	0.33	Main Channel	2.30	1572			
						T_O Total	50				**Ts Total**	266				**Tc Total**	2085	40	24	7
HOW3	7271	100	0.150	Short Grass	1.00	3.84	708	500	1.00	2.03	Paved	246	6055	0.59	Open Channel	3.63	1668			
		ASSUMED 1' CHANGE IN ELEVATION						616	1.00	2.03	Paved	303								
									Assumed											
						T_O Total	708				**Ts Total**	549				**Tc Total**	1668	49	29	8
HOW4	7243	100	0.150	Short Grass	1.00	3.84	708	909	1.27	2.29	Paved	397	4749	0.63	Open Channel	3.18	1493			
		ASSUMED 1' CHANGE IN ELEVATION											1485	0.20	Main Channel	2.32	640			
						T_O Total	708				**Ts Total**	397				**Tc Total**	2133	54	32	9
HOW5	6761	50	0.011	Smooth Surface	1.00	3.84	50	1242	1.00	2.03	Paved	611	5469	0.79	Open Channel	3.68	1486			
		ASSUMED 1' CHANGE IN ELEVATION							Assumed											
						T_O Total	50				**Ts Total**	611				**Tc Total**	1486	36	21	6
HOW6	6777	50	0.011	Smooth Surface	1.00	3.84	50	609	1.82	2.74	Paved	222	3959	0.88	Open Channel	3.95	1002			
		ASSUMED 1' CHANGE IN ELEVATION											1893	0.32	Main Channel	1.89	1000			
													266	0.43	Stormdrain	6.00	44			
						T_O Total	50				**Ts Total**	222				**Tc Total**	2047	39	23	7

Table B.2 -- Howard Creek -- Ultimate Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
HOW7	2940	50	0.011	Smooth Surface	0.75	3.84	56	1007	0.89	1.92	Paved	525	1784	1.02	Open Channel	4.53	394			
													99	1.52	Main Channel	3.94	25			
						T_O Total	56				**Ts Total**	525				**Tc Total**	419	17	10	3
HOW8	7219	50	0.011	Smooth Surface	1.00	3.84	50	1079	1.85	2.76	Paved	390	2134	0.75	Open Channel	2.92	731			
													498	0.36	Stormdrain	6.00	83			
													2412	0.95	Open Channel	3.55	679			
													1046	0.07	Main Channel	2.72	385			
						T_O Total	50				**Ts Total**	390				**Tc Total**	1878	39	23	7
HOW9	5896	50	0.011	Smooth Surface	0.50	3.84	66	714	0.75	1.76	Paved	406	2917	0.99	Open Channel	3.79	770			
													2215	0.24	Main Channel	4.25	521			
						T_O Total	66				**Ts Total**	406				**Tc Total**	1291	29	18	5
HOW10	7120	100	0.150	Short Grass	0.50	3.84	934	156	5.45	4.75	Paved	33	2898	0.60	Open Channel	3.25	892			
								614	1.38	2.39	Paved	257	3185	0.33	Main Channel	4.95	644			
								167	2.22	3.03	Paved	55								
						T_O Total	934				**Ts Total**	345				**Tc Total**	1536	47	28	8
HOW11	6190	100	0.150	Short Grass	1.99	3.84	538	27	3.70	3.91	Paved	7	1878	1.05	Open Channel	4.15	453			
								984	1.20	2.23	Paved	442	1120	0.12	Main Channel	1.23	911			
								374	1.64	2.60	Paved	144	1707	0.29	Main Channel	2.01	851			
						T_O Total	538				**Ts Total**	592				**Tc Total**	2214	56	33	10
HOW12	3322	100	0.150	Short Grass	1.00	3.84	708	468	1.81	2.73	Paved	171	2661	1.27	Open Channel	3.05	872			
													93	0.43	Main Channel	2.32	40			
						T_O Total	708				**Ts Total**	171				**Tc Total**	913	30	18	5
HOW13	5294	50	0.011	Smooth Surface	1.79	3.84	40	535	3.03	3.54	Paved	151	2415	0.82	Open Channel	3.66	660			
													2294	0.12	Main Channel	2.59	884			
						T_O Total	40				**Ts Total**	151				**Tc Total**	1544	29	17	5

Table B.2 -- Swampoodle Creek -- Ultimate Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
SPC1	4042	50	0.011	Smooth Surface	0.56	3.84	63	1287	1.95	2.84	Paved	453	2705	0.73	Main Channel	3.87	699			
						T_O Total	63				**Ts Total**	453				**Tc Total**	699	20	12	4
SPC2	1806	100	0.150	Short Grass	1.95	3.84	542	1040	2.68	3.33	Paved	313	666	1.78	Main Channel	3.21	207			
						T_O Total	542				**Ts Total**	313				**Tc Total**	207	18	11	3
SPC3	4419	100	0.150	Short Grass	2.98	3.84	458	2821	1.38	2.39	Paved	1181	1498	0.77	Open Channel	3.39	442			
						T_O Total	458				**Ts Total**	1181				**Tc Total**	442	35	21	6
SPC4	4546	100	0.150	Short Grass	2.54	3.84	488	668	1.51	2.50	Paved	267	1113	2.06	Stormdrain	6.00	186			
													2665	0.55	Main Channel	2.75	969			
						T_O Total	488				**Ts Total**	267				**Tc Total**	1155	32	19	6
SPC5	1845	50	0.011	Smooth Surface	6.10	3.84	24	547	0.76	1.77	Paved	309	1091	0.63	Main Channel	3.80	287			
								157	6.36	5.13	Paved	31								
						T_O Total	24				**Ts Total**	339				**Tc Total**	287	11	7	2
SPC6	1788	50	0.011	Smooth Surface	1.91	3.84	39	1050	1.24	2.26	Paved	464	688	0.12	Main Channel	3.34	206			
						T_O Total	39				**Ts Total**	464				**Tc Total**	206	12	7	2
SPC7	4137	50	0.011	Smooth Surface	1.93	3.84	39	1933	1.86	2.77	Paved	697	1736	1.47	Stormdrain	6.00	289			
													418	0.43	Main Channel	4.52	92			
						T_O Total	39				**Ts Total**	697				**Tc Total**	382	19	11	3
SPC8	3454	50	0.011	Smooth Surface	1.47	3.84	43	620	1.96	2.85	Paved	218	1700	2.03	Stormdrain	6.00	283			
													1084	1.18	Open Channel	3.21	338			
						T_O Total	43				**Ts Total**	218				**Tc Total**	621	15	9	3
SPC9	2826	50	0.011	Smooth Surface	1.42	3.84	44	861	1.18	2.21	Paved	390	1915	1.33	Stormdrain	6.00	319			
						T_O Total	44				**Ts Total**	390				**Tc Total**	319	13	8	2
SPC10	3455	100	0.150	Short Grass	1.04	3.84	697	539	2.75	3.37	Paved	160	1062	1.74	Stormdrain	6.00	177			
													879	0.70	Open Channel	3.23	272			
													875	1.55	Stormdrain	6.00	146			
						T_O Total	697				**Ts Total**	160				**Tc Total**	595	24	15	4
SPC11	3443	100	0.150	Short Grass	1.31	3.84	636	1118	1.73	2.67	Paved	418	1435	0.31	Main Channel	5.08	282			
								790	3.84	3.98	Paved	198								
						T_O Total	636				**Ts Total**	616				**Tc Total**	282	26	15	4
SPC12	4441	50	0.011	Smooth Surface	1.58	3.84	42	969	1.63	2.60	Paved	373	1614	1.08	Stormdrain	6.00	269			
													1050	0.58	Open Channel	2.23	471			
													758	2.46	Stormdrain	6.00	126			
						T_O Total	42				**Ts Total**	373				**Tc Total**	866	21	13	4
SPC13	2877	50	0.011	Smooth Surface	4.32	3.84	28	1504	2.21	3.02	Paved	498	941	0.31	Main Channel	3.32	283			
								382	2.95	3.49	Paved	109								
						T_O Total	28				**Ts Total**	607				**Tc Total**	283	15	9	3

Table B.2 -- Swampoodle Creek -- Ultimate Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
SPC14	11052	100	0.150	Short Grass	1.24	3.84	650	1330	1.85	2.76	Paved	481	4830	0.49	Stormdrain	6.00	805			
													1185	0.81	Open Channel	3.44	344			
													3042	0.79	Stormdrain	6.00	507			
													565	0.95	Open Channel	4.52	125			
						T_O Total	650				**Ts Total**	481				**Tc Total**	1781	49	29	8
SPC15	8045	100	0.150	Short Grass	3.02	3.84	455	1455	2.16	2.99	Paved	487	6490	0.72	Stormdrain	6.00	1082			
						T_O Total	455				**Ts Total**	487				**Tc Total**	1082	34	20	6
SPC16	8420	50	0.011	Smooth Surface	1.57	3.84	42	592	2.43	3.17	Paved	187	4377	0.31	Stormdrain	6.00	730			
													3401	1.42	Main Channel	2.68	1269			
						T_O Total	42				**Ts Total**	187				**Tc Total**	1999	37	22	6
SPCET1	2362	50	0.011	Smooth Surface	0.68	3.84	59	1024	1.53	2.51	Paved	407	804	1.17	Stormdrain	6.00	134			
													484	2.32	Open Channel	5.87	82			
						T_O Total	59				**Ts Total**	407				**Tc Total**	216	11	7	2
SPCET2	3465	100	0.150	Short Grass	0.99	3.84	711	1672	1.82	2.74	Paved	610	701	1.08	Open Channel	4.78	147			
													515	1.31	Stormdrain	6.00	86			
													477	0.80	Open Channel	6.87	69			
						T_O Total	711				**Ts Total**	610				**Tc Total**	302	27	16	5
SPCET3	3325	100	0.150	Short Grass	1.45	3.84	610	812	2.25	3.05	Paved	266	1600	1.30	Stormdrain	6.00	267			
													313	1.22	Open Channel	4.24	74			
													500	1.14	Main Channel	4.24	118			
						T_O Total	610				**Ts Total**	266				**Tc Total**	458	22	13	4
SPCET4	5305	100	0.150	Short Grass	1.65	3.84	580	1170	0.63	1.61	Paved	725	2490	0.93	Stormdrain	6.00	415			
													1545	1.09	Open Channel	5.64	274			
						T_O Total	580				**Ts Total**	725				**Tc Total**	689	33	20	6
SPCET5	3936	50	0.011	Smooth Surface	2.12	3.84	37	571	2.09	2.94	Paved	194	2200	1.66	Stormdrain	6.00	367			
													1115	1.14	Main Channel	6.05	184			
						T_O Total	37				**Ts Total**	194				**Tc Total**	551	13	8	2
SPCWC1	7041	100	0.150	Short Grass	1.67	3.84	577	2056	1.70	2.65	Paved	776	1619	0.51	Open Channel	4.31	376			
													1919	0.75	Open Channel	4.25	452			
													1347	0.69	Main Channel	2.00	674			
						T_O Total	577				**Ts Total**	776				**Tc Total**	1501	48	29	8
SPCWC2	5611	50	0.011	Smooth Surface	2.73	3.84	34	1396	0.58	1.55	Paved	902	3361	1.05	Stormdrain	6.00	560			
													804	0.55	Open Channel	2.89	278			
						T_O Total	34				**Ts Total**	902				**Tc Total**	838	30	18	5

Table B.2 -- Wagner Creek -- Ultimate Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
SW-1	6885	50	0.011	Smooth Surface	1.00	3.84	50	2514	0.40	1.29	Paved	1955	3609	0.65	Open Channel	3.00	1203			
		ASSUMED 1' CHANGE IN ELEVATION											712	0.68	Stormdrain	6.00	119			
						T_O Total	50				Ts Total	1955				Tc Total	1322	55	33	10
SW-2	3561	50	0.011	Smooth Surface	1.00	3.84	50	1242	0.83	1.85	Paved	671	2269	0.52	Open Channel	4.00	567			
													USGS TOPO ONLY SOURCE - 4 FPS ASSUMED							
						T_O Total	50				Ts Total	671				Tc Total	567	21	13	4
SW-2A	2208	50	0.011	Smooth Surface	1.00	3.84	50	689	0.70	1.70	Paved	405	1048	0.74	Stormdrain	6.00	175			
													421	1.60	Open Channel	1.70	248			
						T_O Total	50				Ts Total	405				Tc Total	422	15	9	3
SW-3	4017	50	0.011	Smooth Surface	0.50	3.84	66	936	1.20	2.23	Paved	420	3031	1.62	Open Channel	3.00	1010			
															FROM RAS MODEL					
						T_O Total	66				Ts Total	420				Tc Total	1010	25	15	4
SW-4	4524	50	0.011	Smooth Surface	2.50	3.84	35	2630	1.92	2.82	Paved	934	1844	0.37	Open Channel	3.40	542			
															FROM RAS MODEL					
						T_O Total	35				Ts Total	934				Tc Total	542	25	15	4
SW-5	3664	50	0.011	Smooth Surface	1.60	3.84	42	2082	1.30	2.32	Paved	898	1532	0.26	Main Channel	3.20	479			
															FROM RAS MODEL					
						T_O Total	42				Ts Total	898				Tc Total	479	24	14	4
SW-6	7321	50	0.011	Smooth Surface	1.00	3.84	50	2224	0.84	1.86	Paved	1194	5047	0.50	Main Channel	3.04	1660			
															FROM RAS MODEL					
						T_O Total	50				Ts Total	1194				Tc Total	1660	48	29	8
WC1	6220	50	0.011	Smooth Surface	1.00	3.84	50	905	0.47	1.39	Paved	649	1280	0.31	Open Channel	4.00	320			
													1730	0.46	Open Channel	4.00	433			
													2255	0.58	Main Channel	4.12	547			
						T_O Total	50				Ts Total	649				Tc Total	1300	33	20	6
WC2	4745	50	0.011	Smooth Surface	1.00	3.84	50	510	1.52	2.51	Paved	203	1865	1.13	Open Channel	4.00	466			
													2320	0.40	Main Channel	2.70	859			
						T_O Total	50				Ts Total	203				Tc Total	1326	26	16	5
WC3	9145	50	0.011	Smooth Surface	1.00	3.84	50	515	0.86	1.89	Paved	273	1815	0.88	Open Channel	4.00	454			
													6765	0.43	Open Channel	4.00	1691			
						T_O Total	50				Ts Total	273				Tc Total	2145	41	25	7
WC4	4520	100	0.150	Short Grass	1.10	3.84	682	440	2.16	2.99	Paved	147	1610	1.55	Open Channel	3.05	528			
													2370	0.22	Main Channel	1.50	1580			
						T_O Total	682				Ts Total	147				Tc Total	2108	49	29	9
WC5	6105	100	0.150	Short Grass	1.77	3.84	564	1085	0.70	1.70	Paved	638	2565	0.82	Open Channel	3.69	695			
													2355	0.46	Open Channel	3.53	667			
						T_O Total	564				Ts Total	638				Tc Total	1362	43	26	7
WC6	7195	100	0.240	Woods	1.68	3.84	838	1240	0.14	0.76	Paved	1630	1345	0.76	Open Channel	6.00	224			
													4510	0.63	Open Channel	2.86	1577			
						T_O Total	838				Ts Total	1630				Tc Total	1801	71	43	12
WC7	6270	100	0.150	Short Grass	0.72	3.84	808	860	0.83	1.85	Paved	464	5310	0.86	Open Channel	2.56	2074			
						T_O Total	808				Ts Total	464				Tc Total	2074	56	33	10
WC8	7985	50	0.011	Smooth Surface	0.71	3.84	58	205	0.60	1.57	Paved	130	3260	0.54	Open Channel	2.37	1376			
													4470	0.43	Open Channel	1.55	2884			
						T_O Total	58				Ts Total	130				Tc Total	4259	74	44	13

Table B.2 -- Wagner Creek -- Ultimate Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
WC9	7850	100	0.150	Short Grass	1.50	3.84	602	745	0.76	1.77	Paved	420	3070	0.88	Open Channel	2.68	1146			
													2445	0.48	Open Channel	2.39	1023			
													1490	0.25	Main Channel	2.10	710			
						T_O Total	602				**Ts Total**	420				**Tc Total**	2878	65	39	11
WC10	11520	100	0.150	Short Grass	1.02	3.84	703	875	2.36	3.12	Paved	280	4385	0.84	Open Channel	2.35	1866			
													6160	0.07	Main Channel	2.95	2088			
						T_O Total	703				**Ts Total**	280				**Tc Total**	3954	82	49	14
WC11	8310	50	0.011	Smooth Surface	1.00	3.84	50	740	0.73	1.74	Paved	426	4110	0.81	Open Channel	5.00	822			
													3410	0.46	Open Channel	2.16	1579			
						T_O Total	50				**Ts Total**	426				**Tc Total**	2401	48	29	8
WC12	10550	100	0.150	Short Grass	1.70	3.84	573	435	2.19	3.01	Paved	145	5405	0.81	Open Channel	2.76	1958			
													4610	0.20	Open Channel	2.16	2134			
						T_O Total	573				**Ts Total**	145				**Tc Total**	4093	80	48	14
WC13	8835	50	0.011	Smooth Surface	0.49	3.84	67	1930	0.40	1.29	Paved	1501	3200	0.72	Open Channel	4.36	734			
													3655	0.49	Open Channel	2.22	1646			
						T_O Total	67				**Ts Total**	1501				**Tc Total**	2380	66	39	11
WC14	4745	50	0.011	Smooth Surface	2.12	3.84	37	125	11.20	6.80	Paved	18	1560	1.54	Stormdrain	6.00	260			
													3010	0.47	Open Channel	4.89	616			
						T_O Total	37				**Ts Total**	18				**Tc Total**	876	16	9	3
WC15	5765	50	0.011	Smooth Surface	2.38	3.84	36	515	1.86	2.77	Paved	186	3480	0.90	Open Channel	2.92	1192			
													1720	0.22	Main Channel	2.60	662			
						T_O Total	36				**Ts Total**	186				**Tc Total**	1853	35	21	6
WC16	9315	50	0.011	Smooth Surface	0.57	3.84	63	550	0.41	1.30	Paved	423	4495	0.88	Stormdrain	6.00	749			
								645	0.39	1.27	Paved	508	3575	0.54	Open Channel	3.86	926			
						T_O Total	63				**Ts Total**	931				**Tc Total**	1675	44	27	8
WC17	6625	100	0.150	Short Grass	2.70	3.84	476	360	1.73	2.67	Paved	135	2855	0.79	Stormdrain	6.00	476			
								790	1.65	2.61	Paved	303	2520	0.45	Open Channel	1.67	1509			
						T_O Total	476				**Ts Total**	437				**Tc Total**	1985	48	29	8
WC18	6695	50	0.011	Smooth Surface	1.12	3.84	48	355	2.07	2.92	Paved	121	1620	1.69	Stormdrain	6.00	270			
													2575	1.22	Open Channel	3.20	805			
													2095	0.14	Main Channel	1.80	1164			
						T_O Total	48				**Ts Total**	121				**Tc Total**	2239	40	24	7
WC19	6870	100	0.150	Short Grass	2.24	3.84	513	200	0.38	1.25	Paved	160	6570	0.58	Open Channel	3.09	2126			
						T_O Total	513				**Ts Total**	160				**Tc Total**	2126	47	28	8
WC20	10050	50	0.011	Smooth Surface	0.98	3.84	51	1115	1.32	2.34	Paved	477	3965	0.61	Open Channel	4.00	991			
													4920	0.68	Open Channel	4.00	1230			
						T_O Total	51				**Ts Total**	477				**Tc Total**	2221	46	27	8
WC21	6070	50	0.011	Smooth Surface	1.35	3.84	45	645	0.80	1.82	Paved	355	2900	0.60	Open Channel	5.85	496			
								595	1.06	2.09	Paved	284	1880	0.68	Main Channel	2.35	800			
						T_O Total	45				**Ts Total**	639				**Tc Total**	1296	33	20	6
WC22	6720	100	0.150	Short Grass	1.48	3.84	605	1240	2.08	2.93	Paved	423	690	1.16	Stormdrain	6.00	115			
													1365	1.20	Open Channel	2.27	601			
													3325	0.84	Stormdrain	6.00	554			
						T_O Total	605				**Ts Total**	423				**Tc Total**	1270	38	23	7

Table B.2 -- Wagner Creek -- Ultimate Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
WC23	4545	100	0.150	Short Grass	0.65	3.84	841	1120	0.64	1.63	Paved	689	2740	0.81	Open Channel	2.43	1128			
								585	2.34	3.11	Paved	188								
						T_O Total	841				**Ts Total**	877				**Tc Total**	1128	47	28	8
WC24	8140	100	0.240	Woods	7.03	3.84	473	425	5.26	4.66	Paved	91	3485	0.51	Open Channel	2.73	1277			
													4130	0.14	Main Channel	2.00	2065			
						T_O Total	473				**Ts Total**	91				**Tc Total**	3342	65	39	11
WC25	5140	50	0.011	Smooth Surface	1.90	3.84	39	1050	1.09	2.12	Paved	495	1205	1.51	Stormdrain	6.00	201			
													2835	0.64	Open Channel	3.16	897			
						T_O Total	39				**Ts Total**	495				**Tc Total**	1098	27	16	5
WC26	2955	50	0.011	Smooth Surface	1.42	3.84	44	1380	1.18	2.21	Paved	625	1525	0.13	Main Channel	2.70	565			
						T_O Total	44				**Ts Total**	625				**Tc Total**	565	21	12	4
WC27	6710	50	0.011	Smooth Surface	3.98	3.84	29	1190	1.23	2.25	Paved	528	3300	0.81	Stormdrain	6.00	550			
													2170	0.63	Open Channel	3.82	568			
						T_O Total	29				**Ts Total**	528				**Tc Total**	1118	28	17	5
WC28	6145	50	0.011	Smooth Surface	0.56	3.84	63	965	1.59	2.56	Paved	376	1670	1.14	Open Channel	2.39	699			
													860	0.60	Stormdrain	6.00	143			
													2600	0.49	Open Channel	2.89	900			
						T_O Total	63				**Ts Total**	376				**Tc Total**	1742	36	22	6
WC29	6470	50	0.011	Smooth Surface	2.26	3.84	36	1480	1.29	2.31	Paved	641	830	0.84	Stormdrain	6.00	138			
													1535	0.95	Open Channel	3.42	449			
													2575	0.08	Main Channel	1.75	1471			
						T_O Total	36				**Ts Total**	641				**Tc Total**	2059	46	27	8
WC30	7825	50	0.011	Smooth Surface	1.75	3.84	40	395	3.82	3.97	Paved	99	1220	0.73	Open Channel	3.06	399			
													335	0.69	Stormdrain	6.00	56			
													5825	0.46	Open Channel	2.17	2684			
						T_O Total	40				**Ts Total**	99				**Tc Total**	3139	55	33	10
WC1_1	2915	50	0.011	Smooth Surface	0.87	3.84	53	555	0.65	1.64	Paved	339	370	0.51	Open Channel	2.00	185			
													1940	0.62	Storm Drain	6.00	323			
						T_O Total	53				**Ts Total**	339				**Tc Total**	508	15	9	3
WC1_2	3330	50	0.011	Smooth Surface	0.34	3.84	77	380	0.92	1.95	Paved	195	845	1.70	Storm Drain	6.00	141			
								625	0.89	1.92	Paved	326	1430	0.57	Main Channel	2.30	622			
						T_O Total	77				**Ts Total**	521				**Tc Total**	763	23	14	4
WC1_3	3790	50	0.011	Smooth Surface	1.03	3.84	50	280	1.60	2.57	Paved	109	2210	1.86	Open Channel	3.50	631			
													1250	0.42	Main Channel	2.00	625			
						T_O Total	50				**Ts Total**	109				**Tc Total**	1256	24	14	4
WC1_4	3765	100	0.240	Woods	0.67	3.84	1211	145	1.49	2.48	Paved	58	1520	1.14	Open Channel	2.35	647			
								780	1.35	2.36	Paved	330	1220	0.69	Main Channel	2.75	444			
						T_O Total	1211				**Ts Total**	389				**Tc Total**	1090	45	27	8
WC1_5	4115	50	0.011	Smooth Surface	1.69	3.84	41	680	2.88	3.45	Paved	197	1565	0.98	Open Channel	2.06	760			
													1820	1.41	Open Channel	4.54	401			
						T_O Total	41				**Ts Total**	197				**Tc Total**	1161	23	14	4

Table B.2 -- Wagner Creek -- Ultimate Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
WC1_6	2565	50	0.011	Smooth Surface	0.82	3.84	54	500	5.29	4.68	Paved	107	945	1.42	Open Channel	2.47	383			
													1070	0.68	Main Channel	5.08	211			
						T_O Total	54				**Ts Total**	107				**Tc Total**	593	13	8	2
WC1_7	3375	50	0.011	Smooth Surface	0.55	3.84	64	555	2.31	3.09	Paved	180	2040	1.39	Open Channel	2.97	687			
													730	0.55	Main Channel	5.00	146			
						T_O Total	64				**Ts Total**	180				**Tc Total**	833	18	11	3
WC2_1	3257	100	0.150	Short Grass	0.25	3.84	1233	1814	0.51	1.45	Paved	1250	1343	0.45	Stormdrain	6.00	224			
						T_O Total	1233				**Ts Total**	1250				**Tc Total**	224	45	27	8
WC2_2	3005	50	0.011	Smooth Surface	0.25	3.84	88	357	0.24	1.00	Paved	358	1873	1.00	Open Channel	5.10	367			
													725	0.35	Main Channel	4.33	167			
						T_O Total	88				**Ts Total**	358				**Tc Total**	535	16	10	3
WC2_3	4112	50	0.011	Smooth Surface	0.50	3.84	66	550	0.35	1.20	Paved	457	3080	0.88	Open Channel	2.76	1116			
													432	0.23	Main Channel	4.11	105			
						T_O Total	66				**Ts Total**	457				**Tc Total**	1221	29	17	5
WC2_4	2311	50	0.011	Smooth Surface	1.53	3.84	42	749	2.72	3.35	Paved	223	924	1.30	Open Channel	3.35	276			
													588	0.51	Main Channel	3.99	147			
						T_O Total	42				**Ts Total**	223				**Tc Total**	423	11	7	2
WC2_5	6227	50	0.011	Smooth Surface	0.25	3.84	88	984	0.34	1.19	Paved	830	5193	0.67	Open Channel	3.50	1484			
						T_O Total	88				**Ts Total**	830				**Tc Total**	1484	40	24	7
WC2_6	1502	100	0.150	Short Grass	1.25	3.84	648	1163	3.22	3.65	Paved	319	239	0.63	Open Channel	2.17	110			
						T_O Total	648				**Ts Total**	319				**Tc Total**	110	18	11	3
WC2_7	3420	50	0.150	Smooth Surface	0.74	3.84	459	552	1.69	2.64	Paved	209	885	2.46	Open Channel	2.38	372			
													1933	0.41	Main Channel	3.67	527			
						T_O Total	459				**Ts Total**	209				**Tc Total**	899	26	16	5

Appendix C
Hydrology Output

Table C.1
Existing HEC-HMS Results

Table C.1 -- Existing HEC-HMS Results

Basin	DA (sq mi)	Existing 2 Year	Existing 5 Year	Existing 10 Year	Existing 25 Year	Existing 50 Year	Existing 100 Year	Existing 250 Year	Existing 500 Year
Clear Creek HECHMS Output									
B_CC1	0.204	290	420	510	650	750	870	1,060	1,220
B_CC10	0.171	150	230	280	360	420	490	600	690
B_CC11	0.487	430	660	810	1,050	1,230	1,440	1,760	2,020
B_CC12	0.221	160	270	340	460	550	650	810	940
B_CC13	0.491	250	430	560	760	910	1,080	1,350	1,570
B_CC14	0.166	80	160	210	290	350	420	530	620
B_CC15	0.232	170	310	400	550	660	790	1,000	1,180
B_CC16	1.175	1,200	1,750	2,110	2,650	3,080	3,550	4,280	4,880
B_CC2	0.169	150	210	250	310	360	410	490	560
B_CC3	0.059	80	120	150	190	220	250	310	350
B_CC4	0.379	380	560	690	870	1,020	1,180	1,440	1,650
B_CC5	0.246	230	330	400	500	590	680	820	940
B_CC6	0.567	390	600	730	940	1,100	1,280	1,560	1,780
B_CC7	0.049	90	120	150	190	220	250	310	350
B_CC8	0.216	200	310	380	490	570	670	810	930
B_CC9	0.213	150	240	300	390	460	540	670	770
BRINGLE LAKE	5.045	540	970	1,240	1,830	2,340	2,920	3,900	4,550
J_CC1	0.204	290	420	510	650	750	870	1,060	1,220
J_CC10	2.273	1,250	2,000	2,570	3,500	4,250	5,070	6,300	7,240
J_CC11	5.045	2,870	4,530	5,760	7,710	9,230	10,970	13,770	16,070
J_CC1A	0.373	360	530	640	810	940	1,090	1,330	1,520
J_CC2	0.373	170	330	450	630	790	950	1,160	1,350
J_CC3	0.619	360	630	840	1,120	1,340	1,580	1,920	2,210
J_CC4	0.678	370	650	870	1,160	1,410	1,660	2,020	2,330
J_CC5	1.057	670	1,010	1,370	1,900	2,320	2,760	3,390	3,910
J_CC6	1.106	670	1,030	1,380	1,910	2,330	2,770	3,410	3,930
J_CC7	1.673	1,050	1,620	2,110	2,840	3,420	4,030	4,910	5,650
J_CC8	1.889	1,100	1,720	2,230	3,010	3,640	4,310	5,310	6,100
J_CC9	2.273	1,260	2,000	2,570	3,510	4,250	5,070	6,300	7,250
OUTLET	5.045	540	970	1,240	1,830	2,340	2,920	3,900	4,550
R_CC1	0.619	350	620	830	1,110	1,330	1,560	1,900	2,180
R_CC2	1.057	650	1,000	1,350	1,870	2,290	2,730	3,360	3,870
R_CC3	1.673	1,020	1,590	2,070	2,780	3,350	3,950	4,850	5,570

Table C.1 -- Existing HEC-HMS Results

Basin	DA (sq mi)	Existing 2 Year	Existing 5 Year	Existing 10 Year	Existing 25 Year	Existing 50 Year	Existing 100 Year	Existing 250 Year	Existing 500 Year
R_CC4	2.273	1,250	2,000	2,570	3,500	4,250	5,070	6,300	7,240
SKYLINE LAKE	0.373	170	330	450	630	790	950	1,160	1,350
Howard Creek HECHMS Output									
B_COC1	0.424	270	420	520	670	790	920	1,120	1,280
B_COC2	0.188	200	290	350	430	510	580	710	810
B_COC3	0.262	220	340	420	540	630	740	900	1,040
B_COC4	0.239	240	350	420	530	620	710	860	980
B_COC5	0.206	190	280	350	440	520	600	730	830
B_COC6	0.559	400	650	820	1,070	1,260	1,480	1,810	2,090
B_HOW1	1.088	590	930	1,150	1,480	1,740	2,020	2,460	2,810
B_HOW10	0.335	240	370	460	600	710	830	1,010	1,170
B_HOW11	0.279	160	260	320	430	510	600	740	850
B_HOW12	0.15	140	210	260	340	400	470	580	670
B_HOW13	0.322	270	400	500	630	750	870	1,060	1,210
B_HOW2	0.55	360	570	700	910	1,070	1,240	1,520	1,740
B_HOW3	0.464	390	570	690	880	1,020	1,180	1,430	1,630
B_HOW4	0.604	410	640	790	1,020	1,210	1,400	1,710	1,960
B_HOW5	0.343	230	370	460	600	710	830	1,020	1,180
B_HOW6	0.535	340	540	680	880	1,050	1,220	1,500	1,720
B_HOW7	0.282	250	400	490	640	760	890	1,090	1,260
B_HOW8	0.671	440	700	880	1,140	1,340	1,570	1,930	2,210
B_HOW9	0.21	270	370	440	550	630	730	870	1,000
J_COC1	0.424	270	420	520	670	790	920	1,120	1,280
J_COC2	0.612	420	640	790	1,010	1,190	1,380	1,680	1,920
J_COC3	0.874	550	840	1,040	1,330	1,500	1,650	1,860	2,110
J_COC4	1.113	750	1,130	1,390	1,770	2,050	2,310	2,710	2,990
J_COC5	1.319	840	1,260	1,500	1,850	2,100	2,310	2,590	2,960
J_COC6	1.878	1,080	1,710	2,070	2,560	2,940	3,330	3,850	4,240
J_HOW1	1.638	710	1,140	1,450	1,900	2,270	2,660	3,290	3,790
J_HOW10	5.361	1,210	2,070	2,670	3,330	3,650	3,940	4,760	5,760
J_HOW11	7.239	1,420	2,310	2,940	3,760	4,480	5,320	6,810	8,850
J_HOW12	7.389	1,380	2,200	2,860	3,570	4,280	5,370	6,730	8,730

Table C.1 -- Existing HEC-HMS Results

Basin	DA (sq mi)	Existing 2 Year	Existing 5 Year	Existing 10 Year	Existing 25 Year	Existing 50 Year	Existing 100 Year	Existing 250 Year	Existing 500 Year
J_HOW2	2.102	860	1,410	1,770	2,370	2,830	3,350	4,160	4,830
J_HOW3	2.706	1,040	1,720	2,210	2,980	3,580	4,180	4,860	5,270
J_HOW4	3.049	1,190	1,970	2,520	3,410	4,110	4,820	5,700	6,300
J_HOW5	3.584	1,280	2,110	2,630	3,100	3,350	3,650	3,960	4,190
J_HOW6	3.866	1,240	2,060	2,580	3,110	3,380	3,640	3,970	4,200
J_HOW7	4.537	1,250	2,080	2,690	3,250	3,530	3,800	4,320	5,090
J_HOW8	4.747	1,240	2,090	2,700	3,290	3,580	3,840	4,520	5,320
J_HOW9	5.082	1,220	2,090	2,700	3,330	3,640	3,910	4,750	5,630
Outlet	7.711	1,370	2,180	2,850	3,560	4,080	5,250	6,770	8,550
R_COC1	0.612	400	620	760	970	1,060	1,190	1,390	1,670
R_COC2	1.113	720	1,090	1,320	1,640	1,860	2,030	2,290	2,580
R_COC3	1.319	830	1,260	1,500	1,850	2,080	2,290	2,570	2,910
R_HOW1	1.088	550	870	1,090	1,410	1,670	1,950	2,390	2,740
R_HOW10	7.389	1,330	2,170	2,830	3,530	4,030	5,140	6,650	8,400
R_HOW2	2.102	830	1,390	1,760	2,350	2,810	3,300	3,930	4,140
R_HOW3	3.049	1,130	1,870	2,370	2,920	3,190	3,490	3,790	4,010
R_HOW4	3.584	1,210	2,010	2,530	3,050	3,320	3,580	3,900	4,120
R_HOW5	3.866	1,190	1,980	2,560	3,100	3,370	3,640	3,960	4,190
R_HOW6	4.537	1,230	2,060	2,670	3,240	3,530	3,800	4,310	4,990
R_HOW7	4.747	1,210	2,050	2,660	3,270	3,570	3,840	4,470	5,180
R_HOW8	5.082	1,200	2,050	2,640	3,290	3,600	3,890	4,620	5,480
R_HOW9	7.239	1,360	2,190	2,850	3,560	4,240	5,310	6,670	8,660
Swampoodle Creek HECHMS Output									
B_SPC1	0.123	140	200	240	300	340	400	480	540
B_SPC10	0.129	190	260	310	380	440	500	610	690
B_SPC11	0.139	190	260	310	390	450	520	630	720
B_SPC12	0.178	230	320	380	470	540	630	760	860
B_SPC13	0.124	190	250	300	380	440	500	610	700
B_SPC14	0.544	540	760	910	1,130	1,300	1,490	1,780	2,030
B_SPC15	0.4	560	740	880	1,070	1,220	1,400	1,670	1,890
B_SPC16	0.51	650	880	1,030	1,270	1,450	1,660	1,990	2,260
B_SPC2	0.039	70	90	110	130	150	180	210	240
B_SPC3	0.153	150	220	270	340	390	450	550	630

Table C.1 -- Existing HEC-HMS Results

Basin	DA (sq mi)	Existing 2 Year	Existing 5 Year	Existing 10 Year	Existing 25 Year	Existing 50 Year	Existing 100 Year	Existing 250 Year	Existing 500 Year
B_SPC4	0.086	110	150	180	230	260	300	360	410
B_SPC5	0.018	30	40	50	60	70	80	100	120
B_SPC6	0.037	30	50	60	90	100	120	160	180
B_SPC7	0.109	180	240	290	360	410	480	580	660
B_SPC8	0.141	220	310	380	480	560	650	790	900
B_SPC9	0.082	120	170	200	250	290	330	400	460
B_SPCET1	0.123	200	270	320	390	450	510	610	690
B_SPCET2	0.279	370	520	620	780	900	1,040	1,260	1,430
B_SPCET3	0.137	190	270	330	410	480	550	670	770
B_SPCET4	0.223	270	370	450	560	650	750	900	1,020
B_SPCET5	0.191	280	390	470	580	670	780	940	1,070
B_SPCWC1	0.362	310	450	540	680	800	920	1,110	1,270
B_SPCWC2	0.299	340	480	570	710	820	950	1,140	1,300
J_SPC1	0.162	170	240	290	370	430	500	590	660
J_SPC10	0.141	220	310	380	480	560	660	900	1,120
J_SPC11	2.32	1,760	2,400	2,900	3,650	4,180	4,740	5,750	6,600
J_SPC12	2.402	1,770	2,430	2,940	3,720	4,260	4,840	5,860	6,670
J_SPC13	0.129	190	260	310	380	440	500	610	690
J_SPC14	2.531	1,840	2,510	3,040	3,860	4,430	5,060	6,090	6,900
J_SPC15	2.67	1,900	2,580	3,120	3,970	4,590	5,250	6,230	7,060
J_SPC16	0.178	230	320	380	470	540	630	760	860
J_SPC17	2.848	1,990	2,720	3,270	4,170	4,840	5,600	6,530	7,360
J_SPC18	2.972	2,030	2,780	3,300	4,230	4,920	5,670	6,640	7,480
J_SPC19	0.944	1,050	1,440	1,710	2,110	2,430	2,780	3,320	3,770
J_SPC2	0.153	150	220	270	340	390	450	550	630
J_SPC20	3.916	2,880	3,990	4,800	6,100	7,020	8,000	9,450	10,510
J_SPC3	0.315	310	460	550	690	810	940	1,120	1,280
J_SPC4	0.401	400	580	700	880	1,030	1,190	1,400	1,590
J_SPC5	0.419	630	950	1,170	1,490	1,720	1,940	2,270	2,530
J_SPC6	1.08	990	1,430	1,730	2,170	2,470	2,750	3,090	3,380
J_SPC7	2.033	1,670	2,340	2,800	3,460	3,940	4,410	5,220	5,900
J_SPC8	2.07	1,660	2,290	2,770	3,460	3,950	4,430	5,260	5,940
J_SPC9	2.179	1,710	2,340	2,820	3,540	4,050	4,540	5,390	6,090
J_SPCET1	0.539	290	410	620	880	1,070	1,300	1,630	1,880
J_SPCET2	0.223	270	370	450	560	650	750	900	1,020

Table C.1 -- Existing HEC-HMS Results

Basin	DA (sq mi)	Existing 2 Year	Existing 5 Year	Existing 10 Year	Existing 25 Year	Existing 50 Year	Existing 100 Year	Existing 250 Year	Existing 500 Year
J_SPCET3	0.762	550	770	910	1,130	1,410	1,730	2,250	2,630
J_SPCET4	0.953	720	940	1,080	1,300	1,480	1,840	2,360	2,770
J_SPCWC_DIV1	0.401	470	790	1,010	1,320	1,540	1,750	2,060	2,310
J_SPCWC_DIV2	0.401	630	950	1,170	1,480	1,710	1,940	2,260	2,520
Outlet	4.426	2,800	3,700	4,420	5,430	6,190	7,110	8,840	10,010
R_SPC1	0.123	140	190	230	290	340	390	470	530
R_SPC2	0.315	310	450	550	690	810	930	1,110	1,270
R_SPC3	0.401	630	940	1,160	1,470	1,700	1,930	2,250	2,500
R_SPC4	2.033	1,650	2,280	2,750	3,430	3,910	4,390	5,210	5,890
R_SPC5	2.07	1,660	2,280	2,750	3,450	3,940	4,420	5,250	5,940
R_SPC6	2.32	1,740	2,390	2,890	3,640	4,170	4,740	5,730	6,550
R_SPC7	2.531	1,830	2,500	3,020	3,840	4,420	5,030	6,030	6,850
R_SPC8	2.848	1,980	2,700	3,240	4,140	4,810	5,540	6,500	7,340
R_SPC9	3.916	2,680	3,590	4,250	5,280	6,030	6,920	8,520	9,620
R_SPCET1	0.123	100	210	270	330	380	450	540	620
R_SPCET2	0.402	240	370	540	770	940	1,130	1,410	1,620
R_SPCET3	0.762	540	730	860	1,060	1,320	1,650	2,130	2,500
R_SPCWC1	0.362	70	70	70	70	90	150	250	330
SPCET_DET1	0.123	150	260	310	380	440	500	600	690
SPCET_DET2	0.402	270	440	610	860	1,060	1,240	1,490	1,700
SPCWC_DIV1	0.362	220	220	220	230	270	340	450	540
SPCWC_DIV2	0.362	70	70	70	70	100	150	250	330
SPCWC_DIV3	0.661	390	540	630	740	790	810	850	870
Wagner Creek HECHMS Output (includes Cowhorn Creek)									
B_CET01	0.396	320	460	560	700	810	940	1,140	1,300
B_CET02	0.222	210	300	350	440	510	590	700	800
B_CNT01	0.197	180	270	320	400	470	540	650	740
B_CNT02	0.110	170	240	290	370	430	500	610	700
B_COW01	0.300	210	320	390	490	580	670	810	920
B_COW02	0.129	140	210	250	320	370	430	530	610
B_COW03	0.035	60	80	90	110	130	150	180	210
B_COW04	0.106	120	180	210	270	320	380	460	530
B_COW05	0.100	70	120	150	200	250	290	370	430
B_COW06	0.039	30	50	60	90	100	120	160	180

Table C.1 -- Existing HEC-HMS Results

Basin	DA (sq mi)	Existing 2 Year	Existing 5 Year	Existing 10 Year	Existing 25 Year	Existing 50 Year	Existing 100 Year	Existing 250 Year	Existing 500 Year
B_COW07	0.057	70	100	130	160	190	230	280	320
B_COW08	0.340	500	680	810	1,000	1,150	1,320	1,590	1,810
B_COW09	0.044	110	140	160	190	220	250	290	330
B_COW10	0.218	200	290	360	460	530	620	750	860
B_COW11	0.229	290	420	510	640	740	860	1,040	1,200
B_COW12	0.379	530	750	900	1,120	1,300	1,500	1,810	2,070
B_COW13	0.322	450	640	770	970	1,130	1,300	1,580	1,810
B_COW14	0.098	100	150	190	240	290	330	410	470
B_COW15	0.288	370	510	610	760	870	1,000	1,200	1,370
B_COW16	0.171	300	410	480	600	690	790	950	1,090
B_COW17	0.540	450	660	790	990	1,150	1,330	1,600	1,830
B_CUT01	0.283	220	330	410	520	610	710	870	990
B_CUT02	0.155	170	250	300	380	450	520	630	730
B_CUT03	0.189	310	410	490	610	700	810	980	1,120
B_CWT01	0.414	380	550	680	860	1,010	1,170	1,430	1,640
B_CWT02	0.157	170	230	280	340	390	450	540	610
B_SWC 01	0.371	320	460	550	690	800	920	1,110	1,260
B_SWC 02	0.220	250	360	430	550	640	740	890	1,020
B_SWC 02A	0.048	70	90	110	140	160	180	220	250
B_SWC 03	0.192	240	340	420	530	610	710	870	990
B_SWC 04	0.338	270	440	550	730	870	1,030	1,290	1,490
B_SWC 05	0.305	270	400	490	630	740	860	1,050	1,210
B_SWC 06	0.447	330	500	620	790	920	1,070	1,310	1,500
B_WC01	0.552	350	580	740	970	1,160	1,360	1,680	1,940
B_WC02	0.381	270	440	550	730	870	1,020	1,270	1,460
B_WC03	0.734	440	720	910	1,200	1,420	1,670	2,060	2,370
B_WC04	0.205	140	220	280	360	430	500	610	700
B_WC05	0.435	360	540	670	860	1,000	1,170	1,420	1,630
B_WC06	0.259	150	230	280	360	430	490	600	690
B_WC07	0.249	150	240	300	400	470	550	670	770
B_WC08	0.916	530	820	1,020	1,310	1,550	1,800	2,190	2,510
B_WC09	0.749	440	700	870	1,120	1,320	1,540	1,880	2,160
B_WC1_1	0.070	110	150	170	210	240	270	330	370
B_WC1_2	0.174	170	250	300	380	450	510	620	710

Table C.1 -- Existing HEC-HMS Results

Basin	DA (sq mi)	Existing 2 Year	Existing 5 Year	Existing 10 Year	Existing 25 Year	Existing 50 Year	Existing 100 Year	Existing 250 Year	Existing 500 Year
B_WC1_3	0.132	130	190	230	300	350	410	500	570
B_WC1_4	0.175	140	220	270	340	400	470	570	650
B_WC1_5	0.107	90	140	170	230	270	310	380	440
B_WC1_6	0.160	150	240	310	400	480	560	690	800
B_WC1_7	0.104	150	210	260	330	380	440	540	620
B_WC10	0.794	390	620	780	1,020	1,210	1,410	1,730	1,980
B_WC11	1.145	760	1,180	1,450	1,860	2,190	2,550	3,100	3,550
B_WC12	0.970	530	820	1,020	1,310	1,540	1,790	2,190	2,500
B_WC15	0.497	410	630	780	990	1,170	1,350	1,650	1,890
B_WC16	0.599	500	710	850	1,060	1,230	1,420	1,700	1,930
B_WC17	0.291	280	400	480	590	690	790	950	1,080
B_WC18	0.434	340	510	630	810	950	1,100	1,340	1,530
B_WC19	0.431	360	550	670	850	990	1,150	1,390	1,590
B_WC2_1	0.174	140	210	260	330	380	440	540	620
B_WC2_2	0.114	160	230	280	350	410	480	590	680
B_WC2_3	0.123	90	150	180	230	280	320	390	450
B_WC2_4	0.057	60	90	110	140	170	200	240	280
B_WC2_5	0.265	170	290	360	480	570	670	830	960
B_WC2_6	0.055	60	90	110	150	180	210	260	300
B_WC2_7	0.071	50	90	110	150	180	210	260	300
B_WC20	0.807	560	840	1,030	1,310	1,530	1,780	2,150	2,460
B_WC21	0.201	170	250	310	400	470	540	660	760
B_WC22	0.399	390	570	690	870	1,020	1,180	1,420	1,620
B_WC23	0.262	150	250	320	430	510	600	750	870
B_WC24	0.677	430	650	800	1,020	1,200	1,400	1,710	1,960
B_WC25	0.247	230	340	420	540	630	740	900	1,040
B_WC26	0.120	80	140	170	230	280	330	420	480
B_WC27	0.406	510	710	840	1,040	1,200	1,370	1,650	1,880
B_WC28	0.406	360	550	670	870	1,020	1,190	1,460	1,680
B_WC29	0.238	190	280	340	440	510	580	710	800
B_WC30	0.727	480	730	900	1,160	1,360	1,570	1,920	2,190
COW_Outlet	5.516	2570	3,320	3,720	4,530	5,070	5,690	6,510	7,480
DET_COW1	0.283	190	280	350	470	550	630	770	890
DET_COW2	0.044	30	50	60	80	140	190	270	320

Table C.1 -- Existing HEC-HMS Results

Basin	DA (sq mi)	Existing 2 Year	Existing 5 Year	Existing 10 Year	Existing 25 Year	Existing 50 Year	Existing 100 Year	Existing 250 Year	Existing 500 Year
DET_COW3	0.098	30	40	60	160	240	310	400	460
J_CET01	0.618	480	670	800	990	1,130	1,270	1,470	1,660
J_CNT01	0.307	230	340	430	540	640	750	910	1,050
J_COW01	0.430	250	370	460	580	660	770	930	1,060
J_COW02	0.737	420	630	790	1,000	1,170	1,360	1,660	1,920
J_COW03	0.772	430	650	800	1,020	1,190	1,370	1,690	1,950
J_COW04	1.390	900	1,310	1,590	2,000	2,310	2,640	3,120	3,490
J_COW05	1.496	920	1,280	1,560	2,000	2,310	2,690	3,190	3,590
J_COW06	1.595	940	1,300	1,570	2,020	2,340	2,710	3,280	3,680
J_COW07	2.221	1230	1,670	2,020	2,620	3,050	3,580	4,380	4,940
J_COW08	2.261	1230	1,680	2,020	2,620	3,060	3,580	4,400	4,970
J_COW09	2.831	1580	2,270	2,700	3,350	3,850	4,390	5,280	6,010
J_COW10	2.888	1580	2,270	2,710	3,360	3,860	4,410	5,300	6,050
J_COW11	3.229	1700	2,370	2,760	3,300	3,720	4,260	5,450	6,320
J_COW12	0.262	220	330	400	520	630	740	910	1,050
J_COW13	0.491	420	620	750	940	1,090	1,250	1,520	1,750
J_COW14	3.719	2030	2,700	3,200	3,780	4,220	4,810	6,050	7,300
J_COW15	4.098	2130	2,830	3,400	4,020	4,630	5,200	6,220	7,380
J_COW16	4.420	2210	2,910	3,400	4,100	4,510	5,050	6,060	6,990
J_COW17	0.386	380	520	620	770	890	1,030	1,270	1,530
J_COW18	4.805	2350	3,120	3,590	4,390	4,840	5,370	6,230	7,180
J_COW19	4.976	2400	3,170	3,610	4,460	4,940	5,450	6,290	7,250
J_Cowhorn	19.531	3090	4,330	5,410	8,190	11,690	13,040	18,260	22,640
J_CUT01	0.437	270	360	440	580	690	790	950	1,090
J_CUT02	0.626	480	630	740	910	1,070	1,240	1,490	1,710
J_CWT01	0.570	540	780	940	1,190	1,390	1,610	1,950	2,240
J_Stream_WC-2	5.340	1990	3,680	4,670	6,230	7,390	8,690	10,660	12,340
J_SWagner	22.622	3440	5,200	6,220	7,950	11,450	13,660	18,960	23,220
J_SWC 1	0.220	250	360	430	550	640	740	890	1,020
J_SWC 2	0.268	310	420	490	610	750	890	1,060	1,220
J_SWC 3	0.831	560	770	910	1,190	1,440	1,700	2,090	2,410
J_SWC 4	1.169	590	800	950	1,230	1,460	1,740	2,050	2,320
J_SWC 5	1.474	690	980	1,160	1,450	1,680	1,900	2,200	2,430
J_SWC1-1	0.639	580	840	1,010	1,260	1,470	1,690	2,050	2,340

Table C.1 -- Existing HEC-HMS Results

Basin	DA (sq mi)	Existing 2 Year	Existing 5 Year	Existing 10 Year	Existing 25 Year	Existing 50 Year	Existing 100 Year	Existing 250 Year	Existing 500 Year
J_WC01	0.933	420	740	960	1,280	1,550	1,840	2,300	2,690
J_WC02	1.667	750	1,350	1,780	2,400	2,880	3,420	4,280	4,970
J_WC03	1.872	810	1,470	1,920	2,610	3,130	3,720	4,660	5,420
J_WC04	2.307	1030	1,790	2,320	3,150	3,790	4,510	5,640	6,560
J_WC05	2.567	1160	2,000	2,580	3,490	4,190	4,970	6,200	7,190
J_WC06	3.732	1780	3,000	3,820	5,110	6,110	7,200	8,950	10,320
J_WC07	4.481	1740	3,080	4,000	5,380	6,450	7,650	9,450	10,960
J_WC08	6.134	1700	3,060	3,920	5,270	6,720	8,310	10,650	12,460
J_WC09	7.056	1830	3,260	4,140	5,550	7,060	8,740	11,210	13,120
J_WC1_1	0.244	220	320	430	580	670	780	940	1,070
J_WC1_2	0.376	170	340	500	730	910	1,080	1,350	1,530
J_WC1_3	0.551	220	370	530	800	1,010	1,230	1,550	1,780
J_WC1_4	0.658	270	450	590	890	1,120	1,380	1,750	2,000
J_WC1_5	0.818	350	570	710	960	1,220	1,500	1,930	2,200
J_WC1_6	0.922	420	670	850	1,110	1,320	1,580	2,020	2,330
J_WC10	2.115	1080	1,740	2,190	2,890	3,440	4,050	4,990	5,770
J_WC11	9.171	2080	3,660	4,620	6,300	8,170	10,290	13,410	15,830
J_WC12	9.667	2100	3,700	4,680	6,360	8,250	10,400	13,580	16,040
J_WC13	0.891	570	860	1,050	1,310	1,530	1,770	2,170	2,490
J_WC14	10.558	2270	3,750	4,780	6,510	8,170	10,380	13,710	16,230
J_WC15	10.992	2080	3,660	4,700	6,400	7,950	10,040	13,540	16,130
J_WC16	1.238	630	1,030	1,330	1,760	2,080	2,430	3,010	3,480
J_WC17	12.230	2240	4,110	5,270	7,160	8,820	10,670	14,380	16,850
J_WC18	12.431	2210	3,870	5,080	6,940	8,580	10,410	14,220	16,800
J_WC19	12.830	2230	3,910	5,140	7,010	8,680	10,530	14,420	16,950
J_WC2_2	0.288	200	300	370	490	580	680	840	960
J_WC2_3	0.411	270	430	530	690	810	960	1,180	1,350
J_WC2_4	0.468	300	450	550	760	900	1,080	1,330	1,550
J_WC2_5	0.733	470	720	880	1,220	1,470	1,740	2,160	2,510
J_WC2_6	0.788	450	680	880	1,280	1,510	1,820	2,260	2,620
J_WC20	13.091	2220	3,850	5,080	6,960	8,510	10,530	14,120	16,930
J_WC21	13.768	2120	3,650	4,730	6,950	8,280	10,040	13,710	16,680
J_WC22	14.015	2110	3,650	4,690	6,810	8,290	10,010	13,670	16,600
J_WC23	19.651	3060	4,330	5,400	7,940	11,640	13,010	18,240	22,330

Table C.1 -- Existing HEC-HMS Results

Basin	DA (sq mi)	Existing 2 Year	Existing 5 Year	Existing 10 Year	Existing 25 Year	Existing 50 Year	Existing 100 Year	Existing 250 Year	Existing 500 Year
J_WC24	20.057	3110	4,400	5,460	7,970	11,690	13,060	18,330	22,440
J_WC25	20.463	3070	4,430	5,480	7,860	11,510	13,090	18,290	22,420
J_WC26	20.701	3030	4,440	5,460	7,720	11,000	13,090	18,290	22,420
R_CET01	0.396	310	440	530	670	770	880	1,040	1,190
R_CNT01	0.197	180	260	320	400	460	540	640	730
R_COW01	0.300	210	310	380	480	560	650	780	890
R_COW02	0.737	420	630	780	990	1,160	1,340	1,630	1,870
R_COW03	1.390	890	1,250	1,520	1,940	2,250	2,600	3,080	3,460
R_COW04	1.496	920	1,280	1,540	1,980	2,300	2,650	3,180	3,580
R_COW05	2.221	1220	1,670	2,010	2,610	3,040	3,560	4,370	4,930
R_COW06	2.831	1560	2,240	2,670	3,310	3,790	4,330	5,250	5,990
R_COW07	2.888	1560	2,200	2,580	3,100	3,540	4,130	5,210	5,990
R_COW08	0.044	30	40	50	70	100	140	190	240
R_COW09	0.262	220	320	390	500	590	700	860	980
R_COW10	3.719	1990	2,670	3,180	3,770	4,200	4,770	5,950	7,030
R_COW11	4.098	2120	2,810	3,300	3,970	4,410	4,950	5,940	6,840
R_COW12	0.098	30	40	60	130	190	250	330	390
R_COW13	4.805	2350	3,090	3,570	4,390	4,830	5,360	6,220	7,170
R_COW14	4.976	2390	3,130	3,580	4,350	4,840	5,390	6,240	7,210
R_CUT01	0.283	180	270	340	450	530	610	740	850
R_CUT02	0.437	260	360	440	580	680	790	940	1,090
R_CWT01	0.414	370	550	670	860	1,000	1,170	1,420	1,640
R_SWC 1	0.220	250	350	420	520	620	730	880	1,010
R_SWC 2	0.639	510	700	840	1,080	1,290	1,520	1,860	2,130
R_SWC 3	0.831	540	740	880	1,130	1,330	1,560	1,860	2,110
R_SWC 4	1.169	570	780	930	1,180	1,380	1,610	1,930	2,160
R_SWC 5	1.474	630	890	1,070	1,390	1,630	1,860	2,160	2,400
R_WC01	0.552	310	530	680	900	1,080	1,280	1,580	1,830
R_WC02	1.667	740	1,340	1,750	2,370	2,840	3,380	4,220	4,910
R_WC03	2.307	1020	1,780	2,310	3,140	3,770	4,480	5,610	6,510
R_WC04	3.732	1590	2,770	3,580	4,800	5,760	6,810	8,420	9,750
R_WC05	5.340	1640	2,950	3,770	5,040	6,380	7,850	10,000	11,630
R_WC06	1.145	670	1,060	1,320	1,720	2,040	2,390	2,930	3,380
R_WC08	9.171	2070	3,650	4,610	6,270	8,130	10,240	13,370	15,790

Table C.1 -- Existing HEC-HMS Results

Basin	DA (sq mi)	Existing 2 Year	Existing 5 Year	Existing 10 Year	Existing 25 Year	Existing 50 Year	Existing 100 Year	Existing 250 Year	Existing 500 Year
R_WC09	0.599	460	670	810	1,010	1,170	1,350	1,630	1,860
R_WC1_1	0.070	80	110	150	200	230	270	320	360
R_WC1_2	0.244	150	270	380	540	650	750	920	1,050
R_WC1_3	0.376	170	300	420	620	780	950	1,200	1,380
R_WC1_4	0.658	270	440	580	870	1,100	1,350	1,730	1,980
R_WC1_5	0.818	350	570	710	960	1,220	1,500	1,910	2,200
R_WC10	10.558	2050	3,620	4,630	6,260	7,870	9,940	13,400	15,950
R_WC11	0.431	290	450	560	730	860	1,000	1,230	1,410
R_WC12	12.230	2200	3,850	5,050	6,900	8,540	10,350	14,110	16,730
R_WC13	12.830	2210	3,830	5,050	6,920	8,450	10,460	14,060	16,850
R_WC14	13.091	2090	3,630	4,710	6,850	8,170	9,940	13,560	16,480
R_WC15	13.768	2100	3,640	4,690	6,780	8,260	9,980	13,620	16,540
R_WC16	19.531	3050	4,320	5,390	7,930	11,620	13,000	18,220	22,310
R_WC17	20.057	3050	4,380	5,430	7,830	11,490	13,030	18,220	22,330
R_WC18	20.463	3020	4,410	5,430	7,700	10,970	13,060	18,250	22,370
R_WC19	22.622	3330	4,960	6,130	7,700	11,160	13,510	18,790	22,870
R_WC2_1	0.174	140	210	250	320	380	440	530	610
R_WC2_2	0.288	180	290	360	460	540	640	790	910
R_WC2_3	0.411	270	410	510	680	810	950	1,170	1,350
R_WC2_4	0.733	440	660	860	1,230	1,460	1,740	2,160	2,500
R_WC2_5	0.788	440	650	850	1,180	1,450	1,750	2,210	2,570
WC_Outlet	23.349	3360	5,010	6,190	7,770	11,230	13,610	18,910	23,020

Table C.2
Ultimate HEC-HMS Results

Table C.2 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 250 Year	Ultimate 500 Year
Clear Creek HECHMS Output									
B_CC1	0.204	320	440	530	670	770	890	1,080	1,230
B_CC10	0.171	220	290	340	420	480	550	650	730
B_CC11	0.487	590	820	980	1,220	1,410	1,630	1,960	2,230
B_CC12	0.221	250	360	440	560	650	760	920	1,060
B_CC13	0.491	440	660	810	1,040	1,230	1,430	1,750	2,010
B_CC14	0.166	140	230	290	390	470	550	690	810
B_CC15	0.232	310	460	570	740	870	1,020	1,260	1,450
B_CC16	1.175	1,800	2,500	2,980	3,700	4,280	4,920	5,920	6,750
B_CC2	0.169	160	220	260	320	360	420	500	560
B_CC3	0.059	100	130	160	200	230	260	320	360
B_CC4	0.379	550	760	900	1,120	1,290	1,480	1,780	2,030
B_CC5	0.246	330	460	550	690	800	920	1,110	1,270
B_CC6	0.567	570	810	960	1,200	1,380	1,580	1,900	2,160
B_CC7	0.049	100	140	160	200	230	260	320	360
B_CC8	0.216	310	410	480	590	680	780	930	1,050
B_CC9	0.213	260	350	420	520	600	690	830	950
BRINGLE LAKE	5.045	770	1,210	1,560	2,210	2,750	3,360	4,270	5,070
J_CC1	0.204	320	440	530	670	770	890	1,080	1,230
J_CC10	2.273	1,820	2,680	3,310	4,290	5,140	6,100	7,490	8,690
J_CC11	5.045	4,180	6,000	7,310	9,370	10,960	12,780	15,700	18,140
J_CC1A	0.373	390	550	660	830	960	1,110	1,350	1,540
J_CC2	0.373	190	350	470	660	810	970	1,180	1,370
J_CC3	0.619	440	680	950	1,300	1,590	1,870	2,270	2,620
J_CC4	0.678	460	720	980	1,360	1,660	1,970	2,410	2,790
J_CC5	1.057	910	1,280	1,600	2,210	2,700	3,230	3,980	4,590
J_CC6	1.106	910	1,290	1,620	2,220	2,710	3,240	4,010	4,630
J_CC7	1.673	1,480	2,090	2,570	3,410	4,080	4,810	5,860	6,730
J_CC8	1.889	1,550	2,250	2,780	3,640	4,360	5,150	6,320	7,310
J_CC9	2.273	1,830	2,680	3,310	4,300	5,150	6,100	7,490	8,700
OUTLET	5.045	770	1,210	1,560	2,210	2,750	3,360	4,270	5,070
R_CC1	0.619	420	670	920	1,270	1,550	1,840	2,240	2,580

Table C.2 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 250 Year	Ultimate 500 Year
R_CC2	1.057	890	1,260	1,580	2,170	2,650	3,180	3,930	4,540
R_CC3	1.673	1,410	2,040	2,530	3,320	3,980	4,700	5,740	6,610
R_CC4	2.273	1,820	2,680	3,310	4,290	5,140	6,100	7,490	8,690
SKYLINE LAKE	0.373	190	350	470	660	810	970	1,180	1,370
Howard HECHMS Output									
B_COC01	0.424	480	640	750	910	1,030	1,180	1,390	1,570
B_COC02	0.188	250	340	400	490	560	640	760	860
B_COC03	0.262	400	540	640	780	900	1,040	1,240	1,410
B_COC04	0.239	290	390	470	580	660	760	910	1,030
B_COC05	0.206	270	370	440	540	620	710	850	960
B_COC06	0.559	600	840	1,000	1,240	1,430	1,640	1,960	2,230
B_HOW01	1.088	950	1,300	1,540	1,880	2,150	2,460	2,920	3,310
B_HOW02	0.55	680	910	1,070	1,300	1,490	1,700	2,020	2,290
B_HOW03	0.464	480	660	780	960	1,110	1,270	1,510	1,710
B_HOW04	0.604	600	820	970	1,190	1,370	1,560	1,860	2,110
B_HOW05	0.343	450	600	710	870	990	1,130	1,350	1,530
B_HOW06	0.535	660	890	1,050	1,280	1,470	1,680	2,000	2,270
B_HOW07	0.282	520	690	810	980	1,130	1,290	1,550	1,760
B_HOW08	0.671	800	1,090	1,290	1,580	1,820	2,080	2,490	2,830
B_HOW09	0.21	310	410	480	580	660	760	900	1,020
B_HOW10	0.335	320	450	540	670	780	900	1,080	1,230
B_HOW11	0.279	220	320	390	490	570	660	800	920
B_HOW12	0.15	190	270	320	390	450	520	630	710
B_HOW13	0.322	460	610	720	890	1,020	1,170	1,400	1,590
J_COC01	0.424	480	640	750	910	1,030	1,180	1,390	1,570
J_COC02	0.612	700	940	1,100	1,340	1,530	1,740	2,070	2,340
J_COC03	0.874	800	1,090	1,250	1,430	1,600	1,800	2,090	2,490
J_COC04	1.113	1,040	1,410	1,660	2,000	2,260	2,540	2,960	3,290
J_COC05	1.319	1,170	1,530	1,760	2,050	2,260	2,420	2,800	3,250
J_COC06	1.878	1,640	2,210	2,560	3,040	3,400	3,740	4,220	4,650
J_HOW01	1.638	1,090	1,550	1,860	2,310	2,670	3,080	3,690	4,190
J_HOW02	2.102	1,330	1,900	2,310	2,880	3,360	3,900	4,740	5,430

Table C.2 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 250 Year	Ultimate 500 Year
J_HOW03	2.706	1,740	2,520	3,070	3,850	4,360	4,840	5,310	5,610
J_HOW04	3.049	1,970	2,840	3,470	4,340	4,970	5,520	6,240	6,760
J_HOW05	3.584	2,030	2,740	3,020	3,360	3,630	3,820	4,250	4,670
J_HOW06	3.866	1,960	2,690	3,030	3,360	3,600	3,810	4,100	4,300
J_HOW07	4.537	1,960	2,790	3,140	3,480	3,740	4,200	5,350	6,240
J_HOW08	4.747	1,950	2,800	3,160	3,520	3,780	4,390	5,570	6,520
J_HOW09	5.082	1,940	2,810	3,200	3,560	3,840	4,560	5,810	6,850
J_HOW10	5.361	1,930	2,790	3,180	3,570	3,840	4,460	5,860	7,020
J_HOW11	7.239	2,250	3,120	3,700	4,780	5,590	6,370	8,980	10,900
J_HOW12	7.389	2,090	2,960	3,490	4,740	5,640	6,420	8,890	10,820
Outlet	7.711	2,060	2,950	3,490	4,410	5,510	6,450	8,590	10,470
R_COC01	0.612	660	890	1,010	1,130	1,240	1,380	1,750	2,090
R_COC02	1.113	1,020	1,360	1,570	1,810	2,000	2,140	2,460	2,890
R_COC03	1.319	1,160	1,520	1,750	2,040	2,240	2,410	2,760	3,210
R_HOW01	1.088	870	1,220	1,450	1,790	2,060	2,370	2,820	3,190
R_HOW02	2.102	1,310	1,880	2,290	2,870	3,330	3,750	4,110	4,400
R_HOW03	3.049	1,830	2,540	2,890	3,230	3,490	3,680	3,950	4,120
R_HOW04	3.584	1,930	2,650	2,980	3,310	3,550	3,750	4,030	4,230
R_HOW05	3.866	1,890	2,680	3,020	3,350	3,600	3,800	4,090	4,300
R_HOW06	4.537	1,930	2,770	3,130	3,480	3,740	4,060	5,110	5,950
R_HOW07	4.747	1,920	2,770	3,140	3,500	3,760	4,220	5,280	6,160
R_HOW08	5.082	1,920	2,760	3,150	3,530	3,790	4,330	5,540	6,580
R_HOW09	7.239	2,060	2,950	3,460	4,700	5,570	6,350	8,810	10,710
R_HOW10	7.389	2,030	2,930	3,440	4,340	5,420	6,340	8,470	10,330
Swampoodle HECHMS Output									
B_SPC1	0.123	230	300	350	430	490	560	660	750
B_SPC10	0.129	200	270	320	390	450	520	620	700
B_SPC11	0.139	230	300	350	430	490	560	670	760
B_SPC12	0.178	310	400	470	580	660	760	910	1,030
B_SPC13	0.124	260	340	390	480	540	620	740	840
B_SPC14	0.544	620	830	980	1,190	1,360	1,550	1,840	2,080
B_SPC15	0.4	570	750	890	1,080	1,230	1,410	1,670	1,900

Table C.2 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 250 Year	Ultimate 500 Year
B_SPC16	0.51	720	940	1,100	1,330	1,510	1,720	2,040	2,310
B_SPC2	0.039	70	100	110	140	160	180	220	240
B_SPC3	0.153	170	240	290	370	430	490	590	680
B_SPC4	0.086	120	160	190	230	270	300	360	410
B_SPC5	0.018	40	50	60	70	80	100	120	130
B_SPC6	0.037	80	100	120	150	170	190	230	260
B_SPC7	0.109	190	250	300	370	420	490	590	670
B_SPC8	0.141	270	360	420	520	590	680	820	930
B_SPC9	0.082	180	230	270	330	370	430	510	580
B_SPCET1	0.123	280	360	420	510	580	660	790	890
B_SPCET2	0.279	390	540	640	790	910	1,050	1,270	1,450
B_SPCET3	0.137	200	280	340	420	490	560	680	780
B_SPCET4	0.223	280	390	460	570	660	750	910	1,030
B_SPCET5	0.191	380	500	590	730	830	960	1,150	1,310
B_SPCWC1	0.362	350	490	590	740	850	980	1,180	1,340
B_SPCWC2	0.299	420	570	670	830	950	1,090	1,300	1,480
J_SPC1	0.162	290	380	450	540	610	690	830	940
J_SPC10	0.141	270	360	420	530	670	860	1,160	1,410
J_SPC11	2.32	1,990	2,590	3,120	3,840	4,330	4,860	5,870	6,700
J_SPC12	2.402	2,000	2,620	3,160	3,890	4,400	4,940	5,950	6,760
J_SPC13	0.129	200	270	320	390	450	520	620	700
J_SPC14	2.531	2,070	2,710	3,280	4,060	4,600	5,220	6,210	7,000
J_SPC15	2.67	2,130	2,790	3,380	4,190	4,790	5,400	6,400	7,200
J_SPC16	0.178	310	400	470	580	660	760	910	1,030
J_SPC17	2.848	2,220	3,010	3,560	4,370	5,030	5,810	6,730	7,560
J_SPC18	2.972	2,260	3,060	3,600	4,430	5,120	5,890	6,850	7,680
J_SPC19	0.944	1,140	1,520	1,790	2,180	2,500	2,850	3,380	3,830
J_SPC2	0.153	170	240	290	370	430	490	590	680
J_SPC20	3.916	3,300	4,450	5,320	6,580	7,500	8,500	9,930	10,960
J_SPC3	0.315	440	600	710	870	1,000	1,150	1,380	1,570
J_SPC4	0.401	540	740	880	1,080	1,250	1,410	1,690	1,920
J_SPC5	0.419	800	1,140	1,370	1,700	1,940	2,190	2,560	2,860
J_SPC6	1.08	1,210	1,680	2,000	2,440	2,730	2,990	3,400	3,720
J_SPC7	2.033	1,890	2,540	3,000	3,640	4,080	4,550	5,400	6,070

Table C.2 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 250 Year	Ultimate 500 Year
J_SPC8	2.07	1,870	2,470	2,960	3,630	4,080	4,550	5,430	6,100
J_SPC9	2.179	1,920	2,520	3,020	3,720	4,190	4,670	5,560	6,240
J_SPCET1	0.539	310	510	730	1,010	1,240	1,500	1,850	2,150
J_SPCET2	0.223	280	390	460	570	660	750	910	1,030
J_SPCET3	0.762	580	790	940	1,300	1,620	1,970	2,490	2,900
J_SPCET4	0.953	690	920	1,070	1,310	1,650	2,020	2,530	2,960
J_SPCWC_DIV1	0.401	640	970	1,200	1,540	1,770	2,000	2,370	2,650
J_SPCWC_DIV2	0.401	800	1,130	1,360	1,700	1,940	2,190	2,570	2,860
Outlet	4.426	3,120	4,010	4,910	5,740	6,560	7,570	9,280	10,410
R_SPC1	0.123	230	290	340	420	470	540	640	720
R_SPC2	0.315	430	590	700	860	990	1,130	1,350	1,530
R_SPC3	0.401	790	1,120	1,350	1,680	1,920	2,170	2,540	2,830
R_SPC4	2.033	1,860	2,450	2,940	3,590	4,050	4,520	5,380	6,050
R_SPC5	2.07	1,870	2,460	2,940	3,600	4,070	4,540	5,420	6,080
R_SPC6	2.32	1,960	2,580	3,100	3,830	4,330	4,850	5,850	6,660
R_SPC7	2.531	2,060	2,700	3,260	4,040	4,590	5,180	6,170	6,970
R_SPC8	2.848	2,210	2,970	3,490	4,340	5,010	5,750	6,700	7,520
R_SPC9	3.916	3,000	3,890	4,690	5,580	6,380	7,310	8,920	9,970
R_SPCET1	0.123	130	250	320	390	470	550	660	750
R_SPCET2	0.402	260	450	650	900	1,100	1,320	1,630	1,870
R_SPCET3	0.762	570	760	880	1,200	1,510	1,860	2,330	2,730
R_SPCWC1	0.362	70	70	70	80	120	180	280	370
SPCET_DET1	0.123	210	350	420	510	580	660	780	890
SPCET_DET2	0.402	300	590	790	1,040	1,240	1,450	1,780	2,040
SPCWC_DIV1	0.362	220	220	220	250	300	370	490	590
SPCWC_DIV2	0.362	70	70	70	80	120	180	280	370
SPCWC_DIV3	0.661	460	630	720	790	810	830	860	880
Wagner Creek HECHMS Output (includes Cowhorn Creek)									
B_CET01	0.3962	370	510	610	750	870	990	1,190	1,350
B_CET02	0.2218	250	330	390	480	550	620	740	840
B_CNT01	0.197	230	310	370	450	520	600	720	810
B_CNT02	0.1103	250	320	370	450	510	580	690	780

Table C.2 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 250 Year	Ultimate 500 Year
B_COW01	0.3004	280	390	460	570	650	750	890	1,010
B_COW02	0.1292	200	270	310	380	430	490	590	670
B_COW03	0.0346	80	100	110	130	150	170	210	230
B_COW04	0.106	200	260	300	360	410	470	550	630
B_COW05	0.0998	190	240	280	340	390	450	530	610
B_COW06	0.0394	80	100	120	140	160	190	220	250
B_COW07	0.0574	90	120	150	180	210	250	300	340
B_COW08	0.3401	540	720	850	1,040	1,190	1,360	1,630	1,850
B_COW09	0.044	110	140	160	200	220	250	300	330
B_COW10	0.2176	250	350	420	520	610	700	840	950
B_COW11	0.2289	370	500	580	720	820	950	1,130	1,290
B_COW12	0.3785	640	860	1,020	1,250	1,440	1,660	1,990	2,270
B_COW13	0.3224	500	690	820	1,010	1,170	1,340	1,620	1,850
B_COW14	0.0977	130	180	220	270	320	360	440	500
B_COW15	0.2878	430	580	680	830	950	1,090	1,300	1,480
B_COW16	0.1705	330	430	510	620	710	810	980	1,110
B_COW17	0.5402	530	730	870	1,070	1,230	1,400	1,670	1,900
B_CUT01	0.2827	300	420	510	630	730	840	1,010	1,150
B_CUT02	0.1547	200	280	330	410	480	550	670	770
B_CUT03	0.1887	360	460	540	660	750	860	1,030	1,170
B_CWT01	0.4137	500	680	800	980	1,130	1,290	1,540	1,750
B_CWT02	0.1565	230	300	350	420	480	550	650	730
B_SWC 01	0.371	360	500	590	720	830	950	1,140	1,290
B_SWC 02	0.22	340	470	560	690	790	910	1,100	1,250
B_SWC 03	0.192	310	410	480	590	670	770	920	1,050
B_SWC 04	0.338	520	700	820	1,010	1,160	1,330	1,600	1,820
B_SWC 05	0.305	450	620	730	910	1,050	1,220	1,470	1,680
B_SWC 06	0.447	450	620	740	920	1,060	1,220	1,460	1,660
B_SWC 2A	0.048	110	140	160	190	210	240	290	330
B_WC01	0.5517	720	990	1,170	1,440	1,650	1,890	2,270	2,580
B_WC02	0.3809	460	660	800	1,010	1,180	1,370	1,660	1,910
B_WC03	0.734	780	1,090	1,310	1,630	1,880	2,160	2,600	2,960
B_WC04	0.2053	190	270	330	410	480	550	660	750
B_WC05	0.4354	440	630	750	940	1,090	1,260	1,510	1,720

Table C.2 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 250 Year	Ultimate 500 Year
B_WC06	0.2593	200	280	340	420	490	560	670	760
B_WC07	0.249	210	300	360	460	530	610	740	840
B_WC08	0.9163	690	980	1,170	1,460	1,690	1,940	2,320	2,640
B_WC09	0.7486	570	830	1,000	1,250	1,450	1,670	2,010	2,290
B_WC1_1	0.07	160	200	230	280	310	360	420	480
B_WC1_2	0.174	300	390	460	560	640	730	870	990
B_WC1_3	0.132	230	300	350	420	490	560	660	750
B_WC1_4	0.175	180	260	310	380	440	500	600	680
B_WC1_5	0.107	180	240	280	340	390	450	530	610
B_WC1_6	0.16	370	470	540	650	740	840	1,000	1,130
B_WC1_7	0.104	210	270	320	380	430	490	590	660
B_WC10	0.7943	670	900	1,060	1,280	1,460	1,670	1,970	2,220
B_WC11	1.1451	1,280	1,730	2,040	2,480	2,840	3,240	3,860	4,370
B_WC12	0.9698	790	1,070	1,270	1,550	1,770	2,020	2,400	2,720
B_WC15	0.4967	670	900	1,060	1,290	1,480	1,690	2,020	2,290
B_WC16	0.5994	750	990	1,160	1,400	1,590	1,810	2,150	2,420
B_WC17	0.2911	350	460	540	650	750	850	1,000	1,130
B_WC18	0.434	530	720	850	1,040	1,200	1,370	1,630	1,850
B_WC19	0.4312	450	630	750	930	1,070	1,220	1,460	1,660
B_WC2_01	0.174	200	270	320	390	450	510	610	690
B_WC2_02	0.114	210	290	340	410	470	540	650	740
B_WC2_03	0.123	160	220	270	330	390	450	540	610
B_WC2_04	0.057	100	140	170	210	240	280	340	390
B_WC2_05	0.265	320	430	510	630	720	830	990	1,120
B_WC2_06	0.055	90	130	150	180	210	240	290	330
B_WC2_07	0.071	100	140	160	200	230	270	320	370
B_WC20	0.8072	860	1,190	1,420	1,760	2,020	2,320	2,780	3,160
B_WC21	0.2009	270	370	440	530	610	700	830	950
B_WC22	0.3985	490	660	790	970	1,110	1,270	1,520	1,730
B_WC23	0.2616	200	300	370	480	570	660	810	930
B_WC24	0.6766	510	730	880	1,110	1,290	1,480	1,790	2,040
B_WC25	0.2472	370	500	580	720	820	950	1,130	1,290
B_WC26	0.1195	200	270	310	390	440	510	610	700
B_WC27	0.4059	640	840	990	1,200	1,370	1,560	1,860	2,110

Table C.2 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 250 Year	Ultimate 500 Year
B_WC28	0.4063	490	670	800	990	1,140	1,310	1,570	1,780
B_WC29	0.2381	270	370	440	540	610	700	840	950
B_WC30	0.7267	710	980	1,160	1,420	1,640	1,870	2,230	2,530
COW_Outlet	5.5161	2,980	3,580	4,100	4,840	5,380	5,970	6,890	7,890
DET_COW01	0.2827	240	350	440	550	630	720	880	1,010
DET_COW02	0.044	40	50	60	90	140	200	270	330
DET_COW03	0.0977	30	50	110	210	280	350	430	500
J_CET01	0.618	560	750	880	1,060	1,190	1,330	1,530	1,720
J_CNT01	0.3073	330	450	530	650	750	860	1,030	1,170
J_COW01	0.4296	330	460	550	660	750	860	1,030	1,160
J_COW02	0.7369	580	800	950	1,170	1,360	1,560	1,860	2,110
J_COW03	0.7715	590	810	970	1,180	1,360	1,560	1,890	2,130
J_COW04	1.3895	1,130	1,550	1,840	2,230	2,540	2,870	3,340	3,720
J_COW05	1.4955	1,110	1,500	1,820	2,230	2,530	2,940	3,400	3,800
J_COW06	1.5953	1,130	1,520	1,830	2,250	2,560	2,980	3,490	3,900
J_COW07	2.2214	1,470	1,940	2,340	2,910	3,330	3,960	4,680	5,260
J_COW08	2.2608	1,490	1,940	2,340	2,910	3,340	3,960	4,710	5,290
J_COW09	2.831	2,040	2,720	3,190	3,840	4,350	4,890	5,700	6,450
J_COW10	2.8884	2,050	2,730	3,200	3,850	4,370	4,930	5,780	6,500
J_COW11	3.2285	2,130	2,760	3,160	3,670	4,120	4,770	5,890	6,770
J_COW12	0.2616	280	390	460	590	700	830	1,020	1,170
J_COW13	0.4905	530	740	870	1,050	1,200	1,370	1,640	1,890
J_COW14	3.719	2,420	3,170	3,570	4,110	4,620	5,450	6,820	8,060
J_COW15	4.0975	2,530	3,330	3,780	4,400	4,910	5,590	6,860	7,940
J_COW16	4.4199	2,620	3,320	3,820	4,370	4,840	5,450	6,520	7,390
J_COW17	0.3855	440	590	690	850	970	1,120	1,400	1,660
J_COW18	4.8054	2,780	3,480	4,040	4,650	5,110	5,620	6,690	7,580
J_COW19	4.9759	2,830	3,490	4,060	4,730	5,170	5,690	6,740	7,650
J_Cowhorn	19.5312	4,110	5,760	8,320	12,020	14,210	17,530	22,840	26,480
J_CUT01	0.4374	310	440	540	680	790	890	1,080	1,210
J_CUT02	0.6261	540	700	820	1,020	1,180	1,350	1,610	1,850
J_CWT01	0.5702	700	940	1,110	1,360	1,560	1,770	2,110	2,430
J_Stream_WC-02	5.3395	3,410	4,950	6,050	7,600	8,810	10,130	12,240	13,900
J_SWagner	22.622	4,760	6,480	7,960	12,330	14,480	18,050	23,210	27,460

Table C.2 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 250 Year	Ultimate 500 Year
J_SWC 01	0.22	340	470	560	690	790	910	1,100	1,250
J_SWC 02	0.268	400	510	590	790	940	1,070	1,310	1,490
J_SWC 03	0.831	630	830	990	1,270	1,520	1,780	2,150	2,470
J_SWC 04	1.169	790	1,030	1,190	1,430	1,620	1,850	2,220	2,540
J_SWC 05	1.474	860	1,120	1,300	1,550	1,750	1,980	2,340	2,640
J_SWC1-01	0.639	670	920	1,090	1,340	1,530	1,760	2,110	2,400
J_WC01	0.9326	800	1,140	1,370	1,730	2,010	2,340	2,850	3,270
J_WC02	1.6666	1,430	2,090	2,540	3,200	3,750	4,350	5,300	6,100
J_WC03	1.8719	1,540	2,270	2,770	3,500	4,090	4,760	5,780	6,630
J_WC04	2.3073	1,850	2,730	3,350	4,240	4,960	5,770	7,020	8,020
J_WC05	2.5666	2,030	2,990	3,660	4,620	5,400	6,280	7,600	8,700
J_WC06	3.7319	2,890	4,220	5,140	6,470	7,560	8,760	10,580	12,080
J_WC07	4.4805	2,850	4,280	5,260	6,680	7,820	9,040	10,980	12,490
J_WC08	6.1338	2,750	4,050	4,940	6,740	8,250	9,870	12,170	14,020
J_WC09	7.0558	2,900	4,250	5,180	7,050	8,620	10,300	12,710	14,650
J_WC1_01	0.244	340	460	600	790	920	1,050	1,260	1,440
J_WC1_02	0.376	280	550	750	1,020	1,240	1,430	1,770	1,980
J_WC1_03	0.551	380	600	820	1,140	1,380	1,620	2,010	2,420
J_WC1_04	0.658	450	660	900	1,240	1,510	1,770	2,190	2,650
J_WC1_05	0.818	580	790	970	1,330	1,600	1,900	2,330	2,760
J_WC1_06	0.922	780	1,050	1,230	1,500	1,700	2,000	2,450	2,890
J_WC10	2.1149	1,820	2,520	3,030	3,750	4,330	4,980	5,970	6,780
J_WC11	9.1707	3,220	4,690	5,760	8,050	10,020	12,110	15,100	17,480
J_WC12	9.6674	3,250	4,740	5,820	8,110	10,090	12,230	15,250	17,690
J_WC13	0.8905	890	1,190	1,420	1,730	1,970	2,300	2,760	3,150
J_WC14	10.5579	3,970	5,660	6,980	8,880	10,570	12,760	15,930	18,520
J_WC15	10.9919	3,820	5,480	6,720	8,640	10,230	12,580	15,770	18,460
J_WC16	1.2384	910	1,290	1,550	1,930	2,250	2,600	3,150	3,610
J_WC17	12.2303	4,180	6,050	7,410	9,570	11,350	14,140	16,960	19,610
J_WC18	12.4312	3,920	5,800	7,110	9,240	10,970	13,090	16,940	19,560
J_WC19	12.8297	3,950	5,860	7,180	9,340	11,090	13,310	17,210	19,900
J_WC2_02	0.288	280	390	470	590	680	780	940	1,070
J_WC2_03	0.411	400	560	670	830	970	1,140	1,380	1,590
J_WC2_04	0.468	400	560	690	880	1,040	1,220	1,490	1,690

Table C.2 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 250 Year	Ultimate 500 Year
J_WC2_05	0.733	710	960	1,200	1,500	1,760	2,040	2,460	2,800
J_WC2_06	0.788	620	960	1,260	1,580	1,840	2,130	2,590	2,940
J_WC20	13.0913	3,850	5,780	7,100	9,010	11,080	12,690	17,210	20,060
J_WC21	13.7679	3,510	5,330	7,010	8,590	10,350	12,310	16,040	18,630
J_WC22	14.0151	3,480	4,910	6,810	8,590	10,160	12,250	16,040	18,720
J_WC23	19.6507	4,120	5,760	8,010	12,010	14,120	17,430	22,320	26,370
J_WC24	20.0566	4,160	5,810	8,050	12,070	14,180	17,520	22,440	26,530
J_WC25	20.4629	4,180	5,820	7,890	12,170	14,070	17,390	22,260	26,420
J_WC26	20.701	4,160	5,800	7,700	11,680	13,990	17,350	22,270	26,280
R_CET01	0.3962	360	490	580	710	810	920	1,090	1,230
R_CNT01	0.197	220	310	370	450	520	590	710	800
R_COW01	0.3004	270	380	450	550	630	720	860	970
R_COW02	0.7369	570	790	940	1,160	1,330	1,520	1,820	2,060
R_COW03	1.3895	1,080	1,460	1,770	2,160	2,460	2,840	3,280	3,670
R_COW04	1.4955	1,110	1,490	1,800	2,210	2,510	2,900	3,390	3,790
R_COW05	2.2214	1,470	1,930	2,330	2,890	3,320	3,930	4,670	5,250
R_COW06	2.831	2,020	2,690	3,150	3,780	4,280	4,820	5,640	6,360
R_COW07	2.8884	2,000	2,590	2,960	3,460	3,890	4,550	5,600	6,360
R_COW08	0.044	30	50	50	80	100	140	200	240
R_COW09	0.2616	270	370	440	560	660	780	940	1,080
R_COW10	3.719	2,400	3,140	3,560	4,100	4,600	5,320	6,520	7,560
R_COW11	4.0975	2,520	3,230	3,710	4,270	4,750	5,350	6,390	7,250
R_COW12	0.0977	30	50	90	170	230	280	360	420
R_COW13	4.8054	2,770	3,460	4,020	4,640	5,100	5,610	6,680	7,570
R_COW14	4.9759	2,790	3,450	3,970	4,640	5,130	5,640	6,680	7,620
R_CUT01	0.2827	240	330	420	530	600	680	830	940
R_CUT02	0.4374	310	430	540	680	780	890	1,070	1,200
R_CWT01	0.4137	500	670	800	980	1,120	1,280	1,530	1,740
R_SWC 01	0.22	330	430	500	670	790	900	1,090	1,240
R_SWC 02	0.639	560	750	890	1,130	1,340	1,560	1,880	2,150
R_SWC 03	0.831	610	810	950	1,200	1,400	1,630	1,920	2,180
R_SWC 04	1.169	710	920	1,070	1,290	1,470	1,700	2,020	2,270
R_SWC 05	1.474	800	1,050	1,240	1,520	1,700	1,890	2,180	2,410
R_WC01	0.5517	630	870	1,040	1,290	1,490	1,730	2,080	2,370

Table C.2 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 250 Year	Ultimate 500 Year
R_WC02	1.6666	1,400	2,060	2,500	3,160	3,690	4,290	5,220	5,980
R_WC03	2.3073	1,840	2,710	3,320	4,200	4,920	5,730	6,940	7,940
R_WC04	3.7319	2,600	3,870	4,730	5,990	7,000	8,100	9,820	11,190
R_WC05	5.3395	2,650	3,900	4,740	6,400	7,780	9,270	11,370	13,070
R_WC06	1.1451	1,110	1,520	1,830	2,260	2,600	2,990	3,590	4,080
R_WC08	9.1707	3,210	4,680	5,740	8,000	9,960	12,060	15,050	17,450
R_WC09	0.5994	680	910	1,060	1,290	1,470	1,690	2,020	2,290
R_WC1_01	0.07	100	160	200	260	300	340	410	460
R_WC1_02	0.244	220	410	550	730	870	1,010	1,220	1,380
R_WC1_03	0.376	250	450	620	850	1,040	1,220	1,500	1,800
R_WC1_04	0.658	440	650	880	1,220	1,470	1,750	2,140	2,540
R_WC1_05	0.818	570	780	970	1,310	1,590	1,890	2,320	2,730
R_WC10	10.5579	3,760	5,380	6,600	8,470	10,030	12,440	15,600	18,250
R_WC11	0.4312	370	530	640	800	920	1,070	1,290	1,470
R_WC12	12.2303	3,900	5,770	7,070	9,190	10,910	12,990	16,820	19,420
R_WC13	12.8297	3,830	5,750	7,060	8,960	11,000	12,590	17,040	19,830
R_WC14	13.0913	3,480	5,270	6,910	8,490	10,190	12,100	15,830	18,370
R_WC15	13.7679	3,470	4,890	6,790	8,560	10,120	12,200	15,970	18,630
R_WC16	19.5312	4,110	5,740	8,000	11,990	14,100	17,410	22,280	26,330
R_WC17	20.0566	4,150	5,780	7,850	12,110	14,010	17,310	22,160	26,280
R_WC18	20.4629	4,140	5,780	7,680	11,640	13,950	17,310	22,210	26,200
R_WC19	22.622	4,520	6,390	7,650	11,650	14,310	17,970	22,860	26,880
R_WC2_01	0.174	190	260	310	380	440	500	600	680
R_WC2_02	0.288	260	370	440	540	630	730	890	1,010
R_WC2_03	0.411	380	520	650	820	960	1,130	1,370	1,570
R_WC2_04	0.733	610	930	1,200	1,500	1,750	2,030	2,450	2,790
R_WC2_05	0.788	620	910	1,140	1,490	1,760	2,080	2,530	2,900
WC_Outlet	23.3487	4,560	6,450	7,700	11,740	14,400	18,100	23,020	27,090

Appendix D
Hydraulic Output and Profiles

Table D.1
HEC-RAS Output
Existing Conditions

HEC-RAS Plan: Clear_Existing River: CLEARCREEK Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	15694 A	2 YR	1250.00	296.70	302.37	298.29	302.38	0.00	0.84	1486.42	354.13	0.07
1	15694 A	5 YR	2000.00	296.70	302.95	298.67	302.97	0.00	1.18	1693.06	358.38	0.10
1	15694 A	10 YR	2570.00	296.70	303.26	298.92	303.29	0.00	1.43	1804.51	360.63	0.11
1	15694 A	25 YR	3500.00	296.70	303.86	299.28	303.91	0.00	1.73	2022.29	366.34	0.13
1	15694 A	50 YR	4250.00	296.70	304.32	299.54	304.38	0.00	1.94	2192.48	373.56	0.14
1	15694 A	100 YR	5070.00	296.70	305.03	299.80	305.10	0.00	2.07	2461.66	384.72	0.14
1	15694 A	250 YR	6300.00	296.70	305.56	300.16	305.65	0.00	2.39	2670.80	409.90	0.16
1	15694 A	500 YR	7240.00	296.70	306.02	300.41	306.12	0.00	2.58	2865.97	438.66	0.16
1	16484 B	2 YR	1260.00	297.52	303.75	303.75	304.42	0.01	7.32	316.17	280.15	0.61
1	16484 B	5 YR	2000.00	297.52	304.31	304.31	305.07	0.01	8.51	479.98	308.76	0.67
1	16484 B	10 YR	2570.00	297.52	304.60	304.60	305.46	0.02	9.37	573.03	319.71	0.72
1	16484 B	25 YR	3510.00	297.52	305.07	305.07	305.99	0.02	10.22	726.57	332.82	0.75
1	16484 B	50 YR	4250.00	297.52	305.31	305.31	306.36	0.02	11.15	807.29	339.52	0.80
1	16484 B	100 YR	5070.00	297.52	305.63	305.63	306.72	0.02	11.72	915.45	348.28	0.82
1	16484 B	250 YR	6300.00	297.52	306.31		307.29	0.02	11.57	1163.09	380.59	0.77
1	16484 B	500 YR	7250.00	297.52	306.90		307.75	0.01	11.12	1394.94	404.88	0.71
1	17242 C	2 YR	1100.00	299.00	306.96	303.96	307.05	0.00	3.22	764.71	355.08	0.23
1	17242 C	5 YR	1720.00	299.00	307.82	306.01	307.93	0.00	3.62	1087.57	393.00	0.24
1	17242 C	10 YR	2230.00	299.00	308.39	306.33	308.50	0.00	3.93	1319.13	426.36	0.25
1	17242 C	25 YR	3010.00	299.00	309.11	306.76	309.23	0.00	4.32	1640.22	468.70	0.26
1	17242 C	50 YR	3640.00	299.00	309.63	307.02	309.76	0.00	4.55	1894.57	499.70	0.27
1	17242 C	100 YR	4310.00	299.00	310.12	307.27	310.26	0.00	4.80	2145.26	534.47	0.28
1	17242 C	250 YR	5310.00	299.00	310.70		310.86	0.00	5.23	2480.87	598.43	0.29
1	17242 C	500 YR	6100.00	299.00	311.08		311.25	0.00	5.52	2709.34	622.46	0.30
1	18012	2 YR	1100.00	299.24	307.52		307.54	0.00	2.13	1234.06	344.31	0.14
1	18012	5 YR	1720.00	299.24	308.46		308.50	0.00	2.61	1580.31	377.61	0.16
1	18012	10 YR	2230.00	299.24	309.08		309.12	0.00	2.92	1817.96	389.97	0.17
1	18012	25 YR	3010.00	299.24	309.87		309.92	0.00	3.33	2131.57	405.69	0.19
1	18012	50 YR	3640.00	299.24	310.43		310.49	0.00	3.61	2362.94	416.91	0.20
1	18012	100 YR	4310.00	299.24	310.96		311.04	0.00	3.91	2588.57	431.85	0.21
1	18012	250 YR	5310.00	299.24	311.64		311.73	0.00	4.33	2887.39	450.78	0.22
1	18012	500 YR	6100.00	299.24	312.08		312.18	0.00	4.64	3087.06	459.72	0.24
1	18947	2 YR	1050.00	302.48	308.35		308.65	0.01	5.61	320.77	202.62	0.52
1	18947	5 YR	1620.00	302.48	309.42		309.62	0.00	4.96	620.97	317.85	0.41
1	18947	10 YR	2110.00	302.48	310.10		310.28	0.00	4.89	843.81	341.33	0.37
1	18947	25 YR	2840.00	302.48	310.95		311.12	0.00	4.90	1145.88	369.20	0.35
1	18947	50 YR	3420.00	302.48	311.54		311.71	0.00	4.93	1369.64	383.35	0.33
1	18947	100 YR	4030.00	302.48	312.11		312.28	0.00	4.99	1592.50	396.05	0.32
1	18947	250 YR	4910.00	302.48	312.85		313.02	0.00	5.11	1890.17	412.40	0.32
1	18947	500 YR	5650.00	302.48	313.35		313.53	0.00	5.28	2100.40	423.56	0.32
1	19427	2 YR	670.00	303.45	310.36		310.43	0.00	2.74	451.55	238.81	0.21
1	19427	5 YR	1030.00	303.45	310.97		311.05	0.00	3.14	601.38	252.57	0.23
1	19427	10 YR	1380.00	303.45	311.48		311.57	0.00	3.40	733.55	263.74	0.23
1	19427	25 YR	1910.00	303.45	312.18		312.28	0.00	3.69	923.76	282.20	0.24
1	19427	50 YR	2330.00	303.45	312.69		312.79	0.00	3.86	1071.39	302.63	0.25
1	19427	100 YR	2770.00	303.45	313.20		313.31	0.00	4.06	1239.55	334.34	0.25
1	19427	250 YR	3410.00	303.45	313.87		313.98	0.00	4.14	1463.87	344.05	0.24
1	19427	500 YR	3930.00	303.45	314.35		314.47	0.00	4.22	1632.28	351.16	0.24
1	20209 D	2 YR	670.00	306.19	311.87		312.03	0.00	4.41	268.79	143.72	0.37
1	20209 D	5 YR	1010.00	306.19	312.53		312.70	0.00	4.72	364.90	149.76	0.37
1	20209 D	10 YR	1370.00	306.19	313.07		313.27	0.00	5.09	447.26	154.74	0.38
1	20209 D	25 YR	1900.00	306.19	313.76		314.00	0.00	5.54	556.64	161.12	0.39
1	20209 D	50 YR	2320.00	306.19	314.25		314.51	0.00	5.84	635.88	165.59	0.39
1	20209 D	100 YR	2760.00	306.19	314.74		315.03	0.00	6.08	719.26	170.17	0.39
1	20209 D	250 YR	3390.00	306.19	315.32		315.65	0.00	6.50	820.67	180.41	0.41
1	20209 D	500 YR	3910.00	306.19	315.76		316.12	0.00	6.81	901.69	189.17	0.41
1	20643	2 YR	670.00	307.06	313.53		313.79	0.01	4.60	220.86	153.36	0.41
1	20643	5 YR	1010.00	307.06	314.13		314.43	0.01	5.20	322.39	179.74	0.43
1	20643	10 YR	1370.00	307.06	314.67		314.99	0.01	5.58	423.97	197.55	0.44
1	20643	25 YR	1900.00	307.06	315.35		315.69	0.01	6.00	566.78	222.69	0.44
1	20643	50 YR	2320.00	307.06	315.83		316.17	0.01	6.22	676.01	238.26	0.44
1	20643	100 YR	2760.00	307.06	316.29		316.64	0.00	6.41	789.40	253.41	0.44
1	20643	250 YR	3390.00	307.06	316.88		317.23	0.00	6.60	943.42	265.63	0.43
1	20643	500 YR	3910.00	307.06	317.32		317.68	0.00	6.73	1063.14	272.57	0.43
1	21172 E	2 YR	370.00	308.49	315.34		315.42	0.00	2.40	199.87	135.78	0.23
1	21172 E	5 YR	650.00	308.49	316.06		316.18	0.00	3.06	305.23	157.63	0.26
1	21172 E	10 YR	870.00	308.49	316.58		316.71	0.00	3.33	390.35	170.08	0.27
1	21172 E	25 YR	1160.00	308.49	317.20		317.34	0.00	3.55	499.94	180.19	0.27
1	21172 E	50 YR	1410.00	308.49	317.64		317.79	0.00	3.76	579.47	186.40	0.28
1	21172 E	100 YR	1660.00	308.49	318.05		318.21	0.00	3.93	656.86	191.25	0.28
1	21172 E	250 YR	2020.00	308.49	318.57		318.74	0.00	4.16	758.56	197.30	0.28
1	21172 E	500 YR	2330.00	308.49	318.97		319.16	0.00	4.35	838.94	202.33	0.29
1	21725	2 YR	360.00	311.08	316.23		316.30	0.00	2.16	191.35	115.25	0.22
1	21725	5 YR	630.00	311.08	317.09		317.18	0.00	2.65	319.64	168.53	0.24
1	21725	10 YR	840.00	311.08	317.61		317.71	0.00	2.88	410.77	182.54	0.25

HEC-RAS Plan: Clear_Existing River: CLEARCREEK Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	21725	25 YR	1120.00	311.08	318.20		318.31	0.00	3.13	522.83	197.38	0.25
1	21725	50 YR	1340.00	311.08	318.62		318.75	0.00	3.27	609.40	207.08	0.25
1	21725	100 YR	1580.00	311.08	319.03		319.16	0.00	3.44	694.52	215.94	0.25
1	21725	250 YR	1920.00	311.08	319.55		319.69	0.00	3.64	810.81	229.25	0.2
1	21725	500 YR	2210.00	311.08	319.96		320.11	0.00	3.80	906.60	239.29	0.26
1	22133 F	2 YR	360.00	313.18	317.48	316.84	317.91	0.02	5.27	72.80	65.63	0.67
1	22133 F	5 YR	630.00	313.18	318.35		318.66	0.01	4.84	182.83	171.06	0.58
1	22133 F	10 YR	840.00	313.18	318.78		319.04	0.01	4.75	256.44	177.74	0.53
1	22133 F	25 YR	1120.00	313.18	319.27		319.52	0.01	4.74	346.87	186.91	0.48
1	22133 F	50 YR	1340.00	313.18	319.63		319.88	0.01	4.77	415.36	195.07	0.46
1	22133 F	100 YR	1580.00	313.18	319.99		320.24	0.01	4.84	487.52	203.98	0.44
1	22133 F	250 YR	1920.00	313.18	320.47		320.72	0.01	4.93	587.67	214.63	0.42
1	22133 F	500 YR	2210.00	313.18	320.85		321.10	0.00	5.01	670.36	222.76	0.41
1	22725	2 YR	170.00	318.20	322.05		322.14	0.00	2.34	72.74	40.11	0.31
1	22725	5 YR	330.00	318.20	322.77		322.92	0.00	3.13	105.34	52.48	0.39
1	22725	10 YR	450.00	318.20	323.03		323.25	0.01	3.76	119.68	58.27	0.46
1	22725	25 YR	630.00	318.20	323.32		323.65	0.01	4.58	137.51	64.83	0.55
1	22725	50 YR	790.00	318.20	323.53		323.95	0.01	5.22	151.42	69.20	0.62
1	22725	100 YR	950.00	318.20	323.69		324.22	0.01	5.85	162.68	72.42	0.67
1	22725	250 YR	1160.00	318.20	323.88		324.55	0.01	6.60	176.82	76.28	0.73
1	22725	500 YR	1350.00	318.20	324.04		324.85	0.01	7.21	189.64	79.01	0.77
1	22769 G	2 YR	170.00	321.24	322.77	322.77	323.50	0.02	6.86	24.79	16.67	0.99
1	22769 G	5 YR	330.00	321.24	323.60	323.60	324.73	0.02	8.54	38.63	17.01	1.00
1	22769 G	10 YR	450.00	321.24	324.13	324.13	325.51	0.02	9.42	47.76	17.23	1.00
1	22769 G	25 YR	630.00	321.24	324.84	324.84	326.54	0.02	10.48	60.09	17.53	1.00
1	22769 G	50 YR	790.00	321.24	325.41	325.41	327.38	0.02	11.26	70.18	17.76	1.00
1	22769 G	100 YR	950.00	321.24	325.97	325.97	328.15	0.02	11.83	80.71	21.26	0.99
1	22769 G	250 YR	1160.00	321.24	327.88	327.88	328.83	0.01	8.50	213.88	141.51	0.59
1	22769 G	500 YR	1350.00	321.24	328.27	328.27	329.11	0.00	8.38	272.74	159.25	0.57
1	22788 Skyline Blvd.		Culvert									
1	22839	2 YR	170.00	322.05	325.87	323.61	325.98	0.00	2.64	64.39	18.47	0.25
1	22839	5 YR	330.00	322.05	329.29	324.44	329.34	0.00	1.92	298.73	217.82	0.13
1	22839	10 YR	450.00	322.05	329.66	324.97	329.71	0.00	2.22	393.86	283.74	0.15
1	22839	25 YR	630.00	322.05	329.89	325.68	329.97	0.00	2.73	462.87	293.07	0.18
1	22839	50 YR	790.00	322.05	330.05	326.25	330.14	0.00	3.16	507.32	339.90	0.21
1	22839	100 YR	950.00	322.05	330.20	326.77	330.31	0.00	3.51	553.09	367.14	0.23
1	22839	250 YR	1160.00	322.05	330.42	328.85	330.54	0.00	3.82	620.34	420.81	0.24
1	22839	500 YR	1350.00	322.05	330.61	329.17	330.75	0.00	4.04	678.97	495.72	0.25
1	22842 H	2 YR	170.00	322.20	325.85	323.98	326.01	0.00	3.28	51.89	16.46	0.33
1	22842 H	5 YR	330.00	322.20	329.32	324.93	329.34	0.00	1.43	374.53	267.39	0.13
1	22842 H	10 YR	450.00	322.20	329.69	325.52	329.72	0.00	1.57	478.28	288.56	0.14
1	22842 H	25 YR	630.00	322.20	329.95	326.29	329.98	0.00	1.91	552.66	299.58	0.17
1	22842 H	50 YR	790.00	322.20	330.11	326.90	330.16	0.00	2.19	602.76	314.27	0.19
1	22842 H	100 YR	950.00	322.20	330.27	328.49	330.33	0.00	2.42	652.55	348.46	0.20
1	22842 H	250 YR	1160.00	322.20	330.50	328.71	330.56	0.00	2.63	721.63	412.38	0.21
1	22842 H	500 YR	1350.00	322.20	330.69	328.91	330.77	0.00	2.80	781.01	470.97	0.22
1	22843 Weir		Inl Struct									
1	22854	2 YR	170.00	326.00	329.34	326.25	329.34	0.00	0.18	935.25	320.10	0.02
1	22854	5 YR	330.00	326.00	329.78	326.38	329.79	0.00	0.31	1079.64	329.57	0.03
1	22854	10 YR	450.00	326.00	329.96	326.47	329.96	0.00	0.40	1136.98	333.26	0.04
1	22854	25 YR	630.00	326.00	330.15	326.59	330.15	0.00	0.53	1200.58	337.30	0.05
1	22854	50 YR	790.00	326.00	330.30	326.68	330.31	0.00	0.64	1253.24	341.06	0.06
1	22854	100 YR	950.00	326.00	330.44	326.77	330.45	0.00	0.74	1302.15	351.64	0.06
1	22854	250 YR	1160.00	326.00	330.64	326.88	330.65	0.00	0.86	1374.64	380.87	0.07
1	22854	500 YR	1350.00	326.00	330.82	326.97	330.84	0.00	0.96	1445.03	388.78	0.08
1	22899	2 YR	360.00	326.00	329.34		329.34	0.00	0.34	1070.26	351.48	0.03
1	22899	5 YR	530.00	326.00	329.78		329.79	0.00	0.43	1228.13	358.62	0.04
1	22899	10 YR	640.00	326.00	329.96		329.96	0.00	0.50	1290.48	361.39	0.05
1	22899	25 YR	810.00	326.00	330.15		330.15	0.00	0.60	1359.47	364.44	0.05
1	22899	50 YR	940.00	326.00	330.30		330.31	0.00	0.67	1416.44	366.94	0.06
1	22899	100 YR	1090.00	326.00	330.45		330.45	0.00	0.75	1468.91	369.23	0.06
1	22899	250 YR	1330.00	326.00	330.64		330.65	0.00	0.87	1541.19	372.36	0.07
1	22899	500 YR	1520.00	326.00	330.82		330.84	0.00	0.96	1609.79	374.59	0.08
1	23092	2 YR	360.00	326.00	329.34		329.34	0.00	0.34	1066.16	332.51	0.03
1	23092	5 YR	530.00	326.00	329.79		329.79	0.00	0.44	1215.01	335.90	0.04
1	23092	10 YR	640.00	326.00	329.96		329.96	0.00	0.50	1273.51	337.24	0.05
1	23092	25 YR	810.00	326.00	330.15		330.16	0.00	0.61	1338.18	338.84	0.05
1	23092	50 YR	940.00	326.00	330.31		330.32	0.00	0.68	1391.33	340.15	0.06
1	23092	100 YR	1090.00	326.00	330.45		330.46	0.00	0.76	1440.25	341.34	0.06
1	23092	250 YR	1330.00	326.00	330.65		330.66	0.00	0.89	1507.54	342.99	0.07
1	23092	500 YR	1520.00	326.00	330.83		330.85	0.00	0.97	1571.08	345.83	0.08
1	23626	2 YR	360.00	326.00	329.35		329.35	0.00	0.58	616.67	210.92	0.06
1	23626	5 YR	530.00	326.00	329.79		329.80	0.00	0.75	717.83	239.18	0.07

HEC-RAS Plan: Clear_Existing River: CLEARCREEK Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	23626	10 YR	640.00	326.00	329.97		329.98	0.00	0.86	760.51	246.70	0.08
1	23626	25 YR	810.00	326.00	330.16		330.18	0.00	1.03	809.21	254.26	0.09
1	23626	50 YR	940.00	326.00	330.32		330.34	0.00	1.14	850.02	260.82	0.10
1	23626	100 YR	1090.00	326.00	330.47		330.49	0.00	1.28	888.63	267.60	0.11
1	23626	250 YR	1330.00	326.00	330.67		330.70	0.00	1.48	942.83	271.40	0.13
1	23626	500 YR	1520.00	326.00	330.86		330.90	0.00	1.62	993.82	274.02	0.13
1	23891	2 YR	290.00	326.00	329.36		329.37	0.00	0.97	300.25	158.65	0.12
1	23891	5 YR	420.00	326.00	329.81		329.83	0.00	1.14	378.27	185.37	0.13
1	23891	10 YR	510.00	326.00	329.98		330.01	0.00	1.28	411.80	191.73	0.14
1	23891	25 YR	650.00	326.00	330.18		330.22	0.00	1.51	450.17	195.61	0.16
1	23891	50 YR	750.00	326.00	330.34		330.38	0.00	1.65	481.99	199.06	0.17
1	23891	100 YR	870.00	326.00	330.49		330.54	0.00	1.81	511.96	202.25	0.18
1	23891	250 YR	1060.00	326.00	330.70		330.76	0.00	2.06	554.14	206.59	0.20
1	23891	500 YR	1220.00	326.00	330.89		330.96	0.00	2.24	593.61	209.65	0.21
1	24202	2 YR	290.00	326.00	329.39		329.40	0.00	0.79	369.53	120.63	0.08
1	24202	5 YR	420.00	326.00	329.84		329.86	0.00	0.99	425.92	127.22	0.09
1	24202	10 YR	510.00	326.00	330.03		330.05	0.00	1.15	449.72	129.93	0.10
1	24202	25 YR	650.00	326.00	330.24		330.27	0.00	1.38	477.52	133.02	0.12
1	24202	50 YR	750.00	326.00	330.41		330.44	0.00	1.53	500.06	135.48	0.13
1	24202	100 YR	870.00	326.00	330.57		330.61	0.00	1.71	521.91	139.63	0.14
1	24202	250 YR	1060.00	326.00	330.79		330.85	0.00	1.98	553.50	145.83	0.16
1	24202	500 YR	1220.00	326.00	330.99		331.06	0.00	2.18	582.98	151.66	0.18
1	24418	2 YR	290.00	327.14	328.90	328.85	329.68	0.01	7.10	40.84	24.54	0.97
1	24418	5 YR	420.00	327.14	329.32	329.32	330.36	0.01	8.16	51.46	25.16	1.01
1	24418	10 YR	510.00	327.14	329.62	329.62	330.78	0.01	8.65	58.97	25.60	1.00
1	24418	25 YR	650.00	327.14	330.06	330.06	331.38	0.01	9.21	70.61	27.06	1.00
1	24418	50 YR	750.00	327.14	330.35	330.35	331.76	0.01	9.55	78.55	28.01	1.00
1	24418	100 YR	870.00	327.14	330.67	330.67	332.20	0.01	9.91	87.75	29.08	1.01
1	24418	250 YR	1060.00	327.14	331.15	331.15	332.83	0.01	10.40	101.96	30.65	1.00
1	24418	500 YR	1220.00	327.14	331.51	331.51	333.31	0.01	10.76	113.37	31.85	1.01
1	24421 I	2 YR	290.00	328.70	330.37	330.37	331.09	0.02	6.84	42.39	29.66	1.01
1	24421 I	5 YR	420.00	328.70	330.80	330.80	331.69	0.02	7.58	55.44	30.99	1.00
1	24421 I	10 YR	510.00	328.70	331.06	331.06	332.06	0.01	8.02	63.59	31.80	1.00
1	24421 I	25 YR	650.00	328.70	331.43	331.43	332.58	0.01	8.59	75.67	32.95	1.00
1	24421 I	50 YR	750.00	328.70	331.68	331.68	332.92	0.01	8.94	83.86	33.71	1.00
1	24421 I	100 YR	870.00	328.70	331.95	331.95	333.30	0.01	9.34	93.16	34.56	1.00
1	24421 I	250 YR	1060.00	328.70	332.37	332.37	333.87	0.01	9.82	107.93	35.86	1.00
1	24421 I	500 YR	1220.00	328.70	332.68	332.68	334.30	0.01	10.21	119.44	36.84	1.00
1	24426 Wyatt Rd.		Culvert									
1	24477 J	2 YR	290.00	329.50	334.27	331.47	334.33	0.00	2.04	142.25	51.06	0.22
1	24477 J	5 YR	420.00	329.50	334.81	332.05	334.91	0.00	2.45	171.67	56.51	0.25
1	24477 J	10 YR	510.00	329.50	335.02	332.37	335.14	0.00	2.77	194.05	144.02	0.27
1	24477 J	25 YR	650.00	329.50	335.22	332.81	335.38	0.00	3.29	221.43	153.34	0.31
1	24477 J	50 YR	750.00	329.50	335.41	333.06	335.60	0.00	3.54	249.58	162.64	0.33
1	24477 J	100 YR	870.00	329.50	335.51	333.35	335.75	0.00	3.96	264.90	167.70	0.36
1	24477 J	250 YR	1060.00	329.50	335.76	333.74	336.04	0.00	4.43	300.28	179.39	0.39
1	24477 J	500 YR	1220.00	329.50	335.95	334.05	336.28	0.00	4.77	329.16	195.15	0.41
1	24488	2 YR	290.00	329.50	334.28	331.70	334.34	0.00	2.00	144.69	59.56	0.23
1	24488	5 YR	420.00	329.50	334.84	332.26	334.92	0.00	2.35	181.99	77.99	0.24
1	24488	10 YR	510.00	329.50	335.05	332.57	335.16	0.00	2.66	200.17	92.37	0.26
1	24488	25 YR	650.00	329.50	335.25	332.97	335.41	0.00	3.16	219.53	100.20	0.30
1	24488	50 YR	750.00	329.50	335.44	333.22	335.62	0.00	3.43	241.91	136.61	0.32
1	24488	100 YR	870.00	329.50	335.55	333.49	335.78	0.00	3.84	257.29	150.75	0.35
1	24488	250 YR	1060.00	329.50	335.80	333.90	336.08	0.00	4.31	293.05	163.53	0.38
1	24488	500 YR	1220.00	329.50	336.00	334.18	336.32	0.00	4.65	322.13	172.94	0.40

HEC-RAS Plan: Corral_Existing River: Corral Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1152	2 YR	1080.00	261.76	269.03	266.88	269.25	0.01	4.11	405.52	268.11	0.34
1	1152	5 YR	1710.00	261.76	269.85	268.37	270.08	0.01	4.58	654.51	331.33	0.34
1	1152	10 YR	2070.00	261.76	270.21	268.89	270.45	0.01	4.78	779.50	356.61	0.35
1	1152	25 YR	2560.00	261.76	270.64	269.30	270.88	0.01	5.00	935.22	378.34	0.35
1	1152	50 YR	2940.00	261.76	270.93	269.45	271.18	0.01	5.16	1049.55	393.98	0.36
1	1152	100 YR	3330.00	261.76	271.21	269.79	271.47	0.01	5.31	1162.32	408.05	0.36
1	1152	250 YR	3850.00	261.76	271.57	270.04	271.83	0.01	5.49	1312.22	431.86	0.36
1	1152	500 YR	4240.00	261.76	271.81	270.15	272.07	0.01	5.62	1418.05	451.53	0.36
1	1422	2 YR	1080.00	262.23	270.64	269.83	270.79	0.01	4.77	486.97	263.80	0.33
1	1422	5 YR	1710.00	262.23	271.45		271.61	0.01	5.12	719.83	318.62	0.33
1	1422	10 YR	2070.00	262.23	271.82		271.98	0.01	5.30	843.88	348.69	0.34
1	1422	25 YR	2560.00	262.23	272.23		272.39	0.01	5.43	987.90	358.86	0.34
1	1422	50 YR	2940.00	262.23	272.51		272.68	0.01	5.54	1091.89	366.21	0.34
1	1422	100 YR	3330.00	262.23	272.80		272.97	0.01	5.67	1197.05	378.99	0.34
1	1422	250 YR	3850.00	262.23	273.15		273.33	0.01	5.82	1335.53	407.95	0.34
1	1422	500 YR	4240.00	262.23	273.41		273.60	0.01	6.05	1446.41	431.04	0.35
1	1745	2 YR	1080.00	262.23	272.32	270.00	272.45	0.00	4.24	576.05	337.22	0.26
1	1745	5 YR	1710.00	262.23	273.14	271.72	273.26	0.00	4.52	812.74	381.95	0.26
1	1745	10 YR	2070.00	262.23	273.52	272.04	273.65	0.00	4.67	926.64	390.42	0.27
1	1745	25 YR	2560.00	262.23	273.95	272.33	274.09	0.00	4.94	1058.09	403.57	0.28
1	1745	50 YR	2940.00	262.23	274.21	272.49	274.34	0.00	4.92	1311.49	411.47	0.27
1	1745	100 YR	3330.00	262.23	274.50	272.64	274.63	0.00	5.02	1433.81	436.09	0.27
1	1745	250 YR	3850.00	262.23	274.90	272.83	275.04	0.00	5.27	1617.49	474.20	0.28
1	1745	500 YR	4240.00	262.23	275.18	272.97	275.32	0.00	5.30	1752.47	488.29	0.28
1	1937 A	2 YR	840.00	263.71	272.58	268.60	272.62	0.00	1.94	600.69	434.06	0.12
1	1937 A	5 YR	1260.00	263.71	273.40	269.21	273.46	0.00	2.42	703.57	495.49	0.14
1	1937 A	10 YR	1500.00	263.71	273.79	269.51	273.86	0.00	2.66	752.45	536.31	0.16
1	1937 A	25 YR	1850.00	263.71	274.25	270.07	274.34	0.00	3.02	808.83	564.98	0.17
1	1937 A	50 YR	2100.00	263.71	274.48	270.26	274.50	0.00	2.12	1983.12	581.10	0.12
1	1937 A	100 YR	2310.00	263.71	274.77	270.41	274.79	0.00	2.13	2157.48	601.19	0.12
1	1937 A	250 YR	2590.00	263.71	275.18	270.58	275.20	0.00	2.12	2408.34	631.57	0.12
1	1937 A	500 YR	2960.00	263.71	275.46	270.81	275.48	0.00	2.26	2590.00	658.97	0.12
1	3130 Culvert		Culvert									
1	4316 B	2 YR	840.00	272.52	276.91	275.67	277.36	0.00	5.39	155.85	51.55	0.55
1	4316 B	5 YR	1260.00	272.52	278.50	276.46	278.90	0.00	5.10	247.00	63.05	0.45
1	4316 B	10 YR	1500.00	272.52	279.32	276.85	279.71	0.00	4.97	301.55	69.02	0.42
1	4316 B	25 YR	1850.00	272.52	280.49	277.36	280.84	0.00	4.79	386.62	77.42	0.38
1	4316 B	50 YR	2100.00	272.52	282.21	277.68	282.46	0.00	3.97	543.82	141.28	0.28
1	4316 B	100 YR	2310.00	272.52	284.02	277.96	284.19	0.00	3.35	734.62	166.03	0.21
1	4316 B	250 YR	2590.00	272.52	284.84	278.28	284.99	0.00	3.17	1007.45	190.77	0.19
1	4316 B	500 YR	2960.00	272.52	285.44	278.70	285.59	0.00	3.33	1125.85	208.34	0.19
1	4391	2 YR	840.00	272.13	277.26	275.30	277.56	0.00	4.35	193.03	55.67	0.41
1	4391	5 YR	1260.00	272.13	278.73	276.09	279.04	0.00	4.46	282.24	65.92	0.38
1	4391	10 YR	1500.00	272.13	279.51	276.49	279.82	0.00	4.46	336.12	71.40	0.36
1	4391	25 YR	1850.00	272.13	280.63	277.00	280.93	0.00	4.40	420.24	79.20	0.34
1	4391	50 YR	2100.00	272.13	282.29	277.34	282.50	0.00	3.70	614.60	145.41	0.25
1	4391	100 YR	2310.00	272.13	284.08	277.60	284.21	0.00	3.05	911.57	195.12	0.18
1	4391	250 YR	2590.00	272.13	284.88	277.95	285.01	0.00	3.04	1078.75	216.10	0.18
1	4391	500 YR	2960.00	272.13	285.47	278.36	285.61	0.00	3.19	1212.58	233.39	0.18
1	4632	2 YR	840.00	272.46	277.64		277.91	0.00	4.24	198.27	57.05	0.40
1	4632	5 YR	1260.00	272.46	279.03		279.33	0.00	4.43	284.58	67.05	0.38
1	4632	10 YR	1500.00	272.46	279.78		280.08	0.00	4.45	336.74	72.43	0.36
1	4632	25 YR	1850.00	272.46	280.85		281.15	0.00	4.42	418.63	87.51	0.34
1	4632	50 YR	2100.00	272.46	282.41		282.62	0.00	3.71	647.57	174.22	0.25
1	4632	100 YR	2310.00	272.46	284.14		284.27	0.00	2.99	1003.56	260.66	0.18
1	4632	250 YR	2590.00	272.46	284.94		285.06	0.00	2.94	1221.31	288.02	0.17
1	4632	500 YR	2960.00	272.46	285.54		285.66	0.00	3.07	1400.36	309.95	0.17
1	4753 C	2 YR	840.00	274.01	277.72	276.99	278.39	0.00	6.60	127.19	53.88	0.68
1	4753 C	5 YR	1260.00	274.01	279.05	277.77	279.74	0.00	6.67	189.03	66.11	0.59
1	4753 C	10 YR	1500.00	274.01	279.77	278.17	280.47	0.00	6.72	223.34	72.66	0.55
1	4753 C	25 YR	1850.00	274.01	280.79	278.69	281.51	0.00	6.78	272.70	253.69	0.50
1	4753 C	50 YR	2100.00	274.01	282.42	279.02	282.73	0.00	4.83	674.06	618.69	0.32
1	4753 C	100 YR	2310.00	274.01	284.26	279.27	284.31	0.00	2.31	1783.83	848.08	0.14
1	4753 C	250 YR	2590.00	274.01	285.07	279.60	285.10	0.00	1.71	3317.68	881.39	0.10
1	4753 C	500 YR	2960.00	274.01	285.68	280.01	285.70	0.00	1.68	3864.76	910.38	0.10
1	4815 Chelf Rd.		Culvert									
1	4878 D	2 YR	840.00	273.23	279.33	277.43	279.68	0.00	4.79	180.46	106.35	0.41
1	4878 D	5 YR	1260.00	273.23	280.87	278.20	281.26	0.00	5.11	257.23	251.89	0.37
1	4878 D	10 YR	1500.00	273.23	281.71	278.60	282.12	0.00	5.24	299.46	491.06	0.36
1	4878 D	25 YR	1850.00	273.23	283.08	279.14	283.24	0.00	3.78	798.53	670.82	0.24
1	4878 D	50 YR	2100.00	273.23	284.22	279.50	284.31	0.00	3.10	1151.98	798.90	0.18
1	4878 D	100 YR	2310.00	273.23	284.92	279.80	284.94	0.00	1.68	2213.27	847.88	0.10
1	4878 D	250 YR	2590.00	273.23	285.28	280.16	285.30	0.00	1.46	3412.37	872.28	0.08
1	4878 D	500 YR	2960.00	273.23	285.76	280.59	285.78	0.00	1.48	3832.29	887.29	0.08

HEC-RAS Plan: Corral_Existing River: Corral Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	4923	2 YR	840.00	272.99	279.73	276.95	279.82	0.00	2.45	363.00	186.13	0.21
1	4923	5 YR	1260.00	272.99	281.30	277.52	281.40	0.00	2.56	535.15	440.33	0.19
1	4923	10 YR	1500.00	272.99	282.16	277.79	282.25	0.00	2.57	661.29	654.52	0.18
1	4923	25 YR	1850.00	272.99	283.22	278.15	283.29	0.00	2.38	1156.34	754.24	0.15
1	4923	50 YR	2100.00	272.99	284.28	278.38	284.34	0.00	2.14	1550.48	802.37	0.13
1	4923	100 YR	2310.00	272.99	284.92	278.59	284.95	0.00	1.84	2271.66	831.24	0.11
1	4923	250 YR	2590.00	272.99	285.29	278.84	285.30	0.00	1.48	3717.36	885.98	0.08
1	4923	500 YR	2960.00	272.99	285.76	279.18	285.78	0.00	1.51	4142.33	896.27	0.08
1	5413	2 YR	750.00	273.48	280.27	278.65	280.43	0.00	3.57	282.79	147.00	0.31
1	5413	5 YR	1130.00	273.48	281.67	279.33	281.78	0.00	3.27	523.07	197.07	0.25
1	5413	10 YR	1390.00	273.48	282.47	279.64	282.57	0.00	3.17	692.01	225.72	0.22
1	5413	25 YR	1770.00	273.48	283.44	280.08	283.53	0.00	3.11	927.91	260.39	0.20
1	5413	50 YR	2050.00	273.48	284.44	280.33	284.51	0.00	2.97	1232.01	340.92	0.18
1	5413	100 YR	2310.00	273.48	285.02	280.55	285.09	0.00	3.00	1451.07	489.63	0.18
1	5413	250 YR	2710.00	273.48	285.34	280.85	285.42	0.00	3.24	1591.37	585.05	0.19
1	5413	500 YR	2990.00	273.48	285.81	281.05	285.89	0.00	3.13	1814.05	749.42	0.18
1	5817 E	2 YR	750.00	273.21	280.98		281.20	0.00	3.92	221.22	72.60	0.31
1	5817 E	5 YR	1130.00	273.21	282.12		282.37	0.00	4.39	312.95	90.03	0.31
1	5817 E	10 YR	1390.00	273.21	282.81		283.08	0.00	4.59	379.55	101.35	0.31
1	5817 E	25 YR	1770.00	273.21	283.70		283.99	0.00	4.89	476.06	120.89	0.31
1	5817 E	50 YR	2050.00	273.21	284.61		284.89	0.00	4.87	623.39	203.42	0.29
1	5817 E	100 YR	2310.00	273.21	285.18		285.44	0.00	4.85	753.64	264.39	0.28
1	5817 E	250 YR	2710.00	273.21	285.52		285.81	0.00	5.24	846.07	289.93	0.30
1	5817 E	500 YR	2990.00	273.21	285.97		286.23	0.00	5.11	980.55	311.10	0.29
1	6302	2 YR	750.00	275.94	282.21		282.55	0.00	4.69	163.21	58.86	0.46
1	6302	5 YR	1130.00	275.94	283.21		283.63	0.00	5.27	228.05	70.41	0.45
1	6302	10 YR	1390.00	275.94	283.82		284.27	0.00	5.56	272.61	77.32	0.44
1	6302	25 YR	1770.00	275.94	284.62		285.12	0.00	5.87	338.26	85.16	0.43
1	6302	50 YR	2050.00	275.94	285.37		285.86	0.00	5.84	407.54	116.25	0.41
1	6302	100 YR	2310.00	275.94	285.85		286.36	0.00	6.03	484.49	208.96	0.40
1	6302	250 YR	2710.00	275.94	286.25		286.81	0.00	6.44	585.23	316.62	0.42
1	6302	500 YR	2990.00	275.94	286.61		287.15	0.00	6.48	713.77	383.49	0.41
1	6385 F	2 YR	750.00	277.06	282.61	281.38	282.98	0.01	4.86	154.33	56.52	0.52
1	6385 F	5 YR	1130.00	277.06	283.56	282.13	284.01	0.01	5.38	211.77	65.01	0.50
1	6385 F	10 YR	1390.00	277.06	284.13	282.54	284.63	0.00	5.67	250.41	70.24	0.49
1	6385 F	25 YR	1770.00	277.06	284.90	283.03	285.45	0.00	6.02	306.92	77.14	0.48
1	6385 F	50 YR	2050.00	277.06	285.60	283.36	286.13	0.00	5.98	384.19	169.59	0.45
1	6385 F	100 YR	2310.00	277.06	286.08	283.67	286.61	0.00	6.05	491.06	282.64	0.43
1	6385 F	250 YR	2710.00	277.06	286.49	284.10	287.06	0.00	6.41	613.88	315.48	0.44
1	6385 F	500 YR	2990.00	277.06	286.83	284.40	287.40	0.00	6.46	726.90	337.09	0.44
1	6423 Martha Dr.		Culvert									
1	6450 G	2 YR	750.00	281.07	287.25	283.75	287.30	0.00	1.96	719.74	387.00	0.15
1	6450 G	5 YR	1130.00	281.07	287.51	284.37	287.59	0.00	2.68	828.87	464.16	0.20
1	6450 G	10 YR	1390.00	281.07	287.62	284.74	287.73	0.00	3.15	882.47	481.23	0.23
1	6450 G	25 YR	1770.00	281.07	287.82	285.25	287.97	0.00	3.71	981.85	493.67	0.27
1	6450 G	50 YR	2050.00	281.07	288.03	285.59	288.19	0.00	3.97	1085.81	506.36	0.28
1	6450 G	100 YR	2310.00	281.07	288.20	285.90	288.37	0.00	4.21	1170.49	516.47	0.30
1	6450 G	250 YR	2710.00	281.07	288.30	286.32	288.52	0.00	4.76	1221.84	522.50	0.33
1	6450 G	500 YR	2990.00	281.07	288.41	286.92	288.66	0.00	5.04	1284.40	529.56	0.35
1	6518	2 YR	750.00	280.71	287.30	283.57	287.33	0.00	1.70	825.86	423.74	0.12
1	6518	5 YR	1130.00	280.71	287.58	284.11	287.63	0.00	2.32	951.17	450.75	0.16
1	6518	10 YR	1390.00	280.71	287.72	284.41	287.79	0.00	2.72	1014.71	457.57	0.19
1	6518	25 YR	1770.00	280.71	287.96	284.81	288.05	0.00	3.20	1124.46	469.18	0.22
1	6518	50 YR	2050.00	280.71	288.18	285.05	288.28	0.00	3.45	1228.66	481.35	0.23
1	6518	100 YR	2310.00	280.71	288.35	285.30	288.47	0.00	3.67	1314.62	491.16	0.25
1	6518	250 YR	2710.00	280.71	288.50	285.61	288.64	0.00	4.12	1384.94	499.04	0.27
1	6518	500 YR	2990.00	280.71	288.63	285.83	288.79	0.00	4.37	1453.76	515.51	0.29
1	6933 H	2 YR	750.00	280.31	287.42		287.55	0.00	3.56	315.36	152.08	0.25
1	6933 H	5 YR	1130.00	280.31	287.81		288.01	0.00	4.65	378.51	176.67	0.32
1	6933 H	10 YR	1390.00	280.31	288.02		288.28	0.00	5.29	418.33	196.13	0.36
1	6933 H	25 YR	1770.00	280.31	288.36		288.68	0.00	6.19	493.67	237.30	0.41
1	6933 H	50 YR	2050.00	280.31	288.63		288.96	0.00	6.46	563.96	291.30	0.42
1	6933 H	100 YR	2310.00	280.31	288.85		289.19	0.00	6.68	631.19	311.79	0.43
1	6933 H	250 YR	2710.00	280.31	289.10		289.47	0.00	7.12	715.42	351.42	0.45
1	6933 H	500 YR	2990.00	280.31	289.30		289.67	0.00	7.31	786.78	386.26	0.45
1	7459 I	2 YR	550.00	280.82	288.18	286.66	288.37	0.00	4.09	183.86	84.06	0.33
1	7459 I	5 YR	840.00	280.82	288.92	287.37	289.19	0.00	4.98	268.12	165.25	0.37
1	7459 I	10 YR	1040.00	280.82	289.33	287.74	289.61	0.00	5.24	344.42	194.11	0.38
1	7459 I	25 YR	1330.00	280.82	289.89	288.19	290.14	0.00	5.25	461.73	223.32	0.36
1	7459 I	50 YR	1500.00	280.82	290.18	288.46	290.41	0.00	5.24	527.95	243.29	0.35
1	7459 I	100 YR	1650.00	280.82	290.41	288.64	290.63	0.00	5.23	586.29	263.89	0.35
1	7459 I	250 YR	1860.00	280.82	290.74	288.82	290.95	0.00	5.21	682.16	316.49	0.34
1	7459 I	500 YR	2110.00	280.82	290.96	288.80	291.19	0.00	5.41	755.84	334.41	0.34

HEC-RAS Plan: Corral_Existing River: Corral Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	7784	2 YR	550.00	283.67	288.85	286.63	289.05	0.00	3.63	169.26	62.89	0.31
1	7784	5 YR	840.00	283.67	289.71	287.38	289.97	0.00	4.34	228.59	76.37	0.34
1	7784	10 YR	1040.00	283.67	290.13	287.89	290.46	0.00	4.86	265.90	110.63	0.37
1	7784	25 YR	1330.00	283.67	290.62	288.47	291.00	0.00	5.38	330.93	157.60	0.3
1	7784	50 YR	1500.00	283.67	290.87	288.78	291.27	0.00	5.61	375.19	174.76	0.40
1	7784	100 YR	1650.00	283.67	291.07	289.03	291.49	0.00	5.78	414.55	208.87	0.40
1	7784	250 YR	1860.00	283.67	291.36	289.36	291.78	0.00	5.95	485.62	279.72	0.41
1	7784	500 YR	2110.00	283.67	291.61	289.68	292.05	0.00	6.21	557.65	299.30	0.42
1	7888 J	2 YR	550.00	284.46	289.09	286.53	289.22	0.00	2.96	194.04	58.43	0.25
1	7888 J	5 YR	840.00	284.46	289.97	287.14	290.17	0.00	3.64	241.80	65.24	0.29
1	7888 J	10 YR	1040.00	284.46	290.43	287.51	290.68	0.00	4.09	266.74	70.24	0.31
1	7888 J	25 YR	1330.00	284.46	290.92	288.05	291.25	0.00	4.77	292.69	81.83	0.34
1	7888 J	50 YR	1500.00	284.46	291.15	288.34	291.53	0.00	5.11	320.68	86.27	0.36
1	7888 J	100 YR	1650.00	284.46	291.33	288.58	291.76	0.00	5.42	334.35	99.67	0.38
1	7888 J	250 YR	1860.00	284.46	291.61	288.87	292.08	0.00	5.76	382.94	107.58	0.39
1	7888 J	500 YR	2110.00	284.46	291.85	289.18	292.39	0.00	6.20	410.77	126.36	0.41
1	7952 Leopard Dr.		Culvert									
1	8021 K	2 YR	550.00	286.77	290.65	288.73	290.78	0.00	2.88	191.54	75.99	0.29
1	8021 K	5 YR	840.00	286.77	291.92	289.27	292.07	0.00	3.07	276.49	110.69	0.26
1	8021 K	10 YR	1040.00	286.77	292.71	289.61	292.86	0.00	3.19	329.12	133.03	0.25
1	8021 K	25 YR	1330.00	286.77	293.96	290.03	294.12	0.00	3.25	412.66	347.60	0.23
1	8021 K	50 YR	1500.00	286.77	294.39	290.25	294.54	0.00	3.21	586.82	441.21	0.22
1	8021 K	100 YR	1650.00	286.77	294.58	290.43	294.74	0.00	3.35	635.41	462.66	0.22
1	8021 K	250 YR	1860.00	286.77	294.83	290.67	294.93	0.00	2.97	1033.37	525.85	0.20
1	8021 K	500 YR	2110.00	286.77	295.04	290.92	295.15	0.00	3.16	1152.30	610.22	0.21
1	8112	2 YR	550.00	287.32	290.83	289.25	290.98	0.00	3.14	176.97	70.79	0.33
1	8112	5 YR	840.00	287.32	292.04	289.79	292.20	0.00	3.22	278.46	96.81	0.29
1	8112	10 YR	1040.00	287.32	292.82	290.10	292.97	0.00	3.23	358.64	112.97	0.26
1	8112	25 YR	1292.33	287.32	294.09	290.43	294.20	0.00	2.89	555.75	265.50	0.21
1	8112	50 YR	1364.52	287.32	294.50	290.53	294.61	0.00	2.82	640.94	360.13	0.20
1	8112	100 YR	1364.44	287.32	294.72	290.52	294.82	0.00	2.64	696.73	387.81	0.18
1	8112	250 YR	1319.86	287.32	294.93	290.48	294.99	0.00	2.21	922.76	425.66	0.15
1	8112	500 YR	1357.94	287.32	295.16	290.52	295.21	0.00	2.15	1022.93	457.02	0.14
1	8525 L	2 YR	420.00	288.09	291.86	290.41	292.02	0.00	3.15	134.62	57.57	0.35
1	8525 L	5 YR	640.00	288.09	292.76	290.93	292.95	0.00	3.50	189.74	65.48	0.33
1	8525 L	10 YR	790.00	288.09	293.39	291.23	293.58	0.00	3.59	232.60	71.33	0.3
1	8525 L	25 YR	972.33	288.09	294.41	291.54	294.59	0.00	3.42	310.98	81.70	0.27
1	8525 L	50 YR	1054.52	288.09	294.78	291.66	294.95	0.00	3.42	341.89	86.04	0.26
1	8525 L	100 YR	1094.44	288.09	294.96	291.72	295.13	0.00	3.42	357.04	104.13	0.25
1	8525 L	250 YR	1139.86	288.09	295.08	291.79	295.25	0.00	3.47	367.51	118.44	0.26
1	8525 L	500 YR	1167.94	288.09	295.28	291.84	295.45	0.00	3.41	386.29	133.70	0.25
1	8934	2 YR	420.00	290.14	293.10		293.27	0.00	3.30	127.35	58.45	0.39
1	8934	5 YR	640.00	290.14	293.84		294.06	0.00	3.70	172.99	64.77	0.40
1	8934	10 YR	790.00	290.14	294.32		294.55	0.00	3.87	204.60	68.81	0.39
1	8934	25 YR	972.33	290.14	295.05		295.28	0.00	3.84	257.12	75.06	0.35
1	8934	50 YR	1054.52	290.14	295.35		295.58	0.00	3.85	280.43	77.67	0.33
1	8934	100 YR	1094.44	290.14	295.50		295.73	0.00	3.85	291.97	78.93	0.33
1	8934	250 YR	1139.86	290.14	295.62		295.85	0.00	3.90	301.19	79.92	0.33
1	8934	500 YR	1167.94	290.14	295.78		296.00	0.00	3.84	314.22	81.30	0.32
1	9117 M	2 YR	420.00	290.36	293.59	292.01	293.66	0.00	2.17	196.22	168.74	0.24
1	9117 M	5 YR	640.00	290.36	294.34	292.38	294.44	0.00	2.53	256.21	237.21	0.25
1	9117 M	10 YR	790.00	290.36	294.80	292.59	294.92	0.00	2.73	293.00	278.24	0.25
1	9117 M	25 YR	972.33	290.36	295.45	292.81	295.58	0.00	2.85	345.20	291.66	0.24
1	9117 M	50 YR	1054.52	290.36	295.74	292.90	295.86	0.00	2.90	367.69	302.05	0.24
1	9117 M	100 YR	1094.44	290.36	295.87	292.94	296.00	0.00	2.93	378.60	310.37	0.24
1	9117 M	250 YR	1139.86	290.36	295.99	293.00	296.12	0.00	2.97	387.92	316.91	0.24
1	9117 M	500 YR	1167.94	290.36	296.13	293.02	296.26	0.00	2.96	399.13	329.59	0.23
1	9438 Loop 151		Culvert									
1	9795	2 YR	420.00	292.24	296.13	294.63	296.19	0.00	2.57	278.23	167.52	0.24
1	9795	5 YR	640.00	292.24	297.21	294.99	297.26	0.00	2.58	415.57	193.48	0.21
1	9795	10 YR	790.00	292.24	298.09	295.21	298.14	0.00	2.47	528.30	226.89	0.18
1	9795	25 YR	972.33	292.24	300.48	295.42	300.51	0.00	1.86	834.59	416.92	0.12
1	9795	50 YR	1054.52	292.24	301.66	295.51	301.68	0.00	1.69	985.20	706.83	0.10
1	9795	100 YR	1094.44	292.24	302.25	295.55	302.27	0.00	1.62	1061.58	855.16	0.09
1	9795	250 YR	1139.86	292.24	302.91	295.60	302.93	0.00	1.56	1146.14	897.84	0.09
1	9795	500 YR	1167.94	292.24	303.40	295.62	303.42	0.00	1.51	1208.56	904.95	0.08
1	9850		Lat Struct									
1	9909 N	2 YR	420.00	291.19	296.33	294.52	296.38	0.00	2.34	351.06	170.20	0.20
1	9909 N	5 YR	640.00	291.19	297.36	294.94	297.41	0.00	2.39	545.40	206.68	0.18
1	9909 N	10 YR	790.00	291.19	298.21	295.18	298.24	0.00	2.25	732.60	236.56	0.16
1	9909 N	25 YR	1010.00	291.19	300.53	295.45	300.55	0.00	1.57	1360.52	414.16	0.09
1	9909 N	50 YR	1190.00	291.19	301.69	295.66	301.71	0.00	1.43	1724.48	831.66	0.08
1	9909 N	100 YR	1380.00	291.19	302.29	295.86	302.30	0.00	1.47	1910.81	876.83	0.08

HEC-RAS Plan: Corral_Existing River: Corral Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	9909 N	250 YR	1680.00	291.19	302.94	296.15	302.96	0.00	1.59	2117.20	927.76	0.08
1	9909 N	500 YR	1920.00	291.19	303.42	296.35	303.44	0.00	1.68	2269.56	971.58	0.09

HEC-RAS Plan: Cowhorn_Existing River: Cowhorn Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	716 A	2YR	2570.00	269.00	279.82	279.57	280.26	0.00	6.52	819.45	2019.52	0.46
1	716 A	5YR	3320.00	269.00	280.22	279.88	280.63	0.00	6.79	1047.83	2227.35	0.47
1	716 A	10YR	3720.00	269.00	280.40	280.01	280.81	0.00	6.92	1160.89	2278.72	0.47
1	716 A	25YR	4530.00	269.00	280.71	280.21	281.11	0.00	7.13	1356.57	2294.91	0.4
1	716 A	50YR	5070.00	269.00	280.90	280.44	281.30	0.00	7.26	1477.20	2305.78	0.48
1	716 A	100YR	5690.00	269.00	281.11	280.57	281.51	0.00	7.40	1610.30	2333.68	0.48
1	716 A	250YR	6510.00	269.00	281.37	280.73	281.77	0.00	7.56	1779.90	2368.42	0.48
1	716 A	500YR	7480.00	269.00	281.65	280.90	282.05	0.00	7.75	1970.18	2425.63	0.48
1	926	2YR	2570.00	269.14	280.39	275.86	280.84	0.00	5.61	649.92	845.75	0.35
1	926	5YR	3320.00	269.14	280.77	276.85	281.34	0.00	6.52	816.42	1075.01	0.40
1	926	10YR	3720.00	269.14	280.94	277.37	281.57	0.00	6.95	906.85	1170.62	0.42
1	926	25YR	4530.00	269.14	281.25	278.31	281.95	0.00	7.57	1071.24	1319.96	0.45
1	926	50YR	5070.00	269.14	281.43	278.88	282.17	0.00	7.93	1174.77	1398.95	0.47
1	926	100YR	5690.00	269.14	281.64	281.28	282.42	0.00	8.31	1294.98	1511.36	0.49
1	926	250YR	6510.00	269.14	281.90	281.49	282.70	0.00	8.66	1474.41	1706.79	0.50
1	926	500YR	7480.00	269.14	282.16	281.89	283.05	0.00	9.29	1681.67	1862.08	0.53
1	1028	2YR	2570.00	269.12	280.58	277.69	281.14	0.00	6.26	581.79	543.62	0.44
1	1028	5YR	3320.00	269.12	281.07	278.72	281.66	0.00	6.76	770.44	625.29	0.46
1	1028	10YR	3720.00	269.12	281.30	279.19	281.91	0.00	6.97	864.86	677.12	0.47
1	1028	25YR	4530.00	269.12	281.65	279.96	282.32	0.00	7.56	1010.53	792.34	0.50
1	1028	50YR	5070.00	269.12	281.83	281.27	282.58	0.00	8.08	1106.04	926.52	0.52
1	1028	100YR	5690.00	269.12	282.05	281.51	282.84	0.00	8.43	1244.57	1046.38	0.54
1	1028	250YR	6510.00	269.12	282.32	281.66	283.14	0.01	8.81	1439.36	1297.41	0.55
1	1028	500YR	7480.00	269.12	282.86	282.26	283.49	0.00	8.20	1970.59	1911.30	0.50
1	1164	2YR	2570.00	270.44	281.24	277.30	281.54	0.00	4.38	587.06	134.42	0.31
1	1164	5YR	3320.00	270.44	281.67	277.96	282.10	0.00	5.28	629.24	217.95	0.37
1	1164	10YR	3720.00	270.44	281.85	278.30	282.36	0.00	5.75	647.40	288.62	0.40
1	1164	25YR	4530.00	270.44	282.15	278.91	282.84	0.00	6.68	677.79	452.83	0.46
1	1164	50YR	5070.00	270.44	282.37	279.30	283.18	0.00	7.22	719.69	714.05	0.49
1	1164	100YR	5690.00	270.44	282.60	279.73	283.54	0.00	7.80	772.47	865.59	0.52
1	1164	250YR	6510.00	270.44	282.86	280.25	283.97	0.01	8.53	836.53	979.25	0.56
1	1164	500YR	7480.00	270.44	283.16	280.84	284.47	0.01	9.31	957.25	1348.80	0.60
1	1235 US Highway 67		Bridge									
1	1350 B	2YR	2570.00	268.32	281.76	276.39	281.97	0.00	3.60	713.48	387.76	0.24
1	1350 B	5YR	3320.00	268.32	282.63	277.05	282.88	0.00	4.13	816.92	888.90	0.26
1	1350 B	10YR	3720.00	268.32	283.13	277.38	283.38	0.00	4.15	1081.80	1297.39	0.25
1	1350 B	25YR	4530.00	268.32	284.11	278.02	284.30	0.00	3.90	1658.25	1531.52	0.23
1	1350 B	50YR	5070.00	268.32	284.48	278.41	284.66	0.00	3.95	1896.72	1663.46	0.23
1	1350 B	100YR	5690.00	268.32	284.74	278.84	284.93	0.00	4.13	2089.48	1770.69	0.23
1	1350 B	250YR	6510.00	268.32	285.01	279.36	285.22	0.00	4.38	2309.49	1901.37	0.24
1	1350 B	500YR	7480.00	268.32	285.27	279.97	285.51	0.00	4.68	2530.70	2075.62	0.26
1	1396	2YR	2570.00	269.50	281.88	278.50	282.02	0.00	3.63	966.81	516.09	0.24
1	1396	5YR	3320.00	269.50	282.89	279.30	282.98	0.00	3.04	1725.26	1064.15	0.19
1	1396	10YR	3720.00	269.50	283.39	279.69	283.47	0.00	3.06	1992.33	1276.24	0.18
1	1396	25YR	4530.00	269.50	284.30	280.45	284.37	0.00	2.99	2535.67	1525.65	0.17
1	1396	50YR	5070.00	269.50	284.66	280.69	284.73	0.00	3.10	2773.37	1592.93	0.17
1	1396	100YR	5690.00	269.50	284.92	280.69	285.01	0.00	3.26	2973.05	1764.34	0.18
1	1396	250YR	6510.00	269.50	285.21	280.70	285.30	0.00	3.49	3204.19	1883.99	0.19
1	1396	500YR	7480.00	269.50	285.49	280.70	285.59	0.00	3.76	3445.31	2105.21	0.20
1	1521	2YR	2570.00	270.00	282.06	275.85	282.08	0.00	1.71	2075.55	415.85	0.11
1	1521	5YR	3320.00	270.00	282.99	276.18	283.03	0.00	1.93	2451.66	628.50	0.11
1	1521	10YR	3720.00	270.00	283.48	276.34	283.52	0.00	2.02	2691.48	885.29	0.11
1	1521	25YR	4530.00	270.00	284.38	276.66	284.42	0.00	2.13	3223.27	1354.21	0.12
1	1521	50YR	5070.00	270.00	284.74	276.85	284.78	0.00	2.24	3571.46	1444.00	0.12
1	1521	100YR	5690.00	270.00	285.01	277.02	285.06	0.00	2.40	3793.58	1482.29	0.13
1	1521	250YR	6510.00	270.00	285.30	277.27	285.36	0.00	2.60	4041.53	1525.21	0.14
1	1521	500YR	7480.00	270.00	285.59	277.68	285.66	0.00	2.84	4295.60	1617.35	0.15
1	1658	2YR	2570.00	270.04	282.00	277.66	282.19	0.00	3.90	965.93	256.12	0.24
1	1658	5YR	3320.00	270.04	282.93	278.28	283.14	0.00	4.23	1187.71	446.82	0.25
1	1658	10YR	3720.00	270.04	283.41	278.74	283.64	0.00	4.42	1317.27	647.66	0.25
1	1658	25YR	4530.00	270.04	284.31	279.55	284.53	0.00	4.54	1615.41	933.64	0.25
1	1658	50YR	5070.00	270.04	284.67	279.89	284.90	0.00	4.74	1796.14	1148.90	0.26
1	1658	100YR	5690.00	270.04	284.93	280.27	285.19	0.00	5.02	1935.67	1207.53	0.27
1	1658	250YR	6510.00	270.04	285.22	280.85	285.51	0.00	5.40	2089.47	1296.07	0.28
1	1658	500YR	7480.00	270.04	285.50	280.85	285.83	0.00	5.84	2241.19	1330.27	0.30
1	2184	2YR	2570.00	271.67	282.43	277.41	282.64	0.00	4.03	851.56	680.21	0.25
1	2184	5YR	3320.00	271.67	283.36	278.39	283.62	0.00	4.49	1043.31	929.86	0.26
1	2184	10YR	3720.00	271.67	283.84	278.94	284.11	0.00	4.65	1149.48	1035.82	0.26
1	2184	25YR	4530.00	271.67	284.72	279.73	284.81	0.00	3.32	2698.07	1201.52	0.18
1	2184	50YR	5070.00	271.67	285.09	280.15	285.19	0.00	3.41	2925.49	1298.39	0.18
1	2184	100YR	5690.00	271.67	285.39	280.42	285.49	0.00	3.58	3108.53	1346.92	0.19
1	2184	250YR	6510.00	271.67	285.72	281.35	285.84	0.00	3.82	3313.14	1392.60	0.20
1	2184	500YR	7480.00	271.67	286.06	281.85	286.20	0.00	4.11	3521.38	1423.43	0.21
1	2245 Railroad		Bridge									
1	2273	2YR	2570.00	272.12	282.74	277.85	282.96	0.00	4.08	917.50	778.95	0.25
1	2273	5YR	3320.00	272.12	283.84	278.70	284.06	0.00	4.26	1306.19	1334.99	0.25
1	2273	10YR	3720.00	272.12	284.95	279.46	285.12	0.00	3.92	1682.14	1971.61	0.22

HEC-RAS Plan: Cowhorn_Existing River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2273	25YR	4530.00	272.12	285.47	280.28	285.54	0.00	3.12	3451.09	2138.81	0.17
1	2273	50YR	5070.00	272.12	285.87	280.76	285.95	0.00	3.22	3731.81	2259.14	0.17
1	2273	100YR	5690.00	272.12	286.21	281.19	286.30	0.00	3.39	3968.48	2317.73	0.18
1	2273	250YR	6510.00	272.12	286.57	281.67	286.66	0.00	3.64	4213.05	2564.81	0.19
1	2273	500YR	7480.00	272.12	286.91	282.16	287.02	0.00	3.94	4449.01	2845.45	0.20
1	2395 C	2YR	2570.00	272.99	282.81	281.63	283.57	0.01	7.36	545.02	452.11	0.55
1	2395 C	5YR	3320.00	272.99	284.02	282.55	284.53	0.00	6.55	1012.25	646.56	0.45
1	2395 C	10YR	3720.00	272.99	285.13	283.00	285.43	0.00	5.38	1562.81	1091.50	0.34
1	2395 C	25YR	4530.00	272.99	285.56	283.59	285.89	0.00	5.82	1792.85	1399.63	0.36
1	2395 C	50YR	5070.00	272.99	285.98	283.86	286.30	0.00	5.88	2032.52	1610.97	0.35
1	2395 C	100YR	5690.00	272.99	286.33	284.02	286.67	0.00	6.13	2255.87	1857.25	0.36
1	2395 C	250YR	6510.00	272.99	286.70	284.51	287.08	0.00	6.54	2512.73	2094.18	0.38
1	2395 C	500YR	7480.00	272.99	287.07	284.84	287.48	0.00	6.94	2779.48	2249.01	0.39
1	2916	2YR	2400.00	274.69	284.77	281.65	285.02	0.00	4.65	1206.22	665.88	0.31
1	2916	5YR	3170.00	274.69	285.44	282.78	285.68	0.00	4.85	1736.96	893.89	0.31
1	2916	10YR	3610.00	274.69	286.01	283.42	286.21	0.00	4.60	2288.68	997.02	0.28
1	2916	25YR	4460.00	274.69	286.51	284.38	286.69	0.00	4.75	2791.19	1022.58	0.28
1	2916	50YR	4940.00	274.69	286.88	284.71	287.05	0.00	4.64	3174.76	1037.71	0.27
1	2916	100YR	5450.00	274.69	287.25	284.95	287.40	0.00	4.61	3566.19	1157.00	0.26
1	2916	250YR	6290.00	274.69	287.68	285.36	287.83	0.00	4.70	4060.66	1285.54	0.26
1	2916	500YR	7250.00	274.69	288.10	285.60	288.24	0.00	4.80	4582.80	1400.47	0.26
1	3187	2YR	2400.00	273.33	285.13	280.30	285.45	0.00	4.90	966.52	533.43	0.30
1	3187	5YR	3170.00	273.33	285.79	281.46	286.13	0.00	5.34	1324.89	564.32	0.31
1	3187	10YR	3610.00	273.33	286.29	282.11	286.61	0.00	5.33	1634.20	634.76	0.30
1	3187	25YR	4460.00	273.33	286.78	283.42	287.11	0.00	5.73	1949.07	702.08	0.32
1	3187	50YR	4940.00	273.33	287.12	284.27	287.45	0.00	5.79	2176.01	725.33	0.32
1	3187	100YR	5450.00	273.33	287.47	285.44	287.78	0.00	5.84	2413.18	747.01	0.31
1	3187	250YR	6290.00	273.33	287.89	285.78	288.21	0.00	6.07	2705.66	772.52	0.32
1	3187	500YR	7250.00	273.33	288.31	286.20	288.64	0.00	6.31	3119.99	846.28	0.33
1	3779	2YR	2400.00	272.46	285.92	279.81	286.14	0.00	4.08	1236.64	578.83	0.24
1	3779	5YR	3170.00	272.46	286.64	281.00	286.86	0.00	4.45	1667.33	634.87	0.25
1	3779	10YR	3610.00	272.46	287.08	281.87	287.30	0.00	4.48	1958.85	659.84	0.25
1	3779	25YR	4460.00	272.46	287.64	282.87	287.86	0.00	4.80	2328.98	684.32	0.26
1	3779	50YR	4940.00	272.46	287.96	283.35	288.18	0.00	4.91	2552.26	698.17	0.26
1	3779	100YR	5450.00	272.46	288.29	285.56	288.51	0.00	5.01	2783.68	713.76	0.26
1	3779	250YR	6290.00	272.46	288.73	285.97	288.97	0.00	5.25	3112.04	817.49	0.27
1	3779	500YR	7250.00	272.46	289.17	286.35	289.42	0.00	5.49	3453.73	1021.29	0.27
1	4361	2YR	2400.00	274.30	286.42		286.56	0.00	3.02	834.88	246.05	0.19
1	4361	5YR	3170.00	274.30	287.16		287.35	0.00	3.54	1153.74	570.50	0.22
1	4361	10YR	3610.00	274.30	287.58		287.78	0.00	3.72	1400.49	610.05	0.22
1	4361	25YR	4460.00	274.30	288.16		288.39	0.00	4.09	1767.62	668.20	0.24
1	4361	50YR	4940.00	274.30	288.48		288.73	0.00	4.25	1988.04	686.10	0.24
1	4361	100YR	5450.00	274.30	288.81		289.06	0.00	4.38	2214.51	693.40	0.25
1	4361	250YR	6290.00	274.30	289.28		289.54	0.00	4.60	2538.21	703.00	0.25
1	4361	500YR	7250.00	274.30	289.73		290.02	0.00	4.87	2867.63	731.75	0.26
1	4640	2YR	2400.00	275.48	286.52	282.10	286.88	0.00	4.83	508.44	98.68	0.31
1	4640	5YR	3170.00	275.48	287.26	282.87	287.77	0.00	5.75	635.73	307.73	0.35
1	4640	10YR	3610.00	275.48	287.66	283.30	288.23	0.00	6.12	763.03	321.74	0.36
1	4640	25YR	4460.00	275.48	288.22	284.04	288.90	0.00	6.83	952.94	357.21	0.39
1	4640	50YR	4940.00	275.48	288.54	284.44	289.26	0.00	7.13	1070.98	389.40	0.40
1	4640	100YR	5450.00	275.48	288.86	284.84	289.61	0.00	7.39	1197.10	403.42	0.41
1	4640	250YR	6290.00	275.48	289.31	285.50	290.12	0.00	7.83	1386.07	438.11	0.43
1	4640	500YR	7250.00	275.48	289.76	286.23	290.63	0.00	8.30	1593.05	485.35	0.44
1	4803	2YR	2400.00	277.00	286.71	285.12	287.52	0.01	7.23	331.96	78.08	0.62
1	4803	5YR	3170.00	277.00	287.53	286.02	288.51	0.01	7.93	399.57	86.44	0.65
1	4803	10YR	3610.00	277.00	287.94	286.46	289.00	0.01	8.28	439.78	116.20	0.66
1	4803	25YR	4460.00	277.00	288.49	287.22	289.78	0.01	9.13	518.40	170.15	0.69
1	4803	50YR	4940.00	277.00	288.79	287.57	290.18	0.01	9.51	580.22	265.05	0.70
1	4803	100YR	5450.00	277.00	289.10	288.00	290.56	0.01	9.82	672.31	332.00	0.71
1	4803	250YR	6290.00	277.00	289.57	288.83	291.09	0.01	10.19	853.21	434.49	0.71
1	4803	500YR	7250.00	277.00	290.10	289.89	291.57	0.01	10.28	1096.26	491.34	0.68
1	4887	2YR	2400.00	276.10	287.66	281.21	287.84	0.00	3.42	712.99	128.05	0.21
1	4887	5YR	3170.00	276.10	288.63	281.98	288.88	0.00	4.02	823.65	215.81	0.23
1	4887	10YR	3610.00	276.10	289.12	282.39	289.41	0.00	4.34	878.77	258.28	0.24
1	4887	25YR	4460.00	276.10	289.91	283.13	290.25	0.00	4.75	1234.69	328.61	0.26
1	4887	50YR	4940.00	276.10	290.31	283.52	290.67	0.00	4.98	1375.22	375.51	0.26
1	4887	100YR	5450.00	276.10	290.68	283.91	291.07	0.00	5.25	1523.73	434.96	0.27
1	4887	250YR	6290.00	276.10	291.18	284.53	291.62	0.00	5.63	1758.61	494.69	0.29
1	4887	500YR	7250.00	276.10	291.57	285.18	292.08	0.00	6.15	1964.63	584.22	0.31
1	4940 West 15th St.		Bridge									
1	4988 D	2YR	2400.00	277.29	287.82	282.39	288.04	0.00	3.77	653.58	141.31	0.24
1	4988 D	5YR	3170.00	277.29	288.85	283.15	289.13	0.00	4.29	790.47	235.29	0.26
1	4988 D	10YR	3610.00	277.29	289.38	283.56	289.69	0.00	4.54	860.20	297.97	0.26
1	4988 D	25YR	4460.00	277.29	290.71	284.28	290.96	0.00	4.32	1443.67	444.39	0.24
1	4988 D	50YR	4940.00	277.29	290.90	284.65	291.18	0.00	4.62	1533.79	493.20	0.25
1	4988 D	100YR	5450.00	277.29	291.24	285.04	291.55	0.00	4.89	1725.67	604.80	0.26
1	4988 D	250YR	6290.00	277.29	291.69	285.62	292.01	0.00	5.11	2001.37	638.07	0.27
1	4988 D	500YR	7250.00	277.29	292.01	286.30	292.37	0.00	5.51	2220.28	702.89	0.28

HEC-RAS Plan: Cowhorn_Existing River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5043	2YR	2400.00	277.01	287.75	285.16	288.29	0.00	6.03	456.69	220.42	0.46
1	5043	5YR	3170.00	277.01	288.87	286.09	289.29	0.00	5.64	731.64	292.31	0.39
1	5043	10YR	3610.00	277.01	289.43	286.71	289.81	0.00	5.48	872.40	320.22	0.3
1	5043	25YR	4460.00	277.01	290.76	288.20	291.02	0.00	4.89	1437.52	553.46	0.30
1	5043	50YR	4940.00	277.01	290.96	288.46	291.24	0.00	5.12	1557.05	625.76	0.31
1	5043	100YR	5450.00	277.01	291.35	288.69	291.63	0.00	5.09	1816.48	691.45	0.30
1	5043	250YR	6290.00	277.01	291.83	289.02	292.09	0.00	5.11	2157.73	722.55	0.29
1	5043	500YR	7250.00	277.01	292.20	289.35	292.47	0.00	5.31	2423.44	738.39	0.30
1	5369	2YR	2400.00	277.44	288.85		289.22	0.00	4.86	535.12	259.04	0.35
1	5369	5YR	3170.00	277.44	289.67		290.05	0.00	5.17	819.35	406.23	0.35
1	5369	10YR	3610.00	277.44	290.12		290.47	0.00	5.15	1014.38	448.96	0.34
1	5369	25YR	4460.00	277.44	291.21		291.45	0.00	4.56	1620.03	640.93	0.28
1	5369	50YR	4940.00	277.44	291.44		291.69	0.00	4.69	1773.77	665.46	0.28
1	5369	100YR	5450.00	277.44	291.82		292.04	0.00	4.60	2023.84	676.11	0.27
1	5369	250YR	6290.00	277.44	292.27		292.49	0.00	4.67	2343.29	745.08	0.27
1	5369	500YR	7250.00	277.44	292.64		292.88	0.00	4.89	2627.88	768.71	0.28
1	5649	2YR	2350.00	277.70	289.38		289.62	0.00	3.96	687.83	233.20	0.24
1	5649	5YR	3120.00	277.70	290.17		290.47	0.00	4.56	918.37	357.90	0.27
1	5649	10YR	3590.00	277.70	290.56		290.89	0.00	4.83	1064.44	380.77	0.28
1	5649	25YR	4390.00	277.70	291.49		291.78	0.00	4.82	1439.30	460.30	0.26
1	5649	50YR	4840.00	277.70	291.72		292.03	0.00	5.04	1555.42	510.21	0.27
1	5649	100YR	5370.00	277.70	292.06		292.38	0.00	5.19	1736.69	550.71	0.28
1	5649	250YR	6230.00	277.70	292.50		292.84	0.00	5.44	1986.72	590.11	0.28
1	5649	500YR	7180.00	277.70	292.89		293.25	0.00	5.76	2220.13	619.88	0.30
1	6145 E	2YR	2350.00	278.67	289.99	286.61	290.41	0.00	5.21	451.77	109.03	0.39
1	6145 E	5YR	3120.00	278.67	290.90	287.49	291.37	0.00	5.60	690.42	353.66	0.41
1	6145 E	10YR	3590.00	278.67	291.33	287.95	291.79	0.00	5.71	855.46	447.10	0.41
1	6145 E	25YR	4390.00	278.67	292.15	288.68	292.51	0.00	5.38	1345.21	742.68	0.36
1	6145 E	50YR	4840.00	278.67	292.42	289.06	292.77	0.00	5.40	1525.02	810.57	0.36
1	6145 E	100YR	5370.00	278.67	292.77	289.48	293.09	0.00	5.35	1755.74	829.19	0.34
1	6145 E	250YR	6230.00	278.67	293.23	291.28	293.54	0.00	5.38	2070.61	853.34	0.34
1	6145 E	500YR	7180.00	278.67	293.67	291.90	293.97	0.00	5.49	2372.72	888.24	0.33
1	6465	2YR	2210.00	279.13	290.86	287.68	291.39	0.00	5.85	377.84	63.32	0.42
1	6465	5YR	2910.00	279.13	291.81	288.56	292.49	0.00	6.62	439.57	72.56	0.46
1	6465	10YR	3400.00	279.13	292.18	289.11	293.01	0.00	7.32	464.47	168.13	0.50
1	6465	25YR	4100.00	279.13	292.67	289.81	293.72	0.01	8.22	498.67	279.33	0.54
1	6465	50YR	4510.00	279.13	292.84	290.21	294.05	0.01	8.83	510.54	313.53	0.5
1	6465	100YR	5050.00	279.13	293.00	290.70	294.45	0.01	9.67	522.33	332.88	0.6
1	6465	250YR	6060.00	279.13	293.12	291.56	295.14	0.01	11.42	530.82	350.95	0.74
1	6465	500YR	6990.00	279.13	293.17	292.27	295.83	0.01	13.08	534.58	356.41	0.85
1	6576	2YR	2210.00	279.79	291.29	287.85	291.84	0.00	5.95	371.55	61.63	0.43
1	6576	5YR	2910.00	279.79	292.31	288.85	293.00	0.01	6.64	437.94	69.15	0.47
1	6576	10YR	3400.00	279.79	292.79	289.46	293.60	0.01	7.20	472.05	72.54	0.50
1	6576	25YR	4100.00	279.79	293.47	290.24	294.42	0.01	7.85	522.55	77.30	0.53
1	6576	50YR	4510.00	279.79	293.79	290.67	294.84	0.01	8.23	548.12	79.60	0.55
1	6576	100YR	5050.00	279.79	294.21	291.18	295.38	0.01	8.68	582.08	82.55	0.58
1	6576	250YR	6060.00	279.79	295.00	292.14	296.35	0.01	9.32	665.97	298.51	0.59
1	6576	500YR	6990.00	279.79	296.06	292.92	297.26	0.01	8.99	937.86	1078.70	0.54
1	6655 US Highway 82		Bridge									
1	6704 F	2YR	2210.00	280.93	292.01	287.40	292.30	0.00	4.32	513.95	82.87	0.29
1	6704 F	5YR	2910.00	280.93	293.16	288.24	293.52	0.00	4.82	618.59	106.22	0.30
1	6704 F	10YR	3400.00	280.93	294.00	288.76	294.39	0.00	5.05	699.36	124.53	0.30
1	6704 F	25YR	4100.00	280.93	295.51	289.41	295.91	0.00	5.10	844.57	319.28	0.28
1	6704 F	50YR	4510.00	280.93	296.27	289.77	296.67	0.00	5.19	917.17	643.89	0.28
1	6704 F	100YR	5050.00	280.93	297.43	290.22	297.75	0.00	4.78	1367.46	898.83	0.24
1	6704 F	250YR	6060.00	280.93	299.18	291.01	299.45	0.00	4.59	1760.97	1453.59	0.22
1	6704 F	500YR	6990.00	280.93	300.47	291.70	300.74	0.00	4.57	2052.05	1633.16	0.21
1	6771	2YR	2210.00	281.00	291.79	290.29	292.89	0.01	8.48	272.69	68.53	0.63
1	6771	5YR	2910.00	281.00	292.93	291.23	294.10	0.01	8.90	411.45	216.29	0.60
1	6771	10YR	3400.00	281.00	293.88	291.89	294.83	0.00	8.37	582.51	273.46	0.53
1	6771	25YR	4100.00	281.00	295.52	293.34	296.12	0.00	7.05	896.37	466.10	0.40
1	6771	50YR	4510.00	281.00	296.31	293.72	296.83	0.00	6.69	1046.99	605.06	0.37
1	6771	100YR	5050.00	281.00	297.51	294.17	297.82	0.00	5.53	1545.41	688.44	0.29
1	6771	250YR	6060.00	281.00	299.26	294.72	299.51	0.00	5.12	1974.08	1171.18	0.25
1	6771	500YR	6990.00	281.00	300.55	295.15	300.79	0.00	5.03	2290.09	1512.22	0.23
1	6920	2YR	2210.00	280.77	293.04	287.97	293.45	0.00	5.23	584.44	298.25	0.32
1	6920	5YR	2910.00	280.77	294.24	289.08	294.58	0.00	5.14	970.27	369.70	0.30
1	6920	10YR	3400.00	280.77	294.92	289.77	295.23	0.00	5.12	1191.52	384.16	0.29
1	6920	25YR	4100.00	280.77	296.14	290.65	296.37	0.00	4.76	1596.61	452.40	0.25
1	6920	50YR	4510.00	280.77	296.83	291.31	297.04	0.00	4.59	1831.33	511.33	0.23
1	6920	100YR	5050.00	280.77	297.80	293.51	297.96	0.00	4.22	2481.27	617.43	0.2
1	6920	250YR	6060.00	280.77	299.52	294.07	299.61	0.00	3.50	4021.09	1008.48	0.16
1	6920	500YR	6990.00	280.77	300.80	294.48	300.86	0.00	3.04	5404.37	1201.07	0.13
1	7410	2YR	2210.00	282.15	294.06	290.23	294.52	0.00	5.48	446.02	179.12	0.39
1	7410	5YR	2910.00	282.15	295.05	291.23	295.53	0.00	5.78	788.34	603.53	0.38
1	7410	10YR	3400.00	282.15	295.65	291.90	296.03	0.00	5.50	1202.21	853.45	0.35
1	7410	25YR	4100.00	282.15	296.69	292.73	296.88	0.00	4.40	2206.31	1224.81	0.26

HEC-RAS Plan: Cowhorn_Existing River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	7410	50YR	4510.00	282.15	297.31	293.14	297.43	0.00	3.79	2936.08	1343.27	0.22
1	7410	100YR	5050.00	282.15	298.16	294.00	298.22	0.00	3.05	3984.17	1401.66	0.17
1	7410	250YR	6060.00	282.15	299.71	295.87	299.74	0.00	2.28	6002.58	1494.85	0.12
1	7410	500YR	6990.00	282.15	300.93	296.17	300.95	0.00	1.97	7690.08	1579.43	0.10
1	7816 G	2YR	2130.00	283.67	295.01		295.35	0.00	4.72	500.48	156.27	0.31
1	7816 G	5YR	2830.00	283.67	295.94		296.34	0.00	5.27	706.63	346.48	0.32
1	7816 G	10YR	3400.00	283.67	296.37		296.83	0.00	5.74	886.75	473.89	0.34
1	7816 G	25YR	4020.00	283.67	297.08		297.45	0.00	5.50	1248.48	542.55	0.32
1	7816 G	50YR	4630.00	283.67	297.56		297.90	0.00	5.47	1522.08	590.06	0.31
1	7816 G	100YR	5200.00	283.67	298.28		298.54	0.00	4.99	1990.37	685.16	0.27
1	7816 G	250YR	6220.00	283.67	299.77		299.90	0.00	4.01	3261.74	948.02	0.20
1	7816 G	500YR	7380.00	283.67	300.97		301.06	0.00	3.45	4461.29	1043.75	0.17
1	8138	2YR	2130.00	285.81	295.60		295.95	0.00	4.82	555.17	336.91	0.36
1	8138	5YR	2830.00	285.81	296.61		296.90	0.00	4.74	1039.77	554.17	0.33
1	8138	10YR	3400.00	285.81	297.12		297.40	0.00	4.79	1333.11	577.41	0.32
1	8138	25YR	4020.00	285.81	297.68		297.93	0.00	4.75	1667.44	648.71	0.30
1	8138	50YR	4630.00	285.81	298.11		298.35	0.00	4.80	1972.24	736.83	0.30
1	8138	100YR	5200.00	285.81	298.69		298.89	0.00	4.57	2404.79	759.41	0.27
1	8138	250YR	6220.00	285.81	299.97		300.10	0.00	3.97	3434.33	851.60	0.22
1	8138	500YR	7380.00	285.81	301.10		301.20	0.00	3.69	4475.21	958.47	0.20
1	8442	2YR	2130.00	286.00	296.24	292.55	296.69	0.00	5.41	489.15	400.26	0.38
1	8442	5YR	2830.00	286.00	297.12		297.52	0.00	5.50	941.11	580.39	0.36
1	8442	10YR	3400.00	286.00	297.60		297.98	0.00	5.59	1225.52	605.53	0.35
1	8442	25YR	4020.00	286.00	298.11		298.45	0.00	5.57	1542.92	649.18	0.34
1	8442	50YR	4630.00	286.00	298.52		298.84	0.00	5.64	1810.54	660.14	0.34
1	8442	100YR	5200.00	286.00	299.03		299.31	0.00	5.43	2149.95	676.56	0.32
1	8442	250YR	6220.00	286.00	300.18		300.37	0.00	4.80	2965.77	730.75	0.26
1	8442	500YR	7380.00	286.00	301.26		301.41	0.00	4.50	3850.27	923.56	0.23
1	8783	2YR	2130.00	287.33	297.12		297.47	0.00	4.78	486.33	225.83	0.35
1	8783	5YR	2830.00	287.33	297.85		298.26	0.00	5.30	802.44	602.79	0.36
1	8783	10YR	3400.00	287.33	298.29		298.71	0.00	5.54	1092.77	703.37	0.37
1	8783	25YR	4020.00	287.33	298.74		299.13	0.00	5.61	1446.59	808.44	0.36
1	8783	50YR	4630.00	287.33	299.13		299.49	0.00	5.63	1765.19	844.23	0.35
1	8783	100YR	5200.00	287.33	299.55		299.87	0.00	5.46	2130.40	891.77	0.33
1	8783	250YR	6220.00	287.33	300.54		300.75	0.00	4.83	3095.36	1010.10	0.28
1	8783	500YR	7380.00	287.33	301.53		301.68	0.00	4.37	4125.78	1084.40	0.24
1	8858	2YR	2130.00	287.87	297.24	293.95	297.69	0.00	5.46	437.10	127.28	0.38
1	8858	5YR	2830.00	287.87	297.96	294.86	298.53	0.00	6.26	663.54	509.83	0.42
1	8858	10YR	3400.00	287.87	298.39	295.50	298.98	0.00	6.61	922.08	676.27	0.43
1	8858	25YR	4020.00	287.87	298.84	296.19	299.40	0.00	6.71	1232.55	709.09	0.42
1	8858	50YR	4630.00	287.87	299.22	296.82	299.74	0.00	6.74	1508.72	737.71	0.41
1	8858	100YR	5200.00	287.87	299.63	298.47	300.09	0.00	6.61	1823.64	820.16	0.40
1	8858	250YR	6220.00	287.87	300.59	299.07	300.90	0.00	5.83	2687.61	1084.16	0.33
1	8858	500YR	7380.00	287.87	301.57	299.36	301.78	0.00	5.25	3671.28	1346.41	0.28
1	8908 Rucker St.		Bridge									
1	8952	2YR	2130.00	288.17	297.93	294.24	298.31	0.00	5.05	541.02	303.20	0.34
1	8952	5YR	2830.00	288.17	298.51	295.12	298.98	0.00	5.79	765.30	496.49	0.38
1	8952	10YR	3400.00	288.17	298.78	295.80	299.33	0.00	6.44	912.84	585.47	0.41
1	8952	25YR	4020.00	288.17	299.02	296.49	299.66	0.00	7.04	1055.66	649.97	0.45
1	8952	50YR	4630.00	288.17	299.25	297.08	299.94	0.00	7.46	1211.88	678.12	0.47
1	8952	100YR	5200.00	288.17	299.54	298.94	300.20	0.00	7.58	1419.87	740.50	0.46
1	8952	250YR	6220.00	288.17	300.59	299.40	300.95	0.00	6.22	2239.07	816.50	0.36
1	8952	500YR	7380.00	288.17	301.60	299.80	301.84	0.00	5.45	3105.89	931.84	0.30
1	8999 H	2YR	2130.00	288.52	297.94	296.14	298.57	0.00	6.57	389.13	204.58	0.49
1	8999 H	5YR	2830.00	288.52	298.49	296.92	299.31	0.01	7.64	582.65	458.21	0.55
1	8999 H	10YR	3400.00	288.52	298.79	297.48	299.69	0.01	8.23	736.88	547.91	0.57
1	8999 H	25YR	4020.00	288.52	299.07	297.74	300.00	0.01	8.67	898.07	610.67	0.59
1	8999 H	50YR	4630.00	288.52	299.34	299.33	300.26	0.01	8.93	1070.34	657.78	0.60
1	8999 H	100YR	5200.00	288.52	299.66	299.58	300.47	0.01	8.70	1290.11	705.86	0.57
1	8999 H	250YR	6220.00	288.52	300.68		301.08	0.00	6.92	2066.81	801.49	0.42
1	8999 H	500YR	7380.00	288.52	301.67		301.92	0.00	5.87	2901.79	876.96	0.34
1	9251	2YR	2130.00	289.64	298.91		299.33	0.00	5.46	601.82	438.21	0.36
1	9251	5YR	2830.00	289.64	299.73		300.08	0.00	5.44	1013.48	546.90	0.34
1	9251	10YR	3400.00	289.64	300.15		300.48	0.00	5.59	1246.12	568.18	0.34
1	9251	25YR	4020.00	289.64	300.48		300.83	0.00	5.85	1443.12	598.63	0.35
1	9251	50YR	4630.00	289.64	300.76		301.12	0.00	6.15	1611.21	635.34	0.36
1	9251	100YR	5200.00	289.64	300.92		301.34	0.00	6.65	1718.99	668.87	0.39
1	9251	250YR	6220.00	289.64	301.31		301.73	0.00	6.96	1987.16	715.72	0.40
1	9251	500YR	7380.00	289.64	302.06		302.41	0.00	6.70	2563.26	817.45	0.37
1	9463	2YR	2130.00	290.00	299.44		299.73	0.00	4.44	562.19	204.07	0.31
1	9463	5YR	2830.00	290.00	300.11		300.47	0.00	5.05	782.92	432.90	0.34
1	9463	10YR	3400.00	290.00	300.50		300.91	0.00	5.44	984.62	595.00	0.36
1	9463	25YR	4020.00	290.00	300.85		301.27	0.00	5.76	1204.90	663.50	0.37
1	9463	50YR	4630.00	290.00	301.14		301.58	0.00	6.01	1405.62	703.16	0.38
1	9463	100YR	5200.00	290.00	301.38		301.83	0.00	6.23	1576.77	776.36	0.38
1	9463	250YR	6220.00	290.00	301.78		302.25	0.00	6.59	1905.66	864.94	0.40
1	9463	500YR	7380.00	290.00	302.46		302.83	0.00	6.26	2523.92	937.82	0.36

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Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	9503	2YR	2130.00	286.89	299.55	293.29	299.79	0.00	4.16	696.30	330.94	0.23
1	9503	5YR	2830.00	286.89	300.21	294.24	300.54	0.00	4.92	978.05	483.25	0.26
1	9503	10YR	3400.00	286.89	300.59	294.97	300.97	0.00	5.48	1188.34	612.11	0.29
1	9503	25YR	4020.00	286.89	300.92	295.72	301.34	0.00	5.91	1400.66	681.84	0.3
1	9503	50YR	4630.00	286.89	301.21	296.34	301.66	0.00	6.24	1592.27	739.16	0.32
1	9503	100YR	5200.00	286.89	301.44	296.87	301.91	0.00	6.54	1747.79	779.23	0.33
1	9503	250YR	6220.00	286.89	301.85	297.78	302.33	0.00	6.95	2025.77	837.96	0.35
1	9503	500YR	7380.00	286.89	302.50	301.08	302.92	0.00	6.83	2485.11	896.07	0.33
1	9544 Martine St.		Culvert									
1	9592	2YR	2130.00	289.53	300.54	295.04	300.74	0.00	3.79	853.26	473.80	0.23
1	9592	5YR	2830.00	289.53	300.92	295.94	301.18	0.00	4.49	1049.59	534.42	0.27
1	9592	10YR	3400.00	289.53	301.15	296.61	301.45	0.00	5.02	1172.37	575.35	0.29
1	9592	25YR	4020.00	289.53	301.31	297.27	301.69	0.00	5.65	1271.53	608.25	0.33
1	9592	50YR	4630.00	289.53	301.46	297.89	301.91	0.00	6.20	1362.73	623.37	0.36
1	9592	100YR	5200.00	289.53	301.61	298.55	302.11	0.00	6.67	1454.29	652.38	0.38
1	9592	250YR	6220.00	289.53	301.88	300.96	302.45	0.00	7.29	1638.64	742.34	0.41
1	9592	500YR	7380.00	289.53	302.53	301.28	302.99	0.00	6.92	2101.05	877.61	0.38
1	9613 I	2YR	2130.00	290.98	300.54	296.52	300.79	0.00	4.35	798.32	439.93	0.27
1	9613 I	5YR	2830.00	290.98	300.93	297.36	301.24	0.00	5.08	975.03	480.17	0.31
1	9613 I	10YR	3400.00	290.98	301.15	297.92	301.53	0.00	5.67	1088.73	516.03	0.34
1	9613 I	25YR	4020.00	290.98	301.33	298.52	301.77	0.00	6.29	1181.57	527.57	0.38
1	9613 I	50YR	4630.00	290.98	301.48	299.15	302.00	0.00	6.89	1264.43	564.51	0.41
1	9613 I	100YR	5200.00	290.98	301.64	300.73	302.21	0.00	7.33	1352.92	575.29	0.43
1	9613 I	250YR	6220.00	290.98	301.92	301.28	302.56	0.00	7.97	1516.82	602.09	0.46
1	9613 I	500YR	7380.00	290.98	302.50	301.65	303.15	0.00	8.30	1962.96	847.01	0.47
1	9832	2YR	2030.00	291.51	300.86		301.11	0.00	4.36	698.30	369.18	0.28
1	9832	5YR	2700.00	291.51	301.34		301.63	0.00	4.91	884.96	395.37	0.31
1	9832	10YR	3200.00	291.51	301.67		301.97	0.00	5.20	1014.32	402.29	0.32
1	9832	25YR	3780.00	291.51	301.95		302.29	0.00	5.59	1130.16	410.74	0.34
1	9832	50YR	4220.00	291.51	302.23		302.57	0.00	5.75	1245.58	437.71	0.34
1	9832	100YR	4810.00	291.51	302.44		302.84	0.00	6.23	1348.15	562.04	0.36
1	9832	250YR	6050.00	291.51	302.80		303.32	0.00	7.27	1581.24	691.61	0.42
1	9832	500YR	7300.00	291.51	303.42		303.87	0.00	7.12	2027.56	791.16	0.40
1	10296 J	2YR	2030.00	291.72	301.55		301.81	0.00	4.40	638.14	374.87	0.28
1	10296 J	5YR	2700.00	291.72	302.14		302.42	0.00	4.80	929.11	580.90	0.29
1	10296 J	10YR	3200.00	291.72	302.52		302.78	0.00	4.88	1157.68	644.05	0.29
1	10296 J	25YR	3780.00	291.72	302.88		303.12	0.00	4.95	1400.05	687.23	0.29
1	10296 J	50YR	4220.00	291.72	303.16		303.39	0.00	4.95	1598.95	716.33	0.28
1	10296 J	100YR	4810.00	291.72	303.48		303.70	0.00	4.98	1827.18	734.18	0.28
1	10296 J	250YR	6050.00	291.72	304.06		304.27	0.00	5.07	2263.11	760.80	0.28
1	10296 J	500YR	7300.00	291.72	304.56		304.77	0.00	5.25	2653.03	828.21	0.28
1	10780	2YR	1700.00	292.53	302.21	297.10	302.40	0.00	3.81	541.48	173.16	0.23
1	10780	5YR	2370.00	292.53	302.85	298.20	303.13	0.00	4.70	685.34	367.74	0.27
1	10780	10YR	2760.00	292.53	303.22	298.76	303.58	0.00	5.30	808.31	562.79	0.30
1	10780	25YR	3300.00	292.53	303.58	299.37	303.97	0.00	5.75	1006.44	753.51	0.32
1	10780	50YR	3720.00	292.53	303.84	299.89	304.26	0.00	6.06	1188.42	938.72	0.33
1	10780	100YR	4260.00	292.53	304.15	300.47	304.56	0.00	6.27	1434.42	1079.56	0.34
1	10780	250YR	5450.00	292.53	304.73	301.46	305.03	0.00	5.94	2335.12	1229.24	0.31
1	10780	500YR	6320.00	292.53	305.21	302.81	305.44	0.00	5.53	2940.35	1245.28	0.28
1	10810	2YR	1700.00	293.69	302.13	299.07	302.58	0.00	5.53	339.69	80.79	0.38
1	10810	5YR	2370.00	293.69	302.72	300.14	303.40	0.00	6.87	389.81	88.72	0.45
1	10810	10YR	2760.00	293.69	303.08	300.75	303.87	0.00	7.47	424.08	137.20	0.48
1	10810	25YR	3300.00	293.69	303.33	301.48	304.40	0.01	8.77	469.42	219.71	0.55
1	10810	50YR	3720.00	293.69	303.56	301.98	304.73	0.01	9.27	525.24	257.93	0.57
1	10810	100YR	4260.00	293.69	303.81	302.54	305.09	0.01	9.87	599.99	368.27	0.60
1	10810	250YR	5450.00	293.69	304.73	304.73	305.50	0.00	8.68	1315.39	1003.53	0.50
1	10810	500YR	6320.00	293.69	305.07	304.85	305.73	0.00	8.53	1665.62	1073.10	0.48
1	10903 College Dr.		Bridge									
1	10956	2YR	1700.00	293.69	303.39	299.07	303.66	0.00	4.44	483.10	230.43	0.28
1	10956	5YR	2370.00	293.69	304.79	300.14	304.93	0.00	3.77	1260.87	1015.19	0.22
1	10956	10YR	2760.00	293.69	305.34	300.75	305.44	0.00	3.42	1723.24	1133.59	0.19
1	10956	25YR	3300.00	293.69	305.30	301.48	305.45	0.00	4.17	1687.89	1127.40	0.23
1	10956	50YR	3720.00	293.69	305.55	301.98	305.69	0.00	4.22	1898.76	1213.84	0.23
1	10956	100YR	4260.00	293.69	305.88	302.54	306.02	0.00	4.22	2176.87	1243.78	0.23
1	10956	250YR	5450.00	293.69	306.12	304.74	306.26	0.00	4.51	2920.89	1267.16	0.24
1	10956	500YR	6320.00	293.69	306.33	304.97	306.48	0.00	4.80	3186.06	1289.83	0.26
1	10993 K	2YR	1700.00	294.37	303.39	301.12	303.97	0.00	6.61	336.48	182.89	0.43
1	10993 K	5YR	2370.00	294.37	304.78	302.33	305.18	0.00	6.14	969.51	993.03	0.37
1	10993 K	10YR	2760.00	294.37	305.34	302.87	305.59	0.00	5.40	1445.82	1046.12	0.31
1	10993 K	25YR	3300.00	294.37	305.29	304.23	305.68	0.00	6.60	1409.19	1035.28	0.39
1	10993 K	50YR	3720.00	294.37	305.55	305.00	305.90	0.00	6.59	1625.94	1106.37	0.38
1	10993 K	100YR	4260.00	294.37	305.88	305.18	306.19	0.00	6.49	1910.69	1112.96	0.37
1	10993 K	250YR	5450.00	294.37	306.13	305.50	306.43	0.00	6.82	2550.60	1117.29	0.38
1	10993 K	500YR	6320.00	294.37	306.34	305.70	306.66	0.00	7.23	2786.06	1126.43	0.40
1	11128	2YR	1700.00	294.51	303.83	300.84	304.21	0.00	5.05	388.51	156.18	0.36
1	11128	5YR	2370.00	294.51	305.05	301.71	305.34	0.00	4.83	966.02	822.48	0.31
1	11128	10YR	2760.00	294.51	305.46	302.17	305.71	0.00	4.77	1282.02	963.04	0.30

HEC-RAS Plan: Cowhorn_Existing River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	11128	25YR	3300.00	294.51	305.52	302.75	305.86	0.00	5.58	1325.39	966.25	0.35
1	11128	50YR	3720.00	294.51	305.74	303.21	306.07	0.00	5.75	1500.12	982.35	0.35
1	11128	100YR	4260.00	294.51	306.04	304.96	306.36	0.00	5.84	1746.77	1004.83	0.35
1	11128	250YR	5450.00	294.51	306.27	305.52	306.63	0.00	6.48	2230.76	1012.61	0.39
1	11128	500YR	6320.00	294.51	306.50	305.77	306.88	0.00	6.88	2458.48	1020.88	0.41
1	11290	2YR	1700.00	296.00	304.02	301.56	304.47	0.00	5.50	350.97	129.19	0.40
1	11290	5YR	2370.00	296.00	305.17	302.48	305.54	0.00	5.38	779.10	714.29	0.36
1	11290	10YR	2760.00	296.00	305.57	302.98	305.89	0.00	5.32	991.94	756.80	0.35
1	11290	25YR	3300.00	296.00	305.68	303.55	306.09	0.00	6.09	1048.68	760.94	0.40
1	11290	50YR	3720.00	296.00	305.89	304.45	306.31	0.00	6.29	1170.34	771.52	0.40
1	11290	100YR	4260.00	296.00	306.19	305.38	306.60	0.00	6.44	1334.26	792.62	0.40
1	11290	250YR	5450.00	296.00	306.40	305.81	306.96	0.00	7.63	1456.10	843.20	0.47
1	11290	500YR	6320.00	296.00	306.63	306.04	307.25	0.00	8.18	1586.16	862.09	0.50
1	11583 L	2YR	1700.00	297.00	304.50		305.22	0.00	7.09	325.12	115.36	0.51
1	11583 L	5YR	2370.00	297.00	305.46	303.77	306.32	0.00	7.97	538.33	300.68	0.53
1	11583 L	10YR	2760.00	297.00	305.79	304.31	306.71	0.00	8.47	641.22	337.15	0.55
1	11583 L	25YR	3300.00	297.00	305.95	305.60	307.14	0.00	9.70	697.95	350.97	0.62
1	11583 L	50YR	3720.00	297.00	306.15	306.13	307.45	0.00	10.32	768.46	356.16	0.65
1	11583 L	100YR	4260.00	297.00	306.41	306.38	307.82	0.00	10.96	860.53	361.36	0.68
1	11583 L	250YR	5450.00	297.00	307.23	307.23	308.57	0.00	11.32	1194.64	464.88	0.67
1	11583 L	500YR	6320.00	297.00	307.60	307.60	308.97	0.00	11.76	1372.56	487.70	0.68
1	11697	2YR	1700.00	297.53	305.30		305.51	0.00	3.73	486.80	92.78	0.25
1	11697	5YR	2370.00	297.53	306.33		306.63	0.00	4.45	589.10	109.36	0.28
1	11697	10YR	2760.00	297.53	306.68		307.04	0.00	4.94	628.89	121.06	0.31
1	11697	25YR	3300.00	297.53	307.09		307.56	0.00	5.59	682.52	143.27	0.34
1	11697	50YR	3720.00	297.53	307.35		307.91	0.00	6.09	723.47	161.59	0.36
1	11697	100YR	4260.00	297.53	307.63		308.30	0.00	6.70	772.00	193.20	0.39
1	11697	250YR	5450.00	297.53	308.04		309.00	0.00	8.12	866.10	310.20	0.47
1	11697	500YR	6320.00	297.53	308.10	305.24	309.37	0.00	9.33	886.28	331.10	0.53
1	11755	2YR	1700.00	297.53	305.34	301.26	305.55	0.00	3.70	486.79	93.18	0.25
1	11755	5YR	2370.00	297.53	306.38	302.00	306.67	0.00	4.40	580.50	111.10	0.28
1	11755	10YR	2760.00	297.53	306.74	302.38	307.10	0.00	4.88	612.55	123.17	0.30
1	11755	25YR	3300.00	297.53	307.17	302.88	307.62	0.00	5.51	650.93	149.71	0.33
1	11755	50YR	3720.00	297.53	307.45	303.23	307.98	0.00	5.99	676.12	167.10	0.36
1	11755	100YR	4260.00	297.53	307.73	303.67	308.38	0.00	6.62	701.51	203.75	0.39
1	11755	250YR	5450.00	297.53	308.21	304.61	309.12	0.00	7.92	923.43	363.80	0.45
1	11755	500YR	6320.00	297.53	308.36	305.23	309.54	0.00	9.01	983.43	419.46	0.51
1	11825 Richmond Rd.		Culvert									
1	11910 M	2YR	1700.00	297.69	305.92	303.01	306.16	0.00	3.87	439.52	113.02	0.33
1	11910 M	5YR	2370.00	297.69	307.24	303.80	307.50	0.00	4.06	589.55	321.83	0.31
1	11910 M	10YR	2760.00	297.69	307.82	304.22	308.10	0.00	4.25	667.49	551.86	0.31
1	11910 M	25YR	3300.00	297.69	308.59	304.71	308.89	0.00	4.46	780.96	601.72	0.30
1	11910 M	50YR	3720.00	297.69	309.15	305.03	309.47	0.00	4.60	864.33	626.15	0.30
1	11910 M	100YR	4260.00	297.69	309.84	305.42	310.18	0.00	4.77	966.75	659.80	0.30
1	11910 M	250YR	5450.00	297.69	311.21	306.13	311.36	0.00	3.59	3144.24	785.36	0.21
1	11910 M	500YR	6320.00	297.69	311.62	306.61	311.79	0.00	3.86	3477.71	837.23	0.22
1	11945	2YR	1700.00	298.00	305.89	305.89	307.16	0.02	9.05	187.91	232.11	1.00
1	11945	5YR	2370.00	298.00	306.90	306.67	308.06	0.01	8.64	276.57	347.79	0.88
1	11945	10YR	2760.00	298.00	307.53	306.99	308.57	0.01	8.24	350.99	459.60	0.77
1	11945	25YR	3300.00	298.00	308.35	307.40	309.29	0.01	7.89	464.20	541.22	0.66
1	11945	50YR	3720.00	298.00	308.94	307.70	309.84	0.01	7.76	568.02	611.67	0.61
1	11945	100YR	4260.00	298.00	309.68	308.07	310.48	0.00	7.44	721.77	636.01	0.55
1	11945	250YR	5450.00	298.00	311.25	308.61	311.38	0.00	4.02	3206.06	788.08	0.26
1	11945	500YR	6320.00	298.00	311.67	309.48	311.82	0.00	4.28	3547.21	831.28	0.27
1	12296	2YR	1580.00	297.23	308.02	304.03	308.24	0.00	3.95	596.02	371.63	0.27
1	12296	5YR	2270.00	297.23	308.86	305.03	309.14	0.00	4.60	921.41	546.55	0.30
1	12296	10YR	2710.00	297.23	309.28	305.56	309.59	0.00	4.93	1123.97	610.30	0.31
1	12296	25YR	3360.00	297.23	309.87	306.32	310.18	0.00	5.19	1420.09	637.97	0.32
1	12296	50YR	3860.00	297.23	310.34	306.95	310.64	0.00	5.27	1657.58	664.68	0.31
1	12296	100YR	4410.00	297.23	310.89	308.08	311.18	0.00	5.31	1942.55	731.29	0.31
1	12296	250YR	5300.00	297.23	311.46	308.84	311.72	0.00	5.29	2721.32	769.09	0.30
1	12296	500YR	6050.00	297.23	311.90	309.41	312.15	0.00	5.42	3060.25	781.88	0.30
1	12690	2YR	1580.00	296.40	308.37	303.76	308.76	0.00	5.10	389.62	219.02	0.31
1	12690	5YR	2270.00	296.40	309.27	305.04	309.75	0.00	5.95	681.90	389.66	0.35
1	12690	10YR	2710.00	296.40	309.73	305.75	310.22	0.00	6.24	873.31	469.98	0.36
1	12690	25YR	3360.00	296.40	310.33	306.80	310.81	0.00	6.48	1141.08	603.53	0.36
1	12690	50YR	3860.00	296.40	310.80	307.59	311.24	0.00	6.52	1361.78	673.67	0.35
1	12690	100YR	4410.00	296.40	311.32	307.79	311.75	0.00	6.63	1643.69	748.44	0.35
1	12690	250YR	5300.00	296.40	311.87	310.18	312.23	0.00	6.52	2295.74	836.21	0.34
1	12690	500YR	6050.00	296.40	312.31	310.54	312.66	0.00	6.63	2677.81	911.26	0.34
1	13089	2YR	1580.00	299.75	309.20		309.56	0.00	4.79	330.42	82.21	0.40
1	13089	5YR	2270.00	299.75	310.18		310.63	0.00	5.49	489.94	262.74	0.42
1	13089	10YR	2710.00	299.75	310.63		311.12	0.00	5.82	617.69	304.17	0.42
1	13089	25YR	3360.00	299.75	311.19		311.73	0.00	6.23	805.27	391.68	0.43
1	13089	50YR	3860.00	299.75	311.59		312.13	0.00	6.40	974.42	445.39	0.43
1	13089	100YR	4410.00	299.75	312.08		312.60	0.00	6.44	1201.76	513.29	0.42
1	13089	250YR	5300.00	299.75	312.52		313.08	0.00	6.84	1450.28	600.13	0.43
1	13089	500YR	6050.00	299.75	312.94		313.48	0.00	6.93	1718.18	671.40	0.43

HEC-RAS Plan: Cowhorn_Existing River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	13346	2YR	1580.00	302.20	310.01	307.59	310.30	0.00	4.47	482.06	285.81	0.38
1	13346	5YR	2270.00	302.20	311.04	308.49	311.29	0.00	4.50	787.92	309.99	0.34
1	13346	10YR	2710.00	302.20	311.51	308.99	311.77	0.00	4.66	943.60	356.36	0.3
1	13346	25YR	3360.00	302.20	312.11	310.12	312.37	0.00	4.86	1178.35	419.09	0.34
1	13346	50YR	3860.00	302.20	312.49	310.44	312.77	0.00	5.04	1347.96	484.64	0.34
1	13346	100YR	4410.00	302.20	312.92	310.69	313.20	0.00	5.17	1574.69	575.27	0.34
1	13346	250YR	5300.00	302.20	313.40	311.02	313.69	0.00	5.45	1860.86	611.16	0.35
1	13346	500YR	6050.00	302.20	313.78	311.37	314.09	0.00	5.65	2101.18	644.49	0.35
1	13410	2YR	1580.00	302.27	310.06		310.37	0.00	4.46	354.44	71.84	0.34
1	13410	5YR	2270.00	302.27	311.01		311.44	0.00	5.28	547.73	305.07	0.39
1	13410	10YR	2710.00	302.27	311.46		311.94	0.00	5.71	714.84	423.76	0.41
1	13410	25YR	3360.00	302.27	312.03		312.58	0.00	6.21	983.52	495.12	0.42
1	13410	50YR	3860.00	302.27	312.39		312.99	0.00	6.56	1166.99	508.98	0.44
1	13410	100YR	4410.00	302.27	312.81		313.43	0.00	6.83	1384.81	559.89	0.44
1	13410	250YR	5300.00	302.27	313.25		313.98	0.00	7.46	1664.15	699.21	0.47
1	13410	500YR	6050.00	302.27	313.61		314.40	0.00	7.94	1924.48	783.59	0.49
1	13461 Kennedy Ln.		Culvert									
1	13538	2YR	1580.00	304.61	311.51	308.32	311.79	0.00	4.48	508.25	285.79	0.32
1	13538	5YR	2270.00	304.61	312.39	309.28	312.66	0.00	4.78	856.82	492.92	0.32
1	13538	10YR	2710.00	304.61	312.67	309.82	312.97	0.00	5.15	998.36	511.59	0.34
1	13538	25YR	3360.00	304.61	312.99	311.48	313.34	0.00	5.68	1167.79	545.06	0.36
1	13538	50YR	3860.00	304.61	313.20	311.92	313.57	0.00	6.05	1281.56	571.52	0.38
1	13538	100YR	4410.00	304.61	313.39	312.44	313.81	0.00	6.54	1395.09	600.10	0.41
1	13538	250YR	5300.00	304.61	313.75	312.79	314.19	0.00	6.89	1612.38	618.09	0.42
1	13538	500YR	6050.00	304.61	314.04	313.06	314.49	0.00	7.14	1795.16	643.86	0.43
1	13577 N	2YR	1580.00	305.50	311.52	310.64	312.06	0.01	6.30	353.65	260.97	0.56
1	13577 N	5YR	2270.00	305.50	312.44	311.72	312.87	0.01	6.13	660.12	433.11	0.49
1	13577 N	10YR	2710.00	305.50	312.74	312.04	313.16	0.01	6.28	796.80	457.30	0.49
1	13577 N	25YR	3360.00	305.50	313.09	312.57	313.53	0.01	6.65	962.37	499.87	0.50
1	13577 N	50YR	3860.00	305.50	313.30	312.75	313.77	0.01	6.99	1077.62	565.43	0.51
1	13577 N	100YR	4410.00	305.50	313.52	312.96	314.01	0.01	7.29	1208.12	619.51	0.53
1	13577 N	250YR	5300.00	305.50	313.90	313.16	314.38	0.01	7.48	1445.43	653.19	0.52
1	13577 N	500YR	6050.00	305.50	314.20	313.45	314.66	0.01	7.53	1644.72	667.52	0.51
1	13879	2YR	1580.00	304.75	313.17		313.49	0.00	5.53	521.12	318.16	0.39
1	13879	5YR	2270.00	304.75	313.82		314.19	0.00	6.28	799.39	519.02	0.42
1	13879	10YR	2700.00	304.75	314.11		314.48	0.00	6.53	966.53	610.33	0.4
1	13879	25YR	3350.00	304.75	314.50		314.84	0.00	6.65	1215.46	652.02	0.4
1	13879	50YR	3850.00	304.75	314.78		315.10	0.00	6.74	1403.59	705.10	0.43
1	13879	100YR	4390.00	304.75	315.04		315.35	0.00	6.80	1590.75	723.64	0.42
1	13879	250YR	5280.00	304.75	315.39		315.70	0.00	7.04	1853.86	762.48	0.43
1	13879	500YR	6010.00	304.75	315.65		315.96	0.00	7.20	2052.73	775.18	0.43
1	14203	2YR	1580.00	304.31	313.98		314.17	0.00	3.97	744.42	467.03	0.26
1	14203	5YR	2270.00	304.31	314.73		314.91	0.00	4.28	1138.79	559.93	0.27
1	14203	10YR	2700.00	304.31	315.04		315.22	0.00	4.49	1315.08	573.30	0.28
1	14203	25YR	3350.00	304.31	315.41		315.61	0.00	4.86	1534.51	600.96	0.29
1	14203	50YR	3850.00	304.31	315.68		315.89	0.00	5.09	1697.11	622.03	0.30
1	14203	100YR	4390.00	304.31	315.93		316.15	0.00	5.35	1856.56	646.94	0.31
1	14203	250YR	5280.00	304.31	316.30		316.54	0.00	5.70	2104.51	680.83	0.33
1	14203	500YR	6010.00	304.31	316.58		316.84	0.00	6.04	2301.87	735.77	0.34
1	14387	2YR	1230.00	306.00	314.19		314.40	0.00	3.81	397.46	182.11	0.27
1	14387	5YR	1680.00	306.00	314.90		315.18	0.00	4.44	502.37	244.55	0.30
1	14387	10YR	2020.00	306.00	315.19		315.55	0.00	5.15	566.18	319.57	0.34
1	14387	25YR	2620.00	306.00	315.54		316.03	0.00	6.11	670.22	431.36	0.39
1	14387	50YR	3060.00	306.00	315.79		316.36	0.00	6.68	768.31	525.12	0.42
1	14387	100YR	3580.00	306.00	316.04		316.66	0.00	7.13	875.69	564.41	0.45
1	14387	250YR	4400.00	306.00	316.43		317.09	0.00	7.62	1043.02	599.48	0.46
1	14387	500YR	4970.00	306.00	316.75		317.39	0.00	7.77	1180.27	647.26	0.47
1	14438	2YR	1230.00	305.75	314.24		314.45	0.00	3.72	390.08	176.88	0.27
1	14438	5YR	1680.00	305.75	314.98		315.24	0.00	4.30	523.19	339.94	0.30
1	14438	10YR	2020.00	305.75	315.31		315.63	0.00	4.79	624.49	449.93	0.32
1	14438	25YR	2620.00	305.75	315.76		316.13	0.00	5.37	789.19	540.85	0.35
1	14438	50YR	3060.00	305.75	316.09		316.47	0.00	5.63	924.21	610.77	0.36
1	14438	100YR	3580.00	305.75	316.38		316.79	0.00	5.94	1048.42	617.01	0.37
1	14438	250YR	4400.00	305.75	316.79		317.22	0.00	6.37	1220.67	631.21	0.39
1	14438	500YR	4970.00	305.75	317.08		317.52	0.00	6.54	1347.92	644.80	0.39
1	14569	2YR	1230.00	305.62	314.43		314.60	0.00	3.54	473.06	321.29	0.29
1	14569	5YR	1680.00	305.62	315.24		315.38	0.00	3.44	815.72	479.31	0.26
1	14569	10YR	2020.00	305.62	315.65		315.78	0.00	3.46	1018.14	517.63	0.25
1	14569	25YR	2620.00	305.62	316.17		316.30	0.00	3.63	1288.91	536.98	0.26
1	14569	50YR	3060.00	305.62	316.51		316.64	0.00	3.72	1473.36	546.41	0.26
1	14569	100YR	3580.00	305.62	316.82		316.96	0.00	3.90	1646.14	573.18	0.2
1	14569	250YR	4400.00	305.62	317.25		317.40	0.00	4.17	1902.13	683.69	0.27
1	14569	500YR	4970.00	305.62	317.53		317.71	0.00	4.67	2092.87	786.23	0.30
1	14701	2YR	1230.00	305.62	314.59		314.80	0.00	3.66	355.62	152.83	0.32
1	14701	5YR	1670.00	305.62	315.34		315.56	0.00	3.95	548.87	393.71	0.32
1	14701	10YR	2020.00	305.62	315.73		315.96	0.00	4.12	723.63	482.34	0.32
1	14701	25YR	2620.00	305.62	316.24		316.47	0.00	4.31	981.70	518.27	0.32

HEC-RAS Plan: Cowhorn_Existing River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	14701	50YR	3050.00	305.62	316.58		316.80	0.00	4.36	1160.99	543.29	0.31
1	14701	100YR	3580.00	305.62	316.90		317.12	0.00	4.53	1329.24	579.66	0.32
1	14701	250YR	4380.00	305.62	317.34		317.56	0.00	4.74	1566.57	641.57	0.32
1	14701	500YR	4940.00	305.62	317.65		317.88	0.00	4.81	1742.25	673.38	0.32
1	15010 O	2YR	1230.00	307.50	315.21	312.58	315.52	0.00	4.48	281.81	114.66	0.38
1	15010 O	5YR	1670.00	307.50	315.90	313.39	316.26	0.00	4.93	403.61	230.08	0.39
1	15010 O	10YR	2020.00	307.50	316.28	313.91	316.66	0.00	5.23	520.87	369.78	0.40
1	15010 O	25YR	2620.00	307.50	316.78	314.65	317.15	0.00	5.46	722.02	442.45	0.40
1	15010 O	50YR	3050.00	307.50	317.10	315.79	317.45	0.00	5.50	867.03	480.01	0.39
1	15010 O	100YR	3580.00	307.50	317.42	316.57	317.76	0.00	5.60	1028.29	528.97	0.38
1	15010 O	250YR	4380.00	307.50	317.86	316.92	318.18	0.00	5.65	1270.60	596.68	0.38
1	15010 O	500YR	4940.00	307.50	318.17	317.06	318.49	0.00	5.77	1461.38	706.89	0.38
1	15610	2YR	940.00	309.39	317.20		317.39	0.00	3.46	272.74	92.35	0.33
1	15610	5YR	1300.00	309.39	317.89		318.12	0.00	3.92	352.90	157.91	0.34
1	15610	10YR	1570.00	309.39	318.29		318.55	0.00	4.18	421.06	180.72	0.35
1	15610	25YR	2020.00	309.39	318.75		319.06	0.00	4.65	509.80	198.82	0.37
1	15610	50YR	2340.00	309.39	319.01		319.36	0.00	4.98	561.56	206.74	0.38
1	15610	100YR	2710.00	309.39	319.30		319.68	0.00	5.28	623.43	216.44	0.40
1	15610	250YR	3280.00	309.39	319.68		320.12	0.00	5.76	707.44	234.77	0.42
1	15610	500YR	3680.00	309.39	319.96		320.43	0.00	6.02	775.52	257.13	0.43
1	15691	2YR	940.00	309.39	317.39		317.77	0.01	4.95	189.80	57.91	0.48
1	15691	5YR	1300.00	309.39	318.04		318.54	0.01	5.66	237.34	128.86	0.51
1	15691	10YR	1570.00	309.39	318.43		318.97	0.01	6.02	291.92	153.85	0.52
1	15691	25YR	2020.00	309.39	318.90		319.51	0.01	6.55	370.75	179.19	0.54
1	15691	50YR	2340.00	309.39	319.17		319.82	0.01	6.89	420.82	190.56	0.55
1	15691	100YR	2710.00	309.39	319.48		320.16	0.01	7.16	481.19	202.54	0.55
1	15691	250YR	3280.00	309.39	319.88		320.61	0.01	7.58	566.73	224.56	0.56
1	15691	500YR	3680.00	309.39	320.17		320.92	0.01	7.76	635.83	246.41	0.56
1	15728 P	2YR	940.00	310.00	317.70		317.94	0.00	3.93	239.43	58.11	0.34
1	15728 P	5YR	1300.00	310.00	318.39		318.72	0.00	4.63	286.75	81.36	0.37
1	15728 P	10YR	1570.00	310.00	318.76		319.16	0.00	5.13	330.14	151.97	0.40
1	15728 P	25YR	2020.00	310.00	319.22		319.72	0.00	5.82	406.18	179.82	0.43
1	15728 P	50YR	2340.00	310.00	319.48		320.04	0.00	6.24	455.60	192.85	0.45
1	15728 P	100YR	2710.00	310.00	319.76		320.38	0.00	6.67	511.09	210.45	0.47
1	15728 P	250YR	3280.00	310.00	320.14		320.84	0.01	7.25	597.81	245.82	0.50
1	15728 P	500YR	3680.00	310.00	320.42		321.14	0.01	7.49	669.95	270.15	0.50
1	15792	2YR	940.00	311.04	317.87		318.17	0.00	4.46	219.08	91.36	0.41
1	15792	5YR	1300.00	311.04	318.59		318.96	0.00	4.96	315.70	179.01	0.42
1	15792	10YR	1570.00	311.04	319.02		319.40	0.00	5.20	406.80	251.71	0.42
1	15792	25YR	2020.00	311.04	319.59		319.98	0.00	5.45	564.30	298.55	0.41
1	15792	50YR	2340.00	311.04	319.93		320.31	0.00	5.59	666.19	308.55	0.41
1	15792	100YR	2710.00	311.04	320.28		320.66	0.00	5.75	780.09	353.83	0.41
1	15792	250YR	3280.00	311.04	320.75		321.14	0.00	5.97	970.89	434.54	0.41
1	15792	500YR	3680.00	311.04	321.06		321.44	0.00	6.08	1109.08	479.36	0.41
1	16069	2YR	920.00	310.98	319.05		319.46	0.01	5.11	185.53	65.43	0.45
1	16069	5YR	1280.00	310.98	319.76		320.26	0.01	5.79	266.39	151.72	0.47
1	16069	10YR	1560.00	310.98	320.16		320.72	0.01	6.25	335.30	214.33	0.49
1	16069	25YR	2000.00	310.98	320.67	319.40	321.26	0.01	6.67	469.53	294.92	0.50
1	16069	50YR	2310.00	310.98	320.98		321.57	0.01	6.87	566.07	338.78	0.50
1	16069	100YR	2690.00	310.98	321.31		321.87	0.01	6.97	681.82	359.00	0.49
1	16069	250YR	3190.00	310.98	321.75		322.26	0.00	6.93	847.41	386.00	0.47
1	16069	500YR	3590.00	310.98	322.03		322.53	0.00	6.99	957.15	394.43	0.47
1	16514	2YR	920.00	312.75	320.38	317.04	320.49	0.00	2.65	347.26	79.89	0.22
1	16514	5YR	1280.00	312.75	321.25	317.56	321.40	0.00	3.05	423.55	106.98	0.24
1	16514	10YR	1560.00	312.75	321.77	317.92	321.94	0.00	3.35	489.76	171.63	0.26
1	16514	25YR	2000.00	312.75	322.34	318.44	322.55	0.00	3.78	618.89	301.07	0.27
1	16514	50YR	2310.00	312.75	322.65	318.77	322.89	0.00	4.03	722.76	382.12	0.28
1	16514	100YR	2690.00	312.75	322.95	319.14	323.22	0.00	4.33	835.66	422.31	0.30
1	16514	250YR	3190.00	312.75	323.30	319.62	323.60	0.00	4.67	972.28	468.18	0.31
1	16514	500YR	3590.00	312.75	323.55	319.96	323.87	0.00	4.90	1073.19	493.65	0.32
1	16560 Q	2YR	920.00	312.30	320.44	316.16	320.54	0.00	2.56	366.95	87.89	0.19
1	16560 Q	5YR	1280.00	312.30	321.31	316.79	321.45	0.00	3.03	452.74	104.82	0.21
1	16560 Q	10YR	1560.00	312.30	321.82	317.22	321.99	0.00	3.37	508.10	154.99	0.23
1	16560 Q	25YR	2000.00	312.30	322.39	317.81	322.62	0.00	3.92	573.19	243.02	0.25
1	16560 Q	50YR	2310.00	312.30	322.71	318.18	322.98	0.00	4.31	610.01	270.65	0.27
1	16560 Q	100YR	2690.00	312.30	323.00	318.62	323.33	0.00	4.79	645.20	289.84	0.30
1	16560 Q	250YR	3190.00	312.30	323.33	319.13	323.75	0.00	5.40	685.53	340.57	0.33
1	16560 Q	500YR	3590.00	312.30	323.55	319.52	324.06	0.00	5.90	714.47	378.82	0.36
1	16624 Mall Dr.		Culvert									
1	16699	2YR	920.00	316.48	323.10	320.09	323.19	0.00	2.34	407.81	257.80	0.20
1	16699	5YR	1280.00	316.48	324.49	320.61	324.57	0.00	2.36	559.87	462.11	0.18
1	16699	10YR	1560.00	316.48	325.74	320.97	325.82	0.00	2.30	698.22	555.37	0.16
1	16699	25YR	2000.00	316.48	327.18	321.53	327.22	0.00	1.70	1282.61	716.94	0.11
1	16699	50YR	2310.00	316.48	327.56	321.82	327.61	0.00	1.85	1359.44	748.81	0.12
1	16699	100YR	2690.00	316.48	327.94	322.09	328.00	0.00	2.03	1436.03	770.95	0.12
1	16699	250YR	3190.00	316.48	328.14	322.43	328.22	0.00	2.34	1476.15	793.72	0.14
1	16699	500YR	3590.00	316.48	328.49	322.67	328.58	0.00	2.51	1547.48	814.36	0.15

HEC-RAS Plan: Cowhorn_Existing River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	16805	2YR	920.00	316.79	323.20	319.19	323.25	0.00	1.94	474.42	101.15	0.16
1	16805	5YR	1280.00	316.79	324.55	319.63	324.62	0.00	2.08	618.69	213.43	0.15
1	16805	10YR	1560.00	316.79	325.79	319.93	325.86	0.00	2.09	752.92	431.46	0.14
1	16805	25YR	2000.00	316.79	327.19	320.36	327.27	0.00	2.24	903.94	633.80	0.1
1	16805	50YR	2310.00	316.79	327.57	320.65	327.66	0.00	2.47	944.77	676.76	0.15
1	16805	100YR	2690.00	316.79	327.94	320.98	328.06	0.00	2.76	985.41	702.40	0.16
1	16805	250YR	3190.00	316.79	328.14	321.39	328.29	0.00	3.21	1006.60	715.12	0.18
1	16805	500YR	3590.00	316.79	328.48	321.70	328.67	0.00	3.48	1044.24	740.89	0.19
1	16931 Interstate 30		Culvert									
1	17038	2YR	920.00	317.11	323.52	319.89	323.60	0.00	2.27	430.80	195.55	0.17
1	17038	5YR	1280.00	317.11	324.95	320.37	325.03	0.00	2.37	570.44	347.52	0.16
1	17038	10YR	1560.00	317.11	326.21	320.71	326.29	0.00	2.38	687.62	411.79	0.15
1	17038	25YR	2000.00	317.11	327.73	321.27	327.82	0.00	2.52	829.57	589.41	0.14
1	17038	50YR	2310.00	317.11	328.30	321.57	328.41	0.00	2.72	882.96	677.22	0.15
1	17038	100YR	2690.00	317.11	328.96	321.89	329.08	0.00	2.96	944.12	721.48	0.16
1	17038	250YR	3190.00	317.11	329.58	322.27	329.74	0.00	3.30	1002.76	804.28	0.17
1	17038	500YR	3590.00	317.11	330.34	322.56	330.52	0.00	3.46	1073.60	872.90	0.17
1	17074	2YR	920.00	316.87	323.47	320.88	323.71	0.00	3.88	239.25	73.17	0.32
1	17074	5YR	1280.00	316.87	324.89	321.52	325.14	0.00	4.07	318.10	275.53	0.30
1	17074	10YR	1560.00	316.87	326.16	321.97	326.37	0.00	3.81	443.35	385.27	0.25
1	17074	25YR	2000.00	316.87	327.72	322.55	327.85	0.00	3.19	762.14	559.60	0.19
1	17074	50YR	2310.00	316.87	328.30	322.92	328.44	0.00	3.32	842.46	621.20	0.19
1	17074	100YR	2690.00	316.87	328.96	323.36	329.11	0.00	3.46	934.50	663.84	0.19
1	17074	250YR	3190.00	316.87	329.59	323.88	329.77	0.00	3.72	1022.88	712.99	0.20
1	17074	500YR	3590.00	316.87	330.36	324.26	330.54	0.00	3.76	1129.63	811.76	0.20
1	17114 Saint Michael Dr		Culvert									
1	17175	2YR	920.00	316.87	324.36	321.06	324.44	0.00	2.49	442.82	266.01	0.19
1	17175	5YR	1280.00	316.87	326.31	321.57	326.38	0.00	2.41	639.65	548.14	0.16
1	17175	10YR	1560.00	316.87	328.01	321.87	328.05	0.00	1.82	1161.92	638.23	0.11
1	17175	25YR	2000.00	316.87	329.08	322.30	329.11	0.00	1.70	1840.66	809.78	0.09
1	17175	50YR	2310.00	316.87	329.47	322.58	329.50	0.00	1.85	1946.60	848.92	0.10
1	17175	100YR	2690.00	316.87	329.87	322.91	329.91	0.00	2.04	2053.83	871.44	0.11
1	17175	250YR	3190.00	316.87	330.30	323.31	330.35	0.00	2.28	2170.33	901.08	0.12
1	17175	500YR	3590.00	316.87	330.73	323.62	330.78	0.00	2.43	2285.83	929.74	0.13
1	17197 R	2YR	920.00	317.20	324.42	320.59	324.46	0.00	1.74	642.60	301.93	0.13
1	17197 R	5YR	1280.00	317.20	326.36	320.99	326.40	0.00	1.67	937.28	571.34	0.11
1	17197 R	10YR	1560.00	317.20	328.03	321.28	328.05	0.00	1.49	1375.94	628.23	0.0
1	17197 R	25YR	2000.00	317.20	329.09	321.68	329.11	0.00	1.40	2143.96	789.59	0.08
1	17197 R	50YR	2310.00	317.20	329.48	321.94	329.51	0.00	1.52	2262.22	812.72	0.08
1	17197 R	100YR	2690.00	317.20	329.88	322.22	329.91	0.00	1.68	2382.11	851.45	0.09
1	17197 R	250YR	3190.00	317.20	330.32	322.65	330.36	0.00	1.89	2512.63	879.49	0.10
1	17197 R	500YR	3590.00	317.20	330.75	322.98	330.79	0.00	2.02	2641.62	920.98	0.10
1	17707	2YR	430.00	320.17	324.56	323.48	324.77	0.01	3.81	134.62	173.45	0.47
1	17707	5YR	650.00	320.17	326.48	324.21	326.52	0.00	1.98	539.65	444.65	0.18
1	17707	10YR	800.00	320.17	328.10	324.55	328.11	0.00	1.27	1049.99	592.17	0.10
1	17707	25YR	1020.00	320.17	329.14	325.00	329.14	0.00	0.86	2268.13	667.30	0.06
1	17707	50YR	1190.00	320.17	329.54	325.17	329.55	0.00	0.89	2514.12	693.45	0.06
1	17707	100YR	1370.00	320.17	329.95	325.32	329.95	0.00	0.93	2766.58	723.06	0.06
1	17707	250YR	1690.00	320.17	330.40	325.57	330.40	0.00	1.03	3046.69	753.81	0.07
1	17707	500YR	1950.00	320.17	330.83	325.74	330.84	0.00	1.08	3333.07	822.10	0.07
1	17852	2YR	430.00	320.98	325.31	324.44	325.46	0.00	3.25	163.84	201.07	0.41
1	17852	5YR	650.00	320.98	326.59	324.94	326.64	0.00	2.19	463.16	318.89	0.22
1	17852	10YR	800.00	320.98	328.13	325.16	328.15	0.00	1.45	846.35	343.74	0.12
1	17852	25YR	1020.00	320.98	329.15	325.52	329.16	0.00	1.15	1465.61	412.72	0.08
1	17852	50YR	1190.00	320.98	329.55	325.67	329.56	0.00	1.23	1620.43	472.66	0.09
1	17852	100YR	1370.00	320.98	329.96	325.84	329.97	0.00	1.29	1786.36	503.77	0.09
1	17852	250YR	1690.00	320.98	330.40	326.13	330.42	0.00	1.44	1973.02	578.19	0.10
1	17852	500YR	1950.00	320.98	330.84	326.27	330.86	0.00	1.53	2160.64	620.94	0.10
1	17959	2YR	420.00	321.05	325.69	324.38	325.80	0.00	2.76	170.55	141.01	0.32
1	17959	5YR	630.00	321.05	326.69	324.80	326.78	0.00	2.63	302.69	198.32	0.25
1	17959	10YR	790.00	321.05	328.15	325.08	328.19	0.00	1.97	542.47	262.11	0.16
1	17959	25YR	1000.00	321.05	329.16	325.46	329.19	0.00	1.61	997.00	374.12	0.12
1	17959	50YR	1170.00	321.05	329.56	325.68	329.59	0.00	1.72	1116.89	407.48	0.12
1	17959	100YR	1360.00	321.05	329.97	325.90	330.00	0.00	1.80	1245.90	425.27	0.12
1	17959	250YR	1660.00	321.05	330.42	326.19	330.45	0.00	1.99	1393.03	449.91	0.13
1	17959	500YR	1920.00	321.05	330.85	326.49	330.89	0.00	1.97	1780.01	539.34	0.13
1	18047	2YR	420.00	320.31	325.85	322.34	325.89	0.00	1.57	267.84	70.99	0.14
1	18047	5YR	630.00	320.31	326.80	322.78	326.85	0.00	1.90	335.21	140.65	0.15
1	18047	10YR	790.00	320.31	328.17	323.07	328.23	0.00	1.85	438.12	169.09	0.13
1	18047	25YR	1000.00	320.31	329.17	323.42	329.21	0.00	1.77	738.74	266.49	0.12
1	18047	50YR	1170.00	320.31	329.57	323.66	329.62	0.00	1.93	810.46	282.34	0.12
1	18047	100YR	1360.00	320.31	329.97	323.94	330.03	0.00	2.11	888.65	311.94	0.13
1	18047	250YR	1660.00	320.31	330.42	324.34	330.50	0.00	2.42	987.55	361.33	0.15
1	18047	500YR	1920.00	320.31	330.86	324.64	330.93	0.00	2.40	1340.08	433.22	0.14
1	18087 Private Dr.		Culvert									
1	18139 S	2YR	420.00	322.30	326.66	324.55	326.75	0.00	2.48	169.19	106.18	0.26

HEC-RAS Plan: Cowhorn_Existing Rive : Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	18139 S	5YR	630.00	322.30	327.64	325.02	327.76	0.00	2.73	230.46	153.63	0.26
1	18139 S	10YR	790.00	322.30	329.11	325.34	329.20	0.00	2.35	335.56	270.90	0.20
1	18139 S	25YR	1000.00	322.30	330.65	325.71	330.67	0.00	1.32	1176.13	413.40	0.10
1	18139 S	50YR	1170.00	322.30	331.03	325.99	331.05	0.00	1.37	1341.51	454.78	0.10
1	18139 S	100YR	1360.00	322.30	331.30	326.28	331.32	0.00	1.47	1467.15	480.14	0.10
1	18139 S	250YR	1660.00	322.30	331.59	326.69	331.62	0.00	1.65	1610.47	505.30	0.12
1	18139 S	500YR	1920.00	322.30	331.81	327.03	331.84	0.00	1.80	1724.97	523.58	0.12
1	18179	2YR	420.00	322.08	326.67	325.49	326.91	0.00	4.00	119.93	106.28	0.42
1	18179	5YR	630.00	322.08	327.66	326.05	327.88	0.00	4.00	201.14	220.17	0.36
1	18179	10YR	790.00	322.08	329.13	326.40	329.25	0.00	3.12	335.90	338.40	0.24
1	18179	25YR	1000.00	322.08	330.66	326.95	330.67	0.00	1.49	1281.92	411.32	0.10
1	18179	50YR	1170.00	322.08	331.04	327.19	331.06	0.00	1.55	1441.52	426.37	0.10
1	18179	100YR	1360.00	322.08	331.31	327.53	331.33	0.00	1.66	1557.71	436.56	0.11
1	18179	250YR	1660.00	322.08	331.60	327.87	331.62	0.00	1.87	1687.31	448.83	0.12
1	18179	500YR	1920.00	322.08	331.83	328.16	331.85	0.00	2.03	1789.52	464.04	0.13
1	18242	2YR	420.00	321.48	326.98	325.80	327.12	0.00	3.20	172.31	156.24	0.35
1	18242	5YR	630.00	321.48	327.91	326.42	328.01	0.00	2.97	286.18	211.32	0.28
1	18242	10YR	790.00	321.48	329.25	326.77	329.31	0.00	2.32	457.33	259.38	0.18
1	18242	25YR	1000.00	321.48	330.67	327.02	330.69	0.00	1.61	1081.81	342.91	0.11
1	18242	50YR	1170.00	321.48	331.05	327.20	331.07	0.00	1.69	1216.67	363.00	0.12
1	18242	100YR	1360.00	321.48	331.32	327.38	331.34	0.00	1.87	1318.22	396.76	0.12
1	18242	250YR	1660.00	321.48	331.61	327.64	331.64	0.00	2.09	1436.70	406.19	0.14
1	18242	500YR	1920.00	321.48	331.84	327.84	331.88	0.00	2.32	1531.64	438.09	0.15
1	18302	2YR	420.00	319.97	327.10	324.31	327.26	0.00	3.32	153.07	100.49	0.29
1	18302	5YR	630.00	319.97	327.97	325.14	328.14	0.00	3.54	262.82	148.96	0.28
1	18302	10YR	790.00	319.97	329.28	325.68	329.35	0.00	2.68	458.95	230.45	0.19
1	18302	25YR	1000.00	319.97	330.67	326.30	330.71	0.00	2.13	845.76	307.79	0.14
1	18302	50YR	1170.00	319.97	331.05	327.26	331.10	0.00	2.40	972.01	358.24	0.15
1	18302	100YR	1360.00	319.97	331.32	327.61	331.38	0.00	2.56	1072.22	382.29	0.16
1	18302	250YR	1660.00	319.97	331.62	328.13	331.68	0.00	2.82	1188.68	403.46	0.17
1	18302	500YR	1920.00	319.97	331.85	328.36	331.92	0.00	3.03	1282.73	421.53	0.18
1	18322 Pedestrian Bridg		Bridge									
1	18339	2YR	420.00	321.19	327.32	325.52	327.53	0.00	3.95	148.94	112.84	0.35
1	18339	5YR	630.00	321.19	328.16	326.25	328.34	0.00	3.98	263.33	158.85	0.32
1	18339	10YR	790.00	321.19	329.34	327.18	329.42	0.00	2.91	460.16	237.57	0.21
1	18339	25YR	1000.00	321.19	330.71	327.62	330.74	0.00	2.27	858.14	295.84	0.15
1	18339	50YR	1170.00	321.19	331.10	327.88	331.14	0.00	2.45	986.87	355.64	0.16
1	18339	100YR	1360.00	321.19	331.37	328.11	331.42	0.00	2.60	1087.95	388.95	0.16
1	18339	250YR	1660.00	321.19	331.67	328.48	331.73	0.00	2.87	1210.38	416.87	0.18
1	18339	500YR	1920.00	321.19	331.91	328.69	331.97	0.00	3.07	1309.94	434.51	0.19
1	18369	2YR	420.00	322.00	327.38	327.00	327.71	0.01	5.10	119.46	104.55	0.55
1	18369	5YR	630.00	322.00	328.22	327.49	328.44	0.00	4.54	229.75	165.67	0.43
1	18369	10YR	790.00	322.00	329.37	327.71	329.45	0.00	3.04	433.62	259.44	0.25
1	18369	25YR	1000.00	322.00	330.72	328.12	330.76	0.00	2.17	845.37	292.74	0.16
1	18369	50YR	1170.00	322.00	331.12	328.28	331.15	0.00	2.25	964.87	315.83	0.16
1	18369	100YR	1360.00	322.00	331.39	328.43	331.43	0.00	2.53	1059.53	377.21	0.17
1	18369	250YR	1660.00	322.00	331.70	328.72	331.75	0.00	2.80	1180.30	419.43	0.19
1	18369	500YR	1920.00	322.00	331.93	328.89	331.99	0.00	3.05	1281.77	447.66	0.20
1	18454	2YR	420.00	323.52	327.93	326.83	328.09	0.00	3.47	161.35	126.87	0.37
1	18454	5YR	630.00	323.52	328.53	327.38	328.70	0.00	3.74	237.53	175.97	0.36
1	18454	10YR	790.00	323.52	329.46	327.81	329.55	0.00	2.95	443.16	225.50	0.25
1	18454	25YR	1000.00	323.52	330.75	328.05	330.80	0.00	2.19	763.90	279.19	0.16
1	18454	50YR	1170.00	323.52	331.15	328.26	331.19	0.00	2.25	878.25	301.98	0.16
1	18454	100YR	1360.00	323.52	331.42	328.47	331.48	0.00	2.59	965.92	350.97	0.18
1	18454	250YR	1660.00	323.52	331.73	328.86	331.80	0.00	2.89	1078.20	386.98	0.20
1	18454	500YR	1920.00	323.52	331.97	329.10	332.05	0.00	3.16	1174.05	418.93	0.21
1	18517	2YR	420.00	324.58	328.14	326.67	328.25	0.00	2.78	169.86	132.92	0.29
1	18517	5YR	630.00	324.58	328.69	327.09	328.85	0.00	3.34	213.61	178.53	0.32
1	18517	10YR	790.00	324.58	329.53	327.36	329.62	0.00	2.70	449.75	233.30	0.23
1	18517	25YR	1000.00	324.58	330.78	327.67	330.82	0.00	2.08	772.26	272.77	0.16
1	18517	50YR	1170.00	324.58	331.17	327.97	331.22	0.00	2.15	881.45	288.10	0.16
1	18517	100YR	1360.00	324.58	331.46	328.20	331.51	0.00	2.33	971.39	334.21	0.17
1	18517	250YR	1660.00	324.58	331.78	328.53	331.84	0.00	2.59	1091.05	435.56	0.18
1	18517	500YR	1920.00	324.58	332.01	328.93	332.09	0.00	3.00	1197.87	464.06	0.20
1	18565 Michael Meagher		Culvert									
1	18601 T	2YR	420.00	323.27	328.38	325.78	328.47	0.00	2.42	181.15	131.62	0.23
1	18601 T	5YR	630.00	323.27	329.18	326.37	329.31	0.00	2.85	245.69	185.59	0.24
1	18601 T	10YR	790.00	323.27	330.40	326.74	330.45	0.00	2.14	576.61	214.80	0.16
1	18601 T	25YR	1000.00	323.27	331.25	327.17	331.30	0.00	2.13	768.18	238.44	0.15
1	18601 T	50YR	1170.00	323.27	331.52	327.48	331.58	0.00	2.32	833.59	248.92	0.16
1	18601 T	100YR	1360.00	323.27	331.73	327.78	331.80	0.00	2.57	887.51	259.72	0.17
1	18601 T	250YR	1660.00	323.27	331.99	328.23	332.09	0.00	2.99	963.63	344.20	0.20
1	18601 T	500YR	1920.00	323.27	332.17	328.69	332.29	0.00	3.35	1026.91	367.66	0.22
1	18632	2YR	420.00	323.50	328.34	327.78	328.64	0.01	4.57	106.62	95.15	0.56
1	18632	5YR	630.00	323.50	329.17	328.29	329.44	0.00	4.40	180.30	149.36	0.46
1	18632	10YR	790.00	323.50	330.40	328.57	330.49	0.00	2.93	430.36	189.54	0.25
1	18632	25YR	1000.00	323.50	331.26	328.87	331.33	0.00	2.74	600.81	214.70	0.22

HEC-RAS Plan: Cowhorn_Existing River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	18632	50YR	1170.00	323.50	331.52	329.09	331.61	0.00	3.01	663.48	258.52	0.23
1	18632	100YR	1360.00	323.50	331.74	329.30	331.84	0.00	3.25	719.49	265.27	0.25
1	18632	250YR	1660.00	323.50	332.00	329.68	332.13	0.00	3.67	791.86	292.49	0.27
1	18632	500YR	1920.00	323.50	332.18	329.95	332.34	0.00	4.07	849.41	335.94	0.3
1	18931	2YR	420.00	325.23	329.62		329.66	0.00	2.15	327.73	299.63	0.27
1	18931	5YR	630.00	325.23	330.12		330.16	0.00	2.25	493.10	340.00	0.26
1	18931	10YR	790.00	325.23	330.75		330.78	0.00	1.90	712.53	354.17	0.19
1	18931	25YR	1000.00	325.23	331.49		331.51	0.00	1.72	979.84	368.47	0.16
1	18931	50YR	1170.00	325.23	331.78		331.81	0.00	1.80	1087.38	375.19	0.16
1	18931	100YR	1360.00	325.23	332.02		332.05	0.00	1.93	1178.06	381.62	0.16
1	18931	250YR	1660.00	325.23	332.33		332.37	0.00	2.13	1299.61	391.77	0.17
1	18931	500YR	1920.00	325.23	332.57		332.61	0.00	2.30	1392.07	402.67	0.18
1	19044	2YR	420.00	326.22	329.87		329.96	0.00	2.85	237.67	202.16	0.32
1	19044	5YR	630.00	326.22	330.35		330.45	0.00	3.16	362.59	296.62	0.33
1	19044	10YR	790.00	326.22	330.89		330.95	0.00	2.70	530.64	327.80	0.27
1	19044	25YR	1000.00	326.22	331.58		331.62	0.00	2.30	770.66	366.67	0.22
1	19044	50YR	1170.00	326.22	331.87		331.91	0.00	2.34	881.80	411.47	0.22
1	19044	100YR	1360.00	326.22	332.11		332.16	0.00	2.44	989.93	458.97	0.22
1	19044	250YR	1660.00	326.22	332.44		332.49	0.00	2.68	1146.49	509.45	0.24
1	19044	500YR	1920.00	326.22	332.68		332.74	0.00	2.77	1273.47	533.95	0.24
1	19175	2YR	420.00	327.20	330.15	329.80	330.28	0.00	4.52	266.09	301.44	0.72
1	19175	5YR	630.00	327.20	330.62	330.06	330.73	0.00	4.29	389.91	333.15	0.63
1	19175	10YR	790.00	327.20	331.05	330.19	331.14	0.00	3.97	512.02	377.29	0.54
1	19175	25YR	1000.00	327.20	331.67	330.34	331.75	0.00	3.75	714.15	487.12	0.47
1	19175	50YR	1170.00	327.20	331.95	330.45	332.03	0.00	3.75	818.83	504.53	0.45
1	19175	100YR	1360.00	327.20	332.19	330.61	332.28	0.00	3.86	910.73	517.57	0.45
1	19175	250YR	1660.00	327.20	332.53	330.70	332.62	0.00	4.07	1039.12	537.13	0.46
1	19175	500YR	1920.00	327.20	332.77	330.83	332.88	0.00	4.32	1134.70	556.79	0.47
1	19274	2YR	420.00	327.50	330.32	329.01	330.56	0.00	5.39	211.77	222.01	0.66
1	19274	5YR	630.00	327.50	330.70	329.53	331.03	0.00	6.56	296.54	335.40	0.76
1	19274	10YR	790.00	327.50	331.11	329.95	331.36	0.00	6.07	425.78	403.37	0.66
1	19274	25YR	1000.00	327.50	331.73	330.05	331.88	0.00	5.18	646.80	490.65	0.53
1	19274	50YR	1170.00	327.50	332.01	330.05	332.16	0.00	5.19	756.94	540.10	0.52
1	19274	100YR	1360.00	327.50	332.25	331.22	332.40	0.00	5.29	857.89	569.35	0.52
1	19274	250YR	1660.00	327.50	332.59	331.43	332.75	0.00	5.58	1000.02	602.55	0.53
1	19274	500YR	1920.00	327.50	332.83	331.56	333.00	0.00	5.78	1107.87	630.08	0.54
1	19408	2YR	420.00	328.01	331.44	331.44	332.35	0.00	7.76	72.62	318.12	0.8
1	19408	5YR	630.00	328.01	332.35	332.35	332.97	0.00	7.03	222.68	552.60	0.7
1	19408	10YR	790.00	328.01	332.62	332.62	333.26	0.00	7.40	288.95	593.02	0.72
1	19408	25YR	1000.00	328.01	332.88	332.88	333.57	0.00	8.04	357.17	627.13	0.77
1	19408	50YR	1170.00	328.01	333.06	333.06	333.80	0.00	8.50	408.53	665.24	0.80
1	19408	100YR	1360.00	328.01	333.28	333.28	334.02	0.00	8.77	477.41	723.93	0.80
1	19408	250YR	1660.00	328.01	333.57	333.57	334.34	0.00	9.19	581.87	794.41	0.82
1	19408	500YR	1920.00	328.01	333.65	333.65	334.58	0.00	10.25	607.97	811.55	0.91
1	19540	2YR	250.00	328.09	332.48	330.37	332.61	0.00	2.87	87.25	37.24	0.33
1	19540	5YR	370.00	328.09	333.02	330.93	333.20	0.00	3.38	109.53	79.34	0.38
1	19540	10YR	460.00	328.09	333.29	331.29	333.50	0.00	3.75	139.05	174.38	0.41
1	19540	25YR	580.00	328.09	333.59	331.72	333.85	0.00	4.17	176.49	227.05	0.43
1	19540	50YR	660.00	328.09	333.81	331.98	334.09	0.00	4.34	204.35	320.13	0.43
1	19540	100YR	770.00	328.09	334.04	332.51	334.31	0.00	4.40	331.23	378.88	0.42
1	19540	250YR	930.00	328.09	334.35	332.93	334.63	0.00	4.59	437.66	498.05	0.42
1	19540	500YR	1060.00	328.09	334.63	333.27	334.90	0.00	4.66	543.47	590.00	0.41
1	19612	2YR	250.00	328.65	332.58	330.41	332.65	0.00	2.07	120.80	43.68	0.22
1	19612	5YR	370.00	328.65	333.16	330.80	333.26	0.00	2.50	147.79	99.66	0.26
1	19612	10YR	460.00	328.65	333.44	331.07	333.57	0.00	2.83	163.05	144.53	0.28
1	19612	25YR	580.00	328.65	333.75	331.39	333.92	0.00	3.25	180.54	236.87	0.31
1	19612	50YR	660.00	328.65	333.96	331.58	334.15	0.00	3.49	192.79	244.32	0.32
1	19612	100YR	770.00	328.65	334.19	331.84	334.37	0.00	3.56	357.79	249.96	0.32
1	19612	250YR	930.00	328.65	334.48	332.17	334.69	0.00	3.87	432.43	307.53	0.33
1	19612	500YR	1060.00	328.65	334.73	332.43	334.96	0.00	4.05	499.85	435.11	0.34
1	19661 Cowhorn Creek Rd		Culvert									
1	19719	2YR	250.00	329.53	332.64	330.64	332.69	0.00	1.87	133.81	48.36	0.20
1	19719	5YR	370.00	329.53	333.26	330.95	333.34	0.00	2.25	170.56	117.76	0.22
1	19719	10YR	460.00	329.53	333.62	331.16	333.72	0.00	2.52	195.76	205.63	0.23
1	19719	25YR	580.00	329.53	334.07	331.43	334.19	0.00	2.82	227.69	236.81	0.24
1	19719	50YR	660.00	329.53	334.40	331.59	334.54	0.00	2.96	251.12	261.05	0.25
1	19719	100YR	770.00	329.53	334.85	331.80	334.95	0.00	2.73	532.99	285.16	0.22
1	19719	250YR	930.00	329.53	335.25	332.09	335.36	0.00	2.93	636.86	311.26	0.22
1	19719	500YR	1060.00	329.53	335.48	332.31	335.60	0.00	3.16	704.74	367.56	0.24
1	19760	2YR	250.00	330.42	332.62	331.93	332.75	0.00	2.92	92.12	111.33	0.43
1	19760	5YR	370.00	330.42	333.24	332.25	333.38	0.00	2.96	142.55	176.89	0.3
1	19760	10YR	460.00	330.42	333.61	332.43	333.75	0.00	3.11	174.73	195.83	0.35
1	19760	25YR	580.00	330.42	334.07	332.64	334.22	0.00	3.26	223.47	231.02	0.34
1	19760	50YR	660.00	330.42	334.40	332.76	334.56	0.00	3.30	264.24	250.41	0.32
1	19760	100YR	770.00	330.42	334.87	332.93	334.96	0.00	2.79	554.49	273.25	0.26
1	19760	250YR	930.00	330.42	335.26	333.16	335.37	0.00	2.93	672.79	334.33	0.26
1	19760	500YR	1060.00	330.42	335.50	333.33	335.61	0.00	3.12	761.30	414.29	0.26

HEC-RAS Plan: Cowhorn_Existing River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	19937 U	2YR	210.00	331.88	333.03	333.03	333.35	0.05	5.04	51.43	83.53	0.99
1	19937 U	5YR	320.00	331.88	333.45		333.70	0.03	4.57	89.62	97.60	0.73
1	19937 U	10YR	390.00	331.88	333.82		334.00	0.01	4.03	127.75	110.22	0.56
1	19937 U	25YR	490.00	331.88	334.27		334.42	0.01	3.75	182.01	131.82	0.46
1	19937 U	50YR	580.00	331.88	334.60		334.74	0.01	3.65	227.69	146.27	0.42
1	19937 U	100YR	670.00	331.88	334.95		335.07	0.01	3.46	282.34	158.82	0.37
1	19937 U	250YR	810.00	331.88	335.36		335.47	0.00	3.42	348.42	169.64	0.34
1	19937 U	500YR	920.00	331.88	335.60		335.72	0.00	3.49	390.63	176.30	0.33
1	20146	2YR	210.00	334.58	336.34		336.42	0.01	2.78	142.58	199.59	0.39
1	20146	5YR	320.00	334.58	336.52		336.63	0.01	3.46	180.00	213.70	0.46
1	20146	10YR	390.00	334.58	336.55		336.70	0.01	4.10	185.86	215.70	0.54
1	20146	25YR	490.00	334.58	336.61		336.81	0.02	4.82	199.72	220.35	0.62
1	20146	50YR	580.00	334.58	336.68		336.92	0.02	5.32	215.19	225.42	0.68
1	20146	100YR	670.00	334.58	336.73		337.01	0.02	5.88	225.33	228.56	0.74
1	20146	250YR	810.00	334.58	336.87		337.18	0.02	6.22	258.19	233.76	0.75
1	20146	500YR	920.00	334.58	337.01		337.31	0.02	6.25	290.79	237.71	0.74
1	20432	2YR	210.00	335.34	337.54		337.57	0.00	2.00	180.77	145.68	0.25
1	20432	5YR	320.00	335.34	337.93		337.97	0.00	2.34	240.53	161.86	0.27
1	20432	10YR	390.00	335.34	338.15		338.20	0.00	2.49	280.17	206.09	0.27
1	20432	25YR	490.00	335.34	338.41		338.47	0.00	2.68	341.30	255.30	0.28
1	20432	50YR	580.00	335.34	338.62		338.68	0.00	2.83	398.72	288.93	0.29
1	20432	100YR	670.00	335.34	338.80		338.87	0.00	2.95	451.99	309.86	0.29
1	20432	250YR	810.00	335.34	339.03		339.11	0.00	3.17	535.99	397.22	0.30
1	20432	500YR	920.00	335.34	339.24		339.32	0.00	3.43	617.93	415.15	0.32
1	20767	2YR	210.00	336.63	338.60		338.66	0.00	2.33	137.99	115.55	0.30
1	20767	5YR	320.00	336.63	339.03		339.11	0.00	2.70	192.61	139.69	0.31
1	20767	10YR	390.00	336.63	339.26		339.35	0.00	2.91	227.64	162.42	0.32
1	20767	25YR	490.00	336.63	339.55		339.65	0.00	3.18	279.44	197.31	0.33
1	20767	50YR	580.00	336.63	339.77		339.88	0.00	3.34	323.66	212.52	0.34
1	20767	100YR	670.00	336.63	339.95		340.06	0.00	3.49	363.48	223.23	0.34
1	20767	250YR	810.00	336.63	340.22		340.34	0.00	3.68	424.95	238.30	0.35
1	20767	500YR	920.00	336.63	340.45		340.57	0.00	3.76	481.54	255.75	0.34
1	21052 V	2YR	210.00	338.25	339.90	339.28	339.96	0.01	2.12	127.82	137.16	0.34
1	21052 V	5YR	320.00	338.25	340.27	339.46	340.34	0.00	2.36	181.84	152.72	0.33
1	21052 V	10YR	390.00	338.25	340.50	339.56	340.57	0.00	2.51	219.47	180.55	0.33
1	21052 V	25YR	490.00	338.25	340.76	339.70	340.84	0.00	2.62	267.27	185.40	0.32
1	21052 V	50YR	580.00	338.25	340.95	339.82	341.04	0.00	2.75	304.19	189.07	0.32
1	21052 V	100YR	670.00	338.25	341.14	339.97	341.24	0.00	2.91	341.44	206.58	0.33
1	21052 V	250YR	810.00	338.25	341.39	340.13	341.50	0.00	3.07	393.36	210.60	0.33
1	21052 V	500YR	920.00	338.25	341.58	340.25	341.69	0.00	3.18	433.93	232.25	0.33

HEC-RAS Plan: CowEast_Existing River: CowEast Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	223	2YR	480.00	320.89	324.54	323.54	324.70	0.00	3.45	193.27	152.14	0.38
1	223	5YR	670.00	320.89	326.39	323.90	326.43	0.00	1.90	616.64	389.45	0.16
1	223	10YR	800.00	320.89	327.97	324.14	327.98	0.00	1.18	1350.05	466.82	0.09
1	223	25YR	990.00	320.89	329.11	324.43	329.12	0.00	1.01	1957.61	624.65	0.0
1	223	50YR	1130.00	320.89	329.52	324.61	329.53	0.00	1.02	2224.71	671.98	0.07
1	223	100YR	1270.00	320.89	329.95	324.74	329.96	0.00	1.02	2521.64	708.38	0.06
1	223	250YR	1470.00	320.89	330.32	325.03	330.33	0.00	1.07	2799.33	779.63	0.07
1	223	500YR	1660.00	320.89	330.61	325.27	330.62	0.00	1.13	3029.93	811.50	0.07
1	308	2YR	480.00	321.85	324.83	324.22	325.14	0.01	4.47	112.81	95.86	0.56
1	308	5YR	670.00	321.85	326.41	324.58	326.51	0.00	2.79	330.15	208.49	0.26
1	308	10YR	800.00	321.85	327.97	324.82	328.00	0.00	1.66	865.98	351.61	0.13
1	308	25YR	990.00	321.85	329.11	325.23	329.13	0.00	1.39	1274.44	365.21	0.10
1	308	50YR	1130.00	321.85	329.52	325.41	329.54	0.00	1.41	1435.18	414.09	0.10
1	308	100YR	1270.00	321.85	329.95	325.59	329.97	0.00	1.41	1636.34	542.69	0.09
1	308	250YR	1470.00	321.85	330.32	325.81	330.34	0.00	1.47	1859.51	642.00	0.10
1	308	500YR	1660.00	321.85	330.61	325.99	330.63	0.00	1.54	2053.07	702.57	0.10
1	412	2YR	480.00	319.80	325.33	322.41	325.40	0.00	2.12	226.60	120.61	0.20
1	412	5YR	670.00	319.80	326.53	322.80	326.60	0.00	2.19	313.37	159.32	0.18
1	412	10YR	800.00	319.80	328.00	323.04	328.03	0.00	1.65	658.41	181.91	0.12
1	412	25YR	990.00	319.80	329.12	323.38	329.15	0.00	1.60	869.67	193.63	0.10
1	412	50YR	1130.00	319.80	329.53	323.62	329.56	0.00	1.69	949.52	197.88	0.11
1	412	100YR	1270.00	319.80	329.96	323.85	329.99	0.00	1.76	1050.73	277.55	0.11
1	412	250YR	1470.00	319.80	330.33	324.16	330.37	0.00	1.90	1158.68	323.37	0.11
1	412	500YR	1660.00	319.80	330.62	324.43	330.66	0.00	2.04	1271.90	444.04	0.12
1	467 Private Dr.		Culvert									
1	496 A	2YR	480.00	322.08	325.89	324.08	326.04	0.00	3.13	153.36	64.64	0.32
1	496 A	5YR	670.00	322.08	327.10	324.49	327.25	0.00	3.04	220.19	98.99	0.28
1	496 A	10YR	800.00	322.08	328.92	324.75	329.01	0.00	2.39	335.40	398.34	0.19
1	496 A	25YR	990.00	322.08	330.60	325.09	330.62	0.00	1.28	1439.05	495.89	0.09
1	496 A	50YR	1130.00	322.08	331.00	325.33	331.02	0.00	1.30	1644.26	526.69	0.09
1	496 A	100YR	1270.00	322.08	331.27	325.54	331.29	0.00	1.36	1787.11	548.07	0.09
1	496 A	250YR	1470.00	322.08	331.53	325.85	331.55	0.00	1.46	1931.65	564.12	0.09
1	496 A	500YR	1660.00	322.08	331.72	326.14	331.74	0.00	1.57	2042.48	582.42	0.10
1	537	2YR	480.00	322.25	325.95	325.10	326.22	0.01	4.19	115.33	72.55	0.53
1	537	5YR	670.00	322.25	327.15	325.54	327.32	0.00	3.40	225.21	199.70	0.34
1	537	10YR	800.00	322.25	328.98	325.78	329.04	0.00	2.17	466.11	358.38	0.17
1	537	25YR	990.00	322.25	330.61	326.10	330.62	0.00	1.28	1428.25	457.36	0.09
1	537	50YR	1130.00	322.25	331.01	326.33	331.02	0.00	1.30	1616.76	479.78	0.09
1	537	100YR	1270.00	322.25	331.27	326.54	331.29	0.00	1.37	1746.65	500.20	0.09
1	537	250YR	1470.00	322.25	331.53	326.78	331.55	0.00	1.48	1878.71	515.43	0.10
1	537	500YR	1660.00	322.25	331.73	327.03	331.75	0.00	1.59	1979.89	523.94	0.10
1	682	2YR	480.00	323.47	326.63	325.64	326.78	0.00	3.13	160.55	120.81	0.39
1	682	5YR	670.00	323.47	327.45	325.94	327.57	0.00	2.86	291.36	213.57	0.30
1	682	10YR	800.00	323.47	329.06	326.13	329.09	0.00	1.71	750.19	357.99	0.14
1	682	25YR	990.00	323.47	330.62	326.37	330.64	0.00	1.24	1394.78	455.24	0.09
1	682	50YR	1130.00	323.47	331.02	326.55	331.04	0.00	1.25	1580.17	468.06	0.09
1	682	100YR	1270.00	323.47	331.29	326.82	331.30	0.00	1.31	1706.00	477.54	0.09
1	682	250YR	1470.00	323.47	331.55	327.04	331.57	0.00	1.42	1832.41	489.69	0.09
1	682	500YR	1660.00	323.47	331.75	327.12	331.77	0.00	1.52	1929.54	500.29	0.10
1	798	2YR	480.00	322.49	326.96	325.67	327.13	0.00	3.32	144.67	143.15	0.41
1	798	5YR	670.00	322.49	327.63	326.10	327.82	0.00	3.45	194.60	174.91	0.38
1	798	10YR	800.00	322.49	329.09	326.36	329.14	0.00	1.93	653.71	363.29	0.17
1	798	25YR	990.00	322.49	330.63	326.68	330.65	0.00	1.34	1290.27	491.31	0.10
1	798	50YR	1130.00	322.49	331.03	326.90	331.05	0.00	1.34	1490.46	516.30	0.10
1	798	100YR	1270.00	322.49	331.30	327.08	331.32	0.00	1.41	1633.05	554.44	0.10
1	798	250YR	1470.00	322.49	331.56	327.31	331.58	0.00	1.51	1781.26	572.37	0.10
1	798	500YR	1660.00	322.49	331.76	327.53	331.78	0.00	1.61	1895.89	584.78	0.11
1	824 Michael Meagher		Culvert									
1	850	2YR	480.00	321.47	327.28	324.66	327.35	0.00	2.21	217.21	158.55	0.23
1	850	5YR	670.00	321.47	328.25	325.15	328.33	0.00	2.30	292.41	220.11	0.21
1	850	10YR	800.00	321.47	330.04	325.43	330.09	0.00	1.87	431.63	390.42	0.14
1	850	25YR	990.00	321.47	330.93	325.79	330.95	0.00	1.28	1387.00	459.88	0.09
1	850	50YR	1130.00	321.47	331.15	326.02	331.17	0.00	1.37	1488.62	468.98	0.09
1	850	100YR	1270.00	321.47	331.36	326.24	331.38	0.00	1.45	1587.34	478.61	0.10
1	850	250YR	1470.00	321.47	331.61	326.53	331.63	0.00	1.58	1708.88	493.13	0.10
1	850	500YR	1660.00	321.47	331.81	326.78	331.83	0.00	1.70	1808.27	519.53	0.11
1	903	2YR	480.00	324.30	327.31	326.38	327.47	0.00	3.49	186.99	192.79	0.40
1	903	5YR	670.00	324.30	328.28	326.72	328.40	0.00	3.17	310.66	250.26	0.30
1	903	10YR	800.00	324.30	330.07	326.81	330.11	0.00	1.95	660.15	345.84	0.15
1	903	25YR	990.00	324.30	330.94	327.18	330.95	0.00	1.45	1399.40	457.56	0.10
1	903	50YR	1130.00	324.30	331.16	327.33	331.18	0.00	1.55	1501.86	475.59	0.1
1	903	100YR	1270.00	324.30	331.37	327.48	331.39	0.00	1.65	1602.81	488.74	0.11
1	903	250YR	1470.00	324.30	331.62	327.67	331.64	0.00	1.76	1727.07	494.88	0.12
1	903	500YR	1660.00	324.30	331.82	327.77	331.85	0.00	1.88	1826.67	499.75	0.13
1	1032	2YR	480.00	324.75	327.73		327.97	0.01	4.35	164.25	164.99	0.53
1	1032	5YR	670.00	324.75	328.50		328.64	0.00	3.61	304.77	194.83	0.37
1	1032	10YR	800.00	324.75	330.12		330.16	0.00	2.17	671.36	276.14	0.18

HEC-RAS Plan: CowEast_Existing River: CowEast Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1032	25YR	990.00	324.75	330.95		330.99	0.00	2.04	935.55	366.72	0.16
1	1032	50YR	1130.00	324.75	331.17		331.21	0.00	2.16	1018.87	390.59	0.16
1	1032	100YR	1270.00	324.75	331.38		331.43	0.00	2.32	1101.13	394.76	0.17
1	1032	250YR	1470.00	324.75	331.64		331.68	0.00	2.45	1201.91	399.08	0.18
1	1032	500YR	1660.00	324.75	331.84		331.89	0.00	2.58	1282.78	404.00	0.18
1	1357 B	2YR	320.00	323.66	329.07		329.24	0.00	3.38	95.88	44.56	0.38
1	1357 B	5YR	460.00	323.66	329.33		329.62	0.00	4.37	108.07	48.51	0.48
1	1357 B	10YR	560.00	323.66	330.25		330.44	0.00	3.64	214.30	183.82	0.34
1	1357 B	25YR	700.00	323.66	331.05		331.17	0.00	3.14	397.71	279.98	0.27
1	1357 B	50YR	810.00	323.66	331.28		331.40	0.00	3.25	464.25	299.96	0.27
1	1357 B	100YR	940.00	323.66	331.51		331.63	0.00	3.40	533.45	317.72	0.27
1	1357 B	250YR	1140.00	323.66	331.77		331.91	0.00	3.65	618.96	335.69	0.29
1	1357 B	500YR	1300.00	323.66	331.98		332.12	0.00	3.79	691.47	347.88	0.29
1	1607	2YR	320.00	324.80	329.87		330.03	0.00	3.24	98.73	55.81	0.43
1	1607	5YR	460.00	324.80	330.44		330.62	0.00	3.39	135.67	74.95	0.44
1	1607	10YR	560.00	324.80	330.85		331.02	0.00	3.34	180.40	143.75	0.39
1	1607	25YR	700.00	324.80	331.39		331.53	0.00	3.17	281.87	228.00	0.33
1	1607	50YR	810.00	324.80	331.61		331.76	0.00	3.27	333.63	238.59	0.33
1	1607	100YR	940.00	324.80	331.83		331.99	0.00	3.40	388.55	254.92	0.33
1	1607	250YR	1140.00	324.80	332.11		332.29	0.00	3.65	467.65	300.14	0.34
1	1607	500YR	1300.00	324.80	332.32		332.50	0.00	3.78	532.55	310.70	0.35
1	1718	2YR	320.00	326.60	330.28	329.43	330.61	0.01	4.73	79.24	70.84	0.53
1	1718	5YR	460.00	326.60	330.82	330.05	331.17	0.01	5.05	130.69	116.22	0.51
1	1718	10YR	560.00	326.60	331.14	330.49	331.48	0.01	5.17	172.13	150.48	0.50
1	1718	25YR	700.00	326.60	331.59	330.86	331.87	0.00	5.03	245.72	182.76	0.45
1	1718	50YR	810.00	326.60	331.80	331.05	332.09	0.00	5.21	288.08	220.59	0.46
1	1718	100YR	940.00	326.60	332.01	331.36	332.34	0.00	5.55	340.75	272.93	0.48
1	1718	250YR	1140.00	326.60	332.32	331.61	332.62	0.00	5.61	429.95	315.49	0.46
1	1718	500YR	1300.00	326.60	332.54	331.77	332.81	0.00	5.54	500.20	328.85	0.45
1	1826 C	2YR	320.00	327.20	331.12	329.73	331.30	0.01	3.43	93.36	56.71	0.47
1	1826 C	5YR	460.00	327.20	331.57	330.22	331.80	0.01	3.83	120.05	73.45	0.48
1	1826 C	10YR	560.00	327.20	331.81	330.55	332.08	0.01	4.17	134.29	84.19	0.49
1	1826 C	25YR	700.00	327.20	332.09	331.14	332.42	0.01	4.64	150.99	111.75	0.51
1	1826 C	50YR	810.00	327.20	332.29	331.34	332.67	0.01	4.97	162.99	140.74	0.53
1	1826 C	100YR	940.00	327.20	332.51	331.55	332.96	0.01	5.33	176.51	207.47	0.55
1	1826 C	250YR	1140.00	327.20	332.76	331.81	333.31	0.01	5.97	191.11	343.60	0.59
1	1826 C	500YR	1300.00	327.20	332.91	332.02	333.57	0.01	6.49	200.31	402.75	0.63
1	1860 Morris Ln.		Culvert									
1	1883 D	2YR	320.00	328.48	331.07	330.35	331.36	0.00	4.34	73.82	39.75	0.56
1	1883 D	5YR	460.00	328.48	332.94	330.78	333.08	0.00	3.01	181.77	185.04	0.28
1	1883 D	10YR	560.00	328.48	331.72	331.04	332.20	0.00	5.59	105.65	55.75	0.62
1	1883 D	25YR	700.00	328.48	331.91	331.36	332.56	0.00	6.47	115.84	60.23	0.70
1	1883 D	50YR	810.00	328.48	332.16	331.59	332.88	0.00	6.81	131.20	95.75	0.70
1	1883 D	100YR	940.00	328.48	332.45	331.84	333.23	0.00	7.16	149.74	119.95	0.70
1	1883 D	250YR	1140.00	328.48	332.97	332.20	333.80	0.00	7.41	183.31	188.30	0.67
1	1883 D	500YR	1300.00	328.48	333.44	332.47	334.27	0.00	7.44	213.88	375.85	0.64
1	1950	2YR	320.00	328.99	331.57	331.57	332.32	0.03	6.95	46.05	30.91	1.00
1	1950	5YR	460.00	328.99	332.90	332.02	333.19	0.01	4.48	130.99	175.55	0.50
1	1950	10YR	560.00	328.99	332.62	332.62	333.27	0.01	6.59	99.26	122.90	0.77
1	1950	25YR	700.00	328.99	332.90	332.90	333.56	0.01	6.84	130.67	175.35	0.76
1	1950	50YR	810.00	328.99	333.06	333.06	333.76	0.01	7.14	148.91	192.00	0.77
1	1950	100YR	940.00	328.99	333.23	333.23	333.97	0.01	7.48	168.10	211.68	0.78
1	1950	250YR	1140.00	328.99	333.46	333.46	334.27	0.01	7.98	194.52	251.24	0.80
1	1950	500YR	1300.00	328.99	333.61	333.61	334.49	0.01	8.39	212.63	258.51	0.82
1	2063 E	2YR	320.00	329.42	333.20	332.42	333.42	0.00	3.78	91.58	73.57	0.49
1	2063 E	5YR	460.00	329.42	333.51		333.82	0.01	4.57	116.00	91.05	0.55
1	2063 E	10YR	560.00	329.42	333.84	333.09	334.15	0.00	4.63	153.62	120.00	0.52
1	2063 E	25YR	700.00	329.42	334.08	333.33	334.45	0.01	5.10	182.38	120.00	0.54
1	2063 E	50YR	810.00	329.42	334.26	333.62	334.66	0.01	5.40	203.77	120.00	0.56
1	2063 E	100YR	940.00	329.42	334.46	333.89	334.90	0.01	5.72	227.10	120.00	0.57
1	2063 E	250YR	1140.00	329.42	334.73	334.14	335.23	0.01	6.18	259.75	120.00	0.59
1	2063 E	500YR	1300.00	329.42	334.93	334.32	335.47	0.01	6.50	284.30	120.00	0.61
1	2161	2YR	320.00	330.00	333.63		333.85	0.00	3.74	87.02	50.82	0.47
1	2161	5YR	460.00	330.00	334.01		334.32	0.00	4.49	108.31	64.64	0.51
1	2161	10YR	560.00	330.00	334.27		334.63	0.00	4.88	129.71	102.43	0.53
1	2161	25YR	700.00	330.00	334.53		334.97	0.01	5.40	157.48	106.00	0.56
1	2161	50YR	810.00	330.00	334.72		335.20	0.01	5.74	177.35	106.00	0.57
1	2161	100YR	940.00	330.00	334.93		335.46	0.01	6.11	198.95	106.00	0.59
1	2161	250YR	1140.00	330.00	335.21		335.82	0.01	6.62	229.12	106.00	0.62
1	2161	500YR	1300.00	330.00	335.42		336.09	0.01	6.99	251.42	106.00	0.63
1	2249 F	2YR	320.00	329.92	333.94		333.97	0.00	1.52	211.34	64.02	0.15
1	2249 F	5YR	460.00	329.92	334.43		334.49	0.00	1.89	244.42	80.76	0.17
1	2249 F	10YR	560.00	329.92	334.76		334.82	0.00	2.11	274.34	95.00	0.18
1	2249 F	25YR	700.00	329.92	335.10		335.19	0.00	2.42	306.78	95.00	0.20
1	2249 F	50YR	810.00	329.92	335.34		335.44	0.00	2.65	329.45	95.00	0.22
1	2249 F	100YR	940.00	329.92	335.59		335.72	0.00	2.89	353.93	95.00	0.23
1	2249 F	250YR	1140.00	329.92	335.95		336.11	0.00	3.24	388.06	95.00	0.25
1	2249 F	500YR	1300.00	329.92	336.22		336.40	0.00	3.50	413.11	95.00	0.26

HEC-RAS Plan: CowEast_Existing River: CowEast Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	2263 Apartment Culver		Culvert									
1	2310	2YR	320.00	329.92	334.08	331.25	334.11	0.00	1.42	249.23	145.10	0.1
1	2310	5YR	460.00	329.92	334.54	331.55	334.59	0.00	1.73	317.76	228.67	0.15
1	2310	10YR	560.00	329.92	334.82	331.73	334.87	0.00	1.90	367.18	303.85	0.16
1	2310	25YR	700.00	329.92	335.16	331.99	335.22	0.00	2.11	438.17	396.56	0.18
1	2310	50YR	810.00	329.92	335.40	332.17	335.47	0.00	2.22	494.29	479.73	0.18
1	2310	100YR	940.00	329.92	335.68	332.38	335.75	0.00	2.33	555.73	517.72	0.18
1	2310	250YR	1140.00	329.92	336.06	332.68	336.14	0.00	2.48	641.71	557.19	0.19
1	2310	500YR	1300.00	329.92	336.35	332.89	336.43	0.00	2.58	706.44	600.24	0.19
1	2327	2YR	320.00	330.44	334.07	331.65	334.13	0.00	1.84	174.69	61.41	0.18
1	2327	5YR	460.00	330.44	334.53	331.97	334.61	0.00	2.30	210.42	96.63	0.21
1	2327	10YR	560.00	330.44	334.80	332.18	334.90	0.00	2.57	239.57	118.69	0.23
1	2327	25YR	700.00	330.44	335.13	332.45	335.26	0.00	2.90	283.34	147.72	0.25
1	2327	50YR	810.00	330.44	335.38	332.65	335.52	0.00	3.11	323.29	223.28	0.26
1	2327	100YR	940.00	330.44	335.65	332.88	335.80	0.00	3.29	377.51	286.64	0.26
1	2327	250YR	1140.00	330.44	336.03	333.19	336.19	0.00	3.45	467.02	451.58	0.27
1	2327	500YR	1300.00	330.44	336.32	333.44	336.48	0.00	3.52	535.20	489.95	0.27
1	2350 Northwood Dr.		Culvert									
1	2373 G	2YR	320.00	331.23	334.21	332.44	334.29	0.00	2.30	138.98	52.05	0.25
1	2373 G	5YR	460.00	331.23	334.86	332.77	334.97	0.00	2.65	174.63	61.35	0.26
1	2373 G	10YR	560.00	331.23	335.30	332.97	335.42	0.00	2.81	208.42	94.90	0.26
1	2373 G	25YR	700.00	331.23	335.72	333.25	335.86	0.00	3.08	255.66	129.24	0.27
1	2373 G	50YR	810.00	331.23	335.97	333.44	336.13	0.00	3.28	289.58	149.09	0.28
1	2373 G	100YR	940.00	331.23	336.19	333.66	336.37	0.00	3.54	325.75	265.51	0.29
1	2373 G	250YR	1140.00	331.23	336.49	333.98	336.69	0.00	3.86	380.78	350.29	0.31
1	2373 G	500YR	1300.00	331.23	336.69	334.22	336.92	0.00	4.09	424.67	413.82	0.32
1	2427	2YR	320.00	330.76	334.20	333.63	334.62	0.01	5.19	62.13	36.05	0.66
1	2427	5YR	460.00	330.76	334.84	334.15	335.30	0.01	5.45	89.84	51.79	0.61
1	2427	10YR	560.00	330.76	335.28	334.44	335.72	0.01	5.50	118.94	100.17	0.56
1	2427	25YR	700.00	330.76	335.72	334.82	336.13	0.01	5.45	172.05	196.14	0.52
1	2427	50YR	810.00	330.76	335.99	335.13	336.37	0.00	5.42	210.16	231.30	0.50
1	2427	100YR	940.00	330.76	336.23	335.67	336.60	0.00	5.56	246.34	279.00	0.50
1	2427	250YR	1140.00	330.76	336.54	335.99	336.92	0.00	5.74	309.31	361.12	0.49
1	2427	500YR	1300.00	330.76	336.77	336.11	337.12	0.00	5.70	358.24	395.33	0.48
1	2561	2YR	320.00	332.17	335.50	334.72	335.73	0.01	3.89	82.74	78.51	0.5
1	2561	5YR	460.00	332.17	335.97	335.12	336.26	0.01	4.32	114.94	136.64	0.5
1	2561	10YR	560.00	332.17	336.26	335.36	336.56	0.01	4.50	141.75	216.38	0.50
1	2561	25YR	700.00	332.17	336.55	335.70	336.88	0.01	4.85	172.84	281.53	0.51
1	2561	50YR	810.00	332.17	336.72	335.97	337.08	0.01	5.13	196.01	308.54	0.53
1	2561	100YR	940.00	332.17	336.92	336.26	337.31	0.01	5.33	226.96	325.22	0.53
1	2561	250YR	1140.00	332.17	337.20	336.60	337.60	0.01	5.56	273.61	340.44	0.53
1	2561	500YR	1300.00	332.17	337.38	336.85	337.81	0.01	5.85	304.72	364.88	0.54
1	2790	2YR	320.00	333.61	336.53	335.63	336.62	0.00	2.69	154.04	290.53	0.33
1	2790	5YR	460.00	333.61	336.97	335.97	337.08	0.00	2.91	210.79	343.96	0.33
1	2790	10YR	560.00	333.61	337.23	336.15	337.34	0.00	3.07	248.76	369.73	0.33
1	2790	25YR	700.00	333.61	337.54	336.37	337.66	0.00	3.25	298.28	384.91	0.33
1	2790	50YR	810.00	333.61	337.73	336.52	337.87	0.00	3.40	332.02	391.40	0.33
1	2790	100YR	940.00	333.61	337.95	336.65	338.09	0.00	3.57	369.74	402.09	0.34
1	2790	250YR	1140.00	333.61	338.23	336.84	338.39	0.00	3.83	423.43	418.83	0.35
1	2790	500YR	1300.00	333.61	338.45	337.01	338.62	0.00	4.00	466.10	434.27	0.35
1	2892 H	2YR	320.00	332.17	336.76	335.09	336.88	0.00	2.79	116.29	66.92	0.31
1	2892 H	5YR	460.00	332.17	337.19	335.57	337.35	0.00	3.30	161.54	207.95	0.34
1	2892 H	10YR	560.00	332.17	337.44	335.86	337.62	0.00	3.54	195.06	291.60	0.35
1	2892 H	25YR	700.00	332.17	337.74	336.21	337.95	0.00	3.89	237.62	363.22	0.37
1	2892 H	50YR	810.00	332.17	337.94	336.42	338.17	0.00	4.08	272.07	379.41	0.38
1	2892 H	100YR	940.00	332.17	338.16	336.65	338.40	0.00	4.26	309.98	394.31	0.38
1	2892 H	250YR	1140.00	332.17	338.45	337.32	338.70	0.00	4.50	370.90	493.59	0.39
1	2892 H	500YR	1300.00	332.17	338.67	337.53	338.92	0.00	4.64	419.72	528.02	0.39

HEC-RAS Plan: CowWest_Existing River: CowWest Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	577	2YR	480.00	309.51	313.89	312.06	314.01	0.00	2.73	175.77	65.76	0.29
1	577	5YR	780.00	309.51	314.57	312.68	314.76	0.00	3.51	222.04	70.19	0.35
1	577	10YR	940.00	309.51	314.96	312.95	315.18	0.00	3.76	253.96	93.32	0.36
1	577	25YR	1190.00	309.51	315.27	313.32	315.56	0.00	4.34	287.59	144.78	0.40
1	577	50YR	1390.00	309.51	315.44	313.59	315.79	0.00	4.81	314.58	188.57	0.43
1	577	100YR	1610.00	309.51	315.63	313.86	316.04	0.00	5.23	351.20	238.84	0.46
1	577	250YR	1950.00	309.51	315.88	314.26	316.38	0.01	5.81	413.76	307.73	0.50
1	577	500YR	2240.00	309.51	316.07	314.57	316.63	0.01	6.22	464.87	327.57	0.52
1	849 A	2YR	480.00	309.50	317.34	317.34	317.93	0.03	6.52	92.85	114.79	0.80
1	849 A	5YR	780.00	309.50	317.85	317.85	318.55	0.02	7.51	140.26	186.83	0.82
1	849 A	10YR	940.00	309.50	318.07	318.07	318.82	0.02	7.86	164.36	204.78	0.83
1	849 A	25YR	1190.00	309.50	318.37	318.37	319.19	0.02	8.42	197.58	222.07	0.84
1	849 A	50YR	1390.00	309.50	318.57	318.57	319.45	0.02	8.85	221.02	234.10	0.86
1	849 A	100YR	1610.00	309.50	318.78	318.78	319.72	0.03	9.27	246.08	244.38	0.87
1	849 A	250YR	1950.00	309.50	319.06	319.06	320.10	0.03	9.86	282.04	258.20	0.89
1	849 A	500YR	2240.00	309.50	319.28	319.28	320.40	0.03	10.31	311.45	277.55	0.91
1	1243	2YR	480.00	309.50	318.38	313.61	318.41	0.00	1.47	333.35	117.88	0.12
1	1243	5YR	780.00	309.50	319.17	314.41	319.23	0.00	1.99	415.38	241.60	0.15
1	1243	10YR	940.00	309.50	319.50	314.76	319.58	0.00	2.23	458.04	268.45	0.17
1	1243	25YR	1190.00	309.50	319.96	315.25	320.06	0.00	2.56	516.97	299.05	0.19
1	1243	50YR	1390.00	309.50	320.28	315.58	320.40	0.00	2.80	558.88	307.85	0.20
1	1243	100YR	1610.00	309.50	320.61	315.92	320.75	0.00	3.05	601.04	319.05	0.21
1	1243	250YR	1950.00	309.50	321.07	316.40	321.23	0.00	3.39	660.06	335.84	0.23
1	1243	500YR	2240.00	309.50	321.43	316.75	321.62	0.00	3.66	706.21	355.24	0.24
1	1279	2YR	480.00	309.50	318.39	313.95	318.43	0.00	1.59	304.90	97.01	0.13
1	1279	5YR	780.00	309.50	319.18	314.63	319.26	0.00	2.19	365.11	239.74	0.17
1	1279	10YR	940.00	309.50	319.51	314.94	319.61	0.00	2.48	393.51	284.34	0.18
1	1279	25YR	1190.00	309.50	319.97	315.36	320.10	0.00	2.89	433.02	299.38	0.20
1	1279	50YR	1390.00	309.50	320.29	315.70	320.44	0.00	3.19	461.02	313.95	0.22
1	1279	100YR	1610.00	309.50	320.61	316.05	320.80	0.00	3.50	489.08	328.04	0.24
1	1279	250YR	1950.00	309.50	321.06	316.54	321.30	0.00	3.95	528.19	344.80	0.26
1	1279	500YR	2240.00	309.50	321.41	316.92	321.69	0.00	4.31	558.62	356.86	0.27
1	2392	2YR	480.00	319.12	322.46		322.97	0.01	5.75	83.52	40.88	0.71
1	2392	5YR	780.00	319.12	323.32		323.96	0.01	6.40	121.96	48.51	0.71
1	2392	10YR	940.00	319.12	323.72		324.40	0.01	6.62	142.08	52.06	0.71
1	2392	25YR	1190.00	319.12	324.32		325.04	0.01	6.81	176.19	78.37	0.67
1	2392	50YR	1390.00	319.12	326.77		327.05	0.00	4.33	335.27	230.50	0.33
1	2392	100YR	1610.00	319.12	329.30		329.35	0.00	2.22	1341.25	427.80	0.14
1	2392	250YR	1950.00	319.12	335.99		335.99	0.00	0.63	6505.71	805.86	0.03
1	2392	500YR	2240.00	319.12	338.23		338.23	0.00	0.54	8310.86	805.86	0.02
1	2415	2YR	380.00	319.22	322.97	321.75	323.19	0.00	3.74	101.72	45.16	0.44
1	2415	5YR	550.00	319.22	323.99	322.25	324.19	0.00	3.62	152.38	59.36	0.38
1	2415	10YR	680.00	319.22	324.40	322.57	324.63	0.00	3.89	176.43	82.84	0.38
1	2415	25YR	860.00	319.22	325.01	322.96	325.27	0.00	4.10	212.77	117.71	0.38
1	2415	50YR	1010.00	319.22	327.00	323.26	327.12	0.00	2.92	390.79	237.66	0.22
1	2415	100YR	1170.00	319.22	329.33	323.54	329.36	0.00	1.64	1451.28	628.28	0.10
1	2415	250YR	1430.00	319.22	335.99	323.96	335.99	0.00	0.44	6677.62	804.65	0.02
1	2415	500YR	1640.00	319.22	338.23	324.26	338.23	0.00	0.39	8479.66	804.65	0.02
1	2650 Interstate 30		Culvert									
1	2691 B	2YR	380.00	320.36	326.78	323.06	326.81	0.00	1.38	286.76	134.91	0.13
1	2691 B	5YR	550.00	320.36	328.07	323.61	328.10	0.00	1.41	409.93	283.53	0.11
1	2691 B	10YR	680.00	320.36	328.96	323.93	328.99	0.00	1.44	495.54	409.50	0.10
1	2691 B	25YR	860.00	320.36	330.11	324.31	330.15	0.00	1.49	605.51	476.43	0.10
1	2691 B	50YR	1010.00	320.36	331.01	324.59	331.04	0.00	1.53	691.32	539.63	0.10
1	2691 B	100YR	1170.00	320.36	331.93	324.87	331.97	0.00	1.56	779.66	604.39	0.09
1	2691 B	250YR	1430.00	320.36	336.08	325.26	336.08	0.00	0.39	5539.70	883.56	0.02
1	2691 B	500YR	1640.00	320.36	338.24	325.54	338.24	0.00	0.31	7448.00	883.56	0.01
1	2853	2YR	380.00	322.95	326.84	324.69	326.86	0.00	1.26	317.82	289.64	0.13
1	2853	5YR	550.00	322.95	328.11	324.95	328.13	0.00	1.22	469.83	398.67	0.10
1	2853	10YR	680.00	322.95	329.00	325.15	329.02	0.00	1.22	576.20	481.38	0.10
1	2853	25YR	860.00	322.95	330.16	325.36	330.17	0.00	0.76	1407.20	559.72	0.05
1	2853	50YR	1010.00	322.95	331.06	325.51	331.06	0.00	0.72	1711.57	602.20	0.05
1	2853	100YR	1170.00	322.95	331.98	325.67	331.99	0.00	0.69	2025.03	654.20	0.04
1	2853	250YR	1430.00	322.95	336.08	325.88	336.08	0.00	0.33	6248.19	964.93	0.02
1	2853	500YR	1640.00	322.95	338.24	326.04	338.24	0.00	0.27	8331.80	964.93	0.01
1	2920 Saint Michael Dr		Culvert									
1	3001	2YR	380.00	323.35	327.11	325.74	327.19	0.00	2.32	174.49	223.06	0.29
1	3001	5YR	550.00	323.35	328.48	326.09	328.52	0.00	1.72	345.95	428.80	0.17
1	3001	10YR	680.00	323.35	329.60	326.33	329.64	0.00	1.49	489.23	488.29	0.12
1	3001	25YR	860.00	323.35	331.16	326.71	331.16	0.00	0.55	2088.11	594.16	0.04
1	3001	50YR	1010.00	323.35	331.61	326.92	331.61	0.00	0.57	2354.65	602.92	0.04
1	3001	100YR	1170.00	323.35	332.04	327.09	332.04	0.00	0.59	2624.48	636.95	0.04
1	3001	250YR	1430.00	323.35	336.09	327.34	336.09	0.00	0.31	6485.98	1086.96	0.02
1	3001	500YR	1640.00	323.35	338.25	327.53	338.25	0.00	0.25	8831.37	1086.96	0.01

HEC-RAS Plan: CowWest_Existing River: CowWest Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3039	2YR	380.00	324.12	327.19	325.85	327.26	0.00	2.18	194.66	267.04	0.26
1	3039	5YR	550.00	324.12	328.52	326.17	328.54	0.00	1.49	445.84	418.90	0.14
1	3039	10YR	680.00	324.12	329.63	326.39	329.65	0.00	1.19	675.50	522.06	0.1
1	3039	25YR	860.00	324.12	331.16	326.64	331.17	0.00	0.56	2067.16	571.94	0.04
1	3039	50YR	1010.00	324.12	331.61	326.85	331.61	0.00	0.59	2332.32	626.30	0.04
1	3039	100YR	1170.00	324.12	332.04	327.17	332.05	0.00	0.60	2614.90	680.00	0.04
1	3039	250YR	1430.00	324.12	336.09	327.39	336.09	0.00	0.31	6294.04	1040.92	0.02
1	3039	500YR	1640.00	324.12	338.25	327.56	338.25	0.00	0.26	8539.99	1040.92	0.01
1	3148	2YR	380.00	325.32	327.73	327.73	328.03	0.01	4.63	102.90	200.03	0.72
1	3148	5YR	550.00	325.32	328.58	327.94	328.64	0.00	2.40	334.91	401.91	0.29
1	3148	10YR	680.00	325.32	329.66	328.06	329.67	0.00	1.23	754.51	486.93	0.12
1	3148	25YR	860.00	325.32	331.17	328.22	331.17	0.00	0.69	1664.54	566.23	0.06
1	3148	50YR	1010.00	325.32	331.61	328.33	331.62	0.00	0.69	1919.30	576.51	0.05
1	3148	100YR	1170.00	325.32	332.04	328.41	332.05	0.00	0.72	2178.86	648.27	0.05
1	3148	250YR	1430.00	325.32	336.09	328.54	336.09	0.00	0.34	5866.09	1140.17	0.02
1	3148	500YR	1640.00	325.32	338.25	328.64	338.25	0.00	0.27	8325.97	1140.17	0.01
1	3268	2YR	380.00	324.87	328.55		328.64	0.00	2.66	184.70	178.95	0.33
1	3268	5YR	550.00	324.87	328.80		328.92	0.00	3.04	231.25	181.62	0.36
1	3268	10YR	680.00	324.87	329.69		329.74	0.00	2.07	413.90	281.17	0.21
1	3268	25YR	860.00	324.87	331.17		331.18	0.00	1.22	998.32	489.95	0.10
1	3268	50YR	1010.00	324.87	331.61		331.63	0.00	1.17	1225.82	518.66	0.09
1	3268	100YR	1170.00	324.87	332.05		332.06	0.00	1.13	1451.50	524.28	0.09
1	3268	250YR	1430.00	324.87	336.09		336.09	0.00	0.46	4562.01	992.75	0.03
1	3268	500YR	1640.00	324.87	338.25		338.25	0.00	0.35	6705.46	993.60	0.02
1	3395 C	2YR	380.00	327.95	329.10	329.01	329.41	0.02	4.70	90.75	126.28	0.83
1	3395 C	5YR	550.00	327.95	329.39	329.28	329.71	0.02	4.88	132.06	153.43	0.76
1	3395 C	10YR	680.00	327.95	329.83		330.03	0.01	4.00	208.19	191.03	0.54
1	3395 C	25YR	860.00	327.95	331.19		331.24	0.00	2.06	530.81	301.63	0.21
1	3395 C	50YR	1010.00	327.95	331.63		331.67	0.00	1.95	680.25	380.03	0.18
1	3395 C	100YR	1170.00	327.95	332.06		332.09	0.00	1.87	856.50	434.62	0.17
1	3395 C	250YR	1430.00	327.95	336.09		336.09	0.00	0.61	3729.16	871.92	0.04
1	3395 C	500YR	1640.00	327.95	338.25		338.25	0.00	0.45	5656.68	900.49	0.02

HEC-RAS Plan: Howard_Existing River: Howard Creek Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1526	2 YR	1370.00	247.16	257.41	255.24	257.82	0.00	5.88	449.20	555.69	0.39
1	1526	5 YR	2180.00	247.16	258.65	256.71	259.06	0.00	6.54	947.34	1015.16	0.40
1	1526	10 YR	2850.00	247.16	259.18	257.57	259.56	0.00	6.81	1236.84	1131.74	0.40
1	1526	25 YR	3560.00	247.16	259.63	258.89	260.00	0.00	7.04	1496.09	1207.33	0.41
1	1526	50 YR	4080.00	247.16	259.93	259.06	260.29	0.00	7.20	1669.34	1241.45	0.41
1	1526	100 YR	5250.00	247.16	260.56	259.48	260.91	0.00	7.50	2030.86	1302.58	0.41
1	1526	250 YR	6770.00	247.16	261.26	259.88	261.61	0.00	7.84	2445.89	1354.76	0.42
1	1526	500 YR	8550.00	247.16	262.05	260.28	262.40	0.00	8.22	2941.36	1554.03	0.42
1	1890	2 YR	1370.00	248.43	258.66	256.19	259.04	0.00	5.51	444.19	490.52	0.37
1	1890	5 YR	2180.00	248.43	259.90	257.59	260.27	0.00	6.01	992.11	1006.67	0.38
1	1890	10 YR	2850.00	248.43	260.43	258.75	260.78	0.00	6.25	1304.40	1132.57	0.38
1	1890	25 YR	3560.00	248.43	260.89	260.03	261.23	0.00	6.54	1591.23	1285.19	0.38
1	1890	50 YR	4080.00	248.43	261.20	260.23	261.52	0.00	6.66	1784.31	1327.65	0.39
1	1890	100 YR	5250.00	248.43	261.82	260.53	262.13	0.00	6.90	2178.65	1376.07	0.39
1	1890	250 YR	6770.00	248.43	262.53	261.08	262.84	0.00	7.20	2624.42	1468.76	0.39
1	1890	500 YR	8550.00	248.43	263.32	261.47	263.62	0.00	7.43	3120.64	1697.07	0.39
1	2182	2 YR	1370.00	251.50	259.57	257.11	259.93	0.00	5.36	434.87	656.78	0.36
1	2182	5 YR	2180.00	251.50	260.78	258.64	261.22	0.00	6.29	643.53	865.13	0.39
1	2182	10 YR	2850.00	251.50	261.33	259.59	261.88	0.00	7.23	742.44	888.87	0.44
1	2182	25 YR	3560.00	251.50	261.81	260.18	262.49	0.00	8.12	830.37	934.59	0.48
1	2182	50 YR	4080.00	251.50	262.12	260.64	262.88	0.00	8.76	885.01	947.60	0.51
1	2182	100 YR	5250.00	251.50	262.72	261.32	263.69	0.01	10.05	993.89	978.10	0.56
1	2182	250 YR	6770.00	251.50	263.39	262.08	264.63	0.01	11.55	1113.98	1108.12	0.63
1	2182	500 YR	8550.00	251.50	264.08	262.84	265.62	0.01	13.09	1238.36	1269.58	0.69
1	2253 Railroad		Bridge									
1	2308	2 YR	1370.00	252.00	260.32	257.43	260.53	0.00	4.38	610.87	813.97	0.29
1	2308	5 YR	2180.00	252.00	261.66	258.83	261.89	0.00	4.94	882.76	913.31	0.30
1	2308	10 YR	2850.00	252.00	262.47	259.36	262.74	0.00	5.44	1046.72	940.24	0.31
1	2308	25 YR	3560.00	252.00	263.23	260.34	263.53	0.00	5.89	1201.07	979.58	0.33
1	2308	50 YR	4080.00	252.00	263.74	260.65	264.06	0.00	6.19	1304.57	1012.44	0.34
1	2308	100 YR	5250.00	252.00	265.12	261.25	265.46	0.00	6.48	1586.00	1163.66	0.33
1	2308	250 YR	6770.00	252.00	265.74	261.93	266.21	0.00	7.71	1710.61	1245.33	0.38
1	2308	500 YR	8550.00	252.00	267.22	262.64	267.74	0.00	8.18	2011.26	1463.22	0.38
1	2373	2 YR	1370.00	252.13	260.30	259.06	260.93	0.01	7.03	349.48	736.28	0.53
1	2373	5 YR	2180.00	252.13	261.71	260.82	262.18	0.00	6.82	689.45	808.55	0.46
1	2373	10 YR	2850.00	252.13	262.55	261.28	262.98	0.00	6.93	919.10	887.61	0.44
1	2373	25 YR	3560.00	252.13	263.33	261.71	263.76	0.00	7.19	1160.69	967.42	0.43
1	2373	50 YR	4080.00	252.13	263.86	261.98	264.27	0.00	7.16	1331.18	999.84	0.42
1	2373	100 YR	5250.00	252.13	265.29	262.57	265.61	0.00	6.72	1787.31	1087.55	0.36
1	2373	250 YR	6770.00	252.13	266.02	263.19	266.41	0.00	7.57	2020.54	1182.75	0.40
1	2373	500 YR	8550.00	252.13	267.58	263.95	267.94	0.00	7.48	2519.82	1402.21	0.37
1	2566	2 YR	1380.00	251.90	261.30	257.48	261.58	0.00	4.58	406.82	720.44	0.29
1	2566	5 YR	2200.00	251.90	262.29	258.88	262.80	0.00	6.21	494.48	783.31	0.37
1	2566	10 YR	2860.00	251.90	263.05	259.74	263.72	0.00	7.19	562.48	849.29	0.41
1	2566	25 YR	3570.00	251.90	263.77	260.48	264.61	0.00	8.12	626.84	894.60	0.45
1	2566	50 YR	4280.00	251.90	264.20	261.29	265.26	0.00	9.21	665.27	923.51	0.50
1	2566	100 YR	5370.00	251.90	265.38	262.46	266.61	0.00	10.04	770.71	967.29	0.52
1	2566	250 YR	6730.00	251.90	266.22	263.44	267.31	0.00	10.15	1294.92	1024.06	0.51
1	2566	500 YR	8730.00	251.90	267.60	264.71	268.74	0.00	10.84	1678.88	1344.77	0.51
1	2613 Railroad		Bridge									
1	2644	2 YR	1380.00	252.10	261.91	256.86	262.04	0.00	3.06	588.30	468.50	0.19
1	2644	5 YR	2200.00	252.10	263.46	257.85	263.66	0.00	3.99	723.96	695.67	0.23
1	2644	10 YR	2860.00	252.10	264.66	258.56	264.92	0.00	4.53	830.08	794.49	0.24
1	2644	25 YR	3570.00	252.10	265.89	259.20	266.21	0.00	5.01	938.56	982.45	0.25
1	2644	50 YR	4280.00	252.10	267.75	259.95	268.08	0.00	5.12	1101.89	1389.48	0.24
1	2644	100 YR	5370.00	252.10	268.63	260.75	269.08	0.00	6.01	1179.43	1605.41	0.27
1	2644	250 YR	6730.00	252.10	270.62	261.66	270.77	0.00	4.19	3668.10	2437.96	0.18
1	2644	500 YR	8730.00	252.10	271.69	262.88	271.72	0.00	2.14	9865.66	2613.59	0.09
1	2693	2 YR	1380.00	251.80	261.94	258.03	262.09	0.00	3.35	469.48	384.43	0.22
1	2693	5 YR	2200.00	251.80	263.51	259.41	263.72	0.00	4.03	626.13	501.47	0.24
1	2693	10 YR	2860.00	251.80	264.74	260.04	264.99	0.00	4.33	766.78	570.92	0.24
1	2693	25 YR	3570.00	251.80	266.01	260.63	266.28	0.00	4.57	913.36	687.68	0.24
1	2693	50 YR	4280.00	251.80	267.95	261.19	268.16	0.00	4.11	1323.04	966.31	0.20
1	2693	100 YR	5370.00	251.80	268.93	261.89	269.19	0.00	4.62	1500.41	1381.96	0.22
1	2693	250 YR	6730.00	251.80	270.65	262.68	270.81	0.00	3.98	2940.65	2008.87	0.18
1	2693	500 YR	8730.00	251.80	271.70	263.80	271.73	0.00	2.23	8692.24	2578.93	0.10
1	2718 Railroad		Bridge									
1	2745	2 YR	1380.00	251.80	262.32	257.93	262.52	0.00	3.69	411.63	78.30	0.24
1	2745	5 YR	2200.00	251.80	264.00	259.13	264.30	0.00	4.60	557.32	131.12	0.27
1	2745	10 YR	2860.00	251.80	265.04	259.98	265.39	0.00	5.08	674.83	252.26	0.28
1	2745	25 YR	3570.00	251.80	266.70	260.79	267.03	0.00	5.01	878.91	436.77	0.26
1	2745	50 YR	4280.00	251.80	268.84	261.49	268.96	0.00	3.50	1831.30	1231.53	0.17
1	2745	100 YR	5370.00	251.80	269.26	262.50	269.42	0.00	4.08	1957.57	1351.73	0.19
1	2745	250 YR	6730.00	251.80	270.88	263.52	270.94	0.00	2.98	4253.24	1971.19	0.13
1	2745	500 YR	8730.00	251.80	271.74	265.34	271.82	0.00	3.21	4958.41	2167.41	0.14
1	2811	2 YR	1380.00	251.80	262.40	257.03	262.60	0.00	3.59	406.13	65.93	0.22

HEC-RAS Plan: Howard_Existing River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2811	5 YR	2200.00	251.80	264.10	258.38	264.40	0.00	4.55	549.74	189.99	0.26
1	2811	10 YR	2860.00	251.80	265.15	259.30	265.51	0.00	5.06	656.97	236.49	0.27
1	2811	25 YR	3570.00	251.80	266.79	260.10	267.14	0.00	5.07	833.38	445.70	0.25
1	2811	50 YR	4280.00	251.80	268.94	261.02	269.02	0.00	3.01	2411.13	1490.02	0.1
1	2811	100 YR	5370.00	251.80	269.41	262.20	269.51	0.00	3.41	2643.80	1642.21	0.16
1	2811	250 YR	6730.00	251.80	270.93	263.06	270.98	0.00	2.73	4651.67	1963.49	0.12
1	2811	500 YR	8730.00	251.80	271.80	265.31	271.86	0.00	2.93	5421.76	2197.36	0.12
1	2856 Railroad		Bridge									
1	2891	2 YR	1380.00	252.70	262.61	257.24	262.76	0.00	3.11	453.26	65.60	0.20
1	2891	5 YR	2200.00	252.70	264.38	258.43	264.63	0.00	4.00	573.95	70.27	0.23
1	2891	10 YR	2860.00	252.70	265.73	259.17	266.04	0.00	4.53	684.39	167.84	0.24
1	2891	25 YR	3570.00	252.70	267.49	259.90	267.84	0.00	4.74	872.93	754.28	0.24
1	2891	50 YR	4280.00	252.70	269.44	260.54	269.56	0.00	3.37	2272.55	1532.24	0.16
1	2891	100 YR	5370.00	252.70	269.85	261.44	270.00	0.00	3.89	2483.07	1634.46	0.18
1	2891	250 YR	6730.00	252.70	270.95	262.52	271.03	0.00	3.12	4684.82	1954.76	0.14
1	2891	500 YR	8730.00	252.70	271.91	263.95	271.98	0.00	3.18	5733.71	2179.68	0.14
1	3078	2 YR	1380.00	253.73	262.83	260.46	262.95	0.00	3.21	546.38	175.16	0.24
1	3078	5 YR	2200.00	253.73	264.73	261.27	264.83	0.00	2.96	972.04	271.01	0.19
1	3078	10 YR	2860.00	253.73	266.16	261.72	266.23	0.00	2.72	1429.58	381.66	0.16
1	3078	25 YR	3570.00	253.73	267.95	262.13	268.00	0.00	2.32	2138.32	752.79	0.13
1	3078	50 YR	4280.00	253.73	269.60	262.51	269.62	0.00	1.90	3383.29	1373.37	0.10
1	3078	100 YR	5370.00	253.73	270.05	263.04	270.09	0.00	2.19	3682.50	1579.18	0.11
1	3078	250 YR	6730.00	253.73	271.04	263.71	271.07	0.00	2.12	5673.05	1893.56	0.10
1	3078	500 YR	8730.00	253.73	271.99	264.42	272.02	0.00	2.22	6836.83	2080.86	0.10
1	3376	2 YR	1380.00	253.98	263.19	259.88	263.30	0.00	3.00	550.17	178.17	0.22
1	3376	5 YR	2200.00	253.98	264.94	260.73	265.08	0.00	3.31	795.74	341.91	0.21
1	3376	10 YR	2860.00	253.98	266.28	261.30	266.44	0.00	3.45	991.88	467.65	0.20
1	3376	25 YR	3570.00	253.98	267.99	261.83	268.14	0.00	3.41	1250.22	588.72	0.18
1	3376	50 YR	4280.00	253.98	269.64	262.17	269.68	0.00	2.15	3603.65	921.56	0.11
1	3376	100 YR	5370.00	253.98	270.11	263.09	270.15	0.00	2.49	4017.90	1093.45	0.12
1	3376	250 YR	6730.00	253.98	271.09	263.74	271.13	0.00	2.57	5052.20	1457.31	0.12
1	3376	500 YR	8730.00	253.98	272.03	264.58	272.08	0.00	2.75	6320.92	1811.58	0.13
1	3461	2 YR	1380.00	255.08	263.30	258.82	263.39	0.00	2.59	656.92	195.75	0.17
1	3461	5 YR	2200.00	255.08	265.05	259.95	265.16	0.00	3.02	902.22	283.68	0.18
1	3461	10 YR	2860.00	255.08	266.38	260.69	266.51	0.00	3.24	1104.97	448.14	0.18
1	3461	25 YR	3570.00	255.08	268.07	261.28	268.20	0.00	3.25	1385.58	708.88	0.16
1	3461	50 YR	4280.00	255.08	269.66	261.79	269.69	0.00	2.14	3804.38	888.44	0.1
1	3461	100 YR	5370.00	255.08	270.13	262.38	270.18	0.00	2.42	4209.31	990.79	0.1
1	3461	250 YR	6730.00	255.08	271.11	263.04	271.16	0.00	2.52	5119.00	1330.94	0.11
1	3461	500 YR	8730.00	255.08	272.06	263.94	272.11	0.00	2.88	6181.52	1642.45	0.13
1	3544 Buchanan Rd.		Bridge									
1	3662 A	2 YR	1380.00	254.40	263.62	258.47	263.72	0.00	2.83	768.67	437.35	0.17
1	3662 A	5 YR	2200.00	254.40	265.37	259.92	265.48	0.00	3.18	1117.53	838.85	0.18
1	3662 A	10 YR	2860.00	254.40	266.70	261.04	266.81	0.00	3.33	1382.21	1072.00	0.17
1	3662 A	25 YR	3570.00	254.40	268.37	261.88	268.47	0.00	3.32	1714.81	1191.09	0.16
1	3662 A	50 YR	4280.00	254.40	269.87	262.37	269.89	0.00	1.77	5604.86	1322.23	0.08
1	3662 A	100 YR	5370.00	254.40	270.36	262.91	270.38	0.00	2.02	6082.90	1375.41	0.09
1	3662 A	250 YR	6730.00	254.40	271.22	263.87	271.25	0.00	2.21	6961.33	1518.29	0.10
1	3662 A	500 YR	8730.00	254.40	272.16	264.67	272.19	0.00	2.47	7957.52	1588.51	0.11
1	3801	2 YR	1380.00	253.81	263.75	259.95	263.81	0.00	2.26	1028.29	455.49	0.16
1	3801	5 YR	2200.00	253.81	265.51	260.90	265.56	0.00	2.26	1889.57	909.56	0.14
1	3801	10 YR	2860.00	253.81	266.85	261.35	266.89	0.00	2.16	2561.20	1191.90	0.13
1	3801	25 YR	3570.00	253.81	268.50	261.67	268.53	0.00	2.00	3397.17	1317.91	0.11
1	3801	50 YR	4280.00	253.81	269.89	262.32	269.90	0.00	1.32	7184.94	1482.86	0.07
1	3801	100 YR	5370.00	253.81	270.38	262.95	270.40	0.00	1.51	7805.08	1522.56	0.07
1	3801	250 YR	6730.00	253.81	271.25	263.60	271.27	0.00	1.63	8907.10	1567.53	0.08
1	3801	500 YR	8730.00	253.81	272.19	264.31	272.21	0.00	1.82	10117.97	1596.97	0.08
1	4481 B	2 YR	1420.00	254.71	264.50	263.30	264.66	0.00	4.57	875.67	727.73	0.30
1	4481 B	5 YR	2310.00	254.71	265.95	264.08	265.99	0.00	2.93	2111.38	1011.90	0.17
1	4481 B	10 YR	2940.00	254.71	267.12	264.40	267.14	0.00	2.19	3254.76	1093.16	0.12
1	4481 B	25 YR	3760.00	254.71	268.67	264.90	268.68	0.00	1.68	4801.42	1150.10	0.09
1	4481 B	50 YR	4480.00	254.71	269.95	265.07	269.96	0.00	1.36	6687.38	1184.87	0.07
1	4481 B	100 YR	5320.00	254.71	270.46	265.24	270.47	0.00	1.46	7293.67	1206.77	0.07
1	4481 B	250 YR	6810.00	254.71	271.33	265.49	271.35	0.00	1.57	8363.94	1256.01	0.07
1	4481 B	500 YR	8850.00	254.71	272.29	265.75	272.30	0.00	1.79	9664.23	1449.62	0.08
1	5380	2 YR	1210.00	256.86	265.59		265.61	0.00	1.50	1417.07	492.58	0.11
1	5380	5 YR	2070.00	256.86	266.67		266.70	0.00	1.95	2208.91	971.65	0.13
1	5380	10 YR	2670.00	256.86	267.58		267.61	0.00	2.02	3231.97	1185.65	0.13
1	5380	25 YR	3330.00	256.86	268.90		268.91	0.00	1.58	4826.04	1233.90	0.09
1	5380	50 YR	3650.00	256.86	270.08		270.09	0.00	1.26	6299.43	1262.50	0.07
1	5380	100 YR	3940.00	256.86	270.59		270.59	0.00	1.21	6945.85	1293.38	0.0
1	5380	250 YR	4760.00	256.86	271.46		271.47	0.00	1.23	8129.79	1406.04	0.06
1	5380	500 YR	5760.00	256.86	272.43		272.43	0.00	1.27	9544.24	1568.14	0.06
1	5987	2 YR	1210.00	259.44	266.04		266.23	0.00	4.38	482.37	255.30	0.35
1	5987	5 YR	2070.00	259.44	267.22		267.42	0.00	4.85	857.83	433.24	0.35
1	5987	10 YR	2670.00	259.44	268.06		268.24	0.00	4.86	1336.05	683.88	0.33
1	5987	25 YR	3330.00	259.44	269.13		269.23	0.00	4.17	2153.60	960.40	0.26

HEC-RAS Plan: Howard_Existing River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5987	50 YR	3650.00	259.44	270.20		270.24	0.00	2.94	3251.96	1094.68	0.17
1	5987	100 YR	3940.00	259.44	270.69		270.72	0.00	2.67	3804.05	1174.50	0.15
1	5987	250 YR	4760.00	259.44	271.55		271.58	0.00	2.48	4886.56	1322.80	0.14
1	5987	500 YR	5760.00	259.44	272.51		272.53	0.00	2.30	6209.82	1415.10	0.12
1	6710	2 YR	1220.00	261.87	266.82		266.82	0.00	0.85	2112.80	1002.19	0.09
1	6710	5 YR	2090.00	261.87	267.89		267.90	0.00	0.95	3244.27	1102.36	0.09
1	6710	10 YR	2700.00	261.87	268.63		268.64	0.00	0.99	4103.46	1235.56	0.08
1	6710	25 YR	3330.00	261.87	269.51		269.52	0.00	0.98	5222.06	1288.14	0.07
1	6710	50 YR	3640.00	261.87	270.39		270.40	0.00	0.87	6384.49	1324.75	0.06
1	6710	100 YR	3910.00	261.87	270.85		270.85	0.00	0.85	6990.45	1345.61	0.06
1	6710	250 YR	4750.00	261.87	271.68		271.69	0.00	0.88	8123.63	1360.66	0.06
1	6710	500 YR	5630.00	261.87	272.62		272.62	0.00	0.89	9398.48	1372.21	0.05
1	7328 C	2 YR	1220.00	262.02	267.02		267.02	0.00	0.97	2164.99	868.95	0.09
1	7328 C	5 YR	2090.00	262.02	268.07		268.08	0.00	1.11	3104.82	928.08	0.09
1	7328 C	10 YR	2700.00	262.02	268.78		268.79	0.00	1.17	3802.79	1016.23	0.09
1	7328 C	25 YR	3330.00	262.02	269.64		269.65	0.00	1.21	4694.00	1060.16	0.08
1	7328 C	50 YR	3640.00	262.02	270.48		270.48	0.00	1.07	5584.47	1064.19	0.07
1	7328 C	100 YR	3910.00	262.02	270.92		270.93	0.00	1.05	6055.75	1066.31	0.07
1	7328 C	250 YR	4750.00	262.02	271.75		271.76	0.00	1.09	6944.10	1070.31	0.06
1	7328 C	500 YR	5630.00	262.02	272.68		272.68	0.00	1.11	7936.17	1074.75	0.06
1	7742	2 YR	1220.00	262.25	267.25	264.77	267.28	0.00	1.65	1121.29	711.74	0.15
1	7742	5 YR	2090.00	262.25	268.29	265.35	268.32	0.00	1.90	1690.14	817.68	0.15
1	7742	10 YR	2700.00	262.25	268.98	265.74	269.01	0.00	1.95	2120.87	882.30	0.15
1	7742	25 YR	3330.00	262.25	269.81	266.11	269.84	0.00	1.94	2693.58	969.76	0.14
1	7742	50 YR	3640.00	262.25	270.59	266.21	270.62	0.00	1.82	3301.57	1021.59	0.12
1	7742	100 YR	3910.00	262.25	271.02	266.29	271.05	0.00	1.76	3640.06	1027.47	0.11
1	7742	250 YR	4750.00	262.25	271.84	266.53	271.87	0.00	1.77	4296.66	1038.23	0.11
1	7742	500 YR	5630.00	262.25	272.76	266.74	272.78	0.00	1.76	5032.45	1047.62	0.10
1	8797	2 YR	1220.00	265.09	270.02		270.59	0.03	6.98	212.35	104.32	0.66
1	8797	5 YR	2090.00	265.09	270.89	270.38	271.77	0.04	9.25	314.36	145.09	0.78
1	8797	10 YR	2700.00	265.09	271.19	270.90	272.60	0.06	12.27	365.06	194.79	1.01
1	8797	25 YR	3330.00	265.09	271.41	270.94	273.11	0.07	13.70	410.03	209.92	1.10
1	8797	50 YR	3640.00	265.09	272.28	272.28	273.30	0.04	11.30	652.27	455.51	0.83
1	8797	100 YR	3910.00	265.09	272.73	272.73	273.43	0.03	9.98	881.59	542.44	0.71
1	8797	250 YR	4750.00	265.09	273.01	273.01	273.69	0.03	10.24	1038.32	573.05	0.71
1	8797	500 YR	5630.00	265.09	273.61		274.05	0.02	8.70	1392.30	603.75	0.58
1	9598 D	2 YR	1220.00	269.15	274.39		274.44	0.00	2.59	895.47	546.73	0.21
1	9598 D	5 YR	2090.00	269.15	275.30		275.36	0.00	2.73	1438.02	621.50	0.20
1	9598 D	10 YR	2700.00	269.15	275.94		275.99	0.00	2.70	1847.96	666.15	0.19
1	9598 D	25 YR	3330.00	269.15	276.42		276.47	0.00	2.78	2177.82	698.73	0.19
1	9598 D	50 YR	3640.00	269.15	276.50		276.56	0.00	2.96	2231.61	701.92	0.20
1	9598 D	100 YR	3910.00	269.15	276.56		276.63	0.00	3.10	2278.02	704.66	0.21
1	9598 D	250 YR	4750.00	269.15	276.94		277.01	0.00	3.32	2546.17	721.59	0.22
1	9598 D	500 YR	5630.00	269.15	277.19		277.28	0.00	3.64	2731.91	747.12	0.24
1	10119	2 YR	1240.00	268.32	275.54		275.62	0.00	3.22	912.96	535.26	0.22
1	10119	5 YR	2090.00	268.32	276.38		276.45	0.00	3.47	1395.56	619.90	0.22
1	10119	10 YR	2700.00	268.32	276.91		276.98	0.00	3.61	1744.61	669.09	0.22
1	10119	25 YR	3290.00	268.32	277.35		277.42	0.00	3.63	2039.65	676.50	0.22
1	10119	50 YR	3580.00	268.32	277.50		277.57	0.00	3.73	2140.20	679.88	0.22
1	10119	100 YR	3840.00	268.32	277.62		277.70	0.00	3.81	2225.94	682.24	0.23
1	10119	250 YR	4520.00	268.32	278.03		278.11	0.00	3.88	2503.49	689.86	0.23
1	10119	500 YR	5320.00	268.32	278.39		278.47	0.00	4.06	2753.82	696.65	0.23
1	10653	2 YR	1240.00	268.12	276.83		276.96	0.00	3.92	674.82	389.44	0.26
1	10653	5 YR	2090.00	268.12	277.74		277.90	0.00	4.67	1072.93	505.86	0.29
1	10653	10 YR	2700.00	268.12	278.24		278.38	0.00	4.76	1327.80	521.60	0.28
1	10653	25 YR	3290.00	268.12	278.63		278.77	0.00	4.92	1532.19	531.05	0.29
1	10653	50 YR	3580.00	268.12	278.80		278.94	0.00	4.99	1624.06	534.94	0.29
1	10653	100 YR	3840.00	268.12	278.94		279.09	0.00	5.07	1701.47	538.34	0.29
1	10653	250 YR	4520.00	268.12	279.33		279.48	0.00	5.20	1910.72	555.14	0.29
1	10653	500 YR	5320.00	268.12	279.73		279.88	0.00	5.37	2135.64	585.26	0.30
1	11204	2 YR	1240.00	267.91	277.79		277.87	0.00	2.61	933.03	518.02	0.17
1	11204	5 YR	2090.00	267.91	278.79		278.86	0.00	2.92	1543.93	648.35	0.18
1	11204	10 YR	2700.00	267.91	279.27		279.35	0.00	3.12	1860.47	669.92	0.18
1	11204	25 YR	3290.00	267.91	279.68		279.76	0.00	3.29	2138.87	698.36	0.19
1	11204	50 YR	3580.00	267.91	279.86		279.94	0.00	3.36	2265.42	704.08	0.19
1	11204	100 YR	3840.00	267.91	280.01		280.09	0.00	3.42	2373.88	708.22	0.19
1	11204	250 YR	4520.00	267.91	280.40		280.49	0.00	3.55	2650.95	719.11	0.20
1	11204	500 YR	5320.00	267.91	280.82		280.91	0.00	3.73	2965.36	783.88	0.20
1	11754	2 YR	1240.00	273.24	279.05	273.68	279.24	0.01	4.62	530.36	458.97	0.44
1	11754	5 YR	2090.00	273.24	279.91		280.04	0.01	4.30	991.89	677.48	0.37
1	11754	10 YR	2700.00	273.24	280.37		280.49	0.01	4.29	1311.98	708.63	0.35
1	11754	25 YR	3290.00	273.24	280.74		280.85	0.01	4.20	1578.81	721.88	0.33
1	11754	50 YR	3580.00	273.24	280.91		281.02	0.01	4.21	1703.30	737.54	0.32
1	11754	100 YR	3840.00	273.24	281.06		281.16	0.01	4.20	1809.53	742.74	0.32
1	11754	250 YR	4520.00	273.24	281.42		281.52	0.00	4.19	2078.72	755.76	0.31
1	11754	500 YR	5320.00	273.24	281.82		281.93	0.00	4.18	2388.73	766.93	0.30
1	12159	2 YR	1240.00	273.80	280.45	277.42	280.50	0.00	2.35	1021.41	625.99	0.17
1	12159	5 YR	2090.00	273.80	281.14	278.11	281.18	0.00	2.63	1640.85	708.48	0.19

HEC-RAS Plan: Howard_Existing River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	12159	10 YR	2700.00	273.80	281.55	278.54	281.61	0.00	2.82	1944.21	747.32	0.19
1	12159	25 YR	3290.00	273.80	281.89	278.88	281.95	0.00	3.00	2201.49	778.98	0.20
1	12159	50 YR	3580.00	273.80	282.05	279.06	282.11	0.00	3.07	2327.57	793.85	0.20
1	12159	100 YR	3840.00	273.80	282.19	279.18	282.25	0.00	3.13	2435.94	812.79	0.2
1	12159	250 YR	4520.00	273.80	282.53	279.64	282.59	0.00	3.30	2723.87	889.04	0.21
1	12159	500 YR	5320.00	273.80	282.89	280.03	282.96	0.00	3.43	3053.00	902.89	0.21
1	12270	2 YR	1240.00	272.86	280.59	277.01	280.62	0.00	2.11	1096.86	493.01	0.14
1	12270	5 YR	2090.00	272.86	281.29	278.36	281.34	0.00	2.71	1503.18	551.16	0.18
1	12270	10 YR	2700.00	272.86	281.72	279.19	281.79	0.00	3.06	1753.89	598.70	0.19
1	12270	25 YR	3290.00	272.86	282.07	280.20	282.14	0.00	3.32	1966.64	637.62	0.21
1	12270	50 YR	3580.00	272.86	282.23	280.20	282.31	0.00	3.46	2076.74	696.50	0.21
1	12270	100 YR	3840.00	272.86	282.37	280.20	282.45	0.00	3.55	2175.68	726.82	0.22
1	12270	250 YR	4520.00	272.86	282.72	280.21	282.81	0.00	3.74	2433.90	750.22	0.22
1	12270	500 YR	5320.00	272.86	283.09	280.21	283.19	0.00	3.93	2715.26	766.15	0.23
1	12305 Flower Acres Rd.		Culvert									
1	12329 E	2 YR	1240.00	272.86	280.83	277.01	280.86	0.00	1.85	1214.86	482.86	0.13
1	12329 E	5 YR	2090.00	272.86	281.62	278.44	281.66	0.00	2.44	1684.76	537.76	0.16
1	12329 E	10 YR	2700.00	272.86	282.01	279.17	282.07	0.00	2.80	1903.47	569.48	0.18
1	12329 E	25 YR	3290.00	272.86	282.34	279.91	282.41	0.00	3.11	2104.25	640.37	0.20
1	12329 E	50 YR	3580.00	272.86	282.49	280.20	282.56	0.00	3.26	2196.13	652.16	0.20
1	12329 E	100 YR	3840.00	272.86	282.61	280.20	282.69	0.00	3.37	2279.53	662.95	0.21
1	12329 E	250 YR	4520.00	272.86	282.89	280.21	282.99	0.00	3.69	2470.51	696.01	0.22
1	12329 E	500 YR	5320.00	272.86	283.22	280.21	283.33	0.00	3.98	2699.96	706.97	0.24
1	12394	2 YR	1240.00	274.28	280.88	278.66	280.93	0.00	2.66	991.88	465.49	0.20
1	12394	5 YR	2090.00	274.28	281.68	280.09	281.75	0.00	3.16	1373.38	483.61	0.22
1	12394	10 YR	2700.00	274.28	282.09	280.21	282.18	0.00	3.52	1574.36	490.94	0.24
1	12394	25 YR	3290.00	274.28	282.43	280.39	282.53	0.00	3.83	1743.55	497.02	0.25
1	12394	50 YR	3580.00	274.28	282.58	280.48	282.69	0.00	3.98	1817.25	499.84	0.26
1	12394	100 YR	3840.00	274.28	282.71	280.56	282.83	0.00	4.11	1883.22	504.90	0.27
1	12394	250 YR	4520.00	274.28	283.01	280.81	283.14	0.00	4.47	2033.28	516.45	0.28
1	12394	500 YR	5320.00	274.28	283.35	281.02	283.49	0.00	4.80	2208.41	520.83	0.30
1	12648	2 YR	1240.00	272.79	281.21	278.22	281.29	0.00	2.76	878.62	475.01	0.21
1	12648	5 YR	2090.00	272.79	282.06	279.53	282.16	0.00	3.26	1304.95	521.83	0.23
1	12648	10 YR	2700.00	272.79	282.52	280.61	282.63	0.00	3.58	1556.38	577.72	0.24
1	12648	25 YR	3290.00	272.79	282.91	280.89	283.03	0.00	3.92	1791.59	635.25	0.26
1	12648	50 YR	3580.00	272.79	283.08	281.01	283.21	0.00	4.06	1900.84	654.02	0.26
1	12648	100 YR	3840.00	272.79	283.23	281.12	283.36	0.00	4.13	1997.36	658.26	0.26
1	12648	250 YR	4520.00	272.79	283.57	281.36	283.71	0.00	4.36	2226.06	675.91	0.27
1	12648	500 YR	5320.00	272.79	283.95	281.63	284.10	0.00	4.60	2484.65	698.73	0.28
1	12975	2 YR	1240.00	273.26	281.72		281.80	0.00	3.30	910.40	510.22	0.23
1	12975	5 YR	2090.00	273.26	282.60		282.68	0.00	3.52	1386.24	560.02	0.23
1	12975	10 YR	2700.00	273.26	283.09		283.17	0.00	3.68	1665.53	589.52	0.24
1	12975	25 YR	3290.00	273.26	283.52		283.60	0.00	3.85	1925.55	619.56	0.24
1	12975	50 YR	3580.00	273.26	283.70		283.79	0.00	3.91	2040.44	626.61	0.24
1	12975	100 YR	3840.00	273.26	283.85		283.94	0.00	3.98	2135.94	632.60	0.24
1	12975	250 YR	4520.00	273.26	284.22		284.31	0.00	4.16	2369.97	647.57	0.25
1	12975	500 YR	5320.00	273.26	284.62		284.72	0.00	4.33	2630.60	661.12	0.25
1	13197	2 YR	1250.00	273.40	282.16		282.25	0.00	3.06	748.98	316.43	0.22
1	13197	5 YR	2080.00	273.40	283.05		283.17	0.00	3.71	1053.70	360.06	0.25
1	13197	10 YR	2690.00	273.40	283.56		283.71	0.00	4.28	1253.09	406.54	0.28
1	13197	25 YR	3250.00	273.40	284.00		284.16	0.00	4.52	1432.99	421.32	0.29
1	13197	50 YR	3530.00	273.40	284.18		284.35	0.00	4.66	1512.93	429.67	0.29
1	13197	100 YR	3800.00	273.40	284.34		284.52	0.00	4.80	1581.73	435.77	0.30
1	13197	250 YR	4320.00	273.40	284.71		284.89	0.00	4.92	1745.43	445.73	0.30
1	13197	500 YR	5090.00	273.40	285.12		285.32	0.00	5.22	1931.43	461.23	0.31
1	13823	2 YR	1250.00	276.53	283.61		283.72	0.00	4.00	791.17	508.86	0.29
1	13823	5 YR	2080.00	276.53	284.51		284.59	0.00	3.85	1265.97	558.66	0.26
1	13823	10 YR	2690.00	276.53	285.09		285.16	0.00	3.78	1611.19	626.46	0.25
1	13823	25 YR	3250.00	276.53	285.50		285.57	0.00	3.80	1883.04	675.77	0.24
1	13823	50 YR	3530.00	276.53	285.69		285.76	0.00	3.79	2009.34	681.62	0.24
1	13823	100 YR	3800.00	276.53	285.85		285.93	0.00	3.80	2123.89	686.10	0.24
1	13823	250 YR	4320.00	276.53	286.18		286.25	0.00	3.80	2347.59	695.17	0.23
1	13823	500 YR	5090.00	276.53	286.60		286.68	0.00	3.84	2645.88	705.91	0.23
1	14445	2 YR	1250.00	276.66	284.52	282.14	284.59	0.00	2.39	649.77	501.58	0.17
1	14445	5 YR	2080.00	276.66	285.25	282.99	285.30	0.00	2.49	1319.45	589.03	0.17
1	14445	10 YR	2690.00	276.66	285.74	283.38	285.79	0.00	2.51	1742.46	651.09	0.16
1	14445	25 YR	3250.00	276.66	286.13	283.61	286.18	0.00	2.62	2000.89	675.51	0.17
1	14445	50 YR	3530.00	276.66	286.31	283.72	286.36	0.00	2.67	2121.44	690.08	0.17
1	14445	100 YR	3800.00	276.66	286.47	283.83	286.52	0.00	2.72	2233.58	706.04	0.17
1	14445	250 YR	4320.00	276.66	286.77	284.02	286.83	0.00	2.80	2453.96	728.65	0.17
1	14445	500 YR	5090.00	276.66	287.19	284.29	287.25	0.00	2.91	2762.46	778.77	0.17
1	14538	2 YR	1250.00	276.00	284.55	282.20	284.97	0.01	5.58	288.08	663.48	0.38
1	14538	5 YR	2080.00	276.00	285.36	283.82	285.43	0.00	3.17	1307.06	733.79	0.21
1	14538	10 YR	2690.00	276.00	285.84	284.52	285.90	0.00	3.00	1753.00	785.25	0.19
1	14538	25 YR	3250.00	276.00	286.23	285.00	286.29	0.00	2.95	2060.36	796.30	0.18
1	14538	50 YR	3530.00	276.00	286.41	285.00	286.46	0.00	2.94	2201.24	800.70	0.18
1	14538	100 YR	3800.00	276.00	286.57	285.01	286.62	0.00	2.93	2332.76	817.75	0.18
1	14538	250 YR	4320.00	276.00	286.88	285.01	286.93	0.00	2.91	2587.43	834.29	0.17

HEC-RAS Plan: Howard_Existing River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	14538	500 YR	5090.00	276.00	287.29	285.06	287.35	0.00	2.91	2938.50	875.40	0.17
1	14609 Lake Dr.		Culvert									
1	14699 F	2 YR	1250.00	276.26	285.24	280.53	285.30	0.00	2.01	710.93	798.50	0.14
1	14699 F	5 YR	2080.00	276.26	286.91	281.39	286.93	0.00	1.26	2824.90	1143.22	0.08
1	14699 F	10 YR	2690.00	276.26	287.30	281.92	287.31	0.00	1.37	3573.22	1201.56	0.08
1	14699 F	25 YR	3250.00	276.26	287.56	282.38	287.58	0.00	1.54	3804.03	1261.15	0.09
1	14699 F	50 YR	3530.00	276.26	287.68	282.65	287.70	0.00	1.62	3910.94	1282.92	0.10
1	14699 F	100 YR	3800.00	276.26	287.79	282.84	287.81	0.00	1.70	4011.20	1312.30	0.10
1	14699 F	250 YR	4320.00	276.26	287.96	283.16	287.99	0.00	1.85	4174.57	1346.02	0.11
1	14699 F	500 YR	5090.00	276.26	288.20	283.59	288.23	0.00	2.05	4400.99	1366.31	0.12
1	14776	2 YR	1250.00	275.56	285.32	279.13	285.33	0.00	0.96	1475.92	642.59	0.06
1	14776	5 YR	2080.00	275.56	286.93	279.92	286.94	0.00	0.93	3228.98	699.71	0.05
1	14776	10 YR	2690.00	275.56	287.31	280.45	287.33	0.00	1.10	3632.21	716.18	0.06
1	14776	25 YR	3250.00	275.56	287.58	280.80	287.59	0.00	1.27	3822.11	729.13	0.07
1	14776	50 YR	3530.00	275.56	287.70	280.95	287.71	0.00	1.34	3909.74	733.66	0.08
1	14776	100 YR	3800.00	275.56	287.81	281.08	287.83	0.00	1.42	3990.82	737.79	0.08
1	14776	250 YR	4320.00	275.56	287.98	281.33	288.01	0.00	1.56	4123.86	768.57	0.09
1	14776	500 YR	5090.00	275.56	288.23	281.67	288.26	0.00	1.76	4318.19	818.55	0.10
1	15095	2 YR	1250.00	277.03	285.37		285.43	0.00	2.30	877.77	364.63	0.17
1	15095	5 YR	2080.00	277.03	286.97		287.01	0.00	2.20	1499.74	413.21	0.14
1	15095	10 YR	2690.00	277.03	287.36		287.42	0.00	2.58	1666.45	436.64	0.16
1	15095	25 YR	3250.00	277.03	287.64		287.71	0.00	2.92	1790.44	458.26	0.18
1	15095	50 YR	3530.00	277.03	287.76		287.84	0.00	3.07	1848.65	463.39	0.19
1	15095	100 YR	3800.00	277.03	287.88		287.96	0.00	3.21	1902.90	468.02	0.19
1	15095	250 YR	4320.00	277.03	288.07		288.17	0.00	3.48	1993.61	478.54	0.21
1	15095	500 YR	5090.00	277.03	288.34		288.45	0.00	3.86	2122.02	491.21	0.23
1	15330	2 YR	1250.00	276.09	285.55		285.58	0.00	1.57	1297.17	586.46	0.11
1	15330	5 YR	2080.00	276.09	287.08		287.10	0.00	1.41	2338.62	726.10	0.09
1	15330	10 YR	2690.00	276.09	287.51		287.53	0.00	1.58	2651.28	742.38	0.10
1	15330	25 YR	3250.00	276.09	287.81		287.84	0.00	1.73	2879.58	749.83	0.11
1	15330	50 YR	3530.00	276.09	287.96		287.98	0.00	1.80	2985.22	755.28	0.11
1	15330	100 YR	3800.00	276.09	288.09		288.11	0.00	1.87	3083.77	762.06	0.11
1	15330	250 YR	4320.00	276.09	288.31		288.34	0.00	2.04	3258.74	794.57	0.12
1	15330	500 YR	5090.00	276.09	288.61		288.65	0.00	2.22	3504.98	815.08	0.13
1	15596	2 YR	1250.00	275.69	285.74		285.78	0.00	2.39	897.30	574.30	0.19
1	15596	5 YR	2080.00	275.69	287.18		287.20	0.00	1.77	1770.39	629.17	0.12
1	15596	10 YR	2690.00	275.69	287.62		287.65	0.00	1.92	2047.98	642.61	0.13
1	15596	25 YR	3250.00	275.69	287.93		287.97	0.00	2.07	2255.27	655.44	0.14
1	15596	50 YR	3530.00	275.69	288.08		288.12	0.00	2.15	2352.08	664.56	0.14
1	15596	100 YR	3800.00	275.69	288.22		288.26	0.00	2.22	2443.85	677.70	0.14
1	15596	250 YR	4320.00	275.69	288.46		288.50	0.00	2.34	2606.16	683.89	0.15
1	15596	500 YR	5090.00	275.69	288.78		288.83	0.00	2.50	2828.14	693.66	0.16
1	16351 G	2 YR	1240.00	279.20	287.33		287.40	0.00	3.23	709.03	328.61	0.24
1	16351 G	5 YR	2060.00	279.20	288.06		288.15	0.00	3.86	975.86	414.73	0.27
1	16351 G	10 YR	2580.00	279.20	288.52		288.62	0.00	3.96	1175.77	449.87	0.27
1	16351 G	25 YR	3110.00	279.20	288.90		289.00	0.00	4.10	1351.58	476.30	0.27
1	16351 G	50 YR	3380.00	279.20	289.07		289.18	0.00	4.15	1437.03	489.40	0.27
1	16351 G	100 YR	3640.00	279.20	289.24		289.35	0.00	4.20	1519.58	503.65	0.27
1	16351 G	250 YR	3970.00	279.20	289.50		289.61	0.00	4.19	1650.49	522.29	0.27
1	16351 G	500 YR	4200.00	279.20	289.80		289.90	0.00	3.96	1813.19	564.35	0.25
1	16964	2 YR	1240.00	280.04	288.34		288.40	0.00	2.09	698.61	263.38	0.17
1	16964	5 YR	2060.00	280.04	289.29		289.39	0.00	2.68	976.75	313.92	0.20
1	16964	10 YR	2580.00	280.04	289.78		289.89	0.00	2.95	1132.75	326.49	0.21
1	16964	25 YR	3110.00	280.04	290.20		290.33	0.00	3.21	1272.72	336.11	0.22
1	16964	50 YR	3380.00	280.04	290.40		290.54	0.00	3.33	1338.78	340.56	0.23
1	16964	100 YR	3640.00	280.04	290.58		290.72	0.00	3.44	1400.89	344.69	0.23
1	16964	250 YR	3970.00	280.04	290.81		290.97	0.00	3.56	1483.02	350.07	0.24
1	16964	500 YR	4200.00	280.04	291.01		291.17	0.00	3.61	1553.21	359.13	0.24
1	17396 H	2 YR	1240.00	282.80	289.17	288.86	289.44	0.01	5.73	403.97	277.15	0.47
1	17396 H	5 YR	2060.00	282.80	290.20	289.30	290.39	0.01	5.09	697.47	318.90	0.38
1	17396 H	10 YR	2580.00	282.80	290.71	289.50	290.89	0.01	5.07	846.83	346.52	0.36
1	17396 H	25 YR	3110.00	282.80	291.15	289.70	291.34	0.01	5.12	982.18	361.97	0.35
1	17396 H	50 YR	3380.00	282.80	291.36	289.80	291.55	0.00	5.17	1046.33	378.14	0.35
1	17396 H	100 YR	3640.00	282.80	291.55	289.87	291.75	0.00	5.22	1106.27	400.61	0.35
1	17396 H	250 YR	3970.00	282.80	291.79	289.98	292.00	0.00	5.28	1183.13	414.13	0.34
1	17396 H	500 YR	4200.00	282.80	291.97	290.06	292.18	0.00	5.28	1241.76	420.65	0.34
1	17475	2 YR	1240.00	282.40	289.71	287.08	289.82	0.00	3.01	574.51	766.32	0.24
1	17475	5 YR	2060.00	282.40	290.57	288.08	290.72	0.00	3.67	786.18	839.37	0.27
1	17475	10 YR	2580.00	282.40	291.04	289.04	291.21	0.00	3.98	901.17	963.32	0.28
1	17475	25 YR	3110.00	282.40	291.47	289.37	291.66	0.00	4.26	1006.82	993.79	0.29
1	17475	50 YR	3380.00	282.40	291.67	289.51	291.88	0.00	4.39	1057.49	1009.59	0.29
1	17475	100 YR	3640.00	282.40	291.86	289.62	292.08	0.00	4.51	1104.36	1036.53	0.30
1	17475	250 YR	3970.00	282.40	292.10	289.76	292.33	0.00	4.65	1162.91	1063.50	0.30
1	17475	500 YR	4200.00	282.40	292.28	289.85	292.51	0.00	4.73	1205.59	1092.92	0.30
1	17490 Findley St.		Culvert									
1	17532	2 YR	1240.00	282.63	289.83	286.90	289.89	0.00	2.18	837.66	1096.03	0.17

HEC-RAS Plan: Howard_Existing River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	17532	5 YR	2060.00	282.63	290.70	287.81	290.79	0.00	2.87	1046.80	1292.98	0.21
1	17532	10 YR	2580.00	282.63	291.18	288.30	291.29	0.00	3.23	1161.20	1324.14	0.22
1	17532	25 YR	3110.00	282.63	291.61	288.38	291.74	0.00	3.56	1265.38	1335.27	0.24
1	17532	50 YR	3380.00	282.63	291.83	288.40	291.97	0.00	3.71	1316.72	1343.70	0.2
1	17532	100 YR	3640.00	282.63	292.01	288.49	292.17	0.00	3.86	1362.00	1349.38	0.25
1	17532	250 YR	3970.00	282.63	292.27	288.67	292.44	0.00	4.01	1423.97	1354.43	0.26
1	17532	500 YR	4200.00	282.63	292.44	288.78	292.61	0.00	4.13	1463.52	1357.15	0.26
1	17550	2 YR	1240.00	283.34	289.76	288.09	290.03	0.01	4.98	361.24	1055.45	0.38
1	17550	5 YR	2060.00	283.34	290.56	288.93	291.05	0.01	6.78	438.37	1243.94	0.48
1	17550	10 YR	2580.00	283.34	290.98	289.36	291.61	0.01	7.73	479.56	1271.64	0.53
1	17550	25 YR	3110.00	283.34	291.36	289.78	292.14	0.01	8.62	516.04	1299.40	0.57
1	17550	50 YR	3380.00	283.34	291.55	289.98	292.40	0.01	9.04	533.96	1301.93	0.59
1	17550	100 YR	3640.00	283.34	291.70	290.16	292.63	0.01	9.45	549.37	1304.11	0.61
1	17550	250 YR	3970.00	283.34	291.93	290.39	292.94	0.01	9.90	571.03	1307.17	0.63
1	17550	500 YR	4200.00	283.34	292.07	290.54	293.15	0.01	10.22	584.50	1320.25	0.65
1	17572 Railroad		Bridge									
1	17606 I	2 YR	1240.00	283.34	290.46	287.83	290.60	0.00	3.71	502.05	911.47	0.27
1	17606 I	5 YR	2060.00	283.34	291.76	288.59	291.99	0.00	4.75	645.19	938.54	0.31
1	17606 I	10 YR	2580.00	283.34	292.51	289.01	292.78	0.00	5.26	726.83	950.69	0.33
1	17606 I	25 YR	3110.00	283.34	293.21	289.41	293.53	0.00	5.70	804.60	960.62	0.34
1	17606 I	50 YR	3380.00	283.34	293.56	289.59	293.90	0.00	5.90	843.10	965.36	0.34
1	17606 I	100 YR	3640.00	283.34	293.89	289.77	294.25	0.00	6.08	879.11	969.79	0.35
1	17606 I	250 YR	3970.00	283.34	294.31	289.98	294.69	0.00	6.29	924.67	975.40	0.35
1	17606 I	500 YR	4200.00	283.34	294.59	290.12	294.99	0.00	6.43	955.57	979.21	0.36
1	17698	2 YR	1240.00	282.51	290.66	286.82	290.67	0.00	1.23	1307.57	880.85	0.08
1	17698	5 YR	2060.00	282.51	292.07	287.25	292.09	0.00	1.48	1722.87	901.83	0.09
1	17698	10 YR	2580.00	282.51	292.87	287.49	292.89	0.00	1.60	1959.27	913.39	0.09
1	17698	25 YR	3110.00	282.51	293.63	287.71	293.66	0.00	1.71	2184.44	925.20	0.10
1	17698	50 YR	3380.00	282.51	294.00	287.83	294.04	0.00	1.76	2295.55	939.69	0.10
1	17698	100 YR	3640.00	282.51	294.36	287.93	294.39	0.00	1.80	2399.53	949.63	0.10
1	17698	250 YR	3970.00	282.51	294.80	288.05	294.84	0.00	1.85	2530.52	960.22	0.10
1	17698	500 YR	4200.00	282.51	295.10	288.17	295.14	0.00	1.88	2619.38	967.40	0.10
1	18119	2 YR	1240.00	283.20	290.71	290.26	291.01	0.01	5.84	520.64	457.76	0.40
1	18119	5 YR	2060.00	283.20	292.23	290.82	292.38	0.00	4.88	1010.27	488.48	0.30
1	18119	10 YR	2580.00	283.20	293.05	291.09	293.18	0.00	4.76	1305.59	532.06	0.28
1	18119	25 YR	3110.00	283.20	293.82	291.33	293.93	0.00	4.58	1609.97	557.60	0.26
1	18119	50 YR	3380.00	283.20	294.20	291.44	294.31	0.00	4.63	1769.89	595.70	0.2
1	18119	100 YR	3640.00	283.20	294.55	291.54	294.66	0.00	4.51	1928.22	601.04	0.2
1	18119	250 YR	3970.00	283.20	295.00	291.67	295.09	0.00	4.38	2129.38	607.75	0.23
1	18119	500 YR	4200.00	283.20	295.30	291.75	295.39	0.00	4.31	2267.33	612.29	0.23
1	18643	2 YR	1280.00	284.77	291.88	289.63	291.91	0.00	2.43	1254.41	440.78	0.17
1	18643	5 YR	2110.00	284.77	293.06	290.07	293.10	0.00	2.72	1800.93	497.06	0.18
1	18643	10 YR	2630.00	284.77	293.77	290.29	293.80	0.00	2.75	2157.62	510.94	0.17
1	18643	25 YR	3100.00	284.77	294.45	290.61	294.48	0.00	2.76	2514.60	538.39	0.16
1	18643	50 YR	3350.00	284.77	294.80	290.48	294.83	0.00	2.75	2704.78	545.36	0.16
1	18643	100 YR	3650.00	284.77	295.12	290.78	295.16	0.00	2.81	2882.44	563.55	0.16
1	18643	250 YR	3960.00	284.77	295.52	290.87	295.56	0.00	2.82	3111.74	581.12	0.16
1	18643	500 YR	4190.00	284.77	295.80	290.94	295.83	0.00	2.84	3273.46	595.52	0.16
1	19050 J	2 YR	1280.00	285.84	292.30	290.22	292.36	0.00	3.35	878.47	584.83	0.24
1	19050 J	5 YR	2110.00	285.84	293.46	290.89	293.53	0.00	3.67	1259.41	729.51	0.24
1	19050 J	10 YR	2630.00	285.84	294.13	291.16	294.20	0.00	3.76	1481.15	806.60	0.24
1	19050 J	25 YR	3100.00	285.84	294.77	291.38	294.84	0.00	3.78	1693.11	875.53	0.23
1	19050 J	50 YR	3350.00	285.84	295.10	291.48	295.18	0.00	3.79	1802.71	889.94	0.23
1	19050 J	100 YR	3650.00	285.84	295.42	291.61	295.50	0.00	3.86	1908.59	903.29	0.23
1	19050 J	250 YR	3960.00	285.84	295.81	291.73	295.88	0.00	3.88	2035.74	921.81	0.22
1	19050 J	500 YR	4190.00	285.84	296.07	291.82	296.15	0.00	3.90	2123.89	931.42	0.22
1	19176	2 YR	1280.00	286.21	292.54	291.19	292.84	0.01	5.25	374.60	497.83	0.41
1	19176	5 YR	2110.00	286.21	293.65	292.01	294.07	0.01	6.40	505.31	728.38	0.45
1	19176	10 YR	2630.00	286.21	294.27	292.42	294.76	0.01	6.93	579.32	889.57	0.46
1	19176	25 YR	3100.00	286.21	294.87	292.77	295.40	0.01	7.25	649.79	955.17	0.47
1	19176	50 YR	3350.00	286.21	295.18	292.94	295.73	0.01	7.40	686.47	973.91	0.47
1	19176	100 YR	3650.00	286.21	295.49	293.14	296.06	0.01	7.64	722.28	989.24	0.47
1	19176	250 YR	3960.00	286.21	295.85	293.33	296.45	0.01	7.80	765.10	1007.57	0.47
1	19176	500 YR	4190.00	286.21	296.10	293.47	296.72	0.01	7.93	794.89	1020.33	0.47
1	19253 Loop 151		Culvert									
1	19897	2 YR	1280.00	285.21	293.76	292.43	293.90	0.00	3.88	527.14	335.00	0.28
1	19897	5 YR	2110.00	285.21	295.91	293.08	295.98	0.00	2.81	1104.69	559.25	0.17
1	19897	10 YR	2630.00	285.21	297.11	293.42	297.17	0.00	2.57	1426.60	829.06	0.15
1	19897	25 YR	3100.00	285.21	299.03	293.68	299.07	0.00	2.09	1942.42	1083.73	0.11
1	19897	50 YR	3350.00	285.21	300.05	293.80	300.09	0.00	1.93	2216.83	1380.51	0.10
1	19897	100 YR	3650.00	285.21	301.28	293.98	301.31	0.00	1.79	2546.32	1535.70	0.0
1	19897	250 YR	3960.00	285.21	302.67	294.10	302.70	0.00	1.65	2922.12	1632.33	0.08
1	19897	500 YR	4190.00	285.21	303.75	294.17	303.78	0.00	1.57	3210.90	1707.58	0.07
1	19989	2 YR	1280.00	285.63	293.91	292.61	294.05	0.00	3.49	526.30	279.08	0.29
1	19989	5 YR	2110.00	285.63	295.97	293.35	296.03	0.00	2.53	1231.73	491.60	0.17
1	19989	10 YR	2630.00	285.63	297.16	293.64	297.20	0.00	2.12	1710.65	738.57	0.13
1	19989	25 YR	3100.00	285.63	299.06	293.86	299.09	0.00	1.59	2476.19	1144.61	0.09

HEC-RAS Plan: Howard_Existing River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	19989	50 YR	3350.00	285.63	300.08	293.93	300.10	0.00	1.43	2835.17	1397.92	0.08
1	19989	100 YR	3650.00	285.63	301.30	293.98	301.32	0.00	1.30	3376.99	1624.05	0.07
1	19989	250 YR	3960.00	285.63	302.70	294.26	302.71	0.00	1.17	3938.39	1699.62	0.06
1	19989	500 YR	4190.00	285.63	303.77	294.34	303.78	0.00	1.10	4370.07	1777.65	0.05

HEC-RAS Plan: S_Wagner_Exist River: South_Wagner Reach: South_Wagner

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)	
South_Wagner	462	2 YR	700.00	259.00	269.03	266.75	269.25	0.01	4.33	304.50	432.34	0.41
South_Wagner	462	5 YR	1010.00	259.00	269.57	268.94	269.70	0.01	3.89	644.07	756.71	0.34
South_Wagner	462	10 YR	1240.00	259.00	269.89	269.22	269.98	0.00	3.50	896.32	808.20	0.30
South_Wagner	462	25 YR	1710.00	259.00	270.37	269.58	270.43	0.00	3.21	1291.30	835.28	0.2
South_Wagner	462	50 YR	2040.00	259.00	270.88	269.65	270.92	0.00	2.70	1731.63	911.27	0.21
South_Wagner	462	100 YR	2360.00	259.00	271.37	269.81	271.40	0.00	2.39	2213.24	1029.32	0.17
South_Wagner	462	250 YR	2840.00	259.00	272.11	269.93	272.13	0.00	2.03	2993.40	1071.84	0.14
South_Wagner	462	500 YR	3230.00	259.00	272.54	270.01	272.56	0.00	1.94	3454.32	1071.84	0.13
South_Wagner	625	2 YR	700.00	260.50	269.38	263.23	269.44	0.00	2.04	342.81	698.83	0.14
South_Wagner	625	5 YR	1010.00	260.50	269.81	263.95	269.89	0.00	2.39	922.08	843.07	0.16
South_Wagner	625	10 YR	1240.00	260.50	270.07	264.43	270.16	0.00	2.67	1156.97	977.08	0.17
South_Wagner	625	25 YR	1710.00	260.50	270.54	265.28	270.63	0.00	3.00	1647.90	1088.85	0.19
South_Wagner	625	50 YR	2040.00	260.50	271.00	265.85	271.09	0.00	2.92	2169.38	1131.52	0.18
South_Wagner	625	100 YR	2360.00	260.50	271.47	266.44	271.53	0.00	2.78	2693.42	1131.52	0.16
South_Wagner	625	250 YR	2840.00	260.50	272.18	267.14	272.23	0.00	2.57	3497.90	1131.52	0.15
South_Wagner	625	500 YR	3230.00	260.50	272.60	267.56	272.64	0.00	2.55	3976.29	1131.52	0.14
South_Wagner	645 Buchanan Rd.		Culvert									
South_Wagner	710	2 YR	700.00	260.29	269.44	263.44	269.45	0.00	1.16	1373.65	913.49	0.07
South_Wagner	710	5 YR	1010.00	260.29	269.87	264.15	269.89	0.00	1.36	1804.69	1032.95	0.09
South_Wagner	710	10 YR	1240.00	260.29	270.15	264.54	270.16	0.00	1.48	2092.13	1061.41	0.09
South_Wagner	710	25 YR	1710.00	260.29	270.62	265.22	270.64	0.00	1.66	2603.00	1093.17	0.10
South_Wagner	710	50 YR	2040.00	260.29	271.07	265.69	271.09	0.00	1.66	3111.96	1144.49	0.10
South_Wagner	710	100 YR	2360.00	260.29	271.52	266.13	271.54	0.00	1.62	3628.08	1144.49	0.09
South_Wagner	710	250 YR	2840.00	260.29	272.22	266.96	272.24	0.00	1.55	4428.61	1144.49	0.09
South_Wagner	710	500 YR	3230.00	260.29	272.64	267.35	272.66	0.00	1.57	4908.12	1144.49	0.08
South_Wagner	859	2 YR	700.00	261.20	269.45		269.50	0.00	2.16	641.61	740.08	0.19
South_Wagner	859	5 YR	1010.00	261.20	269.89		269.94	0.00	2.29	1021.96	931.13	0.19
South_Wagner	859	10 YR	1240.00	261.20	270.17		270.22	0.00	2.33	1291.82	996.82	0.19
South_Wagner	859	25 YR	1710.00	261.20	270.65		270.69	0.00	2.34	1792.31	1060.60	0.18
South_Wagner	859	50 YR	2040.00	261.20	271.10		271.14	0.00	2.15	2279.44	1096.17	0.16
South_Wagner	859	100 YR	2360.00	261.20	271.55		271.58	0.00	2.00	2788.94	1179.55	0.14
South_Wagner	859	250 YR	2840.00	261.20	272.25		272.26	0.00	1.78	3613.21	1189.23	0.12
South_Wagner	859	500 YR	3230.00	261.20	272.66		272.68	0.00	1.74	4110.05	1189.23	0.11
South_Wagner	1479	2 YR	700.00	265.10	270.53		270.81	0.01	4.47	228.61	171.04	0.38
South_Wagner	1479	5 YR	1010.00	265.10	270.98		271.33	0.01	5.31	321.38	253.49	0.43
South_Wagner	1479	10 YR	1240.00	265.10	271.21		271.62	0.01	5.84	388.32	324.06	0.46
South_Wagner	1479	25 YR	1710.00	265.10	271.57	271.12	272.07	0.01	6.77	519.36	400.95	0.5
South_Wagner	1479	50 YR	2040.00	265.10	271.76	271.53	272.30	0.01	7.26	598.83	433.57	0.5
South_Wagner	1479	100 YR	2360.00	265.10	272.04		272.53	0.01	7.21	729.46	477.11	0.53
South_Wagner	1479	250 YR	2840.00	265.10	272.58		272.94	0.01	6.69	1003.01	531.81	0.47
South_Wagner	1479	500 YR	3230.00	265.10	272.97		273.26	0.01	6.26	1214.56	543.22	0.43
South_Wagner	2073	2 YR	700.00	266.63	272.11	269.89	272.20	0.00	2.48	369.77	234.20	0.25
South_Wagner	2073	5 YR	1010.00	266.63	272.74	270.39	272.85	0.00	2.79	536.18	365.57	0.26
South_Wagner	2073	10 YR	1240.00	266.63	273.10	270.74	273.22	0.00	3.03	667.51	437.06	0.27
South_Wagner	2073	25 YR	1710.00	266.63	273.66	271.32	273.79	0.00	3.37	908.43	534.47	0.28
South_Wagner	2073	50 YR	2040.00	266.63	273.96	271.73	274.11	0.00	3.61	1058.58	593.60	0.29
South_Wagner	2073	100 YR	2360.00	266.63	274.18	272.01	274.35	0.00	3.85	1174.19	635.95	0.31
South_Wagner	2073	250 YR	2840.00	266.63	274.48	272.38	274.67	0.00	4.19	1334.16	678.40	0.32
South_Wagner	2073	500 YR	3230.00	266.63	274.69	272.67	274.90	0.00	4.43	1448.73	686.43	0.34
South_Wagner	2196	2 YR	700.00	266.80	272.29	269.52	272.48	0.00	3.50	200.18	68.89	0.35
South_Wagner	2196	5 YR	1010.00	266.80	272.92	270.25	273.18	0.00	4.11	258.02	177.10	0.40
South_Wagner	2196	10 YR	1240.00	266.80	273.28	271.09	273.57	0.00	4.42	349.40	344.74	0.41
South_Wagner	2196	25 YR	1710.00	266.80	273.84	271.91	274.15	0.00	4.77	548.91	416.19	0.41
South_Wagner	2196	50 YR	2040.00	266.80	274.15	272.36	274.47	0.00	4.96	673.15	448.40	0.41
South_Wagner	2196	100 YR	2360.00	266.80	274.39	273.06	274.72	0.00	5.18	769.02	478.47	0.42
South_Wagner	2196	250 YR	2840.00	266.80	274.70	273.74	275.06	0.00	5.49	898.16	499.90	0.43
South_Wagner	2196	500 YR	3230.00	266.80	274.93	274.02	275.30	0.00	5.74	989.15	526.71	0.44
South_Wagner	2226 West St.		Culvert									
South_Wagner	2282 A	2 YR	700.00	265.94	273.39	269.14	273.51	0.00	2.71	258.38	102.03	0.21
South_Wagner	2282 A	5 YR	1010.00	265.94	274.32	269.84	274.46	0.00	3.11	419.70	288.74	0.23
South_Wagner	2282 A	10 YR	1240.00	265.94	274.65	270.33	274.83	0.00	3.49	511.28	373.15	0.25
South_Wagner	2282 A	25 YR	1710.00	265.94	275.04	271.22	275.28	0.00	4.25	678.50	478.14	0.29
South_Wagner	2282 A	50 YR	2040.00	265.94	275.19	271.77	275.50	0.00	4.83	755.27	535.74	0.33
South_Wagner	2282 A	100 YR	2360.00	265.94	275.28	272.25	275.67	0.00	5.45	800.79	551.42	0.37
South_Wagner	2282 A	250 YR	2840.00	265.94	275.44	272.89	275.92	0.00	6.17	882.61	570.31	0.41
South_Wagner	2282 A	500 YR	3230.00	265.94	275.50	273.35	276.08	0.00	6.85	916.27	577.55	0.46
South_Wagner	2390	2 YR	700.00	266.60	273.46		273.82	0.01	4.87	144.83	59.69	0.52
South_Wagner	2390	5 YR	1010.00	266.60	274.38		274.77	0.00	5.12	214.10	87.52	0.47
South_Wagner	2390	10 YR	1240.00	266.60	274.71		275.19	0.00	5.68	247.27	112.11	0.50
South_Wagner	2390	25 YR	1710.00	266.60	275.10		275.80	0.01	6.93	297.02	142.59	0.58
South_Wagner	2390	50 YR	2040.00	266.60	275.27	274.45	276.15	0.01	7.83	322.35	155.19	0.6
South_Wagner	2390	100 YR	2360.00	266.60	275.38	275.05	276.46	0.01	8.72	340.41	160.69	0.71
South_Wagner	2390	250 YR	2840.00	266.60	275.61	275.61	276.92	0.01	9.74	377.26	171.29	0.78
South_Wagner	2390	500 YR	3230.00	266.60	276.01	276.01	277.26	0.01	9.72	457.48	243.88	0.75
South_Wagner	2617	2 YR	690.00	268.00	274.62		274.81	0.00	3.47	198.75	78.57	0.38
South_Wagner	2617	5 YR	980.00	268.00	275.40		275.59	0.00	3.55	330.64	258.28	0.36
South_Wagner	2617	10 YR	1160.00	268.00	275.80		275.97	0.00	3.47	447.38	330.96	0.33

HEC-RAS Plan: S_Wagner_Exist River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South_Wagner	2617	25 YR	1450.00	268.00	276.41		276.54	0.00	3.24	662.19	369.85	0.29
South_Wagner	2617	50 YR	1680.00	268.00	276.78		276.90	0.00	3.19	801.18	380.51	0.27
South_Wagner	2617	100 YR	1900.00	268.00	277.11		277.23	0.00	3.15	928.75	388.85	0.26
South_Wagner	2617	250 YR	2200.00	268.00	277.57		277.68	0.00	3.08	1110.58	400.69	0.24
South_Wagner	2617	500 YR	2430.00	268.00	277.87		277.97	0.00	3.09	1229.41	409.65	0.23
South_Wagner	2773	2 YR	690.00	268.90	275.11	273.46	275.33	0.00	3.77	193.69	97.59	0.38
South_Wagner	2773	5 YR	980.00	268.90	275.81	274.02	276.06	0.00	4.18	295.41	203.00	0.38
South_Wagner	2773	10 YR	1160.00	268.90	276.14	274.30	276.41	0.00	4.36	375.83	270.65	0.38
South_Wagner	2773	25 YR	1450.00	268.90	276.65	274.73	276.91	0.00	4.41	530.47	325.16	0.36
South_Wagner	2773	50 YR	1680.00	268.90	276.99	275.06	277.23	0.00	4.46	646.23	356.79	0.36
South_Wagner	2773	100 YR	1900.00	268.90	277.30	275.33	277.53	0.00	4.46	759.53	373.77	0.34
South_Wagner	2773	250 YR	2200.00	268.90	277.73	275.80	277.94	0.00	4.36	924.29	386.24	0.32
South_Wagner	2773	500 YR	2430.00	268.90	278.01	276.35	278.22	0.00	4.41	1035.21	411.39	0.32
South_Wagner	2827	2 YR	690.00	269.30	275.34	272.05	275.47	0.00	2.85	242.22	158.90	0.27
South_Wagner	2827	5 YR	980.00	269.30	276.08	272.74	276.20	0.00	3.01	440.59	263.71	0.26
South_Wagner	2827	10 YR	1160.00	269.30	276.42	273.26	276.55	0.00	3.16	523.98	286.51	0.26
South_Wagner	2827	25 YR	1450.00	269.30	276.89	274.06	277.04	0.00	3.39	651.45	332.62	0.27
South_Wagner	2827	50 YR	1680.00	269.30	277.20	274.40	277.36	0.00	3.54	741.09	344.88	0.27
South_Wagner	2827	100 YR	1900.00	269.30	277.48	274.70	277.64	0.00	3.66	822.26	355.06	0.27
South_Wagner	2827	250 YR	2200.00	269.30	277.88	275.04	278.04	0.00	3.66	1045.01	400.67	0.26
South_Wagner	2827	500 YR	2430.00	269.30	278.16	275.47	278.31	0.00	3.71	1157.24	413.91	0.26
South_Wagner	2845 Garber St.		Culvert									
South_Wagner	2911 B	2 YR	690.00	269.30	275.81	272.24	275.93	0.00	2.83	250.79	198.10	0.23
South_Wagner	2911 B	5 YR	980.00	269.30	277.19	273.03	277.26	0.00	2.36	724.89	411.31	0.17
South_Wagner	2911 B	10 YR	1160.00	269.30	277.60	273.41	277.67	0.00	2.45	906.29	509.57	0.17
South_Wagner	2911 B	25 YR	1450.00	269.30	277.92	273.91	278.02	0.00	2.86	1058.64	590.92	0.20
South_Wagner	2911 B	50 YR	1680.00	269.30	278.11	274.22	278.23	0.00	3.17	1155.18	634.28	0.21
South_Wagner	2911 B	100 YR	1900.00	269.30	278.26	274.50	278.39	0.00	3.41	1233.75	650.69	0.23
South_Wagner	2911 B	250 YR	2200.00	269.30	278.45	274.88	278.60	0.00	3.70	1338.71	669.85	0.24
South_Wagner	2911 B	500 YR	2430.00	269.30	278.58	275.17	278.74	0.00	3.91	1407.52	677.39	0.26
South_Wagner	2964	2 YR	690.00	267.18	275.86	270.75	275.98	0.00	2.73	254.65	235.30	0.19
South_Wagner	2964	5 YR	980.00	267.18	277.24	271.43	277.28	0.00	1.99	1088.79	496.17	0.13
South_Wagner	2964	10 YR	1160.00	267.18	277.65	271.81	277.70	0.00	2.09	1259.19	583.92	0.13
South_Wagner	2964	25 YR	1450.00	267.18	278.00	272.39	278.05	0.00	2.43	1418.46	628.86	0.15
South_Wagner	2964	50 YR	1680.00	267.18	278.21	272.81	278.27	0.00	2.65	1518.07	642.58	0.16
South_Wagner	2964	100 YR	1900.00	267.18	278.36	273.22	278.44	0.00	2.87	1595.66	647.18	0.17
South_Wagner	2964	250 YR	2200.00	267.18	278.57	273.75	278.65	0.00	3.13	1696.97	653.15	0.19
South_Wagner	2964	500 YR	2430.00	267.18	278.70	274.17	278.80	0.00	3.33	1764.00	657.06	0.20
South_Wagner	3639	2 YR	690.00	268.70	276.18		276.18	0.00	0.78	1372.79	380.73	0.06
South_Wagner	3639	5 YR	980.00	268.70	277.40		277.41	0.00	0.83	1857.74	416.51	0.06
South_Wagner	3639	10 YR	1160.00	268.70	277.82		277.83	0.00	0.91	2033.67	424.50	0.06
South_Wagner	3639	25 YR	1450.00	268.70	278.21		278.22	0.00	1.05	2199.92	432.40	0.07
South_Wagner	3639	50 YR	1680.00	268.70	278.45		278.46	0.00	1.16	2304.03	438.60	0.08
South_Wagner	3639	100 YR	1900.00	268.70	278.64		278.65	0.00	1.27	2389.09	444.79	0.08
South_Wagner	3639	250 YR	2200.00	268.70	278.89		278.90	0.00	1.41	2501.05	452.39	0.09
South_Wagner	3639	500 YR	2430.00	268.70	279.06		279.08	0.00	1.51	2578.37	457.09	0.10
South_Wagner	3973	2 YR	690.00	269.53	276.25	272.78	276.26	0.00	1.32	751.35	429.19	0.11
South_Wagner	3973	5 YR	980.00	269.53	277.46	273.10	277.48	0.00	1.40	1035.57	496.82	0.10
South_Wagner	3973	10 YR	1160.00	269.53	277.88	273.27	277.90	0.00	1.52	1151.89	523.13	0.11
South_Wagner	3973	25 YR	1450.00	269.53	278.28	273.36	278.31	0.00	1.75	1281.40	590.18	0.12
South_Wagner	3973	50 YR	1680.00	269.53	278.53	273.78	278.56	0.00	1.92	1371.88	600.59	0.13
South_Wagner	3973	100 YR	1900.00	269.53	278.74	273.91	278.77	0.00	2.08	1447.11	607.85	0.14
South_Wagner	3973	250 YR	2200.00	269.53	279.00	274.08	279.04	0.00	2.28	1546.55	617.27	0.15
South_Wagner	3973	500 YR	2430.00	269.53	279.18	274.20	279.23	0.00	2.42	1616.17	623.74	0.15
South_Wagner	4326	2 YR	690.00	272.16	276.47	273.57	276.50	0.00	1.84	563.35	627.75	0.17
South_Wagner	4326	5 YR	980.00	272.16	277.64	273.91	277.67	0.00	1.92	774.39	651.01	0.16
South_Wagner	4326	10 YR	1160.00	272.16	278.07	274.06	278.10	0.00	2.08	856.42	668.22	0.16
South_Wagner	4326	25 YR	1450.00	272.16	278.51	274.28	278.55	0.00	2.39	945.51	679.84	0.18
South_Wagner	4326	50 YR	1680.00	272.16	278.79	274.45	278.84	0.00	2.63	1003.61	682.74	0.19
South_Wagner	4326	100 YR	1900.00	272.16	279.02	274.59	279.09	0.00	2.84	1052.15	685.15	0.21
South_Wagner	4326	250 YR	2200.00	272.16	279.33	274.79	279.40	0.00	3.12	1114.95	688.16	0.22
South_Wagner	4326	500 YR	2430.00	272.16	279.54	274.93	279.63	0.00	3.33	1159.09	692.05	0.23
South_Wagner	4396 C	2 YR	690.00	271.75	276.34	275.39	277.07	0.03	6.82	101.11	36.67	0.72
South_Wagner	4396 C	5 YR	980.00	271.75	277.46	276.38	278.19	0.02	6.85	142.99	79.32	0.63
South_Wagner	4396 C	10 YR	1160.00	271.75	277.85	276.74	278.68	0.02	7.33	158.34	102.07	0.65
South_Wagner	4396 C	25 YR	1450.00	271.75	278.20	277.28	279.30	0.03	8.40	172.62	117.70	0.72
South_Wagner	4396 C	50 YR	1680.00	271.75	278.40	277.68	279.74	0.04	9.30	180.67	142.87	0.79
South_Wagner	4396 C	100 YR	1900.00	271.75	278.52	278.03	280.14	0.04	10.21	186.09	159.96	0.86
South_Wagner	4396 C	250 YR	2200.00	271.75	278.66	278.50	280.70	0.05	11.46	191.95	183.74	0.95
South_Wagner	4396 C	500 YR	2430.00	271.75	278.84	278.84	281.14	0.06	12.19	199.38	229.30	1.00
South_Wagner	4407 Findley St.		Bridge									
South_Wagner	4453	2 YR	690.00	271.75	277.27	275.00	277.57	0.00	4.39	157.10	86.21	0.38
South_Wagner	4453	5 YR	980.00	271.75	278.32	275.67	278.70	0.00	4.94	198.38	108.49	0.39
South_Wagner	4453	10 YR	1160.00	271.75	278.83	276.05	279.26	0.00	5.29	219.44	119.28	0.41
South_Wagner	4453	25 YR	1450.00	271.75	279.52	276.62	280.04	0.00	5.82	251.49	218.35	0.43
South_Wagner	4453	50 YR	1680.00	271.75	280.06	277.03	280.64	0.00	6.13	286.46	228.60	0.43
South_Wagner	4453	100 YR	1900.00	271.75	280.85	277.40	281.41	0.00	6.07	345.04	234.02	0.40

HEC-RAS Plan: S_Wagner_Exist River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South_Wagner	4453	250 YR	2200.00	271.75	281.77	277.88	282.33	0.00	6.08	414.54	254.00	0.38
South_Wagner	4453	500 YR	2430.00	271.75	282.50	278.24	283.04	0.00	6.06	469.19	284.90	0.36
South_Wagner	4462	2 YR	690.00	271.75	277.25	275.39	277.66	0.01	5.17	133.44	85.76	0.4
South_Wagner	4462	5 YR	980.00	271.75	278.30	276.38	278.79	0.01	5.61	174.78	108.10	0.48
South_Wagner	4462	10 YR	1160.00	271.75	278.81	276.75	279.35	0.01	5.92	195.84	118.90	0.48
South_Wagner	4462	25 YR	1450.00	271.75	279.50	277.29	280.14	0.01	6.42	231.92	218.03	0.50
South_Wagner	4462	50 YR	1680.00	271.75	280.05	277.70	280.72	0.01	6.65	278.16	228.41	0.49
South_Wagner	4462	100 YR	1900.00	271.75	280.85	278.05	281.46	0.00	6.40	354.09	234.02	0.44
South_Wagner	4462	250 YR	2200.00	271.75	281.80	278.52	282.35	0.00	6.23	443.70	254.60	0.40
South_Wagner	4462	500 YR	2430.00	271.75	282.55	278.85	283.07	0.00	6.08	515.42	288.76	0.37
South_Wagner	4479 Railroad		Bridge									
South_Wagner	4524 D	2 YR	690.00	271.60	277.94	275.85	278.11	0.00	3.26	215.08	73.61	0.32
South_Wagner	4524 D	5 YR	980.00	271.60	279.05	276.51	279.23	0.00	3.41	302.93	84.86	0.29
South_Wagner	4524 D	10 YR	1160.00	271.60	279.62	276.82	279.81	0.00	3.53	353.24	90.67	0.28
South_Wagner	4524 D	25 YR	1450.00	271.60	280.43	277.18	280.63	0.00	3.73	429.45	98.83	0.27
South_Wagner	4524 D	50 YR	1680.00	271.60	281.02	277.44	281.24	0.00	3.86	490.01	104.86	0.27
South_Wagner	4524 D	100 YR	1900.00	271.60	281.73	277.70	281.94	0.00	3.86	566.42	225.13	0.26
South_Wagner	4524 D	250 YR	2200.00	271.60	282.59	278.01	282.81	0.00	3.90	667.49	383.50	0.24
South_Wagner	4524 D	500 YR	2430.00	271.60	283.30	278.25	283.50	0.00	3.87	757.24	568.74	0.23
South_Wagner	4588	2 YR	690.00	271.80	278.03	275.29	278.32	0.00	4.35	160.80	81.71	0.36
South_Wagner	4588	5 YR	980.00	271.80	279.11	276.08	279.40	0.00	4.52	318.22	354.75	0.34
South_Wagner	4588	10 YR	1160.00	271.80	279.69	276.52	279.95	0.00	4.42	430.07	369.65	0.32
South_Wagner	4588	25 YR	1450.00	271.80	280.51	277.15	280.73	0.00	4.33	615.92	471.22	0.29
South_Wagner	4588	50 YR	1680.00	271.80	281.15	277.61	281.33	0.00	4.14	771.87	522.48	0.27
South_Wagner	4588	100 YR	1900.00	271.80	281.88	278.84	282.03	0.00	3.84	952.08	606.51	0.24
South_Wagner	4588	250 YR	2200.00	271.80	282.77	279.32	282.89	0.00	3.61	1170.18	676.95	0.21
South_Wagner	4588	500 YR	2430.00	271.80	283.48	279.55	283.58	0.00	3.46	1342.49	710.96	0.19
South_Wagner	4891	2 YR	690.00	273.00	278.86	276.58	278.94	0.00	2.42	417.32	353.66	0.23
South_Wagner	4891	5 YR	980.00	273.00	279.78	277.13	279.83	0.00	2.18	687.73	375.22	0.18
South_Wagner	4891	10 YR	1160.00	273.00	280.26	277.42	280.31	0.00	2.13	829.43	389.89	0.17
South_Wagner	4891	25 YR	1450.00	273.00	280.98	277.89	281.02	0.00	2.09	1040.96	424.89	0.16
South_Wagner	4891	50 YR	1680.00	273.00	281.53	278.57	281.58	0.00	2.07	1204.62	467.87	0.15
South_Wagner	4891	100 YR	1900.00	273.00	282.18	278.72	282.22	0.00	2.00	1396.21	499.71	0.13
South_Wagner	4891	250 YR	2200.00	273.00	283.01	278.90	283.05	0.00	1.94	1640.21	585.42	0.12
South_Wagner	4891	500 YR	2430.00	273.00	283.68	279.02	283.71	0.00	1.89	1836.83	662.46	0.12
South_Wagner	5308	2 YR	690.00	274.74	279.39		279.42	0.00	1.68	558.40	294.43	0.17
South_Wagner	5308	5 YR	980.00	274.74	280.15		280.18	0.00	1.74	819.77	397.29	0.1
South_Wagner	5308	10 YR	1160.00	274.74	280.57		280.60	0.00	1.74	996.94	460.67	0.16
South_Wagner	5308	25 YR	1450.00	274.74	281.22		281.25	0.00	1.68	1307.75	493.55	0.14
South_Wagner	5308	50 YR	1680.00	274.74	281.74		281.76	0.00	1.63	1570.58	521.01	0.13
South_Wagner	5308	100 YR	1900.00	274.74	282.35		282.36	0.00	1.51	1892.73	540.99	0.11
South_Wagner	5308	250 YR	2200.00	274.74	283.14		283.16	0.00	1.42	2335.29	598.45	0.10
South_Wagner	5308	500 YR	2430.00	274.74	283.78		283.80	0.00	1.33	2728.28	618.61	0.09
South_Wagner	5785	2 YR	590.00	275.40	280.16	279.19	280.30	0.00	3.35	245.13	161.09	0.38
South_Wagner	5785	5 YR	800.00	275.40	280.79	279.50	280.91	0.00	3.19	360.04	195.98	0.34
South_Wagner	5785	10 YR	950.00	275.40	281.14	279.78	281.25	0.00	3.18	428.52	204.08	0.32
South_Wagner	5785	25 YR	1230.00	275.40	281.65	280.06	281.76	0.00	3.31	537.07	219.45	0.31
South_Wagner	5785	50 YR	1460.00	275.40	282.08	280.25	282.20	0.00	3.40	636.37	241.17	0.30
South_Wagner	5785	100 YR	1740.00	275.40	282.60	280.38	282.71	0.00	3.39	763.51	251.15	0.28
South_Wagner	5785	250 YR	2050.00	275.40	283.32	280.73	283.42	0.00	3.26	966.73	305.43	0.25
South_Wagner	5785	500 YR	2320.00	275.40	283.92	280.88	284.01	0.00	3.12	1155.82	323.11	0.23
South_Wagner	6126 E	2 YR	590.00	275.86	281.77		282.08	0.01	4.47	132.03	34.31	0.40
South_Wagner	6126 E	5 YR	800.00	275.86	282.22		282.68	0.01	5.42	147.65	35.41	0.47
South_Wagner	6126 E	10 YR	950.00	275.86	282.47		283.04	0.01	6.07	156.71	40.59	0.51
South_Wagner	6126 E	25 YR	1230.00	275.86	282.85	281.29	283.64	0.01	7.16	180.68	84.82	0.59
South_Wagner	6126 E	50 YR	1460.00	275.86	283.14	281.73	284.07	0.01	7.82	208.47	102.46	0.63
South_Wagner	6126 E	100 YR	1740.00	275.86	283.42	282.28	284.50	0.01	8.56	238.97	113.98	0.67
South_Wagner	6126 E	250 YR	2050.00	275.86	283.83	283.54	284.94	0.01	8.87	288.78	132.19	0.67
South_Wagner	6126 E	500 YR	2320.00	275.86	284.25	283.92	285.28	0.01	8.77	349.06	153.29	0.63
South_Wagner	6491	2 YR	590.00	278.42	283.60		283.80	0.00	3.65	170.96	73.96	0.37
South_Wagner	6491	5 YR	800.00	278.42	284.31		284.52	0.00	3.84	228.54	87.21	0.36
South_Wagner	6491	10 YR	950.00	278.42	284.74		284.96	0.00	3.95	267.56	92.86	0.35
South_Wagner	6491	25 YR	1230.00	278.42	285.43		285.68	0.00	4.16	335.10	102.57	0.34
South_Wagner	6491	50 YR	1460.00	278.42	285.89		286.16	0.00	4.40	384.60	112.46	0.35
South_Wagner	6491	100 YR	1740.00	278.42	286.40		286.70	0.00	4.71	451.46	145.26	0.35
South_Wagner	6491	250 YR	2050.00	278.42	286.81		287.14	0.00	4.97	512.40	152.35	0.36
South_Wagner	6491	500 YR	2320.00	278.42	287.08		287.44	0.00	5.24	554.62	157.76	0.37
South_Wagner	6693 F	2 YR	590.00	278.87	284.28	281.76	284.43	0.00	3.05	193.51	50.46	0.27
South_Wagner	6693 F	5 YR	800.00	278.87	284.96	282.18	285.15	0.00	3.50	228.44	52.75	0.30
South_Wagner	6693 F	10 YR	950.00	278.87	285.37	282.47	285.59	0.00	3.79	250.33	54.14	0.31
South_Wagner	6693 F	25 YR	1230.00	278.87	286.06	282.94	286.34	0.00	4.26	288.49	57.18	0.33
South_Wagner	6693 F	50 YR	1460.00	278.87	286.55	283.32	286.87	0.00	4.59	318.33	63.20	0.36
South_Wagner	6693 F	100 YR	1740.00	278.87	287.07	283.72	287.44	0.00	4.94	352.41	67.96	0.37
South_Wagner	6693 F	250 YR	2050.00	278.87	287.48	284.15	287.93	0.00	5.41	381.37	71.73	0.39
South_Wagner	6693 F	500 YR	2320.00	278.87	287.78	284.49	288.30	0.00	5.82	403.08	116.41	0.41
South_Wagner	6723 Robison Rd.		Culvert									

HEC-RAS Plan: S_Wagner_Exist River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Cr t 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)	
South_Wagner	6829 G	2 YR	590.00	280.07	285.40	282.70	285.52	0.00	2.78	212.21	56.64	0.25
South_Wagner	6829 G	5 YR	800.00	280.07	286.32	283.13	286.46	0.00	3.01	265.97	60.18	0.25
South_Wagner	6829 G	10 YR	950.00	280.07	286.92	283.42	287.07	0.00	3.14	302.78	62.49	0.25
South_Wagner	6829 G	25 YR	1230.00	280.07	287.96	283.89	288.13	0.00	3.33	369.88	66.49	0.25
South_Wagner	6829 G	50 YR	1460.00	280.07	288.75	284.25	288.93	0.00	3.45	423.20	174.03	0.24
South_Wagner	6829 G	100 YR	1740.00	280.07	289.85	284.65	290.04	0.00	3.50	497.38	475.70	0.23
South_Wagner	6829 G	250 YR	2050.00	280.07	291.26	285.06	291.45	0.00	3.46	592.65	588.51	0.21
South_Wagner	6829 G	500 YR	2320.00	280.07	291.79	285.38	292.00	0.00	3.69	628.12	602.28	0.21
South_Wagner	7010	2 YR	590.00	280.20	285.81	285.44	286.80	0.03	7.99	73.87	26.91	0.85
South_Wagner	7010	5 YR	800.00	280.20	286.69	286.17	287.66	0.02	7.93	101.88	47.14	0.82
South_Wagner	7010	10 YR	950.00	280.20	287.31	286.64	288.14	0.02	7.44	150.40	104.04	0.74
South_Wagner	7010	25 YR	1230.00	280.20	288.38	287.76	288.85	0.01	5.99	323.27	242.32	0.55
South_Wagner	7010	50 YR	1460.00	280.20	289.14	288.10	289.41	0.00	4.92	523.92	323.81	0.41
South_Wagner	7010	100 YR	1740.00	280.20	290.19	288.48	290.33	0.00	3.83	818.28	370.66	0.29
South_Wagner	7010	250 YR	2050.00	280.20	291.57	288.76	291.65	0.00	3.00	1203.50	569.35	0.20
South_Wagner	7010	500 YR	2320.00	280.20	292.13	288.93	292.20	0.00	2.97	1359.55	616.25	0.19
South_Wagner	7475	2 YR	590.00	280.75	289.60		289.76	0.00	3.45	273.77	194.35	0.25
South_Wagner	7475	5 YR	800.00	280.75	290.25		290.40	0.00	3.58	419.87	252.37	0.24
South_Wagner	7475	10 YR	950.00	280.75	290.57	286.96	290.72	0.00	3.70	504.61	272.80	0.25
South_Wagner	7475	25 YR	1230.00	280.75	290.96		291.12	0.00	4.12	615.70	305.79	0.27
South_Wagner	7475	50 YR	1460.00	280.75	291.13		291.33	0.00	4.57	670.09	321.30	0.29
South_Wagner	7475	100 YR	1740.00	280.75	291.45		291.66	0.00	4.80	777.97	347.83	0.30
South_Wagner	7475	250 YR	2050.00	280.75	292.23		292.36	0.00	4.23	1066.62	398.61	0.25
South_Wagner	7475	500 YR	2320.00	280.75	292.71		292.82	0.00	4.03	1262.34	421.95	0.24
South_Wagner	7954 H	2 YR	590.00	282.70	290.77		290.89	0.00	3.09	293.05	146.42	0.23
South_Wagner	7954 H	5 YR	800.00	282.70	291.39		291.53	0.00	3.43	389.54	168.78	0.25
South_Wagner	7954 H	10 YR	950.00	282.70	291.73		291.88	0.00	3.65	449.70	182.43	0.25
South_Wagner	7954 H	25 YR	1230.00	282.70	292.26		292.43	0.00	4.02	555.83	226.34	0.27
South_Wagner	7954 H	50 YR	1460.00	282.70	292.63		292.83	0.00	4.41	649.48	275.09	0.29
South_Wagner	7954 H	100 YR	1740.00	282.70	293.03		293.25	0.00	4.70	769.92	333.83	0.30
South_Wagner	7954 H	250 YR	2050.00	282.70	293.47		293.69	0.00	4.84	930.94	389.60	0.30
South_Wagner	7954 H	500 YR	2320.00	282.70	293.81		294.02	0.00	4.89	1067.79	426.82	0.30
South_Wagner	8499	2 YR	560.00	284.60	292.46		292.76	0.01	4.42	141.45	90.59	0.38
South_Wagner	8499	5 YR	770.00	284.60	293.14		293.47	0.01	4.86	214.84	139.12	0.39
South_Wagner	8499	10 YR	910.00	284.60	293.52		293.87	0.01	5.06	280.50	198.37	0.39
South_Wagner	8499	25 YR	1190.00	284.60	294.12		294.44	0.01	5.16	421.91	271.45	0.38
South_Wagner	8499	50 YR	1440.00	284.60	294.59		294.88	0.01	5.17	569.04	348.34	0.36
South_Wagner	8499	100 YR	1700.00	284.60	294.99		295.25	0.00	5.11	714.66	376.68	0.35
South_Wagner	8499	250 YR	2090.00	284.60	295.42		295.68	0.00	5.32	889.10	441.57	0.35
South_Wagner	8499	500 YR	2410.00	284.60	295.72		295.97	0.00	5.42	1026.27	477.49	0.35
South_Wagner	9030	2 YR	560.00	285.80	293.80		293.87	0.00	2.23	397.81	241.98	0.16
South_Wagner	9030	5 YR	770.00	285.80	294.50		294.57	0.00	2.37	578.65	273.75	0.16
South_Wagner	9030	10 YR	910.00	285.80	294.89		294.95	0.00	2.45	687.11	291.14	0.16
South_Wagner	9030	25 YR	1190.00	285.80	295.46		295.53	0.00	2.65	864.39	325.19	0.17
South_Wagner	9030	50 YR	1440.00	285.80	295.90		295.97	0.00	2.81	1011.25	354.12	0.17
South_Wagner	9030	100 YR	1700.00	285.80	296.26		296.34	0.00	2.99	1144.68	378.91	0.18
South_Wagner	9030	250 YR	2090.00	285.80	296.75		296.83	0.00	3.24	1338.84	421.86	0.19
South_Wagner	9030	500 YR	2410.00	285.80	297.06		297.16	0.00	3.41	1476.55	441.30	0.19
South_Wagner	9490	2 YR	560.00	285.80	294.16		294.19	0.00	1.78	526.63	206.13	0.12
South_Wagner	9490	5 YR	770.00	285.80	294.87		294.91	0.00	2.00	682.16	232.11	0.13
South_Wagner	9490	10 YR	910.00	285.80	295.26		295.31	0.00	2.15	778.97	261.22	0.13
South_Wagner	9490	25 YR	1190.00	285.80	295.87		295.93	0.00	2.42	953.42	313.66	0.15
South_Wagner	9490	50 YR	1440.00	285.80	296.33		296.39	0.00	2.61	1104.46	342.26	0.15
South_Wagner	9490	100 YR	1700.00	285.80	296.73		296.80	0.00	2.84	1251.66	407.65	0.16
South_Wagner	9490	250 YR	2090.00	285.80	297.25		297.33	0.00	3.04	1471.54	431.76	0.17
South_Wagner	9490	500 YR	2410.00	285.80	297.60		297.68	0.00	3.21	1626.10	449.33	0.18
South_Wagner	9607 I	2 YR	560.00	291.70	294.12	293.55	294.56	0.01	5.37	104.36	50.37	0.66
South_Wagner	9607 I	5 YR	770.00	291.70	294.83	293.97	295.29	0.01	5.43	141.72	54.60	0.59
South_Wagner	9607 I	10 YR	910.00	291.70	295.22	294.22	295.70	0.01	5.56	163.54	56.93	0.58
South_Wagner	9607 I	25 YR	1190.00	291.70	295.82	294.68	296.38	0.01	5.99	198.77	60.50	0.58
South_Wagner	9607 I	50 YR	1440.00	291.70	296.25	295.04	296.89	0.01	6.39	225.45	63.06	0.60
South_Wagner	9607 I	100 YR	1700.00	291.70	296.63	295.40	297.35	0.01	6.80	249.84	79.55	0.61
South_Wagner	9607 I	250 YR	2090.00	291.70	297.11	295.87	297.95	0.01	7.40	308.34	163.69	0.63
South_Wagner	9607 I	500 YR	2410.00	291.70	297.43	296.24	298.35	0.01	7.81	370.22	234.73	0.64
South_Wagner	9613 Falvey Ave.		Culvert									
South_Wagner	9708 J	2 YR	560.00	289.25	296.99	293.05	297.05	0.00	1.89	296.71	60.74	0.15
South_Wagner	9708 J	5 YR	770.00	289.25	298.02	293.48	298.09	0.00	2.15	359.40	86.15	0.16
South_Wagner	9708 J	10 YR	910.00	289.25	298.58	293.74	298.66	0.00	2.28	438.83	196.49	0.16
South_Wagner	9708 J	25 YR	1190.00	289.25	299.01	294.37	299.12	0.00	2.71	544.84	300.95	0.18
South_Wagner	9708 J	50 YR	1440.00	289.25	299.24	294.69	299.38	0.00	3.08	628.58	400.15	0.20
South_Wagner	9708 J	100 YR	1700.00	289.25	299.51	294.99	299.67	0.00	3.39	747.95	522.74	0.22
South_Wagner	9708 J	250 YR	2090.00	289.25	299.70	295.43	299.90	0.00	3.91	857.03	612.56	0.25
South_Wagner	9708 J	500 YR	2410.00	289.25	299.84	295.75	300.08	0.00	4.26	948.47	632.23	0.27
South_Wagner	9754	2 YR	560.00	289.50	297.02	293.95	297.11	0.00	2.64	275.73	130.09	0.22
South_Wagner	9754	5 YR	770.00	289.50	298.05	294.56	298.14	0.00	2.64	440.10	213.11	0.20
South_Wagner	9754	10 YR	910.00	289.50	298.62	294.91	298.70	0.00	2.56	610.02	363.34	0.18
South_Wagner	9754	25 YR	1190.00	289.50	299.08	295.80	299.17	0.00	2.85	784.35	534.80	0.20
South_Wagner	9754	50 YR	1440.00	289.50	299.34	296.23	299.44	0.00	3.09	902.13	564.47	0.21

HEC-RAS Plan: S_Wagner_Exist River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South_Wagner	9754	100 YR	1700.00	289.50	299.63	296.58	299.74	0.00	3.25	1035.65	587.02	0.22
South_Wagner	9754	250 YR	2090.00	289.50	299.87	297.05	300.00	0.00	3.65	1147.97	605.28	0.24
South_Wagner	9754	500 YR	2410.00	289.50	300.04	297.39	300.19	0.00	3.96	1232.89	619.95	0.26
South_Wagner	10104	2 YR	560.00	291.19	297.58		297.64	0.00	2.73	509.58	434.55	0.22
South_Wagner	10104	5 YR	770.00	291.19	298.42		298.44	0.00	2.03	887.17	463.25	0.15
South_Wagner	10104	10 YR	910.00	291.19	298.92		298.94	0.00	1.86	1129.20	509.03	0.13
South_Wagner	10104	25 YR	1190.00	291.19	299.39		299.41	0.00	1.91	1374.29	516.91	0.13
South_Wagner	10104	50 YR	1440.00	291.19	299.69		299.71	0.00	2.03	1527.28	521.78	0.14
South_Wagner	10104	100 YR	1700.00	291.19	299.99		300.02	0.00	2.13	1686.27	526.88	0.14
South_Wagner	10104	250 YR	2090.00	291.19	300.29		300.32	0.00	2.35	1845.73	532.03	0.15
South_Wagner	10104	500 YR	2410.00	291.19	300.52		300.55	0.00	2.51	1966.42	537.68	0.16
South_Wagner	10271	2 YR	560.00	291.80	297.77		297.79	0.00	1.77	688.60	367.92	0.14
South_Wagner	10271	5 YR	770.00	291.80	298.52		298.54	0.00	1.67	982.95	419.16	0.12
South_Wagner	10271	10 YR	910.00	291.80	299.00		299.01	0.00	1.61	1190.30	448.90	0.11
South_Wagner	10271	25 YR	1190.00	291.80	299.47		299.49	0.00	1.76	1411.14	476.85	0.12
South_Wagner	10271	50 YR	1440.00	291.80	299.77		299.79	0.00	1.92	1556.81	490.69	0.13
South_Wagner	10271	100 YR	1700.00	291.80	300.08		300.10	0.00	2.04	1709.46	502.69	0.13
South_Wagner	10271	250 YR	2090.00	291.80	300.40		300.42	0.00	2.28	1869.20	512.43	0.15
South_Wagner	10271	500 YR	2410.00	291.80	300.63		300.67	0.00	2.45	1991.91	523.74	0.15
South_Wagner	10502	2 YR	560.00	293.90	298.31	298.31	298.82	0.02	6.49	166.49	210.76	0.71
South_Wagner	10502	5 YR	770.00	293.90	298.66	298.66	299.12	0.02	6.70	254.30	276.77	0.68
South_Wagner	10502	10 YR	910.00	293.90	299.02		299.32	0.01	5.84	362.31	316.78	0.56
South_Wagner	10502	25 YR	1190.00	293.90	299.56		299.77	0.01	5.28	551.50	381.78	0.47
South_Wagner	10502	50 YR	1440.00	293.90	299.89		300.09	0.01	5.34	681.74	415.05	0.46
South_Wagner	10502	100 YR	1700.00	293.90	300.22		300.39	0.01	5.18	821.21	427.85	0.43
South_Wagner	10502	250 YR	2090.00	293.90	300.57		300.74	0.00	5.32	972.63	441.33	0.42
South_Wagner	10502	500 YR	2410.00	293.90	300.83		301.00	0.00	5.44	1088.84	451.41	0.42
South_Wagner	10562 K	2 YR	560.00	294.40	299.09	297.67	299.32	0.00	3.81	147.10	221.31	0.41
South_Wagner	10562 K	5 YR	770.00	294.40	299.31	298.11	299.68	0.01	4.83	159.45	263.85	0.50
South_Wagner	10562 K	10 YR	910.00	294.40	299.43	298.38	299.90	0.01	5.48	166.07	299.11	0.56
South_Wagner	10562 K	25 YR	1190.00	294.40	299.86	298.83	300.16	0.00	4.93	409.08	327.15	0.47
South_Wagner	10562 K	50 YR	1440.00	294.40	300.16	299.19	300.48	0.00	5.22	479.10	333.07	0.48
South_Wagner	10562 K	100 YR	1700.00	294.40	300.44	299.59	300.79	0.00	5.51	553.29	385.29	0.49
South_Wagner	10562 K	250 YR	2090.00	294.40	300.76	299.88	301.19	0.01	6.20	650.90	428.79	0.53
South_Wagner	10562 K	500 YR	2410.00	294.40	301.00	300.07	301.47	0.01	6.51	730.72	450.42	0.54
South_Wagner	10582 Kilgore St.		Culvert									
South_Wagner	10652 L	2 YR	560.00	295.20	300.04	297.90	300.14	0.00	2.54	239.26	264.86	0.2
South_Wagner	10652 L	5 YR	770.00	295.20	300.83	298.26	300.94	0.00	2.72	331.54	468.86	0.23
South_Wagner	10652 L	10 YR	910.00	295.20	301.34	298.49	301.45	0.00	2.77	393.28	509.92	0.22
South_Wagner	10652 L	25 YR	1190.00	295.20	302.05	298.86	302.09	0.00	2.08	942.93	701.01	0.16
South_Wagner	10652 L	50 YR	1440.00	295.20	302.31	299.16	302.36	0.00	2.24	1068.03	729.53	0.17
South_Wagner	10652 L	100 YR	1700.00	295.20	302.57	299.48	302.62	0.00	2.36	1200.03	748.27	0.17
South_Wagner	10652 L	250 YR	2090.00	295.20	302.90	299.98	302.96	0.00	2.58	1365.64	760.09	0.18
South_Wagner	10652 L	500 YR	2410.00	295.20	303.11	300.44	303.18	0.00	2.73	1477.40	765.51	0.19
South_Wagner	10682	2 YR	560.00	295.10	300.15	298.03	300.18	0.00	1.57	510.74	317.22	0.15
South_Wagner	10682	5 YR	770.00	295.10	300.95	298.27	300.98	0.00	1.64	760.99	468.46	0.14
South_Wagner	10682	10 YR	910.00	295.10	301.46	298.43	301.49	0.00	1.59	968.40	528.04	0.13
South_Wagner	10682	25 YR	1190.00	295.10	302.09	298.68	302.11	0.00	1.54	1448.28	652.73	0.12
South_Wagner	10682	50 YR	1440.00	295.10	302.35	298.88	302.37	0.00	1.68	1624.32	702.05	0.13
South_Wagner	10682	100 YR	1700.00	295.10	302.61	299.07	302.64	0.00	1.80	1818.69	748.31	0.13
South_Wagner	10682	250 YR	2090.00	295.10	302.94	299.34	302.98	0.00	1.94	2070.44	765.06	0.14
South_Wagner	10682	500 YR	2410.00	295.10	303.17	299.55	303.20	0.00	2.06	2240.68	770.34	0.14
South_Wagner	10858	2 YR	560.00	294.70	300.26		300.35	0.00	3.11	369.32	306.26	0.31
South_Wagner	10858	5 YR	770.00	294.70	301.04		301.10	0.00	2.73	631.02	390.57	0.25
South_Wagner	10858	10 YR	910.00	294.70	301.54		301.58	0.00	2.49	833.59	430.83	0.21
South_Wagner	10858	25 YR	1190.00	294.70	302.14		302.18	0.00	2.50	1129.03	536.86	0.20
South_Wagner	10858	50 YR	1440.00	294.70	302.41		302.46	0.00	2.76	1281.29	613.95	0.21
South_Wagner	10858	100 YR	1700.00	294.70	302.68		302.73	0.00	2.88	1451.89	640.54	0.22
South_Wagner	10858	250 YR	2090.00	294.70	303.02		303.07	0.00	3.06	1671.37	663.48	0.22
South_Wagner	10858	500 YR	2410.00	294.70	303.24		303.30	0.00	3.21	1823.64	678.66	0.23
South_Wagner	10955	2 YR	580.00	294.50	300.43		300.48	0.00	2.55	615.09	336.60	0.21
South_Wagner	10955	5 YR	840.00	294.50	301.14		301.19	0.00	2.71	891.74	456.85	0.20
South_Wagner	10955	10 YR	1010.00	294.50	301.61		301.66	0.00	2.67	1123.28	523.76	0.19
South_Wagner	10955	25 YR	1260.00	294.50	302.21		302.25	0.00	2.63	1449.75	568.51	0.18
South_Wagner	10955	50 YR	1470.00	294.50	302.48		302.53	0.00	2.78	1610.11	589.09	0.19
South_Wagner	10955	100 YR	1690.00	294.50	302.76		302.80	0.00	2.92	1773.31	616.42	0.19
South_Wagner	10955	250 YR	2050.00	294.50	303.10		303.15	0.00	3.16	1985.46	631.02	0.20
South_Wagner	10955	500 YR	2340.00	294.50	303.33		303.38	0.00	3.35	2132.59	641.90	0.21
South_Wagner	10978	2 YR	580.00	294.40	300.38	297.53	300.60	0.00	3.80	152.73	223.81	0.32
South_Wagner	10978	5 YR	840.00	294.40	301.15	298.26	301.23	0.00	2.83	644.49	343.47	0.22
South_Wagner	10978	10 YR	1010.00	294.40	301.62	298.68	301.69	0.00	2.86	821.95	422.39	0.2
South_Wagner	10978	25 YR	1260.00	294.40	302.21	299.25	302.28	0.00	2.88	1104.91	522.78	0.21
South_Wagner	10978	50 YR	1470.00	294.40	302.49	299.70	302.56	0.00	3.05	1255.61	567.56	0.21
South_Wagner	10978	100 YR	1690.00	294.40	302.76	300.13	302.84	0.00	3.18	1414.03	585.98	0.22
South_Wagner	10978	250 YR	2050.00	294.40	303.10	300.51	303.19	0.00	3.43	1616.55	602.60	0.23
South_Wagner	10978	500 YR	2340.00	294.40	303.33	300.51	303.43	0.00	3.63	1757.61	613.91	0.24
South_Wagner	10987 Abandoned Rd.		Bridge									

HEC-RAS Plan: S_Wagner_Exist River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South_Wagner	11028 M	2 YR	580.00	294.40	300.69	297.53	300.89	0.00	3.54	163.68	138.39	0.29
South_Wagner	11028 M	5 YR	840.00	294.40	301.76	298.26	301.93	0.00	3.53	428.44	302.36	0.26
South_Wagner	11028 M	10 YR	1010.00	294.40	302.05	298.68	302.23	0.00	3.81	532.45	414.11	0.28
South_Wagner	11028 M	25 YR	1260.00	294.40	302.33	299.26	302.55	0.00	4.28	659.03	479.24	0.30
South_Wagner	11028 M	50 YR	1470.00	294.40	302.47	299.69	302.73	0.00	4.71	728.10	497.75	0.33
South_Wagner	11028 M	100 YR	1690.00	294.40	302.62	300.13	302.91	0.00	5.08	805.62	517.74	0.35
South_Wagner	11028 M	250 YR	2050.00	294.40	302.92	301.43	303.23	0.00	5.47	963.59	549.13	0.37
South_Wagner	11028 M	500 YR	2340.00	294.40	303.15	302.02	303.46	0.00	5.71	1090.91	578.01	0.38
South_Wagner	11075	2 YR	580.00	294.56	300.93		300.97	0.00	1.66	566.80	312.70	0.14
South_Wagner	11075	5 YR	840.00	294.56	301.96		301.99	0.00	1.72	947.06	460.23	0.13
South_Wagner	11075	10 YR	1010.00	294.56	302.26		302.30	0.00	1.89	1093.40	496.89	0.14
South_Wagner	11075	25 YR	1260.00	294.56	302.58		302.63	0.00	2.14	1258.58	534.00	0.16
South_Wagner	11075	50 YR	1470.00	294.56	302.76		302.82	0.00	2.35	1357.20	547.43	0.17
South_Wagner	11075	100 YR	1690.00	294.56	302.95		303.02	0.00	2.55	1460.01	560.36	0.18
South_Wagner	11075	250 YR	2050.00	294.56	303.27		303.35	0.00	2.83	1642.02	588.98	0.19
South_Wagner	11075	500 YR	2340.00	294.56	303.50		303.59	0.00	3.02	1780.38	608.00	0.20
South_Wagner	11352	2 YR	580.00	294.60	301.05		301.10	0.00	1.71	439.21	247.15	0.17
South_Wagner	11352	5 YR	840.00	294.60	302.05		302.09	0.00	1.72	747.13	398.79	0.15
South_Wagner	11352	10 YR	1010.00	294.60	302.37		302.41	0.00	1.85	879.92	448.00	0.16
South_Wagner	11352	25 YR	1260.00	294.60	302.70		302.76	0.00	2.11	1038.28	484.62	0.17
South_Wagner	11352	50 YR	1470.00	294.60	302.90		302.97	0.00	2.30	1136.44	496.67	0.18
South_Wagner	11352	100 YR	1690.00	294.60	303.11		303.18	0.00	2.49	1240.02	531.85	0.19
South_Wagner	11352	250 YR	2050.00	294.60	303.44		303.53	0.00	2.73	1428.70	581.10	0.21
South_Wagner	11352	500 YR	2340.00	294.60	303.69		303.78	0.00	2.90	1574.09	597.44	0.21
South_Wagner	11634	2 YR	580.00	296.10	301.28	301.21	301.59	0.01	5.41	252.24	321.42	0.62
South_Wagner	11634	5 YR	840.00	296.10	302.25		302.33	0.00	3.44	607.14	446.76	0.33
South_Wagner	11634	10 YR	1010.00	296.10	302.57		302.64	0.00	3.36	767.34	545.57	0.31
South_Wagner	11634	25 YR	1260.00	296.10	302.94		303.01	0.00	3.50	984.05	615.37	0.31
South_Wagner	11634	50 YR	1470.00	296.10	303.16		303.24	0.00	3.60	1132.21	676.09	0.31
South_Wagner	11634	100 YR	1690.00	296.10	303.39		303.46	0.00	3.60	1288.45	692.64	0.30
South_Wagner	11634	250 YR	2050.00	296.10	303.76		303.82	0.00	3.58	1550.13	742.83	0.29
South_Wagner	11634	500 YR	2340.00	296.10	304.02		304.08	0.00	3.57	1746.32	761.49	0.28
South_Wagner	11711 N	2 YR	580.00	296.80	301.78	298.97	301.88	0.00	2.66	327.37	356.48	0.26
South_Wagner	11711 N	5 YR	840.00	296.80	302.38	299.55	302.48	0.00	2.81	610.98	542.17	0.25
South_Wagner	11711 N	10 YR	1010.00	296.80	302.69	299.89	302.78	0.00	2.85	791.92	617.59	0.24
South_Wagner	11711 N	25 YR	1260.00	296.80	303.06	300.35	303.14	0.00	2.93	1024.18	673.05	0.24
South_Wagner	11711 N	50 YR	1470.00	296.80	303.28	301.15	303.37	0.00	3.08	1181.34	704.99	0.25
South_Wagner	11711 N	100 YR	1690.00	296.80	303.51	301.72	303.60	0.00	3.17	1339.74	713.79	0.25
South_Wagner	11711 N	250 YR	2050.00	296.80	303.86	302.13	303.95	0.00	3.26	1595.91	727.41	0.25
South_Wagner	11711 N	500 YR	2340.00	296.80	304.12	302.42	304.21	0.00	3.36	1785.75	762.89	0.25
South_Wagner	11721 Waco St.		Culvert									
South_Wagner	11803	2 YR	580.00	296.44	302.40	299.20	302.47	0.00	2.20	353.60	405.99	0.19
South_Wagner	11803	5 YR	840.00	296.44	302.68	299.75	302.79	0.00	2.73	519.13	512.46	0.23
South_Wagner	11803	10 YR	1010.00	296.44	302.84	300.06	302.96	0.00	3.04	599.44	545.59	0.25
South_Wagner	11803	25 YR	1260.00	296.44	303.05	300.48	303.19	0.00	3.39	720.67	589.46	0.28
South_Wagner	11803	50 YR	1470.00	296.44	303.27	300.80	303.41	0.00	3.54	857.93	657.02	0.28
South_Wagner	11803	100 YR	1690.00	296.44	303.49	301.11	303.63	0.00	3.65	1004.77	684.45	0.28
South_Wagner	11803	250 YR	2050.00	296.44	303.87	301.68	303.99	0.00	3.63	1269.78	717.55	0.27
South_Wagner	11803	500 YR	2340.00	296.44	304.11	302.68	304.23	0.00	3.66	1448.78	732.66	0.27
South_Wagner	11897 O	2 YR	580.00	297.00	302.47		302.63	0.00	3.19	225.23	242.65	0.34
South_Wagner	11897 O	5 YR	840.00	297.00	302.78		303.01	0.00	3.94	316.32	340.00	0.40
South_Wagner	11897 O	10 YR	1010.00	297.00	302.95		303.21	0.00	4.31	378.12	376.10	0.43
South_Wagner	11897 O	25 YR	1260.00	297.00	303.19		303.48	0.00	4.70	478.54	459.08	0.45
South_Wagner	11897 O	50 YR	1470.00	297.00	303.42		303.69	0.00	4.78	585.99	501.22	0.45
South_Wagner	11897 O	100 YR	1690.00	297.00	303.64		303.90	0.00	4.83	703.48	557.25	0.44
South_Wagner	11897 O	250 YR	2050.00	297.00	303.99		304.25	0.00	4.89	930.62	694.79	0.42
South_Wagner	11897 O	500 YR	2340.00	297.00	304.24		304.47	0.00	4.84	1105.24	729.76	0.41
South_Wagner	12213	2 YR	580.00	297.50	303.37		303.66	0.00	4.32	135.04	60.22	0.44
South_Wagner	12213	5 YR	840.00	297.50	303.93		304.32	0.00	5.11	186.67	118.97	0.49
South_Wagner	12213	10 YR	1010.00	297.50	304.21		304.66	0.01	5.51	223.19	151.43	0.51
South_Wagner	12213	25 YR	1260.00	297.50	304.54	303.29	305.06	0.01	6.04	296.53	281.30	0.54
South_Wagner	12213	50 YR	1470.00	297.50	304.73	303.97	305.29	0.01	6.42	355.10	348.64	0.56
South_Wagner	12213	100 YR	1690.00	297.50	304.90	304.41	305.49	0.01	6.76	415.82	367.86	0.58
South_Wagner	12213	250 YR	2050.00	297.50	305.17	304.97	305.79	0.01	7.15	521.80	417.16	0.59
South_Wagner	12213	500 YR	2340.00	297.50	305.31	305.19	305.98	0.01	7.57	585.19	438.94	0.62
South_Wagner	12385	2 YR	580.00	298.00	304.07	302.22	304.32	0.00	3.99	147.10	67.35	0.40
South_Wagner	12385	5 YR	840.00	298.00	304.74	302.90	305.06	0.00	4.58	208.79	109.43	0.42
South_Wagner	12385	10 YR	1010.00	298.00	305.07	303.27	305.42	0.00	4.93	248.59	140.05	0.44
South_Wagner	12385	25 YR	1260.00	298.00	305.46	303.76	305.87	0.00	5.39	313.47	199.41	0.46
South_Wagner	12385	50 YR	1470.00	298.00	305.69	304.27	306.15	0.00	5.77	364.63	228.37	0.47
South_Wagner	12385	100 YR	1690.00	298.00	305.90	304.71	306.41	0.00	6.16	415.63	265.48	0.50
South_Wagner	12385	250 YR	2050.00	298.00	306.18	305.20	306.76	0.01	6.76	493.95	329.60	0.53
South_Wagner	12385	500 YR	2340.00	298.00	306.39	305.61	307.02	0.01	7.11	561.34	416.52	0.54
South_Wagner	12537	2 YR	580.00	298.60	304.58		304.76	0.00	3.40	179.59	78.36	0.34
South_Wagner	12537	5 YR	840.00	298.60	305.28		305.51	0.00	3.95	247.40	124.46	0.36
South_Wagner	12537	10 YR	1010.00	298.60	305.62		305.90	0.00	4.29	303.83	213.04	0.37
South_Wagner	12537	25 YR	1260.00	298.60	306.06		306.36	0.00	4.60	405.73	264.66	0.38

HEC-RAS Plan: S_Wagner_Exist River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South_Wagner	12537	50 YR	1470.00	298.60	306.35		306.67	0.00	4.85	488.45	319.04	0.39
South_Wagner	12537	100 YR	1690.00	298.60	306.61		306.95	0.00	5.07	586.38	413.01	0.39
South_Wagner	12537	250 YR	2050.00	298.60	306.98		307.35	0.00	5.44	761.93	532.88	0.41
South_Wagner	12537	500 YR	2340.00	298.60	307.24		307.62	0.00	5.64	916.97	655.98	0.4
South_Wagner	12576	2 YR	580.00	298.80	304.73	301.41	304.84	0.00	2.62	233.56	76.06	0.22
South_Wagner	12576	5 YR	840.00	298.80	305.45	302.12	305.60	0.00	3.19	302.70	144.55	0.25
South_Wagner	12576	10 YR	1010.00	298.80	305.81	302.50	305.99	0.00	3.52	362.01	199.08	0.27
South_Wagner	12576	25 YR	1260.00	298.80	306.23	303.00	306.46	0.00	3.93	473.44	312.77	0.29
South_Wagner	12576	50 YR	1470.00	298.80	306.52	303.37	306.77	0.00	4.22	571.40	379.61	0.30
South_Wagner	12576	100 YR	1690.00	298.80	306.79	303.66	307.05	0.00	4.44	684.77	450.60	0.31
South_Wagner	12576	250 YR	2050.00	298.80	307.18	304.17	307.46	0.00	4.73	888.68	578.38	0.32
South_Wagner	12576	500 YR	2340.00	298.80	307.44	304.55	307.73	0.00	4.96	1052.39	693.90	0.33
South_Wagner	12590 Private Dr.		Culvert									
South_Wagner	12622	2 YR	580.00	299.40	305.90	302.02	305.96	0.00	2.14	389.45	171.06	0.17
South_Wagner	12622	5 YR	840.00	299.40	306.34	302.60	306.45	0.00	2.76	479.01	241.09	0.20
South_Wagner	12622	10 YR	1010.00	299.40	306.56	302.96	306.69	0.00	3.13	533.81	277.00	0.23
South_Wagner	12622	25 YR	1260.00	299.40	306.83	303.42	307.00	0.00	3.63	620.88	376.82	0.26
South_Wagner	12622	50 YR	1470.00	299.40	307.00	303.79	307.20	0.00	4.03	686.68	423.93	0.28
South_Wagner	12622	100 YR	1690.00	299.40	307.16	304.14	307.39	0.00	4.40	756.11	457.06	0.30
South_Wagner	12622	250 YR	2050.00	299.40	307.34	305.28	307.64	0.00	5.02	843.04	499.18	0.34
South_Wagner	12622	500 YR	2340.00	299.40	307.46	305.07	307.82	0.00	5.51	906.96	529.01	0.37
South_Wagner	12641	2 YR	580.00	300.24	305.90		305.97	0.00	2.30	368.72	164.24	0.19
South_Wagner	12641	5 YR	840.00	300.24	306.35		306.47	0.00	2.92	453.80	210.87	0.23
South_Wagner	12641	10 YR	1010.00	300.24	306.57		306.71	0.00	3.30	507.79	282.40	0.25
South_Wagner	12641	25 YR	1260.00	300.24	306.85		307.03	0.00	3.77	600.54	388.24	0.28
South_Wagner	12641	50 YR	1470.00	300.24	307.02		307.23	0.00	4.15	670.27	445.44	0.30
South_Wagner	12641	100 YR	1690.00	300.24	307.18		307.42	0.00	4.51	746.43	487.50	0.32
South_Wagner	12641	250 YR	2050.00	300.24	307.36		307.69	0.00	5.26	836.86	518.68	0.37
South_Wagner	12641	500 YR	2340.00	300.24	307.50		307.87	0.00	5.70	907.40	532.87	0.40
South_Wagner	12673 P	2 YR	310.00	300.33	305.98	302.02	306.00	0.00	1.25	249.00	264.06	0.10
South_Wagner	12673 P	5 YR	420.00	300.33	306.50	302.29	306.50	0.00	0.69	753.94	379.90	0.06
South_Wagner	12673 P	10 YR	490.00	300.33	306.75	302.45	306.76	0.00	0.75	861.45	461.43	0.06
South_Wagner	12673 P	25 YR	610.00	300.33	307.08	302.72	307.09	0.00	0.84	1025.70	558.28	0.06
South_Wagner	12673 P	50 YR	750.00	300.33	307.29	302.99	307.30	0.00	0.96	1150.32	643.60	0.07
South_Wagner	12673 P	100 YR	890.00	300.33	307.49	303.24	307.51	0.00	1.06	1279.86	706.88	0.08
South_Wagner	12673 P	250 YR	1060.00	300.33	307.78	303.53	307.79	0.00	1.14	1476.87	829.49	0.08
South_Wagner	12673 P	500 YR	1220.00	300.33	307.97	303.79	307.99	0.00	1.23	1616.98	878.62	0.09
South_Wagner	12692 US Highway 67		Culvert									
South_Wagner	12842 Q	2 YR	310.00	300.90	306.99	303.12	307.02	0.00	1.39	224.49	356.99	0.12
South_Wagner	12842 Q	5 YR	420.00	300.90	307.84	303.52	307.85	0.00	1.05	731.42	768.87	0.08
South_Wagner	12842 Q	10 YR	490.00	300.90	307.98	303.75	307.99	0.00	1.12	816.99	820.21	0.09
South_Wagner	12842 Q	25 YR	610.00	300.90	308.12	304.09	308.14	0.00	1.31	903.77	873.97	0.10
South_Wagner	12842 Q	50 YR	750.00	300.90	308.23	304.43	308.26	0.00	1.50	974.44	907.54	0.11
South_Wagner	12842 Q	100 YR	890.00	300.90	308.37	304.74	308.39	0.00	1.64	1057.63	924.81	0.12
South_Wagner	12842 Q	250 YR	1060.00	300.90	308.46	305.07	308.49	0.00	1.85	1113.53	930.99	0.14
South_Wagner	12842 Q	500 YR	1220.00	300.90	308.61	305.36	308.64	0.00	1.95	1211.04	947.69	0.14
South_Wagner	12944	2 YR	310.00	302.69	307.03		307.09	0.00	1.86	166.92	88.59	0.24
South_Wagner	12944	5 YR	420.00	302.69	307.85		307.89	0.00	1.65	298.06	251.51	0.18
South_Wagner	12944	10 YR	490.00	302.69	307.99		308.04	0.00	1.78	335.07	272.25	0.19
South_Wagner	12944	25 YR	610.00	302.69	308.13		308.19	0.00	2.06	375.43	289.53	0.21
South_Wagner	12944	50 YR	750.00	302.69	308.25		308.33	0.00	2.38	409.62	299.00	0.24
South_Wagner	12944	100 YR	890.00	302.69	308.38		308.48	0.00	2.62	450.36	311.98	0.26
South_Wagner	12944	250 YR	1060.00	302.69	308.48		308.59	0.00	2.97	479.52	321.67	0.29
South_Wagner	12944	500 YR	1220.00	302.69	308.63		308.76	0.00	3.15	529.86	334.89	0.30
South_Wagner	13029 R	2 YR	310.00	304.39	307.17		307.22	0.00	1.84	174.24	195.37	0.27
South_Wagner	13029 R	5 YR	420.00	304.39	307.92		307.95	0.00	1.42	387.58	346.33	0.17
South_Wagner	13029 R	10 YR	490.00	304.39	308.07		308.10	0.00	1.49	439.55	353.66	0.17
South_Wagner	13029 R	25 YR	610.00	304.39	308.23		308.27	0.00	1.68	499.32	378.47	0.19
South_Wagner	13029 R	50 YR	750.00	304.39	308.38		308.42	0.00	1.88	554.42	396.72	0.20
South_Wagner	13029 R	100 YR	890.00	304.39	308.53		308.58	0.00	2.03	617.15	427.41	0.21
South_Wagner	13029 R	250 YR	1060.00	304.39	308.65		308.72	0.00	2.26	672.00	442.76	0.23
South_Wagner	13029 R	500 YR	1220.00	304.39	308.82		308.89	0.00	2.40	746.17	455.98	0.24

HEC-RAS Plan: WC1_Existing River: Stream_WC1 Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1608	2 YR	350.00	301.52	305.80	305.01	306.00	0.01	4.11	115.21	82.32	0.41
1	1608	5 YR	570.00	301.52	306.41	305.71	306.64	0.01	4.63	168.47	94.60	0.42
1	1608	10 YR	710.00	301.52	306.71	305.92	306.96	0.01	4.88	200.52	118.09	0.43
1	1608	25 YR	960.00	301.52	307.13	306.14	307.38	0.01	5.22	276.22	238.24	0.44
1	1608	50 YR	1220.00	301.52	307.44	306.59	307.69	0.01	5.46	361.49	330.56	0.44
1	1608	100 YR	1500.00	301.52	307.84	307.07	308.08	0.01	5.76	499.19	399.00	0.45
1	1608	250 YR	1930.00	301.52	308.10	307.42	308.35	0.01	5.95	596.99	403.95	0.45
1	1608	500 YR	2200.00	301.52	308.24	307.55	308.49	0.00	6.05	677.61	406.54	0.45
1	1794	2 YR	350.00	301.60	306.41	304.94	306.49	0.00	2.71	169.71	77.53	0.24
1	1794	5 YR	570.00	301.60	307.08	305.40	307.20	0.00	3.32	224.51	85.99	0.27
1	1794	10 YR	710.00	301.60	307.41	305.65	307.55	0.00	3.65	254.00	90.35	0.28
1	1794	25 YR	960.00	301.60	307.87	306.03	308.05	0.00	4.28	301.16	154.03	0.32
1	1794	50 YR	1220.00	301.60	308.20	306.36	308.43	0.00	4.89	345.90	252.71	0.35
1	1794	100 YR	1500.00	301.60	308.64	306.69	308.91	0.00	5.62	414.19	310.86	0.39
1	1794	250 YR	1930.00	301.60	308.94	307.14	309.28	0.00	6.33	463.09	317.57	0.43
1	1794	500 YR	2200.00	301.60	309.11	307.40	309.38	0.00	6.31	650.00	320.69	0.43
1	1953	2 YR	350.00	301.03	306.64	304.49	306.73	0.00	2.81	165.46	83.66	0.24
1	1953	5 YR	570.00	301.03	307.35	305.75	307.48	0.00	3.34	225.20	94.93	0.26
1	1953	10 YR	710.00	301.03	307.71	306.02	307.86	0.00	3.62	256.76	101.62	0.27
1	1953	25 YR	960.00	301.03	308.23	306.42	308.40	0.00	4.06	302.83	111.63	0.29
1	1953	50 YR	1220.00	301.03	308.62	306.75	308.85	0.00	4.52	338.41	178.52	0.32
1	1953	100 YR	1500.00	301.03	309.11	307.08	309.36	0.00	4.82	381.89	272.96	0.33
1	1953	250 YR	1930.00	301.03	309.51	307.50	309.86	0.00	5.78	428.23	301.88	0.38
1	1953	500 YR	2200.00	301.03	309.65	307.73	309.94	0.00	5.79	645.18	317.73	0.38
1	2010 University Ave.		Culvert									
1	2057 A	2 YR	350.00	301.73	306.46	305.51	307.08	0.01	6.29	57.07	34.57	0.64
1	2057 A	5 YR	570.00	301.73	307.23	307.23	307.89	0.01	7.01	107.25	84.82	0.63
1	2057 A	10 YR	710.00	301.73	307.74	307.49	308.24	0.01	6.45	152.10	90.79	0.55
1	2057 A	25 YR	960.00	301.73	308.52	307.85	308.89	0.01	5.89	225.69	99.81	0.46
1	2057 A	50 YR	1220.00	301.73	309.10	308.16	309.45	0.00	5.78	285.92	106.70	0.43
1	2057 A	100 YR	1500.00	301.73	309.78	308.45	310.09	0.00	5.51	355.02	114.54	0.38
1	2057 A	250 YR	1930.00	301.73	310.78	308.87	311.08	0.00	5.58	471.70	161.60	0.36
1	2057 A	500 YR	2200.00	301.73	311.06	309.08	311.43	0.00	6.51	543.18	208.21	0.42
1	2179	2 YR	350.00	303.57	308.04		308.46	0.01	5.69	78.56	59.46	0.56
1	2179	5 YR	570.00	303.57	308.73		309.18	0.01	6.19	123.33	70.47	0.56
1	2179	10 YR	710.00	303.57	308.86		309.46	0.01	7.19	133.11	73.02	0.63
1	2179	25 YR	960.00	303.57	309.31		309.98	0.01	7.84	167.68	81.38	0.65
1	2179	50 YR	1220.00	303.57	309.76		310.46	0.01	8.21	206.11	90.47	0.65
1	2179	100 YR	1500.00	303.57	310.28		310.96	0.01	8.30	256.39	103.94	0.63
1	2179	250 YR	1930.00	303.57	311.20		311.84	0.01	8.65	390.32	207.07	0.61
1	2179	500 YR	2200.00	303.57	311.61		312.15	0.01	8.24	484.76	255.58	0.56
1	2735	2 YR	350.00	306.63	310.99		311.13	0.00	3.56	137.41	89.73	0.34
1	2735	5 YR	570.00	306.63	311.62	310.67	311.79	0.00	4.07	202.71	129.61	0.36
1	2735	10 YR	710.00	306.63	312.00		312.17	0.00	4.15	266.64	187.85	0.35
1	2735	25 YR	960.00	306.63	312.52		312.69	0.00	4.43	375.48	233.43	0.35
1	2735	50 YR	1220.00	306.63	312.92		313.09	0.00	4.62	475.88	265.53	0.35
1	2735	100 YR	1500.00	306.63	313.29		313.46	0.00	4.78	577.74	287.76	0.35
1	2735	250 YR	1930.00	306.63	313.87		314.03	0.00	4.78	754.45	325.03	0.34
1	2735	500 YR	2200.00	306.63	314.07		314.24	0.00	4.97	821.77	333.94	0.34
1	3017	2 YR	270.00	309.72	313.57	313.57	314.01	0.02	5.86	66.24	83.54	0.66
1	3017	5 YR	450.00	309.72	313.91	313.91	314.50	0.02	7.26	98.77	109.14	0.76
1	3017	10 YR	590.00	309.72	314.29	314.29	314.74	0.02	6.85	151.89	155.66	0.68
1	3017	25 YR	890.00	309.72	314.67	314.67	315.15	0.02	7.54	221.56	205.16	0.70
1	3017	50 YR	1120.00	309.72	314.87	314.87	315.36	0.02	7.91	262.31	211.90	0.72
1	3017	100 YR	1380.00	309.72	314.99	314.99	315.57	0.02	8.77	288.63	216.12	0.78
1	3017	250 YR	1750.00	309.72	315.19	315.19	315.85	0.02	9.48	333.14	223.08	0.83
1	3017	500 YR	2000.00	309.72	315.32	315.32	316.03	0.03	9.88	363.03	230.45	0.85
1	3117 B	2 YR	270.00	308.29	314.28	311.75	314.31	0.00	1.59	221.98	164.14	0.13
1	3117 B	5 YR	450.00	308.29	314.87	312.33	314.92	0.00	2.12	270.66	355.90	0.17
1	3117 B	10 YR	590.00	308.29	315.10	312.59	315.17	0.00	2.59	289.25	390.76	0.20
1	3117 B	25 YR	890.00	308.29	315.57	313.04	315.70	0.00	3.39	327.62	423.49	0.25
1	3117 B	50 YR	1120.00	308.29	315.82	313.37	316.00	0.00	3.99	348.20	441.45	0.29
1	3117 B	100 YR	1380.00	308.29	316.11	313.70	316.34	0.00	4.56	371.98	468.95	0.32
1	3117 B	250 YR	1750.00	308.29	316.31	314.27	316.37	0.00	2.97	997.58	476.19	0.21
1	3117 B	500 YR	2000.00	308.29	316.51	314.49	316.58	0.00	3.09	1078.91	484.48	0.21
1	3175 Gibson Ln.		Culvert									
1	3216 C	2 YR	270.00	312.28	314.96	314.07	315.04	0.00	2.57	124.06	91.34	0.30
1	3216 C	5 YR	450.00	312.28	315.59	314.39	315.71	0.00	3.02	169.54	135.18	0.31
1	3216 C	10 YR	590.00	312.28	316.03	314.61	316.17	0.00	3.29	200.70	150.86	0.31
1	3216 C	25 YR	890.00	312.28	316.85	314.99	317.04	0.00	3.74	260.09	197.76	0.32
1	3216 C	50 YR	1120.00	312.28	317.42	315.27	317.64	0.00	4.02	301.11	221.26	0.32
1	3216 C	100 YR	1380.00	312.28	318.32	315.55	318.54	0.00	4.01	365.92	357.34	0.30
1	3216 C	250 YR	1750.00	312.28	318.97	315.92	319.05	0.00	2.87	950.22	560.47	0.20
1	3216 C	500 YR	2000.00	312.28	319.31	316.17	319.39	0.00	3.00	1122.81	590.79	0.20

HEC-RAS Plan: WC1_Existing River: Stream_WC1 Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	3310	2 YR	270.00	312.08	315.19	314.21	315.26	0.00	2.41	160.35	170.38	0.27
1	3310	5 YR	450.00	312.08	315.84	314.65	315.90	0.00	2.38	269.30	208.60	0.2
1	3310	10 YR	590.00	312.08	316.29	315.06	316.35	0.00	2.37	350.67	233.39	0.2
1	3310	25 YR	890.00	312.08	317.15	315.35	317.21	0.00	2.37	530.77	302.85	0.20
1	3310	50 YR	1120.00	312.08	317.75	315.53	317.80	0.00	2.38	672.02	345.63	0.19
1	3310	100 YR	1380.00	312.08	318.63	315.72	318.68	0.00	2.22	892.96	383.17	0.16
1	3310	250 YR	1750.00	312.08	319.09	315.95	319.12	0.00	2.13	1314.10	402.41	0.15
1	3310	500 YR	2000.00	312.08	319.43	316.09	319.46	0.00	2.19	1449.26	415.72	0.15
1	3854 D	2 YR	220.00	315.64	317.52		317.67	0.02	4.62	96.60	129.98	0.63
1	3854 D	5 YR	370.00	315.64	317.65		317.94	0.05	6.63	113.95	139.82	0.87
1	3854 D	10 YR	530.00	315.64	317.88		318.21	0.05	7.23	146.86	149.33	0.89
1	3854 D	25 YR	800.00	315.64	318.32		318.65	0.04	7.58	217.56	183.36	0.85
1	3854 D	50 YR	1010.00	315.64	318.73		318.99	0.03	6.94	301.18	213.07	0.72
1	3854 D	100 YR	1230.00	315.64	319.30		319.47	0.01	5.68	426.44	226.68	0.54
1	3854 D	250 YR	1550.00	315.64	319.61		319.80	0.01	5.97	498.80	230.82	0.54
1	3854 D	500 YR	1780.00	315.64	319.94		320.13	0.01	5.83	575.50	236.50	0.51
1	4351	2 YR	220.00	317.25	320.40		320.42	0.00	1.79	266.20	270.78	0.20
1	4351	5 YR	370.00	317.25	320.87	319.77	320.89	0.00	1.94	403.52	315.76	0.20
1	4351	10 YR	530.00	317.25	321.23	319.94	321.25	0.00	2.13	523.04	360.04	0.21
1	4351	25 YR	800.00	317.25	321.69	320.16	321.71	0.00	2.39	705.47	423.80	0.22
1	4351	50 YR	1010.00	317.25	321.94		321.97	0.00	2.58	814.64	446.96	0.23
1	4351	100 YR	1230.00	317.25	322.15		322.18	0.00	2.83	911.86	482.38	0.24
1	4351	250 YR	1550.00	317.25	322.50		322.53	0.00	3.01	1089.07	533.17	0.25
1	4351	500 YR	1780.00	317.25	322.70		322.74	0.00	3.11	1198.87	559.76	0.25
1	4890 E	2 YR	170.00	319.25	322.33	321.91	322.41	0.01	3.00	93.27	93.22	0.39
1	4890 E	5 YR	340.00	319.25	322.86	322.26	322.97	0.01	3.69	152.04	134.83	0.44
1	4890 E	10 YR	500.00	319.25	323.25	322.50	323.37	0.01	4.03	216.91	191.21	0.44
1	4890 E	25 YR	730.00	319.25	323.69	322.81	323.82	0.01	4.27	313.03	274.25	0.43
1	4890 E	50 YR	910.00	319.25	323.99	323.07	324.11	0.01	4.37	386.58	338.32	0.42
1	4890 E	100 YR	1080.00	319.25	324.30	323.25	324.42	0.01	4.43	473.87	439.27	0.41
1	4890 E	250 YR	1350.00	319.25	324.62	323.49	324.74	0.01	4.55	581.96	500.12	0.40
1	4890 E	500 YR	1530.00	319.25	324.82	323.62	324.94	0.01	4.72	653.38	526.41	0.41
1	5383	2 YR	170.00	323.05	324.14		324.15	0.00	0.67	220.64	228.84	0.16
1	5383	5 YR	340.00	323.05	324.69		324.71	0.00	0.85	358.41	267.22	0.17
1	5383	10 YR	500.00	323.05	325.12		325.13	0.00	0.98	484.45	326.80	0.18
1	5383	25 YR	730.00	323.05	325.52		325.54	0.00	1.11	618.33	346.86	0.1
1	5383	50 YR	910.00	323.05	325.78		325.80	0.00	1.25	710.99	359.59	0.19
1	5383	100 YR	1080.00	323.05	326.02		326.05	0.00	1.39	800.32	373.09	0.20
1	5383	250 YR	1350.00	323.05	326.35		326.38	0.00	1.61	925.67	397.78	0.21
1	5383	500 YR	1530.00	323.05	326.55		326.59	0.00	1.72	1007.73	408.24	0.21
1	5493 F	2 YR	170.00	321.44	324.56	323.71	324.74	0.01	3.43	51.45	248.20	0.43
1	5493 F	5 YR	340.00	321.44	325.07	324.41	325.50	0.02	5.36	67.50	296.32	0.60
1	5493 F	10 YR	500.00	321.44	325.43	324.96	325.46	0.00	2.39	421.60	349.01	0.25
1	5493 F	25 YR	730.00	321.44	325.82	325.25	325.86	0.00	2.53	563.81	376.96	0.25
1	5493 F	50 YR	910.00	321.44	326.09	325.25	326.13	0.00	2.70	673.66	434.14	0.25
1	5493 F	100 YR	1080.00	321.44	326.33	325.26	326.38	0.00	2.80	782.63	464.93	0.25
1	5493 F	250 YR	1350.00	321.44	326.65	325.26	326.70	0.00	2.85	933.39	472.78	0.25
1	5493 F	500 YR	1530.00	321.44	326.85	325.29	326.90	0.00	2.88	1027.67	477.73	0.25
1	5540 Jonathan St.		Culvert									
1	5571 G	2 YR	170.00	323.37	327.55	325.48	327.55	0.00	0.27	1022.01	479.45	0.03
1	5571 G	5 YR	340.00	323.37	328.00	326.26	328.00	0.00	0.46	1199.05	514.00	0.04
1	5571 G	10 YR	500.00	323.37	328.17	326.83	328.18	0.00	0.63	1268.18	517.61	0.05
1	5571 G	25 YR	730.00	323.37	328.38	327.36	328.39	0.00	0.86	1352.02	523.37	0.07
1	5571 G	50 YR	910.00	323.37	328.50	327.36	328.51	0.00	0.99	1545.83	527.75	0.08
1	5571 G	100 YR	1080.00	323.37	328.65	327.36	328.66	0.00	1.12	1626.37	548.19	0.09
1	5571 G	250 YR	1350.00	323.37	328.83	327.36	328.84	0.00	1.32	1723.37	566.50	0.10
1	5571 G	500 YR	1530.00	323.37	328.98	327.37	328.99	0.00	1.43	1809.55	577.03	0.11
1	5641	2 YR	170.00	322.39	327.56	324.07	327.56	0.00	0.28	1166.06	457.77	0.02
1	5641	5 YR	340.00	322.39	328.01	324.51	328.01	0.00	0.47	1354.66	474.35	0.04
1	5641	10 YR	500.00	322.39	328.18	324.81	328.19	0.00	0.65	1429.57	479.75	0.05
1	5641	25 YR	730.00	322.39	328.40	325.17	328.40	0.00	0.88	1521.34	519.48	0.07
1	5641	50 YR	910.00	322.39	328.52	325.47	328.53	0.00	1.03	1693.56	524.79	0.08
1	5641	100 YR	1080.00	322.39	328.68	325.84	328.69	0.00	1.16	1775.49	533.34	0.08
1	5641	250 YR	1350.00	322.39	328.86	326.04	328.87	0.00	1.37	1874.06	553.59	0.10
1	5641	500 YR	1530.00	322.39	329.02	326.16	329.03	0.00	1.49	1960.52	563.04	0.11
1	5956	2 YR	170.00	324.66	327.57		327.57	0.00	0.55	565.01	313.58	0.06
1	5956	5 YR	340.00	324.66	328.04		328.04	0.00	0.87	722.03	347.66	0.09
1	5956	10 YR	500.00	324.66	328.24		328.25	0.00	1.16	792.96	356.18	0.1
1	5956	25 YR	730.00	324.66	328.49		328.51	0.00	1.51	884.00	362.63	0.14
1	5956	50 YR	910.00	324.66	328.65		328.67	0.00	1.77	940.19	367.86	0.16
1	5956	100 YR	1080.00	324.66	328.83		328.85	0.00	1.97	1006.89	373.97	0.18
1	5956	250 YR	1350.00	324.66	329.05		329.08	0.00	2.27	1092.39	381.68	0.20
1	5956	500 YR	1530.00	324.66	329.23		329.26	0.00	2.42	1160.51	387.50	0.21

HEC-RAS Plan: WC1_Existing River: Stream_WC1 Reach 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	6355 H	2 YR	220.00	327.58	328.69	328.69	328.94	0.04	4.92	67.23	130.83	0.87
1	6355 H	5 YR	320.00	327.58	328.89	328.89	329.15	0.04	5.26	95.40	149.14	0.85
1	6355 H	10 YR	430.00	327.58	328.99	328.99	329.33	0.04	6.03	111.03	152.66	0.94
1	6355 H	25 YR	580.00	327.58	329.15	329.15	329.54	0.04	6.64	134.95	158.47	0.97
1	6355 H	50 YR	670.00	327.58	329.23	329.23	329.66	0.04	6.96	148.08	161.48	0.99
1	6355 H	100 YR	780.00	327.58	329.53		329.84	0.03	5.96	199.11	172.21	0.78
1	6355 H	250 YR	940.00	327.58	329.90		330.14	0.02	5.40	263.85	185.63	0.64
1	6355 H	500 YR	1070.00	327.58	330.12		330.35	0.01	5.31	306.22	195.00	0.60
1	6661	2 YR	220.00	327.83	331.43	330.90	331.49	0.00	2.69	188.15	303.89	0.29
1	6661	5 YR	320.00	327.83	331.64	331.18	331.69	0.00	2.86	252.76	312.39	0.30
1	6661	10 YR	430.00	327.83	331.85	331.30	331.91	0.00	2.94	320.38	321.36	0.29
1	6661	25 YR	580.00	327.83	332.09	331.41	332.14	0.00	3.08	397.39	330.20	0.30
1	6661	50 YR	670.00	327.83	332.22	331.41	332.27	0.00	3.15	439.63	334.95	0.30
1	6661	100 YR	780.00	327.83	332.29	331.66	332.36	0.00	3.43	465.60	337.83	0.32
1	6661	250 YR	940.00	327.83	332.42	331.76	332.50	0.00	3.70	510.29	343.00	0.34
1	6661	500 YR	1070.00	327.83	332.54	331.82	332.63	0.00	3.84	551.75	347.63	0.35
1	6790 I	2 YR	220.00	328.74	332.01	331.49	332.20	0.01	4.03	95.71	174.98	0.45
1	6790 I	5 YR	320.00	328.74	332.21	332.06	332.43	0.01	4.63	132.96	202.04	0.50
1	6790 I	10 YR	430.00	328.74	332.40	332.28	332.62	0.01	4.98	172.17	213.36	0.52
1	6790 I	25 YR	580.00	328.74	332.62	332.42	332.85	0.01	5.30	221.96	229.37	0.54
1	6790 I	50 YR	670.00	328.74	332.74	332.52	332.97	0.01	5.49	250.61	244.68	0.54
1	6790 I	100 YR	780.00	328.74	332.88	332.64	333.12	0.01	5.72	287.00	289.03	0.55
1	6790 I	250 YR	940.00	328.74	333.05	332.75	333.29	0.01	5.91	341.00	317.04	0.56
1	6790 I	500 YR	1070.00	328.74	333.18	332.90	333.41	0.01	5.95	381.93	325.02	0.55
1	6831 McKnight Rd.		Culvert									
1	6858 J	2 YR	220.00	330.28	334.86	332.61	334.87	0.00	0.42	963.26	617.95	0.04
1	6858 J	5 YR	320.00	330.28	334.96	332.94	334.96	0.00	0.57	1021.77	621.77	0.05
1	6858 J	10 YR	430.00	330.28	335.11	333.23	335.11	0.00	0.69	1114.01	629.53	0.06
1	6858 J	25 YR	580.00	330.28	335.23	333.58	335.24	0.00	0.87	1194.82	657.01	0.08
1	6858 J	50 YR	670.00	330.28	335.30	333.77	335.31	0.00	0.97	1239.72	664.34	0.08
1	6858 J	100 YR	780.00	330.28	335.38	333.99	335.39	0.00	1.08	1293.69	672.38	0.09
1	6858 J	250 YR	940.00	330.28	335.47	334.29	335.48	0.00	1.24	1354.33	686.09	0.10
1	6858 J	500 YR	1070.00	330.28	335.54	334.37	335.55	0.00	1.36	1398.87	697.12	0.11
1	7153	2 YR	220.00	330.92	334.88		334.88	0.00	0.85	450.41	305.81	0.08
1	7153	5 YR	320.00	330.92	334.98		334.99	0.00	1.14	482.37	311.80	0.11
1	7153	10 YR	430.00	330.92	335.14		335.15	0.00	1.37	531.43	318.29	0.13
1	7153	25 YR	580.00	330.92	335.28		335.29	0.00	1.69	576.50	325.90	0.15
1	7153	50 YR	670.00	330.92	335.35		335.38	0.00	1.86	601.62	330.43	0.17
1	7153	100 YR	780.00	330.92	335.44		335.47	0.00	2.05	631.88	335.82	0.18
1	7153	250 YR	940.00	330.92	335.55		335.59	0.00	2.32	667.74	342.09	0.20
1	7153	500 YR	1070.00	330.92	335.63		335.67	0.00	2.53	694.83	346.03	0.22
1	7441 K	2 YR	220.00	332.22	334.94	333.92	334.98	0.00	2.15	134.92	190.31	0.24
1	7441 K	5 YR	320.00	332.22	335.08	334.09	335.16	0.00	2.85	146.51	193.77	0.32
1	7441 K	10 YR	430.00	332.22	335.26	334.26	335.38	0.00	3.44	161.48	198.20	0.37
1	7441 K	25 YR	580.00	332.22	335.45	334.47	335.63	0.00	4.20	176.80	202.68	0.43
1	7441 K	50 YR	670.00	332.22	335.55	334.61	335.77	0.00	4.61	185.25	204.86	0.47
1	7441 K	100 YR	780.00	332.22	335.67	334.74	335.94	0.01	5.07	195.07	206.94	0.51
1	7441 K	250 YR	940.00	332.22	335.82	334.94	336.16	0.01	5.72	207.53	209.58	0.56
1	7441 K	500 YR	1070.00	332.22	335.93	335.09	336.33	0.01	6.21	216.85	211.55	0.59
1	7639	2 YR	220.00	333.68	335.35	335.24	335.78	0.02	5.22	42.30	38.96	0.86
1	7639	5 YR	320.00	333.68	335.73	335.54	336.22	0.02	5.66	57.66	42.77	0.81
1	7639	10 YR	430.00	333.68	336.06	335.84	336.64	0.02	6.17	72.29	46.12	0.80
1	7639	25 YR	580.00	333.68	336.44	336.20	337.13	0.01	6.77	90.68	50.00	0.80
1	7639	50 YR	670.00	333.68	336.64	336.40	337.39	0.01	7.10	100.96	52.04	0.80
1	7639	100 YR	780.00	333.68	336.87	336.63	337.69	0.01	7.47	112.89	54.32	0.81
1	7639	250 YR	940.00	333.68	337.16	336.93	338.09	0.01	7.96	129.45	57.33	0.82
1	7639	500 YR	1070.00	333.68	337.39	337.15	338.39	0.01	8.33	142.46	60.04	0.82
1	7891 L	2 YR	220.00	333.18	337.23	336.10	337.40	0.00	3.90	77.73	44.12	0.36
1	7891 L	5 YR	320.00	333.18	337.69		337.91	0.00	4.56	99.50	50.58	0.40
1	7891 L	10 YR	430.00	333.18	338.12		338.38	0.00	5.09	122.37	56.48	0.42
1	7891 L	25 YR	580.00	333.18	338.61		338.93	0.00	5.67	152.08	64.97	0.45
1	7891 L	50 YR	670.00	333.18	338.88		339.22	0.00	5.98	170.48	73.01	0.46
1	7891 L	100 YR	780.00	333.18	339.18		339.54	0.00	6.28	193.49	81.96	0.47
1	7891 L	250 YR	940.00	333.18	339.56		339.95	0.00	6.62	227.64	94.13	0.48
1	7891 L	500 YR	1070.00	333.18	339.85		340.26	0.00	6.82	256.34	103.54	0.48
1	8222	2 YR	110.00	335.50	337.96		338.00	0.00	1.49	74.82	40.58	0.18
1	8222	5 YR	150.00	335.50	338.48		338.52	0.00	1.60	96.69	44.00	0.18
1	8222	10 YR	170.00	335.50	338.93		338.97	0.00	1.52	117.17	46.98	0.16
1	8222	25 YR	210.00	335.50	339.47		339.51	0.00	1.56	143.56	50.27	0.15
1	8222	50 YR	240.00	335.50	339.77		339.81	0.00	1.63	158.91	52.02	0.15
1	8222	100 YR	270.00	335.50	340.09		340.13	0.00	1.67	175.92	53.90	0.14
1	8222	250 YR	330.00	335.50	340.52		340.56	0.00	1.83	199.31	58.02	0.15
1	8222	500 YR	370.00	335.50	340.82		340.87	0.00	1.91	217.63	63.20	0.15
1	8274	2 YR	110.00	335.82	338.01	336.78	338.05	0.00	1.57	70.08	40.54	0.21

HEC-RAS Plan: WC1_Existing River: Stream_WC1 Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	8274	5 YR	150.00	335.82	338.52	336.94	338.56	0.00	1.66	91.29	42.80	0.19
1	8274	10 YR	170.00	335.82	338.96	337.01	339.00	0.00	1.57	110.50	44.75	0.17
1	8274	25 YR	210.00	335.82	339.50	337.15	339.53	0.00	1.60	135.18	47.14	0.16
1	8274	50 YR	240.00	335.82	339.79	337.25	339.84	0.00	1.67	149.27	48.47	0.1
1	8274	100 YR	270.00	335.82	340.11	337.34	340.16	0.00	1.71	164.49	49.90	0.15
1	8274	250 YR	330.00	335.82	340.54	337.52	340.59	0.00	1.87	184.92	51.77	0.16
1	8274	500 YR	370.00	335.82	340.84	337.63	340.90	0.00	1.95	199.71	53.12	0.16
1	8316 Arista Blvd.		Culvert									
1	8363 M	2 YR	110.00	335.55	338.34	337.47	338.50	0.00	3.45	42.53	49.11	0.41
1	8363 M	5 YR	150.00	335.55	338.61	338.13	338.78	0.00	3.72	57.06	56.25	0.41
1	8363 M	10 YR	170.00	335.55	339.03	338.23	339.13	0.00	3.01	82.28	62.58	0.31
1	8363 M	25 YR	210.00	335.55	339.59	338.42	339.66	0.00	2.58	118.72	68.37	0.24
1	8363 M	50 YR	240.00	335.55	339.90	338.54	339.96	0.00	2.47	140.48	71.61	0.22
1	8363 M	100 YR	270.00	335.55	340.23	338.64	340.28	0.00	2.35	164.04	75.03	0.20
1	8363 M	250 YR	330.00	335.55	340.68	338.84	340.73	0.00	2.35	197.26	79.70	0.19
1	8363 M	500 YR	370.00	335.55	341.01	338.93	341.06	0.00	2.29	221.99	83.14	0.18
1	8431	2 YR	110.00	337.63	338.92	338.92	339.33	0.03	5.11	21.54	26.52	1.00
1	8431	5 YR	150.00	337.63	339.13	339.13	339.60	0.03	5.50	27.27	29.21	1.00
1	8431	10 YR	170.00	337.63	339.23	339.23	339.72	0.03	5.64	30.13	30.47	1.00
1	8431	25 YR	210.00	337.63	339.66	339.40	340.01	0.01	4.72	44.74	37.73	0.73
1	8431	50 YR	240.00	337.63	339.95	339.50	340.24	0.01	4.38	56.48	43.83	0.61
1	8431	100 YR	270.00	337.63	340.26	339.61	340.51	0.01	4.03	70.66	47.15	0.52
1	8431	250 YR	330.00	337.63	340.70	339.81	340.92	0.00	3.89	92.31	52.17	0.45
1	8431	500 YR	370.00	337.63	341.02	339.94	341.22	0.00	3.74	110.00	57.49	0.40
1	8609	2 YR	110.00	338.33	340.88		340.99	0.00	2.70	41.42	34.71	0.40
1	8609	5 YR	150.00	338.33	341.14		341.28	0.00	3.07	52.26	48.80	0.42
1	8609	10 YR	170.00	338.33	341.25	340.45	341.40	0.00	3.22	57.97	53.63	0.42
1	8609	25 YR	210.00	338.33	341.34	340.63	341.54	0.01	3.73	62.91	56.74	0.48
1	8609	50 YR	240.00	338.33	341.39	340.76	341.64	0.01	4.10	66.24	58.74	0.52
1	8609	100 YR	270.00	338.33	341.45	340.87	341.74	0.01	4.43	69.79	60.73	0.55
1	8609	250 YR	330.00	338.33	341.65		341.97	0.01	4.77	82.11	66.98	0.57
1	8609	500 YR	370.00	338.33	341.80		342.13	0.01	4.86	92.76	72.03	0.56
1	8920	2 YR	110.00	341.27	342.77		342.95	0.01	3.40	32.40	31.26	0.59
1	8920	5 YR	150.00	341.27	343.03		343.24	0.01	3.68	40.80	33.65	0.59
1	8920	10 YR	170.00	341.27	343.14		343.37	0.01	3.80	44.70	34.71	0.59
1	8920	25 YR	210.00	341.27	343.42		343.65	0.01	3.86	54.46	37.22	0.56
1	8920	50 YR	240.00	341.27	343.60		343.84	0.01	3.90	61.50	38.93	0.55
1	8920	100 YR	270.00	341.27	343.76		344.01	0.01	3.97	68.01	40.44	0.54
1	8920	250 YR	330.00	341.27	344.01		344.28	0.01	4.23	78.09	42.69	0.55
1	8920	500 YR	370.00	341.27	344.13		344.43	0.01	4.45	83.22	43.78	0.57
1	9169	2 YR	110.00	342.44	344.76		344.94	0.01	3.34	32.90	22.53	0.49
1	9169	5 YR	150.00	342.44	345.06		345.28	0.01	3.77	39.84	24.13	0.52
1	9169	10 YR	170.00	342.44	345.19		345.44	0.01	3.95	43.06	24.85	0.53
1	9169	25 YR	210.00	342.44	345.41		345.70	0.01	4.33	48.53	26.31	0.56
1	9169	50 YR	240.00	342.44	345.55		345.88	0.01	4.58	52.39	27.56	0.59
1	9169	100 YR	270.00	342.44	345.70		346.05	0.01	4.77	56.60	28.97	0.60
1	9169	250 YR	330.00	342.44	345.99		346.38	0.01	5.05	65.37	31.72	0.62
1	9169	500 YR	370.00	342.44	346.17		346.59	0.01	5.18	71.42	33.47	0.63
1	9225 N	2 YR	110.00	342.09	345.10		345.21	0.00	2.62	42.00	26.07	0.36
1	9225 N	5 YR	150.00	342.09	345.44		345.57	0.00	2.93	51.21	28.27	0.38
1	9225 N	10 YR	170.00	342.09	345.59		345.73	0.00	3.06	55.54	29.28	0.39
1	9225 N	25 YR	210.00	342.09	345.85		346.02	0.00	3.31	63.46	31.03	0.41
1	9225 N	50 YR	240.00	342.09	346.03		346.22	0.00	3.47	69.15	32.24	0.42
1	9225 N	100 YR	270.00	342.09	346.20		346.41	0.00	3.61	74.80	33.39	0.43
1	9225 N	250 YR	330.00	342.09	346.52		346.75	0.00	3.85	85.72	35.51	0.44
1	9225 N	500 YR	370.00	342.09	346.71		346.96	0.00	3.99	92.73	36.81	0.44

HEC-RAS Plan: WC2_Existing River: Stream WC-2 Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	704	2 YR	460.00	310.43	313.76	312.77	313.82	0.00	2.85	310.99	200.46	0.32
1	704	5 YR	670.00	310.43	315.04	313.01	315.07	0.00	2.18	591.40	242.40	0.20
1	704	10 YR	890.00	310.43	315.49	313.18	315.53	0.00	2.41	704.62	264.05	0.21
1	704	25 YR	1240.00	310.43	315.64	313.52	315.70	0.00	3.18	744.75	270.01	0.27
1	704	50 YR	1540.00	310.43	315.91	313.73	315.99	0.00	3.61	819.54	283.38	0.29
1	704	100 YR	1850.00	310.43	316.44	313.91	316.52	0.00	3.68	974.99	304.92	0.28
1	704	250 YR	2360.00	310.43	317.01	314.19	317.10	0.00	3.98	1163.21	348.68	0.29
1	704	500 YR	2750.00	310.43	317.43	314.38	317.53	0.00	4.13	1314.32	370.57	0.29
1	944 A	2 YR	460.00	308.66	314.37		314.44	0.00	2.57	294.57	168.77	0.24
1	944 A	5 YR	670.00	308.66	315.33		315.39	0.00	2.49	483.65	230.39	0.20
1	944 A	10 YR	890.00	308.66	315.79		315.86	0.00	2.71	596.34	255.91	0.21
1	944 A	25 YR	1240.00	308.66	316.10		316.20	0.00	3.33	678.99	269.60	0.25
1	944 A	50 YR	1540.00	308.66	316.44		316.56	0.00	3.64	772.43	279.64	0.27
1	944 A	100 YR	1850.00	308.66	316.93		317.04	0.00	3.70	911.40	292.96	0.26
1	944 A	250 YR	2360.00	308.66	317.51		317.63	0.00	3.96	1097.14	336.64	0.27
1	944 A	500 YR	2750.00	308.66	317.92		318.05	0.00	4.12	1242.41	366.01	0.27
1	1145	2 YR	450.00	308.70	314.93		315.01	0.00	3.46	278.75	174.15	0.30
1	1145	5 YR	680.00	308.70	315.73		315.80	0.00	3.36	435.05	216.02	0.27
1	1145	10 YR	890.00	308.70	316.19		316.26	0.00	3.41	553.38	280.28	0.26
1	1145	25 YR	1280.00	308.70	316.64		316.73	0.00	3.92	686.42	308.59	0.29
1	1145	50 YR	1520.00	308.70	317.01		317.09	0.00	3.95	804.33	334.92	0.28
1	1145	100 YR	1830.00	308.70	317.45		317.53	0.00	3.94	959.00	357.94	0.27
1	1145	250 YR	2270.00	308.70	318.02		318.10	0.00	3.93	1167.95	377.11	0.26
1	1145	500 YR	2620.00	308.70	318.43		318.51	0.00	3.93	1324.10	389.39	0.25
1	1599 B	2 YR	450.00	310.97	316.20		316.25	0.00	2.19	364.99	267.29	0.24
1	1599 B	5 YR	680.00	310.97	316.74		316.79	0.00	2.34	515.44	290.38	0.23
1	1599 B	10 YR	890.00	310.97	317.14		317.19	0.00	2.48	632.71	303.60	0.23
1	1599 B	25 YR	1280.00	310.97	317.69		317.75	0.00	2.79	803.25	318.65	0.24
1	1599 B	50 YR	1520.00	310.97	318.01		318.07	0.00	2.93	906.90	328.88	0.25
1	1599 B	100 YR	1830.00	310.97	318.39		318.46	0.00	3.08	1035.21	342.29	0.25
1	1599 B	250 YR	2270.00	310.97	318.89		318.96	0.00	3.26	1209.62	359.04	0.25
1	1599 B	500 YR	2620.00	310.97	319.25		319.34	0.00	3.38	1342.86	369.56	0.25
1	1824	2 YR	450.00	314.31	317.12	316.75	317.22	0.01	3.82	223.69	227.03	0.50
1	1824	5 YR	680.00	314.31	317.52	316.95	317.63	0.01	3.93	318.91	243.04	0.47
1	1824	10 YR	890.00	314.31	317.86	317.09	317.97	0.01	4.03	403.43	260.47	0.44
1	1824	25 YR	1280.00	314.31	318.39	317.35	318.50	0.01	4.23	553.23	298.45	0.42
1	1824	50 YR	1520.00	314.31	318.68	317.40	318.80	0.01	4.30	643.95	316.95	0.41
1	1824	100 YR	1830.00	314.31	319.03	317.40	319.15	0.01	4.36	757.64	332.69	0.40
1	1824	250 YR	2270.00	314.31	319.50	317.82	319.61	0.00	4.44	915.46	354.16	0.38
1	1824	500 YR	2620.00	314.31	319.84	318.03	319.96	0.00	4.51	1040.85	375.39	0.37
1	1946	2 YR	450.00	314.10	318.12	317.46	318.29	0.01	4.20	182.41	217.44	0.43
1	1946	5 YR	680.00	314.10	318.40	317.88	318.54	0.01	4.28	298.66	227.66	0.41
1	1946	10 YR	890.00	314.10	318.65	318.11	318.77	0.01	4.27	401.88	237.85	0.40
1	1946	25 YR	1280.00	314.10	319.12	318.26	319.26	0.01	4.69	519.01	258.32	0.41
1	1946	50 YR	1520.00	314.10	319.38	318.42	319.54	0.01	4.90	588.77	274.13	0.42
1	1946	100 YR	1830.00	314.10	319.69	318.51	319.86	0.01	5.15	676.46	295.17	0.42
1	1946	250 YR	2270.00	314.10	320.09	318.72	320.27	0.01	5.37	800.89	315.63	0.42
1	1946	500 YR	2620.00	314.10	320.40	318.90	320.59	0.01	5.51	900.95	334.36	0.42
1	2002 C	2 YR	450.00	313.71	318.37	316.38	318.61	0.00	3.94	116.56	233.97	0.35
1	2002 C	5 YR	680.00	313.71	318.64	317.02	318.81	0.00	3.85	262.38	245.20	0.33
1	2002 C	10 YR	890.00	313.71	318.89	317.52	318.98	0.00	3.30	483.92	258.57	0.27
1	2002 C	25 YR	1280.00	313.71	319.37	318.34	319.49	0.00	3.91	629.06	329.94	0.31
1	2002 C	50 YR	1520.00	313.71	319.65	318.70	319.77	0.00	4.03	720.73	342.82	0.31
1	2002 C	100 YR	1830.00	313.71	319.96	318.70	320.09	0.00	4.24	834.77	375.22	0.31
1	2002 C	250 YR	2270.00	313.71	320.37	318.71	320.51	0.00	4.37	992.93	392.16	0.31
1	2002 C	500 YR	2620.00	313.71	320.68	318.87	320.82	0.00	4.45	1115.49	405.12	0.31
1	2050 Pleasant Grove R		Culvert									
1	2097 D	2 YR	450.00	314.45	320.11	316.34	320.14	0.00	1.47	319.44	419.94	0.12
1	2097 D	5 YR	680.00	314.45	321.95	316.78	321.97	0.00	1.17	975.56	588.73	0.08
1	2097 D	10 YR	890.00	314.45	322.37	317.14	322.37	0.00	1.03	2022.05	605.26	0.07
1	2097 D	25 YR	1280.00	314.45	322.78	317.65	322.79	0.00	1.32	2275.51	624.86	0.08
1	2097 D	50 YR	1520.00	314.45	322.97	317.95	322.98	0.00	1.49	2395.11	634.81	0.09
1	2097 D	100 YR	1830.00	314.45	323.14	318.30	323.16	0.00	1.73	2506.91	652.01	0.11
1	2097 D	250 YR	2270.00	314.45	323.38	318.77	323.41	0.00	2.03	2662.75	671.64	0.13
1	2097 D	500 YR	2620.00	314.45	323.53	319.12	323.57	0.00	2.26	2768.78	682.66	0.14
1	2160	2 YR	450.00	313.71	320.13	316.43	320.15	0.00	1.18	417.71	357.25	0.10
1	2160	5 YR	680.00	313.71	321.96	316.79	321.98	0.00	1.22	663.93	536.85	0.08
1	2160	10 YR	890.00	313.71	322.37	317.08	322.38	0.00	1.00	1798.94	570.83	0.07
1	2160	25 YR	1280.00	313.71	322.78	317.53	322.80	0.00	1.29	2043.34	625.36	0.08
1	2160	50 YR	1520.00	313.71	322.97	317.79	322.99	0.00	1.47	2166.57	658.29	0.09
1	2160	100 YR	1830.00	313.71	323.15	318.10	323.17	0.00	1.68	2283.17	666.59	0.11
1	2160	250 YR	2270.00	313.71	323.38	318.52	323.42	0.00	1.96	2442.54	680.28	0.12
1	2160	500 YR	2620.00	313.71	323.54	318.84	323.58	0.00	2.18	2551.00	690.66	0.13
1	2442 E	2 YR	450.00	316.21	320.18		320.20	0.00	1.27	469.36	225.71	0.13
1	2442 E	5 YR	680.00	316.21	321.99		322.00	0.00	1.07	952.31	300.75	0.09
1	2442 E	10 YR	890.00	316.21	322.38		322.40	0.00	1.26	1072.71	309.92	0.10
1	2442 E	25 YR	1280.00	316.21	322.80		322.84	0.00	1.64	1214.83	361.75	0.12
1	2442 E	50 YR	1520.00	316.21	323.00		323.04	0.00	1.86	1286.37	369.34	0.14

HEC-RAS Plan: WC2_Existing River: Stream WC-2 Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2442 E	100 YR	1830.00	316.21	323.18		323.24	0.00	2.14	1354.44	375.20	0.15
1	2442 E	250 YR	2270.00	316.21	323.43		323.50	0.00	2.52	1447.64	384.48	0.18
1	2442 E	500 YR	2620.00	316.21	323.59		323.68	0.00	2.82	1512.23	398.03	0.20
1	2795	2 YR	470.00	317.49	320.29		320.43	0.00	2.99	159.77	107.20	0.39
1	2795	5 YR	720.00	317.49	322.03		322.07	0.00	1.91	527.06	297.18	0.18
1	2795	10 YR	880.00	317.49	322.43		322.48	0.00	1.97	649.93	311.48	0.17
1	2795	25 YR	1230.00	317.49	322.88		322.94	0.00	2.33	792.28	328.69	0.20
1	2795	50 YR	1470.00	317.49	323.09		323.16	0.00	2.58	862.60	335.27	0.21
1	2795	100 YR	1750.00	317.49	323.29		323.39	0.00	2.87	932.57	341.52	0.23
1	2795	250 YR	2170.00	317.49	323.57		323.69	0.00	3.26	1029.34	351.51	0.25
1	2795	500 YR	2510.00	317.49	323.77		323.91	0.00	3.56	1098.84	358.81	0.27
1	3170 F	2 YR	300.00	319.01	321.24		321.36	0.00	2.80	107.29	81.25	0.43
1	3170 F	5 YR	450.00	319.01	322.22		322.29	0.00	2.20	209.53	120.56	0.27
1	3170 F	10 YR	550.00	319.01	322.60		322.68	0.00	2.24	257.57	130.89	0.26
1	3170 F	25 YR	760.00	319.01	323.07		323.17	0.00	2.56	322.28	143.64	0.27
1	3170 F	50 YR	910.00	319.01	323.31		323.43	0.00	2.81	358.10	160.27	0.28
1	3170 F	100 YR	1080.00	319.01	323.55		323.69	0.00	3.08	399.09	185.53	0.30
1	3170 F	250 YR	1340.00	319.01	323.87		324.05	0.00	3.42	462.54	206.40	0.32
1	3170 F	500 YR	1550.00	319.01	324.10		324.30	0.00	3.66	512.32	223.47	0.33
1	3361	2 YR	300.00	320.75	322.62	322.62	323.22	0.01	6.24	49.67	45.79	0.97
1	3361	5 YR	450.00	320.75	323.01	323.01	323.75	0.01	6.98	69.11	52.83	0.95
1	3361	10 YR	550.00	320.75	323.25	323.25	324.05	0.01	7.32	82.53	58.78	0.93
1	3361	25 YR	760.00	320.75	323.71	323.71	324.58	0.01	7.80	112.11	69.58	0.89
1	3361	50 YR	910.00	320.75	323.99	323.99	324.91	0.01	8.12	131.87	74.50	0.88
1	3361	100 YR	1080.00	320.75	324.28	324.28	325.22	0.01	8.32	156.35	94.51	0.85
1	3361	250 YR	1340.00	320.75	324.64	324.64	325.63	0.01	8.73	194.52	121.48	0.85
1	3361	500 YR	1550.00	320.75	324.90	324.90	325.92	0.01	9.03	227.49	135.49	0.84
1	3415 G	2 YR	270.00	321.06	323.27	322.48	323.50	0.00	3.88	70.39	42.91	0.48
1	3415 G	5 YR	430.00	321.06	323.64	322.94	324.06	0.00	5.22	83.43	47.16	0.59
1	3415 G	10 YR	530.00	321.06	323.84	323.19	324.36	0.00	5.86	95.38	49.49	0.64
1	3415 G	25 YR	690.00	321.06	324.28	323.58	324.88	0.00	6.39	121.80	54.57	0.64
1	3415 G	50 YR	810.00	321.06	324.50	323.85	325.21	0.00	6.93	134.16	57.13	0.68
1	3415 G	100 YR	960.00	321.06	324.53	324.19	325.50	0.00	8.11	136.20	57.54	0.79
1	3415 G	250 YR	1180.00	321.06	324.82	324.59	326.01	0.00	9.02	154.73	90.22	0.84
1	3415 G	500 YR	1360.00	321.06	325.10	325.10	326.38	0.00	9.47	187.56	143.84	0.85
1	3452 Independence Cir		Culvert									
1	3489 H	2 YR	270.00	321.38	325.61	323.25	325.66	0.00	1.88	144.51	78.54	0.1
1	3489 H	5 YR	430.00	321.38	327.15	323.73	327.21	0.00	2.01	215.39	305.98	0.16
1	3489 H	10 YR	530.00	321.38	327.75	323.99	327.78	0.00	1.76	599.48	357.98	0.13
1	3489 H	25 YR	690.00	321.38	327.99	324.35	328.04	0.00	2.02	774.55	381.59	0.15
1	3489 H	50 YR	810.00	321.38	328.10	324.58	328.16	0.00	2.29	816.99	394.48	0.17
1	3489 H	100 YR	960.00	321.38	328.22	324.84	328.29	0.00	2.61	864.25	406.21	0.19
1	3489 H	250 YR	1180.00	321.38	328.38	325.20	328.48	0.00	3.05	929.75	421.94	0.22
1	3489 H	500 YR	1360.00	321.38	328.47	325.45	328.59	0.00	3.41	968.70	436.74	0.24
1	3542	2 YR	270.00	321.67	325.62	323.53	325.68	0.00	1.93	151.90	81.77	0.20
1	3542	5 YR	430.00	321.67	327.19	324.00	327.23	0.00	1.80	291.60	202.06	0.15
1	3542	10 YR	530.00	321.67	327.75	324.24	327.79	0.00	1.80	487.51	303.88	0.14
1	3542	25 YR	690.00	321.67	328.00	324.57	328.05	0.00	2.17	565.15	325.98	0.16
1	3542	50 YR	810.00	321.67	328.11	324.81	328.18	0.00	2.45	601.45	329.97	0.18
1	3542	100 YR	960.00	321.67	328.23	325.11	328.32	0.00	2.78	641.30	334.29	0.21
1	3542	250 YR	1180.00	321.67	328.39	325.50	328.51	0.00	3.24	695.77	341.87	0.24
1	3542	500 YR	1360.00	321.67	328.48	325.83	328.63	0.00	3.62	728.59	367.42	0.26
1	3669	2 YR	270.00	322.46	325.65	324.36	325.79	0.00	3.07	92.90	60.13	0.34
1	3669	5 YR	430.00	322.46	327.22	324.83	327.27	0.00	2.18	405.17	283.43	0.19
1	3669	10 YR	530.00	322.46	327.78	325.10	327.82	0.00	2.05	561.58	313.06	0.17
1	3669	25 YR	690.00	322.46	328.04	325.50	328.09	0.00	2.39	658.09	321.75	0.19
1	3669	50 YR	810.00	322.46	328.16	325.96	328.23	0.00	2.67	697.80	325.90	0.21
1	3669	100 YR	960.00	322.46	328.30	326.40	328.38	0.00	3.00	742.47	331.37	0.23
1	3669	250 YR	1180.00	322.46	328.48	326.75	328.59	0.00	3.43	805.12	342.97	0.26
1	3669	500 YR	1360.00	322.46	328.60	326.96	328.72	0.00	3.79	846.33	353.62	0.28
1	3843	2 YR	270.00	322.71	325.90	324.61	326.03	0.00	2.88	93.77	44.80	0.35
1	3843	5 YR	430.00	322.71	327.26	325.10	327.38	0.00	2.73	164.03	66.16	0.26
1	3843	10 YR	530.00	322.71	327.80	325.35	327.92	0.00	2.84	208.54	102.61	0.25
1	3843	25 YR	690.00	322.71	328.05	325.72	328.22	0.00	3.43	237.53	128.02	0.30
1	3843	50 YR	810.00	322.71	328.17	325.99	328.39	0.00	3.89	254.70	164.13	0.33
1	3843	100 YR	960.00	322.71	328.30	326.25	328.58	0.00	4.43	278.39	206.81	0.37
1	3843	250 YR	1180.00	322.71	328.47	326.62	328.85	0.00	5.16	317.71	246.99	0.42
1	3843	500 YR	1360.00	322.71	328.58	326.93	329.05	0.00	5.74	344.88	251.73	0.46
1	3882 I	2 YR	270.00	323.21	325.89	324.97	326.17	0.00	4.33	65.69	31.24	0.48
1	3882 I	5 YR	430.00	323.21	327.21	325.55	327.49	0.00	4.33	109.93	46.69	0.39
1	3882 I	10 YR	530.00	323.21	327.74	325.86	328.04	0.00	4.57	141.31	76.39	0.39
1	3882 I	25 YR	690.00	323.21	327.96	326.33	328.39	0.00	5.51	163.43	94.60	0.46
1	3882 I	50 YR	810.00	323.21	328.06	326.63	328.61	0.00	6.29	172.91	110.09	0.51
1	3882 I	100 YR	960.00	323.21	328.15	327.00	328.87	0.00	7.24	183.17	119.51	0.59
1	3882 I	250 YR	1180.00	323.21	328.24	327.85	329.26	0.00	8.64	194.85	132.78	0.69
1	3882 I	500 YR	1360.00	323.21	328.29	328.29	329.59	0.00	9.78	202.22	142.28	0.78
1	3909 Lexington Pl.		Culvert									

HEC-RAS Plan: WC2_Existing River: Stream WC-2 Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3936 J	2 YR	270.00	323.59	327.72	325.22	327.83	0.00	2.57	105.80	73.20	0.23
1	3936 J	5 YR	430.00	323.59	329.22	325.76	329.36	0.00	2.97	145.67	263.66	0.22
1	3936 J	10 YR	530.00	323.59	329.92	326.06	330.00	0.00	2.51	507.59	328.85	0.18
1	3936 J	25 YR	690.00	323.59	330.20	326.51	330.28	0.00	2.75	711.40	361.99	0.19
1	3936 J	50 YR	810.00	323.59	330.37	326.83	330.46	0.00	3.07	771.75	377.77	0.21
1	3936 J	100 YR	960.00	323.59	330.48	327.20	330.61	0.00	3.50	815.91	388.19	0.24
1	3936 J	250 YR	1180.00	323.59	330.65	327.70	330.82	0.00	4.08	883.70	404.17	0.27
1	3936 J	500 YR	1360.00	323.59	330.76	328.09	330.96	0.00	4.54	929.60	413.00	0.30
1	3971	2 YR	270.00	323.69	327.71	325.59	327.84	0.00	2.96	107.11	44.12	0.27
1	3971	5 YR	430.00	323.69	329.22	326.19	329.36	0.00	3.12	204.48	144.43	0.24
1	3971	10 YR	530.00	323.69	329.90	326.52	330.03	0.00	3.17	345.97	231.99	0.23
1	3971	25 YR	690.00	323.69	330.15	327.02	330.34	0.00	3.82	412.11	261.99	0.27
1	3971	50 YR	810.00	323.69	330.30	327.37	330.53	0.00	4.29	452.60	277.81	0.30
1	3971	100 YR	960.00	323.69	330.40	327.78	330.70	0.00	4.94	479.23	285.95	0.34
1	3971	250 YR	1180.00	323.69	330.54	328.34	330.95	0.00	5.84	519.34	297.49	0.40
1	3971	500 YR	1360.00	323.69	330.62	328.94	331.13	0.00	6.57	543.30	303.78	0.45
1	4032	2 YR	270.00	324.37	327.69	326.27	327.87	0.00	3.53	83.44	41.27	0.36
1	4032	5 YR	430.00	324.37	329.23	326.93	329.37	0.00	3.26	165.34	100.06	0.27
1	4032	10 YR	530.00	324.37	329.90	327.29	330.03	0.00	3.29	246.70	224.62	0.25
1	4032	25 YR	690.00	324.37	330.17	327.77	330.35	0.00	3.91	337.90	269.14	0.29
1	4032	50 YR	810.00	324.37	330.33	328.06	330.54	0.00	4.37	380.81	282.41	0.32
1	4032	100 YR	960.00	324.37	330.43	328.39	330.71	0.00	5.00	411.11	291.26	0.37
1	4032	250 YR	1180.00	324.37	330.59	328.81	330.97	0.00	5.85	458.78	303.93	0.42
1	4032	500 YR	1360.00	324.37	330.70	329.22	331.16	0.00	6.52	491.64	315.68	0.47
1	4238	2 YR	270.00	325.43	327.75	327.00	327.98	0.00	3.86	71.09	44.85	0.50
1	4238	5 YR	430.00	325.43	329.26	327.49	329.41	0.00	3.22	163.26	89.65	0.31
1	4238	10 YR	530.00	325.43	329.92	327.74	330.07	0.00	3.22	214.71	125.31	0.28
1	4238	25 YR	690.00	325.43	330.18	328.11	330.40	0.00	3.88	240.61	160.66	0.33
1	4238	50 YR	810.00	325.43	330.34	328.37	330.61	0.00	4.37	256.80	173.26	0.37
1	4238	100 YR	960.00	325.43	330.44	328.66	330.80	0.00	5.04	268.19	182.71	0.42
1	4238	250 YR	1180.00	325.43	330.59	329.11	331.08	0.00	5.97	287.33	207.45	0.49
1	4238	500 YR	1360.00	325.43	330.72	329.39	331.29	0.00	6.49	378.24	216.41	0.52
1	4276 K	2 YR	270.00	325.56	327.58	327.45	328.24	0.00	6.56	41.59	28.52	0.88
1	4276 K	5 YR	430.00	325.56	329.16	328.06	329.53	0.00	5.04	120.85	82.31	0.49
1	4276 K	10 YR	530.00	325.56	329.85	328.42	330.16	0.00	4.76	181.83	97.03	0.42
1	4276 K	25 YR	690.00	325.56	330.09	328.92	330.52	0.00	5.69	204.82	109.62	0.49
1	4276 K	50 YR	810.00	325.56	330.22	329.32	330.75	0.00	6.39	217.58	120.76	0.54
1	4276 K	100 YR	960.00	325.56	330.28	329.69	330.99	0.00	7.42	224.01	129.18	0.62
1	4276 K	250 YR	1180.00	325.56	330.36	330.07	331.37	0.00	8.90	232.43	139.77	0.74
1	4276 K	500 YR	1360.00	325.56	330.40	330.40	331.69	0.00	10.11	245.30	145.58	0.84
1	4308 Concord Pl.		Culvert									
1	4340 L	2 YR	270.00	325.95	329.86	328.34	330.12	0.00	4.07	66.30	23.13	0.42
1	4340 L	5 YR	430.00	325.95	330.71	329.07	331.06	0.00	4.80	131.29	196.50	0.46
1	4340 L	10 YR	530.00	325.95	331.00	329.48	331.39	0.00	5.22	197.32	312.21	0.48
1	4340 L	25 YR	690.00	325.95	331.10	330.05	331.69	0.00	6.44	223.80	320.29	0.59
1	4340 L	50 YR	810.00	325.95	331.12	331.12	331.91	0.00	7.51	227.39	321.38	0.68
1	4340 L	100 YR	960.00	325.95	331.38	331.38	332.18	0.00	7.81	294.65	341.69	0.69
1	4340 L	250 YR	1180.00	325.95	331.67	331.67	332.52	0.00	8.33	370.93	364.38	0.71
1	4340 L	500 YR	1360.00	325.95	331.91	331.91	332.64	0.00	8.14	524.13	378.07	0.67
1	4446	2 YR	270.00	326.04	329.86	328.52	330.24	0.00	4.94	54.65	53.21	0.49
1	4446	5 YR	430.00	326.04	330.72	329.35	331.18	0.00	5.70	147.53	140.93	0.52
1	4446	10 YR	530.00	326.04	331.00	329.79	331.54	0.00	6.25	188.52	150.95	0.56
1	4446	25 YR	690.00	326.04	331.08	330.88	331.93	0.00	7.90	200.58	156.70	0.70
1	4446	50 YR	810.00	326.04	331.18	331.18	332.26	0.00	8.91	216.69	163.33	0.79
1	4446	100 YR	960.00	326.04	331.42	331.42	332.63	0.00	9.62	258.18	192.16	0.84
1	4446	250 YR	1180.00	326.04	331.78	331.78	333.17	0.00	10.46	346.56	293.62	0.88
1	4446	500 YR	1360.00	326.04	332.49	332.49	333.35	0.00	8.88	601.51	406.37	0.69
1	4699 M	2 YR	270.00	326.46	329.97		330.50	0.00	5.82	48.76	29.84	0.58
1	4699 M	5 YR	430.00	326.46	330.71	329.83	331.53	0.00	7.36	86.14	109.33	0.66
1	4699 M	10 YR	530.00	326.46	330.91	330.39	331.98	0.00	8.47	115.32	166.17	0.74
1	4699 M	25 YR	690.00	326.46	331.54	331.54	332.53	0.00	8.57	238.79	210.98	0.70
1	4699 M	50 YR	810.00	326.46	331.81	331.81	332.85	0.00	9.04	296.44	222.60	0.72
1	4699 M	100 YR	960.00	326.46	332.13	332.13	333.21	0.00	9.45	370.89	236.77	0.73
1	4699 M	250 YR	1180.00	326.46	332.52	332.52	333.66	0.00	10.07	466.94	253.87	0.75
1	4699 M	500 YR	1360.00	326.46	332.78	332.78	333.99	0.00	10.60	534.42	265.17	0.77
1	4974	2 YR	200.00	330.53	333.02	333.02	333.24	0.02	4.79	72.07	161.07	0.71
1	4974	5 YR	300.00	330.53	333.16	333.16	333.42	0.02	5.50	95.27	172.48	0.77
1	4974	10 YR	380.00	330.53	333.25	333.25	333.54	0.03	5.98	111.06	179.83	0.82
1	4974	25 YR	490.00	330.53	333.37	333.37	333.69	0.03	6.47	132.05	189.15	0.86
1	4974	50 YR	580.00	330.53	333.43	333.43	333.80	0.03	6.98	144.60	194.33	0.91
1	4974	100 YR	680.00	330.53	333.81		334.00	0.01	5.22	222.57	226.03	0.62
1	4974	250 YR	840.00	330.53	334.27		334.40	0.01	4.24	341.62	290.61	0.46
1	4974	500 YR	970.00	330.53	334.60		334.70	0.00	3.79	441.42	321.24	0.39
1	5219 N	2 YR	200.00	331.65	334.60		334.63	0.00	2.34	208.08	196.42	0.27
1	5219 N	5 YR	300.00	331.65	334.90		334.94	0.00	2.62	280.34	260.30	0.28
1	5219 N	10 YR	380.00	331.65	335.10		335.13	0.00	2.78	331.18	270.50	0.29
1	5219 N	25 YR	490.00	331.65	335.31		335.35	0.00	2.99	391.45	284.49	0.30

HEC-RAS Plan: WC2_Existing River: Stream WC-2 Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5219 N	50 YR	580.00	331.65	335.48		335.52	0.00	3.11	439.01	291.73	0.31
1	5219 N	100 YR	680.00	331.65	335.53		335.58	0.00	3.52	452.84	293.80	0.34
1	5219 N	250 YR	840.00	331.65	335.66		335.73	0.00	3.94	492.69	299.68	0.38
1	5219 N	500 YR	970.00	331.65	335.78		335.85	0.00	4.21	529.74	325.04	0.4
1	5569	2 YR	200.00	333.95	335.86		335.92	0.01	2.66	126.47	167.49	0.38
1	5569	5 YR	300.00	333.95	336.15		336.21	0.01	2.80	176.69	187.54	0.37
1	5569	10 YR	380.00	333.95	336.33		336.40	0.00	2.92	212.97	200.75	0.37
1	5569	25 YR	490.00	333.95	336.56		336.63	0.00	3.08	260.00	216.68	0.37
1	5569	50 YR	580.00	333.95	336.72		336.80	0.00	3.20	295.64	227.79	0.37
1	5569	100 YR	680.00	333.95	336.90		336.98	0.00	3.28	338.82	240.85	0.36
1	5569	250 YR	840.00	333.95	337.15		337.24	0.00	3.46	401.01	260.09	0.37
1	5569	500 YR	970.00	333.95	337.33		337.42	0.00	3.58	447.57	269.76	0.37
1	5776 O	2 YR	200.00	335.02	337.03		337.11	0.01	2.60	98.60	141.46	0.38
1	5776 O	5 YR	300.00	335.02	337.25		337.35	0.01	2.94	130.20	149.84	0.40
1	5776 O	10 YR	380.00	335.02	337.40		337.51	0.01	3.14	153.80	158.53	0.41
1	5776 O	25 YR	490.00	335.02	337.60		337.72	0.01	3.34	186.16	169.70	0.42
1	5776 O	50 YR	580.00	335.02	337.74		337.87	0.01	3.47	210.70	177.44	0.42
1	5776 O	100 YR	680.00	335.02	337.88		338.03	0.01	3.59	236.50	185.29	0.42
1	5776 O	250 YR	840.00	335.02	338.10		338.25	0.01	3.74	277.87	197.21	0.42
1	5776 O	500 YR	970.00	335.02	338.26		338.42	0.01	3.86	310.47	215.27	0.42
1	6011	2 YR	140.00	336.33	338.16		338.20	0.00	1.97	98.83	105.89	0.29
1	6011	5 YR	210.00	336.33	338.43		338.49	0.00	2.25	128.19	110.23	0.30
1	6011	10 YR	260.00	336.33	338.60		338.67	0.00	2.41	147.39	112.97	0.31
1	6011	25 YR	330.00	336.33	338.81		338.89	0.00	2.62	171.31	116.30	0.32
1	6011	50 YR	380.00	336.33	338.95		339.04	0.00	2.74	187.95	118.56	0.32
1	6011	100 YR	450.00	336.33	339.11		339.21	0.00	2.95	206.68	121.05	0.34
1	6011	250 YR	540.00	336.33	339.32		339.43	0.00	3.15	231.96	124.33	0.35
1	6011	500 YR	620.00	336.33	339.48		339.60	0.00	3.33	251.95	126.87	0.35
1	6343	2 YR	140.00	337.63	339.55		339.62	0.01	2.58	70.95	66.83	0.36
1	6343	5 YR	210.00	337.63	339.87		339.96	0.01	2.95	92.57	70.37	0.38
1	6343	10 YR	260.00	337.63	340.05		340.16	0.01	3.19	105.85	72.52	0.39
1	6343	25 YR	330.00	337.63	340.30		340.43	0.01	3.47	124.34	76.24	0.40
1	6343	50 YR	380.00	337.63	340.46		340.60	0.01	3.66	136.67	79.11	0.41
1	6343	100 YR	450.00	337.63	340.67		340.83	0.01	3.88	153.80	82.93	0.42
1	6343	250 YR	540.00	337.63	340.91		341.08	0.01	4.13	173.82	86.70	0.43
1	6343	500 YR	620.00	337.63	341.10		341.29	0.01	4.32	191.12	89.38	0.43
1	6593 P	2 YR	140.00	340.88	342.21	342.21	342.46	0.03	4.60	37.01	66.62	0.8
1	6593 P	5 YR	210.00	340.88	342.38	342.38	342.69	0.03	5.09	49.64	84.71	0.8
1	6593 P	10 YR	260.00	340.88	342.49	342.47	342.83	0.03	5.39	58.73	94.21	0.88
1	6593 P	25 YR	330.00	340.88	342.66	342.66	343.00	0.03	5.36	76.85	112.27	0.81
1	6593 P	50 YR	380.00	340.88	342.76	342.73	343.10	0.02	5.37	88.68	116.85	0.78
1	6593 P	100 YR	450.00	340.88	342.90	342.82	343.23	0.02	5.39	106.07	126.06	0.75
1	6593 P	250 YR	540.00	340.88	343.07	342.95	343.39	0.02	5.38	128.33	134.74	0.71
1	6593 P	500 YR	620.00	340.88	343.20	343.04	343.52	0.02	5.38	145.72	140.13	0.69

HEC-RAS Plan: Swampoodle_Exist River: Swampoodle Reach: 1

Reach	River Sta	Profile	C Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	765	2 YR	2800.00	261.35	273.16	267.11	273.40	0.00	3.96	717.28	489.22	0.25
1	765	5 YR	3700.00	261.35	273.54	267.99	273.92	0.00	4.98	758.20	654.74	0.31
1	765	10 YR	4420.00	261.35	273.95	268.64	274.44	0.00	5.66	803.52	727.24	0.34
1	765	25 YR	5430.00	261.35	274.38	269.48	275.05	0.00	6.61	856.67	814.11	0.39
1	765	50 YR	6190.00	261.35	274.86	270.06	275.64	0.00	7.12	929.45	920.10	0.41
1	765	100 YR	7110.00	261.35	275.27	270.83	276.20	0.00	7.79	1010.63	1002.52	0.44
1	765	250 YR	8840.00	261.35	275.72	272.04	276.99	0.01	9.17	1132.77	1111.73	0.50
1	765	500 YR	10010.00	261.35	276.05	272.66	277.52	0.01	9.93	1235.37	1156.30	0.54
1	1194	2 YR	2800.00	261.33	273.94	269.05	274.23	0.00	4.34	653.57	272.05	0.27
1	1194	5 YR	3700.00	261.33	274.65	269.83	275.08	0.00	5.26	716.57	488.43	0.31
1	1194	10 YR	4420.00	261.33	275.26	270.39	275.79	0.00	5.86	771.95	586.37	0.34
1	1194	25 YR	5430.00	261.33	276.00	271.12	276.68	0.00	6.65	844.43	711.57	0.37
1	1194	50 YR	6190.00	261.33	276.60	271.63	277.38	0.00	7.13	915.76	873.90	0.39
1	1194	100 YR	7110.00	261.33	277.22	272.19	278.12	0.00	7.70	1005.84	977.20	0.40
1	1194	250 YR	8840.00	261.33	278.20	273.19	279.33	0.00	8.67	1175.98	1076.91	0.44
1	1194	500 YR	10010.00	261.33	278.81	273.83	280.07	0.00	9.21	1291.17	1094.05	0.45
1	1282	2 YR	2800.00	263.11	274.17	269.41	274.41	0.00	3.98	724.70	138.23	0.25
1	1282	5 YR	3700.00	263.11	274.96	270.07	275.31	0.00	4.77	805.48	258.70	0.29
1	1282	10 YR	4420.00	263.11	275.63	270.55	276.06	0.00	5.28	875.24	420.55	0.30
1	1282	25 YR	5430.00	263.11	276.46	271.19	276.99	0.00	5.94	969.32	605.68	0.33
1	1282	50 YR	6190.00	263.11	277.11	271.64	277.72	0.00	6.33	1047.89	672.52	0.34
1	1282	100 YR	7110.00	263.11	277.79	272.16	278.49	0.00	6.81	1140.20	734.23	0.35
1	1282	250 YR	8840.00	263.11	278.88	273.09	279.75	0.00	7.64	1290.04	823.50	0.38
1	1282	500 YR	10010.00	263.11	279.53	273.68	280.52	0.00	8.17	1379.86	868.79	0.40
1	1370 Railroad		Bridge									
1	1460 A	2 YR	2800.00	265.43	275.24	271.73	275.83	0.00	6.22	494.36	306.61	0.41
1	1460 A	5 YR	3700.00	265.43	276.44	272.73	277.05	0.00	6.54	669.64	475.46	0.40
1	1460 A	10 YR	4420.00	265.43	277.38	273.45	277.98	0.00	6.63	806.91	479.37	0.38
1	1460 A	25 YR	5430.00	265.43	278.55	274.49	279.15	0.00	6.75	981.93	571.18	0.37
1	1460 A	50 YR	6190.00	265.43	279.41	275.76	280.01	0.00	6.82	1110.04	788.40	0.36
1	1460 A	100 YR	7110.00	265.43	282.00	276.32	282.41	0.00	5.74	1506.31	926.91	0.27
1	1460 A	250 YR	8840.00	265.43	282.97	277.18	283.50	0.00	6.50	1662.23	1091.10	0.30
1	1460 A	500 YR	10010.00	265.43	283.97	277.67	284.52	0.00	6.69	1859.85	1228.62	0.29
1	1523	2 YR	2800.00	266.38	275.50	272.87	276.03	0.00	5.86	479.79	216.90	0.44
1	1523	5 YR	3700.00	266.38	276.61	273.63	277.23	0.00	6.38	617.81	471.21	0.43
1	1523	10 YR	4420.00	266.38	277.52	274.21	278.14	0.00	6.45	782.10	680.97	0.41
1	1523	25 YR	5430.00	266.38	278.71	274.90	279.29	0.00	6.42	1024.54	840.03	0.38
1	1523	50 YR	6190.00	266.38	279.61	275.39	280.14	0.00	6.26	1218.64	888.75	0.35
1	1523	100 YR	7110.00	266.38	282.19	276.01	282.50	0.00	4.96	1781.20	981.54	0.25
1	1523	250 YR	8840.00	266.38	283.24	277.52	283.61	0.00	5.44	2014.25	1077.90	0.26
1	1523	500 YR	10010.00	266.38	284.26	278.09	284.63	0.00	5.55	2253.74	1211.89	0.26
1	1606	2 YR	2800.00	265.79	275.51	273.78	276.54	0.01	8.24	361.75	192.87	0.59
1	1606	5 YR	3700.00	265.79	276.57	274.79	277.74	0.01	8.95	482.58	508.54	0.59
1	1606	10 YR	4420.00	265.79	277.51	275.62	278.54	0.00	8.68	636.47	567.27	0.54
1	1606	25 YR	5430.00	265.79	278.72	277.07	279.60	0.00	8.32	851.90	749.32	0.48
1	1606	50 YR	6190.00	265.79	279.62	277.54	280.40	0.00	8.03	1019.67	880.61	0.44
1	1606	100 YR	7110.00	265.79	282.33	278.02	282.57	0.00	4.86	2079.06	1097.50	0.24
1	1606	250 YR	8840.00	265.79	283.44	278.79	283.68	0.00	5.05	2635.41	1320.26	0.24
1	1606	500 YR	10010.00	265.79	284.48	279.23	284.71	0.00	4.95	3124.52	1532.85	0.22
1	1693	2 YR	2800.00	265.83	276.51	272.90	277.00	0.00	5.84	563.60	414.43	0.36
1	1693	5 YR	3700.00	265.83	277.68	273.92	278.21	0.00	6.25	731.16	526.63	0.36
1	1693	10 YR	4420.00	265.83	278.37	274.68	278.94	0.00	6.59	846.70	557.75	0.37
1	1693	25 YR	5430.00	265.83	279.32	275.57	279.91	0.00	6.89	1012.93	599.94	0.37
1	1693	50 YR	6190.00	265.83	280.06	276.04	280.66	0.00	6.98	1143.92	673.68	0.36
1	1693	100 YR	7110.00	265.83	282.45	277.14	282.64	0.00	4.35	2328.76	1103.90	0.21
1	1693	250 YR	8840.00	265.83	283.57	278.17	283.75	0.00	4.48	3058.86	1261.39	0.20
1	1693	500 YR	0010.00	265.83	284.60	278.71	284.77	0.00	4.35	3588.79	1371.59	0.19
1	1765 Railroad		Bridge									
1	1828 B	2 YR	2800.00	266.89	278.32	273.19	278.68	0.00	4.93	704.43	646.27	0.29
1	1828 B	5 YR	3700.00	266.89	279.72	274.19	280.11	0.00	5.32	939.67	802.69	0.29
1	1828 B	10 YR	4420.00	266.89	281.45	274.88	281.79	0.00	5.09	1231.42	906.01	0.26
1	1828 B	25 YR	5430.00	266.89	282.54	275.79	282.93	0.00	5.53	1414.72	992.63	0.27
1	1828 B	50 YR	6190.00	266.89	283.94	276.46	284.31	0.00	5.48	1651.45	1098.51	0.25
1	1828 B	100 YR	7110.00	266.89	286.26	277.60	286.36	0.00	3.36	3986.53	1250.99	0.14
1	1828 B	250 YR	8840.00	266.89	287.68	278.89	287.75	0.00	3.13	5855.57	1482.54	0.13
1	1828 B	500 YR	0010.00	266.89	288.30	279.49	288.38	0.00	3.29	6346.33	1572.46	0.13
1	1855	2 YR	2800.00	266.38	278.50	273.35	278.75	0.00	4.25	934.01	731.33	0.25
1	1855	5 YR	3700.00	266.38	279.92	274.16	280.19	0.00	4.49	1237.31	870.24	0.24
1	1855	10 YR	4420.00	266.38	281.63	274.73	281.85	0.00	4.29	1598.77	962.38	0.22
1	1855	25 YR	5430.00	266.38	282.74	275.52	283.00	0.00	4.63	1835.85	1008.87	0.22
1	1855	50 YR	6190.00	266.38	284.14	276.08	284.38	0.00	4.58	2131.52	1090.19	0.21
1	1855	100 YR	7110.00	266.38	286.31	276.44	286.38	0.00	2.87	4760.56	1230.27	0.12
1	1855	250 YR	8840.00	266.38	287.71	278.41	287.76	0.00	2.79	6685.90	1481.25	0.12
1	1855	500 YR	0010.00	266.38	288.33	278.93	288.39	0.00	2.94	7206.15	1594.20	0.12
1	1930	2 YR	2800.00	267.08	278.64	273.67	278.83	0.00	3.81	1034.48	694.11	0.22
1	1930	5 YR	3700.00	267.08	280.06	274.48	280.26	0.00	4.10	1315.84	849.85	0.23
1	1930	10 YR	4420.00	267.08	281.72	274.98	281.91	0.00	3.99	1647.11	914.31	0.20

HEC-RAS Plan: Swampoodle_Exist River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1930	25 YR	5430.00	267.08	282.84	275.59	283.06	0.00	4.35	1869.71	979.63	0.21
1	1930	50 YR	6190.00	267.08	284.22	276.02	284.43	0.00	4.34	2143.61	1046.17	0.20
1	1930	100 YR	7110.00	267.08	286.37	276.49	286.40	0.00	2.02	8111.69	1184.92	0.09
1	1930	250 YR	8840.00	267.08	287.75	277.34	287.78	0.00	2.07	11118.92	1499.24	0.0
1	1930	500 YR	10010.00	267.08	288.38	278.19	288.41	0.00	2.15	12094.38	1607.65	0.09
1	1970	2 YR	2800.00	267.32	278.63	274.16	278.93	0.00	4.51	745.84	653.99	0.28
1	1970	5 YR	3700.00	267.32	280.04	275.00	280.36	0.00	4.77	1001.80	749.84	0.28
1	1970	10 YR	4420.00	267.32	281.71	275.59	281.98	0.00	4.54	1304.13	863.97	0.24
1	1970	25 YR	5430.00	267.32	282.83	276.42	283.14	0.00	4.88	1506.84	964.92	0.25
1	1970	50 YR	6190.00	267.32	284.20	276.97	284.49	0.00	4.81	1756.70	1004.05	0.23
1	1970	100 YR	7110.00	267.32	286.37	277.62	286.41	0.00	2.26	7126.78	1224.78	0.10
1	1970	250 YR	8840.00	267.32	287.76	278.86	287.79	0.00	2.25	10203.14	1573.90	0.10
1	1970	500 YR	10010.00	267.32	288.39	279.46	288.42	0.00	2.31	11212.36	1633.01	0.10
1	2015 Railroad		Bridge									
1	2080 C	2 YR	2800.00	267.23	279.15	273.43	279.26	0.00	3.15	1282.96	659.88	0.18
1	2080 C	5 YR	3700.00	267.23	280.61	274.23	280.74	0.00	3.39	1575.33	700.29	0.18
1	2080 C	10 YR	4420.00	267.23	282.22	274.81	282.34	0.00	3.36	1897.03	781.60	0.17
1	2080 C	25 YR	5430.00	267.23	283.49	275.71	283.64	0.00	3.62	2152.78	913.83	0.17
1	2080 C	50 YR	6190.00	267.23	284.91	276.15	285.06	0.00	3.63	2436.40	1030.41	0.16
1	2080 C	100 YR	7110.00	267.23	286.91	276.73	286.93	0.00	1.89	8823.51	1285.26	0.08
1	2080 C	250 YR	8840.00	267.23	287.92	277.41	287.94	0.00	2.07	10704.95	1383.29	0.08
1	2080 C	500 YR	10010.00	267.23	288.49	277.84	288.51	0.00	2.16	11532.83	1522.37	0.09
1	2117	2 YR	2800.00	267.24	279.25	272.86	279.30	0.00	2.04	2108.46	789.62	0.12
1	2117	5 YR	3700.00	267.24	280.73	273.42	280.78	0.00	2.13	2697.07	851.43	0.11
1	2117	10 YR	4420.00	267.24	282.33	273.85	282.38	0.00	2.05	3339.61	913.42	0.10
1	2117	25 YR	5430.00	267.24	283.63	274.41	283.68	0.00	2.17	3859.16	999.36	0.10
1	2117	50 YR	6190.00	267.24	285.05	274.83	285.09	0.00	2.15	4427.12	1127.90	0.10
1	2117	100 YR	7110.00	267.24	286.92	275.15	286.93	0.00	1.60	9085.97	1331.93	0.07
1	2117	250 YR	8840.00	267.24	287.93	275.76	287.95	0.00	1.77	11728.39	1463.38	0.07
1	2117	500 YR	10010.00	267.24	288.50	276.11	288.52	0.00	1.86	12591.66	1551.17	0.08
1	2138	2 YR	2800.00	265.60	279.16	273.07	279.35	0.00	3.87	1096.63	434.01	0.21
1	2138	5 YR	3700.00	265.60	280.62	273.98	280.84	0.00	4.21	1469.01	540.79	0.21
1	2138	10 YR	4420.00	265.60	282.24	274.58	282.43	0.00	4.11	1990.04	704.92	0.20
1	2138	25 YR	5430.00	265.60	283.54	275.44	283.73	0.00	4.29	2497.95	833.16	0.20
1	2138	50 YR	6190.00	265.60	284.98	275.97	285.13	0.00	4.02	3091.93	855.48	0.17
1	2138	100 YR	7110.00	265.60	286.89	276.53	286.95	0.00	2.95	5721.54	1065.76	0.12
1	2138	250 YR	8840.00	265.60	287.89	277.70	287.97	0.00	3.23	6653.85	1263.54	0.13
1	2138	500 YR	10010.00	265.60	288.46	278.42	288.54	0.00	3.41	7261.55	1377.18	0.13
1	2219	2 YR	2800.00	266.49	279.33	272.82	279.43	0.00	2.85	1521.81	500.31	0.16
1	2219	5 YR	3700.00	266.49	280.83	273.40	280.92	0.00	2.94	2046.18	714.01	0.15
1	2219	10 YR	4420.00	266.49	282.43	273.83	282.50	0.00	2.76	2614.13	752.70	0.13
1	2219	25 YR	5430.00	266.49	283.73	274.40	283.80	0.00	2.86	3082.08	786.24	0.13
1	2219	50 YR	6190.00	266.49	285.12	274.78	285.19	0.00	2.80	3620.74	868.40	0.12
1	2219	100 YR	7110.00	266.49	286.91	275.24	286.98	0.00	2.61	4604.79	1181.85	0.11
1	2219	250 YR	8840.00	266.49	287.92	276.02	287.99	0.00	2.87	5429.73	1369.26	0.12
1	2219	500 YR	10010.00	266.49	288.49	276.54	288.57	0.00	3.04	5963.66	1479.28	0.12
1	2264 Texas Viaduct Rd		Bridge									
1	2299	2 YR	2800.00	268.03	279.31	275.00	279.76	0.00	5.71	611.29	400.71	0.35
1	2299	5 YR	3700.00	268.03	280.87	276.14	281.18	0.00	5.12	1013.66	609.54	0.29
1	2299	10 YR	4420.00	268.03	282.49	277.46	282.68	0.00	4.17	1464.37	697.06	0.22
1	2299	25 YR	5430.00	268.03	283.80	278.65	283.96	0.00	3.96	1871.35	758.85	0.20
1	2299	50 YR	6190.00	268.03	285.18	279.82	285.31	0.00	3.55	2482.05	1002.74	0.17
1	2299	100 YR	7110.00	268.03	286.95	280.45	287.05	0.00	3.00	3677.15	1276.03	0.13
1	2299	250 YR	8840.00	268.03	287.96	281.01	288.06	0.00	3.13	4532.42	1390.82	0.13
1	2299	500 YR	10010.00	268.03	288.53	281.33	288.63	0.00	3.23	5061.41	1438.78	0.14
1	2376	2 YR	2800.00	267.88	279.56	275.89	280.10	0.00	6.14	564.67	411.90	0.40
1	2376	5 YR	3700.00	267.88	281.01	277.04	281.34	0.00	5.28	987.21	637.75	0.31
1	2376	10 YR	4420.00	267.88	282.56	277.99	282.74	0.00	4.17	1458.10	709.35	0.23
1	2376	25 YR	5430.00	267.88	283.85	280.25	284.01	0.00	3.88	1856.72	733.25	0.20
1	2376	50 YR	6190.00	267.88	285.22	280.55	285.35	0.00	3.47	2282.76	757.79	0.17
1	2376	100 YR	7110.00	267.88	286.97	280.86	287.07	0.00	3.05	3154.28	1173.04	0.14
1	2376	250 YR	8840.00	267.88	287.97	281.34	288.08	0.00	3.22	3908.57	1270.57	0.14
1	2376	500 YR	10010.00	267.88	288.54	281.63	288.66	0.00	3.33	4367.82	1303.49	0.15
1	2477	2 YR	2800.00	269.09	279.94	275.54	280.31	0.00	5.05	734.86	505.90	0.31
1	2477	5 YR	3700.00	269.09	281.13	276.41	281.48	0.00	5.22	1108.72	714.80	0.30
1	2477	10 YR	4420.00	269.09	282.60	277.06	282.82	0.00	4.50	1696.92	804.10	0.24
1	2477	25 YR	5430.00	269.09	283.88	277.80	284.06	0.00	4.29	2227.55	841.66	0.22
1	2477	50 YR	6190.00	269.09	285.24	278.89	285.38	0.00	3.88	2801.37	866.37	0.18
1	2477	100 YR	7110.00	269.09	286.98	280.37	287.09	0.00	3.56	3650.21	1071.07	0.16
1	2477	250 YR	8840.00	269.09	287.98	281.45	288.11	0.00	3.85	4265.46	1127.14	0.17
1	2477	500 YR	10010.00	269.09	288.55	281.85	288.69	0.00	4.06	4637.35	1176.09	0.17
1	2510	2 YR	2800.00	269.00	280.05	274.99	280.36	0.00	4.49	670.31	518.92	0.28
1	2510	5 YR	3700.00	269.00	281.17	275.90	281.52	0.00	4.89	977.26	637.15	0.28
1	2510	10 YR	4420.00	269.00	282.59	276.54	282.87	0.00	4.54	1399.08	716.50	0.25
1	2510	25 YR	5430.00	269.00	283.87	277.34	284.11	0.00	4.51	1855.13	810.19	0.23
1	2510	50 YR	6190.00	269.00	285.23	277.86	285.42	0.00	4.17	2412.51	885.39	0.20
1	2510	100 YR	7110.00	269.00	286.97	278.48	287.12	0.00	3.73	3279.73	1057.36	0.17

Table D.2
HEC-RAS Output
Ultimate Conditions

HEC-RAS Plan: Swampoodle_Exist River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2510	250 YR	8840.00	269.00	287.97	279.58	288.14	0.00	4.06	3907.98	1186.93	0.18
1	2510	500 YR	10010.00	269.00	288.54	281.41	288.71	0.00	4.24	4311.64	1222.19	0.18
1	2545 Broad St.		Culvert									
1	2574 D	2 YR	2800.00	268.71	280.87	275.62	281.24	0.00	4.91	594.03	433.06	0.30
1	2574 D	5 YR	3700.00	268.71	282.26	276.62	282.67	0.00	5.28	846.86	619.36	0.30
1	2574 D	10 YR	4420.00	268.71	283.37	277.35	283.74	0.00	5.22	1176.26	681.39	0.28
1	2574 D	25 YR	5430.00	268.71	284.29	278.27	284.67	0.00	5.48	1456.51	718.47	0.29
1	2574 D	50 YR	6190.00	268.71	285.25	278.89	285.60	0.00	5.39	1792.14	787.07	0.27
1	2574 D	100 YR	7110.00	268.71	286.97	279.62	287.20	0.00	4.70	2585.48	998.81	0.22
1	2574 D	250 YR	8840.00	268.71	287.94	281.66	288.20	0.00	5.04	3142.94	1063.43	0.23
1	2574 D	500 YR	10010.00	268.71	288.50	282.74	288.77	0.00	5.26	3482.35	1092.61	0.23
1	2642	2 YR	2800.00	269.91	280.74	277.84	281.56	0.00	7.50	443.17	321.68	0.47
1	2642	5 YR	3700.00	269.91	282.11	279.02	282.98	0.00	7.91	637.42	520.01	0.46
1	2642	10 YR	4420.00	269.91	283.23	279.88	284.01	0.00	7.80	879.58	621.97	0.43
1	2642	25 YR	5430.00	269.91	284.18	280.88	284.92	0.00	7.93	1124.76	651.02	0.41
1	2642	50 YR	6190.00	269.91	285.18	282.27	285.79	0.00	7.49	1395.52	674.34	0.38
1	2642	100 YR	7110.00	269.91	286.92	282.84	287.33	0.00	6.47	1894.80	731.47	0.30
1	2642	250 YR	8840.00	269.91	287.88	284.09	288.33	0.00	7.01	2278.12	914.76	0.32
1	2642	500 YR	10010.00	269.91	288.44	284.52	288.91	0.00	7.31	2549.66	933.36	0.33
1	2717	2 YR	2800.00	269.99	280.87	278.44	281.76	0.00	7.64	407.01	193.63	0.51
1	2717	5 YR	3700.00	269.99	282.24	279.47	283.14	0.00	7.96	598.38	455.33	0.49
1	2717	10 YR	4420.00	269.99	283.37	280.28	284.14	0.00	7.64	830.25	542.71	0.44
1	2717	25 YR	5430.00	269.99	284.27	281.67	285.04	0.00	7.90	1024.78	587.60	0.43
1	2717	50 YR	6190.00	269.99	285.25	282.35	285.89	0.00	7.46	1369.67	703.67	0.39
1	2717	100 YR	7110.00	269.99	286.99	283.28	287.38	0.00	6.34	2067.06	854.24	0.31
1	2717	250 YR	8840.00	269.99	287.98	284.05	288.39	0.00	6.69	2528.63	891.38	0.31
1	2717	500 YR	10010.00	269.99	288.54	284.64	288.98	0.00	6.95	2797.56	918.25	0.32
1	2836	2 YR	2880.00	268.17	281.51	277.39	282.10	0.00	6.33	520.74	230.46	0.37
1	2836	5 YR	3990.00	268.17	282.67	278.68	283.44	0.00	7.39	675.46	340.16	0.41
1	2836	10 YR	4800.00	268.17	283.57	279.46	284.39	0.00	7.76	820.79	419.53	0.41
1	2836	25 YR	6100.00	268.17	284.41	280.48	285.39	0.00	8.68	975.75	514.26	0.44
1	2836	50 YR	7020.00	268.17	285.32	282.10	286.24	0.00	8.68	1265.65	717.88	0.43
1	2836	100 YR	8000.00	268.17	287.04	282.79	287.59	0.00	7.26	2108.58	926.24	0.34
1	2836	250 YR	9450.00	268.17	288.07	283.96	288.54	0.00	7.05	2666.97	976.48	0.32
1	2836	500 YR	10510.00	268.17	288.65	284.73	289.11	0.00	7.09	2990.82	1014.65	0.31
1	2880 Texas Viaduct Rd		Bridge									
1	2924	2 YR	2880.00	267.81	281.89	276.59	282.33	0.00	5.36	557.93	212.17	0.33
1	2924	5 YR	3990.00	267.81	283.13	277.97	283.72	0.00	6.30	714.28	402.65	0.36
1	2924	10 YR	4800.00	267.81	284.03	278.82	284.68	0.00	6.68	870.15	481.23	0.36
1	2924	25 YR	6100.00	267.81	284.97	280.01	285.73	0.00	7.41	1055.28	522.07	0.39
1	2924	50 YR	7020.00	267.81	285.81	280.81	286.58	0.00	7.59	1236.80	568.76	0.38
1	2924	100 YR	8000.00	267.81	287.29	281.67	287.89	0.00	6.98	1710.04	814.34	0.33
1	2924	250 YR	9450.00	267.81	288.29	283.26	288.87	0.00	7.09	2184.72	950.43	0.33
1	2924	500 YR	10510.00	267.81	288.88	284.08	289.46	0.00	7.20	2497.72	1009.07	0.32
1	2957	2 YR	2880.00	268.70	281.80	278.14	282.52	0.00	6.90	462.51	169.50	0.42
1	2957	5 YR	3990.00	268.70	283.01	279.47	283.96	0.00	8.04	599.54	307.67	0.46
1	2957	10 YR	4800.00	268.70	283.90	280.34	284.94	0.00	8.57	732.67	402.30	0.47
1	2957	25 YR	6100.00	268.70	284.81	281.76	286.02	0.00	9.48	904.24	455.71	0.50
1	2957	50 YR	7020.00	268.70	285.67	282.76	286.85	0.00	9.56	1087.72	494.00	0.48
1	2957	100 YR	8000.00	268.70	287.20	283.25	288.07	0.00	8.63	1526.24	777.35	0.41
1	2957	250 YR	9450.00	268.70	288.20	284.95	289.05	0.00	8.80	1976.26	938.89	0.40
1	2957	500 YR	10510.00	268.70	288.79	285.67	289.64	0.00	9.00	2291.38	1004.03	0.41
1	2972	2 YR	2880.00	268.22	281.84	277.62	282.55	0.00	6.97	486.95	169.32	0.39
1	2972	5 YR	3990.00	268.22	283.02	279.09	284.01	0.00	8.34	615.59	268.44	0.45
1	2972	10 YR	4800.00	268.22	283.91	279.98	284.99	0.00	8.89	751.15	330.18	0.46
1	2972	25 YR	6100.00	268.22	284.80	281.63	286.09	0.00	9.96	914.38	426.69	0.49
1	2972	50 YR	7020.00	268.22	285.66	282.62	286.92	0.00	10.12	1091.84	513.31	0.48
1	2972	100 YR	8000.00	268.22	287.16	283.91	288.14	0.00	9.34	1549.92	813.55	0.42
1	2972	250 YR	9450.00	268.22	288.20	285.08	289.09	0.00	9.29	2073.80	1002.65	0.41
1	2972	500 YR	10510.00	268.22	288.82	285.73	289.66	0.00	9.28	2455.06	1115.45	0.40
1	3035 3rd St.		Bridge									
1	3081 E	2 YR	2880.00	269.70	282.61	276.85	282.89	0.00	4.41	781.61	322.33	0.26
1	3081 E	5 YR	3990.00	269.70	284.23	278.06	284.53	0.00	4.75	1115.73	422.88	0.26
1	3081 E	10 YR	4800.00	269.70	285.34	278.87	285.65	0.00	4.89	1411.24	529.95	0.25
1	3081 E	25 YR	6100.00	269.70	286.45	279.97	286.78	0.00	5.25	1776.40	637.95	0.26
1	3081 E	50 YR	7020.00	269.70	287.41	280.80	287.57	0.00	4.12	3273.08	663.95	0.20
1	3081 E	100 YR	8000.00	269.70	288.41	281.85	288.54	0.00	3.92	3949.85	689.63	0.18
1	3081 E	250 YR	9450.00	269.70	289.34	282.98	289.47	0.00	3.96	4603.53	709.57	0.18
1	3081 E	500 YR	10510.00	269.70	289.89	283.47	290.02	0.00	4.06	4997.17	724.93	0.18
1	3130	2 YR	2880.00	270.35	282.54	278.67	283.04	0.00	5.98	633.07	364.82	0.36
1	3130	5 YR	3990.00	270.35	284.24	279.86	284.59	0.00	5.54	1178.36	421.78	0.30
1	3130	10 YR	4800.00	270.35	285.38	280.67	285.68	0.00	5.36	1545.43	559.52	0.28
1	3130	25 YR	6100.00	270.35	286.53	282.47	286.83	0.00	5.50	2002.38	641.13	0.27
1	3130	50 YR	7020.00	270.35	287.44	282.98	287.59	0.00	4.40	3326.63	688.53	0.21
1	3130	100 YR	8000.00	270.35	288.44	283.88	288.56	0.00	4.11	4050.50	744.49	0.19
1	3130	250 YR	9450.00	270.35	289.38	284.24	289.49	0.00	4.12	4767.12	789.58	0.18

HEC-RAS Plan: Swampoodle_Exist River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3130	500 YR	10510.00	270.35	289.93	284.30	290.04	0.00	4.19	5219.12	871.09	0.18
1	3211	2 YR	2880.00	270.27	282.77	278.47	283.16	0.00	5.16	614.31	341.07	0.33
1	3211	5 YR	3990.00	270.27	284.49	279.68	284.69	0.00	4.26	1599.24	491.27	0.2
1	3211	10 YR	4800.00	270.27	285.62	280.43	285.77	0.00	3.87	2286.94	653.36	0.21
1	3211	25 YR	6100.00	270.27	286.79	281.61	286.91	0.00	3.77	3091.97	740.15	0.19
1	3211	50 YR	7020.00	270.27	287.51	282.22	287.62	0.00	3.73	3645.66	791.98	0.19
1	3211	100 YR	8000.00	270.27	288.49	282.79	288.59	0.00	3.53	4441.06	823.00	0.17
1	3211	250 YR	9450.00	270.27	289.42	283.62	289.52	0.00	3.55	5217.20	843.82	0.17
1	3211	500 YR	10510.00	270.27	289.97	284.13	290.07	0.00	3.63	5686.37	864.80	0.17
1	3258 Texas Viaduct Rd		Bridge									
1	3284	2 YR	2880.00	271.08	283.04	278.70	283.56	0.00	6.15	614.17	257.34	0.35
1	3284	5 YR	3990.00	271.08	284.96	280.15	285.28	0.00	5.43	1527.24	669.85	0.28
1	3284	10 YR	4800.00	271.08	285.78	281.10	286.03	0.00	5.15	2086.09	709.50	0.26
1	3284	25 YR	6100.00	271.08	286.77	282.84	286.97	0.00	4.97	2829.35	796.54	0.24
1	3284	50 YR	7020.00	271.08	287.50	283.52	287.67	0.00	4.74	3424.50	819.18	0.22
1	3284	100 YR	8000.00	271.08	288.54	284.81	288.66	0.00	4.29	4278.65	837.77	0.19
1	3284	250 YR	9450.00	271.08	289.47	285.41	289.58	0.00	4.22	5066.13	855.58	0.19
1	3284	500 YR	10510.00	271.08	290.02	285.67	290.13	0.00	4.26	5544.20	876.56	0.18
1	3293	2 YR	2880.00	271.13	283.21	278.76	283.61	0.00	5.30	678.61	271.50	0.32
1	3293	5 YR	3990.00	271.13	285.08	279.98	285.32	0.00	4.63	1623.89	676.70	0.25
1	3293	10 YR	4800.00	271.13	285.84	280.74	286.05	0.00	4.51	2162.37	726.65	0.24
1	3293	25 YR	6100.00	271.13	286.80	282.43	286.98	0.00	4.48	2894.76	783.12	0.23
1	3293	50 YR	7020.00	271.13	287.53	283.10	287.68	0.00	4.36	3465.36	798.19	0.21
1	3293	100 YR	8000.00	271.13	288.54	283.70	288.66	0.00	4.02	4299.55	834.70	0.19
1	3293	250 YR	9450.00	271.13	289.47	284.64	289.58	0.00	4.00	5085.60	862.75	0.18
1	3293	500 YR	10510.00	271.13	290.02	285.31	290.13	0.00	4.05	5563.37	873.39	0.18
1	3299	2 YR	2880.00	271.22	283.13	278.72	283.70	0.00	6.33	600.09	186.74	0.36
1	3299	5 YR	3990.00	271.22	284.96	280.10	285.44	0.00	6.29	1235.79	644.73	0.33
1	3299	10 YR	4800.00	271.22	285.76	280.87	286.14	0.00	6.00	1778.79	708.67	0.30
1	3299	25 YR	6100.00	271.22	286.75	282.17	287.05	0.00	5.79	2526.06	789.94	0.28
1	3299	50 YR	7020.00	271.22	287.49	284.01	287.72	0.00	5.46	3118.99	817.19	0.26
1	3299	100 YR	8000.00	271.22	288.52	285.55	288.69	0.00	4.86	3980.39	847.46	0.22
1	3299	250 YR	9450.00	271.22	289.46	285.91	289.60	0.00	4.73	4784.37	878.31	0.21
1	3299	500 YR	10510.00	271.22	290.01	286.16	290.15	0.00	4.75	5275.57	899.97	0.21
1	3325 4th St.		Culvert									
1	3362 F	2 YR	2880.00	271.08	283.81	278.82	283.94	0.00	3.65	1543.03	847.69	0.2
1	3362 F	5 YR	3990.00	271.08	285.46	280.30	285.52	0.00	2.80	3160.64	922.68	0.14
1	3362 F	10 YR	4800.00	271.08	286.12	281.11	286.18	0.00	2.86	3659.71	959.72	0.14
1	3362 F	25 YR	6100.00	271.08	287.03	282.06	287.08	0.00	2.97	4390.77	1026.23	0.14
1	3362 F	50 YR	7020.00	271.08	287.72	282.66	287.77	0.00	2.99	4974.20	1061.17	0.14
1	3362 F	100 YR	8000.00	271.08	288.67	283.47	288.72	0.00	2.87	5809.76	1085.00	0.13
1	3362 F	250 YR	9450.00	271.08	289.59	283.72	289.64	0.00	2.93	6625.72	1100.58	0.13
1	3362 F	500 YR	10510.00	271.08	290.12	283.96	290.17	0.00	3.01	7108.28	1110.61	0.13
1	3443	2 YR	2880.00	271.61	283.79	279.86	284.03	0.00	4.61	1120.31	692.06	0.27
1	3443	5 YR	3990.00	271.61	285.47	281.05	285.54	0.00	2.98	2948.65	840.22	0.16
1	3443	10 YR	4800.00	271.61	286.13	281.69	286.20	0.00	3.01	3478.02	880.63	0.16
1	3443	25 YR	6100.00	271.61	287.04	283.42	287.10	0.00	3.11	4269.04	949.70	0.16
1	3443	50 YR	7020.00	271.61	287.73	283.80	287.79	0.00	3.10	4888.17	989.12	0.15
1	3443	100 YR	8000.00	271.61	288.68	284.00	288.73	0.00	2.95	5777.79	1025.08	0.14
1	3443	250 YR	9450.00	271.61	289.60	284.01	289.65	0.00	2.99	6642.67	1057.06	0.14
1	3443	500 YR	10510.00	271.61	290.13	284.09	290.19	0.00	3.07	7151.16	1065.38	0.14
1	3574	2 YR	2880.00	271.30	283.91	279.72	284.13	0.00	4.31	1107.70	589.27	0.26
1	3574	5 YR	3990.00	271.30	285.48	281.09	285.58	0.00	3.42	2539.07	835.69	0.19
1	3574	10 YR	4800.00	271.30	286.15	281.93	286.24	0.00	3.42	3112.29	896.97	0.19
1	3574	25 YR	6100.00	271.30	287.06	283.41	287.14	0.00	3.45	4003.89	1049.91	0.18
1	3574	50 YR	7020.00	271.30	287.74	283.54	287.82	0.00	3.38	4745.54	1099.97	0.17
1	3574	100 YR	8000.00	271.30	288.69	283.96	288.75	0.00	3.15	5808.06	1132.16	0.15
1	3574	250 YR	9450.00	271.30	289.61	284.13	289.67	0.00	3.15	6881.52	1205.53	0.15
1	3574	500 YR	10510.00	271.30	290.15	284.13	290.21	0.00	3.18	7533.58	1214.11	0.15
1	3668	2 YR	2880.00	271.59	284.09	279.48	284.23	0.00	3.57	1212.40	541.23	0.21
1	3668	5 YR	3990.00	271.59	285.55	280.57	285.63	0.00	2.99	2111.72	792.38	0.17
1	3668	10 YR	4800.00	271.59	286.22	281.31	286.28	0.00	2.83	2779.11	857.47	0.15
1	3668	25 YR	6100.00	271.59	287.12	283.41	287.18	0.00	2.74	3586.19	930.16	0.14
1	3668	50 YR	7020.00	271.59	287.80	283.75	287.86	0.00	2.64	4253.59	1039.51	0.13
1	3668	100 YR	8000.00	271.59	288.74	284.07	288.78	0.00	2.39	5268.19	1120.81	0.12
1	3668	250 YR	9450.00	271.59	289.66	284.47	289.70	0.00	2.31	6316.44	1165.47	0.11
1	3668	500 YR	10510.00	271.59	290.19	284.63	290.23	0.00	2.31	6949.07	1186.59	0.11
1	3705 5th St.		Bridge									
1	3757 G	2 YR	2880.00	271.58	284.24	279.90	284.36	0.00	3.74	1699.38	722.22	0.2
1	3757 G	5 YR	3990.00	271.58	285.59	281.65	285.68	0.00	3.56	2570.99	823.39	0.18
1	3757 G	10 YR	4800.00	271.58	286.26	282.39	286.33	0.00	3.30	3571.68	918.65	0.16
1	3757 G	25 YR	6100.00	271.58	287.16	283.06	287.22	0.00	3.34	4434.56	998.43	0.16
1	3757 G	50 YR	7020.00	271.58	287.90	283.33	287.95	0.00	3.25	5182.30	1025.16	0.15
1	3757 G	100 YR	8000.00	271.58	288.81	283.83	288.85	0.00	3.08	6164.69	1113.75	0.14
1	3757 G	250 YR	9450.00	271.58	289.71	284.21	289.75	0.00	3.09	7181.52	1139.83	0.14
1	3757 G	500 YR	10510.00	271.58	290.24	284.44	290.29	0.00	3.14	7793.68	1153.90	0.14

HEC-RAS Plan: Swampoodle_Exist River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3848	2 YR	2880.00	271.25	284.30	279.53	284.40	0.00	3.32	1932.40	737.02	0.20
1	3848	5 YR	3990.00	271.25	285.63	280.74	285.71	0.00	3.15	2898.43	801.37	0.17
1	3848	10 YR	4800.00	271.25	286.28	282.83	286.36	0.00	3.21	3511.65	832.75	0.17
1	3848	25 YR	6100.00	271.25	287.18	283.36	287.26	0.00	3.36	4295.03	922.53	0.17
1	3848	50 YR	7020.00	271.25	287.92	283.61	287.99	0.00	3.34	4989.58	960.62	0.17
1	3848	100 YR	8000.00	271.25	288.82	283.87	288.88	0.00	3.22	5871.65	1007.42	0.15
1	3848	250 YR	9450.00	271.25	289.72	284.21	289.78	0.00	3.28	6831.37	1088.51	0.15
1	3848	500 YR	10510.00	271.25	290.25	284.42	290.32	0.00	3.36	7414.03	1096.70	0.15
1	4130	2 YR	2880.00	271.01	284.32	279.22	284.68	0.00	5.13	951.60	541.01	0.30
1	4130	5 YR	3990.00	271.01	285.67	280.63	285.90	0.00	4.72	1782.24	658.92	0.26
1	4130	10 YR	4800.00	271.01	286.33	281.53	286.53	0.00	4.68	2222.72	677.23	0.25
1	4130	25 YR	6100.00	271.01	287.23	283.46	287.42	0.00	4.69	2869.60	763.26	0.24
1	4130	50 YR	7020.00	271.01	287.97	285.03	288.13	0.00	4.54	3445.02	810.33	0.23
1	4130	100 YR	8000.00	271.01	288.87	285.34	289.00	0.00	4.28	4198.49	873.44	0.21
1	4130	250 YR	9450.00	271.01	289.77	285.71	289.89	0.00	4.24	4999.60	906.45	0.20
1	4130	500 YR	10510.00	271.01	290.30	285.96	290.42	0.00	4.37	5500.53	988.37	0.20
1	4313	2 YR	2880.00	273.16	284.52	280.78	284.93	0.00	5.42	726.48	245.98	0.34
1	4313	5 YR	3990.00	273.16	285.72	281.96	286.15	0.00	5.90	1130.85	427.00	0.34
1	4313	10 YR	4800.00	273.16	286.32	282.97	286.80	0.00	6.35	1426.92	613.74	0.36
1	4313	25 YR	6100.00	273.16	287.23	284.17	287.66	0.00	6.41	2086.05	784.63	0.34
1	4313	50 YR	7020.00	273.16	287.99	284.72	288.32	0.00	5.99	2699.34	822.72	0.31
1	4313	100 YR	8000.00	273.16	288.90	285.56	289.14	0.00	5.44	3459.89	853.01	0.27
1	4313	250 YR	9450.00	273.16	289.81	286.20	290.01	0.00	5.24	4243.09	872.39	0.25
1	4313	500 YR	10510.00	273.16	290.35	287.16	290.54	0.00	5.22	4716.40	883.09	0.25
1	4443	2 YR	2880.00	274.04	284.65	281.01	285.22	0.00	6.13	496.46	126.69	0.39
1	4443	5 YR	3990.00	274.04	285.78	282.15	286.53	0.00	7.14	700.71	264.51	0.43
1	4443	10 YR	4800.00	274.04	286.37	282.86	287.21	0.00	7.67	932.90	487.03	0.44
1	4443	25 YR	6100.00	274.04	287.26	283.88	288.04	0.00	7.83	1437.23	601.05	0.43
1	4443	50 YR	7020.00	274.04	288.01	285.05	288.62	0.00	7.37	1898.63	638.81	0.39
1	4443	100 YR	8000.00	274.04	288.92	287.20	289.36	0.00	6.72	2527.50	732.62	0.35
1	4443	250 YR	9450.00	274.04	289.82	287.62	290.19	0.00	6.42	3221.87	791.48	0.32
1	4443	500 YR	10510.00	274.04	290.37	287.92	290.70	0.00	6.32	3657.00	838.87	0.31
1	4509 7th St.		Culvert									
1	4567 H	2 YR	2880.00	275.06	286.22	280.16	286.49	0.00	4.23	851.51	352.44	0.24
1	4567 H	5 YR	3990.00	275.06	286.78	281.25	287.18	0.00	5.30	1129.16	573.04	0.30
1	4567 H	10 YR	4800.00	275.06	287.11	281.96	287.59	0.00	5.91	1319.92	615.61	0.33
1	4567 H	25 YR	6100.00	275.06	287.58	282.99	288.16	0.00	6.72	1633.06	712.31	0.36
1	4567 H	50 YR	7020.00	275.06	288.16	283.66	288.68	0.00	6.64	2034.32	726.20	0.35
1	4567 H	100 YR	8000.00	275.06	289.00	284.29	289.40	0.00	6.15	2617.84	739.55	0.31
1	4567 H	250 YR	9450.00	275.06	289.94	287.40	290.26	0.00	5.90	3264.17	749.82	0.29
1	4567 H	500 YR	10510.00	275.06	290.41	287.82	290.73	0.00	5.96	3594.83	754.75	0.29
1	4632	2 YR	2880.00	275.43	286.20	282.56	286.65	0.00	5.68	721.83	295.06	0.36
1	4632	5 YR	3990.00	275.43	286.76	283.71	287.40	0.00	6.95	896.19	426.32	0.42
1	4632	10 YR	4800.00	275.43	287.07	284.48	287.86	0.00	7.83	1015.70	498.91	0.47
1	4632	25 YR	6100.00	275.43	287.53	285.58	288.51	0.00	8.96	1238.79	712.93	0.52
1	4632	50 YR	7020.00	275.43	288.12	287.15	289.00	0.00	8.83	1594.89	735.51	0.50
1	4632	100 YR	8000.00	275.43	289.01	287.52	289.61	0.00	7.85	2131.36	756.30	0.42
1	4632	250 YR	9450.00	275.43	289.95	288.33	290.42	0.00	7.31	2712.70	780.64	0.38
1	4632	500 YR	10510.00	275.43	290.43	288.58	290.88	0.00	7.29	3007.57	798.72	0.37
1	4717	2 YR	2880.00	275.23	286.45	282.62	286.78	0.00	5.07	946.44	500.77	0.31
1	4717	5 YR	3990.00	275.23	287.17	283.75	287.57	0.00	5.86	1248.40	626.44	0.35
1	4717	10 YR	4800.00	275.23	287.62	284.52	288.06	0.00	6.31	1498.95	703.53	0.37
1	4717	25 YR	6100.00	275.23	288.31	286.23	288.74	0.00	6.59	1884.69	717.33	0.37
1	4717	50 YR	7020.00	275.23	288.79	286.90	289.21	0.00	6.67	2157.28	725.99	0.36
1	4717	100 YR	8000.00	275.23	289.39	287.02	289.77	0.00	6.58	2494.59	736.42	0.35
1	4717	250 YR	9450.00	275.23	290.20	287.92	290.54	0.00	6.51	2955.47	749.80	0.33
1	4717	500 YR	10510.00	275.23	290.65	288.17	290.99	0.00	6.61	3212.82	756.95	0.33
1	4812	2 YR	2030.00	275.13	286.79	281.48	286.91	0.00	3.46	1217.38	719.46	0.19
1	4812	5 YR	2780.00	275.13	287.62	283.07	287.73	0.00	3.62	1693.54	738.87	0.19
1	4812	10 YR	3300.00	275.13	288.13	283.88	288.24	0.00	3.70	1987.12	746.57	0.19
1	4812	25 YR	4230.00	275.13	288.80	284.96	288.92	0.00	3.95	2375.18	755.54	0.20
1	4812	50 YR	4920.00	275.13	289.26	285.45	289.38	0.00	4.10	2640.70	761.05	0.20
1	4812	100 YR	5670.00	275.13	289.80	286.09	289.92	0.00	4.17	2956.61	767.34	0.20
1	4812	250 YR	6640.00	275.13	290.57	286.92	290.68	0.00	4.17	3403.67	777.64	0.20
1	4812	500 YR	7480.00	275.13	291.01	287.17	291.13	0.00	4.32	3663.22	785.00	0.20
1	4882 8th St.		Bridge									
1	4944 I	2 YR	2030.00	275.13	286.86	281.51	286.96	0.00	3.30	1572.10	607.79	0.18
1	4944 I	5 YR	2780.00	275.13	287.69	282.66	287.79	0.00	3.55	2077.77	708.98	0.19
1	4944 I	10 YR	3300.00	275.13	288.20	283.35	288.30	0.00	3.68	2388.67	731.62	0.19
1	4944 I	25 YR	4230.00	275.13	288.88	284.29	288.99	0.00	4.01	2806.88	758.89	0.20
1	4944 I	50 YR	4920.00	275.13	289.34	284.84	289.46	0.00	4.21	3092.24	774.38	0.21
1	4944 I	100 YR	5670.00	275.13	289.89	285.43	290.01	0.00	4.34	3429.10	794.39	0.21
1	4944 I	250 YR	6640.00	275.13	290.66	286.29	290.77	0.00	4.41	3903.09	871.41	0.21
1	4944 I	500 YR	7480.00	275.13	291.10	286.57	291.23	0.00	4.60	4182.25	882.68	0.21
1	5062	2 YR	2030.00	276.53	286.88	282.90	287.01	0.00	3.46	1253.88	626.85	0.23
1	5062	5 YR	2780.00	276.53	287.70	283.68	287.85	0.00	3.76	1841.83	740.90	0.23

HEC-RAS Plan: Swampoodle_Exist River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5062	10 YR	3300.00	276.53	288.22	284.19	288.35	0.00	3.79	2219.17	752.83	0.23
1	5062	25 YR	4230.00	276.53	288.91	285.12	289.04	0.00	4.00	2727.31	766.76	0.23
1	5062	50 YR	4920.00	276.53	289.37	285.63	289.51	0.00	4.13	3073.56	776.83	0.23
1	5062	100 YR	5670.00	276.53	289.92	285.67	290.05	0.00	4.18	3480.69	932.66	0.2
1	5062	250 YR	6640.00	276.53	290.69	286.78	290.81	0.00	4.17	4051.54	1008.41	0.22
1	5062	500 YR	7480.00	276.53	291.14	287.58	291.27	0.00	4.31	4389.37	1020.66	0.22
1	5656 J	2 YR	2030.00	277.30	287.23	283.89	287.47	0.00	4.51	558.58	150.75	0.27
1	5656 J	5 YR	2780.00	277.30	288.05	284.89	288.34	0.00	5.10	716.59	244.63	0.29
1	5656 J	10 YR	3300.00	277.30	288.53	285.56	288.84	0.00	5.40	841.08	283.55	0.30
1	5656 J	25 YR	4230.00	277.30	289.20	286.24	289.56	0.00	5.88	1036.54	298.62	0.32
1	5656 J	50 YR	4920.00	277.30	289.66	286.73	290.04	0.00	6.15	1178.50	320.96	0.32
1	5656 J	100 YR	5670.00	277.30	290.18	287.24	290.57	0.00	6.30	1347.64	519.76	0.32
1	5656 J	250 YR	6640.00	277.30	290.91	287.96	291.29	0.00	6.33	1605.70	713.84	0.32
1	5656 J	500 YR	7480.00	277.30	291.36	288.37	291.75	0.00	6.51	1780.32	765.40	0.32
1	6252	2 YR	1990.00	276.85	287.79		288.11	0.00	5.10	587.30	130.21	0.29
1	6252	5 YR	2720.00	276.85	288.69		289.12	0.00	6.02	711.53	154.27	0.33
1	6252	10 YR	3270.00	276.85	289.20		289.72	0.00	6.65	811.86	225.23	0.36
1	6252	25 YR	4170.00	276.85	289.94		290.56	0.00	7.47	1009.18	322.35	0.39
1	6252	50 YR	4840.00	276.85	290.42		291.10	0.00	7.98	1188.95	441.70	0.40
1	6252	100 YR	5600.00	276.85	290.95		291.66	0.00	8.36	1435.57	499.57	0.42
1	6252	250 YR	6530.00	276.85	291.64		292.33	0.00	8.53	1795.15	526.59	0.41
1	6252	500 YR	7360.00	276.85	292.11		292.80	0.00	8.80	2041.29	533.48	0.42
1	6873	2 YR	1990.00	276.62	288.20	284.43	288.71	0.00	5.74	356.96	70.16	0.41
1	6873	5 YR	2720.00	276.62	289.16	285.92	289.85	0.00	6.74	427.41	77.76	0.44
1	6873	10 YR	3270.00	276.62	289.70	286.76	290.55	0.00	7.48	471.03	81.97	0.47
1	6873	25 YR	4170.00	276.62	290.45	287.67	291.56	0.00	8.60	534.03	104.19	0.52
1	6873	50 YR	4840.00	276.62	290.91	288.29	292.23	0.00	9.39	576.93	145.45	0.55
1	6873	100 YR	5600.00	276.62	291.37	288.98	292.89	0.00	10.16	720.73	441.98	0.58
1	6873	250 YR	6530.00	276.62	292.00	289.74	293.56	0.00	10.55	1091.93	674.03	0.59
1	6873	500 YR	7360.00	276.62	292.52	290.39	293.99	0.00	10.60	1442.97	692.13	0.58
1	7003	2 YR	1990.00	278.61	288.35	285.71	288.98	0.00	6.35	313.22	58.03	0.48
1	7003	5 YR	2720.00	278.61	289.32	286.74	290.16	0.00	7.35	371.67	62.72	0.52
1	7003	10 YR	3270.00	278.61	289.88	287.42	290.89	0.00	8.08	407.68	65.44	0.55
1	7003	25 YR	4170.00	278.61	290.65	288.38	291.96	0.00	9.21	459.10	68.87	0.60
1	7003	50 YR	4840.00	278.61	291.13	289.01	292.68	0.00	10.02	492.52	70.96	0.63
1	7003	100 YR	5600.00	278.61	291.57	289.67	293.42	0.00	10.95	529.72	102.09	0.67
1	7003	250 YR	6530.00	278.61	292.05	290.42	294.27	0.00	12.01	588.68	146.68	0.72
1	7003	500 YR	7360.00	278.61	292.34	291.01	294.94	0.00	13.05	647.66	298.56	0.77
1	7055 13th St.		Bridge									
1	7116 K	2 YR	1990.00	279.58	288.96	285.36	289.36	0.00	5.11	389.52	67.42	0.37
1	7116 K	5 YR	2720.00	279.58	290.13	286.33	290.65	0.00	5.76	472.06	73.66	0.40
1	7116 K	10 YR	3270.00	279.58	290.86	286.98	291.46	0.00	6.21	527.56	77.56	0.41
1	7116 K	25 YR	4170.00	279.58	291.92	287.92	292.66	0.00	6.88	612.63	83.18	0.42
1	7116 K	50 YR	4840.00	279.58	292.40	288.55	293.28	0.00	7.55	654.53	105.01	0.45
1	7116 K	100 YR	5600.00	279.58	293.61	289.20	294.39	0.00	7.25	1147.31	628.13	0.41
1	7116 K	250 YR	6530.00	279.58	294.90	289.94	295.43	0.00	6.44	2081.55	776.11	0.34
1	7116 K	500 YR	7360.00	279.58	295.54	290.52	296.02	0.00	6.36	2613.91	874.02	0.33
1	7237	2 YR	1990.00	280.09	289.12	286.87	289.79	0.01	6.61	301.23	63.60	0.53
1	7237	5 YR	2720.00	280.09	290.30	287.91	291.09	0.01	7.13	383.12	74.55	0.53
1	7237	10 YR	3270.00	280.09	291.03	288.60	291.91	0.01	7.54	440.12	81.50	0.53
1	7237	25 YR	4170.00	280.09	292.10	289.60	293.10	0.01	8.11	535.96	99.72	0.53
1	7237	50 YR	4840.00	280.09	292.60	290.14	293.75	0.01	8.71	589.03	132.52	0.55
1	7237	100 YR	5600.00	280.09	293.99	290.76	294.66	0.00	7.20	1190.33	687.56	0.42
1	7237	250 YR	6530.00	280.09	295.39	291.48	295.65	0.00	5.17	2327.60	853.30	0.28
1	7237	500 YR	7360.00	280.09	296.02	292.20	296.22	0.00	4.75	2872.40	867.64	0.25
1	7747	2 YR	1900.00	280.55	290.20	286.23	290.68	0.00	5.66	387.12	81.42	0.36
1	7747	5 YR	2580.00	280.55	291.41	287.30	292.02	0.00	6.46	492.39	92.85	0.38
1	7747	10 YR	3120.00	280.55	292.16	288.04	292.87	0.00	7.07	564.64	99.94	0.40
1	7747	25 YR	3970.00	280.55	293.23	289.26	294.11	0.00	7.93	679.09	121.44	0.42
1	7747	50 YR	4590.00	280.55	293.82	289.97	294.85	0.00	8.59	758.19	146.23	0.45
1	7747	100 YR	5250.00	280.55	294.60	290.65	295.72	0.00	9.06	892.74	203.09	0.46
1	7747	250 YR	6230.00	280.55	295.40	291.57	296.63	0.00	9.65	1062.55	366.24	0.47
1	7747	500 YR	7060.00	280.55	295.85	292.27	297.23	0.00	10.38	1305.15	417.30	0.50
1	8122	2 YR	1840.00	282.51	290.16	289.51	291.39	0.00	8.90	207.75	55.31	0.78
1	8122	5 YR	2510.00	282.51	291.38	290.36	292.70	0.00	9.27	281.52	67.15	0.71
1	8122	10 YR	3040.00	282.51	292.12	290.97	293.58	0.00	9.75	335.00	76.34	0.70
1	8122	25 YR	3860.00	282.51	293.23	291.85	294.80	0.00	10.24	427.11	89.92	0.68
1	8122	50 YR	4430.00	282.51	293.87	292.46	295.55	0.00	10.65	486.94	98.67	0.67
1	8122	100 YR	5060.00	282.51	294.68	293.03	296.39	0.00	10.82	573.43	114.19	0.65
1	8122	250 YR	6090.00	282.51	295.36	293.89	297.39	0.00	11.87	655.97	182.62	0.69
1	8122	500 YR	6900.00	282.51	295.78	294.54	298.08	0.00	12.72	755.09	235.26	0.72
1	8222	2 YR	1840.00	282.41	290.79	288.66	291.74	0.00	7.79	237.17	43.36	0.57
1	8222	5 YR	2510.00	282.41	291.63	289.83	292.96	0.00	9.28	274.85	47.40	0.63
1	8222	10 YR	3040.00	282.41	292.30	290.57	293.90	0.00	10.17	308.01	50.72	0.66
1	8222	25 YR	3860.00	282.41	293.27	291.59	295.25	0.00	11.34	360.01	56.73	0.69
1	8222	50 YR	4430.00	282.41	293.81	292.25	296.09	0.00	12.19	395.57	74.78	0.72
1	8222	100 YR	5060.00	282.41	294.54	292.92	296.99	0.00	12.71	457.43	96.15	0.72
1	8222	250 YR	6090.00	282.41	295.13	294.46	298.14	0.00	14.20	519.15	113.55	0.78

HEC-RAS Plan: Swampoodle_Exist River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	8222	500 YR	6900.00	282.41	295.45	295.42	298.98	0.00	15.45	556.77	122.38	0.84
1	8241 17th St.		Bridge									
1	8290 L	2 YR	1840.00	282.64	291.37	288.67	292.12	0.00	6.99	263.41	44.28	0.50
1	8290 L	5 YR	2510.00	282.64	294.33	289.79	294.91	0.00	6.12	442.11	104.23	0.38
1	8290 L	10 YR	3040.00	282.64	294.89	290.56	295.60	0.00	6.85	506.52	126.11	0.41
1	8290 L	25 YR	3860.00	282.64	295.10	291.63	296.18	0.00	8.44	534.03	134.37	0.50
1	8290 L	50 YR	4430.00	282.64	295.47	292.31	296.74	0.00	9.20	585.95	148.73	0.53
1	8290 L	100 YR	5060.00	282.64	295.76	293.00	297.27	0.00	10.10	632.85	180.56	0.58
1	8290 L	250 YR	6090.00	282.64	296.33	294.40	298.16	0.00	11.22	757.29	252.63	0.62
1	8290 L	500 YR	6900.00	282.64	297.41	295.32	299.00	0.00	10.79	1086.00	362.68	0.57
1	8403	2 YR	1840.00	282.47	291.65	288.90	292.31	0.00	6.54	281.94	52.63	0.48
1	8403	5 YR	2510.00	282.47	294.47	290.04	295.00	0.00	5.88	452.04	68.44	0.36
1	8403	10 YR	3040.00	282.47	295.02	290.80	295.70	0.00	6.66	493.06	80.40	0.39
1	8403	25 YR	3860.00	282.47	295.31	291.73	296.33	0.00	8.18	516.44	85.48	0.47
1	8403	50 YR	4430.00	282.47	295.66	292.31	296.90	0.00	9.01	557.40	170.90	0.51
1	8403	100 YR	5060.00	282.47	295.98	292.91	297.45	0.00	9.88	612.93	214.04	0.55
1	8403	250 YR	6090.00	282.47	296.57	293.86	298.36	0.00	11.02	718.14	267.45	0.60
1	8403	500 YR	6900.00	282.47	297.55	294.55	299.19	0.00	10.82	1066.74	369.56	0.56
1	8697	2 YR	1840.00	284.19	291.87	290.14	292.95	0.00	8.35	221.23	43.89	0.62
1	8697	5 YR	2510.00	284.19	294.49	291.25	295.34	0.00	7.50	368.88	66.44	0.47
1	8697	10 YR	3040.00	284.19	295.05	292.03	296.11	0.00	8.42	406.76	70.48	0.51
1	8697	25 YR	3860.00	284.19	295.33	293.18	296.92	0.00	10.30	427.15	72.56	0.61
1	8697	50 YR	4430.00	284.19	295.68	293.85	297.58	0.00	11.31	452.72	75.09	0.66
1	8697	100 YR	5060.00	284.19	295.95	294.54	298.27	0.00	12.49	473.76	78.11	0.72
1	8697	250 YR	6090.00	284.19	296.37	295.59	299.40	0.00	14.33	507.96	85.26	0.80
1	8697	500 YR	6900.00	284.19	297.02	296.11	300.29	0.00	15.01	577.71	151.41	0.81
1	8897	2 YR	1840.00	286.80	292.28	292.28	294.14	0.00	10.96	167.93	45.06	1.00
1	8897	5 YR	2510.00	286.80	294.49		295.75	0.00	8.99	281.93	59.42	0.69
1	8897	10 YR	3040.00	286.80	295.06		296.55	0.00	9.82	316.71	64.17	0.71
1	8897	25 YR	3860.00	286.80	295.36	294.73	297.53	0.00	11.85	336.42	66.72	0.84
1	8897	50 YR	4430.00	286.80	295.72	295.26	298.26	0.00	12.82	361.17	69.78	0.88
1	8897	100 YR	5060.00	286.80	296.03	295.88	299.03	0.00	13.95	383.14	72.36	0.94
1	8897	250 YR	6090.00	286.80	296.78	296.78	300.24	0.00	15.04	439.84	78.40	0.96
1	8897	500 YR	6900.00	286.80	297.39	297.39	301.13	0.00	15.67	489.38	83.32	0.96
1	9025	2 YR	1840.00	288.15	293.77	292.64	294.73	0.00	7.87	233.65	55.45	0.68
1	9025	5 YR	2510.00	288.15	294.93	293.52	296.01	0.00	8.33	301.17	61.00	0.66
1	9025	10 YR	3040.00	288.15	295.67	294.14	296.86	0.00	8.75	347.26	64.52	0.66
1	9025	25 YR	3860.00	288.15	296.68	295.00	298.02	0.00	9.29	415.32	69.35	0.67
1	9025	50 YR	4430.00	288.15	297.48	295.55	298.85	0.00	9.39	471.98	73.06	0.65
1	9025	100 YR	5060.00	288.15	298.37	296.10	299.74	0.00	9.40	541.01	82.92	0.61
1	9025	250 YR	6090.00	288.15	299.63	296.95	301.06	0.00	9.61	656.01	182.57	0.58
1	9025	500 YR	6900.00	288.15	300.54	297.55	302.01	0.00	9.77	775.71	597.55	0.56
1	9110 US Highway 82		Culvert									
1	9180 M	2 YR	1840.00	288.22	296.71	292.76	297.11	0.00	5.05	367.52	63.30	0.34
1	9180 M	5 YR	2510.00	288.22	297.80	293.71	298.34	0.00	5.90	444.38	77.86	0.37
1	9180 M	10 YR	3040.00	288.22	298.74	294.37	299.36	0.00	6.35	527.71	142.14	0.38
1	9180 M	25 YR	3860.00	288.22	299.37	295.30	300.21	0.00	7.41	631.95	185.56	0.43
1	9180 M	50 YR	4430.00	288.22	299.58	295.91	300.61	0.00	8.27	672.35	203.42	0.47
1	9180 M	100 YR	5060.00	288.22	299.75	296.48	301.04	0.00	9.26	708.84	250.43	0.52
1	9180 M	250 YR	6090.00	288.22	299.92	297.41	301.69	0.00	10.87	755.16	306.54	0.61
1	9180 M	500 YR	6900.00	288.22	300.04	298.11	302.22	0.00	12.11	792.60	375.19	0.67
1	9277	2 YR	1840.00	287.89	296.88	292.56	297.17	0.00	4.35	423.19	69.66	0.31
1	9277	5 YR	2510.00	287.89	298.04	293.47	298.42	0.00	4.95	508.53	79.27	0.33
1	9277	10 YR	3040.00	287.89	299.03	294.09	299.45	0.00	5.25	594.78	98.83	0.33
1	9277	25 YR	3860.00	287.89	299.76	295.01	300.33	0.00	6.07	677.16	129.76	0.36
1	9277	50 YR	4430.00	287.89	300.08	295.57	300.77	0.00	6.70	725.83	195.52	0.39
1	9277	100 YR	5060.00	287.89	300.41	296.15	301.24	0.00	7.35	810.96	371.66	0.42
1	9277	250 YR	6090.00	287.89	300.98	297.00	301.99	0.00	8.19	976.17	483.33	0.46
1	9277	500 YR	6900.00	287.89	301.54	297.61	302.63	0.00	8.61	1137.62	622.39	0.47
1	9854 N	2 YR	1770.00	288.16	297.17		297.56	0.00	5.63	434.74	110.49	0.36
1	9854 N	5 YR	2430.00	288.16	298.39		298.81	0.00	6.02	577.93	124.25	0.36
1	9854 N	10 YR	2940.00	288.16	299.40		299.80	0.00	6.06	709.42	143.32	0.34
1	9854 N	25 YR	3720.00	288.16	300.29		300.74	0.00	6.59	850.44	169.35	0.35
1	9854 N	50 YR	4260.00	288.16	300.74		301.24	0.00	7.01	928.58	178.99	0.37
1	9854 N	100 YR	4840.00	288.16	301.23		301.76	0.00	7.34	1033.47	270.02	0.38
1	9854 N	250 YR	5860.00	288.16	302.03		302.58	0.00	7.74	1293.49	339.09	0.39
1	9854 N	500 YR	6670.00	288.16	302.69		303.23	0.00	7.82	1529.57	365.98	0.38
1	10292	2 YR	1760.00	287.76	297.91		298.32	0.00	5.39	400.21	105.42	0.36
1	10292	5 YR	2400.00	287.76	299.08		299.53	0.00	5.81	529.71	116.02	0.36
1	10292	10 YR	2900.00	287.76	300.00		300.45	0.00	5.95	640.39	124.28	0.35
1	10292	25 YR	3650.00	287.76	300.91		301.42	0.00	6.46	756.77	132.43	0.36
1	10292	50 YR	4180.00	287.76	301.39		301.97	0.00	6.90	822.59	138.64	0.38
1	10292	100 YR	4740.00	287.76	301.90		302.53	0.00	7.28	895.52	150.54	0.39
1	10292	250 YR	5750.00	287.76	302.69		303.38	0.00	7.80	1030.37	201.86	0.40
1	10292	500 YR	6600.00	287.76	303.30		304.04	0.00	8.16	1166.20	239.07	0.41
1	10601	2 YR	1710.00	289.25	298.48	295.83	298.90	0.00	5.72	397.65	108.40	0.38

HEC-RAS Plan: Swampoodle_Exist River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	10601	5 YR	2340.00	289.25	299.62	297.31	300.06	0.00	6.09	526.25	117.66	0.37
1	10601	10 YR	2820.00	289.25	300.50	297.82	300.94	0.00	6.19	640.33	141.55	0.36
1	10601	25 YR	3540.00	289.25	301.44	298.44	301.92	0.00	6.68	792.80	193.55	0.37
1	10601	50 YR	4050.00	289.25	301.99	298.85	302.49	0.00	6.87	903.95	207.19	0.3
1	10601	100 YR	4540.00	289.25	302.57	299.20	303.06	0.00	6.93	1035.27	250.44	0.37
1	10601	250 YR	5390.00	289.25	303.44	299.76	303.91	0.00	7.05	1300.40	364.95	0.36
1	10601	500 YR	6090.00	289.25	304.11	300.21	304.57	0.00	7.12	1573.98	422.68	0.35
1	10765	2 YR	1710.00	291.04	298.01	298.01	299.66	0.00	10.88	236.67	91.10	0.82
1	10765	5 YR	2340.00	291.04	299.07	298.87	300.78	0.00	11.50	337.23	98.84	0.79
1	10765	10 YR	2820.00	291.04	299.97	299.43	301.58	0.00	11.49	428.90	107.06	0.74
1	10765	25 YR	3540.00	291.04	300.84	300.19	302.60	0.00	12.28	530.82	129.40	0.75
1	10765	50 YR	4050.00	291.04	301.29	300.69	303.21	0.00	13.00	591.86	142.28	0.77
1	10765	100 YR	4540.00	291.04	301.80	301.15	303.79	0.00	13.39	668.55	156.13	0.78
1	10765	250 YR	5390.00	291.04	302.54	301.88	304.81	0.00	14.44	800.82	230.69	0.81
1	10765	500 YR	6090.00	291.04	303.12	301.97	305.38	0.00	14.72	957.36	333.80	0.80
1	10842	2 YR	1660.00	290.77	298.70	297.52	299.85	0.00	8.87	252.13	93.55	0.64
1	10842	5 YR	2290.00	290.77	299.36	298.90	300.94	0.00	10.59	315.62	99.02	0.72
1	10842	10 YR	2770.00	290.77	300.08	299.54	301.74	0.00	11.07	389.43	105.07	0.72
1	10842	25 YR	3460.00	290.77	300.96	300.32	302.74	0.00	11.75	485.00	112.44	0.72
1	10842	50 YR	3950.00	290.77	301.41	300.87	303.37	0.00	12.44	536.62	116.22	0.74
1	10842	100 YR	4430.00	290.77	301.90	301.07	303.96	0.00	12.91	594.10	122.98	0.75
1	10842	250 YR	5260.00	290.77	302.87	301.92	304.96	0.00	13.27	727.80	158.83	0.73
1	10842	500 YR	5940.00	290.77	303.16	302.66	305.58	0.00	14.36	776.50	177.71	0.78
1	10978	2 YR	1660.00	291.53	299.83	296.55	300.19	0.00	4.77	348.91	123.03	0.34
1	10978	5 YR	2290.00	291.53	300.89	297.38	301.37	0.00	5.59	411.03	145.26	0.37
1	10978	10 YR	2770.00	291.53	301.76	297.95	302.20	0.00	5.53	699.16	161.92	0.35
1	10978	25 YR	3460.00	291.53	302.73	298.64	303.22	0.00	5.98	864.46	179.61	0.35
1	10978	50 YR	3950.00	291.53	303.36	299.08	303.89	0.00	6.26	993.93	238.19	0.36
1	10978	100 YR	4430.00	291.53	303.94	299.51	304.51	0.00	6.52	1158.75	333.65	0.36
1	10978	250 YR	5260.00	291.53	304.92	300.19	305.51	0.00	6.75	1571.59	497.43	0.36
1	10978	500 YR	5940.00	291.53	305.62	300.72	306.21	0.00	6.93	1953.73	579.55	0.36
1	11049 Richmond Rd.		Culvert									
1	11101 O	2 YR	1660.00	289.01	302.34	293.14	302.44	0.00	2.54	668.34	75.09	0.13
1	11101 O	5 YR	2290.00	289.01	304.68	294.04	304.81	0.00	2.86	833.95	361.00	0.14
1	11101 O	10 YR	2770.00	289.01	306.00	294.66	306.09	0.00	2.62	1551.24	477.30	0.12
1	11101 O	25 YR	3460.00	289.01	306.72	295.49	306.81	0.00	2.80	1883.28	625.45	0.13
1	11101 O	50 YR	3950.00	289.01	307.07	296.03	307.17	0.00	2.97	2053.23	738.68	0.1
1	11101 O	100 YR	4430.00	289.01	307.35	296.53	307.46	0.00	3.14	2189.60	787.69	0.1
1	11101 O	250 YR	5260.00	289.01	307.80	297.34	307.92	0.00	3.40	2423.05	844.66	0.15
1	11101 O	500 YR	5940.00	289.01	308.03	297.96	308.18	0.00	3.67	2550.01	871.94	0.16
1	11262	2 YR	1660.00	287.75	302.40	295.31	302.67	0.00	4.21	414.61	61.19	0.24
1	11262	5 YR	2290.00	287.75	304.74	297.10	305.02	0.00	4.44	618.97	273.34	0.23
1	11262	10 YR	2770.00	287.75	306.04	298.01	306.24	0.00	4.06	1187.57	431.04	0.20
1	11262	25 YR	3460.00	287.75	306.76	299.11	306.96	0.00	4.28	1500.14	436.98	0.20
1	11262	50 YR	3950.00	287.75	307.12	299.72	307.33	0.00	4.50	1657.37	439.58	0.21
1	11262	100 YR	4430.00	287.75	307.40	300.33	307.63	0.00	4.74	1782.44	441.64	0.22
1	11262	250 YR	5260.00	287.75	307.86	301.33	308.11	0.00	5.10	1985.21	444.92	0.23
1	11262	500 YR	5940.00	287.75	308.10	302.10	308.39	0.00	5.47	2094.65	446.66	0.25
1	11858	2 YR	1660.00	293.31	303.53	298.83	303.71	0.00	3.66	592.24	145.68	0.23
1	11858	5 YR	2290.00	293.31	305.64	299.80	305.78	0.00	3.44	927.13	178.80	0.19
1	11858	10 YR	2770.00	293.31	306.70	300.47	306.84	0.00	3.46	1135.48	210.96	0.18
1	11858	25 YR	3460.00	293.31	307.44	301.95	307.60	0.00	3.84	1296.22	226.49	0.20
1	11858	50 YR	3950.00	293.31	307.84	302.38	308.02	0.00	4.12	1389.54	238.77	0.21
1	11858	100 YR	4430.00	293.31	308.17	302.73	308.38	0.00	4.39	1473.23	264.33	0.22
1	11858	250 YR	5260.00	293.31	308.70	303.24	308.95	0.00	4.81	1620.84	302.18	0.24
1	11858	500 YR	5940.00	293.31	309.05	303.64	309.32	0.00	5.16	1723.18	337.16	0.25
1	12163 P	2 YR	1670.00	293.50	303.96		304.50	0.00	6.44	348.97	86.44	0.40
1	12163 P	5 YR	2340.00	293.50	305.86		306.35	0.00	6.42	540.50	144.59	0.36
1	12163 P	10 YR	2800.00	293.50	306.91		307.30	0.00	6.12	840.79	394.45	0.33
1	12163 P	25 YR	3460.00	293.50	307.72		308.02	0.00	5.79	1173.15	428.55	0.30
1	12163 P	50 YR	3940.00	293.50	308.16		308.46	0.00	5.93	1362.68	439.47	0.30
1	12163 P	100 YR	4410.00	293.50	308.53		308.81	0.00	5.89	1528.75	449.04	0.29
1	12163 P	250 YR	5220.00	293.50	309.12		309.38	0.00	5.91	1799.49	475.83	0.29
1	12163 P	500 YR	5900.00	293.50	309.51		309.77	0.00	5.96	1988.49	483.53	0.29
1	12567 Q	2 YR	1670.00	293.22	305.34		305.69	0.00	4.76	355.39	64.48	0.33
1	12567 Q	5 YR	2340.00	293.22	306.90		307.33	0.00	5.29	469.62	82.45	0.33
1	12567 Q	10 YR	2800.00	293.22	307.72		308.21	0.00	5.67	541.14	92.05	0.34
1	12567 Q	25 YR	3460.00	293.22	308.35		308.97	0.00	6.47	601.86	112.08	0.37
1	12567 Q	50 YR	3940.00	293.22	308.75		309.48	0.00	6.99	666.14	227.67	0.39
1	12567 Q	100 YR	4410.00	293.22	309.06		309.87	0.00	7.48	745.43	293.46	0.41
1	12567 Q	250 YR	5220.00	293.22	309.55	305.59	310.50	0.00	8.19	906.83	347.58	0.44
1	12567 Q	500 YR	5900.00	293.22	309.90	306.21	310.93	0.00	8.66	1031.65	365.35	0.4
1	12894	2 YR	990.00	298.64	306.26		306.72	0.01	5.45	182.41	52.17	0.49
1	12894	5 YR	1430.00	298.64	307.71		308.19	0.00	5.58	272.62	74.89	0.43
1	12894	10 YR	1730.00	298.64	308.53		309.02	0.00	5.71	342.17	97.07	0.41
1	12894	25 YR	2170.00	298.64	309.33		309.87	0.00	6.15	437.64	153.28	0.41
1	12894	50 YR	2470.00	298.64	309.88		310.42	0.00	6.19	535.48	191.75	0.40
1	12894	100 YR	2750.00	298.64	310.33		310.85	0.00	6.19	626.10	207.91	0.39

HEC-RAS Plan: Swampoodle_Exist River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	12894	250 YR	3090.00	298.64	311.05		311.48	0.00	5.91	786.70	244.60	0.36
1	12894	500 YR	3380.00	298.64	311.51		311.93	0.00	5.86	910.68	293.52	0.34
1	13336	2 YR	630.00	297.77	307.43		307.51	0.00	2.28	277.63	60.15	0.18
1	13336	5 YR	950.00	297.77	308.76		308.87	0.00	2.68	364.27	71.47	0.19
1	13336	10 YR	1170.00	297.77	309.53		309.66	0.00	2.91	424.93	89.44	0.20
1	13336	25 YR	1490.00	297.77	310.38		310.54	0.00	3.23	510.10	109.23	0.20
1	13336	50 YR	1720.00	297.77	310.89		311.06	0.00	3.44	567.66	117.86	0.21
1	13336	100 YR	1940.00	297.77	311.29		311.48	0.00	3.65	616.56	124.72	0.22
1	13336	250 YR	2270.00	297.77	311.85		312.07	0.00	3.92	688.29	131.71	0.23
1	13336	500 YR	2530.00	297.77	312.26		312.49	0.00	4.11	742.93	135.88	0.23
1	13576 R	2 YR	630.00	298.42	307.59	304.19	307.74	0.00	3.11	204.20	50.88	0.26
1	13576 R	5 YR	950.00	298.42	308.91	305.06	309.11	0.00	3.57	277.57	59.98	0.26
1	13576 R	10 YR	1170.00	298.42	309.67	305.56	309.90	0.00	3.84	325.30	65.42	0.26
1	13576 R	25 YR	1490.00	298.42	310.52	306.20	310.79	0.00	4.25	383.29	72.06	0.28
1	13576 R	50 YR	1720.00	298.42	311.02	306.61	311.33	0.00	4.54	420.73	76.28	0.28
1	13576 R	100 YR	1940.00	298.42	311.43	306.96	311.77	0.00	4.83	452.19	79.65	0.29
1	13576 R	250 YR	2270.00	298.42	311.98	307.43	312.38	0.00	5.23	497.63	86.91	0.31
1	13576 R	500 YR	2530.00	298.42	312.38	307.78	312.83	0.00	5.57	546.44	199.96	0.32
1	13805	2 YR	630.00	298.93	307.86	303.66	307.98	0.00	2.86	239.58	56.40	0.21
1	13805	5 YR	950.00	298.93	309.18	304.57	309.34	0.00	3.36	316.97	60.62	0.22
1	13805	10 YR	1170.00	298.93	309.95	305.08	310.14	0.00	3.66	364.50	65.14	0.23
1	13805	25 YR	1480.00	298.93	310.81	305.74	311.04	0.00	4.07	425.18	74.95	0.24
1	13805	50 YR	1710.00	298.93	311.33	306.20	311.60	0.00	4.36	465.89	80.87	0.25
1	13805	100 YR	1940.00	298.93	311.76	306.65	312.05	0.00	4.68	500.98	85.49	0.26
1	13805	250 YR	2260.00	298.93	312.34	307.23	312.69	0.00	5.07	553.45	161.66	0.28
1	13805	500 YR	2520.00	298.93	312.78	307.59	313.16	0.00	5.36	595.41	210.25	0.29
1	13977	2 YR	630.00	300.82	307.84	304.71	308.09	0.00	4.06	155.23	33.34	0.33
1	13977	5 YR	950.00	300.82	309.12	305.68	309.48	0.00	4.75	206.52	48.17	0.35
1	13977	10 YR	1170.00	300.82	309.87	306.26	310.28	0.00	5.17	244.93	55.10	0.36
1	13977	25 YR	1480.00	300.82	310.70	306.99	311.21	0.00	5.76	293.79	62.40	0.38
1	13977	50 YR	1710.00	300.82	311.19	307.45	311.78	0.00	6.21	325.65	66.73	0.39
1	13977	100 YR	1940.00	300.82	311.58	307.91	312.26	0.00	6.68	352.31	69.43	0.41
1	13977	250 YR	2260.00	300.82	312.12	308.47	312.93	0.00	7.27	391.20	74.85	0.43
1	13977	500 YR	2520.00	300.82	312.52	308.88	313.42	0.00	7.73	421.53	80.83	0.45
1	14117	2 YR	470.00	301.22	307.84	305.32	308.15	0.00	4.48	104.82	27.63	0.41
1	14117	5 YR	790.00	301.22	309.08	306.70	309.57	0.00	5.58	141.57	31.53	0.46
1	14117	10 YR	1010.00	301.22	309.80	307.42	310.38	0.00	6.12	165.11	33.79	0.49
1	14117	25 YR	1320.00	301.22	310.61	308.23	311.33	0.00	6.82	193.47	36.33	0.52
1	14117	50 YR	1540.00	301.22	311.10	308.74	311.92	0.00	7.28	211.61	39.51	0.54
1	14117	100 YR	1750.00	301.22	311.49	309.18	312.42	0.00	7.74	228.07	44.98	0.56
1	14117	250 YR	2060.00	301.22	312.02	309.79	313.10	0.00	8.35	253.34	50.37	0.58
1	14117	500 YR	2310.00	301.22	312.40	310.24	313.61	0.00	8.82	273.53	54.57	0.60
1	14208	2 YR	470.00	303.40	307.93	307.93	309.46	0.00	9.94	47.30	15.50	1.00
1	14208	5 YR	790.00	303.40	309.33	309.33	311.25	0.00	11.11	71.08	18.43	1.00
1	14208	10 YR	1010.00	303.40	310.11	310.11	312.25	0.00	11.73	86.10	20.06	1.00
1	14208	25 YR	1320.00	303.40	311.01	311.01	313.48	0.00	12.63	107.70	28.63	0.98
1	14208	50 YR	1540.00	303.40	311.58	311.58	314.28	0.00	13.21	125.40	33.07	0.98
1	14208	100 YR	1750.00	303.40	312.13	312.13	314.99	0.00	13.64	144.48	37.27	0.96
1	14208	250 YR	2060.00	303.40	312.86	312.86	315.97	0.00	14.26	173.95	42.95	0.95
1	14208	500 YR	2310.00	303.40	313.55	313.55	316.70	0.00	14.42	207.17	70.21	0.92
1	14249 College Dr.		Culvert									
1	14310 S	2 YR	400.00	304.43	313.17	308.52	313.26	0.00	2.38	168.38	34.38	0.19
1	14310 S	5 YR	580.00	304.43	314.64	309.29	314.75	0.00	2.64	239.00	69.07	0.18
1	14310 S	10 YR	700.00	304.43	315.22	309.73	315.35	0.00	2.90	277.45	90.06	0.19
1	14310 S	25 YR	880.00	304.43	315.78	310.32	315.95	0.00	3.35	315.70	115.19	0.22
1	14310 S	50 YR	1030.00	304.43	316.16	310.75	316.37	0.00	3.71	341.59	134.63	0.23
1	14310 S	100 YR	1190.00	304.43	316.57	311.18	316.82	0.00	4.05	369.87	154.09	0.25
1	14310 S	250 YR	1400.00	304.43	317.07	311.70	317.38	0.00	4.47	404.84	197.13	0.27
1	14310 S	500 YR	1590.00	304.43	317.48	312.13	317.83	0.00	4.83	433.68	206.02	0.28
1	14367	2 YR	400.00	304.43	313.19		313.27	0.00	2.21	180.94	37.97	0.18
1	14367	5 YR	580.00	304.43	314.67		314.76	0.00	2.42	256.63	66.82	0.18
1	14367	10 YR	700.00	304.43	315.25		315.36	0.00	2.64	299.19	80.56	0.18
1	14367	25 YR	880.00	304.43	315.83		315.97	0.00	3.04	353.44	107.34	0.20
1	14367	50 YR	1030.00	304.43	316.22		316.39	0.00	3.35	397.84	119.70	0.22
1	14367	100 YR	1190.00	304.43	316.64		316.84	0.00	3.63	451.83	135.61	0.23
1	14367	250 YR	1400.00	304.43	317.17		317.40	0.00	3.96	526.07	145.97	0.24
1	14367	500 YR	1590.00	304.43	317.60		317.87	0.00	4.23	591.10	153.19	0.25
1	14616	2 YR	400.00	310.80	314.47	314.47	315.88	0.00	9.53	41.95	15.04	1.01
1	14616	5 YR	580.00	310.80	315.41	315.41	317.00	0.00	10.11	57.37	18.18	1.00
1	14616	10 YR	700.00	310.80	315.95	315.95	317.61	0.00	10.34	67.73	20.66	1.01
1	14616	25 YR	880.00	310.80	316.63	316.63	318.38	0.00	10.60	83.04	23.85	1.00
1	14616	50 YR	1030.00	310.80	317.10	317.10	318.94	0.00	10.89	94.61	26.01	1.01
1	14616	100 YR	1190.00	310.80	317.54	317.54	319.48	0.00	11.17	106.54	28.24	1.01
1	14616	250 YR	1400.00	310.80	318.04	318.04	320.13	0.00	11.59	121.97	33.52	1.00
1	14616	500 YR	1590.00	310.80	318.46	318.46	320.67	0.00	11.94	137.09	37.84	0.99
1	14812	2 YR	400.00	311.32	315.20	315.07	316.45	0.00	9.00	44.43	15.93	0.95
1	14812	5 YR	580.00	311.32	315.96	315.94	317.55	0.00	10.11	57.36	17.70	0.99

HEC-RAS Plan: Swampoodle_Exist River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	14812	10 YR	700.00	311.32	316.44	316.41	318.18	0.00	10.61	65.97	18.79	1.00
1	14812	25 YR	880.00	311.32	317.07	317.07	319.03	0.00	11.23	78.34	20.25	1.01
1	14812	50 YR	1030.00	311.32	317.58	317.58	319.66	0.00	11.56	89.06	21.44	1.00
1	14812	100 YR	1190.00	311.32	318.04	318.04	320.28	0.00	12.02	98.98	22.51	1.0
1	14812	250 YR	1400.00	311.32	318.61	318.61	321.03	0.00	12.48	112.45	24.08	1.00
1	14812	500 YR	1590.00	311.32	319.05	319.05	321.67	0.00	12.99	123.48	26.40	1.00
1	15035	2 YR	400.00	312.47	316.04	316.04	317.40	0.00	9.36	42.75	15.93	1.01
1	15035	5 YR	580.00	312.47	316.88	316.88	318.50	0.00	10.21	56.80	17.78	1.01
1	15035	10 YR	700.00	312.47	317.36	317.36	319.13	0.00	10.66	65.66	18.85	1.01
1	15035	25 YR	880.00	312.47	318.02	318.02	319.97	0.00	11.19	78.65	20.32	1.00
1	15035	50 YR	1030.00	312.47	318.51	318.51	320.60	0.00	11.58	88.91	21.56	1.01
1	15035	100 YR	1190.00	312.47	319.04	319.04	321.21	0.00	11.83	100.61	23.39	1.01
1	15035	250 YR	1400.00	312.47	319.65	319.65	321.93	0.00	12.10	115.74	25.56	1.00
1	15035	500 YR	1590.00	312.47	320.08	320.08	322.52	0.00	12.55	126.86	27.23	1.01
1	15246	2 YR	400.00	313.41	316.99	316.99	318.30	0.00	9.22	43.40	16.42	1.00
1	15246	5 YR	580.00	313.41	317.81	317.81	319.38	0.00	10.04	57.80	18.36	1.00
1	15246	10 YR	700.00	313.41	318.27	318.27	319.99	0.00	10.54	66.42	19.44	1.00
1	15246	25 YR	880.00	313.41	318.90	318.90	320.82	0.00	11.11	79.21	20.93	1.01
1	15246	50 YR	1030.00	313.41	319.40	319.40	321.44	0.00	11.44	90.00	22.11	1.00
1	15246	100 YR	1190.00	313.41	319.84	319.84	322.05	0.00	11.92	99.83	23.16	1.01
1	15246	250 YR	1400.00	313.41	320.38	320.38	322.79	0.00	12.48	112.63	24.67	1.00
1	15246	500 YR	1590.00	313.41	320.81	320.81	323.43	0.00	13.01	123.52	26.00	1.00
1	15462	2 YR	310.00	313.91	318.31		318.69	0.00	4.92	63.05	20.81	0.50
1	15462	5 YR	460.00	313.91	319.32		319.77	0.00	5.38	85.52	23.96	0.50
1	15462	10 YR	550.00	313.91	319.92		320.39	0.00	5.47	100.57	25.86	0.49
1	15462	25 YR	690.00	313.91	320.72		321.21	0.00	5.65	122.22	28.37	0.48
1	15462	50 YR	810.00	313.91	321.31		321.83	0.00	5.81	139.53	30.23	0.48
1	15462	100 YR	940.00	313.91	321.90		322.45	0.00	5.95	157.90	32.08	0.47
1	15462	250 YR	1120.00	313.91	322.60		323.20	0.00	6.20	181.32	34.90	0.46
1	15462	500 YR	1280.00	313.91	323.21		323.84	0.00	6.37	203.38	37.56	0.45
1	15633 T	2 YR	310.00	314.05	318.35		318.86	0.00	5.73	54.10	17.14	0.57
1	15633 T	5 YR	460.00	314.05	319.32		319.96	0.00	6.43	71.59	19.19	0.59
1	15633 T	10 YR	550.00	314.05	319.90		320.58	0.00	6.62	83.06	20.42	0.58
1	15633 T	25 YR	690.00	314.05	320.66		321.41	0.00	6.95	99.31	22.04	0.58
1	15633 T	50 YR	810.00	314.05	321.23		322.04	0.00	7.22	112.12	23.24	0.58
1	15633 T	100 YR	940.00	314.05	321.79		322.66	0.00	7.47	125.92	25.76	0.58
1	15633 T	250 YR	1120.00	314.05	322.45		323.42	0.00	7.89	143.96	29.16	0.58
1	15633 T	500 YR	1280.00	314.05	323.02		324.06	0.00	8.19	161.55	32.13	0.5
1	15839	2 YR	310.00	315.07	318.21	318.16	319.37	0.00	8.63	35.90	14.85	0.98
1	15839	5 YR	460.00	315.07	319.20	318.95	320.43	0.00	8.92	51.60	16.99	0.90
1	15839	10 YR	550.00	315.07	319.79		321.01	0.00	8.87	62.01	18.28	0.85
1	15839	25 YR	690.00	315.07	320.56		321.82	0.00	8.99	76.77	19.96	0.81
1	15839	50 YR	810.00	315.07	321.13		322.43	0.00	9.16	88.45	21.20	0.79
1	15839	100 YR	940.00	315.07	321.68		323.04	0.00	9.37	100.56	23.00	0.77
1	15839	250 YR	1120.00	315.07	322.29		323.80	0.00	9.86	115.38	25.42	0.76
1	15839	500 YR	1280.00	315.07	322.83		324.44	0.00	10.20	129.69	27.55	0.75
1	16026	2 YR	310.00	317.37	320.19	320.19	321.19	0.00	8.04	38.57	19.52	1.01
1	16026	5 YR	460.00	317.37	320.85	320.85	322.04	0.00	8.76	52.49	22.32	1.01
1	16026	10 YR	550.00	317.37	321.21	321.21	322.48	0.00	9.06	60.71	23.83	1.00
1	16026	25 YR	690.00	317.37	321.68	321.68	323.09	0.00	9.51	72.55	25.83	1.00
1	16026	50 YR	810.00	317.37	322.04	322.04	323.56	0.00	9.88	81.97	27.05	1.00
1	16026	100 YR	940.00	317.37	322.39	322.39	324.02	0.00	10.25	91.75	28.18	1.00
1	16026	250 YR	1120.00	317.37	322.83	322.83	324.62	0.00	10.74	104.31	29.56	1.01
1	16026	500 YR	1280.00	317.37	323.22	323.22	325.11	0.00	11.02	116.10	30.80	1.00
1	16205	2 YR	310.00	315.65	321.16		321.40	0.00	3.98	77.80	20.27	0.36
1	16205	5 YR	460.00	315.65	321.93		322.30	0.00	4.88	94.21	22.70	0.42
1	16205	10 YR	550.00	315.65	322.30		322.74	0.00	5.34	103.15	25.16	0.45
1	16205	25 YR	690.00	315.65	322.81		323.36	0.00	6.00	116.90	29.36	0.48
1	16205	50 YR	810.00	315.65	323.18		323.84	0.00	6.53	128.48	32.48	0.50
1	16205	100 YR	940.00	315.65	323.54		324.32	0.00	7.07	140.66	34.66	0.53
1	16205	250 YR	1120.00	315.65	323.99		324.92	0.00	7.78	156.74	37.35	0.56
1	16205	500 YR	1280.00	315.65	324.33		325.41	0.00	8.40	169.78	39.40	0.59
1	16356	2 YR	310.00	317.27	320.87		321.67	0.00	7.17	43.24	17.63	0.81
1	16356	5 YR	460.00	317.27	321.60		322.62	0.00	8.09	56.88	19.78	0.84
1	16356	10 YR	550.00	317.27	321.94	321.60	323.10	0.00	8.61	63.85	20.79	0.87
1	16356	25 YR	690.00	317.27	322.39	322.13	323.76	0.00	9.40	73.42	22.10	0.91
1	16356	50 YR	810.00	317.27	322.71	322.54	324.28	0.00	10.04	80.66	23.27	0.94
1	16356	100 YR	940.00	317.27	323.00	322.94	324.80	0.00	10.75	87.83	25.44	0.98
1	16356	250 YR	1120.00	317.27	323.44	323.44	325.48	0.00	11.47	99.50	28.69	0.99
1	16356	500 YR	1280.00	317.27	323.82	323.82	326.04	0.00	11.99	111.00	31.72	0.99
1	16568	2 YR	310.00	317.46	321.09		322.24	0.00	8.59	36.07	12.05	0.88
1	16568	5 YR	460.00	317.46	321.74	321.74	323.42	0.00	10.39	44.25	13.13	1.0
1	16568	10 YR	550.00	317.46	322.36	322.36	324.01	0.00	10.31	53.34	16.23	1.00
1	16568	25 YR	690.00	317.46	323.09	323.09	324.76	0.00	10.36	66.60	20.00	1.00
1	16568	50 YR	810.00	317.46	323.52	323.52	325.30	0.00	10.71	75.70	22.99	1.01
1	16568	100 YR	940.00	317.46	323.92	323.92	325.85	0.00	11.17	85.66	27.38	1.00
1	16568	250 YR	1120.00	317.46	324.44	324.44	326.56	0.00	11.71	101.71	35.19	0.98
1	16568	500 YR	1280.00	317.46	324.87	324.87	327.14	0.00	12.13	119.17	46.49	0.97

HEC-RAS Plan: Swampoodle_Exist River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	16806	2 YR	310.00	319.85	322.56	322.56	323.51	0.00	7.82	39.67	20.95	1.00
1	16806	5 YR	460.00	319.85	323.20	323.20	324.33	0.00	8.55	53.93	24.94	0.99
1	16806	10 YR	550.00	319.85	323.54	323.54	324.75	0.00	8.86	63.04	28.62	0.97
1	16806	25 YR	690.00	319.85	324.23	324.02	325.34	0.00	8.57	85.43	35.81	0.83
1	16806	50 YR	810.00	319.85	324.84	324.41	325.82	0.00	8.17	108.23	39.29	0.73
1	16806	100 YR	940.00	319.85	325.40	324.73	326.32	0.00	8.01	132.07	47.55	0.67
1	16806	250 YR	1120.00	319.85	326.15	325.11	326.99	0.00	7.85	177.20	86.67	0.60
1	16806	500 YR	1280.00	319.85	326.78	325.46	327.56	0.00	7.69	244.31	124.29	0.56
1	16925	2 YR	310.00	320.42	323.35	323.35	324.56	0.00	8.83	35.42	16.67	1.00
1	16925	5 YR	460.00	320.42	324.12	324.12	325.63	0.00	9.90	50.58	23.08	0.97
1	16925	10 YR	550.00	320.42	324.53	324.53	326.20	0.00	10.43	60.65	31.04	0.97
1	16925	25 YR	690.00	320.42	325.12	325.12	327.01	0.00	11.13	77.33	42.38	0.96
1	16925	50 YR	810.00	320.42	325.59	325.59	327.63	0.00	11.65	92.54	51.39	0.95
1	16925	100 YR	940.00	320.42	326.05	326.05	328.28	0.00	12.20	109.55	62.66	0.95
1	16925	250 YR	1120.00	320.42	326.93	326.93	329.03	0.00	12.05	173.62	131.41	0.87
1	16925	500 YR	1280.00	320.42	328.03	328.03	329.52	0.00	10.61	363.38	245.45	0.70
1	16969 40th St.		Culvert									
1	17013 U	2 YR	310.00	320.42	325.49	323.34	325.76	0.00	4.18	74.12	42.61	0.38
1	17013 U	5 YR	460.00	320.42	326.36	324.11	326.73	0.00	4.95	104.51	91.57	0.42
1	17013 U	10 YR	550.00	320.42	326.62	324.50	327.08	0.00	5.53	124.11	107.11	0.46
1	17013 U	25 YR	690.00	320.42	326.82	325.06	327.48	0.00	6.57	142.30	118.53	0.53
1	17013 U	50 YR	810.00	320.42	326.91	325.49	327.76	0.00	7.54	150.30	122.86	0.60
1	17013 U	100 YR	940.00	320.42	327.49	325.97	328.30	0.00	7.50	236.04	217.04	0.57
1	17013 U	250 YR	1120.00	320.42	328.53	326.85	329.05	0.00	6.47	444.37	243.06	0.45
1	17013 U	500 YR	1280.00	320.42	329.04	327.70	329.52	0.00	6.41	557.73	262.88	0.43
1	17057	2 YR	310.00	321.20	325.39		325.95	0.00	6.01	51.57	17.56	0.62
1	17057	5 YR	460.00	321.20	326.24		326.96	0.00	6.81	67.56	20.17	0.66
1	17057	10 YR	550.00	321.20	326.46		327.37	0.00	7.62	72.16	20.86	0.72
1	17057	25 YR	690.00	321.20	326.57	326.18	327.91	0.00	9.27	74.44	23.19	0.87
1	17057	50 YR	810.00	321.20	326.65	326.65	328.41	0.01	10.65	76.44	28.27	1.00
1	17057	100 YR	940.00	321.20	327.07	327.07	328.94	0.00	11.00	89.30	31.72	0.98
1	17057	250 YR	1120.00	321.20	328.05	327.58	329.66	0.00	10.29	135.61	126.74	0.83
1	17057	500 YR	1280.00	321.20	328.79	328.79	330.04	0.00	9.40	279.35	215.28	0.71
1	17178	2 YR	170.00	320.42	326.01		326.07	0.00	2.01	84.77	21.11	0.18
1	17178	5 YR	240.00	320.42	327.01		327.09	0.00	2.23	124.70	60.48	0.18
1	17178	10 YR	290.00	320.42	327.43		327.52	0.00	2.46	152.28	73.97	0.19
1	17178	25 YR	370.00	320.42	328.00		328.12	0.00	2.76	205.60	105.69	0.20
1	17178	50 YR	430.00	320.42	328.55		328.66	0.00	2.86	277.59	159.25	0.20
1	17178	100 YR	500.00	320.42	329.09		329.20	0.00	2.92	371.94	188.12	0.19
1	17178	250 YR	590.00	320.42	329.77		329.88	0.00	2.91	508.85	209.37	0.18
1	17178	500 YR	660.00	320.42	330.10		330.21	0.00	3.00	580.03	215.94	0.19
1	17307	2 YR	170.00	322.23	325.64	325.64	326.50	0.05	7.42	22.92	13.39	1.00
1	17307	5 YR	240.00	322.23	326.74	326.14	327.30	0.02	6.00	40.03	17.79	0.70
1	17307	10 YR	290.00	322.23	327.17	326.46	327.73	0.02	6.04	48.14	27.89	0.68
1	17307	25 YR	370.00	322.23	327.81	326.89	328.30	0.02	5.78	76.32	109.56	0.61
1	17307	50 YR	430.00	322.23	328.57	327.21	328.74	0.01	3.89	174.45	178.06	0.38
1	17307	100 YR	500.00	322.23	329.17	328.08	329.26	0.00	3.00	262.66	185.68	0.27
1	17307	250 YR	590.00	322.23	329.86	328.37	329.92	0.00	2.46	365.88	193.05	0.20
1	17307	500 YR	660.00	322.23	330.21	328.46	330.26	0.00	2.38	416.75	196.41	0.19
1	17423	2 YR	140.00	325.83	328.55	327.94	328.68	0.01	3.12	66.97	199.88	0.42
1	17423	5 YR	200.00	325.83	328.77	328.38	328.90	0.01	3.38	92.03	209.96	0.43
1	17423	10 YR	240.00	325.83	328.98	328.50	329.09	0.01	3.23	115.88	245.83	0.39
1	17423	25 YR	300.00	325.83	329.27	328.72	329.37	0.00	3.08	149.73	261.34	0.35
1	17423	50 YR	340.00	325.83	329.31	328.78	329.43	0.01	3.38	154.62	262.80	0.38
1	17423	100 YR	400.00	325.83	329.57	328.88	329.67	0.00	3.29	183.84	272.90	0.35
1	17423	250 YR	480.00	325.83	330.08	328.99	330.16	0.00	2.88	244.05	284.39	0.28
1	17423	500 YR	540.00	325.83	330.39	329.07	330.46	0.00	2.78	280.06	288.77	0.26
1	17570	2 YR	140.00	326.66	329.89		330.12	0.01	3.90	41.10	62.53	0.49
1	17570	5 YR	200.00	326.66	330.16	329.43	330.43	0.01	4.39	65.62	110.68	0.53
1	17570	10 YR	240.00	326.66	330.23	330.16	330.55	0.02	4.87	73.66	114.42	0.58
1	17570	25 YR	300.00	326.66	330.33	330.33	330.71	0.02	5.46	85.36	120.51	0.64
1	17570	50 YR	340.00	326.66	330.48	330.40	330.81	0.02	5.29	104.56	134.13	0.60
1	17570	100 YR	400.00	326.66	330.59	330.50	330.93	0.02	5.58	119.17	139.90	0.62
1	17570	250 YR	480.00	326.66	330.75		331.08	0.02	5.75	141.66	149.46	0.62
1	17570	500 YR	540.00	326.66	330.94		331.22	0.01	5.43	171.09	157.40	0.56
1	17716 V	2 YR	140.00	327.35	331.18		331.33	0.01	3.13	52.86	74.98	0.37
1	17716 V	5 YR	200.00	327.35	331.57		331.73	0.01	3.38	93.20	139.08	0.38
1	17716 V	10 YR	240.00	327.35	331.76		331.91	0.01	3.41	121.24	155.00	0.38
1	17716 V	25 YR	300.00	327.35	331.99	331.04	332.13	0.01	3.45	158.83	168.91	0.37
1	17716 V	50 YR	340.00	327.35	332.07		332.22	0.01	3.65	172.18	171.77	0.39
1	17716 V	100 YR	400.00	327.35	332.23	331.70	332.37	0.01	3.76	199.02	177.38	0.39
1	17716 V	250 YR	480.00	327.35	332.39	331.90	332.54	0.01	3.93	229.41	183.53	0.40
1	17716 V	500 YR	540.00	327.35	332.47	331.96	332.63	0.01	4.18	242.72	185.23	0.42

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	34191	10 YR	4140.00	299.49	309.15	304.86	309.17	0.00	1.37	5206.90	1560.29	0.09
1	34191	25 YR	5550.00	299.49	310.28	305.12	310.29	0.00	1.28	7649.61	1646.00	0.08
1	34191	50 YR	7060.00	299.49	310.89	305.53	310.90	0.00	1.41	8650.53	1673.26	0.08
1	34191	100 YR	8740.00	299.49	311.20	305.80	311.22	0.00	1.63	9174.57	1686.83	0.09
1	34191	250 YR	11210.00	299.49	311.71	306.19	311.74	0.00	1.87	10047.00	1709.19	0.10
1	34191	500 YR	13120.00	299.49	312.04	306.41	312.07	0.00	2.06	10612.79	1723.82	0.11
1	34611	2 YR	1700.00	295.97	305.94	303.26	305.99	0.00	2.54	1163.43	392.81	0.17
1	34611	5 YR	3060.00	295.97	307.90	304.07	307.95	0.00	2.57	2010.81	480.94	0.15
1	34611	10 YR	3920.00	295.97	309.24	304.42	309.29	0.00	2.38	2694.89	549.40	0.13
1	34611	25 YR	5270.00	295.97	310.34	304.88	310.39	0.00	2.57	3330.25	649.36	0.13
1	34611	50 YR	6720.00	295.97	310.95	305.31	311.02	0.00	2.91	3703.38	725.11	0.15
1	34611	100 YR	8310.00	295.97	311.28	305.71	311.37	0.00	3.39	3908.97	768.70	0.17
1	34611	250 YR	10650.00	295.97	311.81	306.42	311.93	0.00	4.11	4439.96	852.37	0.20
1	34611	500 YR	12460.00	295.97	312.16	306.73	312.29	0.00	4.46	4743.13	922.41	0.22
1	35626	2 YR	1700.00	297.91	306.61		306.64	0.00	1.97	1531.60	702.78	0.14
1	35626	5 YR	3060.00	297.91	308.32		308.34	0.00	1.71	2766.12	746.09	0.11
1	35626	10 YR	3920.00	297.91	309.53		309.55	0.00	1.54	3685.70	769.28	0.09
1	35626	25 YR	5270.00	297.91	310.63		310.66	0.00	1.62	4547.87	804.35	0.09
1	35626	50 YR	6720.00	297.91	311.29		311.33	0.00	1.84	5090.49	836.36	0.10
1	35626	100 YR	8310.00	297.91	311.72		311.77	0.00	2.13	5455.09	863.04	0.11
1	35626	250 YR	10650.00	297.91	312.39		312.45	0.00	2.46	6041.23	900.96	0.12
1	35626	500 YR	12460.00	297.91	312.81		312.88	0.00	2.68	6425.28	915.83	0.13
1	36714 AB	2 YR	1990.00	299.30	307.82	307.08	307.97	0.00	4.83	1096.01	640.33	0.34
1	36714 AB	5 YR	3680.00	299.30	309.02	307.70	309.12	0.00	4.70	1936.64	737.59	0.30
1	36714 AB	10 YR	4670.00	299.30	309.99	307.95	310.06	0.00	4.05	2668.58	770.03	0.24
1	36714 AB	25 YR	6230.00	299.30	311.04	308.30	311.11	0.00	3.91	3507.76	830.14	0.22
1	36714 AB	50 YR	7390.00	299.30	311.73	308.46	311.80	0.00	3.89	4082.09	912.68	0.21
1	36714 AB	100 YR	8690.00	299.30	312.24	308.71	312.32	0.00	4.09	4524.70	995.09	0.22
1	36714 AB	250 YR	10660.00	299.30	312.98	308.98	313.07	0.00	4.29	5189.75	1093.75	0.22
1	36714 AB	500 YR	12340.00	299.30	313.47	309.17	313.56	0.00	4.52	5641.81	1142.07	0.23
1	37617	2 YR	1990.00	299.97	310.01	307.93	310.09	0.00	3.64	1294.48	439.89	0.23
1	37617	5 YR	3680.00	299.97	311.19	308.92	311.31	0.00	4.61	1882.64	575.85	0.27
1	37617	10 YR	4670.00	299.97	311.78	309.22	311.92	0.00	5.11	2212.84	658.87	0.29
1	37617	25 YR	6230.00	299.97	312.62	309.73	312.77	0.00	5.48	2709.06	760.71	0.30
1	37617	50 YR	7390.00	299.97	313.20	309.99	313.35	0.00	5.62	3064.42	801.99	0.30
1	37617	100 YR	8690.00	299.97	313.75	310.32	313.91	0.00	5.86	3409.20	852.56	0.30
1	37617	250 YR	10660.00	299.97	314.51	310.64	314.69	0.00	6.24	3918.90	962.68	0.31
1	37617	500 YR	12340.00	299.97	315.07	311.12	315.26	0.00	6.54	4299.14	1032.12	0.32
1	38728	2 YR	1990.00	303.63	311.30	308.83	311.35	0.00	2.86	1566.86	489.94	0.22
1	38728	5 YR	3680.00	303.63	312.72	309.72	312.80	0.00	3.54	2298.37	525.33	0.24
1	38728	10 YR	4670.00	303.63	313.43	310.01	313.51	0.00	3.85	2674.69	540.50	0.25
1	38728	25 YR	6230.00	303.63	314.36	310.40	314.47	0.00	4.36	3192.27	575.90	0.26
1	38728	50 YR	7390.00	303.63	314.98	310.66	315.10	0.00	4.73	3585.36	741.45	0.28
1	38728	100 YR	8690.00	303.63	315.67	310.94	315.81	0.00	5.32	4108.27	902.06	0.30
1	38728	250 YR	10660.00	303.63	316.54	311.31	316.71	0.00	5.84	4922.09	1086.34	0.32
1	38728	500 YR	12340.00	303.63	317.11	311.66	317.28	0.00	6.00	5495.78	1163.17	0.32
1	39286	2 YR	1990.00	302.20	311.79		311.82	0.00	2.64	1822.88	755.92	0.19
1	39286	5 YR	3680.00	302.20	313.22		313.25	0.00	2.82	2950.21	814.74	0.18
1	39286	10 YR	4670.00	302.20	313.93		313.96	0.00	2.90	3530.36	831.85	0.18
1	39286	25 YR	6230.00	302.20	314.88		314.92	0.00	3.04	4398.43	955.34	0.18
1	39286	50 YR	7390.00	302.20	315.51		315.56	0.00	3.12	5016.17	1011.84	0.18
1	39286	100 YR	8690.00	302.20	316.24		316.28	0.00	3.19	5772.41	1056.55	0.17
1	39286	250 YR	10660.00	302.20	317.13		317.17	0.00	3.28	6724.33	1090.41	0.17
1	39286	500 YR	12340.00	302.20	317.70		317.75	0.00	3.42	7359.93	1149.24	0.18
1	39436	2 YR	1990.00	304.49	311.97	311.06	312.09	0.00	4.93	1369.40	670.76	0.34
1	39436	5 YR	3680.00	304.49	313.37	311.67	313.46	0.00	4.97	2384.58	794.43	0.31
1	39436	10 YR	4670.00	304.49	314.07	311.91	314.15	0.00	4.99	2961.86	841.78	0.30
1	39436	25 YR	6230.00	304.49	315.01	312.27	315.10	0.00	5.04	3777.82	888.95	0.29
1	39436	50 YR	7390.00	304.49	315.64	312.51	315.72	0.00	5.03	4358.63	985.65	0.28
1	39436	100 YR	8690.00	304.49	316.36	312.73	316.43	0.00	5.06	5084.80	1025.00	0.27
1	39436	250 YR	10660.00	304.49	317.24	313.02	317.31	0.00	5.07	6044.88	1148.33	0.26
1	39436	500 YR	12340.00	304.49	317.81	313.22	317.89	0.00	5.19	6708.66	1177.37	0.26
1	39488 FM 2878		Culvert									
1	39568 AC	2 YR	1990.00	304.49	312.81	311.29	312.94	0.00	4.80	1499.77	547.38	0.31
1	39568 AC	5 YR	3680.00	304.49	313.66	311.67	313.86	0.00	6.64	1976.78	590.98	0.41
1	39568 AC	10 YR	4670.00	304.49	314.08	312.36	314.31	0.00	7.34	2250.67	696.77	0.44
1	39568 AC	25 YR	6230.00	304.49	314.93	312.91	315.15	0.00	7.67	2912.87	825.70	0.44
1	39568 AC	50 YR	7390.00	304.49	315.60	313.21	315.80	0.00	7.58	3488.89	886.94	0.42
1	39568 AC	100 YR	8690.00	304.49	316.31	313.49	316.49	0.00	7.45	4159.92	1019.44	0.40
1	39568 AC	250 YR	10660.00	304.49	317.19	314.03	317.36	0.00	7.47	5085.40	1084.79	0.39
1	39568 AC	500 YR	12340.00	304.49	317.74	314.20	317.92	0.00	7.63	5698.64	1109.89	0.39
1	39873	2 YR	1990.00	304.47	313.19		313.21	0.00	2.26	2014.21	627.00	0.16
1	39873	5 YR	3680.00	304.47	314.24		314.28	0.00	3.00	2696.33	669.42	0.19
1	39873	10 YR	4670.00	304.47	314.74		314.79	0.00	3.33	3032.81	684.68	0.21
1	39873	25 YR	6230.00	304.47	315.57		315.63	0.00	3.65	3618.07	714.77	0.22

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	39873	50 YR	7390.00	304.47	316.19		316.25	0.00	3.81	4062.49	736.22	0.22
1	39873	100 YR	8690.00	304.47	316.84		316.91	0.00	3.96	4547.37	757.62	0.22
1	39873	250 YR	10660.00	304.47	317.67		317.75	0.00	4.20	5188.93	782.30	0.22
1	39873	500 YR	12340.00	304.47	318.22		318.31	0.00	4.45	5625.51	798.28	0.2
1	40395	2 YR	1990.00	304.86	313.67	311.62	313.72	0.00	3.20	1352.36	435.63	0.22
1	40395	5 YR	3680.00	304.86	314.90	312.23	314.98	0.00	4.05	1919.42	482.12	0.26
1	40395	10 YR	4670.00	304.86	315.46	312.55	315.56	0.00	4.42	2195.61	494.14	0.27
1	40395	25 YR	6230.00	304.86	316.33	312.96	316.45	0.00	4.84	2631.66	514.98	0.28
1	40395	50 YR	7390.00	304.86	316.94	313.24	317.07	0.00	5.10	2950.66	533.99	0.29
1	40395	100 YR	8690.00	304.86	317.58	313.51	317.73	0.00	5.40	3309.54	573.05	0.29
1	40395	250 YR	10660.00	304.86	318.43	313.93	318.59	0.00	5.78	3816.94	623.93	0.30
1	40395	500 YR	12340.00	304.86	319.01	314.25	319.19	0.00	6.08	4187.36	681.25	0.31
1	41036	2 YR	1740.00	308.83	314.88	313.05	314.94	0.00	3.37	1048.53	373.62	0.27
1	41036	5 YR	3080.00	308.83	316.23	313.54	316.30	0.00	3.74	1606.07	444.53	0.27
1	41036	10 YR	4000.00	308.83	316.91	313.84	316.99	0.00	4.15	1925.28	509.57	0.28
1	41036	25 YR	5380.00	308.83	317.79	314.23	317.89	0.00	4.42	2396.96	559.40	0.28
1	41036	50 YR	6450.00	308.83	318.40	314.50	318.50	0.00	4.57	2740.58	578.87	0.28
1	41036	100 YR	7650.00	308.83	319.05	314.82	319.16	0.00	4.72	3128.67	612.09	0.28
1	41036	250 YR	9450.00	308.83	319.90	315.21	320.02	0.00	4.91	3667.58	648.06	0.28
1	41036	500 YR	10960.00	308.83	320.52	315.54	320.65	0.00	5.12	4077.15	764.70	0.28
1	41599 AD	2 YR	1740.00	309.00	315.60	313.35	315.62	0.00	2.05	1741.82	587.87	0.15
1	41599 AD	5 YR	3080.00	309.00	316.92	313.78	316.95	0.00	2.36	2547.69	631.91	0.16
1	41599 AD	10 YR	4000.00	309.00	317.64	314.02	317.68	0.00	2.61	3029.18	721.58	0.17
1	41599 AD	25 YR	5380.00	309.00	318.54	314.34	318.59	0.00	2.87	3713.21	807.58	0.17
1	41599 AD	50 YR	6450.00	309.00	319.14	314.55	319.18	0.00	2.99	4195.52	819.25	0.18
1	41599 AD	100 YR	7650.00	309.00	319.78	314.78	319.83	0.00	3.13	4736.67	867.40	0.18
1	41599 AD	250 YR	9450.00	309.00	320.62	315.09	320.67	0.00	3.28	5472.36	894.62	0.18
1	41599 AD	500 YR	10960.00	309.00	321.24	315.34	321.30	0.00	3.41	6035.94	912.29	0.18

HEC-RAS Plan: SwamEast_Exist River: Swampoodle_East Reach: Swampoodle_East

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)	
Swampoodle_East	595	2 YR	720.00	301.53	305.60	305.19	306.68	0.00	8.34	86.33	28.03	0.84
Swampoodle_East	595	5 YR	940.00	301.53	307.13	305.79	307.94	0.00	7.24	135.22	35.88	0.59
Swampoodle_East	595	10 YR	1080.00	301.53	307.95	306.12	308.71	0.00	7.02	167.18	42.42	0.53
Swampoodle_East	595	25 YR	1300.00	301.53	308.62	306.59	309.48	0.00	7.48	198.07	51.72	0.5
Swampoodle_East	595	50 YR	1480.00	301.53	309.07	306.97	310.02	0.00	7.89	223.39	60.79	0.54
Swampoodle_East	595	100 YR	1840.00	301.53	309.41	307.68	310.71	0.00	9.28	245.22	67.65	0.62
Swampoodle_East	595	250 YR	2360.00	301.53	309.94	308.60	311.73	0.00	10.93	283.92	81.75	0.71
Swampoodle_East	595	500 YR	2770.00	301.53	310.34	309.45	312.56	0.00	12.17	336.86	200.68	0.77
Swampoodle_East	837	2 YR	720.00	304.39	308.07	308.07	309.48	0.00	9.53	75.54	26.75	1.00
Swampoodle_East	837	5 YR	940.00	304.39	308.66	308.66	310.28	0.00	10.23	92.18	31.47	1.00
Swampoodle_East	837	10 YR	1080.00	304.39	309.00	309.00	310.75	0.00	10.64	103.54	35.31	0.99
Swampoodle_East	837	25 YR	1300.00	304.39	309.49	309.49	311.43	0.00	11.22	122.22	40.34	0.98
Swampoodle_East	837	50 YR	1480.00	304.39	309.89	309.89	311.95	0.00	11.57	139.31	44.46	0.96
Swampoodle_East	837	100 YR	1840.00	304.39	310.63	310.63	312.90	0.00	12.22	179.56	79.17	0.94
Swampoodle_East	837	250 YR	2360.00	304.39	311.58	311.58	313.97	0.00	12.78	303.06	187.01	0.91
Swampoodle_East	837	500 YR	2770.00	304.39	312.59	312.59	314.56	0.00	12.00	535.28	264.53	0.79
Swampoodle_East	966	2 YR	720.00	305.61	309.29	309.29	310.70	0.00	9.52	75.61	26.76	1.00
Swampoodle_East	966	5 YR	940.00	305.61	309.87	309.87	311.50	0.00	10.26	91.67	28.97	1.00
Swampoodle_East	966	10 YR	1080.00	305.61	310.19	310.19	311.98	0.00	10.72	101.37	30.60	1.00
Swampoodle_East	966	25 YR	1300.00	305.61	310.69	310.69	312.67	0.00	11.30	117.29	33.11	0.99
Swampoodle_East	966	50 YR	1480.00	305.61	311.07	311.07	313.21	0.00	11.77	130.02	34.99	0.98
Swampoodle_East	966	100 YR	1840.00	305.61	311.78	311.78	314.21	0.00	12.55	157.22	42.68	0.97
Swampoodle_East	966	250 YR	2360.00	305.61	313.23	313.23	315.38	0.00	12.07	309.44	166.68	0.83
Swampoodle_East	966	500 YR	2770.00	305.61	314.31	314.31	316.04	0.00	11.26	611.95	347.65	0.72
Swampoodle_East	1060 State Loop 14		Culvert									
Swampoodle_East	1134	2 YR	720.00	306.34	313.17	310.55	313.61	0.00	5.69	180.29	213.67	0.40
Swampoodle_East	1134	5 YR	940.00	306.34	313.19	311.32	313.92	0.01	7.34	184.66	215.05	0.51
Swampoodle_East	1134	10 YR	1080.00	306.34	313.41	313.41	314.12	0.01	7.50	224.80	244.78	0.51
Swampoodle_East	1134	25 YR	1300.00	306.34	313.69	313.69	314.27	0.01	7.33	328.52	275.52	0.49
Swampoodle_East	1134	50 YR	1480.00	306.34	314.04	313.87	314.45	0.00	6.63	431.50	307.08	0.43
Swampoodle_East	1134	100 YR	1840.00	306.34	314.40	314.08	314.80	0.00	6.92	566.94	432.60	0.44
Swampoodle_East	1134	250 YR	2360.00	306.34	315.24	314.13	315.41	0.00	5.07	982.80	549.67	0.31
Swampoodle_East	1134	500 YR	2770.00	306.34	315.99	314.70	316.08	0.00	3.81	1423.68	665.70	0.22
Swampoodle_East	1455 A	2 YR	720.00	307.00	313.68	312.23	314.14	0.00	6.60	233.11	365.41	0.46
Swampoodle_East	1455 A	5 YR	940.00	307.00	314.09	313.36	314.64	0.00	7.48	272.73	387.13	0.50
Swampoodle_East	1455 A	10 YR	1080.00	307.00	314.43	313.61	314.68	0.00	6.00	648.24	404.71	0.39
Swampoodle_East	1455 A	25 YR	1300.00	307.00	314.49	313.94	314.83	0.00	6.96	674.59	411.01	0.4
Swampoodle_East	1455 A	50 YR	1480.00	307.00	314.52	314.30	314.94	0.00	7.80	686.58	413.80	0.5
Swampoodle_East	1455 A	100 YR	1840.00	307.00	314.87	314.51	315.26	0.00	7.93	838.82	447.25	0.50
Swampoodle_East	1455 A	250 YR	2360.00	307.00	315.44	314.80	315.74	0.00	7.68	1137.43	559.68	0.47
Swampoodle_East	1455 A	500 YR	2770.00	307.00	316.08	314.92	316.27	0.00	6.62	1507.68	588.29	0.39
Swampoodle_East	1567	2 YR	720.00	307.56	313.35	312.94	314.54	0.00	9.58	140.81	115.45	0.71
Swampoodle_East	1567	5 YR	940.00	307.56	313.48	312.94	315.26	0.00	11.89	152.62	121.06	0.87
Swampoodle_East	1567	10 YR	1080.00	307.56	314.44	314.44	315.22	0.00	8.92	321.43	307.14	0.61
Swampoodle_East	1567	25 YR	1300.00	307.56	314.87	314.87	315.46	0.00	8.52	519.40	374.27	0.56
Swampoodle_East	1567	50 YR	1480.00	307.56	315.00	315.00	315.62	0.00	8.92	571.53	380.42	0.58
Swampoodle_East	1567	100 YR	1840.00	307.56	315.25	315.25	315.90	0.00	9.59	665.17	386.47	0.62
Swampoodle_East	1567	250 YR	2360.00	307.56	315.53	315.53	316.23	0.00	10.53	773.63	393.54	0.66
Swampoodle_East	1567	500 YR	2770.00	307.56	315.97	315.71	316.51	0.00	9.88	951.31	402.86	0.61
Swampoodle_East	1708	2 YR	550.00	308.10	314.07	312.73	314.89	0.00	7.65	124.83	63.99	0.56
Swampoodle_East	1708	5 YR	770.00	308.10	314.80	313.81	315.73	0.00	8.59	223.54	191.12	0.59
Swampoodle_East	1708	10 YR	910.00	308.10	315.31	315.31	316.05	0.00	8.21	360.82	322.67	0.54
Swampoodle_East	1708	25 YR	1130.00	308.10	315.62	315.62	316.35	0.00	8.64	475.47	411.60	0.56
Swampoodle_East	1708	50 YR	1410.00	308.10	315.99	315.99	316.63	0.00	8.74	631.20	433.80	0.55
Swampoodle_East	1708	100 YR	1730.00	308.10	316.23	316.23	316.89	0.00	9.33	741.43	481.05	0.58
Swampoodle_East	1708	250 YR	2250.00	308.10	316.53	316.53	317.24	0.00	10.31	889.73	510.76	0.63
Swampoodle_East	1708	500 YR	2630.00	308.10	316.66	316.66	317.52	0.00	11.48	955.84	522.36	0.70
Swampoodle_East	1782	2 YR	550.00	309.04	314.26	312.86	315.01	0.00	7.14	106.78	40.21	0.56
Swampoodle_East	1782	5 YR	770.00	309.04	314.79	313.79	315.93	0.00	8.88	132.20	71.94	0.67
Swampoodle_East	1782	10 YR	910.00	309.04	314.91	314.32	316.42	0.00	10.20	143.12	106.42	0.76
Swampoodle_East	1782	25 YR	1130.00	309.04	315.81	315.81	316.93	0.00	9.48	313.31	304.78	0.65
Swampoodle_East	1782	50 YR	1410.00	309.04	316.53	316.53	317.32	0.00	8.75	607.45	435.41	0.57
Swampoodle_East	1782	100 YR	1730.00	309.04	316.80	316.80	317.65	0.00	9.45	734.01	506.19	0.61
Swampoodle_East	1782	250 YR	2250.00	309.04	317.29	317.29	318.05	0.00	9.70	997.19	581.15	0.60
Swampoodle_East	1782	500 YR	2630.00	309.04	317.59	317.59	318.32	0.00	9.97	1181.08	650.92	0.61
Swampoodle_East	1874 Main St.		Culvert									
Swampoodle_East	1959 B	2 YR	550.00	309.04	315.26	312.87	315.71	0.00	5.68	183.64	196.99	0.41
Swampoodle_East	1959 B	5 YR	770.00	309.04	315.77	313.81	316.37	0.00	6.81	280.29	248.48	0.47
Swampoodle_East	1959 B	10 YR	910.00	309.04	315.83	314.27	316.64	0.00	7.89	292.66	253.09	0.54
Swampoodle_East	1959 B	25 YR	1130.00	309.04	315.89	315.89	317.07	0.00	9.60	305.20	256.95	0.66
Swampoodle_East	1959 B	50 YR	1410.00	309.04	316.45	316.45	317.56	0.00	9.84	497.36	295.41	0.61
Swampoodle_East	1959 B	100 YR	1730.00	309.04	316.95	316.95	318.03	0.00	10.20	659.86	346.00	0.65
Swampoodle_East	1959 B	250 YR	2250.00	309.04	317.50	317.50	318.64	0.00	11.07	862.82	395.30	0.68
Swampoodle_East	1959 B	500 YR	2630.00	309.04	317.89	317.89	319.01	0.00	11.42	1021.73	425.59	0.69
Swampoodle_East	2010	2 YR	550.00	309.08	315.28	312.93	315.77	0.00	5.88	148.63	87.78	0.42
Swampoodle_East	2010	5 YR	770.00	309.08	315.74	313.90	316.51	0.00	7.46	214.08	181.85	0.51
Swampoodle_East	2010	10 YR	910.00	309.08	315.77	314.44	316.84	0.00	8.79	219.46	196.77	0.60

HEC-RAS Plan: SwamEast_Exist River: Swampoodle_East Reach: Swampoodle_East (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Swampoodle_East	2010	25 YR	1130.00	309.08	316.21	316.21	317.43	0.00	9.64	319.78	249.38	0.64
Swampoodle_East	2010	50 YR	1410.00	309.08	316.91	316.91	317.95	0.00	9.56	515.65	313.29	0.61
Swampoodle_East	2010	100 YR	1730.00	309.08	317.25	317.25	318.39	0.00	10.38	626.09	333.36	0.64
Swampoodle_East	2010	250 YR	2250.00	309.08	317.94	317.94	319.00	0.00	10.72	884.97	398.53	0.64
Swampoodle_East	2010	500 YR	2630.00	309.08	318.21	318.21	319.34	0.00	11.43	991.90	409.70	0.67
Swampoodle_East	2117	2 YR	550.00	309.50	314.96	313.87	316.13	0.00	8.80	87.76	76.86	0.67
Swampoodle_East	2117	5 YR	770.00	309.50	316.05	316.05	316.90	0.00	8.31	275.65	270.32	0.58
Swampoodle_East	2117	10 YR	910.00	309.50	316.37	316.37	317.17	0.00	8.49	366.72	292.72	0.58
Swampoodle_East	2117	25 YR	1130.00	309.50	317.23	316.69	317.66	0.00	7.09	632.41	323.06	0.45
Swampoodle_East	2117	50 YR	1410.00	309.50	317.77		318.16	0.00	7.23	815.01	354.46	0.45
Swampoodle_East	2117	100 YR	1730.00	309.50	318.23		318.62	0.00	7.53	985.23	385.16	0.45
Swampoodle_East	2117	250 YR	2250.00	309.50	318.73		319.22	0.00	8.71	1201.06	476.35	0.51
Swampoodle_East	2117	500 YR	2630.00	309.50	319.12		319.58	0.00	8.86	1389.81	499.24	0.51
Swampoodle_East	2186	2 YR	550.00	309.60	315.14	313.93	316.39	0.00	8.96	67.83	54.45	0.68
Swampoodle_East	2186	5 YR	770.00	309.60	316.18	316.18	317.33	0.00	9.20	190.51	172.92	0.64
Swampoodle_East	2186	10 YR	910.00	309.60	316.87	316.87	317.64	0.00	8.24	366.84	330.26	0.55
Swampoodle_East	2186	25 YR	1130.00	309.60	317.16	317.15	317.97	0.00	8.83	468.08	361.03	0.57
Swampoodle_East	2186	50 YR	1410.00	309.60	317.78		318.34	0.00	8.21	704.49	401.06	0.51
Swampoodle_East	2186	100 YR	1730.00	309.60	318.28		318.75	0.00	8.03	912.31	421.85	0.49
Swampoodle_East	2186	250 YR	2250.00	309.60	318.97		319.35	0.00	7.93	1212.45	446.38	0.46
Swampoodle_East	2186	500 YR	2630.00	309.60	319.33		319.70	0.00	8.20	1373.90	463.36	0.47
Swampoodle_East	2196 Pedestrian Bridg		Bridge									
Swampoodle_East	2206	2 YR	550.00	309.70	316.20	314.03	316.84	0.00	6.81	172.45	157.13	0.48
Swampoodle_East	2206	5 YR	770.00	309.70	317.43	316.35	317.77	0.00	5.79	489.29	358.48	0.37
Swampoodle_East	2206	10 YR	910.00	309.70	317.62	316.64	318.00	0.00	6.27	561.36	387.58	0.40
Swampoodle_East	2206	25 YR	1130.00	309.70	317.97	317.29	318.34	0.00	6.57	701.42	405.05	0.41
Swampoodle_East	2206	50 YR	1410.00	309.70	318.27	317.74	318.67	0.00	7.16	822.33	414.00	0.44
Swampoodle_East	2206	100 YR	1730.00	309.70	318.68	318.00	319.05	0.00	7.37	995.01	427.06	0.44
Swampoodle_East	2206	250 YR	2250.00	309.70	319.27	318.39	319.62	0.00	7.72	1254.79	457.22	0.45
Swampoodle_East	2206	500 YR	2630.00	309.70	319.61	318.57	319.97	0.00	8.02	1416.35	472.81	0.45
Swampoodle_East	2231	2 YR	550.00	309.72	316.18	314.05	316.96	0.00	7.28	128.93	142.92	0.51
Swampoodle_East	2231	5 YR	770.00	309.72	317.40		317.84	0.00	6.31	415.11	325.55	0.41
Swampoodle_East	2231	10 YR	910.00	309.72	317.59	317.07	318.08	0.00	6.88	479.73	363.39	0.44
Swampoodle_East	2231	25 YR	1130.00	309.72	317.95		318.43	0.00	7.23	614.22	395.24	0.45
Swampoodle_East	2231	50 YR	1410.00	309.72	318.24		318.76	0.00	7.88	733.09	409.12	0.48
Swampoodle_East	2231	100 YR	1730.00	309.72	318.66		319.14	0.00	8.04	908.04	424.60	0.48
Swampoodle_East	2231	250 YR	2250.00	309.72	319.26		319.70	0.00	8.29	1168.53	449.24	0.48
Swampoodle_East	2231	500 YR	2630.00	309.72	319.61		320.04	0.00	8.52	1329.53	459.00	0.48
Swampoodle_East	2248	2 YR	550.00	309.80	316.22	314.13	316.99	0.00	7.27	128.32	139.79	0.51
Swampoodle_East	2248	5 YR	770.00	309.80	317.41		317.86	0.00	6.40	407.28	310.33	0.41
Swampoodle_East	2248	10 YR	910.00	309.80	317.61		318.11	0.00	6.93	472.23	345.29	0.44
Swampoodle_East	2248	25 YR	1130.00	309.80	317.96		318.46	0.00	7.31	600.29	375.66	0.46
Swampoodle_East	2248	50 YR	1410.00	309.80	318.26		318.80	0.00	7.99	712.71	392.63	0.49
Swampoodle_East	2248	100 YR	1730.00	309.80	318.65		319.18	0.00	8.32	876.43	433.42	0.50
Swampoodle_East	2248	250 YR	2250.00	309.80	319.28		319.72	0.00	8.37	1148.67	441.87	0.48
Swampoodle_East	2248	500 YR	2630.00	309.80	319.63		320.07	0.00	8.59	1307.26	448.96	0.49
Swampoodle_East	2279	2 YR	550.00	309.83	316.28	314.17	317.05	0.00	7.18	131.66	159.76	0.51
Swampoodle_East	2279	5 YR	770.00	309.83	317.45	315.36	317.91	0.00	6.39	400.91	283.79	0.42
Swampoodle_East	2279	10 YR	910.00	309.83	317.65	317.11	318.16	0.00	6.90	460.85	311.87	0.44
Swampoodle_East	2279	25 YR	1130.00	309.83	318.00	317.57	318.55	0.00	7.51	580.92	364.23	0.47
Swampoodle_East	2279	50 YR	1410.00	309.83	318.30	318.03	318.90	0.00	8.21	691.71	380.46	0.51
Swampoodle_East	2279	100 YR	1730.00	309.83	318.69	318.33	319.28	0.00	8.55	851.68	417.01	0.52
Swampoodle_East	2279	250 YR	2250.00	309.83	319.31	318.77	319.83	0.00	8.75	1120.80	460.29	0.51
Swampoodle_East	2279	500 YR	2630.00	309.83	319.67	319.05	320.17	0.00	8.99	1291.99	494.14	0.51
Swampoodle_East	2308 Pine St.		Culvert									
Swampoodle_East	2341 C	2 YR	550.00	310.05	316.60	314.43	317.14	0.00	6.34	187.46	168.00	0.44
Swampoodle_East	2341 C	5 YR	770.00	310.05	317.48	315.51	317.92	0.00	6.28	395.23	281.06	0.41
Swampoodle_East	2341 C	10 YR	910.00	310.05	317.66	316.87	318.17	0.00	6.94	446.66	302.66	0.45
Swampoodle_East	2341 C	25 YR	1130.00	310.05	318.10	316.87	318.56	0.00	7.08	584.03	326.23	0.45
Swampoodle_East	2341 C	50 YR	1410.00	310.05	318.40	317.98	318.91	0.00	7.71	686.77	337.65	0.48
Swampoodle_East	2341 C	100 YR	1730.00	310.05	318.80	318.31	319.30	0.00	8.10	825.05	357.21	0.49
Swampoodle_East	2341 C	250 YR	2250.00	310.05	319.34	318.54	319.84	0.00	8.61	1021.47	372.35	0.50
Swampoodle_East	2341 C	500 YR	2630.00	310.05	319.66	318.98	320.20	0.00	9.24	1142.92	415.68	0.53
Swampoodle_East	2402	2 YR	550.00	310.26	316.69		317.26	0.00	6.48	142.96	57.32	0.46
Swampoodle_East	2402	5 YR	770.00	310.26	317.51	315.72	318.28	0.00	7.64	233.52	196.40	0.51
Swampoodle_East	2402	10 YR	910.00	310.26	317.68	316.50	318.64	0.00	8.65	269.41	218.97	0.57
Swampoodle_East	2402	25 YR	1130.00	310.26	318.10	316.86	319.11	0.00	9.30	366.02	250.23	0.59
Swampoodle_East	2402	50 YR	1410.00	310.26	318.60	318.60	319.55	0.00	9.58	513.90	336.82	0.59
Swampoodle_East	2402	100 YR	1730.00	310.26	319.00	319.00	319.92	0.00	9.95	654.75	355.29	0.60
Swampoodle_East	2402	250 YR	2250.00	310.26	319.38	319.38	320.39	0.00	11.04	790.80	363.49	0.65
Swampoodle_East	2402	500 YR	2630.00	310.26	319.71	319.55	320.71	0.00	11.44	912.02	378.08	0.66

HEC-RAS Plan: SwamWest_Exist River: Swampoodle_West Reach: Swampoodle_West

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)	
Swampoodle_West	49	2 YR	390.00	303.63	306.54	304.52	306.63	0.00	2.50	160.50	71.25	0.33
Swampoodle_West	49	5 YR	540.00	303.63	307.96	304.97	308.04	0.00	2.44	257.75	159.19	0.24
Swampoodle_West	49	10 YR	630.00	303.63	308.77	305.19	308.84	0.00	2.39	317.23	198.16	0.21
Swampoodle_West	49	25 YR	740.00	303.63	309.57	305.42	309.65	0.00	2.48	384.81	243.50	0.2
Swampoodle_West	49	50 YR	790.00	303.63	310.12	305.51	310.19	0.00	2.36	436.39	304.93	0.18
Swampoodle_West	49	100 YR	810.00	303.63	310.56	305.56	310.62	0.00	2.23	479.47	375.72	0.16
Swampoodle_West	49	250 YR	850.00	303.63	311.22	305.64	311.27	0.00	2.08	547.46	457.66	0.14
Swampoodle_West	49	500 YR	870.00	303.63	311.69	305.66	311.74	0.00	1.98	607.31	584.59	0.13
Swampoodle_West	62	2 YR	390.00	304.65	306.55	305.18	306.77	0.01	2.10	108.05	49.21	0.38
Swampoodle_West	62	5 YR	540.00	304.65	307.97	305.70	308.09	0.00	2.05	193.43	67.90	0.28
Swampoodle_West	62	10 YR	630.00	304.65	308.78	305.95	308.88	0.00	1.98	251.82	76.51	0.23
Swampoodle_West	62	25 YR	740.00	304.65	309.58	306.23	309.67	0.00	1.93	315.42	85.86	0.21
Swampoodle_West	62	50 YR	790.00	304.65	310.13	306.36	310.21	0.00	1.86	362.08	93.08	0.19
Swampoodle_West	62	100 YR	810.00	304.65	310.57	306.39	310.63	0.00	1.79	400.70	103.20	0.17
Swampoodle_West	62	250 YR	850.00	304.65	311.23	306.48	311.28	0.00	1.71	461.88	159.14	0.15
Swampoodle_West	62	500 YR	870.00	304.65	311.70	306.52	311.75	0.00	1.65	521.77	264.03	0.13
Swampoodle_West	100 Railroad		Mult Open									
Swampoodle_West	134 A	2 YR	390.00	305.24	309.65	305.22	309.67	0.00	1.09	328.92	96.13	0.11
Swampoodle_West	134 A	5 YR	540.00	305.24	311.34	305.84	311.36	0.00	0.99	491.56	145.18	0.09
Swampoodle_West	134 A	10 YR	630.00	305.24	312.26	306.06	312.28	0.00	1.00	586.55	193.68	0.08
Swampoodle_West	134 A	25 YR	740.00	305.24	313.32	306.29	313.33	0.00	1.02	697.79	497.85	0.07
Swampoodle_West	134 A	50 YR	790.00	305.24	314.06	306.39	314.07	0.00	0.99	775.94	646.76	0.07
Swampoodle_West	134 A	100 YR	810.00	305.24	314.37	306.42	314.39	0.00	0.98	808.80	648.03	0.06
Swampoodle_West	134 A	250 YR	850.00	305.24	314.38	306.50	314.40	0.00	1.02	810.14	648.09	0.07
Swampoodle_West	134 A	500 YR	870.00	305.24	315.06	306.55	315.07	0.00	0.97	881.21	705.44	0.06
Swampoodle_West	172	2 YR	390.00	305.60	309.66	308.41	309.79	0.01	2.89	142.40	74.49	0.33
Swampoodle_West	172	5 YR	540.00	305.60	311.34	308.73	311.42	0.00	2.20	282.96	106.73	0.19
Swampoodle_West	172	10 YR	630.00	305.60	312.26	308.90	312.32	0.00	2.00	384.90	181.81	0.16
Swampoodle_West	172	25 YR	740.00	305.60	313.32	309.09	313.36	0.00	1.83	597.54	522.02	0.13
Swampoodle_West	172	50 YR	790.00	305.60	314.07	309.18	314.09	0.00	1.50	876.26	760.39	0.10
Swampoodle_West	172	100 YR	810.00	305.60	314.38	309.20	314.40	0.00	1.36	1012.95	778.64	0.09
Swampoodle_West	172	250 YR	850.00	305.60	314.39	309.27	314.41	0.00	1.42	1018.86	779.00	0.09
Swampoodle_West	172	500 YR	870.00	305.60	315.07	309.30	315.08	0.00	1.14	1316.21	792.51	0.07
Swampoodle_West	452	2 YR	70.00	304.28	310.29		310.30	0.00	0.64	114.84	32.07	0.05
Swampoodle_West	452	5 YR	70.00	304.28	311.62		311.63	0.00	0.48	161.11	37.40	0.04
Swampoodle_West	452	10 YR	70.00	304.28	312.46		312.46	0.00	0.41	193.83	40.75	0.03
Swampoodle_West	452	25 YR	70.00	304.28	313.46		313.46	0.00	0.35	236.61	44.75	0.02
Swampoodle_West	452	50 YR	100.00	304.28	314.16		314.16	0.00	0.45	268.66	47.53	0.03
Swampoodle_West	452	100 YR	150.00	304.28	314.45		314.46	0.00	0.64	283.05	49.58	0.04
Swampoodle_West	452	250 YR	250.00	304.28	314.48		314.49	0.00	1.07	284.14	49.79	0.06
Swampoodle_West	452	500 YR	330.00	304.28	315.12		315.14	0.00	1.24	416.31	235.66	0.07
Swampoodle_West	710	2 YR	70.00	305.89	310.34		310.34	0.00	0.65	107.38	37.39	0.07
Swampoodle_West	710	5 YR	70.00	305.89	311.64		311.64	0.00	0.44	161.41	45.62	0.04
Swampoodle_West	710	10 YR	70.00	305.89	312.47		312.47	0.00	0.37	201.51	50.91	0.03
Swampoodle_West	710	25 YR	70.00	305.89	313.47		313.47	0.00	0.30	254.82	55.76	0.02
Swampoodle_West	710	50 YR	100.00	305.89	314.17		314.17	0.00	0.38	294.78	58.91	0.03
Swampoodle_West	710	100 YR	150.00	305.89	314.47		314.47	0.00	0.54	313.01	60.56	0.04
Swampoodle_West	710	250 YR	250.00	305.89	314.52		314.53	0.00	0.89	316.00	60.83	0.06
Swampoodle_West	710	500 YR	330.00	305.89	315.17		315.19	0.00	1.06	356.71	64.38	0.07
Swampoodle_West	935	2 YR	70.00	305.31	310.41		310.42	0.00	0.96	82.75	33.92	0.10
Swampoodle_West	935	5 YR	70.00	305.31	311.66		311.67	0.00	0.64	127.66	37.96	0.05
Swampoodle_West	935	10 YR	70.00	305.31	312.48		312.49	0.00	0.52	159.92	40.61	0.04
Swampoodle_West	935	25 YR	70.00	305.31	313.47		313.48	0.00	0.43	201.78	43.81	0.03
Swampoodle_West	935	50 YR	100.00	305.31	314.17		314.18	0.00	0.54	234.13	50.51	0.04
Swampoodle_West	935	100 YR	150.00	305.31	314.48		314.49	0.00	0.76	250.54	54.79	0.05
Swampoodle_West	935	250 YR	250.00	305.31	314.56		314.58	0.00	1.25	254.54	55.78	0.08
Swampoodle_West	935	500 YR	330.00	305.31	315.22		315.24	0.00	1.48	294.30	64.83	0.09
Swampoodle_West	1003	2 YR	220.00	304.53	310.49		310.64	0.00	3.19	72.18	25.39	0.30
Swampoodle_West	1003	5 YR	220.00	304.53	311.67		311.75	0.00	2.31	104.65	29.44	0.19
Swampoodle_West	1003	10 YR	220.00	304.53	312.48		312.54	0.00	1.92	129.66	32.21	0.14
Swampoodle_West	1003	25 YR	230.00	304.53	313.47		313.51	0.00	1.66	164.52	39.79	0.11
Swampoodle_West	1003	50 YR	270.00	304.53	314.17		314.21	0.00	1.71	194.85	46.97	0.11
Swampoodle_West	1003	100 YR	340.00	304.53	314.48		314.54	0.00	2.04	210.03	50.17	0.13
Swampoodle_West	1003	250 YR	450.00	304.53	314.56		314.66	0.00	2.66	214.08	50.99	0.17
Swampoodle_West	1003	500 YR	540.00	304.53	315.22		315.33	0.00	2.84	249.60	56.37	0.17
Swampoodle_West	1028 Weir		Inl Struct									
Swampoodle_West	1068	2 YR	220.00	300.95	310.72	303.24	310.74	0.00	1.01	288.08	57.34	0.06
Swampoodle_West	1068	5 YR	220.00	300.95	311.77	303.24	311.78	0.00	0.88	350.97	62.62	0.05
Swampoodle_West	1068	10 YR	220.00	300.95	312.55	303.24	312.56	0.00	0.80	401.29	66.57	0.04
Swampoodle_West	1068	25 YR	230.00	300.95	313.51	303.30	313.52	0.00	0.75	467.73	71.46	0.04
Swampoodle_West	1068	50 YR	270.00	300.95	314.21	303.52	314.22	0.00	0.82	519.46	77.38	0.04
Swampoodle_West	1068	100 YR	340.00	300.95	314.54	303.88	314.55	0.00	1.00	545.22	80.12	0.05
Swampoodle_West	1068	250 YR	450.00	300.95	314.66	304.38	314.69	0.00	1.31	555.46	81.11	0.07
Swampoodle_West	1068	500 YR	540.00	300.95	315.33	304.74	315.36	0.00	1.48	611.37	86.31	0.07
Swampoodle_West	1107	2 YR	220.00	300.95	310.73	303.24	310.74	0.00	1.00	294.85	60.06	0.06
Swampoodle_West	1107	5 YR	220.00	300.95	311.77	303.24	311.78	0.00	0.87	361.14	66.43	0.05
Swampoodle_West	1107	10 YR	220.00	300.95	312.55	303.24	312.56	0.00	0.79	414.73	71.16	0.04

HEC-RAS Plan: SwamWest_Exist River: Swampoodle_West Reach: Swampoodle_West (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Swampoodle_West	1107	25 YR	230.00	300.95	313.51	303.30	313.52	0.00	0.74	486.05	77.01	0.04
Swampoodle_West	1107	50 YR	270.00	300.95	314.21	303.53	314.22	0.00	0.81	541.11	81.24	0.04
Swampoodle_West	1107	100 YR	340.00	300.95	314.54	303.89	314.55	0.00	0.99	568.03	83.23	0.05
Swampoodle_West	1107	250 YR	450.00	300.95	314.67	304.39	314.69	0.00	1.29	578.70	84.00	0.07
Swampoodle_West	1107	500 YR	540.00	300.95	315.33	304.75	315.36	0.00	1.45	638.47	96.22	0.07
Swampoodle_West	1247	2 YR	220.00	301.18	310.73	303.35	310.74	0.00	1.01	293.36	60.07	0.06
Swampoodle_West	1247	5 YR	220.00	301.18	311.77	303.35	311.79	0.00	0.88	359.63	66.43	0.05
Swampoodle_West	1247	10 YR	220.00	301.18	312.55	303.35	312.56	0.00	0.80	413.21	71.16	0.04
Swampoodle_West	1247	25 YR	230.00	301.18	313.52	303.41	313.52	0.00	0.75	484.52	77.01	0.04
Swampoodle_West	1247	50 YR	270.00	301.18	314.21	303.63	314.22	0.00	0.81	539.59	81.24	0.04
Swampoodle_West	1247	100 YR	340.00	301.18	314.54	303.98	314.55	0.00	0.99	566.52	83.23	0.05
Swampoodle_West	1247	250 YR	450.00	301.18	314.67	304.48	314.69	0.00	1.30	577.23	84.01	0.07
Swampoodle_West	1247	500 YR	540.00	301.18	315.34	304.84	315.36	0.00	1.47	636.76	95.51	0.07
Swampoodle_West	1338	2 YR	220.00	301.37	310.72	304.02	310.75	0.00	1.34	200.46	44.14	0.09
Swampoodle_West	1338	5 YR	220.00	301.37	311.77	304.02	311.79	0.00	1.16	258.29	63.72	0.07
Swampoodle_West	1338	10 YR	220.00	301.37	312.55	304.02	312.57	0.00	1.04	312.32	76.34	0.06
Swampoodle_West	1338	25 YR	230.00	301.37	313.51	304.10	313.53	0.00	0.96	403.69	116.18	0.05
Swampoodle_West	1338	50 YR	270.00	301.37	314.21	304.36	314.22	0.00	1.02	500.50	174.09	0.05
Swampoodle_West	1338	100 YR	340.00	301.37	314.54	304.77	314.56	0.00	1.22	561.53	193.27	0.06
Swampoodle_West	1338	250 YR	450.00	301.37	314.66	305.34	314.70	0.00	1.59	586.19	197.56	0.08
Swampoodle_West	1338	500 YR	540.00	301.37	315.33	305.77	315.37	0.00	1.72	725.81	219.75	0.09
Swampoodle_West	1385 College Dr.		Culvert									
Swampoodle_West	1439 B	2 YR	310.00	301.87	311.10	304.68	311.13	0.00	1.46	257.68	57.97	0.10
Swampoodle_West	1439 B	5 YR	450.00	301.87	312.17	305.33	312.22	0.00	1.81	324.24	66.87	0.11
Swampoodle_West	1439 B	10 YR	540.00	301.87	312.83	305.69	312.89	0.00	2.00	374.43	85.60	0.12
Swampoodle_West	1439 B	25 YR	680.00	301.87	313.62	306.19	313.69	0.00	2.29	451.79	120.18	0.13
Swampoodle_West	1439 B	50 YR	800.00	301.87	314.21	306.58	314.30	0.00	2.50	548.43	210.15	0.14
Swampoodle_West	1439 B	100 YR	920.00	301.87	314.51	306.95	314.62	0.00	2.77	614.86	234.03	0.15
Swampoodle_West	1439 B	250 YR	1110.00	301.87	314.64	307.44	314.79	0.00	3.26	646.54	237.10	0.18
Swampoodle_West	1439 B	500 YR	1270.00	301.87	315.24	307.84	315.39	0.00	3.37	792.43	254.31	0.18
Swampoodle_West	1496	2 YR	310.00	300.77	311.13	303.49	311.14	0.00	0.79	485.09	82.65	0.05
Swampoodle_West	1496	5 YR	450.00	300.77	312.21	304.00	312.23	0.00	1.01	579.18	92.02	0.06
Swampoodle_West	1496	10 YR	540.00	300.77	312.88	304.26	312.90	0.00	1.12	642.73	98.17	0.06
Swampoodle_West	1496	25 YR	680.00	300.77	313.68	304.60	313.71	0.00	1.30	724.45	106.24	0.07
Swampoodle_West	1496	50 YR	800.00	300.77	314.29	304.84	314.32	0.00	1.45	804.06	150.17	0.08
Swampoodle_West	1496	100 YR	920.00	300.77	314.60	305.08	314.64	0.00	1.62	856.97	192.72	0.08
Swampoodle_West	1496	250 YR	1110.00	300.77	314.77	305.39	314.82	0.00	1.93	891.27	216.48	0.10
Swampoodle_West	1496	500 YR	1270.00	300.77	315.36	305.64	315.42	0.00	2.08	1050.47	297.75	0.10

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	572	2 YR	3360.00	252.62	262.85	258.11	262.97	0.00	3.28	1664.14	3685.47	0.20
1	572	5 YR	5010.00	252.62	263.30	260.02	263.51	0.00	4.46	1821.64	3899.68	0.26
1	572	10 YR	6190.00	252.62	263.54	260.55	263.83	0.00	5.27	1905.65	4047.95	0.30
1	572	25 YR	7770.00	252.62	264.05	261.22	264.42	0.00	6.04	2084.14	4208.88	0.3
1	572	50 YR	11230.00	252.62	264.53	262.16	265.17	0.00	8.05	2252.14	4251.20	0.44
1	572	100 YR	13610.00	252.62	265.01	262.70	265.81	0.01	9.05	2420.15	4356.48	0.48
1	572	250 YR	18910.00	252.62	265.47	263.76	266.81	0.01	11.75	2581.14	4482.60	0.61
1	572	500 YR	23020.00	252.62	265.95	264.47	267.66	0.01	13.38	2749.15	4635.23	0.69
1	678	2 YR	3360.00	251.45	262.93	257.14	263.11	0.00	3.80	1241.02	3783.04	0.21
1	678	5 YR	5010.00	251.45	263.43	258.58	263.77	0.00	5.20	1374.68	4006.81	0.28
1	678	10 YR	6190.00	251.45	263.72	259.35	264.18	0.00	6.14	1450.05	4040.15	0.33
1	678	25 YR	7770.00	251.45	264.26	260.51	264.86	0.00	7.09	1594.01	4116.09	0.37
1	678	50 YR	11230.00	251.45	264.88	262.53	265.90	0.01	9.38	1757.82	4203.11	0.48
1	678	100 YR	13610.00	251.45	265.42	263.28	266.69	0.01	10.57	1900.19	4299.93	0.53
1	678	250 YR	18910.00	251.45	266.13	264.69	268.13	0.01	13.41	2088.51	4395.17	0.65
1	678	500 YR	23020.00	251.45	266.75	265.61	269.27	0.01	15.16	2253.64	4451.43	0.72
1	750 Railroad		Bridge									
1	863	2 YR	3360.00	251.00	263.29	256.61	263.39	0.00	2.92	1726.59	2780.98	0.16
1	863	5 YR	5010.00	251.00	264.12	257.69	264.28	0.00	3.79	1994.35	3065.45	0.20
1	863	10 YR	6190.00	251.00	264.67	258.35	264.87	0.00	4.29	2173.98	3192.88	0.22
1	863	25 YR	7770.00	251.00	265.53	259.17	265.77	0.00	4.75	2453.50	3321.92	0.23
1	863	50 YR	11230.00	251.00	266.98	261.01	267.32	0.00	5.70	2924.41	3717.03	0.27
1	863	100 YR	13610.00	251.00	267.25	261.80	267.72	0.00	6.69	3012.98	3805.35	0.31
1	863	250 YR	18910.00	251.00	268.32	263.83	269.02	0.00	8.27	3359.72	4017.57	0.37
1	863	500 YR	23020.00	251.00	270.50	264.60	271.18	0.00	8.17	4069.56	4224.01	0.34
1	980	2 YR	3360.00	250.99	263.35	257.25	263.48	0.00	3.32	1697.66	2150.79	0.18
1	980	5 YR	5010.00	250.99	264.21	258.57	264.41	0.00	4.23	2021.23	2405.79	0.23
1	980	10 YR	6190.00	250.99	264.78	259.90	265.03	0.00	4.75	2238.44	2552.17	0.25
1	980	25 YR	7770.00	250.99	265.66	260.76	265.94	0.00	5.21	2571.56	2745.93	0.26
1	980	50 YR	11230.00	250.99	267.14	262.52	267.51	0.00	6.17	3140.94	3003.02	0.29
1	980	100 YR	13610.00	250.99	267.47	263.33	267.97	0.00	7.18	3268.59	3056.48	0.34
1	980	250 YR	18910.00	250.99	268.63	264.49	269.35	0.00	8.75	3718.67	3294.42	0.39
1	980	500 YR	23020.00	250.99	270.79	265.26	271.44	0.00	8.54	4648.44	3780.96	0.36
1	1131	2 YR	3360.00	252.92	263.49	259.04	263.65	0.00	3.90	1850.98	2516.42	0.23
1	1131	5 YR	5010.00	252.92	264.44	260.68	264.62	0.00	4.43	2467.29	2784.64	0.25
1	1131	10 YR	6190.00	252.92	265.08	261.59	265.26	0.00	4.67	2881.05	2874.43	0.2
1	1131	25 YR	7770.00	252.92	266.00	263.09	266.18	0.00	4.78	3485.78	2967.48	0.25
1	1131	50 YR	11230.00	252.92	267.59	263.84	267.78	0.00	5.17	4529.81	3115.96	0.25
1	1131	100 YR	13610.00	252.92	268.07	264.26	268.31	0.00	5.81	4848.70	3131.71	0.28
1	1131	250 YR	18910.00	252.92	269.48	265.05	269.77	0.00	6.61	5780.42	3271.47	0.30
1	1131	500 YR	23020.00	252.92	271.52	265.58	271.78	0.00	6.29	7247.00	3714.11	0.27
1	1325	2 YR	3360.00	252.35	263.74	257.68	263.86	0.00	3.14	1703.74	2572.72	0.18
1	1325	5 YR	5010.00	252.35	264.70	258.81	264.87	0.00	3.84	2165.34	2783.16	0.21
1	1325	10 YR	6190.00	252.35	265.33	259.53	265.53	0.00	4.21	2469.75	2818.78	0.22
1	1325	25 YR	7770.00	252.35	266.24	260.34	266.45	0.00	4.52	2903.20	2910.88	0.23
1	1325	50 YR	11230.00	252.35	267.81	261.63	268.07	0.00	5.17	3658.62	3061.61	0.25
1	1325	100 YR	13610.00	252.35	268.33	263.86	268.66	0.00	5.85	3909.79	3122.62	0.27
1	1325	250 YR	18910.00	252.35	269.89	264.94	270.01	0.00	4.11	8844.88	3311.93	0.18
1	1325	500 YR	23020.00	252.35	271.86	265.62	271.96	0.00	3.95	10995.22	3744.04	0.17
1	1455	2 YR	3360.00	253.13	263.85	258.82	264.04	0.00	3.93	1372.22	2776.27	0.23
1	1455	5 YR	5010.00	253.13	264.84	260.09	265.10	0.00	4.76	1758.86	2982.89	0.27
1	1455	10 YR	6190.00	253.13	265.48	260.99	265.79	0.00	5.21	2010.88	3011.40	0.28
1	1455	25 YR	7770.00	253.13	266.39	262.72	266.72	0.00	5.60	2363.36	3063.09	0.29
1	1455	50 YR	11230.00	253.13	267.97	264.09	268.37	0.00	6.42	2979.49	3158.56	0.31
1	1455	100 YR	13610.00	253.13	268.52	264.70	269.03	0.00	7.24	3195.46	3202.60	0.35
1	1455	250 YR	18910.00	253.13	270.03	265.81	270.10	0.00	3.51	11610.13	3305.60	0.16
1	1455	500 YR	23020.00	253.13	271.98	266.57	272.04	0.00	3.35	14263.27	3636.00	0.14
1	1545 Railroad		Bridge									
1	1616	2 YR	3360.00	254.36	264.75	263.12	264.98	0.00	5.18	1425.61	2853.23	0.31
1	1616	5 YR	5010.00	254.36	265.84	263.93	266.08	0.00	5.66	1915.49	2917.76	0.32
1	1616	10 YR	6190.00	254.36	266.53	264.30	266.79	0.00	5.92	2227.15	2950.41	0.32
1	1616	25 YR	7770.00	254.36	267.84	264.73	268.06	0.00	5.70	2815.00	2997.94	0.29
1	1616	50 YR	11230.00	254.36	268.44	265.50	268.81	0.00	7.41	3086.48	3017.84	0.37
1	1616	100 YR	13610.00	254.36	269.36	265.95	269.75	0.00	7.77	3500.23	3063.18	0.37
1	1616	250 YR	18910.00	254.36	271.29	266.83	271.31	0.00	2.64	15447.47	3280.79	0.12
1	1616	500 YR	23020.00	254.36	272.42	267.43	272.45	0.00	2.80	17324.70	3399.95	0.12
1	1729 A	2 YR	3360.00	253.36	265.08	258.42	265.11	0.00	1.85	3355.94	2786.89	0.10
1	1729 A	5 YR	5010.00	253.36	266.18	259.78	266.23	0.00	2.28	4069.67	2891.73	0.12
1	1729 A	10 YR	6190.00	253.36	266.88	260.26	266.94	0.00	2.53	4524.68	2956.13	0.13
1	1729 A	25 YR	7770.00	253.36	268.13	260.88	268.19	0.00	2.66	5336.84	3072.04	0.13
1	1729 A	50 YR	11230.00	253.36	268.92	261.68	269.02	0.00	3.48	5849.29	3113.88	0.16
1	1729 A	100 YR	13610.00	253.36	269.86	262.69	269.97	0.00	3.79	6461.60	3193.92	0.17
1	1729 A	250 YR	18910.00	253.36	271.32	263.59	271.34	0.00	2.00	19643.42	3470.43	0.09
1	1729 A	500 YR	23020.00	253.36	272.46	264.20	272.48	0.00	2.16	21780.05	3569.38	0.09

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2758	2 YR	3440.00	257.22	265.35	260.41	265.37	0.00	1.70	3441.82	1958.15	0.13
1	2758	5 YR	5200.00	257.22	266.52	260.98	266.54	0.00	2.06	4315.86	2032.57	0.14
1	2758	10 YR	6220.00	257.22	267.24	261.21	267.27	0.00	2.18	4856.85	2082.92	0.14
1	2758	25 YR	7950.00	257.22	268.33	261.57	268.34	0.00	1.19	11488.63	2154.13	0.07
1	2758	50 YR	11450.00	257.22	269.23	262.03	269.24	0.00	1.53	12854.01	2201.61	0.09
1	2758	100 YR	13660.00	257.22	270.20	262.35	270.21	0.00	1.64	14349.82	2296.94	0.09
1	2758	250 YR	18960.00	257.22	271.44	263.07	271.45	0.00	1.70	20727.29	2404.47	0.09
1	2758	500 YR	23220.00	257.22	272.58	263.59	272.60	0.00	1.83	23432.39	2586.37	0.09
1	2899	2 YR	3440.00	254.11	265.39	260.86	265.51	0.00	3.51	2012.64	1778.03	0.20
1	2899	5 YR	5200.00	254.11	266.56	262.07	266.72	0.00	4.18	2590.89	1912.49	0.23
1	2899	10 YR	6220.00	254.11	267.28	262.55	267.44	0.00	4.39	2946.07	1976.14	0.23
1	2899	25 YR	7950.00	254.11	268.23	263.35	268.55	0.00	5.86	3588.71	2067.43	0.30
1	2899	50 YR	11450.00	254.11	269.12	264.47	269.50	0.00	6.85	4713.17	2116.81	0.34
1	2899	100 YR	13660.00	254.11	270.16	265.05	270.37	0.00	5.69	7064.38	2143.88	0.27
1	2899	250 YR	18960.00	254.11	271.45	266.44	271.53	0.00	4.35	13289.48	2181.38	0.20
1	2899	500 YR	23220.00	254.11	272.59	267.12	272.67	0.00	4.33	15801.50	2256.96	0.19
1	2949 Railroad		Mult Open									
1	2994 B	2 YR	3440.00	254.55	266.08	262.32	266.17	0.00	2.96	1983.20	1922.13	0.19
1	2994 B	5 YR	5200.00	254.55	267.15	263.43	267.27	0.00	3.52	2497.30	2001.69	0.21
1	2994 B	10 YR	6220.00	254.55	267.82	263.78	267.95	0.00	3.71	2818.13	2020.03	0.21
1	2994 B	25 YR	7950.00	254.55	268.62	264.46	268.84	0.00	4.89	3670.28	2038.12	0.27
1	2994 B	50 YR	11450.00	254.55	269.36	265.25	269.63	0.00	5.67	4591.94	2068.01	0.30
1	2994 B	100 YR	13660.00	254.55	270.56	265.76	270.67	0.00	4.12	7594.78	2122.21	0.21
1	2994 B	250 YR	18960.00	254.55	271.84	266.61	271.91	0.00	3.28	13938.11	2163.87	0.16
1	2994 B	500 YR	23220.00	254.55	272.50	267.22	272.56	0.00	3.58	15352.46	2256.70	0.17
1	3133	2 YR	3440.00	255.74	266.20	262.32	266.25	0.00	2.55	2868.47	1462.20	0.16
1	3133	5 YR	5200.00	255.74	267.31	263.14	267.37	0.00	2.89	3981.29	1767.56	0.17
1	3133	10 YR	6220.00	255.74	267.99	263.48	268.05	0.00	2.88	4682.56	1855.11	0.16
1	3133	25 YR	7950.00	255.74	268.92	264.03	268.99	0.00	3.33	5909.06	1957.42	0.18
1	3133	50 YR	11450.00	255.74	269.72	264.85	269.81	0.00	3.89	7092.19	2027.83	0.20
1	3133	100 YR	13660.00	255.74	270.69	265.39	270.77	0.00	3.76	8535.88	2166.61	0.19
1	3133	250 YR	18960.00	255.74	271.89	266.34	271.95	0.00	3.54	13513.42	2224.43	0.17
1	3133	500 YR	23220.00	255.74	272.56	266.47	272.63	0.00	3.87	15031.96	2293.66	0.18
1	3350	2 YR	3440.00	255.13	266.31	262.88	266.42	0.00	3.51	2032.10	1418.04	0.21
1	3350	5 YR	5200.00	255.13	267.43	264.02	267.56	0.00	3.99	2868.94	1606.03	0.23
1	3350	10 YR	6220.00	255.13	268.11	264.41	268.18	0.00	3.40	4728.19	1712.15	0.19
1	3350	25 YR	7950.00	255.13	269.06	264.89	269.12	0.00	3.29	6107.00	1904.14	0.17
1	3350	50 YR	11450.00	255.13	269.90	266.02	269.98	0.00	3.99	7417.28	1980.52	0.20
1	3350	100 YR	13660.00	255.13	270.84	266.06	270.91	0.00	3.84	8936.98	2043.41	0.19
1	3350	250 YR	18960.00	255.13	272.00	266.41	272.06	0.00	3.67	13241.54	2112.82	0.17
1	3350	500 YR	23220.00	255.13	272.69	268.00	272.75	0.00	3.99	14703.28	2167.89	0.18
1	3539	2 YR	3440.00	256.39	266.36	263.27	266.81	0.00	5.85	776.53	478.65	0.36
1	3539	5 YR	5200.00	256.39	267.33	264.55	268.09	0.01	7.73	1040.05	953.05	0.45
1	3539	10 YR	6220.00	256.39	268.13	265.13	268.49	0.00	6.15	2517.09	1494.85	0.35
1	3539	25 YR	7950.00	256.39	269.13	266.06	269.33	0.00	5.22	4094.47	1701.95	0.28
1	3539	50 YR	11450.00	256.39	270.03	268.47	270.20	0.00	5.34	5636.46	1845.72	0.28
1	3539	100 YR	13660.00	256.39	270.96	268.80	271.08	0.00	4.77	7344.13	2025.71	0.24
1	3539	250 YR	18960.00	256.39	272.10	269.23	272.20	0.00	4.72	9885.88	2072.25	0.22
1	3539	500 YR	23220.00	256.39	272.79	269.60	272.91	0.00	4.92	11355.24	2153.94	0.23
1	3674 C	2 YR	3440.00	256.76	266.80	263.06	267.28	0.00	5.95	752.04	257.53	0.35
1	3674 C	5 YR	5200.00	256.76	268.03	264.69	268.74	0.00	7.41	974.72	615.33	0.41
1	3674 C	10 YR	6220.00	256.76	268.43	265.52	269.11	0.00	7.71	1561.29	699.25	0.42
1	3674 C	25 YR	7950.00	256.76	269.26	266.63	269.87	0.00	7.79	2247.29	985.95	0.41
1	3674 C	50 YR	11450.00	256.76	270.10	269.39	270.81	0.00	9.00	3205.78	1404.95	0.46
1	3674 C	100 YR	13660.00	256.76	271.04	269.43	271.47	0.00	7.77	4668.85	1628.85	0.38
1	3674 C	250 YR	18960.00	256.76	272.19	270.81	272.51	0.00	7.41	6675.64	1802.45	0.35
1	3674 C	500 YR	23220.00	256.76	272.90	271.16	273.19	0.00	7.39	7959.95	1830.72	0.34
1	3743 Lake Dr.		Mult Open									
1	3848 D	2 YR	3440.00	256.76	267.75	263.17	268.10	0.00	5.28	1157.18	751.11	0.31
1	3848 D	5 YR	5200.00	256.76	269.09	266.24	269.50	0.00	6.10	1622.82	1008.81	0.33
1	3848 D	10 YR	6220.00	256.76	270.02	266.98	270.21	0.00	4.82	3433.06	1189.80	0.25
1	3848 D	25 YR	7950.00	256.76	271.08	267.75	271.21	0.00	4.26	5209.27	1422.60	0.21
1	3848 D	50 YR	11450.00	256.76	271.75	268.99	271.91	0.00	5.17	6244.22	1615.15	0.25
1	3848 D	100 YR	13660.00	256.76	272.05	269.71	272.25	0.00	5.72	6733.98	1653.70	0.27
1	3848 D	250 YR	18960.00	256.76	272.78	270.35	273.01	0.00	6.64	7974.85	1758.76	0.31
1	3848 D	500 YR	23220.00	256.76	273.21	270.76	273.49	0.00	7.36	8754.59	1826.42	0.34
1	4010	2 YR	3440.00	260.44	268.19	267.61	268.60	0.01	6.61	1220.35	803.52	0.50
1	4010	5 YR	5200.00	260.44	269.71	268.20	269.94	0.00	5.63	2216.63	1080.75	0.37
1	4010	10 YR	6220.00	260.44	270.32	268.44	270.46	0.00	4.93	3535.85	1252.37	0.31
1	4010	25 YR	7950.00	260.44	271.27	268.95	271.37	0.00	4.52	4782.39	1415.11	0.27
1	4010	50 YR	11450.00	260.44	272.00	269.57	272.14	0.00	5.29	5864.03	1524.29	0.31
1	4010	100 YR	13660.00	260.44	272.35	269.90	272.50	0.00	5.74	6404.04	1606.23	0.33
1	4010	250 YR	18960.00	260.44	273.15	270.12	273.33	0.00	6.44	7711.96	1666.18	0.35
1	4010	500 YR	23220.00	260.44	273.65	270.12	273.86	0.00	7.01	8550.11	1711.35	0.37

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	4191	2 YR	3440.00	258.93	269.03		269.22	0.00	4.87	1710.57	800.38	0.33
1	4191	5 YR	5200.00	258.93	270.20		270.35	0.00	4.84	2885.60	1203.80	0.30
1	4191	10 YR	6220.00	258.93	270.66		270.80	0.00	4.96	3449.94	1272.11	0.30
1	4191	25 YR	7950.00	258.93	271.52		271.64	0.00	4.79	4594.04	1371.97	0.2
1	4191	50 YR	11450.00	258.93	272.31		272.45	0.00	5.43	5713.40	1473.36	0.30
1	4191	100 YR	13660.00	258.93	272.70		272.86	0.00	5.90	6297.62	1549.23	0.32
1	4191	250 YR	18960.00	258.93	273.55		273.73	0.00	6.61	7667.57	1675.65	0.35
1	4191	500 YR	23220.00	258.93	274.09		274.31	0.00	7.34	8605.71	1761.59	0.37
1	4514	2 YR	3030.00	261.30	269.62		269.73	0.00	3.56	1876.46	883.77	0.24
1	4514	5 YR	4440.00	261.30	270.70		270.79	0.00	3.58	3042.28	1224.49	0.22
1	4514	10 YR	5460.00	261.30	271.15		271.25	0.00	3.77	3614.21	1318.20	0.23
1	4514	25 YR	7720.00	261.30	271.96		272.07	0.00	4.19	4730.63	1427.62	0.24
1	4514	50 YR	11000.00	261.30	272.83		272.95	0.00	4.67	5987.55	1471.59	0.26
1	4514	100 YR	13090.00	261.30	273.28		273.41	0.00	5.01	6657.86	1514.14	0.27
1	4514	250 YR	18290.00	261.30	274.21		274.37	0.00	5.69	8122.72	1611.97	0.30
1	4514	500 YR	22420.00	261.30	274.87		275.05	0.00	6.32	9238.56	1810.34	0.32
1	4605	2 YR	3030.00	258.09	269.69	264.15	269.81	0.00	3.33	2005.26	950.43	0.19
1	4605	5 YR	4440.00	258.09	270.76	265.54	270.87	0.00	3.48	3248.05	1331.38	0.19
1	4605	10 YR	5460.00	258.09	271.22	266.69	271.33	0.00	3.70	3877.79	1432.94	0.20
1	4605	25 YR	7720.00	258.09	272.03	269.06	272.15	0.00	4.13	5097.44	1532.06	0.21
1	4605	50 YR	11000.00	258.09	272.91	270.01	273.04	0.00	4.63	6459.94	1587.75	0.23
1	4605	100 YR	13090.00	258.09	273.36	270.49	273.50	0.00	4.92	7190.34	1623.17	0.24
1	4605	250 YR	18290.00	258.09	274.31	271.21	274.48	0.00	5.60	8804.51	1743.93	0.26
1	4605	500 YR	22420.00	258.09	274.99	271.69	275.17	0.00	5.95	9995.31	1868.13	0.27
1	4679 Garber St.		Bridge									
1	4797 E	2 YR	3030.00	258.14	270.01	263.99	270.12	0.00	3.02	2309.46	1113.47	0.17
1	4797 E	5 YR	4440.00	258.14	271.06	265.16	271.16	0.00	3.25	3551.33	1208.83	0.18
1	4797 E	10 YR	5460.00	258.14	271.52	265.84	271.63	0.00	3.50	4112.05	1221.61	0.18
1	4797 E	25 YR	7720.00	258.14	272.37	267.43	272.49	0.00	4.00	5165.14	1268.50	0.20
1	4797 E	50 YR	11000.00	258.14	273.28	269.65	273.43	0.00	4.64	6345.28	1313.60	0.23
1	4797 E	100 YR	13090.00	258.14	273.76	270.65	273.93	0.00	5.03	6986.49	1360.57	0.24
1	4797 E	250 YR	18290.00	258.14	274.78	271.37	274.99	0.00	5.88	8423.75	1539.63	0.27
1	4797 E	500 YR	22420.00	258.14	275.45	271.83	275.70	0.00	6.39	9415.86	1622.65	0.29
1	4928	2 YR	3030.00	255.58	270.14	261.84	270.17	0.00	1.83	3723.53	1073.41	0.10
1	4928	5 YR	4440.00	255.58	271.18	262.94	271.22	0.00	2.15	4872.06	1141.63	0.11
1	4928	10 YR	5460.00	255.58	271.64	263.62	271.69	0.00	2.40	5411.18	1177.25	0.1
1	4928	25 YR	7720.00	255.58	272.50	265.26	272.57	0.00	2.91	6442.12	1231.06	0.14
1	4928	50 YR	11000.00	255.58	273.43	266.82	273.52	0.00	3.52	7609.02	1267.73	0.16
1	4928	100 YR	13090.00	255.58	273.93	267.83	274.04	0.00	3.89	8245.65	1307.77	0.18
1	4928	250 YR	18290.00	255.58	274.97	269.47	275.12	0.00	4.66	9653.64	1420.98	0.20
1	4928	500 YR	22420.00	255.58	275.66	270.08	275.84	0.00	5.21	10655.13	1524.19	0.22
1	5421	2 YR	3030.00	258.37	270.24		270.29	0.00	2.55	3205.55	1005.69	0.14
1	5421	5 YR	4440.00	258.37	271.30		271.35	0.00	2.81	4340.33	1123.42	0.15
1	5421	10 YR	5460.00	258.37	271.79		271.85	0.00	3.17	4907.83	1176.64	0.16
1	5421	25 YR	7720.00	258.37	272.69		272.76	0.00	3.61	5988.79	1236.88	0.18
1	5421	50 YR	11000.00	258.37	273.69		273.77	0.00	4.18	7302.79	1442.82	0.20
1	5421	100 YR	13090.00	258.37	274.22		274.32	0.00	4.47	8092.62	1495.41	0.21
1	5421	250 YR	18290.00	258.37	275.36		275.47	0.00	5.07	9819.17	1550.79	0.23
1	5421	500 YR	22420.00	258.37	276.12		276.24	0.00	5.49	11023.27	1649.38	0.24
1	6038	2 YR	3070.00	260.47	270.48	266.37	270.57	0.00	3.28	2315.13	841.73	0.19
1	6038	5 YR	4430.00	260.47	271.54	267.25	271.64	0.00	3.54	3164.67	933.82	0.20
1	6038	10 YR	5480.00	260.47	272.08	268.47	272.18	0.00	3.87	3623.35	998.54	0.21
1	6038	25 YR	7860.00	260.47	273.03	269.58	273.15	0.00	4.48	4526.78	1118.92	0.23
1	6038	50 YR	11510.00	260.47	274.09	270.40	274.26	0.00	5.33	5639.10	1236.57	0.26
1	6038	100 YR	13090.00	260.47	274.65	270.69	274.82	0.00	5.48	6267.28	1296.30	0.26
1	6038	250 YR	18290.00	260.47	275.86	271.52	276.07	0.00	6.46	7726.19	1458.67	0.30
1	6038	500 YR	22420.00	260.47	276.65	272.08	276.89	0.00	6.86	8743.70	1767.60	0.31
1	6255	2 YR	3070.00	258.08	270.59	267.92	270.87	0.00	5.26	1362.60	842.05	0.32
1	6255	5 YR	4430.00	258.08	271.66	269.18	271.92	0.00	5.53	2109.31	1029.37	0.32
1	6255	10 YR	5480.00	258.08	272.22	269.95	272.48	0.00	5.86	2563.00	1125.47	0.33
1	6255	25 YR	7860.00	258.08	273.21	271.14	273.47	0.00	6.29	3444.95	1200.99	0.34
1	6255	50 YR	11510.00	258.08	274.33	271.92	274.63	0.00	7.12	4559.26	1330.91	0.36
1	6255	100 YR	13090.00	258.08	274.90	272.43	275.18	0.00	7.11	5158.74	1372.38	0.35
1	6255	250 YR	18290.00	258.08	276.17	273.16	276.46	0.00	7.59	6589.27	1485.19	0.36
1	6255	500 YR	22420.00	258.08	276.98	273.68	277.29	0.00	8.00	7543.90	1668.69	0.37
1	6339	2 YR	3070.00	259.38	270.57	267.93	271.39	0.00	7.76	719.51	663.53	0.47
1	6339	5 YR	4430.00	259.38	271.67	271.12	272.37	0.00	7.93	1429.25	985.73	0.45
1	6339	10 YR	5480.00	259.38	272.27	271.66	272.89	0.00	8.02	1872.90	1123.59	0.45
1	6339	25 YR	7860.00	259.38	273.30	272.41	273.83	0.00	8.25	2753.94	1276.84	0.44
1	6339	50 YR	11510.00	259.38	274.47	273.19	274.96	0.00	8.71	3872.85	1358.45	0.44
1	6339	100 YR	13090.00	259.38	275.03	273.46	275.48	0.00	8.63	4434.41	1429.47	0.43
1	6339	250 YR	18290.00	259.38	276.31	274.28	276.74	0.00	8.99	5838.65	1590.70	0.42
1	6339	500 YR	22420.00	259.38	277.13	274.68	277.56	0.00	9.30	6766.19	1734.94	0.42
1	6400 Findley St.		Bridge									

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	6449 F	2 YR	3070.00	259.43	271.89	266.50	272.04	0.00	3.91	1751.21	1149.49	0.21
1	6449 F	5 YR	4430.00	259.43	272.81	268.26	272.96	0.00	4.17	2412.02	1276.81	0.22
1	6449 F	10 YR	5480.00	259.43	273.31	270.74	273.46	0.00	4.44	2792.69	1320.28	0.23
1	6449 F	25 YR	7860.00	259.43	274.20	271.81	274.37	0.00	4.96	3497.91	1459.04	0.24
1	6449 F	50 YR	11510.00	259.43	275.30	272.59	275.50	0.00	5.61	4365.52	1568.06	0.26
1	6449 F	100 YR	13090.00	259.43	275.78	272.85	275.99	0.00	5.77	4743.69	1695.53	0.27
1	6449 F	250 YR	18290.00	259.43	276.97	273.55	277.23	0.00	6.47	5687.31	1865.57	0.29
1	6449 F	500 YR	22420.00	259.43	277.76	274.02	278.06	0.00	6.98	6310.28	1898.27	0.30
1	6607	2 YR	3070.00	260.85	272.02	269.37	272.31	0.00	5.00	1202.14	1130.36	0.33
1	6607	5 YR	4430.00	260.85	272.94	270.99	273.21	0.00	5.27	1731.64	1200.73	0.33
1	6607	10 YR	5480.00	260.85	273.45	271.64	273.72	0.00	5.52	2034.86	1230.41	0.33
1	6607	25 YR	7860.00	260.85	274.36	272.56	274.66	0.00	6.11	2581.06	1324.98	0.35
1	6607	50 YR	11510.00	260.85	275.47	273.37	275.83	0.00	6.88	3249.34	1431.13	0.37
1	6607	100 YR	13090.00	260.85	275.95	273.63	276.33	0.00	7.10	3535.50	1513.87	0.37
1	6607	250 YR	18290.00	260.85	277.15	274.37	277.62	0.00	7.98	4258.56	1858.03	0.40
1	6607	500 YR	22420.00	260.85	277.95	274.87	278.49	0.00	8.64	4736.27	1976.80	0.42
1	6895	2 YR	3070.00	260.43	272.50	266.42	272.64	0.00	3.45	1662.52	1084.36	0.19
1	6895	5 YR	4430.00	260.43	273.37	267.87	273.56	0.00	4.21	2030.63	1225.63	0.23
1	6895	10 YR	5480.00	260.43	273.86	268.84	274.10	0.00	4.76	2237.40	1325.30	0.25
1	6895	25 YR	7860.00	260.43	274.77	270.98	275.12	0.00	5.87	2627.05	1448.09	0.30
1	6895	50 YR	11510.00	260.43	275.92	272.47	276.42	0.00	7.25	3116.63	1725.18	0.35
1	6895	100 YR	13090.00	260.43	276.40	272.89	276.95	0.00	7.74	3318.64	1810.91	0.37
1	6895	250 YR	18290.00	260.43	277.63	274.08	278.40	0.00	9.30	3843.47	1977.31	0.42
1	6895	500 YR	22420.00	260.43	278.45	274.84	279.39	0.00	10.42	4190.70	2112.30	0.46
1	6953 Railroad		Bridge									
1	7013 G	2 YR	3070.00	261.33	272.69	267.13	272.86	0.00	3.79	1511.41	1149.47	0.21
1	7013 G	5 YR	4430.00	261.33	273.63	268.74	273.86	0.00	4.61	1921.95	1262.97	0.24
1	7013 G	10 YR	5480.00	261.33	274.18	269.51	274.45	0.00	5.14	2171.75	1280.35	0.27
1	7013 G	25 YR	7860.00	261.33	275.23	270.98	275.59	0.00	6.16	2652.04	1471.73	0.31
1	7013 G	50 YR	11510.00	261.33	276.62	272.86	277.09	0.00	7.33	3284.48	1628.38	0.35
1	7013 G	100 YR	13090.00	261.33	277.18	273.07	277.69	0.00	7.73	3539.49	1740.72	0.36
1	7013 G	250 YR	18290.00	261.33	278.95	274.69	279.56	0.00	8.74	4343.48	1839.95	0.38
1	7013 G	500 YR	22420.00	261.33	280.55	275.49	281.19	0.00	9.09	5072.00	2153.48	0.38
1	7125	2 YR	3070.00	260.76	272.80	268.71	272.96	0.00	3.99	1862.17	1113.15	0.24
1	7125	5 YR	4430.00	260.76	273.84	270.91	273.99	0.00	4.25	2567.90	1239.68	0.24
1	7125	10 YR	5480.00	260.76	274.45	271.88	274.61	0.00	4.51	2980.62	1351.44	0.25
1	7125	25 YR	7860.00	260.76	275.62	272.65	275.80	0.00	5.02	3775.19	1530.83	0.26
1	7125	50 YR	11510.00	260.76	277.14	273.43	277.34	0.00	5.62	4808.90	1730.05	0.27
1	7125	100 YR	13090.00	260.76	277.74	273.71	277.96	0.00	5.83	5219.69	1867.04	0.28
1	7125	250 YR	18290.00	260.76	279.61	274.52	279.86	0.00	6.37	6491.56	1992.02	0.29
1	7125	500 YR	22420.00	260.76	281.22	275.06	281.47	0.00	6.54	7587.28	2212.01	0.28
1	7267	2 YR	3070.00	261.42	272.93	268.16	273.15	0.00	4.56	1676.85	1261.36	0.26
1	7267	5 YR	4430.00	261.42	273.98	269.78	274.17	0.00	4.73	2584.25	1537.42	0.25
1	7267	10 YR	5480.00	261.42	274.60	272.34	274.79	0.00	4.88	3163.38	1703.36	0.26
1	7267	25 YR	7860.00	261.42	275.80	273.22	275.97	0.00	5.08	4294.97	1900.42	0.25
1	7267	50 YR	11510.00	261.42	277.36	274.03	277.53	0.00	5.41	5823.51	2074.34	0.25
1	7267	100 YR	13090.00	261.42	277.97	274.03	278.14	0.00	5.46	6447.98	2112.77	0.25
1	7267	250 YR	18290.00	261.42	279.87	275.11	280.03	0.00	5.59	8367.22	2158.35	0.24
1	7267	500 YR	22420.00	261.42	281.49	275.58	281.63	0.00	5.54	9994.72	2267.79	0.23
1	7416 H	2 YR	3110.00	261.69	273.12	269.05	273.38	0.00	4.70	1526.30	1351.70	0.29
1	7416 H	5 YR	4400.00	261.69	274.16	270.38	274.37	0.00	4.65	2580.48	1718.75	0.27
1	7416 H	10 YR	5460.00	261.69	274.78	272.70	274.98	0.00	4.77	3297.52	1868.95	0.26
1	7416 H	25 YR	7970.00	261.69	275.98	273.67	276.15	0.00	4.91	4733.45	2014.12	0.26
1	7416 H	50 YR	11690.00	261.69	277.55	274.53	277.69	0.00	4.92	6750.65	2101.34	0.24
1	7416 H	100 YR	13060.00	261.69	278.16	274.76	278.29	0.00	4.91	7569.02	2193.32	0.24
1	7416 H	250 YR	18330.00	261.69	280.05	275.41	280.17	0.00	4.92	10183.55	2277.96	0.22
1	7416 H	500 YR	22440.00	261.69	281.64	275.57	281.75	0.00	4.78	12461.40	2356.20	0.20
1	7511	2 YR	3110.00	262.72	273.38	268.78	273.53	0.00	3.46	1971.70	1592.34	0.21
1	7511	5 YR	4400.00	262.72	274.36	269.81	274.49	0.00	3.63	3151.98	1992.34	0.21
1	7511	10 YR	5460.00	262.72	274.97	270.52	275.10	0.00	3.70	3969.01	2051.88	0.21
1	7511	25 YR	7970.00	262.72	276.14	272.77	276.25	0.00	3.92	5571.10	2149.25	0.21
1	7511	50 YR	11690.00	262.72	277.67	274.18	277.78	0.00	4.03	7774.12	2179.99	0.20
1	7511	100 YR	13060.00	262.72	278.28	274.36	278.38	0.00	4.00	8653.28	2209.54	0.20
1	7511	250 YR	18330.00	262.72	280.14	275.08	280.24	0.00	4.15	11451.22	2353.98	0.19
1	7511	500 YR	22440.00	262.72	281.72	275.50	281.81	0.00	4.06	13880.88	2398.78	0.18
1	7586 Jameson St.		Bridge									
1	7635	2 YR	3110.00	263.14	273.74	269.38	273.93	0.00	4.20	1539.78	1136.50	0.24
1	7635	5 YR	4400.00	263.14	275.09	270.78	275.24	0.00	4.09	2413.42	1332.67	0.22
1	7635	10 YR	5460.00	263.14	275.85	271.59	275.99	0.00	4.18	3067.90	1752.65	0.22
1	7635	25 YR	7970.00	263.14	277.04	273.76	277.17	0.00	4.42	4612.78	2100.77	0.22
1	7635	50 YR	11690.00	263.14	278.11	274.57	278.24	0.00	4.81	6152.93	2197.01	0.23
1	7635	100 YR	13060.00	263.14	278.61	274.79	278.73	0.00	4.75	6897.07	2330.98	0.22
1	7635	250 YR	18330.00	263.14	280.34	276.26	280.44	0.00	4.60	9797.61	2525.26	0.20
1	7635	500 YR	22440.00	263.14	281.86	276.76	281.94	0.00	4.25	12504.77	2648.26	0.18

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	7656	2 YR	3110.00	263.10	273.76	269.35	273.96	0.00	4.12	1282.15	940.92	0.24
1	7656	5 YR	4400.00	263.10	275.09	270.61	275.27	0.00	4.24	2088.03	1334.82	0.24
1	7656	10 YR	5460.00	263.10	275.86	271.33	276.02	0.00	4.30	2693.67	1653.77	0.2
1	7656	25 YR	7970.00	263.10	277.04	273.41	277.20	0.00	4.56	4166.93	2174.57	0.2
1	7656	50 YR	11690.00	263.10	278.11	274.81	278.27	0.00	4.92	5731.78	2205.87	0.24
1	7656	100 YR	13060.00	263.10	278.62	275.23	278.76	0.00	4.84	6487.64	2319.87	0.23
1	7656	250 YR	18330.00	263.10	280.34	276.23	280.46	0.00	4.67	9385.96	2534.97	0.21
1	7656	500 YR	22440.00	263.10	281.86	276.95	281.96	0.00	4.29	12106.34	2655.31	0.18
1	7681	2 YR	3110.00	262.30	273.77	267.73	274.00	0.00	3.89	840.53	486.66	0.23
1	7681	5 YR	4400.00	262.30	275.04	268.87	275.38	0.00	4.74	1099.83	1011.48	0.26
1	7681	10 YR	5460.00	262.30	275.77	269.66	276.17	0.00	5.27	1483.96	1347.03	0.28
1	7681	25 YR	7970.00	262.30	276.93	271.14	277.37	0.00	5.99	2688.05	2125.73	0.30
1	7681	50 YR	11690.00	262.30	278.02	273.09	278.43	0.00	6.39	4346.64	2307.55	0.31
1	7681	100 YR	13060.00	262.30	278.54	273.74	278.89	0.00	6.17	5214.33	2400.54	0.29
1	7681	250 YR	18330.00	262.30	280.32	277.75	280.53	0.00	5.47	8280.37	2553.33	0.24
1	7681	500 YR	22440.00	262.30	281.85	278.04	282.00	0.00	4.86	11171.73	2733.26	0.21
1	7703 Railroad		Bridge									
1	7751 I	2 YR	3110.00	260.11	274.19	267.28	274.25	0.00	2.50	2315.80	1033.58	0.14
1	7751 I	5 YR	4400.00	260.11	275.53	269.05	275.60	0.00	2.65	3330.69	1303.80	0.14
1	7751 I	10 YR	5460.00	260.11	276.13	269.85	276.20	0.00	2.89	3834.66	1490.53	0.15
1	7751 I	25 YR	7970.00	260.11	277.31	270.75	277.39	0.00	3.27	5063.48	1846.86	0.16
1	7751 I	50 YR	11690.00	260.11	278.35	273.22	278.45	0.00	3.87	6629.53	2319.47	0.18
1	7751 I	100 YR	13060.00	260.11	278.81	273.58	278.92	0.00	3.93	7402.77	2357.91	0.18
1	7751 I	250 YR	18330.00	260.11	280.55	274.41	280.64	0.00	3.94	10439.07	2579.54	0.17
1	7751 I	500 YR	22440.00	260.11	282.00	275.45	282.08	0.00	3.79	13239.33	2761.33	0.16
1	7926	2 YR	3110.00	261.00	274.29	268.24	274.31	0.00	1.34	3902.44	1211.65	0.08
1	7926	5 YR	4400.00	261.00	275.63	268.79	275.65	0.00	1.51	5072.46	1348.25	0.08
1	7926	10 YR	5460.00	261.00	276.24	269.13	276.26	0.00	1.66	5625.32	1374.58	0.09
1	7926	25 YR	7970.00	261.00	277.43	269.81	277.46	0.00	1.98	6764.74	1483.84	0.10
1	7926	50 YR	11690.00	261.00	278.49	270.45	278.54	0.00	2.48	7910.95	1841.77	0.12
1	7926	100 YR	13060.00	261.00	278.95	270.87	279.00	0.00	2.60	8488.82	2022.23	0.12
1	7926	250 YR	18330.00	261.00	280.66	271.90	280.72	0.00	2.84	11407.80	2495.20	0.12
1	7926	500 YR	22440.00	261.00	282.09	272.38	282.14	0.00	2.87	14261.69	2800.13	0.12
1	8838	2 YR	3110.00	262.49	274.52	269.47	274.59	0.00	2.75	1725.58	585.38	0.16
1	8838	5 YR	4400.00	262.49	275.88	270.12	275.97	0.00	3.35	2663.15	972.59	0.18
1	8838	10 YR	5460.00	262.49	276.51	270.57	276.61	0.00	3.51	3233.81	1047.39	0.1
1	8838	25 YR	7970.00	262.49	277.76	271.49	277.86	0.00	3.78	4479.17	1226.23	0.19
1	8838	50 YR	11690.00	262.49	278.95	272.63	279.07	0.00	4.33	5817.34	1495.82	0.21
1	8838	100 YR	13060.00	262.49	279.42	273.06	279.54	0.00	4.37	6381.62	1620.80	0.21
1	8838	250 YR	18330.00	262.49	281.11	274.47	281.20	0.00	4.13	10658.79	2398.13	0.19
1	8838	500 YR	22440.00	262.49	282.47	274.92	282.54	0.00	3.81	13974.27	2776.77	0.16
1	10041 J	2 YR	3060.00	266.31	275.83	273.19	275.93	0.00	3.79	1751.19	1079.41	0.24
1	10041 J	5 YR	4330.00	266.31	277.21	273.84	277.29	0.00	3.66	2634.19	1482.71	0.21
1	10041 J	10 YR	5400.00	266.31	277.86	274.21	277.94	0.00	3.84	3139.50	1642.79	0.22
1	10041 J	25 YR	7940.00	266.31	279.12	275.01	279.21	0.00	4.19	4530.24	2300.70	0.22
1	10041 J	50 YR	11640.00	266.31	280.40	275.88	280.49	0.00	4.36	6506.51	2826.36	0.22
1	10041 J	100 YR	13010.00	266.31	280.82	276.13	280.90	0.00	4.32	7250.53	2887.11	0.21
1	10041 J	250 YR	18240.00	266.31	282.04	277.14	282.07	0.00	2.69	16624.14	3111.21	0.13
1	10041 J	500 YR	22330.00	266.31	283.06	277.67	283.08	0.00	2.65	19876.69	3284.05	0.12
1	11738	2 YR	2110.00	265.19	277.73	272.34	277.79	0.00	2.51	1304.91	471.87	0.15
1	11738	5 YR	3650.00	265.19	279.13	273.61	279.25	0.00	3.44	1641.18	593.33	0.19
1	11738	10 YR	4690.00	265.19	279.93	274.83	280.08	0.00	3.94	1832.73	710.94	0.21
1	11738	25 YR	6810.00	265.19	280.85	275.85	280.93	0.00	3.41	4214.94	901.83	0.18
1	11738	50 YR	8290.00	265.19	282.00	276.39	282.07	0.00	3.34	5362.17	1117.90	0.17
1	11738	100 YR	10010.00	265.19	282.47	276.91	282.56	0.00	3.72	5905.35	1200.27	0.18
1	11738	250 YR	13670.00	265.19	282.94	277.95	283.07	0.00	4.60	6481.71	1253.21	0.22
1	11738	500 YR	16600.00	265.19	283.86	278.68	283.98	0.00	4.64	7681.49	1335.79	0.21
1	11919	2 YR	2110.00	265.19	277.78	272.29	278.09	0.00	4.52	490.52	178.35	0.27
1	11919	5 YR	3650.00	265.19	279.13	274.26	279.81	0.00	6.68	595.79	432.46	0.37
1	11919	10 YR	4690.00	265.19	279.87	275.29	280.81	0.00	7.90	658.99	506.96	0.42
1	11919	25 YR	6810.00	265.19	280.81	277.19	281.38	0.00	7.32	1957.94	735.11	0.38
1	11919	50 YR	8290.00	265.19	281.99	278.46	282.39	0.00	6.62	2967.58	1000.42	0.32
1	11919	100 YR	10010.00	265.19	282.48	280.41	282.88	0.00	7.01	3477.18	1112.13	0.34
1	11919	250 YR	13670.00	265.19	282.96	281.56	283.51	0.00	8.46	4038.72	1216.49	0.40
1	11919	500 YR	16600.00	265.19	283.91	282.27	284.31	0.00	7.76	5208.36	1245.83	0.35
1	11948 Railroad Access		Bridge									
1	11984 K	2 YR	2110.00	267.08	277.99	272.78	278.34	0.00	4.72	458.77	61.60	0.28
1	11984 K	5 YR	3650.00	267.08	280.08	274.73	280.73	0.00	6.50	603.82	519.62	0.35
1	11984 K	10 YR	4690.00	267.08	280.90	275.75	281.80	0.00	7.67	695.27	719.44	0.4
1	11984 K	25 YR	6810.00	267.08	281.99	277.62	282.34	0.00	6.10	2217.13	838.30	0.30
1	11984 K	50 YR	8290.00	267.08	282.57	278.80	282.89	0.00	6.14	2712.19	863.52	0.30
1	11984 K	100 YR	10010.00	267.08	282.91	280.14	283.28	0.00	6.68	3012.36	898.25	0.32
1	11984 K	250 YR	13670.00	267.08	283.35	282.22	283.89	0.00	8.31	3429.64	982.15	0.39
1	11984 K	500 YR	16600.00	267.08	283.88	282.61	284.45	0.00	8.75	3975.79	1126.92	0.41

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	12109	2 YR	2110.00	263.40	278.33	270.99	278.60	0.00	4.29	563.40	126.73	0.23
1	12109	5 YR	3650.00	263.40	280.77	273.44	281.11	0.00	5.18	952.73	632.80	0.25
1	12109	10 YR	4690.00	263.40	281.92	274.94	282.27	0.00	5.46	1243.36	730.74	0.25
1	12109	25 YR	6810.00	263.40	282.39	277.65	282.56	0.00	4.67	2776.66	779.78	0.21
1	12109	50 YR	8290.00	263.40	282.91	279.61	283.10	0.00	4.93	3203.41	831.65	0.22
1	12109	100 YR	10010.00	263.40	283.28	280.76	283.51	0.00	5.52	3526.33	913.22	0.24
1	12109	250 YR	13670.00	263.40	283.94	282.20	284.22	0.00	6.46	4154.89	1019.25	0.28
1	12109	500 YR	16600.00	263.40	284.48	282.21	284.79	0.00	6.83	4719.21	1084.36	0.29
1	12467	2 YR	2120.00	263.40	278.85		278.94	0.00	2.81	1182.01	209.90	0.15
1	12467	5 YR	3650.00	263.40	281.36		281.45	0.00	3.15	2365.31	671.95	0.15
1	12467	10 YR	4730.00	263.40	282.51		282.60	0.00	3.20	3201.07	781.64	0.14
1	12467	25 YR	6950.00	263.40	282.77		282.93	0.00	4.46	3405.77	809.67	0.20
1	12467	50 YR	8280.00	263.40	283.32		283.50	0.00	4.86	3900.75	996.75	0.21
1	12467	100 YR	10040.00	263.40	283.78		283.98	0.00	5.31	4366.17	1059.79	0.23
1	12467	250 YR	13710.00	263.40	284.58		284.82	0.00	6.10	5238.75	1124.76	0.26
1	12467	500 YR	16680.00	263.40	285.16		285.44	0.00	6.65	5922.37	1209.40	0.28
1	13532 L	2 YR	2120.00	267.81	279.70	276.95	280.31	0.00	6.65	460.67	287.14	0.43
1	13532 L	5 YR	3650.00	267.81	282.06		282.20	0.00	4.40	1934.05	813.40	0.25
1	13532 L	10 YR	4730.00	267.81	283.09		283.19	0.00	3.89	2846.94	996.53	0.21
1	13532 L	25 YR	6950.00	267.81	283.73		283.85	0.00	4.57	3488.97	1024.08	0.24
1	13532 L	50 YR	8280.00	267.81	284.32		284.43	0.00	4.54	4100.24	1046.41	0.23
1	13532 L	100 YR	10040.00	267.81	284.86		284.98	0.00	4.73	4674.00	1068.81	0.23
1	13532 L	250 YR	13710.00	267.81	285.81		285.94	0.00	5.11	5700.08	1096.34	0.24
1	13532 L	500 YR	16680.00	267.81	286.49		286.64	0.00	5.36	6454.37	1110.16	0.25
1	13867	2 YR	2120.00	268.21	280.80	276.04	281.20	0.00	5.12	433.91	63.62	0.31
1	13867	5 YR	3650.00	268.21	282.26	277.91	283.03	0.00	7.24	620.56	241.05	0.40
1	13867	10 YR	4730.00	268.21	283.06	279.05	283.96	0.00	8.08	829.50	304.08	0.43
1	13867	25 YR	6950.00	268.21	283.47	281.18	285.04	0.01	10.93	951.59	392.23	0.57
1	13867	50 YR	8280.00	268.21	283.86	283.62	285.70	0.01	12.08	1145.02	476.64	0.62
1	13867	100 YR	10040.00	268.21	284.65	284.65	286.26	0.01	12.00	1540.48	563.86	0.60
1	13867	250 YR	13710.00	268.21	285.91	285.91	287.21	0.01	11.87	2534.87	985.64	0.56
1	13867	500 YR	16680.00	268.21	286.54	286.39	287.74	0.01	12.03	3170.53	1022.78	0.56
1	13973 M	2 YR	2120.00	270.17	280.87	277.06	281.33	0.00	5.51	449.27	83.34	0.35
1	13973 M	5 YR	3650.00	270.17	282.36	278.84	283.25	0.00	7.80	582.72	98.48	0.45
1	13973 M	10 YR	4730.00	270.17	283.08	279.97	284.35	0.00	9.31	659.48	117.07	0.52
1	13973 M	25 YR	6950.00	270.17	283.35	281.79	285.92	0.00	13.32	693.41	148.68	0.73
1	13973 M	50 YR	8280.00	270.17	283.51	282.76	287.03	0.00	15.58	721.34	186.72	0.85
1	13973 M	100 YR	10040.00	270.17	286.20	286.20	288.10	0.00	12.50	2082.79	792.01	0.61
1	13973 M	250 YR	13710.00	270.17	287.68	287.68	289.26	0.00	12.58	3643.67	1236.24	0.58
1	13973 M	500 YR	16680.00	270.17	288.25	288.25	289.90	0.00	13.42	4360.91	1264.97	0.61
1	14054 US Highway 67		Bridge									
1	14110	2 YR	2120.00	270.17	281.21	277.01	281.51	0.00	4.47	494.24	83.36	0.29
1	14110	5 YR	3650.00	270.17	283.23	278.65	283.77	0.00	5.91	677.82	124.40	0.34
1	14110	10 YR	4730.00	270.17	284.21	279.52	284.92	0.00	6.87	778.02	240.53	0.38
1	14110	25 YR	6950.00	270.17	284.50	281.15	285.94	0.00	9.79	809.54	284.16	0.53
1	14110	50 YR	8280.00	270.17	285.54	282.07	287.03	0.00	10.16	1389.87	609.13	0.53
1	14110	100 YR	10040.00	270.17	286.94	283.14	288.11	0.00	9.61	2501.51	925.97	0.47
1	14110	250 YR	13710.00	270.17	288.05	287.20	289.28	0.00	10.54	3604.33	1058.34	0.50
1	14110	500 YR	16680.00	270.17	288.40	287.98	289.93	0.00	11.95	3981.01	1070.52	0.56
1	14157	2 YR	2120.00	269.22	281.24	276.59	281.54	0.00	4.35	492.26	75.64	0.29
1	14157	5 YR	3650.00	269.22	283.28	278.39	283.80	0.00	5.78	658.01	112.70	0.34
1	14157	10 YR	4730.00	269.22	284.26	279.41	284.95	0.00	6.73	748.54	242.92	0.37
1	14157	25 YR	6950.00	269.22	284.62	281.02	286.02	0.00	9.53	785.08	286.05	0.52
1	14157	50 YR	8280.00	269.22	285.68	281.88	287.11	0.00	9.85	1278.00	540.09	0.51
1	14157	100 YR	10040.00	269.22	286.94	282.97	288.19	0.00	9.73	2307.72	926.58	0.48
1	14157	250 YR	13710.00	269.22	288.04	285.20	289.37	0.00	10.68	3382.92	1007.63	0.51
1	14157	500 YR	16680.00	269.22	288.38	288.03	290.04	0.00	12.16	3731.29	1026.11	0.57
1	14179	2 YR	2120.00	270.02	281.26	276.98	281.55	0.00	4.29	496.30	77.86	0.29
1	14179	5 YR	3650.00	270.02	283.33	278.68	283.82	0.00	5.62	662.63	114.44	0.34
1	14179	10 YR	4730.00	270.02	284.32	279.58	284.98	0.00	6.52	747.10	226.32	0.37
1	14179	25 YR	6950.00	270.02	284.78	281.08	286.08	0.00	9.15	788.24	265.71	0.51
1	14179	50 YR	8280.00	270.02	285.84	281.92	287.16	0.00	9.45	1331.79	537.06	0.50
1	14179	100 YR	10040.00	270.02	286.94	282.93	288.23	0.00	9.70	2105.26	903.29	0.49
1	14179	250 YR	13710.00	270.02	288.02	287.32	289.44	0.00	10.77	3183.71	1031.80	0.52
1	14179	500 YR	16680.00	270.02	288.35	288.12	290.13	0.00	12.30	3529.57	1067.53	0.58
1	14224 Robison Rd.		Bridge									
1	14302 N	2 YR	2120.00	270.10	281.66	277.74	281.94	0.00	5.08	736.16	278.69	0.29
1	14302 N	5 YR	3650.00	270.10	284.20	279.73	284.54	0.00	5.85	1175.49	452.97	0.29
1	14302 N	10 YR	4730.00	270.10	285.84	280.63	286.02	0.00	5.06	2474.33	812.11	0.24
1	14302 N	25 YR	6950.00	270.10	286.18	282.17	286.53	0.00	7.08	2671.08	917.62	0.33
1	14302 N	50 YR	8280.00	270.10	286.89	282.88	287.19	0.00	6.92	3806.25	1068.54	0.32
1	14302 N	100 YR	10040.00	270.10	288.05	283.73	288.25	0.00	6.19	5135.02	1212.56	0.27
1	14302 N	250 YR	13710.00	270.10	289.28	285.20	289.46	0.00	6.22	6748.42	1496.27	0.26
1	14302 N	500 YR	16680.00	270.10	289.97	286.64	290.15	0.00	6.42	7847.92	1749.07	0.27

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	14437	2 YR	2120.00	269.28	282.05	275.61	282.12	0.00	2.42	1418.08	717.72	0.14
1	14437	5 YR	3650.00	269.28	284.64	277.10	284.72	0.00	2.73	2297.41	810.43	0.14
1	14437	10 YR	4730.00	269.28	286.10	277.89	286.11	0.00	1.29	7028.50	1003.33	0.06
1	14437	25 YR	6950.00	269.28	286.67	279.09	286.69	0.00	1.75	7579.45	1111.99	0.0
1	14437	50 YR	8280.00	269.28	287.30	280.55	287.33	0.00	1.92	8486.86	1391.75	0.09
1	14437	100 YR	10040.00	269.28	288.33	281.24	288.36	0.00	1.99	9937.22	1425.57	0.09
1	14437	250 YR	13710.00	269.28	289.53	281.91	289.56	0.00	2.30	11676.26	1513.38	0.10
1	14437	500 YR	16680.00	269.28	290.21	283.35	290.25	0.00	2.56	12732.04	1591.46	0.11
1	15547 O	2 YR	2120.00	269.28	282.55		282.59	0.00	2.13	2085.52	443.76	0.12
1	15547 O	5 YR	3650.00	269.28	285.08		285.12	0.00	2.23	3299.60	513.40	0.11
1	15547 O	10 YR	4730.00	269.28	286.24		286.27	0.00	2.42	3903.96	549.96	0.12
1	15547 O	25 YR	6950.00	269.28	286.90		286.97	0.00	3.24	4294.11	630.11	0.15
1	15547 O	50 YR	8280.00	269.28	287.56		287.63	0.00	3.52	4739.48	727.04	0.16
1	15547 O	100 YR	10040.00	269.28	288.59		288.66	0.00	3.69	5522.94	783.81	0.16
1	15547 O	250 YR	13710.00	269.28	289.83		289.93	0.00	4.22	6534.61	873.09	0.18
1	15547 O	500 YR	16680.00	269.28	290.56		290.68	0.00	4.63	7277.30	1092.75	0.19
1	16554	2 YR	2220.00	270.62	282.98		283.02	0.00	2.39	1701.79	312.13	0.14
1	16554	5 YR	3850.00	270.62	285.43		285.47	0.00	2.64	2881.97	794.59	0.14
1	16554	10 YR	5080.00	270.62	286.58		286.62	0.00	2.69	3921.31	1024.30	0.13
1	16554	25 YR	6960.00	270.62	287.41		287.46	0.00	3.05	4780.47	1062.08	0.15
1	16554	50 YR	8510.00	270.62	288.11		288.16	0.00	3.22	5542.54	1102.38	0.15
1	16554	100 YR	10530.00	270.62	289.12		289.17	0.00	3.27	6697.36	1158.72	0.15
1	16554	250 YR	14120.00	270.62	290.43		290.49	0.00	3.50	8240.24	1216.14	0.15
1	16554	500 YR	16930.00	270.62	291.23		291.29	0.00	3.74	9228.79	1249.14	0.16
1	17149 P	2 YR	2220.00	272.99	283.42	280.81	283.47	0.00	2.50	1785.23	610.70	0.17
1	17149 P	5 YR	3850.00	272.99	285.77	281.65	285.80	0.00	2.28	3348.61	705.92	0.14
1	17149 P	10 YR	5080.00	272.99	286.90	282.25	286.94	0.00	2.38	4160.10	801.76	0.13
1	17149 P	25 YR	6960.00	272.99	287.80	282.69	287.86	0.00	2.80	4865.06	975.08	0.15
1	17149 P	50 YR	8510.00	272.99	288.53	283.01	288.59	0.00	3.02	5541.73	1116.09	0.16
1	17149 P	100 YR	10530.00	272.99	289.54	283.38	289.60	0.00	3.18	6601.49	1302.51	0.16
1	17149 P	250 YR	14120.00	272.99	290.87	283.97	290.94	0.00	3.47	8190.70	2039.00	0.16
1	17149 P	500 YR	16930.00	272.99	291.69	284.37	291.75	0.00	3.47	10899.96	2243.54	0.16
1	18168	2 YR	2220.00	275.26	284.41	280.13	284.55	0.00	3.27	958.01	527.15	0.22
1	18168	5 YR	3850.00	275.26	286.39	281.86	286.55	0.00	3.76	1579.87	1096.15	0.22
1	18168	10 YR	5080.00	275.26	287.47	282.70	287.66	0.00	4.11	1954.35	1498.43	0.23
1	18168	25 YR	6960.00	275.26	288.49	283.52	288.73	0.00	4.80	2318.87	1875.83	0.26
1	18168	50 YR	8510.00	275.26	289.25	284.46	289.54	0.00	5.27	2594.78	1907.06	0.2
1	18168	100 YR	10530.00	275.26	290.24	285.24	290.57	0.00	5.73	2950.85	1967.37	0.2
1	18168	250 YR	14120.00	275.26	291.49	286.31	291.62	0.00	4.35	7128.72	2390.45	0.21
1	18168	500 YR	16930.00	275.26	292.13	286.94	292.18	0.00	3.25	13738.08	2617.18	0.15
1	18225 Railroad		Mult Open									
1	18279 Q	2 YR	2220.00	274.83	285.76	280.39	285.94	0.00	3.92	1048.43	1169.06	0.22
1	18279 Q	5 YR	3850.00	274.83	287.93	283.17	288.10	0.00	4.24	1809.69	1443.62	0.22
1	18279 Q	10 YR	5080.00	274.83	289.10	284.65	289.27	0.00	4.51	2236.40	1721.59	0.22
1	18279 Q	25 YR	6960.00	274.83	289.95	285.73	290.20	0.00	5.44	2571.57	1971.87	0.26
1	18279 Q	50 YR	8510.00	274.83	290.11	286.49	290.45	0.00	6.48	2634.70	2053.08	0.30
1	18279 Q	100 YR	10530.00	274.83	291.25	287.14	291.60	0.00	6.81	3083.47	2390.96	0.31
1	18279 Q	250 YR	14120.00	274.83	292.80	288.01	292.95	0.00	5.48	6715.46	2608.03	0.24
1	18279 Q	500 YR	16930.00	274.83	293.71	288.62	293.73	0.00	2.45	18764.72	2710.98	0.10
1	18801	2 YR	2220.00	272.91	286.18	280.70	286.20	0.00	1.88	2718.26	872.53	0.11
1	18801	5 YR	3850.00	272.91	288.29	281.64	288.31	0.00	1.93	4709.42	1393.01	0.10
1	18801	10 YR	5080.00	272.91	289.46	282.15	289.48	0.00	1.97	5922.80	1639.24	0.10
1	18801	25 YR	6960.00	272.91	290.43	283.09	290.46	0.00	2.24	6993.52	2031.34	0.11
1	18801	50 YR	8510.00	272.91	290.77	283.53	290.80	0.00	2.58	7411.16	2126.29	0.12
1	18801	100 YR	10530.00	272.91	291.91	284.08	291.94	0.00	2.61	8847.86	2320.08	0.12
1	18801	250 YR	14120.00	272.91	293.12	285.66	293.15	0.00	2.54	11926.61	2525.01	0.11
1	18801	500 YR	16930.00	272.91	293.79	286.18	293.82	0.00	2.42	16562.56	2625.22	0.11
1	19254	2 YR	2220.00	275.08	286.37		286.77	0.00	5.42	639.95	466.56	0.34
1	19254	5 YR	3850.00	275.08	288.55		288.69	0.00	4.19	2609.62	1146.25	0.24
1	19254	10 YR	5080.00	275.08	289.70		289.78	0.00	3.56	4023.41	1345.50	0.19
1	19254	25 YR	6960.00	275.08	290.70		290.77	0.00	3.48	5567.48	1679.69	0.18
1	19254	50 YR	8510.00	275.08	291.11		291.18	0.00	3.74	6264.05	1736.72	0.19
1	19254	100 YR	10530.00	275.08	292.21		292.26	0.00	3.41	8301.67	1942.34	0.16
1	19254	250 YR	14120.00	275.08	293.39		293.44	0.00	3.49	10684.24	2083.31	0.16
1	19254	500 YR	16930.00	275.08	294.03		294.08	0.00	3.66	12037.86	2144.88	0.16
1	19365	2 YR	2230.00	274.81	286.82		287.08	0.00	4.38	745.00	185.35	0.25
1	19365	5 YR	3910.00	274.81	288.67		289.02	0.00	5.58	1386.27	523.41	0.29
1	19365	10 YR	5140.00	274.81	289.75		290.07	0.00	5.65	2068.46	712.93	0.28
1	19365	25 YR	7010.00	274.81	290.74		291.06	0.00	6.16	3019.34	1203.04	0.29
1	19365	50 YR	8680.00	274.81	291.15		291.52	0.00	6.77	3549.12	1353.02	0.3
1	19365	100 YR	10530.00	274.81	292.26		292.51	0.00	6.10	5212.78	1577.47	0.28
1	19365	250 YR	14420.00	274.81	293.46		293.67	0.00	6.22	7214.80	1771.65	0.27
1	19365	500 YR	16950.00	274.81	294.12		294.31	0.00	6.22	8396.08	1833.93	0.27
1	20188	2 YR	2230.00	272.76	288.07		288.37	0.00	4.58	698.48	222.41	0.23
1	20188	5 YR	3910.00	272.76	290.19		290.46	0.00	5.08	2197.58	1390.07	0.24

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	20188	10 YR	5140.00	272.76	291.10		291.29	0.00	4.74	3573.74	1559.14	0.21
1	20188	25 YR	7010.00	272.76	292.07		292.20	0.00	4.54	5119.78	1626.15	0.20
1	20188	50 YR	8680.00	272.76	292.62		292.75	0.00	4.71	6030.59	1665.36	0.20
1	20188	100 YR	10530.00	272.76	293.40		293.51	0.00	4.57	7343.73	1705.40	0.19
1	20188	250 YR	14420.00	272.76	294.53		294.63	0.00	4.70	9299.86	1751.18	0.19
1	20188	500 YR	16950.00	272.76	295.15		295.25	0.00	4.82	10390.80	1777.54	0.19
1	20846	2 YR	2230.00	274.53	288.87	282.27	288.95	0.00	2.78	1396.20	302.87	0.15
1	20846	5 YR	3910.00	274.53	291.01	284.14	291.13	0.00	3.57	1992.66	755.28	0.17
1	20846	10 YR	5140.00	274.53	291.80	285.05	291.96	0.00	4.17	2266.22	969.07	0.20
1	20846	25 YR	7010.00	274.53	292.68	286.17	292.83	0.00	4.35	3917.44	1146.35	0.20
1	20846	50 YR	8680.00	274.53	293.27	287.03	293.44	0.00	4.80	4551.19	1203.94	0.22
1	20846	100 YR	10530.00	274.53	294.01	287.85	294.19	0.00	5.19	5730.28	1318.56	0.23
1	20846	250 YR	14420.00	274.53	295.14	289.46	295.33	0.00	5.65	7267.45	1390.44	0.24
1	20846	500 YR	16950.00	274.53	295.77	290.14	295.96	0.00	5.90	8150.84	1425.96	0.25
1	21074 R	2 YR	2210.00	277.80	288.98	284.87	289.34	0.00	5.07	569.82	149.63	0.33
1	21074 R	5 YR	3870.00	277.80	291.13	287.62	291.60	0.00	6.10	884.12	178.76	0.35
1	21074 R	10 YR	5080.00	277.80	291.94	288.69	292.56	0.00	7.09	1005.64	259.37	0.39
1	21074 R	25 YR	6940.00	277.80	292.73	289.80	293.59	0.01	8.60	1318.73	582.95	0.46
1	21074 R	50 YR	8580.00	277.80	293.24	290.62	294.44	0.01	10.14	1646.80	818.25	0.52
1	21074 R	100 YR	10410.00	277.80	294.08	291.52	295.14	0.01	10.24	2608.95	1103.73	0.51
1	21074 R	250 YR	14220.00	277.80	295.39	294.69	296.06	0.00	9.26	4146.75	1223.23	0.44
1	21074 R	500 YR	16800.00	277.80	296.06	295.03	296.64	0.00	9.08	5010.81	1353.71	0.42
1	21115 Piney Rd.		Bridge									
1	21181 S	2 YR	2210.00	277.80	289.70	284.86	290.03	0.00	4.78	506.39	86.52	0.30
1	21181 S	5 YR	3870.00	277.80	292.08	287.42	292.58	0.00	6.01	728.27	134.45	0.33
1	21181 S	10 YR	5080.00	277.80	293.13	288.48	293.79	0.00	6.96	836.13	150.96	0.36
1	21181 S	25 YR	6940.00	277.80	295.01	289.88	295.68	0.00	7.44	1559.82	829.54	0.36
1	21181 S	50 YR	8580.00	277.80	296.24	290.93	296.67	0.00	6.58	2483.78	1118.72	0.30
1	21181 S	100 YR	10410.00	277.80	297.49	292.00	297.68	0.00	5.11	4520.10	1503.65	0.23
1	21181 S	250 YR	14220.00	277.80	297.83	296.00	298.10	0.00	6.23	5047.71	1549.57	0.27
1	21181 S	500 YR	16800.00	277.80	298.14	296.42	298.45	0.00	6.78	5531.59	1566.45	0.29
1	21236	2 YR	2210.00	277.90	289.78	284.89	290.13	0.00	5.02	521.12	103.23	0.29
1	21236	5 YR	3870.00	277.90	292.21	287.52	292.69	0.00	6.17	836.14	201.94	0.32
1	21236	10 YR	5080.00	277.90	293.47	288.82	293.95	0.00	6.47	1149.75	379.80	0.32
1	21236	25 YR	6940.00	277.90	295.60	290.32	295.88	0.00	5.57	2249.23	911.77	0.25
1	21236	50 YR	8580.00	277.90	296.54	291.40	296.79	0.00	5.54	2942.08	963.84	0.24
1	21236	100 YR	10410.00	277.90	297.58	291.92	297.73	0.00	4.79	4626.32	1152.07	0.20
1	21236	250 YR	14220.00	277.90	297.96	294.51	298.18	0.00	5.86	5060.67	1159.79	0.25
1	21236	500 YR	16800.00	277.90	298.29	295.15	298.53	0.00	6.33	5441.08	1166.90	0.27
1	21273	2 YR	2210.00	276.81	289.83	284.75	290.21	0.00	5.10	477.03	82.72	0.30
1	21273	5 YR	3870.00	276.81	292.22	287.05	292.83	0.00	6.59	744.81	176.15	0.34
1	21273	10 YR	5080.00	276.81	293.46	288.50	294.11	0.00	7.11	1009.03	249.60	0.35
1	21273	25 YR	6940.00	276.81	295.61	290.08	295.95	0.00	5.84	2215.76	895.16	0.27
1	21273	50 YR	8580.00	276.81	296.58	291.59	296.83	0.00	5.49	2961.70	949.96	0.24
1	21273	100 YR	10410.00	276.81	297.60	294.72	297.77	0.00	4.97	4429.19	1136.03	0.21
1	21273	250 YR	14220.00	276.81	297.98	295.65	298.23	0.00	6.06	4866.54	1142.35	0.26
1	21273	500 YR	16800.00	276.81	298.31	296.04	298.59	0.00	6.53	5245.80	1147.81	0.28
1	21317 US Highway 59 N		Bridge									
1	21343	2 YR	2210.00	276.81	289.97	284.75	290.34	0.00	5.00	488.81	84.13	0.29
1	21343	5 YR	3870.00	276.81	292.45	287.05	293.01	0.00	6.36	795.51	210.08	0.33
1	21343	10 YR	5080.00	276.81	293.84	288.50	294.32	0.00	6.38	1337.57	520.33	0.31
1	21343	25 YR	6940.00	276.81	295.85	290.08	296.07	0.00	4.97	2699.22	789.15	0.23
1	21343	50 YR	8580.00	276.81	296.79	291.59	296.97	0.00	4.78	3473.86	912.26	0.21
1	21343	100 YR	10410.00	276.81	297.71	294.48	297.86	0.00	4.61	4403.64	1083.08	0.20
1	21343	250 YR	14220.00	276.81	298.12	295.32	298.37	0.00	5.99	4862.52	1109.31	0.25
1	21343	500 YR	16800.00	276.81	298.50	295.70	298.77	0.00	6.40	5278.76	1115.91	0.27
1	21361	2 YR	2210.00	276.81	290.01	284.75	290.37	0.00	4.96	492.22	84.51	0.29
1	21361	5 YR	3870.00	276.81	292.50	287.04	293.04	0.00	6.31	795.87	189.83	0.33
1	21361	10 YR	5080.00	276.81	293.88	288.49	294.35	0.00	6.32	1340.08	532.31	0.31
1	21361	25 YR	6940.00	276.81	295.87	290.08	296.09	0.00	4.97	2667.60	771.16	0.23
1	21361	50 YR	8580.00	276.81	296.80	291.59	296.98	0.00	4.80	3414.91	893.15	0.21
1	21361	100 YR	10410.00	276.81	297.71	291.87	297.88	0.00	4.98	4332.82	1076.86	0.21
1	21361	250 YR	14220.00	276.81	298.14	295.26	298.39	0.00	6.04	4805.08	1097.03	0.26
1	21361	500 YR	16800.00	276.81	298.52	295.66	298.79	0.00	6.46	5219.80	1107.52	0.27
1	21382	2 YR	2210.00	276.81	290.34	282.38	290.46	0.00	2.78	842.57	120.68	0.16
1	21382	5 YR	3870.00	276.81	292.98	284.37	293.17	0.00	3.64	1312.34	355.69	0.18
1	21382	10 YR	5080.00	276.81	294.25	285.56	294.45	0.00	3.89	1829.02	453.59	0.19
1	21382	25 YR	6940.00	276.81	295.94	286.84	296.11	0.00	3.92	2863.75	732.69	0.18
1	21382	50 YR	8580.00	276.81	296.83	287.85	297.00	0.00	4.05	3550.14	838.41	0.18
1	21382	100 YR	10410.00	276.81	297.72	288.88	297.90	0.00	4.37	4406.12	1047.35	0.19
1	21382	250 YR	14220.00	276.81	298.15	290.94	298.42	0.00	5.45	4868.05	1088.60	0.23
1	21382	500 YR	16800.00	276.81	298.52	293.80	298.83	0.00	5.93	5277.98	1104.57	0.25
1	21437 US Highway 59 S		Bridge									

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	21481	2 YR	2210.00	277.40	290.54	282.60	290.65	0.00	2.75	857.23	124.41	0.15
1	21481	5 YR	3870.00	277.40	293.17	284.56	293.34	0.00	3.53	1344.52	285.55	0.18
1	21481	10 YR	5080.00	277.40	294.46	285.73	294.65	0.00	3.85	1824.95	472.71	0.18
1	21481	25 YR	6940.00	277.40	296.17	286.97	296.34	0.00	3.88	2812.49	661.84	0.1
1	21481	50 YR	8580.00	277.40	297.09	287.98	297.27	0.00	4.13	3403.19	823.68	0.18
1	21481	100 YR	10410.00	277.40	297.99	289.01	298.18	0.00	4.38	4292.34	951.26	0.19
1	21481	250 YR	14220.00	277.40	298.46	291.13	298.74	0.00	5.44	4752.33	1004.02	0.23
1	21481	500 YR	16800.00	277.40	298.85	293.59	299.18	0.00	6.06	5173.30	1222.47	0.25
1	21524	2 YR	2210.00	278.13	290.52	283.19	290.71	0.00	3.61	695.48	120.22	0.19
1	21524	5 YR	3870.00	278.13	293.15	285.21	293.42	0.00	4.50	1097.44	195.99	0.22
1	21524	10 YR	5080.00	278.13	294.44	286.48	294.74	0.00	4.93	1487.47	414.25	0.23
1	21524	25 YR	6940.00	278.13	296.16	288.36	296.41	0.00	4.89	2459.07	700.66	0.21
1	21524	50 YR	8580.00	278.13	297.09	289.87	297.32	0.00	4.93	3054.60	782.39	0.21
1	21524	100 YR	10410.00	278.13	298.00	291.18	298.21	0.00	5.00	3938.15	865.86	0.21
1	21524	250 YR	14220.00	278.13	298.48	293.87	298.79	0.00	6.24	4374.85	969.71	0.25
1	21524	500 YR	16800.00	278.13	298.88	295.89	299.24	0.00	6.83	4798.56	1151.97	0.28
1	21607	2 YR	2210.00	278.19	290.67	283.15	290.78	0.00	2.79	846.33	124.93	0.16
1	21607	5 YR	3870.00	278.19	293.31	285.05	293.50	0.00	3.60	1212.79	150.17	0.18
1	21607	10 YR	5080.00	278.19	294.57	286.07	294.81	0.00	4.18	1464.48	370.57	0.20
1	21607	25 YR	6940.00	278.19	296.22	287.30	296.47	0.00	4.46	2311.98	672.27	0.20
1	21607	50 YR	8580.00	278.19	297.13	288.30	297.41	0.00	4.85	2914.63	857.60	0.21
1	21607	100 YR	10410.00	278.19	298.05	289.23	298.29	0.00	4.84	3882.17	950.82	0.21
1	21607	250 YR	14220.00	278.19	298.55	291.49	298.89	0.00	5.92	4379.81	1040.49	0.25
1	21607	500 YR	16800.00	278.19	298.97	292.67	299.35	0.00	6.40	4845.73	1183.37	0.27
1	21749 Westlawn Dr.		Bridge									
1	21869 T	2 YR	2210.00	278.88	293.21	285.28	293.32	0.00	2.83	1106.39	366.28	0.15
1	21869 T	5 YR	3870.00	278.88	293.87	287.25	294.14	0.00	4.51	1256.43	490.32	0.23
1	21869 T	10 YR	5080.00	278.88	294.88	288.19	295.16	0.00	4.79	2131.04	583.71	0.24
1	21869 T	25 YR	6940.00	278.88	296.25	289.46	296.51	0.00	5.02	3135.63	941.96	0.24
1	21869 T	50 YR	8580.00	278.88	297.21	290.45	297.43	0.00	4.98	4148.91	1203.91	0.23
1	21869 T	100 YR	10410.00	278.88	298.13	291.16	298.31	0.00	4.88	5366.55	1441.10	0.22
1	21869 T	250 YR	14220.00	278.88	298.69	294.99	298.92	0.00	5.75	6184.69	1482.64	0.25
1	21869 T	500 YR	16800.00	278.88	299.13	295.78	299.38	0.00	6.07	6851.77	1504.66	0.26
1	22112	2 YR	2210.00	278.29	293.31	287.09	293.44	0.00	3.23	1092.62	623.32	0.18
1	22112	5 YR	3870.00	278.29	294.13	288.80	294.39	0.00	4.73	1529.07	710.27	0.25
1	22112	10 YR	5080.00	278.29	295.22	289.85	295.40	0.00	4.43	2770.72	1034.26	0.2
1	22112	25 YR	6940.00	278.29	296.61	291.04	296.72	0.00	3.95	4371.28	1285.19	0.19
1	22112	50 YR	8580.00	278.29	297.53	292.00	297.62	0.00	3.77	5623.69	1386.81	0.18
1	22112	100 YR	10410.00	278.29	298.40	294.00	298.48	0.00	3.58	6871.82	1508.38	0.16
1	22112	250 YR	14220.00	278.29	299.03	294.87	299.14	0.00	4.27	7859.09	1626.60	0.19
1	22112	500 YR	16800.00	278.29	299.50	295.88	299.61	0.00	4.56	8625.36	1695.32	0.20
1	22528	2 YR	2240.00	282.04	293.58		293.66	0.00	2.77	2056.39	1304.26	0.16
1	22528	5 YR	4110.00	282.04	294.64		294.71	0.00	3.13	3644.83	1618.22	0.17
1	22528	10 YR	5270.00	282.04	295.58		295.62	0.00	2.70	5194.87	1665.76	0.14
1	22528	25 YR	7160.00	282.04	296.85		296.88	0.00	2.40	7355.15	1725.90	0.12
1	22528	50 YR	8820.00	282.04	297.72		297.75	0.00	2.32	8887.11	1762.43	0.11
1	22528	100 YR	10670.00	282.04	298.56		298.59	0.00	2.30	10374.89	1800.84	0.11
1	22528	250 YR	14380.00	282.04	299.25		299.29	0.00	2.69	11619.80	1818.71	0.12
1	22528	500 YR	16850.00	282.04	299.73		299.78	0.00	2.87	12504.30	1841.68	0.13
1	22746	2 YR	2240.00	280.57	293.71		293.76	0.00	2.46	2010.45	1226.89	0.13
1	22746	5 YR	4110.00	280.57	294.77		294.82	0.00	2.78	3489.19	1465.56	0.14
1	22746	10 YR	5270.00	280.57	295.67		295.70	0.00	2.44	4810.68	1499.98	0.12
1	22746	25 YR	7160.00	280.57	296.91		296.93	0.00	2.18	6695.14	1537.77	0.10
1	22746	50 YR	8820.00	280.57	297.77		297.80	0.00	2.12	8039.58	1564.64	0.10
1	22746	100 YR	10670.00	280.57	298.61		298.63	0.00	2.11	9371.89	1623.19	0.09
1	22746	250 YR	14380.00	280.57	299.31		299.34	0.00	2.45	10514.14	1645.60	0.11
1	22746	500 YR	16850.00	280.57	299.79		299.84	0.00	2.61	11321.68	1661.27	0.11
1	22796	2 YR	2240.00	280.38	293.73		293.79	0.00	2.49	1958.30	1114.03	0.13
1	22796	5 YR	4110.00	280.38	294.80		294.85	0.00	2.90	3342.13	1417.09	0.14
1	22796	10 YR	5270.00	280.38	295.68		295.72	0.00	2.57	4623.56	1467.99	0.12
1	22796	25 YR	7160.00	280.38	296.92		296.95	0.00	2.30	6463.15	1510.18	0.11
1	22796	50 YR	8820.00	280.38	297.79		297.81	0.00	2.23	7793.02	1555.30	0.10
1	22796	100 YR	10670.00	280.38	298.62		298.64	0.00	2.22	9106.60	1596.83	0.10
1	22796	250 YR	14380.00	280.38	299.32		299.36	0.00	2.57	10235.69	1621.81	0.11
1	22796	500 YR	16850.00	280.38	299.81		299.85	0.00	2.74	11034.65	1641.53	0.12
1	22845 Utility Crossing		Culvert									
1	22876	2 YR	2240.00	279.82	293.77	286.74	293.79	0.00	1.95	3518.21	1377.27	0.10
1	22876	5 YR	4110.00	279.82	294.83	291.17	294.86	0.00	2.42	4995.49	1402.23	0.12
1	22876	10 YR	5270.00	279.82	295.71	291.65	295.73	0.00	2.38	6233.24	1424.52	0.1
1	22876	25 YR	7160.00	279.82	296.93	292.65	296.96	0.00	2.38	8002.63	1457.31	0.11
1	22876	50 YR	8820.00	279.82	297.80	293.02	297.83	0.00	2.53	9316.69	1571.27	0.11
1	22876	100 YR	10670.00	279.82	298.63	293.34	298.66	0.00	2.62	10642.40	1613.40	0.11
1	22876	250 YR	14380.00	279.82	299.34	293.72	299.38	0.00	3.12	11800.70	1679.57	0.13
1	22876	500 YR	16850.00	279.82	299.83	294.09	299.87	0.00	3.36	12631.36	1697.01	0.14

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	22939	2 YR	2240.00	279.47	293.80		293.81	0.00	1.23	4738.37	1402.39	0.06
1	22939	5 YR	4110.00	279.47	294.87		294.88	0.00	1.64	6253.09	1428.58	0.08
1	22939	10 YR	5270.00	279.47	295.74		295.75	0.00	1.68	7502.64	1445.50	0.08
1	22939	25 YR	7160.00	279.47	296.96		296.97	0.00	1.76	9292.27	1489.88	0.08
1	22939	50 YR	8820.00	279.47	297.83		297.84	0.00	1.90	10621.48	1562.11	0.08
1	22939	100 YR	10670.00	279.47	298.66		298.68	0.00	2.00	11934.48	1592.40	0.09
1	22939	250 YR	14380.00	279.47	299.37		299.40	0.00	2.41	13083.63	1637.51	0.10
1	22939	500 YR	16850.00	279.47	299.87		299.90	0.00	2.63	13907.26	1680.00	0.11
1	24261 U	2 YR	2080.00	280.16	293.98		294.08	0.00	2.82	1455.77	699.19	0.16
1	24261 U	5 YR	3660.00	280.16	295.14		295.27	0.00	3.54	2328.08	840.37	0.18
1	24261 U	10 YR	4700.00	280.16	296.00		296.11	0.00	3.58	3146.03	1014.38	0.18
1	24261 U	25 YR	6400.00	280.16	297.21		297.31	0.00	3.61	4433.97	1135.15	0.17
1	24261 U	50 YR	7950.00	280.16	298.09		298.18	0.00	3.64	5460.98	1193.91	0.17
1	24261 U	100 YR	10040.00	280.16	298.94		299.03	0.00	3.81	6484.84	1225.28	0.17
1	24261 U	250 YR	13540.00	280.16	299.75		299.86	0.00	4.37	7484.07	1245.78	0.19
1	24261 U	500 YR	16130.00	280.16	300.29		300.42	0.00	4.70	8170.22	1259.63	0.20
1	25720	2 YR	2080.00	282.75	295.55		295.79	0.00	4.88	1076.09	676.14	0.29
1	25720	5 YR	3660.00	282.75	296.89		297.05	0.00	4.71	2032.24	734.16	0.26
1	25720	10 YR	4700.00	282.75	297.58		297.72	0.00	4.70	2542.19	741.98	0.25
1	25720	25 YR	6400.00	282.75	298.60		298.72	0.00	4.70	3302.76	755.72	0.24
1	25720	50 YR	7950.00	282.75	299.38		299.50	0.00	4.79	3896.09	765.94	0.24
1	25720	100 YR	10040.00	282.75	300.22		300.35	0.00	5.03	4549.21	778.90	0.24
1	25720	250 YR	13540.00	282.75	301.26		301.42	0.00	5.63	5375.24	811.70	0.26
1	25720	500 YR	16130.00	282.75	301.94		302.12	0.00	6.01	5937.48	834.38	0.27
1	26793 V	2 YR	2270.00	284.31	296.99		297.08	0.00	2.85	1932.55	1216.26	0.17
1	26793 V	5 YR	3750.00	284.31	298.06		298.13	0.00	2.98	3301.87	1313.77	0.17
1	26793 V	10 YR	4780.00	284.31	298.65		298.71	0.00	3.03	4090.29	1351.71	0.17
1	26793 V	25 YR	6510.00	284.31	299.55		299.61	0.00	3.08	5333.86	1399.62	0.16
1	26793 V	50 YR	8170.00	284.31	300.28		300.34	0.00	3.14	6359.01	1416.05	0.16
1	26793 V	100 YR	10380.00	284.31	301.12		301.18	0.00	3.25	7553.14	1430.64	0.16
1	26793 V	250 YR	13710.00	284.31	302.21		302.27	0.00	3.42	9134.76	1457.01	0.16
1	26793 V	500 YR	16230.00	284.31	302.94		303.00	0.00	3.56	10207.94	1501.36	0.16
1	28085	2 YR	2270.00	288.89	297.99		298.05	0.00	3.12	1598.05	678.38	0.20
1	28085	5 YR	3750.00	288.89	298.93		299.01	0.00	3.47	2254.99	717.17	0.21
1	28085	10 YR	4780.00	288.89	299.47		299.55	0.00	3.68	2648.39	741.37	0.22
1	28085	25 YR	6510.00	288.89	300.30		300.39	0.00	3.94	3282.98	794.80	0.22
1	28085	50 YR	8170.00	288.89	300.98		301.08	0.00	4.14	3840.28	822.18	0.23
1	28085	100 YR	10380.00	288.89	301.79		301.91	0.00	4.37	4513.32	844.49	0.23
1	28085	250 YR	13710.00	288.89	302.87		303.00	0.00	4.71	5462.04	923.25	0.24
1	28085	500 YR	16230.00	288.89	303.59		303.73	0.00	4.92	6139.50	974.99	0.24
1	28703	2 YR	2270.00	287.31	299.00	297.12	299.29	0.00	5.47	776.83	1202.34	0.35
1	28703	5 YR	3750.00	287.31	299.66	298.49	299.71	0.00	3.33	2986.17	1266.06	0.20
1	28703	10 YR	4780.00	287.31	300.19	299.07	300.24	0.00	3.36	3633.75	1295.37	0.20
1	28703	25 YR	6510.00	287.31	301.00	299.50	301.04	0.00	3.38	4620.09	1307.16	0.19
1	28703	50 YR	8170.00	287.31	301.67	299.50	301.72	0.00	3.44	5450.50	1318.41	0.19
1	28703	100 YR	10380.00	287.31	302.47	299.51	302.53	0.00	3.54	6442.04	1332.00	0.19
1	28703	250 YR	13710.00	287.31	303.55	299.52	303.60	0.00	3.63	8142.26	1380.55	0.18
1	28703	500 YR	16230.00	287.31	304.27	299.73	304.33	0.00	3.75	9160.42	1420.85	0.18
1	28955	2 YR	2270.00	288.03	299.60	295.58	299.90	0.00	4.85	664.33	1225.10	0.29
1	28955	5 YR	3750.00	288.03	299.94	297.17	300.03	0.00	3.75	2999.36	1236.08	0.22
1	28955	10 YR	4780.00	288.03	300.46	298.05	300.55	0.00	3.88	3622.76	1254.57	0.22
1	28955	25 YR	6510.00	288.03	301.25	299.20	301.33	0.00	4.03	4577.56	1294.98	0.22
1	28955	50 YR	8170.00	288.03	301.91	299.90	302.00	0.00	4.16	5394.31	1369.64	0.22
1	28955	100 YR	10380.00	288.03	302.71	299.91	302.80	0.00	4.31	6374.64	1402.70	0.22
1	28955	250 YR	13710.00	288.03	303.77	300.16	303.85	0.00	4.39	8300.35	1450.14	0.21
1	28955	500 YR	16230.00	288.03	304.49	300.42	304.58	0.00	4.51	9362.15	1486.04	0.21
1	29020 US Highway 82		Bridge									
1	29075 W	2 YR	2270.00	290.86	300.28	296.51	300.47	0.00	4.40	843.54	1123.96	0.27
1	29075 W	5 YR	3750.00	290.86	301.41	297.56	301.44	0.00	2.29	4184.72	1254.62	0.13
1	29075 W	10 YR	4780.00	290.86	301.84	298.19	301.87	0.00	2.56	4664.30	1285.51	0.14
1	29075 W	25 YR	6510.00	290.86	302.37	299.11	302.41	0.00	3.02	5270.32	1342.64	0.16
1	29075 W	50 YR	8170.00	290.86	302.77	299.91	302.82	0.00	3.43	5736.03	1363.59	0.18
1	29075 W	100 YR	10380.00	290.86	303.23	300.60	303.29	0.00	3.91	6270.99	1376.73	0.20
1	29075 W	250 YR	13710.00	290.86	303.99	300.61	304.05	0.00	4.18	8001.29	1409.26	0.21
1	29075 W	500 YR	16230.00	290.86	304.64	300.61	304.71	0.00	4.36	8929.25	1435.29	0.21
1	29154	2 YR	2270.00	291.75	300.50	298.54	300.64	0.00	4.04	982.08	1337.32	0.29
1	29154	5 YR	3750.00	291.75	301.45	299.24	301.47	0.00	1.97	3971.28	1356.93	0.13
1	29154	10 YR	4780.00	291.75	301.89	299.63	301.91	0.00	2.15	4495.42	1364.70	0.14
1	29154	25 YR	6510.00	291.75	302.43	300.21	302.46	0.00	2.48	5144.43	1375.09	0.15
1	29154	50 YR	8170.00	291.75	302.84	300.60	302.88	0.00	2.77	5651.70	1429.53	0.17
1	29154	100 YR	10380.00	291.75	303.31	300.60	303.36	0.00	3.13	6248.20	1443.43	0.19
1	29154	250 YR	13710.00	291.75	304.08	300.61	304.13	0.00	3.09	8315.10	1458.87	0.18
1	29154	500 YR	16230.00	291.75	304.74	300.61	304.79	0.00	3.22	9270.14	1470.27	0.18
1	29999 X	2 YR	2100.00	290.42	301.74		301.80	0.00	3.06	1702.74	621.51	0.18
1	29999 X	5 YR	3700.00	290.42	302.03		302.18	0.00	4.84	1885.88	632.35	0.29

HEC-RAS Plan: Wagner_Existing River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	29999 X	10 YR	4680.00	290.42	302.51		302.68	0.00	5.17	2193.51	643.72	0.30
1	29999 X	25 YR	6360.00	290.42	303.16		303.35	0.00	5.75	2615.10	657.15	0.32
1	29999 X	50 YR	8250.00	290.42	303.70		303.93	0.00	6.43	2973.87	670.20	0.3
1	29999 X	100 YR	10400.00	290.42	304.30		304.57	0.00	7.02	3383.81	691.32	0.3
1	29999 X	250 YR	13580.00	290.42	304.96		305.30	0.00	7.99	3852.47	725.26	0.41
1	29999 X	500 YR	16040.00	290.42	305.60		305.96	0.00	8.33	4321.77	750.89	0.42
1	31276 Y	2 YR	2080.00	291.35	303.27		303.41	0.00	4.05	834.31	237.28	0.24
1	31276 Y	5 YR	3660.00	291.35	304.65		304.84	0.00	4.78	1190.01	326.54	0.26
1	31276 Y	10 YR	4620.00	291.35	305.27		305.48	0.00	5.11	1447.61	487.05	0.27
1	31276 Y	25 YR	6300.00	291.35	306.14		306.35	0.00	5.49	1974.71	699.95	0.28
1	31276 Y	50 YR	8170.00	291.35	306.95		307.17	0.00	5.79	2568.55	751.21	0.29
1	31276 Y	100 YR	10290.00	291.35	307.69		307.91	0.00	5.97	3157.16	836.07	0.29
1	31276 Y	250 YR	13410.00	291.35	308.63		308.85	0.00	6.14	4015.54	996.24	0.29
1	31276 Y	500 YR	15830.00	291.35	309.25		309.47	0.00	6.24	4645.30	1046.31	0.28
1	32251	2 YR	2080.00	293.95	303.92		303.93	0.00	1.58	2771.66	906.93	0.10
1	32251	5 YR	3660.00	293.95	305.33		305.34	0.00	1.68	4094.89	963.36	0.10
1	32251	10 YR	4620.00	293.95	305.98		305.99	0.00	1.77	4723.63	980.11	0.10
1	32251	25 YR	6300.00	293.95	306.88		306.90	0.00	1.94	5617.96	1005.61	0.10
1	32251	50 YR	8170.00	293.95	307.72		307.75	0.00	2.12	6473.87	1030.42	0.11
1	32251	100 YR	10290.00	293.95	308.49		308.53	0.00	2.33	7285.48	1066.15	0.11
1	32251	250 YR	13410.00	293.95	309.46		309.51	0.00	2.60	8338.45	1104.97	0.12
1	32251	500 YR	15830.00	293.95	310.11		310.17	0.00	2.82	9066.41	1149.84	0.13
1	33218	2 YR	1830.00	297.97	304.27	301.49	304.30	0.00	2.04	1392.18	1373.17	0.16
1	33218	5 YR	3260.00	297.97	305.66	302.09	305.70	0.00	2.41	2038.37	1699.01	0.17
1	33218	10 YR	4140.00	297.97	306.30	302.38	306.36	0.00	2.58	2342.72	1767.30	0.17
1	33218	25 YR	5550.00	297.97	307.16	302.78	307.19	0.00	1.94	4518.44	1934.17	0.12
1	33218	50 YR	7060.00	297.97	308.00	303.14	308.03	0.00	1.92	5551.86	2028.33	0.12
1	33218	100 YR	8740.00	297.97	308.70	303.51	308.72	0.00	1.35	9240.81	2075.45	0.08
1	33218	250 YR	11210.00	297.97	309.69	304.04	309.71	0.00	1.42	10869.16	2119.38	0.08
1	33218	500 YR	13120.00	297.97	310.36	304.41	310.37	0.00	1.48	11992.22	2188.41	0.08
1	33444 Z	2 YR	1830.00	297.19	304.52	301.46	304.65	0.00	3.33	668.17	886.55	0.24
1	33444 Z	5 YR	3260.00	297.19	305.90	302.55	306.15	0.00	4.50	869.01	1157.92	0.29
1	33444 Z	10 YR	4140.00	297.19	306.54	303.12	306.86	0.00	5.14	961.69	1271.45	0.32
1	33444 Z	25 YR	5550.00	297.19	307.25	303.79	307.47	0.00	4.75	1715.36	1391.24	0.29
1	33444 Z	50 YR	7060.00	297.19	308.05	304.42	308.31	0.00	5.19	2034.82	1489.86	0.30
1	33444 Z	100 YR	8740.00	297.19	308.77	305.08	308.83	0.00	3.10	5247.22	1643.47	0.17
1	33444 Z	250 YR	11210.00	297.19	309.75	305.94	309.82	0.00	3.20	6438.81	1780.63	0.1
1	33444 Z	500 YR	13120.00	297.19	310.42	306.58	310.48	0.00	3.28	7312.99	1886.43	0.17
1	33616 I-30		Mult Open									
1	33743	2 YR	1830.00	297.58	304.88	301.50	305.03	0.00	3.56	626.04	608.07	0.24
1	33743	5 YR	3260.00	297.58	306.65	302.73	306.91	0.00	4.62	845.21	1355.98	0.28
1	33743	10 YR	4140.00	297.58	307.58	303.30	307.91	0.00	5.12	961.57	1642.80	0.29
1	33743	25 YR	5550.00	297.58	309.53	304.09	309.55	0.00	1.88	4782.13	1908.77	0.10
1	33743	50 YR	7060.00	297.58	310.23	304.81	310.26	0.00	2.13	5349.41	1938.10	0.11
1	33743	100 YR	8740.00	297.58	310.50	305.53	310.52	0.00	1.84	8490.85	1996.16	0.09
1	33743	250 YR	11210.00	297.58	310.99	306.49	311.02	0.00	2.13	9218.76	2091.70	0.10
1	33743	500 YR	13120.00	297.58	311.32	307.20	311.35	0.00	2.33	9713.43	2144.23	0.11
1	33753	2 YR	1830.00	297.58	304.93	301.37	305.05	0.00	3.28	721.97	706.42	0.22
1	33753	5 YR	3260.00	297.58	306.75	302.84	306.93	0.00	4.07	1020.78	1563.52	0.24
1	33753	10 YR	4140.00	297.58	307.72	303.36	307.94	0.00	4.41	1180.48	1679.23	0.25
1	33753	25 YR	5550.00	297.58	309.54	304.13	309.56	0.00	1.43	5765.67	1873.90	0.07
1	33753	50 YR	7060.00	297.58	310.24	304.73	310.26	0.00	1.63	6330.24	1896.15	0.08
1	33753	100 YR	8740.00	297.58	310.50	305.36	310.52	0.00	1.49	9550.77	1907.91	0.07
1	33753	250 YR	11210.00	297.58	311.00	306.19	311.02	0.00	1.77	10271.32	2042.62	0.09
1	33753	500 YR	13120.00	297.58	311.33	306.82	311.36	0.00	1.96	10766.29	2119.00	0.09
1	33761	2 YR	1830.00	298.59	305.03	300.84	305.07	0.00	1.97	1121.17	860.25	0.14
1	33761	5 YR	3260.00	298.59	306.90	301.82	306.97	0.00	2.45	1588.52	1582.35	0.15
1	33761	10 YR	4140.00	298.59	307.89	302.24	307.98	0.00	2.67	1838.11	1672.09	0.16
1	33761	25 YR	5550.00	298.59	309.55	303.04	309.56	0.00	1.20	6199.67	1790.64	0.06
1	33761	50 YR	7060.00	298.59	310.25	303.58	310.27	0.00	1.40	6775.78	1875.87	0.07
1	33761	100 YR	8740.00	298.59	310.51	304.09	310.52	0.00	1.30	10087.24	1885.36	0.07
1	33761	250 YR	11210.00	298.59	311.00	304.76	311.02	0.00	1.55	10810.06	1957.41	0.08
1	33761	500 YR	13120.00	298.59	311.34	305.14	311.36	0.00	1.72	11306.89	2033.65	0.09
1	33812 I-30 Frontage		Mult Open									
1	33882 AA	2 YR	1830.00	297.52	305.26	300.86	305.31	0.00	1.99	1168.20	860.74	0.14
1	33882 AA	5 YR	3260.00	297.52	307.59	301.94	307.65	0.00	2.23	1808.71	1393.44	0.13
1	33882 AA	10 YR	4140.00	297.52	309.05	302.54	309.11	0.00	2.28	2208.67	1416.82	0.12
1	33882 AA	25 YR	5550.00	297.52	310.25	303.34	310.27	0.00	1.44	5438.14	1462.62	0.07
1	33882 AA	50 YR	7060.00	297.52	310.84	304.08	310.87	0.00	1.69	5875.16	1491.91	0.0
1	33882 AA	100 YR	8740.00	297.52	311.18	304.57	311.19	0.00	1.39	9851.77	1560.51	0.07
1	33882 AA	250 YR	11210.00	297.52	311.69	305.18	311.71	0.00	1.64	10567.40	1631.60	0.08
1	33882 AA	500 YR	13120.00	297.52	312.01	305.61	312.04	0.00	1.83	11028.33	1693.90	0.09
1	34191	2 YR	1830.00	299.49	305.41	303.93	305.47	0.00	2.81	1143.24	749.09	0.25
1	34191	5 YR	3260.00	299.49	307.72	304.63	307.74	0.00	1.81	3375.67	1390.06	0.13

Existing vs Ultimate Water Surface Elevations											
					Existing		Ultimate		Difference		
River	Reach	River Sta	Profile	Min Ch El	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	
Stream WC-2	1	3361	100 YR	320.75	1080	324.28	1220	324.47	140	0.19	
Stream WC-2	1	3415 G	100 YR	321.06	960	324.53	1140	324.62	180	0.09	
Stream WC-2	1	3452 Independence Cir			Culvert		Culvert				
Stream WC-2	1	3489 H	100 YR	321.38	960	328.22	1140	328.34	180	0.12	
Stream WC-2	1	3542	100 YR	321.67	960	328.23	1140	328.35	180	0.12	
Stream WC-2	1	3669	100 YR	322.46	960	328.3	1140	328.44	180	0.14	
Stream WC-2	1	3843	100 YR	322.71	960	328.3	1140	328.43	180	0.13	
Stream WC-2	1	3882 I	100 YR	323.21	960	328.15	1140	328.21	180	0.06	
Stream WC-2	1	3909 Lexington Pl.			Culvert		Culvert				
Stream WC-2	1	3936 J	100 YR	323.59	960	330.48	1140	330.66	180	0.18	
Stream WC-2	1	3971	100 YR	323.69	960	330.4	1140	330.55	180	0.15	
Stream WC-2	1	4032	100 YR	324.37	960	330.43	1140	330.6	180	0.17	
Stream WC-2	1	4238	100 YR	325.43	960	330.44	1140	330.59	180	0.15	
Stream WC-2	1	4276 K	100 YR	325.56	960	330.28	1140	330.39	180	0.11	
Stream WC-2	1	4308 Concord Pl.			Culvert		Culvert				
Stream WC-2	1	4340 L	100 YR	325.95	960	331.38	1140	331.63	180	0.25	
Stream WC-2	1	4446	100 YR	326.04	960	331.42	1140	331.78	180	0.36	
Stream WC-2	1	4699 M	100 YR	326.46	960	332.13	1140	332.46	180	0.33	
Stream WC-2	1	4974	100 YR	330.53	680	333.81	780	334.19	100	0.38	
Stream WC-2	1	5219 N	100 YR	331.65	680	335.53	780	335.58	100	0.05	
Stream WC-2	1	5569	100 YR	333.95	680	336.9	780	337.07	100	0.17	
Stream WC-2	1	5776 O	100 YR	335.02	680	337.88	780	338.02	100	0.14	
Stream WC-2	1	6011	100 YR	336.33	450	339.11	780	339.46	330	0.35	
Stream WC-2	1	6343	100 YR	337.63	450	340.67	510	341.24	60	0.57	
Stream WC-2	1	6593 P	100 YR	340.88	450	342.9	510	342.9	60	0	
Stream WC-2	1	765	100 YR	261.35	7110	275.27	7570	275.41	460	0.14	
Swampoodle Creek	1	765	100 YR	261.35	7110	275.27	7570	275.41	460	0.14	
Swampoodle Creek	1	1194	100 YR	261.33	7110	277.22	7570	277.49	460	0.27	
Swampoodle Creek	1	1282	100 YR	263.11	7110	277.79	7570	278.1	460	0.31	
Swampoodle Creek	1	1370 Railroad			Bridge		Bridge				
Swampoodle Creek	1	1460 A	100 YR	265.43	7110	282	7570	282.2	460	0.2	
Swampoodle Creek	1	1523	100 YR	266.38	7110	282.19	7570	282.41	460	0.22	
Swampoodle Creek	1	1606	100 YR	265.79	7110	282.33	7570	282.56	460	0.23	
Swampoodle Creek	1	1693	100 YR	265.83	7110	282.45	7570	282.69	460	0.24	
Swampoodle Creek	1	1765 Railroad			Bridge		Bridge				
Swampoodle Creek	1	1828 B	100 YR	266.89	7110	286.26	7570	286.7	460	0.44	
Swampoodle Creek	1	1855	100 YR	266.38	7110	286.31	7570	286.75	460	0.44	
Swampoodle Creek	1	1930	100 YR	267.08	7110	286.37	7570	286.81	460	0.44	
Swampoodle Creek	1	1970	100 YR	267.32	7110	286.37	7570	286.81	460	0.44	
Swampoodle Creek	1	2015 Railroad			Bridge		Bridge				
Swampoodle Creek	1	2080 C	100 YR	267.23	7110	286.91	7570	287.21	460	0.3	
Swampoodle Creek	1	2117	100 YR	267.24	7110	286.92	7570	287.22	460	0.3	
Swampoodle Creek	1	2138	100 YR	265.6	7110	286.89	7570	287.19	460	0.3	
Swampoodle Creek	1	2219	100 YR	266.49	7110	286.91	7570	287.22	460	0.31	
Swampoodle Creek	1	2264 Texas Viaduct Rd			Bridge		Bridge				
Swampoodle Creek	1	2299	100 YR	268.03	7110	286.95	7570	287.26	460	0.31	
Swampoodle Creek	1	2376	100 YR	267.88	7110	286.97	7570	287.27	460	0.3	
Swampoodle Creek	1	2477	100 YR	269.09	7110	286.98	7570	287.28	460	0.3	
Swampoodle Creek	1	2510	100 YR	269	7110	286.97	7570	287.28	460	0.31	
Swampoodle Creek	1	2545 Broad St.			Culvert		Culvert				
Swampoodle Creek	1	2574 D	100 YR	268.71	7110	286.97	7570	287.25	460	0.28	
Swampoodle Creek	1	2642	100 YR	269.91	7110	286.92	7570	287.19	460	0.27	
Swampoodle Creek	1	2717	100 YR	269.99	7110	286.99	7570	287.27	460	0.28	
Swampoodle Creek	1	2836	100 YR	268.17	8000	287.04	8500	287.33	500	0.29	
Swampoodle Creek	1	2880 Texas Viaduct Rd			Bridge		Bridge				
Swampoodle Creek	1	2924	100 YR	267.81	8000	287.29	8500	287.58	500	0.29	
Swampoodle Creek	1	2957	100 YR	268.7	8000	287.2	8500	287.49	500	0.29	
Swampoodle Creek	1	2972	100 YR	268.22	8000	287.16	8500	287.46	500	0.3	
Swampoodle Creek	1	3035 3rd St.			Bridge		Bridge				
Swampoodle Creek	1	3081 E	100 YR	269.7	8000	288.41	8500	288.71	500	0.3	
Swampoodle Creek	1	3130	100 YR	270.35	8000	288.44	8500	288.74	500	0.3	
Swampoodle Creek	1	3211	100 YR	270.27	8000	288.49	8500	288.79	500	0.3	
Swampoodle Creek	1	3258 Texas Viaduct Rd			Bridge		Bridge				
Swampoodle Creek	1	3284	100 YR	271.08	8000	288.54	8500	288.84	500	0.3	
Swampoodle Creek	1	3293	100 YR	271.13	8000	288.54	8500	288.84	500	0.3	
Swampoodle Creek	1	3299	100 YR	271.22	8000	288.52	8500	288.83	500	0.31	
Swampoodle Creek	1	3325 4th St.			Culvert		Culvert				
Swampoodle Creek	1	3362 F	100 YR	271.08	8000	288.67	8500	288.98	500	0.31	
Swampoodle Creek	1	3443	100 YR	271.61	8000	288.68	8500	288.99	500	0.31	
Swampoodle Creek	1	3574	100 YR	271.3	8000	288.69	8500	289	500	0.31	
Swampoodle Creek	1	3668	100 YR	271.59	8000	288.74	8500	289.05	500	0.31	

Existing vs Ultimate Water Surface Elevations											
						Existing		Ultimate		Difference	
River	Reach	River Sta	Profile	Min Ch El	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Swampoodle Creek	1	3705 5th St.			Bridge		Bridge			
Swampoodle Creek	1	3757 G	100 YR	271.58	8000	288.81	8500	289.11	500	0.3
Swampoodle Creek	1	3848	100 YR	271.25	8000	288.82	8500	289.12	500	0.3
Swampoodle Creek	1	4130	100 YR	271.01	8000	288.87	8500	289.17	500	0.3
Swampoodle Creek	1	4313	100 YR	273.16	8000	288.9	8500	289.21	500	0.31
Swampoodle Creek	1	4443	100 YR	274.04	8000	288.92	8500	289.22	500	0.3
Swampoodle Creek	1	4509 7th St.			Culvert		Culvert			
Swampoodle Creek	1	4567 H	100 YR	275.06	8000	289	8500	289.33	500	0.33
Swampoodle Creek	1	4632	100 YR	275.43	8000	289.01	8500	289.34	500	0.33
Swampoodle Creek	1	4717	100 YR	275.23	8000	289.39	8500	289.66	500	0.27
Swampoodle Creek	1	4812	100 YR	275.13	5670	289.8	5890	290.07	220	0.27
Swampoodle Creek	1	4882 8th St.			Bridge		Bridge			
Swampoodle Creek	1	4944 I	100 YR	275.13	5670	289.89	5890	290.15	220	0.26
Swampoodle Creek	1	5062	100 YR	276.53	5670	289.92	5890	290.18	220	0.26
Swampoodle Creek	1	5656 J	100 YR	277.3	5670	290.18	5890	290.42	220	0.24
Swampoodle Creek	1	6252	100 YR	276.85	5600	290.95	5810	291.15	210	0.2
Swampoodle Creek	1	6873	100 YR	276.62	5600	291.37	5810	291.54	210	0.17
Swampoodle Creek	1	7003	100 YR	278.61	5600	291.57	5810	291.71	210	0.14
Swampoodle Creek	1	7055 13th St.			Bridge		Bridge			
Swampoodle Creek	1	7116 K	100 YR	279.58	5600	293.61	5810	293.94	210	0.33
Swampoodle Creek	1	7237	100 YR	280.09	5600	293.99	5810	294.4	210	0.41
Swampoodle Creek	1	7747	100 YR	280.55	5250	294.6	5400	294.82	150	0.22
Swampoodle Creek	1	8122	100 YR	282.51	5060	294.68	5220	294.88	160	0.2
Swampoodle Creek	1	8222	100 YR	282.41	5060	294.54	5220	294.72	160	0.18
Swampoodle Creek	1	8241 17th St.			Bridge		Bridge			
Swampoodle Creek	1	8290 L	100 YR	282.64	5060	295.76	5220	295.81	160	0.05
Swampoodle Creek	1	8403	100 YR	282.47	5060	295.98	5220	296.06	160	0.08
Swampoodle Creek	1	8697	100 YR	284.19	5060	295.95	5220	296.01	160	0.06
Swampoodle Creek	1	8897	100 YR	286.8	5060	296.03	5220	296.1	160	0.07
Swampoodle Creek	1	9025	100 YR	288.15	5060	298.37	5220	298.6	160	0.23
Swampoodle Creek	1	9110 US Highway 82			Culvert		Culvert			
Swampoodle Creek	1	9180 M	100 YR	288.22	5060	299.75	5220	299.76	160	0.01
Swampoodle Creek	1	9277	100 YR	287.89	5060	300.41	5220	300.48	160	0.07
Swampoodle Creek	1	9854 N	100 YR	288.16	4840	301.23	4940	301.35	100	0.12
Swampoodle Creek	1	10292	100 YR	287.76	4740	301.9	4860	302.01	120	0.11
Swampoodle Creek	1	10601	100 YR	289.25	4540	302.57	4670	302.68	130	0.11
Swampoodle Creek	1	10765	100 YR	291.04	4540	301.8	4670	301.88	130	0.08
Swampoodle Creek	1	10842	100 YR	290.77	4430	301.9	4550	301.98	120	0.08
Swampoodle Creek	1	10978	100 YR	291.53	4430	303.94	4550	304.08	120	0.14
Swampoodle Creek	1	11049 Richmond Rd.			Culvert		Culvert			
Swampoodle Creek	1	11101 O	100 YR	289.01	4430	307.35	4550	307.43	120	0.08
Swampoodle Creek	1	11262	100 YR	287.75	4430	307.4	4550	307.48	120	0.08
Swampoodle Creek	1	11858	100 YR	293.31	4430	308.17	4550	308.26	120	0.09
Swampoodle Creek	1	12163 P	100 YR	293.5	4410	308.53	4550	308.63	140	0.1
Swampoodle Creek	1	12567 Q	100 YR	293.22	4410	309.06	4550	309.14	140	0.08
Swampoodle Creek	1	12894	100 YR	298.64	2750	310.33	2990	310.43	240	0.1
Swampoodle Creek	1	13336	100 YR	297.77	1940	311.29	2190	311.49	250	0.2
Swampoodle Creek	1	13576 R	100 YR	298.42	1940	311.43	2190	311.65	250	0.22
Swampoodle Creek	1	13805	100 YR	298.93	1940	311.76	2190	312.03	250	0.27
Swampoodle Creek	1	13977	100 YR	300.82	1940	311.58	2190	311.81	250	0.23
Swampoodle Creek	1	14117	100 YR	301.22	1750	311.49	2000	311.68	250	0.19
Swampoodle Creek	1	14208	100 YR	303.4	1750	312.13	2000	312.71	250	0.58
Swampoodle Creek	1	14249 College Dr.			Culvert		Culvert			
Swampoodle Creek	1	14310 S	100 YR	304.43	1190	316.57	1410	317.06	220	0.49
Swampoodle Creek	1	14367	100 YR	304.43	1190	316.64	1410	317.15	220	0.51
Swampoodle Creek	1	14616	100 YR	310.8	1190	317.54	1410	318.06	220	0.52
Swampoodle Creek	1	14812	100 YR	311.32	1190	318.04	1410	318.64	220	0.6
Swampoodle Creek	1	15035	100 YR	312.47	1190	319.04	1410	319.68	220	0.64
Swampoodle Creek	1	15246	100 YR	313.41	1190	319.84	1410	320.4	220	0.56
Swampoodle Creek	1	15462	100 YR	313.91	940	321.9	1150	322.61	210	0.71
Swampoodle Creek	1	15633 T	100 YR	314.05	940	321.79	1150	322.45	210	0.66
Swampoodle Creek	1	15839	100 YR	315.07	940	321.68	1150	322.27	210	0.59
Swampoodle Creek	1	16026	100 YR	317.37	940	322.39	1150	322.9	210	0.51
Swampoodle Creek	1	16205	100 YR	315.65	940	323.54	1150	324.06	210	0.52
Swampoodle Creek	1	16356	100 YR	317.27	940	323	1150	323.51	210	0.51
Swampoodle Creek	1	16568	100 YR	317.46	940	323.92	1150	324.52	210	0.6
Swampoodle Creek	1	16806	100 YR	319.85	940	325.4	1150	326.27	210	0.87
Swampoodle Creek	1	16925	100 YR	320.42	940	326.05	1150	326.92	210	0.87
Swampoodle Creek	1	16969 40th St.			Culvert		Culvert			
Swampoodle Creek	1	17013 U	100 YR	320.42	940	327.49	1150	328.67	210	1.18
Swampoodle Creek	1	17057	100 YR	321.2	940	327.07	1150	328.18	210	1.11

HEC-RAS Plan: Clear_Ultimate River: CLEARCREEK Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	23626	10 YR	660.00	326.00	329.99		330.00	0.00	0.88	765.72	247.52	0.08
1	23626	25 YR	830.00	326.00	330.19		330.21	0.00	1.04	816.69	255.40	0.09
1	23626	50 YR	960.00	326.00	330.33		330.36	0.00	1.16	853.00	261.35	0.10
1	23626	100 YR	1110.00	326.00	330.49		330.51	0.00	1.30	893.28	268.41	0.11
1	23626	250 YR	1350.00	326.00	330.69		330.73	0.00	1.50	948.96	271.72	0.13
1	23626	500 YR	1540.00	326.00	330.86		330.90	0.00	1.64	995.36	274.10	0.14
1	23891	2 YR	320.00	326.00	329.46		329.48	0.00	1.01	316.91	161.63	0.12
1	23891	5 YR	440.00	326.00	329.83		329.86	0.00	1.18	383.50	186.41	0.13
1	23891	10 YR	530.00	326.00	330.00		330.03	0.00	1.32	415.92	192.13	0.14
1	23891	25 YR	670.00	326.00	330.21		330.25	0.00	1.54	455.96	196.25	0.16
1	23891	50 YR	770.00	326.00	330.35		330.40	0.00	1.68	484.35	199.31	0.17
1	23891	100 YR	890.00	326.00	330.51		330.56	0.00	1.84	515.54	202.63	0.18
1	23891	250 YR	1080.00	326.00	330.72		330.79	0.00	2.09	558.83	206.96	0.20
1	23891	500 YR	1230.00	326.00	330.89		330.97	0.00	2.25	594.99	209.76	0.21
1	24202	2 YR	320.00	326.00	329.49		329.51	0.00	0.84	382.38	122.16	0.08
1	24202	5 YR	440.00	326.00	329.87		329.89	0.00	1.03	429.80	127.67	0.10
1	24202	10 YR	530.00	326.00	330.05		330.07	0.00	1.18	452.82	130.28	0.11
1	24202	25 YR	670.00	326.00	330.27		330.30	0.00	1.41	481.67	133.48	0.12
1	24202	50 YR	770.00	326.00	330.42		330.46	0.00	1.56	502.03	135.69	0.14
1	24202	100 YR	890.00	326.00	330.59		330.63	0.00	1.74	524.68	140.19	0.15
1	24202	250 YR	1080.00	326.00	330.81		330.87	0.00	2.00	557.00	146.50	0.17
1	24202	500 YR	1230.00	326.00	330.99		331.07	0.00	2.19	584.14	151.90	0.18
1	24418	2 YR	320.00	327.14	328.97	328.97	329.84	0.01	7.50	42.64	24.64	1.01
1	24418	5 YR	440.00	327.14	329.39	329.39	330.45	0.01	8.28	53.14	25.25	1.01
1	24418	10 YR	530.00	327.14	329.69	329.69	330.87	0.01	8.73	60.72	25.82	1.00
1	24418	25 YR	670.00	327.14	330.12	330.12	331.46	0.01	9.27	72.26	27.26	1.00
1	24418	50 YR	770.00	327.14	330.40	330.40	331.84	0.01	9.61	80.10	28.19	1.01
1	24418	100 YR	890.00	327.14	330.72	330.72	332.27	0.01	9.97	89.27	29.25	1.01
1	24418	250 YR	1080.00	327.14	331.20	331.20	332.89	0.01	10.44	103.44	30.81	1.00
1	24418	500 YR	1230.00	327.14	331.53	331.53	333.34	0.01	10.78	114.07	31.92	1.01
1	24421 I	2 YR	320.00	328.70	330.48	330.48	331.24	0.02	6.99	45.77	30.01	1.00
1	24421 I	5 YR	440.00	328.70	330.86	330.86	331.77	0.02	7.68	57.32	31.18	1.00
1	24421 I	10 YR	530.00	328.70	331.11	331.11	332.13	0.01	8.11	65.32	31.97	1.00
1	24421 I	25 YR	670.00	328.70	331.48	331.48	332.65	0.01	8.67	77.28	33.10	1.00
1	24421 I	50 YR	770.00	328.70	331.72	331.72	332.98	0.01	9.02	85.33	33.85	1.00
1	24421 I	100 YR	890.00	328.70	332.00	332.00	333.36	0.01	9.37	94.95	34.72	1.00
1	24421 I	250 YR	1080.00	328.70	332.39	332.39	333.92	0.01	9.93	108.79	35.93	1.01
1	24421 I	500 YR	1230.00	328.70	332.70	332.70	334.33	0.01	10.25	120.05	36.89	1.00
1	24426 Wyatt Rd.		Culvert									
1	24477 J	2 YR	320.00	329.50	334.41	331.62	334.48	0.00	2.14	149.57	52.47	0.22
1	24477 J	5 YR	440.00	329.50	334.87	332.12	334.97	0.00	2.51	176.28	97.27	0.25
1	24477 J	10 YR	530.00	329.50	335.04	332.45	335.17	0.00	2.86	196.99	145.05	0.28
1	24477 J	25 YR	670.00	329.50	335.29	332.85	335.45	0.00	3.31	232.13	156.87	0.31
1	24477 J	50 YR	770.00	329.50	335.36	333.12	335.57	0.00	3.70	243.02	160.47	0.34
1	24477 J	100 YR	890.00	329.50	335.51	333.39	335.75	0.00	4.06	264.04	167.42	0.37
1	24477 J	250 YR	1080.00	329.50	335.73	333.79	336.03	0.00	4.55	296.57	178.16	0.40
1	24477 J	500 YR	1230.00	329.50	335.94	334.06	336.27	0.00	4.83	326.99	194.55	0.42
1	24488	2 YR	320.00	329.50	334.42	331.85	334.49	0.00	2.09	153.43	62.25	0.23
1	24488	5 YR	440.00	329.50	334.90	332.34	334.99	0.00	2.41	186.86	81.25	0.24
1	24488	10 YR	530.00	329.50	335.07	332.63	335.19	0.00	2.74	202.31	94.15	0.27
1	24488	25 YR	670.00	329.50	335.32	333.02	335.48	0.00	3.19	226.91	110.97	0.30
1	24488	50 YR	770.00	329.50	335.40	333.26	335.60	0.00	3.57	236.78	131.60	0.33
1	24488	100 YR	890.00	329.50	335.55	333.54	335.78	0.00	3.93	256.75	150.27	0.36
1	24488	250 YR	1080.00	329.50	335.78	333.93	336.07	0.00	4.43	289.66	162.43	0.40
1	24488	500 YR	1230.00	329.50	335.99	334.20	336.31	0.00	4.71	320.29	172.35	0.41

HEC-RAS Plan: Corral_Ultimate River: Corral Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1152	2 YR	1640.00	261.76	269.77	268.13	270.01	0.01	4.54	629.93	327.85	0.34
1	1152	5 YR	2210.00	261.76	270.34	269.01	270.58	0.01	4.84	824.98	362.52	0.35
1	1152	10 YR	2560.00	261.76	270.64	269.30	270.88	0.01	5.00	935.22	378.34	0.35
1	1152	25 YR	3040.00	261.76	271.01	269.67	271.26	0.01	5.20	1078.86	397.48	0.3
1	1152	50 YR	3400.00	261.76	271.27	269.81	271.52	0.01	5.34	1184.01	414.47	0.36
1	1152	100 YR	3740.00	261.76	271.50	269.92	271.76	0.01	5.45	1281.75	428.47	0.36
1	1152	250 YR	4220.00	261.76	271.80	270.14	272.06	0.01	5.61	1412.56	450.24	0.36
1	1152	500 YR	4650.00	261.76	272.05	270.34	272.32	0.01	5.74	1531.67	476.49	0.36
1	1422	2 YR	1640.00	262.23	271.38	270.27	271.54	0.01	5.08	696.00	313.90	0.33
1	1422	5 YR	2210.00	262.23	271.94		272.10	0.01	5.34	886.02	351.51	0.34
1	1422	10 YR	2560.00	262.23	272.23		272.39	0.01	5.43	987.90	358.86	0.34
1	1422	25 YR	3040.00	262.23	272.59		272.76	0.01	5.57	1118.57	368.48	0.34
1	1422	50 YR	3400.00	262.23	272.85		273.02	0.01	5.69	1217.15	381.63	0.34
1	1422	100 YR	3740.00	262.23	273.08		273.26	0.01	5.78	1305.96	399.24	0.34
1	1422	250 YR	4220.00	262.23	273.40		273.59	0.01	6.05	1441.22	430.75	0.35
1	1422	500 YR	4650.00	262.23	273.65		273.84	0.01	6.11	1549.36	436.59	0.35
1	1745	2 YR	1640.00	262.23	273.06	271.67	273.19	0.00	4.48	789.56	380.23	0.26
1	1745	5 YR	2210.00	262.23	273.65	272.11	273.78	0.00	4.76	965.49	394.32	0.27
1	1745	10 YR	2560.00	262.23	273.95	272.33	274.09	0.00	4.94	1058.09	403.57	0.28
1	1745	25 YR	3040.00	262.23	274.29	272.52	274.41	0.00	4.95	1342.27	413.64	0.27
1	1745	50 YR	3400.00	262.23	274.59	272.67	274.72	0.00	5.16	1472.62	456.52	0.28
1	1745	100 YR	3740.00	262.23	274.82	272.79	274.96	0.00	5.25	1582.13	470.94	0.28
1	1745	250 YR	4220.00	262.23	275.17	272.96	275.31	0.00	5.30	1746.73	487.68	0.28
1	1745	500 YR	4650.00	262.23	275.42	273.09	275.56	0.00	5.41	1869.35	500.58	0.28
1	1937 A	2 YR	1170.00	263.71	273.32	269.10	273.37	0.00	2.28	693.50	489.71	0.14
1	1937 A	5 YR	1530.00	263.71	273.93	269.54	274.00	0.00	2.65	769.40	542.68	0.15
1	1937 A	10 YR	1760.00	263.71	274.25	269.66	274.33	0.00	2.87	809.07	565.32	0.16
1	1937 A	25 YR	2050.00	263.71	274.55	270.22	274.57	0.00	2.02	2026.36	586.79	0.11
1	1937 A	50 YR	2260.00	263.71	274.86	270.37	274.88	0.00	2.03	2212.50	610.77	0.11
1	1937 A	100 YR	2420.00	263.71	275.10	270.48	275.12	0.00	2.03	2360.03	627.16	0.11
1	1937 A	250 YR	2800.00	263.71	275.44	270.73	275.47	0.00	2.14	2580.82	658.14	0.12
1	1937 A	500 YR	3250.00	263.71	275.70	270.97	275.73	0.00	2.31	2751.48	673.37	0.12
1	3130 Culvert		Culvert									
1	4316 B	2 YR	1170.00	272.52	278.17	276.31	278.59	0.00	5.15	227.02	60.71	0.47
1	4316 B	5 YR	1530.00	272.52	279.43	276.90	279.81	0.00	4.96	308.70	69.77	0.42
1	4316 B	10 YR	1760.00	272.52	280.19	277.24	280.55	0.00	4.83	364.05	75.29	0.39
1	4316 B	25 YR	2050.00	272.52	281.90	277.63	282.16	0.00	4.08	511.75	135.62	0.29
1	4316 B	50 YR	2260.00	272.52	283.83	277.89	284.00	0.00	3.36	713.96	163.72	0.21
1	4316 B	100 YR	2420.00	272.52	284.51	278.08	284.65	0.00	3.11	945.66	180.85	0.19
1	4316 B	250 YR	2800.00	272.52	285.23	278.53	285.38	0.00	3.24	1084.00	202.33	0.19
1	4316 B	500 YR	3250.00	272.52	285.83	279.00	286.00	0.00	3.46	1210.93	220.07	0.19
1	4391	2 YR	1170.00	272.13	278.43	275.94	278.73	0.00	4.46	262.57	63.80	0.39
1	4391	5 YR	1530.00	272.13	279.61	276.53	279.92	0.00	4.46	343.17	72.09	0.36
1	4391	10 YR	1760.00	272.13	280.35	276.88	280.65	0.00	4.42	397.92	77.21	0.34
1	4391	25 YR	2050.00	272.13	281.98	277.26	282.21	0.00	3.81	571.00	137.34	0.27
1	4391	50 YR	2260.00	272.13	283.89	277.55	284.03	0.00	3.07	877.37	189.13	0.19
1	4391	100 YR	2420.00	272.13	284.54	277.74	284.67	0.00	2.98	1008.70	205.06	0.18
1	4391	250 YR	2800.00	272.13	285.27	278.19	285.40	0.00	3.11	1165.25	227.74	0.18
1	4391	500 YR	3250.00	272.13	285.87	278.67	286.02	0.00	3.32	1306.71	238.37	0.18
1	4632	2 YR	1170.00	272.46	278.74		279.04	0.00	4.41	265.56	64.98	0.38
1	4632	5 YR	1530.00	272.46	279.87		280.18	0.00	4.45	343.57	73.10	0.36
1	4632	10 YR	1760.00	272.46	280.57		280.88	0.00	4.44	396.77	78.16	0.35
1	4632	25 YR	2050.00	272.46	282.11		282.34	0.00	3.83	596.93	168.16	0.27
1	4632	50 YR	2260.00	272.46	283.96		284.08	0.00	3.02	954.90	255.68	0.19
1	4632	100 YR	2420.00	272.46	284.60		284.72	0.00	2.90	1127.02	276.34	0.17
1	4632	250 YR	2800.00	272.46	285.33		285.45	0.00	3.00	1336.76	301.69	0.17
1	4632	500 YR	3250.00	272.46	285.94		286.07	0.00	3.17	1531.10	338.02	0.18
1	4753 C	2 YR	1170.00	274.01	278.78	277.62	279.46	0.00	6.65	175.84	63.59	0.61
1	4753 C	5 YR	1530.00	274.01	279.86	278.21	280.56	0.00	6.72	227.65	73.48	0.54
1	4753 C	10 YR	1760.00	274.01	280.53	278.56	281.24	0.00	6.77	260.03	194.28	0.51
1	4753 C	25 YR	2050.00	274.01	282.12	278.95	282.48	0.00	5.13	596.33	559.87	0.35
1	4753 C	50 YR	2260.00	274.01	284.07	279.21	284.13	0.00	2.36	1699.03	816.99	0.15
1	4753 C	100 YR	2420.00	274.01	284.74	279.40	284.76	0.00	1.76	3022.07	867.70	0.11
1	4753 C	250 YR	2800.00	274.01	285.47	279.84	285.49	0.00	1.68	3670.31	901.84	0.10
1	4753 C	500 YR	3250.00	274.01	286.10	280.34	286.12	0.00	1.68	4243.19	926.54	0.09
1	4815 Chelf Rd.		Culvert									
1	4878 D	2 YR	1170.00	273.23	280.54	278.04	280.93	0.00	5.06	240.94	189.04	0.38
1	4878 D	5 YR	1530.00	273.23	281.81	278.64	282.23	0.00	5.25	304.63	517.30	0.36
1	4878 D	10 YR	1760.00	273.23	282.82	279.00	282.99	0.00	3.92	721.71	639.45	0.25
1	4878 D	25 YR	2050.00	273.23	284.06	279.42	284.15	0.00	3.15	1100.14	785.54	0.19
1	4878 D	50 YR	2260.00	273.23	284.85	279.76	284.87	0.00	1.67	2174.97	845.91	0.10
1	4878 D	100 YR	2420.00	273.23	285.11	279.97	285.13	0.00	1.42	3262.62	866.31	0.08
1	4878 D	250 YR	2800.00	273.23	285.57	280.41	285.58	0.00	1.47	3660.55	882.08	0.08
1	4878 D	500 YR	3250.00	273.23	286.15	280.92	286.17	0.00	1.49	4182.24	897.76	0.08

HEC-RAS Plan: Corral_Ultimate River: Corral Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	4923	2 YR	1170.00	272.99	280.97	277.41	281.07	0.00	2.53	497.22	277.65	0.19
1	4923	5 YR	1530.00	272.99	282.27	277.82	282.36	0.00	2.56	677.75	665.39	0.17
1	4923	10 YR	1760.00	272.99	282.97	278.06	283.05	0.00	2.39	1069.92	740.20	0.15
1	4923	25 YR	2050.00	272.99	284.13	278.34	284.18	0.00	2.16	1491.60	795.38	0.13
1	4923	50 YR	2260.00	272.99	284.85	278.54	284.88	0.00	1.82	2233.37	828.04	0.11
1	4923	100 YR	2420.00	272.99	285.12	278.69	285.13	0.00	1.43	3565.93	860.21	0.08
1	4923	250 YR	2800.00	272.99	285.57	279.02	285.59	0.00	1.50	3968.80	892.06	0.08
1	4923	500 YR	3250.00	272.99	286.16	279.40	286.17	0.00	1.52	4495.27	908.32	0.08
1	5413	2 YR	1040.00	273.48	281.36	279.22	281.48	0.00	3.32	464.77	186.17	0.26
1	5413	5 YR	1410.00	273.48	282.57	279.67	282.66	0.00	3.12	714.16	229.21	0.22
1	5413	10 YR	1660.00	273.48	283.21	279.96	283.30	0.00	3.10	868.44	252.14	0.21
1	5413	25 YR	2000.00	273.48	284.29	280.29	284.36	0.00	3.02	1181.96	333.98	0.19
1	5413	50 YR	2260.00	273.48	284.95	280.51	285.02	0.00	2.93	1421.43	466.50	0.17
1	5413	100 YR	2540.00	273.48	285.16	280.72	285.24	0.00	3.18	1513.16	538.08	0.19
1	5413	250 YR	2960.00	273.48	285.62	281.03	285.70	0.00	3.28	1722.30	689.64	0.19
1	5413	500 YR	3290.00	273.48	286.21	281.24	286.27	0.00	3.09	2254.55	781.63	0.17
1	5817 E	2 YR	1040.00	273.21	281.86		282.11	0.00	4.31	290.40	85.86	0.32
1	5817 E	5 YR	1410.00	273.21	282.89		283.16	0.00	4.57	387.75	102.65	0.31
1	5817 E	10 YR	1660.00	273.21	283.48		283.76	0.00	4.77	450.59	113.65	0.31
1	5817 E	25 YR	2000.00	273.21	284.48		284.76	0.00	4.90	595.96	194.90	0.30
1	5817 E	50 YR	2260.00	273.21	285.11		285.36	0.00	4.75	734.40	259.83	0.28
1	5817 E	100 YR	2540.00	273.21	285.34		285.63	0.00	5.13	796.44	272.36	0.30
1	5817 E	250 YR	2960.00	273.21	285.80		286.09	0.00	5.30	928.21	296.98	0.30
1	5817 E	500 YR	3290.00	273.21	286.35		286.60	0.00	5.08	1103.05	334.25	0.28
1	6302	2 YR	1040.00	275.94	282.99		283.39	0.00	5.15	212.73	67.87	0.45
1	6302	5 YR	1410.00	275.94	283.87		284.33	0.00	5.56	276.98	77.96	0.44
1	6302	10 YR	1660.00	275.94	284.41		284.89	0.00	5.78	319.97	83.09	0.44
1	6302	25 YR	2000.00	275.94	285.27		285.75	0.00	5.81	395.86	104.98	0.41
1	6302	50 YR	2260.00	275.94	285.76		286.27	0.00	6.02	466.16	190.81	0.41
1	6302	100 YR	2540.00	275.94	286.07		286.61	0.00	6.32	533.01	251.45	0.42
1	6302	250 YR	2960.00	275.94	286.51		287.08	0.00	6.60	674.38	376.76	0.42
1	6302	500 YR	3290.00	275.94	286.95		287.47	0.00	6.51	846.24	404.38	0.41
1	6385 F	2 YR	1040.00	277.06	283.35	282.01	283.78	0.01	5.26	198.41	63.04	0.51
1	6385 F	5 YR	1410.00	277.06	284.18	282.57	284.68	0.00	5.68	254.00	70.70	0.49
1	6385 F	10 YR	1660.00	277.06	284.69	282.90	285.22	0.00	5.92	291.03	75.27	0.48
1	6385 F	25 YR	2000.00	277.06	285.49	283.31	286.03	0.00	5.97	367.71	150.21	0.45
1	6385 F	50 YR	2260.00	277.06	285.99	283.61	286.52	0.00	6.03	466.67	269.99	0.43
1	6385 F	100 YR	2540.00	277.06	286.30	283.92	286.87	0.00	6.29	557.51	300.92	0.44
1	6385 F	250 YR	2960.00	277.06	286.74	284.37	287.33	0.00	6.55	697.10	332.74	0.44
1	6385 F	500 YR	3290.00	277.06	287.15	284.70	287.72	0.00	6.58	835.94	360.69	0.43
1	6423 Martha Dr.		Culvert									
1	6450 G	2 YR	1040.00	281.07	287.47	284.23	287.54	0.00	2.50	810.89	455.54	0.19
1	6450 G	5 YR	1410.00	281.07	287.65	284.76	287.76	0.00	3.15	899.61	483.40	0.23
1	6450 G	10 YR	1660.00	281.07	287.85	285.10	287.97	0.00	3.44	994.72	495.26	0.25
1	6450 G	25 YR	2000.00	281.07	288.00	285.53	288.16	0.00	3.92	1070.78	504.55	0.28
1	6450 G	50 YR	2260.00	281.07	288.12	285.85	288.30	0.00	4.24	1129.75	511.63	0.30
1	6450 G	100 YR	2540.00	281.07	288.23	286.16	288.44	0.00	4.57	1188.72	518.62	0.32
1	6450 G	250 YR	2960.00	281.07	288.42	286.90	288.66	0.00	4.98	1285.84	529.72	0.35
1	6450 G	500 YR	3290.00	281.07	288.56	287.10	288.82	0.00	5.27	1362.69	538.23	0.36
1	6518	2 YR	1040.00	280.71	287.53	283.99	287.58	0.00	2.17	929.51	448.40	0.15
1	6518	5 YR	1410.00	280.71	287.76	284.43	287.83	0.00	2.73	1030.49	459.25	0.19
1	6518	10 YR	1660.00	280.71	287.96	284.69	288.04	0.00	2.99	1126.93	469.47	0.21
1	6518	25 YR	2000.00	280.71	288.15	285.02	288.25	0.00	3.40	1212.99	479.54	0.23
1	6518	50 YR	2260.00	280.71	288.28	285.25	288.40	0.00	3.68	1279.07	487.12	0.25
1	6518	100 YR	2540.00	280.71	288.42	285.48	288.55	0.00	3.96	1346.49	494.75	0.26
1	6518	250 YR	2960.00	280.71	288.63	285.80	288.78	0.00	4.33	1452.29	515.19	0.28
1	6518	500 YR	3290.00	280.71	288.79	286.05	288.96	0.00	4.58	1537.45	528.65	0.30
1	6933 H	2 YR	1040.00	280.31	287.73		287.91	0.00	4.40	365.60	172.61	0.30
1	6933 H	5 YR	1410.00	280.31	288.05		288.31	0.00	5.31	425.12	208.76	0.36
1	6933 H	10 YR	1660.00	280.31	288.31		288.61	0.00	5.92	482.83	233.30	0.39
1	6933 H	25 YR	2000.00	280.31	288.58		288.91	0.00	6.41	551.55	287.21	0.42
1	6933 H	50 YR	2260.00	280.31	288.78		289.13	0.00	6.70	611.05	305.80	0.43
1	6933 H	100 YR	2540.00	280.31	288.99		289.35	0.00	6.97	675.35	330.35	0.44
1	6933 H	250 YR	2960.00	280.31	289.28		289.66	0.00	7.28	781.23	383.55	0.45
1	6933 H	500 YR	3290.00	280.31	289.51		289.88	0.00	7.48	870.60	418.49	0.46
1	7459 I	2 YR	800.00	280.82	288.76	287.29	289.01	0.00	4.78	245.69	130.83	0.36
1	7459 I	5 YR	1090.00	280.82	289.38	287.82	289.67	0.00	5.37	353.72	196.40	0.38
1	7459 I	10 YR	1250.00	280.82	289.76	288.06	290.01	0.00	5.23	432.84	217.66	0.36
1	7459 I	25 YR	1430.00	280.82	290.12	288.35	290.35	0.00	5.13	513.89	238.78	0.35
1	7459 I	50 YR	1600.00	280.82	290.36	288.61	290.59	0.00	5.17	574.44	257.65	0.34
1	7459 I	100 YR	1800.00	280.82	290.61	288.82	290.83	0.00	5.26	642.82	299.39	0.34
1	7459 I	250 YR	2090.00	280.82	290.94	288.80	291.16	0.00	5.40	748.47	332.66	0.34
1	7459 I	500 YR	2490.00	280.82	291.21	288.80	291.46	0.00	5.81	841.83	354.18	0.36

HEC-RAS Plan: Corral_Ultimate River: Corral Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	7784	2 YR	800.00	283.67	289.53	287.28	289.80	0.00	4.33	215.73	73.23	0.35
1	7784	5 YR	1090.00	283.67	290.21	288.00	290.55	0.00	5.00	274.91	126.09	0.38
1	7784	10 YR	1250.00	283.67	290.50	288.31	290.87	0.00	5.25	314.05	148.40	0.3
1	7784	25 YR	1430.00	283.67	290.79	288.65	291.18	0.00	5.48	361.61	169.43	0.3
1	7784	50 YR	1600.00	283.67	291.02	288.94	291.43	0.00	5.71	403.39	201.43	0.40
1	7784	100 YR	1800.00	283.67	291.26	289.27	291.69	0.00	5.95	456.59	257.38	0.41
1	7784	250 YR	2090.00	283.67	291.59	289.66	292.02	0.00	6.20	551.38	298.10	0.42
1	7784	500 YR	2490.00	283.67	291.92	289.84	292.39	0.00	6.59	657.33	341.32	0.43
1	7888 J	2 YR	800.00	284.46	289.81	287.06	290.01	0.00	3.60	233.22	63.63	0.29
1	7888 J	5 YR	1090.00	284.46	290.52	287.59	290.79	0.00	4.22	271.49	71.36	0.31
1	7888 J	10 YR	1250.00	284.46	290.80	287.90	291.11	0.00	4.58	286.53	79.64	0.33
1	7888 J	25 YR	1430.00	284.46	291.07	288.23	291.43	0.00	4.94	315.17	84.81	0.35
1	7888 J	50 YR	1600.00	284.46	291.27	288.51	291.69	0.00	5.32	330.13	95.40	0.37
1	7888 J	100 YR	1800.00	284.46	291.51	288.78	291.98	0.00	5.72	348.16	104.80	0.39
1	7888 J	250 YR	2090.00	284.46	291.83	289.16	292.36	0.00	6.17	408.29	124.08	0.41
1	7888 J	500 YR	2490.00	284.46	292.15	289.63	292.80	0.00	6.86	451.91	142.17	0.45
1	7952 Leopard Dr.		Culvert									
1	8021 K	2 YR	800.00	286.77	291.76	289.21	291.90	0.00	3.04	265.36	107.31	0.27
1	8021 K	5 YR	1090.00	286.77	292.90	289.68	293.06	0.00	3.22	341.69	139.33	0.25
1	8021 K	10 YR	1250.00	286.77	293.56	289.91	293.73	0.00	3.27	386.43	211.49	0.24
1	8021 K	25 YR	1430.00	286.77	294.26	290.17	294.41	0.00	3.16	556.67	431.24	0.22
1	8021 K	50 YR	1600.00	286.77	294.52	290.38	294.67	0.00	3.30	619.43	455.04	0.22
1	8021 K	100 YR	1800.00	286.77	294.71	290.60	294.89	0.00	3.53	671.60	492.86	0.23
1	8021 K	250 YR	2090.00	286.77	295.03	290.91	295.14	0.00	3.14	1148.46	608.84	0.20
1	8021 K	500 YR	2490.00	286.77	295.24	291.31	295.38	0.00	3.49	1283.83	658.55	0.22
1	8112	2 YR	800.00	287.32	291.88	289.72	292.04	0.00	3.22	263.10	93.32	0.29
1	8112	5 YR	1080.26	287.32	293.01	290.16	293.16	0.00	3.20	381.23	148.85	0.25
1	8112	10 YR	1176.68	287.32	293.70	290.29	293.82	0.00	2.92	487.98	241.36	0.22
1	8112	25 YR	1185.73	287.32	294.40	290.29	294.48	0.00	2.50	616.69	334.82	0.18
1	8112	50 YR	1194.79	287.32	294.68	290.31	294.75	0.00	2.35	684.66	382.50	0.16
1	8112	100 YR	1211.88	287.32	294.92	290.33	294.97	0.00	2.04	919.81	424.62	0.14
1	8112	250 YR	1206.20	287.32	295.16	290.33	295.20	0.00	1.91	1024.06	457.08	0.13
1	8112	500 YR	1356.92	287.32	295.40	290.52	295.45	0.00	1.96	1136.85	469.39	0.13
1	8525 L	2 YR	700.00	288.09	292.68	291.07	292.92	0.00	3.92	184.83	64.77	0.38
1	8525 L	5 YR	930.26	288.09	293.56	291.47	293.81	0.00	4.03	245.44	72.99	0.35
1	8525 L	10 YR	1026.68	288.09	294.08	291.61	294.31	0.00	3.90	284.64	77.85	0.3
1	8525 L	25 YR	1095.73	288.09	294.63	291.73	294.83	0.00	3.67	329.06	84.27	0.28
1	8525 L	50 YR	1124.79	288.09	294.87	291.77	295.05	0.00	3.58	348.97	87.00	0.27
1	8525 L	100 YR	1151.88	288.09	295.04	291.80	295.22	0.00	3.53	364.61	114.71	0.26
1	8525 L	250 YR	1186.20	288.09	295.25	291.86	295.43	0.00	3.48	383.45	131.45	0.25
1	8525 L	500 YR	1206.92	288.09	295.49	291.89	295.66	0.00	3.38	407.07	166.32	0.24
1	8934	2 YR	700.00	290.14	293.98		294.21	0.00	3.86	181.56	65.89	0.41
1	8934	5 YR	930.26	290.14	294.61		294.88	0.00	4.16	225.30	71.34	0.40
1	8934	10 YR	1026.68	290.14	294.95		295.22	0.00	4.17	249.71	74.21	0.38
1	8934	25 YR	1095.73	290.14	295.30		295.56	0.00	4.05	276.70	77.25	0.35
1	8934	50 YR	1124.79	290.14	295.47		295.71	0.00	3.99	289.59	78.67	0.34
1	8934	100 YR	1151.88	290.14	295.61		295.85	0.00	3.95	300.35	79.83	0.33
1	8934	250 YR	1186.20	290.14	295.77		296.01	0.00	3.91	313.68	81.24	0.32
1	8934	500 YR	1206.92	290.14	295.95		296.18	0.00	3.81	328.64	82.80	0.31
1	9117 M	2 YR	700.00	290.36	294.49	292.46	294.60	0.00	2.64	268.43	260.66	0.25
1	9117 M	5 YR	930.26	290.36	295.13	292.74	295.26	0.00	2.95	319.27	287.15	0.26
1	9117 M	10 YR	1026.68	290.36	295.43	292.87	295.57	0.00	3.03	343.48	291.36	0.26
1	9117 M	25 YR	1095.73	290.36	295.73	292.95	295.87	0.00	3.02	367.31	301.69	0.25
1	9117 M	50 YR	1124.79	290.36	295.87	292.98	296.01	0.00	3.01	378.46	310.28	0.24
1	9117 M	100 YR	1151.88	290.36	295.99	293.01	296.13	0.00	3.01	387.90	316.89	0.24
1	9117 M	250 YR	1186.20	290.36	296.13	293.04	296.27	0.00	3.00	399.58	329.95	0.24
1	9117 M	500 YR	1206.92	290.36	296.29	293.07	296.42	0.00	2.97	411.83	339.70	0.23
1	9438 Loop 151		Culvert									
1	9795	2 YR	700.00	292.24	297.47	295.03	297.53	0.00	2.60	449.98	202.82	0.21
1	9795	5 YR	930.26	292.24	299.72	295.37	299.76	0.00	2.03	737.61	307.13	0.13
1	9795	10 YR	1026.68	292.24	301.04	295.47	301.07	0.00	1.80	906.41	556.28	0.11
1	9795	25 YR	1095.73	292.24	302.13	295.55	302.15	0.00	1.65	1045.36	806.15	0.09
1	9795	50 YR	1124.79	292.24	302.61	295.58	302.63	0.00	1.59	1107.53	880.36	0.09
1	9795	100 YR	1151.88	292.24	303.06	295.60	303.08	0.00	1.55	1164.99	899.99	0.08
1	9795	250 YR	1186.20	292.24	303.64	295.64	303.66	0.00	1.49	1238.76	913.41	0.08
1	9795	500 YR	1206.92	292.24	304.06	295.67	304.07	0.00	1.45	1292.40	929.63	0.08
1	9850		Lat Struct									
1	9909 N	2 YR	700.00	291.19	297.62	295.03	297.67	0.00	2.39	600.69	215.94	0.18
1	9909 N	5 YR	940.00	291.19	299.79	295.37	299.81	0.00	1.73	1145.63	296.47	0.11
1	9909 N	10 YR	1100.00	291.19	301.09	295.56	301.10	0.00	1.52	1532.88	548.11	0.09
1	9909 N	25 YR	1340.00	291.19	302.16	295.82	302.17	0.00	1.46	1871.41	868.23	0.08
1	9909 N	50 YR	1530.00	291.19	302.64	296.01	302.66	0.00	1.53	2023.07	901.35	0.08
1	9909 N	100 YR	1740.00	291.19	303.09	296.19	303.10	0.00	1.61	2163.29	941.58	0.09

HEC-RAS Plan: Corral_Ultimate River: Corral Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	9909 N	250 YR	2070.00	291.19	303.66	296.47	303.68	0.00	1.74	2343.27	987.10	0.09
1	9909 N	500 YR	2340.00	291.19	304.08	296.67	304.10	0.00	1.85	2474.69	1014.62	0.09

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	716 A	2YR	2980.00	269.00	280.04	279.75	280.46	0.00	6.67	945.74	2122.48	0.47
1	716 A	5YR	3580.00	269.00	280.34	279.95	280.75	0.00	6.88	1124.77	2275.15	0.47
1	716 A	10YR	4100.00	269.00	280.55	280.07	280.95	0.00	7.02	1255.17	2286.53	0.47
1	716 A	25YR	4840.00	269.00	280.82	280.38	281.22	0.00	7.21	1426.62	2300.16	0.48
1	716 A	50YR	5380.00	269.00	281.01	280.51	281.40	0.00	7.33	1544.16	2319.43	0.48
1	716 A	100YR	5970.00	269.00	281.20	280.62	281.60	0.00	7.46	1669.13	2341.64	0.48
1	716 A	250YR	6890.00	269.00	281.48	280.80	281.88	0.00	7.64	1854.75	2392.79	0.48
1	716 A	500YR	7890.00	269.00	281.76	280.97	282.17	0.00	7.82	2048.51	2448.63	0.48
1	926	2YR	2980.00	269.14	280.60	276.43	281.13	0.00	6.16	737.27	962.14	0.38
1	926	5YR	3580.00	269.14	280.89	277.19	281.50	0.00	6.82	877.32	1142.23	0.42
1	926	10YR	4100.00	269.14	281.09	277.83	281.76	0.00	7.26	985.31	1222.99	0.44
1	926	25YR	4840.00	269.14	281.36	278.65	282.08	0.00	7.78	1131.30	1368.61	0.46
1	926	50YR	5380.00	269.14	281.54	279.20	282.30	0.00	8.14	1233.44	1457.10	0.48
1	926	100YR	5970.00	269.14	281.73	281.37	282.52	0.00	8.47	1352.29	1607.67	0.50
1	926	250YR	6890.00	269.14	282.00	281.77	282.82	0.00	8.85	1552.31	1771.45	0.51
1	926	500YR	7890.00	269.14	282.29	281.96	283.15	0.00	9.31	1784.30	1949.40	0.53
1	1028	2YR	2980.00	269.12	280.86	278.28	281.44	0.00	6.55	689.58	585.85	0.45
1	1028	5YR	3580.00	269.12	281.24	279.02	281.83	0.00	6.86	838.31	662.48	0.46
1	1028	10YR	4100.00	269.12	281.47	279.63	282.11	0.00	7.25	935.59	716.18	0.48
1	1028	25YR	4840.00	269.12	281.74	281.16	282.47	0.00	7.92	1059.23	877.10	0.52
1	1028	50YR	5380.00	269.12	281.94	281.38	282.72	0.00	8.29	1173.42	992.85	0.53
1	1028	100YR	5970.00	269.12	282.17	281.58	282.94	0.00	8.47	1322.81	1144.03	0.54
1	1028	250YR	6890.00	269.12	282.45	281.81	283.26	0.00	8.88	1550.45	1447.64	0.55
1	1028	500YR	7890.00	269.12	282.87	282.56	283.56	0.00	8.62	1980.67	1925.11	0.52
1	1164	2YR	2980.00	270.44	281.49	277.67	281.86	0.00	4.87	612.05	165.06	0.34
1	1164	5YR	3580.00	270.44	281.79	278.19	282.27	0.00	5.58	641.53	260.27	0.39
1	1164	10YR	4100.00	270.44	281.99	278.59	282.59	0.00	6.20	661.67	377.91	0.43
1	1164	25YR	4840.00	270.44	282.28	279.13	283.04	0.00	7.00	698.82	649.58	0.48
1	1164	50YR	5380.00	270.44	282.50	279.52	283.37	0.00	7.51	747.84	836.73	0.50
1	1164	100YR	5970.00	270.44	282.69	279.91	283.69	0.00	8.05	794.42	905.19	0.53
1	1164	250YR	6890.00	270.44	282.96	280.49	284.15	0.01	8.87	867.72	1069.01	0.58
1	1164	500YR	7890.00	270.44	283.20	281.07	284.63	0.01	9.73	979.18	1412.50	0.62
1	1235 US Highway 67		Bridge									
1	1350 B	2YR	2980.00	268.32	282.23	276.76	282.47	0.00	3.92	761.61	604.74	0.25
1	1350 B	5YR	3580.00	268.32	282.95	277.27	283.21	0.00	4.15	990.90	1162.96	0.26
1	1350 B	10YR	4100.00	268.32	283.62	277.69	283.84	0.00	4.04	1358.65	1457.14	0.24
1	1350 B	25YR	4840.00	268.32	284.35	278.24	284.53	0.00	3.90	1810.07	1590.20	0.23
1	1350 B	50YR	5380.00	268.32	284.62	278.63	284.81	0.00	4.03	1998.60	1730.87	0.23
1	1350 B	100YR	5970.00	268.32	284.83	279.02	285.04	0.00	4.23	2164.09	1797.24	0.24
1	1350 B	250YR	6890.00	268.32	285.11	279.60	285.34	0.00	4.51	2396.03	1985.99	0.25
1	1350 B	500YR	7890.00	268.32	285.35	280.21	285.60	0.00	4.83	2598.09	2174.33	0.26
1	1396	2YR	2980.00	269.50	282.37	278.97	282.54	0.00	3.86	1074.96	749.04	0.24
1	1396	5YR	3580.00	269.50	283.22	279.55	283.30	0.00	3.04	1897.46	1185.92	0.18
1	1396	10YR	4100.00	269.50	283.84	280.05	283.92	0.00	3.01	2259.91	1459.70	0.17
1	1396	25YR	4840.00	269.50	284.53	280.69	284.60	0.00	3.05	2686.76	1580.25	0.17
1	1396	50YR	5380.00	269.50	284.80	280.69	284.88	0.00	3.18	2875.69	1722.67	0.18
1	1396	100YR	5970.00	269.50	285.02	280.70	285.11	0.00	3.35	3052.48	1793.75	0.18
1	1396	250YR	6890.00	269.50	285.32	280.70	285.42	0.00	3.60	3299.63	2006.19	0.19
1	1396	500YR	7890.00	269.50	285.57	280.70	285.68	0.00	3.90	3522.87	2154.10	0.21
1	1521	2YR	2980.00	270.00	282.57	276.04	282.60	0.00	1.85	2264.18	547.17	0.11
1	1521	5YR	3580.00	270.00	283.31	276.29	283.35	0.00	1.99	2604.65	744.91	0.11
1	1521	10YR	4100.00	270.00	283.93	276.49	283.97	0.00	2.08	2946.59	1226.89	0.12
1	1521	25YR	4840.00	270.00	284.61	276.76	284.65	0.00	2.19	3467.23	1418.67	0.12
1	1521	50YR	5380.00	270.00	284.88	276.91	284.93	0.00	2.32	3687.82	1470.47	0.12
1	1521	100YR	5970.00	270.00	285.11	277.10	285.16	0.00	2.47	3879.68	1496.38	0.13
1	1521	250YR	6890.00	270.00	285.42	277.54	285.48	0.00	2.69	4141.44	1541.29	0.14
1	1521	500YR	7890.00	270.00	285.69	277.79	285.76	0.00	2.95	4378.43	1632.47	0.15
1	1658	2YR	2980.00	270.04	282.51	278.14	282.71	0.00	4.08	1086.37	282.39	0.25
1	1658	5YR	3580.00	270.04	283.24	278.91	283.47	0.00	4.40	1266.94	587.85	0.26
1	1658	10YR	4100.00	270.04	283.86	279.28	284.08	0.00	4.47	1457.68	758.56	0.25
1	1658	25YR	4840.00	270.04	284.54	279.76	284.77	0.00	4.65	1728.19	1124.59	0.25
1	1658	50YR	5380.00	270.04	284.81	280.09	285.06	0.00	4.88	1870.17	1178.92	0.26
1	1658	100YR	5970.00	270.04	285.03	280.43	285.30	0.00	5.16	1988.72	1239.01	0.27
1	1658	250YR	6890.00	270.04	285.33	280.85	285.64	0.00	5.58	2150.53	1311.39	0.29
1	1658	500YR	7890.00	270.04	285.58	280.85	285.94	0.00	6.04	2287.73	1339.89	0.31
1	2184	2YR	2980.00	271.67	282.94	277.89	283.17	0.00	4.26	953.29	807.60	0.26
1	2184	5YR	3580.00	271.67	283.67	278.77	283.94	0.00	4.59	1113.21	997.82	0.26
1	2184	10YR	4100.00	271.67	284.28	279.34	284.39	0.00	3.35	2431.78	1173.12	0.19
1	2184	25YR	4840.00	271.67	284.95	279.99	285.05	0.00	3.36	2841.66	1275.45	0.18
1	2184	50YR	5380.00	271.67	285.25	280.39	285.35	0.00	3.50	3021.21	1328.95	0.19
1	2184	100YR	5970.00	271.67	285.51	280.72	285.62	0.00	3.67	3180.53	1356.34	0.19
1	2184	250YR	6890.00	271.67	285.86	281.56	285.98	0.00	3.94	3396.89	1407.01	0.20
1	2184	500YR	7890.00	271.67	286.18	282.03	286.32	0.00	4.23	3593.96	1452.61	0.22
1	2245 Railroad		Bridge									
1	2273	2YR	2980.00	272.12	283.32	278.33	283.56	0.00	4.30	1027.98	1033.97	0.26
1	2273	5YR	3580.00	272.12	284.20	279.18	284.43	0.00	4.30	1428.39	1616.89	0.25
1	2273	10YR	4100.00	272.12	285.03	279.88	285.23	0.00	4.26	1710.45	2007.31	0.23

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2273	25YR	4840.00	272.12	285.72	280.59	285.80	0.00	3.17	3626.75	2212.96	0.17
1	2273	50YR	5380.00	272.12	286.06	280.99	286.14	0.00	3.30	3859.43	2281.78	0.17
1	2273	100YR	5970.00	272.12	286.34	281.36	286.43	0.00	3.48	4053.84	2351.15	0.18
1	2273	250YR	6890.00	272.12	286.71	281.87	286.81	0.00	3.76	4310.28	2704.13	0.19
1	2273	500YR	7890.00	272.12	287.04	282.35	287.15	0.00	4.07	4538.61	2935.61	0.20
1	2395 C	2YR	2980.00	272.99	283.46	282.13	284.09	0.00	6.96	778.66	576.45	0.50
1	2395 C	5YR	3580.00	272.99	284.41	282.88	284.86	0.00	6.31	1196.49	724.98	0.42
1	2395 C	10YR	4100.00	272.99	285.25	283.34	285.58	0.00	5.73	1626.20	1161.09	0.36
1	2395 C	25YR	4840.00	272.99	285.82	283.74	286.14	0.00	5.83	1939.23	1543.16	0.35
1	2395 C	50YR	5380.00	272.99	286.17	283.99	286.49	0.00	5.96	2150.25	1760.61	0.35
1	2395 C	100YR	5970.00	272.99	286.46	284.32	286.81	0.00	6.23	2345.09	1937.30	0.36
1	2395 C	250YR	6890.00	272.99	286.85	284.64	287.25	0.00	6.77	2618.34	2172.23	0.39
1	2395 C	500YR	7890.00	272.99	287.21	285.07	287.63	0.00	7.06	2884.52	2303.29	0.40
1	2916	2YR	2830.00	274.69	285.14	282.33	285.39	0.00	4.81	1478.35	815.12	0.31
1	2916	5YR	3490.00	274.69	285.69	283.24	285.93	0.00	4.97	1972.02	969.01	0.31
1	2916	10YR	4060.00	274.69	286.22	283.77	286.42	0.00	4.79	2497.31	1008.50	0.29
1	2916	25YR	4730.00	274.69	286.73	284.61	286.90	0.00	4.67	3020.71	1030.70	0.27
1	2916	50YR	5170.00	274.69	287.06	284.65	287.22	0.00	4.59	3365.32	1081.94	0.26
1	2916	100YR	5690.00	274.69	287.39	285.09	287.54	0.00	4.62	3724.88	1215.44	0.26
1	2916	250YR	6740.00	274.69	287.86	285.49	288.01	0.00	4.77	4288.17	1340.64	0.26
1	2916	500YR	7650.00	274.69	288.26	285.62	288.40	0.00	4.87	4787.80	1466.66	0.26
1	3187	2YR	2830.00	273.33	285.50	280.94	285.84	0.00	5.18	1166.68	549.07	0.31
1	3187	5YR	3490.00	273.33	286.04	281.94	286.39	0.00	5.54	1475.11	618.51	0.32
1	3187	10YR	4060.00	273.33	286.51	282.70	286.85	0.00	5.63	1774.91	672.07	0.32
1	3187	25YR	4730.00	273.33	286.98	284.30	287.31	0.00	5.76	2082.94	715.99	0.32
1	3187	50YR	5170.00	273.33	287.29	285.34	287.61	0.00	5.80	2289.67	736.48	0.31
1	3187	100YR	5690.00	273.33	287.61	285.54	287.92	0.00	5.89	2507.38	754.88	0.31
1	3187	250YR	6740.00	273.33	288.08	285.92	288.41	0.00	6.22	2837.48	797.69	0.32
1	3187	500YR	7650.00	273.33	288.47	286.33	288.80	0.00	6.39	3254.86	893.89	0.33
1	3779	2YR	2830.00	272.46	286.34	280.50	286.56	0.00	4.31	1480.92	609.36	0.25
1	3779	5YR	3490.00	272.46	286.92	281.51	287.14	0.00	4.54	1848.78	652.39	0.25
1	3779	10YR	4060.00	272.46	287.36	282.48	287.59	0.00	4.68	2145.59	672.31	0.25
1	3779	25YR	4730.00	272.46	287.82	283.12	288.05	0.00	4.86	2457.99	692.32	0.26
1	3779	50YR	5170.00	272.46	288.11	283.92	288.34	0.00	4.95	2660.93	704.58	0.26
1	3779	100YR	5690.00	272.46	288.42	285.70	288.65	0.00	5.07	2882.25	753.67	0.26
1	3779	250YR	6740.00	272.46	288.94	286.13	289.18	0.00	5.37	3273.67	891.81	0.27
1	3779	500YR	7650.00	272.46	289.34	286.58	289.59	0.00	5.59	3586.34	1119.71	0.28
1	4361	2YR	2830.00	274.30	286.85		287.02	0.00	3.33	990.91	451.94	0.21
1	4361	5YR	3490.00	274.30	287.44		287.64	0.00	3.70	1314.82	593.31	0.22
1	4361	10YR	4060.00	274.30	287.88		288.10	0.00	3.94	1588.77	635.66	0.23
1	4361	25YR	4730.00	274.30	288.35		288.59	0.00	4.18	1894.27	677.94	0.24
1	4361	50YR	5170.00	274.30	288.64		288.88	0.00	4.31	2093.62	689.51	0.24
1	4361	100YR	5690.00	274.30	288.95		289.21	0.00	4.44	2312.69	696.17	0.25
1	4361	250YR	6740.00	274.30	289.50		289.77	0.00	4.74	2694.52	718.43	0.26
1	4361	500YR	7650.00	274.30	289.91		290.20	0.00	4.97	2999.15	763.73	0.26
1	4640	2YR	2830.00	275.48	286.96	282.52	287.40	0.00	5.36	570.64	162.79	0.33
1	4640	5YR	3490.00	275.48	287.53	283.19	288.08	0.00	6.06	719.64	317.03	0.36
1	4640	10YR	4060.00	275.48	287.96	283.70	288.59	0.00	6.53	859.22	345.83	0.38
1	4640	25YR	4730.00	275.48	288.41	284.27	289.10	0.00	7.00	1019.79	377.73	0.40
1	4640	50YR	5170.00	275.48	288.69	284.61	289.42	0.00	7.25	1129.28	395.76	0.41
1	4640	100YR	5690.00	275.48	289.00	285.04	289.76	0.00	7.51	1252.93	411.75	0.42
1	4640	250YR	6740.00	275.48	289.53	285.84	290.36	0.00	8.05	1483.76	455.68	0.43
1	4640	500YR	7650.00	275.48	289.94	286.60	290.83	0.00	8.46	1678.73	493.83	0.45
1	4803	2YR	2830.00	277.00	287.19	285.65	288.10	0.01	7.63	370.96	83.28	0.64
1	4803	5YR	3490.00	277.00	287.81	286.33	288.86	0.01	8.22	425.76	103.12	0.66
1	4803	10YR	4060.00	277.00	288.24	286.87	289.43	0.01	8.75	478.33	143.12	0.68
1	4803	25YR	4730.00	277.00	288.67	287.43	290.01	0.01	9.34	550.65	201.58	0.70
1	4803	50YR	5170.00	277.00	288.93	287.77	290.36	0.01	9.67	619.86	300.75	0.71
1	4803	100YR	5690.00	277.00	289.23	288.20	290.72	0.01	9.94	719.81	354.11	0.71
1	4803	250YR	6740.00	277.00	289.82	289.42	291.32	0.01	10.25	965.04	448.97	0.70
1	4803	500YR	7650.00	277.00	290.30	290.03	291.75	0.01	10.33	1196.49	509.97	0.68
1	4887	2YR	2830.00	276.10	288.23	281.65	288.45	0.00	3.76	777.68	179.60	0.22
1	4887	5YR	3490.00	276.10	288.98	282.28	289.26	0.00	4.26	863.33	246.38	0.24
1	4887	10YR	4060.00	276.10	289.53	282.78	289.86	0.00	4.67	925.94	306.49	0.26
1	4887	25YR	4730.00	276.10	290.14	283.34	290.49	0.00	4.89	1313.39	354.74	0.26
1	4887	50YR	5170.00	276.10	290.49	283.70	290.86	0.00	5.09	1443.15	407.00	0.27
1	4887	100YR	5690.00	276.10	290.83	284.09	291.24	0.00	5.37	1591.57	456.41	0.28
1	4887	250YR	6740.00	276.10	291.38	284.84	291.85	0.00	5.86	1859.42	521.76	0.30
1	4887	500YR	7650.00	276.10	291.72	285.44	292.26	0.00	6.33	2053.44	603.14	0.32
1	4940 West 15th St.		Bridge									
1	4988 D	2YR	2830.00	277.29	288.42	282.82	288.67	0.00	4.07	733.06	196.97	0.25
1	4988 D	5YR	3490.00	277.29	289.24	283.45	289.54	0.00	4.48	840.72	270.63	0.26
1	4988 D	10YR	4060.00	277.29	290.58	283.95	290.80	0.00	4.03	1390.81	422.85	0.22
1	4988 D	25YR	4730.00	277.29	290.75	284.49	291.02	0.00	4.54	1463.43	465.20	0.25
1	4988 D	50YR	5170.00	277.29	291.07	284.83	291.36	0.00	4.68	1626.59	550.27	0.25
1	4988 D	100YR	5690.00	277.29	291.38	285.22	291.70	0.00	4.94	1812.90	612.32	0.26
1	4988 D	250YR	6740.00	277.29	291.85	285.96	292.20	0.00	5.31	2112.05	696.39	0.27
1	4988 D	500YR	7650.00	277.29	292.13	286.54	292.51	0.00	5.65	2305.41	708.15	0.29

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5043	2YR	2830.00	277.01	288.40	285.69	288.87	0.00	5.81	614.15	265.05	0.42
1	5043	5YR	3490.00	277.01	289.28	286.45	289.66	0.00	5.53	833.32	314.97	0.37
1	5043	10YR	4060.00	277.01	290.63	287.88	290.86	0.00	4.49	1370.19	507.53	0.2
1	5043	25YR	4730.00	277.01	290.81	288.37	291.09	0.00	5.11	1465.49	567.48	0.31
1	5043	50YR	5170.00	277.01	291.13	288.57	291.42	0.00	5.17	1668.47	648.84	0.31
1	5043	100YR	5690.00	277.01	291.50	288.79	291.77	0.00	5.11	1919.76	710.82	0.30
1	5043	250YR	6740.00	277.01	292.02	289.18	292.29	0.00	5.18	2297.32	730.51	0.29
1	5043	500YR	7650.00	277.01	292.33	289.49	292.61	0.00	5.40	2522.00	743.63	0.30
1	5369	2YR	2830.00	277.44	289.32		289.71	0.00	5.11	687.98	363.86	0.35
1	5369	5YR	3490.00	277.44	289.99		290.36	0.00	5.17	958.01	437.43	0.34
1	5369	10YR	4060.00	277.44	291.02		291.25	0.00	4.41	1497.90	622.92	0.27
1	5369	25YR	4730.00	277.44	291.30		291.55	0.00	4.70	1678.58	654.87	0.29
1	5369	50YR	5170.00	277.44	291.62		291.86	0.00	4.63	1894.20	670.84	0.28
1	5369	100YR	5690.00	277.44	291.96		292.18	0.00	4.60	2119.55	692.39	0.27
1	5369	250YR	6740.00	277.44	292.46		292.69	0.00	4.80	2487.44	756.47	0.27
1	5369	500YR	7650.00	277.44	292.78		293.02	0.00	4.96	2736.91	776.34	0.28
1	5649	2YR	2780.00	277.70	289.85		290.13	0.00	4.32	812.43	302.89	0.26
1	5649	5YR	3480.00	277.70	290.45		290.78	0.00	4.79	1023.33	376.46	0.28
1	5649	10YR	4040.00	277.70	291.28		291.56	0.00	4.64	1351.22	418.53	0.26
1	5649	25YR	4650.00	277.70	291.59		291.90	0.00	4.98	1488.47	488.18	0.27
1	5649	50YR	5110.00	277.70	291.88		292.21	0.00	5.15	1639.39	531.12	0.28
1	5649	100YR	5620.00	277.70	292.20		292.52	0.00	5.27	1811.38	563.36	0.28
1	5649	250YR	6690.00	277.70	292.70		293.05	0.00	5.60	2105.43	605.56	0.29
1	5649	500YR	7580.00	277.70	293.03		293.40	0.00	5.89	2308.99	632.74	0.30
1	6145 E	2YR	2780.00	278.67	290.54	287.11	291.00	0.00	5.50	569.29	299.41	0.41
1	6145 E	5YR	3480.00	278.67	291.23	287.85	291.69	0.00	5.70	811.77	404.21	0.41
1	6145 E	10YR	4040.00	278.67	291.92	288.38	292.29	0.00	5.33	1196.38	667.15	0.36
1	6145 E	25YR	4650.00	278.67	292.29	288.91	292.65	0.00	5.44	1435.92	804.08	0.36
1	6145 E	50YR	5110.00	278.67	292.60	289.29	292.93	0.00	5.39	1641.01	821.02	0.35
1	6145 E	100YR	5620.00	278.67	292.91	289.67	293.23	0.00	5.35	1851.02	836.29	0.34
1	6145 E	250YR	6690.00	278.67	293.46	291.70	293.76	0.00	5.43	2224.49	873.41	0.33
1	6145 E	500YR	7580.00	278.67	293.83	291.90	294.13	0.00	5.55	2488.57	900.39	0.33
1	6465	2YR	2620.00	279.13	291.45	288.21	292.07	0.00	6.30	415.95	65.62	0.44
1	6465	5YR	3320.00	279.13	292.10	289.02	292.91	0.00	7.24	458.88	134.66	0.49
1	6465	10YR	3820.00	279.13	292.50	289.54	293.46	0.00	7.85	486.79	251.20	0.52
1	6465	25YR	4370.00	279.13	292.76	290.07	293.92	0.01	8.65	505.04	291.20	0.57
1	6465	50YR	4840.00	279.13	292.91	290.50	294.28	0.01	9.38	516.03	322.55	0.61
1	6465	100YR	5450.00	279.13	293.02	291.04	294.70	0.01	10.41	523.67	335.09	0.66
1	6465	250YR	6520.00	279.13	293.17	291.92	295.48	0.01	12.21	534.15	355.83	0.79
1	6465	500YR	7390.00	279.13	293.13	292.57	296.13	0.01	13.91	531.44	351.97	0.90
1	6576	2YR	2620.00	279.79	291.92	288.46	292.55	0.01	6.36	411.69	66.42	0.45
1	6576	5YR	3320.00	279.79	292.70	289.37	293.49	0.01	7.14	465.19	71.87	0.49
1	6576	10YR	3820.00	279.79	293.21	289.94	294.11	0.01	7.59	503.32	75.52	0.52
1	6576	25YR	4370.00	279.79	293.67	290.50	294.69	0.01	8.12	538.27	78.72	0.55
1	6576	50YR	4840.00	279.79	294.04	290.98	295.16	0.01	8.53	567.73	81.31	0.57
1	6576	100YR	5450.00	279.79	294.50	291.53	295.76	0.01	8.99	606.39	86.94	0.59
1	6576	250YR	6520.00	279.79	295.44	292.54	296.80	0.01	9.41	732.50	718.14	0.58
1	6576	500YR	7390.00	279.79	296.63	293.23	297.65	0.01	8.53	1119.39	1203.92	0.49
1	6655 US Highway 82		Bridge									
1	6704 F	2YR	2620.00	280.93	292.72	287.92	293.05	0.00	4.62	576.74	95.11	0.30
1	6704 F	5YR	3320.00	280.93	293.88	288.68	294.26	0.00	5.01	687.77	121.53	0.30
1	6704 F	10YR	3820.00	280.93	295.01	289.16	295.40	0.00	5.03	796.58	161.77	0.28
1	6704 F	25YR	4370.00	280.93	296.00	289.65	296.40	0.00	5.17	890.96	463.33	0.28
1	6704 F	50YR	4840.00	280.93	296.99	290.04	297.32	0.00	4.87	1267.09	765.68	0.25
1	6704 F	100YR	5450.00	280.93	298.19	290.53	298.48	0.00	4.67	1537.00	1206.69	0.23
1	6704 F	250YR	6520.00	280.93	299.89	291.39	300.15	0.00	4.55	1920.75	1614.75	0.21
1	6704 F	500YR	7390.00	280.93	301.31	291.96	301.33	0.00	2.09	7756.87	1708.53	0.09
1	6771	2YR	2620.00	281.00	292.47	290.84	293.66	0.01	8.85	332.29	173.89	0.62
1	6771	5YR	3320.00	281.00	293.74	291.75	294.72	0.00	8.43	557.56	251.60	0.54
1	6771	10YR	3820.00	281.00	294.99	293.11	295.66	0.00	7.32	795.15	394.02	0.43
1	6771	25YR	4370.00	281.00	296.03	293.60	296.57	0.00	6.82	992.91	514.90	0.38
1	6771	50YR	4840.00	281.00	297.06	293.96	297.39	0.00	5.72	1434.97	655.00	0.30
1	6771	100YR	5450.00	281.00	298.27	294.41	298.54	0.00	5.30	1730.45	860.45	0.27
1	6771	250YR	6520.00	281.00	299.97	294.94	300.21	0.00	5.03	2147.32	1373.74	0.24
1	6771	500YR	7390.00	281.00	301.31	295.33	301.34	0.00	2.40	6988.28	1680.99	0.11
1	6920	2YR	2620.00	280.77	293.81	288.64	294.17	0.00	5.15	830.45	359.10	0.30
1	6920	5YR	3320.00	280.77	294.82	289.67	295.13	0.00	5.12	1157.50	381.33	0.29
1	6920	10YR	3820.00	280.77	295.69	290.32	295.95	0.00	4.86	1446.84	413.20	0.26
1	6920	25YR	4370.00	280.77	296.58	291.01	296.80	0.00	4.65	1746.18	493.71	0.24
1	6920	50YR	4840.00	280.77	297.38	292.18	297.55	0.00	4.35	2285.30	572.05	0.22
1	6920	100YR	5450.00	280.77	298.52	293.74	298.66	0.00	4.03	2835.71	739.00	0.1
1	6920	250YR	6520.00	280.77	300.22	294.29	300.29	0.00	3.24	4741.09	1061.42	0.15
1	6920	500YR	7390.00	280.77	301.33	294.64	301.38	0.00	2.86	6050.06	1272.43	0.12
1	7410	2YR	2620.00	282.15	294.68	290.82	295.16	0.00	5.70	611.42	377.74	0.38
1	7410	5YR	3320.00	282.15	295.55	291.79	295.96	0.00	5.57	1129.08	819.66	0.35
1	7410	10YR	3820.00	282.15	296.29	292.43	296.54	0.00	4.83	1775.87	1086.79	0.29
1	7410	25YR	4370.00	282.15	297.09	293.00	297.23	0.00	4.00	2665.31	1305.96	0.23

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	7410	50YR	4840.00	282.15	297.78	293.47	297.86	0.00	3.36	3511.70	1382.98	0.19
1	7410	100YR	5450.00	282.15	298.82	295.63	298.86	0.00	2.64	4826.26	1431.66	0.14
1	7410	250YR	6520.00	282.15	300.37	295.88	300.40	0.00	2.08	6909.59	1541.09	0.10
1	7410	500YR	7390.00	282.15	301.43	296.26	301.45	0.00	1.78	9229.52	1629.83	0.09
1	7816 G	2YR	2530.00	283.67	295.60		295.98	0.00	5.04	614.37	235.49	0.32
1	7816 G	5YR	3330.00	283.67	296.30		296.76	0.00	5.72	856.00	459.54	0.34
1	7816 G	10YR	3780.00	283.67	296.79		297.20	0.00	5.65	1095.76	518.42	0.33
1	7816 G	25YR	4400.00	283.67	297.38		297.73	0.00	5.49	1417.68	573.09	0.31
1	7816 G	50YR	4910.00	283.67	297.95		298.24	0.00	5.21	1766.71	658.58	0.29
1	7816 G	100YR	5590.00	283.67	298.89		299.10	0.00	4.73	2461.18	871.60	0.25
1	7816 G	250YR	6860.00	283.67	300.42		300.52	0.00	3.68	3892.18	990.66	0.18
1	7816 G	500YR	7940.00	283.67	301.46		301.54	0.00	3.29	4974.22	1054.56	0.16
1	8138	2YR	2530.00	285.81	296.24		296.55	0.00	4.78	838.84	529.58	0.34
1	8138	5YR	3330.00	285.81	297.06		297.34	0.00	4.79	1295.92	575.46	0.32
1	8138	10YR	3780.00	285.81	297.46		297.72	0.00	4.78	1532.16	591.07	0.31
1	8138	25YR	4400.00	285.81	297.95		298.20	0.00	4.79	1856.68	724.43	0.30
1	8138	50YR	4910.00	285.81	298.42		298.63	0.00	4.66	2200.15	751.43	0.28
1	8138	100YR	5590.00	285.81	299.23		299.39	0.00	4.27	2824.76	796.12	0.25
1	8138	250YR	6860.00	285.81	300.57		300.69	0.00	3.85	3978.12	936.27	0.21
1	8138	500YR	7940.00	285.81	301.57		301.66	0.00	3.61	4939.66	1023.69	0.19
1	8442	2YR	2530.00	286.00	296.80		297.22	0.00	5.49	756.95	558.21	0.37
1	8442	5YR	3330.00	286.00	297.54		297.92	0.00	5.58	1190.15	602.56	0.35
1	8442	10YR	3780.00	286.00	297.91		298.27	0.00	5.59	1416.90	623.26	0.35
1	8442	25YR	4400.00	286.00	298.37		298.70	0.00	5.63	1711.43	656.06	0.34
1	8442	50YR	4910.00	286.00	298.79		299.08	0.00	5.51	1986.87	668.11	0.32
1	8442	100YR	5590.00	286.00	299.50		299.73	0.00	5.14	2476.13	700.50	0.29
1	8442	250YR	6860.00	286.00	300.76		300.92	0.00	4.63	3408.25	843.17	0.25
1	8442	500YR	7940.00	286.00	301.71		301.85	0.00	4.48	4298.04	1042.85	0.23
1	8783	2YR	2530.00	287.33	297.59		297.98	0.00	5.11	654.26	488.94	0.36
1	8783	5YR	3330.00	287.33	298.24		298.65	0.00	5.52	1056.50	689.87	0.37
1	8783	10YR	3780.00	287.33	298.57		298.97	0.00	5.62	1306.88	796.63	0.37
1	8783	25YR	4400.00	287.33	298.99		299.36	0.00	5.63	1647.76	837.12	0.36
1	8783	50YR	4910.00	287.33	299.34		299.68	0.00	5.54	1949.21	855.42	0.34
1	8783	100YR	5590.00	287.33	299.94		300.22	0.00	5.27	2501.35	984.63	0.31
1	8783	250YR	6860.00	287.33	301.07		301.24	0.00	4.57	3634.23	1032.47	0.26
1	8783	500YR	7940.00	287.33	301.97		302.10	0.00	4.22	4608.50	1120.32	0.23
1	8858	2YR	2530.00	287.87	297.70	294.48	298.23	0.00	5.95	557.64	349.29	0.40
1	8858	5YR	3330.00	287.87	298.34	295.42	298.93	0.00	6.58	887.53	658.60	0.43
1	8858	10YR	3780.00	287.87	298.66	295.93	299.25	0.00	6.71	1111.50	698.73	0.43
1	8858	25YR	4400.00	287.87	299.08	296.59	299.62	0.00	6.73	1407.93	726.85	0.42
1	8858	50YR	4910.00	287.87	299.43	297.12	299.92	0.00	6.68	1665.36	766.19	0.40
1	8858	100YR	5590.00	287.87	300.01	298.87	300.41	0.00	6.34	2158.27	927.61	0.37
1	8858	250YR	6860.00	287.87	301.11	299.28	301.36	0.00	5.51	3192.53	1243.35	0.30
1	8858	500YR	7940.00	287.87	302.02	299.53	302.18	0.00	4.92	4561.91	1360.24	0.26
1	8908 Rucker St.		Bridge									
1	8952	2YR	2530.00	288.17	298.33	294.76	298.75	0.00	5.44	683.22	426.39	0.36
1	8952	5YR	3330.00	288.17	298.76	295.72	299.30	0.00	6.35	899.40	582.64	0.41
1	8952	10YR	3780.00	288.17	298.92	296.23	299.54	0.00	6.83	996.12	613.31	0.43
1	8952	25YR	4400.00	288.17	299.16	296.88	299.84	0.00	7.34	1150.72	670.82	0.46
1	8952	50YR	4910.00	288.17	299.41	297.27	300.07	0.00	7.47	1320.68	722.35	0.46
1	8952	100YR	5590.00	288.17	299.96	299.19	300.47	0.00	6.97	1738.34	774.04	0.42
1	8952	250YR	6860.00	288.17	301.14	299.66	301.42	0.00	5.76	2692.20	847.03	0.32
1	8952	500YR	7940.00	288.17	302.02	299.89	302.24	0.00	5.36	3519.04	1021.64	0.29
1	8999 H	2YR	2530.00	288.52	298.31	296.61	299.07	0.00	7.24	504.98	409.58	0.53
1	8999 H	5YR	3330.00	288.52	298.77	297.41	299.65	0.01	8.14	723.26	542.99	0.57
1	8999 H	10YR	3780.00	288.52	298.96	297.77	299.89	0.01	8.56	829.59	580.83	0.59
1	8999 H	25YR	4400.00	288.52	299.23	297.89	300.17	0.01	8.88	998.61	648.57	0.60
1	8999 H	50YR	4910.00	288.52	299.50	297.89	300.36	0.01	8.82	1177.51	670.38	0.58
1	8999 H	100YR	5590.00	288.52	300.06		300.68	0.00	7.99	1581.48	765.27	0.51
1	8999 H	250YR	6860.00	288.52	301.21		301.52	0.00	6.35	2505.40	849.06	0.38
1	8999 H	500YR	7940.00	288.52	302.09		302.30	0.00	5.58	3279.54	930.82	0.32
1	9251	2YR	2530.00	289.64	299.46		299.82	0.00	5.37	867.07	518.44	0.34
1	9251	5YR	3330.00	289.64	300.10		300.44	0.00	5.57	1219.71	566.02	0.34
1	9251	10YR	3780.00	289.64	300.37		300.71	0.00	5.74	1374.11	587.86	0.35
1	9251	25YR	4400.00	289.64	300.66		301.02	0.00	6.04	1552.00	623.41	0.36
1	9251	50YR	4910.00	289.64	300.84		301.22	0.00	6.38	1664.18	659.10	0.37
1	9251	100YR	5590.00	289.64	301.04		301.47	0.00	6.87	1796.91	676.12	0.40
1	9251	250YR	6860.00	289.64	301.70		302.09	0.00	6.93	2275.45	770.90	0.39
1	9251	500YR	7940.00	289.64	302.42		302.73	0.00	6.47	2869.21	853.24	0.35
1	9463	2YR	2530.00	290.00	299.87		300.21	0.00	4.80	685.11	376.82	0.33
1	9463	5YR	3330.00	290.00	300.46		300.86	0.00	5.40	958.31	581.76	0.35
1	9463	10YR	3780.00	290.00	300.73		301.14	0.00	5.64	1124.25	645.50	0.36
1	9463	25YR	4400.00	290.00	301.04		301.47	0.00	5.92	1333.71	680.96	0.37
1	9463	50YR	4910.00	290.00	301.26		301.70	0.00	6.13	1485.14	736.73	0.38
1	9463	100YR	5590.00	290.00	301.52		301.98	0.00	6.38	1688.18	808.89	0.39
1	9463	250YR	6860.00	290.00	302.14		302.57	0.00	6.52	2228.57	927.43	0.39
1	9463	500YR	7940.00	290.00	302.78		303.11	0.00	6.06	2832.45	974.11	0.35

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	9503	2YR	2530.00	286.89	299.97	293.85	300.27	0.00	4.62	865.67	454.38	0.25
1	9503	5YR	3330.00	286.89	300.54	294.89	300.92	0.00	5.42	1161.15	600.18	0.28
1	9503	10YR	3780.00	286.89	300.80	295.45	301.20	0.00	5.74	1321.09	657.37	0.30
1	9503	25YR	4400.00	286.89	301.11	296.11	301.54	0.00	6.12	1523.90	718.92	0.3
1	9503	50YR	4910.00	286.89	301.32	296.60	301.78	0.00	6.40	1666.50	751.20	0.32
1	9503	100YR	5590.00	286.89	301.58	297.24	302.06	0.00	6.75	1841.51	804.30	0.34
1	9503	250YR	6860.00	286.89	302.20	299.72	302.65	0.00	6.90	2276.19	867.78	0.34
1	9503	500YR	7940.00	286.89	302.81	301.26	303.20	0.00	6.77	2706.48	980.49	0.32
1	9544 Martine St.		Culvert									
1	9592	2YR	2530.00	289.53	300.79	295.57	301.02	0.00	4.20	978.24	529.80	0.25
1	9592	5YR	3330.00	289.53	301.11	296.53	301.41	0.00	4.97	1151.02	562.80	0.29
1	9592	10YR	3780.00	289.53	301.25	297.02	301.60	0.00	5.38	1232.72	595.84	0.31
1	9592	25YR	4400.00	289.53	301.40	297.65	301.82	0.00	6.01	1325.84	617.97	0.35
1	9592	50YR	4910.00	289.53	301.53	298.17	302.00	0.00	6.42	1407.39	631.94	0.37
1	9592	100YR	5590.00	289.53	301.70	300.65	302.23	0.00	6.97	1512.67	684.69	0.40
1	9592	250YR	6860.00	289.53	302.22	301.24	302.73	0.00	7.14	1878.23	779.35	0.40
1	9592	500YR	7940.00	289.53	302.84	301.55	303.25	0.00	6.73	2326.94	892.38	0.36
1	9613 I	2YR	2530.00	290.98	300.79	297.02	301.07	0.00	4.75	911.34	467.65	0.29
1	9613 I	5YR	3330.00	290.98	301.11	297.86	301.48	0.00	5.63	1068.71	514.04	0.34
1	9613 I	10YR	3780.00	290.98	301.26	298.28	301.68	0.00	6.07	1143.20	522.24	0.37
1	9613 I	25YR	4400.00	290.98	301.42	298.59	301.92	0.00	6.70	1229.96	562.07	0.40
1	9613 I	50YR	4910.00	290.98	301.56	300.52	302.10	0.00	7.12	1305.58	569.55	0.42
1	9613 I	100YR	5590.00	290.98	301.73	300.93	302.34	0.00	7.63	1407.26	581.81	0.45
1	9613 I	250YR	6860.00	290.98	302.20	301.52	302.90	0.00	8.47	1712.95	755.84	0.48
1	9613 I	500YR	7940.00	290.98	302.84	301.81	303.37	0.00	7.85	2250.06	865.30	0.43
1	9832	2YR	2420.00	291.51	301.16		301.43	0.00	4.70	812.35	392.73	0.30
1	9832	5YR	3170.00	291.51	301.62		301.94	0.00	5.23	996.43	400.97	0.32
1	9832	10YR	3570.00	291.51	301.84		302.17	0.00	5.48	1084.22	407.41	0.33
1	9832	25YR	4110.00	291.51	302.12		302.48	0.00	5.78	1201.58	423.67	0.34
1	9832	50YR	4620.00	291.51	302.33		302.72	0.00	6.12	1292.41	478.11	0.36
1	9832	100YR	5450.00	291.51	302.56		303.06	0.00	7.01	1418.07	604.22	0.41
1	9832	250YR	6820.00	291.51	303.21		303.66	0.00	7.06	1866.14	725.14	0.40
1	9832	500YR	8060.00	291.51	303.57		304.06	0.00	7.47	2151.56	817.61	0.41
1	10296 J	2YR	2420.00	291.72	301.92		302.19	0.00	4.70	801.13	534.11	0.29
1	10296 J	5YR	3170.00	291.72	302.49		302.75	0.00	4.89	1137.90	641.65	0.29
1	10296 J	10YR	3570.00	291.72	302.75		303.00	0.00	4.93	1311.09	672.16	0.29
1	10296 J	25YR	4110.00	291.72	303.08		303.32	0.00	4.98	1541.45	713.77	0.29
1	10296 J	50YR	4620.00	291.72	303.36		303.59	0.00	5.01	1739.01	724.44	0.29
1	10296 J	100YR	5450.00	291.72	303.79		304.00	0.00	5.03	2059.24	748.96	0.28
1	10296 J	250YR	6820.00	291.72	304.36		304.57	0.00	5.21	2493.94	792.43	0.28
1	10296 J	500YR	8060.00	291.72	304.80		305.02	0.00	5.53	2864.13	918.22	0.29
1	10780	2YR	2130.00	292.53	302.62	297.81	302.88	0.00	4.42	625.80	297.53	0.26
1	10780	5YR	2760.00	292.53	303.20	298.76	303.56	0.00	5.33	799.10	533.14	0.30
1	10780	10YR	3160.00	292.53	303.46	299.25	303.86	0.00	5.71	932.96	731.82	0.32
1	10780	25YR	3670.00	292.53	303.78	299.84	304.20	0.00	6.06	1140.48	914.91	0.33
1	10780	50YR	4120.00	292.53	304.04	300.33	304.48	0.00	6.33	1348.30	1034.80	0.34
1	10780	100YR	4770.00	292.53	304.45	300.97	304.77	0.00	5.87	2005.09	1201.71	0.31
1	10780	250YR	5890.00	292.53	305.02	302.23	305.27	0.00	5.61	2700.51	1238.95	0.29
1	10780	500YR	6770.00	292.53	305.49	302.97	305.68	0.00	5.29	3283.18	1261.66	0.27
1	10810	2YR	2130.00	293.69	302.51	299.74	303.11	0.00	6.43	371.50	85.91	0.43
1	10810	5YR	2760.00	293.69	303.06	300.75	303.85	0.00	7.51	421.28	121.72	0.48
1	10810	10YR	3160.00	293.69	303.22	301.30	304.28	0.01	8.64	446.67	188.40	0.55
1	10810	25YR	3670.00	293.69	303.49	301.93	304.69	0.01	9.33	507.03	240.22	0.58
1	10810	50YR	4120.00	293.69	303.72	302.39	305.00	0.01	9.80	570.97	303.72	0.60
1	10810	100YR	4770.00	293.69	304.49	304.49	305.31	0.00	8.57	1048.71	929.48	0.50
1	10810	250YR	5890.00	293.69	304.84	304.83	305.61	0.00	8.91	1421.84	1036.91	0.51
1	10810	500YR	6770.00	293.69	305.39	305.06	305.89	0.00	7.82	2027.44	1143.14	0.44
1	10903 College Dr.		Bridge									
1	10956	2YR	2130.00	293.69	304.47	299.74	304.64	0.00	3.91	997.82	922.77	0.23
1	10956	5YR	2760.00	293.69	305.34	300.75	305.44	0.00	3.42	1722.83	1133.52	0.19
1	10956	10YR	3160.00	293.69	305.60	301.30	305.70	0.00	3.51	1942.55	1227.96	0.19
1	10956	25YR	3670.00	293.69	305.52	301.93	305.67	0.00	4.21	1877.02	1207.06	0.23
1	10956	50YR	4120.00	293.69	305.80	302.40	305.94	0.00	4.21	2114.20	1239.48	0.23
1	10956	100YR	4770.00	293.69	305.95	304.48	306.08	0.00	4.24	2710.78	1248.22	0.23
1	10956	250YR	5890.00	293.69	306.25	304.87	306.39	0.00	4.62	3085.83	1281.33	0.25
1	10956	500YR	6770.00	293.69	306.42	305.07	306.58	0.00	4.95	3304.05	1299.76	0.26
1	10993 K	2YR	2130.00	294.37	304.46	301.98	304.91	0.00	6.27	717.02	797.69	0.38
1	10993 K	5YR	2760.00	294.37	305.34	302.87	305.59	0.00	5.40	1445.40	1045.98	0.31
1	10993 K	10YR	3160.00	294.37	305.60	303.23	305.84	0.00	5.46	1670.02	1108.04	0.31
1	10993 K	25YR	3670.00	294.37	305.52	304.97	305.88	0.00	6.58	1603.66	1105.28	0.38
1	10993 K	50YR	4120.00	294.37	305.81	305.13	306.13	0.00	6.49	1846.56	1111.65	0.37
1	10993 K	100YR	4770.00	294.37	305.95	305.33	306.31	0.00	7.07	1966.85	1114.10	0.40
1	10993 K	250YR	5890.00	294.37	306.26	305.61	306.56	0.00	6.96	2696.85	1120.36	0.39
1	10993 K	500YR	6770.00	294.37	306.44	305.80	306.76	0.00	7.45	2890.53	1131.15	0.41
1	11128	2YR	2130.00	294.51	304.79	301.41	305.09	0.00	4.79	796.98	694.58	0.31
1	11128	5YR	2760.00	294.51	305.46	302.17	305.71	0.00	4.77	1281.72	963.02	0.30
1	11128	10YR	3160.00	294.51	305.72	302.59	305.97	0.00	4.92	1484.29	981.07	0.30

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	11128	25YR	3670.00	294.51	305.71	303.16	306.05	0.00	5.72	1480.94	980.80	0.35
1	11128	50YR	4120.00	294.51	305.96	303.44	306.29	0.00	5.81	1687.12	1002.43	0.35
1	11128	100YR	4770.00	294.51	306.13	305.31	306.50	0.00	6.30	1826.07	1008.01	0.38
1	11128	250YR	5890.00	294.51	306.41	305.66	306.77	0.00	6.64	2366.75	1017.04	0.39
1	11128	500YR	6770.00	294.51	306.60	305.91	307.00	0.00	7.09	2561.23	1025.24	0.42
1	11290	2YR	2130.00	296.00	304.91	302.16	305.30	0.00	5.38	650.07	648.44	0.37
1	11290	5YR	2760.00	296.00	305.57	302.98	305.89	0.00	5.32	991.76	756.78	0.35
1	11290	10YR	3160.00	296.00	305.83	303.41	306.15	0.00	5.49	1132.00	768.19	0.35
1	11290	25YR	3670.00	296.00	305.87	304.45	306.29	0.00	6.27	1156.93	770.36	0.40
1	11290	50YR	4120.00	296.00	306.12	305.32	306.53	0.00	6.40	1294.72	783.62	0.40
1	11290	100YR	4770.00	296.00	306.31	305.59	306.77	0.00	6.91	1402.08	823.23	0.43
1	11290	250YR	5890.00	296.00	306.53	305.93	307.12	0.00	7.88	1531.35	855.00	0.48
1	11290	500YR	6770.00	296.00	306.73	306.16	307.38	0.00	8.47	1645.69	864.88	0.51
1	11583 L	2YR	2130.00	297.00	305.25	303.34	306.04	0.00	7.60	475.11	282.63	0.51
1	11583 L	5YR	2760.00	297.00	305.79	304.31	306.71	0.00	8.47	641.15	337.12	0.55
1	11583 L	10YR	3160.00	297.00	306.01	305.02	307.06	0.00	9.16	718.36	354.24	0.59
1	11583 L	25YR	3670.00	297.00	306.13	306.01	307.42	0.00	10.26	760.28	355.85	0.65
1	11583 L	50YR	4120.00	297.00	306.35	306.32	307.72	0.00	10.78	838.36	359.44	0.67
1	11583 L	100YR	4770.00	297.00	306.63	306.63	308.14	0.00	11.54	941.66	369.20	0.71
1	11583 L	250YR	5890.00	297.00	307.43	307.43	308.78	0.00	11.52	1290.09	478.11	0.68
1	11583 L	500YR	6770.00	297.00	307.69	307.69	309.16	0.00	12.28	1416.45	492.89	0.71
1	11697	2YR	2130.00	297.53	306.08		306.34	0.00	4.14	562.77	101.99	0.27
1	11697	5YR	2760.00	297.53	306.68		307.04	0.00	4.94	628.89	121.06	0.31
1	11697	10YR	3160.00	297.53	306.99		307.43	0.00	5.42	669.18	136.31	0.33
1	11697	25YR	3670.00	297.53	307.33		307.87	0.00	6.03	719.02	159.90	0.36
1	11697	50YR	4120.00	297.53	307.56		308.20	0.00	6.55	758.08	183.86	0.39
1	11697	100YR	4770.00	297.53	307.88		308.65	0.00	7.26	822.95	230.67	0.42
1	11697	250YR	5890.00	297.53	308.08	304.92	309.19	0.00	8.72	879.33	324.53	0.50
1	11697	500YR	6770.00	297.53	308.13	305.56	309.58	0.00	9.94	897.79	340.97	0.57
1	11755	2YR	2130.00	297.53	306.12	301.76	306.38	0.00	4.11	557.32	102.76	0.26
1	11755	5YR	2760.00	297.53	306.74	302.38	307.10	0.00	4.88	612.55	123.17	0.30
1	11755	10YR	3160.00	297.53	307.06	302.75	307.49	0.00	5.34	641.87	141.25	0.32
1	11755	25YR	3670.00	297.53	307.42	303.19	307.94	0.00	5.93	673.52	165.34	0.35
1	11755	50YR	4120.00	297.53	307.65	303.57	308.28	0.00	6.47	694.89	195.56	0.38
1	11755	100YR	4770.00	297.53	307.97	304.07	308.74	0.00	7.20	723.40	281.59	0.42
1	11755	250YR	5890.00	297.53	308.28	304.93	309.33	0.00	8.50	950.87	400.36	0.48
1	11755	500YR	6770.00	297.53	308.49	305.54	309.78	0.00	9.44	1044.11	462.01	0.53
1	11825 Richmond Rd.		Culvert									
1	11910 M	2YR	2130.00	297.69	306.87	303.56	307.11	0.00	3.93	542.91	215.56	0.31
1	11910 M	5YR	2760.00	297.69	307.82	304.22	308.10	0.00	4.25	667.49	551.86	0.31
1	11910 M	10YR	3160.00	297.69	308.39	304.58	308.69	0.00	4.41	752.68	595.26	0.31
1	11910 M	25YR	3670.00	297.69	309.08	305.01	309.40	0.00	4.58	854.72	622.99	0.30
1	11910 M	50YR	4120.00	297.69	309.66	305.33	310.00	0.00	4.73	940.00	651.01	0.30
1	11910 M	100YR	4770.00	297.69	310.75	305.74	310.88	0.00	3.42	2791.55	730.73	0.21
1	11910 M	250YR	5890.00	297.69	311.44	306.39	311.60	0.00	3.73	3328.72	812.93	0.22
1	11910 M	500YR	6770.00	297.69	311.80	306.85	311.97	0.00	4.00	3628.48	863.13	0.23
1	11945	2YR	2130.00	298.00	306.46	306.41	307.75	0.02	9.11	233.89	312.80	0.98
1	11945	5YR	2760.00	298.00	307.53	306.99	308.57	0.01	8.24	350.99	459.60	0.77
1	11945	10YR	3160.00	298.00	308.15	307.30	309.11	0.01	7.95	434.67	530.06	0.68
1	11945	25YR	3670.00	298.00	308.86	307.67	309.78	0.01	7.79	553.50	606.65	0.62
1	11945	50YR	4120.00	298.00	309.49	307.98	310.31	0.00	7.52	681.81	630.92	0.56
1	11945	100YR	4770.00	298.00	310.78	308.41	310.91	0.00	3.85	2854.13	733.99	0.26
1	11945	250YR	5890.00	298.00	311.48	309.27	311.62	0.00	4.15	3395.03	817.72	0.27
1	11945	500YR	6770.00	298.00	311.85	309.70	312.01	0.00	4.42	3699.23	846.74	0.28
1	12296	2YR	2050.00	297.23	308.61	304.73	308.88	0.00	4.44	811.28	508.62	0.29
1	12296	5YR	2730.00	297.23	309.28	305.58	309.59	0.00	4.97	1124.69	610.42	0.32
1	12296	10YR	3200.00	297.23	309.72	306.13	310.03	0.00	5.15	1343.26	625.11	0.32
1	12296	25YR	3850.00	297.23	310.29	306.94	310.60	0.00	5.32	1632.51	663.56	0.32
1	12296	50YR	4370.00	297.23	310.75	308.06	311.05	0.00	5.40	1865.63	710.97	0.31
1	12296	100YR	4930.00	297.23	310.97	308.37	311.32	0.00	5.82	1986.43	737.35	0.33
1	12296	250YR	5780.00	297.23	311.71	309.26	311.97	0.00	5.43	2908.55	777.63	0.30
1	12296	500YR	6500.00	297.23	312.09	309.60	312.35	0.00	5.56	3209.37	786.05	0.30
1	12690	2YR	2050.00	296.40	309.01	304.65	309.48	0.00	5.76	584.84	349.45	0.34
1	12690	5YR	2730.00	296.40	309.74	305.76	310.23	0.00	6.27	876.80	471.09	0.36
1	12690	10YR	3200.00	296.40	310.18	306.54	310.67	0.00	6.45	1072.95	565.30	0.36
1	12690	25YR	3850.00	296.40	310.76	307.56	311.21	0.00	6.57	1343.22	669.33	0.36
1	12690	50YR	4370.00	296.40	311.20	307.79	311.64	0.00	6.67	1577.58	732.40	0.35
1	12690	100YR	4930.00	296.40	311.49	310.04	311.96	0.00	7.06	1741.30	757.39	0.37
1	12690	250YR	5780.00	296.40	312.12	310.42	312.48	0.00	6.60	2514.03	875.60	0.34
1	12690	500YR	6500.00	296.40	312.52	310.71	312.85	0.00	6.65	2868.62	919.12	0.33
1	13089	2YR	2050.00	299.75	309.92		310.35	0.00	5.29	426.37	216.38	0.41
1	13089	5YR	2730.00	299.75	310.64		311.14	0.00	5.83	622.38	305.33	0.43
1	13089	10YR	3200.00	299.75	311.06		311.58	0.00	6.12	754.98	348.11	0.43
1	13089	25YR	3850.00	299.75	311.57		312.12	0.00	6.42	965.83	444.48	0.44
1	13089	50YR	4370.00	299.75	311.98		312.52	0.00	6.53	1153.28	490.48	0.43
1	13089	100YR	4930.00	299.75	312.32		312.88	0.00	6.74	1333.51	565.14	0.43
1	13089	250YR	5780.00	299.75	312.77		313.32	0.00	6.97	1603.87	644.05	0.44
1	13089	500YR	6500.00	299.75	313.14		313.67	0.00	7.06	1854.93	771.00	0.43

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	13346	2YR	2050.00	302.20	310.76	308.22	311.02	0.00	4.45	702.98	302.64	0.35
1	13346	5YR	2730.00	302.20	311.53	309.00	311.79	0.00	4.67	950.11	359.43	0.34
1	13346	10YR	3200.00	302.20	311.96	310.02	312.23	0.00	4.83	1117.21	407.31	0.3
1	13346	25YR	3850.00	302.20	312.48	310.44	312.76	0.00	5.04	1342.64	482.71	0.34
1	13346	50YR	4370.00	302.20	312.85	310.69	313.14	0.00	5.21	1538.90	571.13	0.34
1	13346	100YR	4930.00	302.20	313.21	310.93	313.49	0.00	5.34	1744.40	593.87	0.34
1	13346	250YR	5780.00	302.20	313.64	311.26	313.94	0.00	5.59	2011.70	633.06	0.35
1	13346	500YR	6500.00	302.20	313.98	311.56	314.29	0.00	5.78	2228.06	667.32	0.35
1	13410	2YR	2050.00	302.27	310.75		311.14	0.00	5.04	477.72	253.83	0.38
1	13410	5YR	2730.00	302.27	311.48		311.96	0.00	5.73	722.17	427.27	0.41
1	13410	10YR	3200.00	302.27	311.88		312.43	0.00	6.11	913.51	490.22	0.42
1	13410	25YR	3850.00	302.27	312.38		312.98	0.00	6.56	1161.49	508.35	0.44
1	13410	50YR	4370.00	302.27	312.74		313.38	0.00	6.86	1350.20	551.65	0.45
1	13410	100YR	4930.00	302.27	313.08		313.76	0.00	7.20	1545.42	634.90	0.46
1	13410	250YR	5780.00	302.27	313.48		314.25	0.00	7.77	1826.67	742.64	0.48
1	13410	500YR	6500.00	302.27	313.79		314.62	0.00	8.20	2068.51	811.53	0.50
1	13461 Kennedy Ln.		Culvert									
1	13538	2YR	2050.00	304.61	312.20	308.98	312.47	0.00	4.66	763.74	473.16	0.31
1	13538	5YR	2730.00	304.61	312.69	309.83	312.99	0.00	5.15	1006.62	513.67	0.34
1	13538	10YR	3200.00	304.61	312.93	311.32	313.26	0.00	5.55	1132.14	540.44	0.36
1	13538	25YR	3850.00	304.61	313.19	311.90	313.57	0.00	6.04	1279.01	570.58	0.38
1	13538	50YR	4370.00	304.61	313.36	312.43	313.79	0.00	6.56	1376.21	598.76	0.41
1	13538	100YR	4930.00	304.61	313.59	312.48	314.03	0.00	6.78	1517.77	609.46	0.42
1	13538	250YR	5780.00	304.61	313.92	312.81	314.37	0.00	7.08	1721.41	632.03	0.43
1	13538	500YR	6500.00	304.61	314.27	313.19	314.71	0.00	7.15	1951.50	686.53	0.42
1	13577 N	2YR	2050.00	305.50	312.25	311.21	312.66	0.01	5.87	584.93	388.84	0.48
1	13577 N	5YR	2730.00	305.50	312.76	312.04	313.18	0.01	6.27	804.39	458.63	0.48
1	13577 N	10YR	3200.00	305.50	313.02	312.22	313.45	0.01	6.54	927.05	492.16	0.49
1	13577 N	25YR	3850.00	305.50	313.30	312.75	313.77	0.01	6.99	1074.98	564.37	0.51
1	13577 N	50YR	4370.00	305.50	313.49	312.94	313.99	0.01	7.31	1189.59	615.24	0.53
1	13577 N	100YR	4930.00	305.50	313.74	313.11	314.23	0.01	7.46	1342.21	638.64	0.53
1	13577 N	250YR	5780.00	305.50	314.08	313.16	314.55	0.01	7.55	1566.95	662.42	0.52
1	13577 N	500YR	6500.00	305.50	314.44	313.59	314.87	0.00	7.38	1809.29	691.43	0.50
1	13879	2YR	2040.00	304.75	313.58		313.94	0.00	6.08	682.91	448.53	0.42
1	13879	5YR	2720.00	304.75	314.12		314.49	0.00	6.54	973.72	613.56	0.43
1	13879	10YR	3190.00	304.75	314.41		314.75	0.00	6.63	1156.80	646.17	0.43
1	13879	25YR	3840.00	304.75	314.77		315.10	0.00	6.74	1400.10	704.75	0.43
1	13879	50YR	4350.00	304.75	315.02		315.33	0.00	6.79	1578.92	722.48	0.42
1	13879	100YR	4890.00	304.75	315.25		315.56	0.00	6.91	1748.55	753.39	0.42
1	13879	250YR	5700.00	304.75	315.56		315.86	0.00	7.10	1979.83	770.54	0.43
1	13879	500YR	6450.00	304.75	315.81		316.11	0.00	7.27	2173.40	782.72	0.43
1	14203	2YR	2040.00	304.31	314.48		314.67	0.00	4.27	1003.27	550.24	0.27
1	14203	5YR	2720.00	304.31	315.05		315.23	0.00	4.50	1322.31	573.90	0.28
1	14203	10YR	3190.00	304.31	315.33		315.52	0.00	4.76	1482.41	591.95	0.29
1	14203	25YR	3840.00	304.31	315.67		315.88	0.00	5.08	1694.10	621.64	0.30
1	14203	50YR	4350.00	304.31	315.91		316.13	0.00	5.33	1845.21	644.83	0.31
1	14203	100YR	4890.00	304.31	316.15		316.38	0.00	5.55	2000.93	664.41	0.32
1	14203	250YR	5700.00	304.31	316.47		316.71	0.00	5.85	2218.75	728.17	0.33
1	14203	500YR	6450.00	304.31	316.74		317.00	0.00	6.15	2421.23	770.18	0.34
1	14387	2YR	1490.00	306.00	314.68		314.92	0.00	4.14	465.96	218.10	0.28
1	14387	5YR	1940.00	306.00	315.21		315.54	0.00	4.92	572.60	321.16	0.32
1	14387	10YR	2340.00	306.00	315.47		315.89	0.00	5.56	649.12	407.47	0.36
1	14387	25YR	2910.00	306.00	315.81		316.31	0.00	6.30	777.20	529.03	0.40
1	14387	50YR	3340.00	306.00	316.06		316.59	0.00	6.61	882.83	566.49	0.41
1	14387	100YR	3960.00	306.00	316.28		316.89	0.00	7.23	979.21	590.82	0.44
1	14387	250YR	4710.00	306.00	316.61		317.25	0.00	7.67	1120.43	624.99	0.46
1	14387	500YR	5290.00	306.00	316.92		317.55	0.00	7.78	1259.58	660.97	0.46
1	14438	2YR	1490.00	305.75	314.74		314.98	0.00	4.03	465.88	266.35	0.28
1	14438	5YR	1940.00	305.75	315.32		315.61	0.00	4.59	628.32	451.84	0.31
1	14438	10YR	2340.00	305.75	315.65		315.97	0.00	4.98	745.48	508.52	0.33
1	14438	25YR	2910.00	305.75	316.06		316.42	0.00	5.41	912.06	610.15	0.35
1	14438	50YR	3340.00	305.75	316.33		316.70	0.00	5.65	1024.79	615.83	0.36
1	14438	100YR	3960.00	305.75	316.61		317.02	0.00	6.09	1142.95	621.61	0.38
1	14438	250YR	4710.00	305.75	316.95		317.39	0.00	6.47	1288.98	641.28	0.39
1	14438	500YR	5290.00	305.75	317.23		317.68	0.00	6.65	1412.37	655.58	0.40
1	14569	2YR	1490.00	305.62	314.97		315.12	0.00	3.45	689.28	457.79	0.27
1	14569	5YR	1940.00	305.62	315.63		315.76	0.00	3.35	1007.85	513.65	0.25
1	14569	10YR	2340.00	305.62	316.00		316.12	0.00	3.47	1199.19	532.45	0.25
1	14569	25YR	2910.00	305.62	316.45		316.57	0.00	3.62	1440.85	544.64	0.25
1	14569	50YR	3340.00	305.62	316.72		316.85	0.00	3.76	1593.25	560.65	0.25
1	14569	100YR	3960.00	305.62	317.04		317.18	0.00	4.01	1774.97	618.21	0.26
1	14569	250YR	4710.00	305.62	317.41		317.56	0.00	4.26	2005.93	732.08	0.27
1	14569	500YR	5290.00	305.62	317.68		317.87	0.00	4.73	2205.03	807.52	0.30
1	14701	2YR	1470.00	305.62	315.09		315.30	0.00	3.78	461.68	304.69	0.31
1	14701	5YR	1940.00	305.62	315.70		315.92	0.00	3.99	711.86	478.43	0.31
1	14701	10YR	2340.00	305.62	316.07		316.28	0.00	4.14	892.58	511.71	0.31
1	14701	25YR	2910.00	305.62	316.52		316.73	0.00	4.27	1127.05	538.07	0.31

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	14701	50YR	3330.00	305.62	316.80		317.01	0.00	4.37	1276.43	562.16	0.31
1	14701	100YR	3960.00	305.62	317.12		317.35	0.00	4.61	1450.72	624.47	0.32
1	14701	250YR	4680.00	305.62	317.50		317.73	0.00	4.79	1656.04	656.66	0.32
1	14701	500YR	5260.00	305.62	317.81		318.04	0.00	4.88	1826.41	686.26	0.32
1	15010 O	2YR	1470.00	307.50	315.65	313.06	315.98	0.00	4.71	352.43	182.09	0.38
1	15010 O	5YR	1940.00	307.50	316.23	313.81	316.60	0.00	5.14	501.04	361.36	0.39
1	15010 O	10YR	2340.00	307.50	316.58	314.35	316.95	0.00	5.31	639.36	413.50	0.39
1	15010 O	25YR	2910.00	307.50	317.02	314.96	317.36	0.00	5.44	829.66	465.77	0.39
1	15010 O	50YR	3330.00	307.50	317.30	316.42	317.63	0.00	5.49	964.79	505.45	0.38
1	15010 O	100YR	3960.00	307.50	317.64	316.73	317.97	0.00	5.61	1147.42	554.96	0.38
1	15010 O	250YR	4680.00	307.50	318.02	317.04	318.35	0.00	5.77	1366.85	650.54	0.38
1	15010 O	500YR	5260.00	307.50	318.32	317.24	318.64	0.00	5.85	1570.53	748.50	0.38
1	15610	2YR	1130.00	309.39	317.60		317.81	0.00	3.70	314.33	115.41	0.33
1	15610	5YR	1520.00	309.39	318.21		318.47	0.00	4.15	407.44	177.71	0.35
1	15610	10YR	1830.00	309.39	318.55		318.84	0.00	4.49	469.07	191.52	0.36
1	15610	25YR	2250.00	309.39	318.92		319.26	0.00	4.91	543.99	204.04	0.38
1	15610	50YR	2560.00	309.39	319.17		319.54	0.00	5.19	594.28	211.93	0.40
1	15610	100YR	2980.00	309.39	319.49		319.89	0.00	5.51	663.63	223.90	0.41
1	15610	250YR	3490.00	309.39	319.84		320.29	0.00	5.87	747.20	246.03	0.42
1	15610	500YR	3900.00	309.39	320.11		320.59	0.00	6.15	815.47	271.79	0.43
1	15691	2YR	1130.00	309.39	317.77		318.21	0.01	5.32	213.52	67.45	0.50
1	15691	5YR	1520.00	309.39	318.35		318.89	0.01	5.97	280.93	149.59	0.52
1	15691	10YR	1830.00	309.39	318.69		319.29	0.01	6.39	334.60	168.20	0.53
1	15691	25YR	2250.00	309.39	319.08		319.73	0.01	6.83	404.32	187.15	0.55
1	15691	50YR	2560.00	309.39	319.34		320.02	0.01	7.10	453.51	197.14	0.55
1	15691	100YR	2980.00	309.39	319.67		320.38	0.01	7.36	521.80	211.20	0.56
1	15691	250YR	3490.00	309.39	320.05		320.78	0.01	7.65	605.56	237.09	0.56
1	15691	500YR	3900.00	309.39	320.33		321.08	0.01	7.85	675.66	259.84	0.56
1	15728 P	2YR	1130.00	310.00	318.10		318.38	0.00	4.30	264.61	69.55	0.36
1	15728 P	5YR	1520.00	310.00	318.69		319.08	0.00	5.05	320.16	148.30	0.39
1	15728 P	10YR	1830.00	310.00	319.03		319.49	0.00	5.56	373.19	167.69	0.42
1	15728 P	25YR	2250.00	310.00	319.40		319.95	0.00	6.14	440.67	189.24	0.45
1	15728 P	50YR	2560.00	310.00	319.64		320.24	0.00	6.51	487.28	200.80	0.47
1	15728 P	100YR	2980.00	310.00	319.94		320.60	0.01	6.97	550.71	226.37	0.49
1	15728 P	250YR	3490.00	310.00	320.29		321.01	0.01	7.38	636.04	260.06	0.50
1	15728 P	500YR	3900.00	310.00	320.58		321.30	0.01	7.56	714.91	288.33	0.50
1	15792	2YR	1130.00	311.04	318.28		318.62	0.00	4.75	265.21	145.54	0.41
1	15792	5YR	1520.00	311.04	318.94		319.32	0.00	5.18	387.03	247.43	0.42
1	15792	10YR	1830.00	311.04	319.36		319.75	0.00	5.37	496.94	282.41	0.42
1	15792	25YR	2250.00	311.04	319.83		320.22	0.00	5.56	637.20	306.02	0.41
1	15792	50YR	2560.00	311.04	320.13		320.52	0.00	5.70	730.80	327.90	0.41
1	15792	100YR	2980.00	311.04	320.50		320.90	0.00	5.88	866.99	408.14	0.41
1	15792	250YR	3490.00	311.04	320.92		321.31	0.00	6.02	1045.22	451.89	0.41
1	15792	500YR	3900.00	311.04	321.21		321.60	0.00	6.14	1186.15	501.60	0.41
1	16069	2YR	1110.00	310.98	319.46		319.92	0.01	5.50	225.06	120.81	0.46
1	16069	5YR	1500.00	310.98	320.09		320.63	0.01	6.12	321.99	186.60	0.48
1	16069	10YR	1820.00	310.98	320.47		321.05	0.01	6.54	412.97	267.95	0.50
1	16069	25YR	2230.00	310.98	320.89		321.49	0.01	6.84	538.03	324.72	0.50
1	16069	50YR	2530.00	310.98	321.18		321.75	0.01	6.93	634.68	352.76	0.49
1	16069	100YR	2940.00	310.98	321.53		322.07	0.00	6.97	762.90	375.20	0.48
1	16069	250YR	3400.00	310.98	321.90		322.40	0.00	6.96	905.90	390.93	0.47
1	16069	500YR	3800.00	310.98	322.18		322.66	0.00	7.00	1015.12	398.78	0.46
1	16514	2YR	1110.00	312.75	320.88	317.33	321.01	0.00	2.86	387.63	83.64	0.23
1	16514	5YR	1500.00	312.75	321.66	317.86	321.83	0.00	3.29	473.81	142.47	0.25
1	16514	10YR	1820.00	312.75	322.13	318.24	322.32	0.00	3.61	561.28	240.57	0.27
1	16514	25YR	2230.00	312.75	322.58	318.69	322.81	0.00	3.97	695.64	360.88	0.28
1	16514	50YR	2530.00	312.75	322.83	318.99	323.09	0.00	4.21	789.14	407.25	0.29
1	16514	100YR	2940.00	312.75	323.13	319.39	323.42	0.00	4.50	906.69	435.66	0.31
1	16514	250YR	3400.00	312.75	323.43	319.80	323.74	0.00	4.79	1026.04	483.09	0.32
1	16514	500YR	3800.00	312.75	323.67	320.14	324.00	0.00	5.01	1124.26	504.98	0.33
1	16560 Q	2YR	1110.00	312.30	320.94	316.51	321.06	0.00	2.81	414.38	100.48	0.20
1	16560 Q	5YR	1500.00	312.30	321.72	317.13	321.88	0.00	3.30	496.53	130.21	0.22
1	16560 Q	10YR	1820.00	312.30	322.18	317.58	322.39	0.00	3.70	548.69	199.74	0.24
1	16560 Q	25YR	2230.00	312.30	322.63	318.09	322.89	0.00	4.21	600.99	265.67	0.27
1	16560 Q	50YR	2530.00	312.30	322.88	318.45	323.19	0.00	4.59	630.99	282.12	0.29
1	16560 Q	100YR	2940.00	312.30	323.17	318.89	323.55	0.00	5.10	666.35	304.89	0.31
1	16560 Q	250YR	3400.00	312.30	323.45	319.33	323.91	0.00	5.66	701.02	360.86	0.34
1	16560 Q	500YR	3800.00	312.30	323.67	319.71	324.21	0.00	6.15	729.36	409.31	0.37
1	16624 Mall Dr.		Culvert									
1	16699	2YR	1110.00	316.48	323.85	320.38	323.93	0.00	2.34	490.21	395.32	0.19
1	16699	5YR	1500.00	316.48	325.29	320.88	325.38	0.00	2.38	648.79	530.43	0.17
1	16699	10YR	1820.00	316.48	326.87	321.33	326.91	0.00	1.63	1219.76	680.54	0.11
1	16699	25YR	2230.00	316.48	327.48	321.76	327.52	0.00	1.81	1341.57	741.66	0.11
1	16699	50YR	2530.00	316.48	327.78	321.97	327.84	0.00	1.96	1404.31	761.92	0.12
1	16699	100YR	2940.00	316.48	327.88	322.26	327.95	0.00	2.24	1422.79	767.18	0.14
1	16699	250YR	3400.00	316.48	328.32	322.55	328.41	0.00	2.43	1513.62	804.61	0.14
1	16699	500YR	3800.00	316.48	328.67	322.80	328.76	0.00	2.59	1583.28	823.40	0.15

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	16805	2YR	1110.00	316.79	323.93	319.43	323.99	0.00	2.02	551.43	112.72	0.15
1	16805	5YR	1500.00	316.79	325.35	319.86	325.42	0.00	2.15	705.19	395.36	0.14
1	16805	10YR	1820.00	316.79	326.88	320.19	326.95	0.00	2.12	870.53	606.44	0.13
1	16805	25YR	2230.00	316.79	327.48	320.58	327.57	0.00	2.41	935.28	667.73	0.1
1	16805	50YR	2530.00	316.79	327.79	320.84	327.89	0.00	2.64	968.59	691.98	0.15
1	16805	100YR	2940.00	316.79	327.88	321.19	328.02	0.00	3.04	978.39	698.39	0.18
1	16805	250YR	3400.00	316.79	328.32	321.54	328.49	0.00	3.35	1026.39	728.60	0.19
1	16805	500YR	3800.00	316.79	328.66	321.85	328.86	0.00	3.62	1063.09	755.90	0.20
1	16931 Interstate 30		Culvert									
1	17038	2YR	1110.00	317.11	324.30	320.16	324.37	0.00	2.31	509.38	252.90	0.16
1	17038	5YR	1500.00	317.11	325.78	320.64	325.87	0.00	2.44	648.15	393.39	0.15
1	17038	10YR	1820.00	317.11	327.31	321.04	327.39	0.00	2.41	790.62	541.08	0.14
1	17038	25YR	2230.00	317.11	328.16	321.50	328.26	0.00	2.67	869.82	658.13	0.15
1	17038	50YR	2530.00	317.11	328.68	321.76	328.80	0.00	2.87	918.08	705.77	0.16
1	17038	100YR	2940.00	317.11	329.09	322.08	329.24	0.00	3.19	956.86	741.10	0.17
1	17038	250YR	3400.00	317.11	329.98	322.43	330.14	0.00	3.39	1039.35	847.68	0.17
1	17038	500YR	3800.00	317.11	330.76	322.69	330.94	0.00	3.53	1111.98	897.58	0.18
1	17074	2YR	1110.00	316.87	324.24	321.23	324.48	0.00	3.98	281.95	194.25	0.31
1	17074	5YR	1500.00	316.87	325.73	321.87	325.96	0.00	3.95	408.99	355.90	0.27
1	17074	10YR	1820.00	316.87	327.30	322.32	327.43	0.00	3.15	703.51	516.95	0.19
1	17074	25YR	2230.00	316.87	328.16	322.84	328.29	0.00	3.28	822.68	605.84	0.19
1	17074	50YR	2530.00	316.87	328.68	323.19	328.82	0.00	3.40	895.31	654.54	0.19
1	17074	100YR	2940.00	316.87	329.10	323.62	329.27	0.00	3.70	953.78	668.29	0.20
1	17074	250YR	3400.00	316.87	329.99	324.08	330.16	0.00	3.74	1077.97	767.20	0.20
1	17074	500YR	3800.00	316.87	330.78	324.46	330.96	0.00	3.76	1188.15	871.19	0.19
1	17114 Saint Michael Dr		Culvert									
1	17175	2YR	1110.00	316.87	325.28	321.34	325.36	0.00	2.49	536.12	447.50	0.18
1	17175	5YR	1500.00	316.87	327.66	321.80	327.70	0.00	1.84	1108.21	619.62	0.11
1	17175	10YR	1820.00	316.87	328.79	322.13	328.81	0.00	1.62	1762.12	799.67	0.09
1	17175	25YR	2230.00	316.87	329.37	322.51	329.40	0.00	1.81	1920.16	838.14	0.10
1	17175	50YR	2530.00	316.87	329.70	322.77	329.74	0.00	1.96	2009.28	862.28	0.11
1	17175	100YR	2940.00	316.87	330.04	323.10	330.09	0.00	2.18	2100.96	884.67	0.12
1	17175	250YR	3400.00	316.87	330.51	323.48	330.56	0.00	2.37	2226.22	913.39	0.12
1	17175	500YR	3800.00	316.87	331.04	323.76	331.10	0.00	2.48	2370.18	969.89	0.13
1	17197 R	2YR	1110.00	317.20	325.34	320.81	325.38	0.00	1.74	782.53	445.96	0.12
1	17197 R	5YR	1500.00	317.20	327.68	321.22	327.71	0.00	1.50	1310.35	615.17	0.09
1	17197 R	10YR	1820.00	317.20	328.80	321.53	328.82	0.00	1.33	2056.43	745.42	0.0
1	17197 R	25YR	2230.00	317.20	329.39	321.88	329.41	0.00	1.49	2232.70	807.51	0.08
1	17197 R	50YR	2530.00	317.20	329.72	322.12	329.75	0.00	1.62	2332.30	832.35	0.09
1	17197 R	100YR	2940.00	317.20	330.06	322.48	330.09	0.00	1.80	2435.10	865.63	0.10
1	17197 R	250YR	3400.00	317.20	330.53	322.87	330.57	0.00	1.96	2575.11	892.95	0.10
1	17197 R	500YR	3800.00	317.20	331.06	323.09	331.10	0.00	2.06	2735.46	952.31	0.10
1	17707	2YR	590.00	320.17	325.49	324.02	325.60	0.00	2.92	294.18	289.64	0.31
1	17707	5YR	810.00	320.17	327.76	324.55	327.78	0.00	1.44	942.35	567.80	0.11
1	17707	10YR	970.00	320.17	328.85	324.95	328.85	0.00	0.89	2088.75	646.10	0.06
1	17707	25YR	1180.00	320.17	329.44	325.16	329.45	0.00	0.91	2452.71	686.08	0.06
1	17707	50YR	1360.00	320.17	329.78	325.32	329.78	0.00	0.96	2661.80	712.49	0.06
1	17707	100YR	1560.00	320.17	330.13	325.47	330.14	0.00	1.01	2881.40	735.18	0.07
1	17707	250YR	1890.00	320.17	330.61	325.70	330.62	0.00	1.11	3182.67	787.76	0.07
1	17707	500YR	2130.00	320.17	331.15	325.87	331.15	0.00	1.11	3547.48	847.45	0.07
1	17852	2YR	590.00	320.98	325.84	324.81	325.96	0.00	3.12	275.48	290.78	0.35
1	17852	5YR	810.00	320.98	327.80	325.18	327.82	0.00	1.63	764.10	337.94	0.14
1	17852	10YR	970.00	320.98	328.86	325.42	328.87	0.00	1.17	1359.56	366.23	0.09
1	17852	25YR	1180.00	320.98	329.45	325.67	329.46	0.00	1.25	1580.87	462.11	0.09
1	17852	50YR	1360.00	320.98	329.79	325.83	329.80	0.00	1.33	1717.55	492.87	0.09
1	17852	100YR	1560.00	320.98	330.14	326.05	330.16	0.00	1.41	1863.03	534.31	0.10
1	17852	250YR	1890.00	320.98	330.62	326.24	330.64	0.00	1.55	2063.70	601.81	0.10
1	17852	500YR	2130.00	320.98	331.16	326.37	331.17	0.00	1.52	2558.69	657.35	0.10
1	17959	2YR	580.00	321.05	326.10	324.70	326.24	0.00	3.11	219.23	157.81	0.33
1	17959	5YR	800.00	321.05	327.83	325.09	327.89	0.00	2.20	489.68	255.35	0.18
1	17959	10YR	950.00	321.05	328.87	325.39	328.90	0.00	1.66	914.57	359.14	0.12
1	17959	25YR	1170.00	321.05	329.46	325.68	329.49	0.00	1.76	1086.25	403.27	0.13
1	17959	50YR	1360.00	321.05	329.80	325.90	329.83	0.00	1.88	1192.52	418.03	0.13
1	17959	100YR	1560.00	321.05	330.15	326.07	330.19	0.00	1.98	1306.34	433.87	0.13
1	17959	250YR	1860.00	321.05	330.63	326.43	330.67	0.00	2.13	1466.20	484.11	0.14
1	17959	500YR	2110.00	321.05	331.17	326.66	331.20	0.00	2.01	1954.52	571.45	0.13
1	18047	2YR	580.00	320.31	326.29	322.68	326.35	0.00	1.95	298.71	104.67	0.16
1	18047	5YR	800.00	320.31	327.87	323.10	327.93	0.00	1.98	414.66	153.87	0.14
1	18047	10YR	950.00	320.31	328.88	323.34	328.93	0.00	1.78	689.02	233.57	0.12
1	18047	25YR	1170.00	320.31	329.47	323.66	329.52	0.00	1.96	792.70	278.48	0.12
1	18047	50YR	1360.00	320.31	329.81	323.94	329.87	0.00	2.16	855.62	299.03	0.13
1	18047	100YR	1560.00	320.31	330.16	324.20	330.23	0.00	2.35	927.90	328.23	0.14
1	18047	250YR	1860.00	320.31	330.64	324.58	330.72	0.00	2.60	1041.12	391.44	0.15
1	18047	500YR	2110.00	320.31	331.17	324.87	331.24	0.00	2.47	1483.69	507.33	0.14
1	18087 Private Dr.		Culvert									
1	18139 S	2YR	580.00	322.30	327.36	324.92	327.47	0.00	2.74	212.06	132.60	0.26

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	18139 S	5YR	800.00	322.30	328.82	325.36	328.92	0.00	2.56	313.07	260.76	0.22
1	18139 S	10YR	950.00	322.30	330.34	325.62	330.36	0.00	1.38	1052.64	385.98	0.11
1	18139 S	25YR	1170.00	322.30	330.99	325.99	331.01	0.00	1.39	1325.06	451.34	0.10
1	18139 S	50YR	1360.00	322.30	331.26	326.28	331.28	0.00	1.49	1448.14	476.67	0.11
1	18139 S	100YR	1560.00	322.30	331.47	326.56	331.50	0.00	1.60	1552.24	495.13	0.11
1	18139 S	250YR	1860.00	322.30	331.74	326.95	331.77	0.00	1.78	1686.90	518.22	0.12
1	18139 S	500YR	2110.00	322.30	331.95	327.26	331.98	0.00	1.90	1798.32	532.57	0.13
1	18179	2YR	580.00	322.08	327.38	325.93	327.61	0.00	4.12	176.32	155.47	0.38
1	18179	5YR	800.00	322.08	328.84	326.43	328.98	0.00	3.43	307.99	320.53	0.27
1	18179	10YR	950.00	322.08	330.35	326.68	330.37	0.00	1.58	1157.34	400.18	0.11
1	18179	25YR	1170.00	322.08	331.00	327.19	331.02	0.00	1.57	1426.18	425.08	0.10
1	18179	50YR	1360.00	322.08	331.27	327.53	331.29	0.00	1.68	1540.55	434.83	0.11
1	18179	100YR	1560.00	322.08	331.48	327.77	331.51	0.00	1.81	1635.20	444.05	0.12
1	18179	250YR	1860.00	322.08	331.75	328.10	331.78	0.00	2.01	1755.76	459.07	0.13
1	18179	500YR	2110.00	322.08	331.96	328.36	332.00	0.00	2.15	1855.14	475.42	0.13
1	18242	2YR	580.00	321.48	327.65	326.33	327.77	0.00	3.06	254.82	174.71	0.30
1	18242	5YR	800.00	321.48	328.98	326.79	329.05	0.00	2.54	423.05	256.52	0.21
1	18242	10YR	950.00	321.48	330.36	326.97	330.39	0.00	1.67	979.80	322.94	0.12
1	18242	25YR	1170.00	321.48	331.01	327.20	331.04	0.00	1.71	1203.72	361.96	0.12
1	18242	50YR	1360.00	321.48	331.28	327.38	331.31	0.00	1.88	1302.87	390.39	0.13
1	18242	100YR	1560.00	321.48	331.49	327.56	331.53	0.00	2.03	1389.27	403.16	0.13
1	18242	250YR	1860.00	321.48	331.76	327.79	331.80	0.00	2.29	1499.69	434.46	0.15
1	18242	500YR	2110.00	321.48	331.98	327.98	332.02	0.00	2.45	1593.91	445.06	0.16
1	18302	2YR	580.00	319.97	327.73	324.97	327.91	0.00	3.58	228.54	135.91	0.29
1	18302	5YR	800.00	319.97	329.02	325.71	329.12	0.00	2.96	419.62	202.16	0.21
1	18302	10YR	950.00	319.97	330.37	326.14	330.42	0.00	2.22	764.56	253.62	0.14
1	18302	25YR	1170.00	319.97	331.02	327.26	331.06	0.00	2.25	959.29	354.86	0.14
1	18302	50YR	1360.00	319.97	331.29	327.61	331.34	0.00	2.59	1057.36	377.17	0.16
1	18302	100YR	1560.00	319.97	331.50	328.03	331.56	0.00	2.76	1141.70	394.55	0.17
1	18302	250YR	1860.00	319.97	331.78	328.31	331.85	0.00	3.01	1251.95	415.51	0.18
1	18302	500YR	2110.00	319.97	331.99	328.51	332.07	0.00	3.18	1343.72	433.33	0.19
1	18322 Pedestrian Bridg		Bridge									
1	18339	2YR	580.00	321.19	327.96	326.07	328.15	0.00	4.02	232.58	147.89	0.33
1	18339	5YR	800.00	321.19	329.10	327.19	329.20	0.00	3.24	419.87	230.62	0.24
1	18339	10YR	950.00	321.19	330.41	327.53	330.45	0.00	2.36	772.13	277.09	0.16
1	18339	25YR	1170.00	321.19	331.05	327.88	331.10	0.00	2.49	970.87	353.02	0.16
1	18339	50YR	1360.00	321.19	331.33	328.11	331.38	0.00	2.63	1073.47	381.78	0.16
1	18339	100YR	1560.00	321.19	331.55	328.41	331.61	0.00	2.81	1161.48	407.11	0.17
1	18339	250YR	1860.00	321.19	331.83	328.65	331.89	0.00	3.05	1278.04	430.80	0.19
1	18339	500YR	2110.00	321.19	332.05	328.82	332.12	0.00	3.21	1374.51	455.62	0.19
1	18369	2YR	580.00	322.00	328.02	327.38	328.27	0.00	4.78	199.23	149.81	0.46
1	18369	5YR	800.00	322.00	329.14	327.73	329.24	0.00	3.44	392.24	231.58	0.29
1	18369	10YR	950.00	322.00	330.43	327.90	330.47	0.00	2.32	759.43	285.95	0.17
1	18369	25YR	1170.00	322.00	331.07	328.28	331.11	0.00	2.27	951.18	311.09	0.16
1	18369	50YR	1360.00	322.00	331.35	328.43	331.40	0.00	2.54	1046.06	366.92	0.17
1	18369	100YR	1560.00	322.00	331.58	328.65	331.63	0.00	2.75	1131.93	397.36	0.18
1	18369	250YR	1860.00	322.00	331.86	328.86	331.91	0.00	3.01	1249.48	439.12	0.20
1	18369	500YR	2110.00	322.00	332.08	329.01	332.14	0.00	3.16	1349.30	465.69	0.20
1	18454	2YR	580.00	323.52	328.40	327.31	328.57	0.00	3.69	219.81	166.83	0.37
1	18454	5YR	800.00	323.52	329.26	327.82	329.37	0.00	3.28	399.68	219.44	0.29
1	18454	10YR	950.00	323.52	330.46	327.99	330.51	0.00	2.30	685.51	261.30	0.18
1	18454	25YR	1170.00	323.52	331.10	328.26	331.15	0.00	2.28	865.35	299.42	0.17
1	18454	50YR	1360.00	323.52	331.39	328.47	331.44	0.00	2.50	953.98	344.35	0.18
1	18454	100YR	1560.00	323.52	331.61	328.54	331.68	0.00	2.77	1033.57	362.06	0.19
1	18454	250YR	1860.00	323.52	331.90	329.06	331.97	0.00	3.07	1144.15	410.72	0.21
1	18454	500YR	2110.00	323.52	332.12	329.22	332.20	0.00	3.28	1238.46	449.29	0.22
1	18517	2YR	580.00	324.58	328.57	327.00	328.72	0.00	3.22	204.13	171.74	0.32
1	18517	5YR	800.00	324.58	329.36	327.37	329.47	0.00	2.95	411.12	225.84	0.26
1	18517	10YR	950.00	324.58	330.49	327.60	330.54	0.00	2.20	695.15	267.67	0.17
1	18517	25YR	1170.00	324.58	331.13	327.97	331.18	0.00	2.18	869.52	282.48	0.16
1	18517	50YR	1360.00	324.58	331.42	328.20	331.47	0.00	2.36	957.96	327.95	0.17
1	18517	100YR	1560.00	324.58	331.65	328.42	331.71	0.00	2.52	1040.31	384.81	0.18
1	18517	250YR	1860.00	324.58	331.94	328.89	332.02	0.00	2.99	1163.21	459.85	0.21
1	18517	500YR	2110.00	324.58	332.16	329.11	332.25	0.00	3.12	1268.70	472.54	0.21
1	18565 Michael Meagher		Culvert									
1	18601 T	2YR	580.00	323.27	328.97	326.23	329.09	0.00	2.78	228.95	175.89	0.24
1	18601 T	5YR	800.00	323.27	330.28	326.76	330.34	0.00	2.25	551.11	212.60	0.17
1	18601 T	10YR	950.00	323.27	331.09	327.07	331.14	0.00	2.10	730.09	231.48	0.15
1	18601 T	25YR	1170.00	323.27	331.50	327.48	331.56	0.00	2.33	829.74	248.34	0.16
1	18601 T	50YR	1360.00	323.27	331.72	327.78	331.79	0.00	2.58	883.90	259.01	0.17
1	18601 T	100YR	1560.00	323.27	331.91	328.09	331.99	0.00	2.84	935.96	314.79	0.19
1	18601 T	250YR	1860.00	323.27	332.12	328.61	332.23	0.00	3.29	1009.46	362.79	0.22
1	18601 T	500YR	2110.00	323.27	332.29	328.93	332.42	0.00	3.55	1073.45	379.68	0.23
1	18632	2YR	580.00	323.50	328.96	328.19	329.24	0.01	4.48	160.33	141.23	0.48
1	18632	5YR	800.00	323.50	330.28	328.58	330.39	0.00	3.11	407.87	186.96	0.27
1	18632	10YR	950.00	323.50	331.09	328.80	331.17	0.00	2.73	566.85	205.36	0.22
1	18632	25YR	1170.00	323.50	331.51	329.09	331.60	0.00	3.02	659.47	258.08	0.23

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	18632	50YR	1360.00	323.50	331.72	329.30	331.83	0.00	3.27	715.80	264.59	0.25
1	18632	100YR	1560.00	323.50	331.92	329.54	332.03	0.00	3.54	767.63	274.09	0.26
1	18632	250YR	1860.00	323.50	332.13	329.89	332.28	0.00	3.99	833.61	328.95	0.29
1	18632	500YR	2110.00	323.50	332.30	330.15	332.48	0.00	4.39	892.14	367.23	0.3
1	18931	2YR	580.00	325.23	330.00		330.05	0.00	2.27	453.23	337.92	0.26
1	18931	5YR	800.00	325.23	330.69		330.72	0.00	2.00	689.57	352.80	0.20
1	18931	10YR	950.00	325.23	331.34		331.36	0.00	1.74	924.31	365.75	0.16
1	18931	25YR	1170.00	325.23	331.77		331.79	0.00	1.81	1082.88	374.87	0.16
1	18931	50YR	1360.00	325.23	332.01		332.04	0.00	1.93	1173.92	381.33	0.16
1	18931	100YR	1560.00	325.23	332.23		332.26	0.00	2.06	1259.80	388.18	0.17
1	18931	250YR	1860.00	325.23	332.51		332.55	0.00	2.27	1369.21	399.64	0.18
1	18931	500YR	2110.00	325.23	332.73		332.78	0.00	2.42	1459.36	410.85	0.19
1	19044	2YR	580.00	326.22	330.24		330.35	0.00	3.17	331.60	290.42	0.34
1	19044	5YR	800.00	326.22	330.84		330.91	0.00	2.83	514.73	325.05	0.28
1	19044	10YR	950.00	326.22	331.43		331.48	0.00	2.36	718.08	358.02	0.22
1	19044	25YR	1170.00	326.22	331.86		331.90	0.00	2.36	877.33	408.29	0.22
1	19044	50YR	1360.00	326.22	332.10		332.15	0.00	2.45	985.41	457.83	0.22
1	19044	100YR	1560.00	326.22	332.33		332.38	0.00	2.53	1093.72	482.78	0.22
1	19044	250YR	1860.00	326.22	332.63		332.68	0.00	2.76	1242.25	528.49	0.24
1	19044	500YR	2110.00	326.22	332.85		332.91	0.00	2.82	1365.59	543.67	0.24
1	19175	2YR	580.00	327.20	330.52	330.02	330.63	0.00	4.30	364.13	323.41	0.64
1	19175	5YR	800.00	327.20	331.02	330.20	331.11	0.00	4.10	502.93	373.28	0.56
1	19175	10YR	950.00	327.20	331.53	330.30	331.62	0.00	3.87	665.06	474.22	0.49
1	19175	25YR	1170.00	327.20	331.94	330.45	332.02	0.00	3.77	815.18	503.99	0.45
1	19175	50YR	1360.00	327.20	332.19	330.61	332.27	0.00	3.87	907.37	517.01	0.45
1	19175	100YR	1560.00	327.20	332.41	330.65	332.51	0.00	4.01	995.00	530.92	0.45
1	19175	250YR	1860.00	327.20	332.71	330.82	332.82	0.00	4.27	1111.46	552.14	0.47
1	19175	500YR	2110.00	327.20	332.93	330.96	333.05	0.00	4.50	1203.50	574.18	0.48
1	19274	2YR	580.00	327.50	330.61	329.43	330.94	0.00	6.44	273.84	300.45	0.75
1	19274	5YR	800.00	327.50	331.08	329.95	331.35	0.00	6.26	416.98	400.58	0.69
1	19274	10YR	950.00	327.50	331.60	330.05	331.77	0.00	5.28	598.70	457.25	0.55
1	19274	25YR	1170.00	327.50	332.00	330.05	332.15	0.00	5.22	753.29	539.02	0.52
1	19274	50YR	1360.00	327.50	332.24	331.22	332.39	0.00	5.31	854.42	568.39	0.52
1	19274	100YR	1560.00	327.50	332.47	331.38	332.63	0.00	5.56	950.55	593.29	0.53
1	19274	250YR	1860.00	327.50	332.77	331.55	332.94	0.00	5.73	1081.93	622.75	0.53
1	19274	500YR	2110.00	327.50	333.00	331.59	333.18	0.00	5.93	1185.93	651.62	0.54
1	19408	2YR	580.00	328.01	331.99	331.99	332.88	0.00	8.01	144.11	478.11	0.8
1	19408	5YR	800.00	328.01	332.62	332.62	333.27	0.00	7.49	289.35	593.16	0.7
1	19408	10YR	950.00	328.01	332.81	332.81	333.50	0.00	7.94	338.82	617.56	0.76
1	19408	25YR	1170.00	328.01	333.06	333.06	333.80	0.00	8.50	408.53	665.24	0.80
1	19408	50YR	1360.00	328.01	333.28	333.28	334.02	0.00	8.77	477.41	723.93	0.80
1	19408	100YR	1560.00	328.01	333.32	333.32	334.25	0.00	9.85	490.69	733.88	0.90
1	19408	250YR	1860.00	328.01	333.65	333.65	334.52	0.00	9.93	607.97	811.55	0.88
1	19408	500YR	2110.00	328.01	333.96	333.96	334.73	0.00	9.64	724.49	835.58	0.83
1	19540	2YR	330.00	328.09	333.00	330.76	333.14	0.00	3.05	108.23	75.64	0.34
1	19540	5YR	460.00	328.09	333.31	331.29	333.52	0.00	3.72	141.71	192.30	0.40
1	19540	10YR	550.00	328.09	333.52	331.61	333.77	0.00	4.06	168.59	219.73	0.42
1	19540	25YR	660.00	328.09	333.81	331.98	334.09	0.00	4.34	204.35	320.13	0.43
1	19540	50YR	750.00	328.09	334.05	332.45	334.30	0.00	4.26	335.39	382.29	0.41
1	19540	100YR	860.00	328.09	334.32	332.75	334.56	0.00	4.32	424.70	485.68	0.40
1	19540	250YR	1030.00	328.09	334.56	333.24	334.84	0.00	4.69	514.87	576.26	0.42
1	19540	500YR	1160.00	328.09	334.73	333.54	335.02	0.00	4.87	583.65	611.22	0.43
1	19612	2YR	330.00	328.65	333.10	330.68	333.18	0.00	2.28	145.02	92.07	0.23
1	19612	5YR	460.00	328.65	333.46	331.07	333.58	0.00	2.82	164.04	145.63	0.28
1	19612	10YR	550.00	328.65	333.69	331.30	333.84	0.00	3.14	176.75	234.52	0.30
1	19612	25YR	660.00	328.65	333.96	331.58	334.15	0.00	3.49	192.79	244.32	0.32
1	19612	50YR	750.00	328.65	334.19	331.79	334.36	0.00	3.47	357.85	249.97	0.31
1	19612	100YR	860.00	328.65	334.43	332.02	334.62	0.00	3.64	419.36	275.37	0.31
1	19612	250YR	1030.00	328.65	334.67	332.36	334.89	0.00	4.02	483.38	419.25	0.34
1	19612	500YR	1160.00	328.65	334.81	332.63	335.07	0.00	4.40	566.65	449.88	0.36
1	19661 Cowhorn Creek Rd		Culvert									
1	19719	2YR	330.00	329.53	333.18	330.85	333.25	0.00	2.06	165.36	102.40	0.20
1	19719	5YR	460.00	329.53	333.64	331.16	333.74	0.00	2.51	197.10	206.72	0.23
1	19719	10YR	550.00	329.53	333.97	331.36	334.08	0.00	2.75	220.25	228.66	0.24
1	19719	25YR	660.00	329.53	334.40	331.59	334.54	0.00	2.96	251.12	261.05	0.25
1	19719	50YR	750.00	329.53	334.82	331.76	334.92	0.00	2.68	525.47	283.51	0.21
1	19719	100YR	860.00	329.53	335.14	331.97	335.24	0.00	2.80	608.60	302.12	0.21
1	19719	250YR	1030.00	329.53	335.43	332.26	335.56	0.00	3.11	691.66	346.01	0.23
1	19719	500YR	1160.00	329.53	335.57	332.48	335.72	0.00	3.46	739.09	435.56	0.26
1	19760	2YR	330.00	330.42	333.17	332.15	333.28	0.00	2.75	135.99	172.89	0.34
1	19760	5YR	460.00	330.42	333.63	332.43	333.77	0.00	3.08	176.58	198.07	0.3
1	19760	10YR	550.00	330.42	333.96	332.58	334.11	0.00	3.22	211.29	223.14	0.34
1	19760	25YR	660.00	330.42	334.40	332.76	334.56	0.00	3.30	264.24	250.41	0.32
1	19760	50YR	750.00	330.42	334.84	332.90	334.93	0.00	2.74	546.52	271.85	0.25
1	19760	100YR	860.00	330.42	335.16	333.06	335.25	0.00	2.81	637.79	313.60	0.25
1	19760	250YR	1030.00	330.42	335.46	333.29	335.57	0.00	3.07	743.90	402.86	0.26
1	19760	500YR	1160.00	330.42	335.62	333.46	335.74	0.00	3.29	812.75	458.07	0.27

HEC-RAS Plan: Cowhorn_Ultimate River: Cowhorn Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	19937 U	2YR	280.00	331.88	333.34		333.58	0.03	4.49	78.98	93.84	0.75
1	19937 U	5YR	390.00	331.88	333.83		334.01	0.01	3.99	129.32	110.71	0.55
1	19937 U	10YR	460.00	331.88	334.16		334.32	0.01	3.76	168.03	125.96	0.48
1	19937 U	25YR	570.00	331.88	334.60		334.73	0.01	3.58	228.10	146.38	0.41
1	19937 U	50YR	650.00	331.88	334.92		335.04	0.01	3.41	277.37	157.90	0.37
1	19937 U	100YR	750.00	331.88	335.24		335.35	0.00	3.35	329.25	166.89	0.34
1	19937 U	250YR	890.00	331.88	335.56		335.67	0.00	3.44	382.83	174.99	0.33
1	19937 U	500YR	1010.00	331.88	335.72		335.85	0.00	3.64	412.89	179.95	0.34
1	20146	2YR	280.00	334.58	336.45		336.55	0.01	3.30	164.00	208.15	0.45
1	20146	5YR	390.00	334.58	336.54		336.69	0.01	4.13	184.43	215.21	0.54
1	20146	10YR	460.00	334.58	336.58		336.77	0.02	4.67	192.96	218.09	0.61
1	20146	25YR	570.00	334.58	336.65		336.90	0.02	5.37	208.94	223.39	0.69
1	20146	50YR	650.00	334.58	336.69		336.99	0.02	5.89	217.77	226.26	0.75
1	20146	100YR	750.00	334.58	336.78	336.64	337.10	0.02	6.25	237.60	230.52	0.77
1	20146	250YR	890.00	334.58	336.96		337.27	0.02	6.28	280.26	236.44	0.75
1	20146	500YR	1010.00	334.58	337.14		337.42	0.02	6.19	321.60	241.39	0.71
1	20432	2YR	280.00	335.34	337.80		337.85	0.00	2.22	220.93	156.54	0.26
1	20432	5YR	390.00	335.34	338.16		338.21	0.00	2.48	280.68	206.98	0.27
1	20432	10YR	460.00	335.34	338.34		338.40	0.00	2.62	324.20	242.57	0.28
1	20432	25YR	570.00	335.34	338.60		338.67	0.00	2.82	393.30	286.85	0.29
1	20432	50YR	650.00	335.34	338.77		338.83	0.00	2.91	442.30	305.75	0.29
1	20432	100YR	750.00	335.34	338.96		339.03	0.00	3.07	505.61	379.46	0.30
1	20432	250YR	890.00	335.34	339.20		339.28	0.00	3.40	604.55	414.38	0.32
1	20432	500YR	1010.00	335.34	339.33		339.41	0.00	3.54	656.25	417.28	0.32
1	20767	2YR	280.00	336.63	338.88		338.95	0.00	2.57	172.78	128.18	0.31
1	20767	5YR	390.00	336.63	339.26		339.35	0.00	2.91	227.62	162.40	0.32
1	20767	10YR	460.00	336.63	339.47		339.57	0.00	3.11	263.87	187.65	0.33
1	20767	25YR	570.00	336.63	339.75		339.85	0.00	3.33	319.02	211.24	0.34
1	20767	50YR	650.00	336.63	339.91		340.02	0.00	3.46	354.63	220.90	0.34
1	20767	100YR	750.00	336.63	340.11		340.23	0.00	3.59	400.55	232.76	0.34
1	20767	250YR	890.00	336.63	340.40		340.52	0.00	3.70	469.88	250.27	0.34
1	20767	500YR	1010.00	336.63	340.57		340.70	0.00	3.91	514.49	267.24	0.35
1	21052 V	2YR	280.00	338.25	340.14	339.40	340.21	0.01	2.29	162.34	148.86	0.33
1	21052 V	5YR	390.00	338.25	340.50	339.56	340.57	0.00	2.51	219.47	180.55	0.33
1	21052 V	10YR	460.00	338.25	340.68	339.64	340.76	0.00	2.59	253.59	184.03	0.32
1	21052 V	25YR	570.00	338.25	340.93	339.81	341.02	0.00	2.73	300.28	188.68	0.32
1	21052 V	50YR	650.00	338.25	341.10	339.88	341.20	0.00	2.89	333.74	206.02	0.33
1	21052 V	100YR	750.00	338.25	341.29	340.06	341.39	0.00	3.00	371.74	208.81	0.33
1	21052 V	250YR	890.00	338.25	341.53	340.22	341.64	0.00	3.15	422.82	226.02	0.33
1	21052 V	500YR	1010.00	338.25	341.73	340.33	341.84	0.00	3.27	464.87	246.30	0.33

HEC-RAS Plan: CowEast_Ult River: CowEast Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	223	2YR	560.00	320.89	325.78	323.70	325.83	0.00	2.15	454.12	300.59	0.19
1	223	5YR	750.00	320.89	328.06	324.05	328.07	0.00	1.07	1392.21	470.16	0.08
1	223	10YR	880.00	320.89	328.83	324.26	328.84	0.00	0.98	1792.24	559.32	0.07
1	223	25YR	1060.00	320.89	329.51	324.53	329.52	0.00	0.96	2218.01	671.09	0.0
1	223	50YR	1190.00	320.89	329.91	324.69	329.92	0.00	0.97	2493.40	703.95	0.06
1	223	100YR	1330.00	320.89	330.18	324.82	330.19	0.00	1.01	2691.22	764.42	0.06
1	223	250YR	1530.00	320.89	330.41	325.08	330.42	0.00	1.09	2869.92	789.23	0.07
1	223	500YR	1720.00	320.89	330.85	325.30	330.86	0.00	1.11	3229.57	851.06	0.07
1	308	2YR	560.00	321.85	325.82	324.37	325.95	0.00	3.04	241.22	168.75	0.31
1	308	5YR	750.00	321.85	328.06	324.72	328.08	0.00	1.50	897.44	352.79	0.12
1	308	10YR	880.00	321.85	328.83	325.06	328.85	0.00	1.35	1172.56	362.90	0.10
1	308	25YR	1060.00	321.85	329.51	325.31	329.53	0.00	1.33	1431.02	413.28	0.09
1	308	50YR	1190.00	321.85	329.91	325.49	329.93	0.00	1.34	1615.03	521.64	0.09
1	308	100YR	1330.00	321.85	330.18	325.68	330.20	0.00	1.39	1770.80	620.44	0.09
1	308	250YR	1530.00	321.85	330.41	325.86	330.43	0.00	1.50	1918.02	658.35	0.10
1	308	500YR	1720.00	321.85	330.85	326.03	330.87	0.00	1.49	2227.72	752.52	0.09
1	412	2YR	560.00	319.80	326.01	322.58	326.07	0.00	2.07	275.64	131.71	0.18
1	412	5YR	750.00	319.80	328.08	322.94	328.11	0.00	1.51	673.82	182.79	0.11
1	412	10YR	880.00	319.80	328.84	323.18	328.87	0.00	1.50	816.02	190.72	0.10
1	412	25YR	1060.00	319.80	329.52	323.51	329.55	0.00	1.59	947.32	197.76	0.10
1	412	50YR	1190.00	319.80	329.92	323.72	329.95	0.00	1.66	1039.55	272.92	0.10
1	412	100YR	1330.00	319.80	330.19	323.94	330.22	0.00	1.77	1116.22	293.86	0.11
1	412	250YR	1530.00	319.80	330.42	324.23	330.46	0.00	1.95	1190.81	377.56	0.12
1	412	500YR	1720.00	319.80	330.85	324.51	330.90	0.00	2.01	1393.23	584.78	0.12
1	467 Private Dr.		Culvert									
1	496 A	2YR	560.00	322.08	326.48	324.27	326.62	0.00	3.03	184.94	81.84	0.29
1	496 A	5YR	750.00	322.08	328.89	324.65	328.97	0.00	2.26	333.49	397.07	0.18
1	496 A	10YR	880.00	322.08	330.00	324.90	330.07	0.00	2.17	413.34	465.57	0.15
1	496 A	25YR	1060.00	322.08	330.92	325.21	330.93	0.00	1.25	1600.54	518.83	0.08
1	496 A	50YR	1190.00	322.08	331.20	325.43	331.21	0.00	1.30	1747.23	542.69	0.08
1	496 A	100YR	1330.00	322.08	331.38	325.65	331.40	0.00	1.38	1848.68	555.24	0.09
1	496 A	250YR	1530.00	322.08	331.59	325.95	331.61	0.00	1.49	1965.64	568.01	0.09
1	496 A	500YR	1720.00	322.08	331.82	326.20	331.84	0.00	1.59	2098.63	623.30	0.10
1	537	2YR	560.00	322.25	326.53	325.30	326.74	0.00	3.69	160.50	110.14	0.41
1	537	5YR	750.00	322.25	328.94	325.69	329.00	0.00	2.06	461.50	357.16	0.16
1	537	10YR	880.00	322.25	330.05	325.92	330.09	0.00	1.84	607.36	402.65	0.13
1	537	25YR	1060.00	322.25	330.92	326.20	330.94	0.00	1.25	1576.69	475.15	0.0
1	537	50YR	1190.00	322.25	331.20	326.43	331.22	0.00	1.31	1710.18	493.97	0.0
1	537	100YR	1330.00	322.25	331.39	326.62	331.40	0.00	1.39	1802.80	506.83	0.09
1	537	250YR	1530.00	322.25	331.59	326.86	331.61	0.00	1.52	1909.82	518.46	0.10
1	537	500YR	1720.00	322.25	331.82	327.10	331.84	0.00	1.61	2028.62	527.87	0.10
1	682	2YR	560.00	323.47	326.97	325.77	327.11	0.00	3.04	208.80	164.43	0.35
1	682	5YR	750.00	323.47	329.01	326.06	329.05	0.00	1.63	734.95	354.95	0.14
1	682	10YR	880.00	323.47	330.10	326.23	330.12	0.00	1.28	1129.86	429.65	0.10
1	682	25YR	1060.00	323.47	330.94	326.47	330.95	0.00	1.20	1540.61	465.22	0.08
1	682	50YR	1190.00	323.47	331.21	326.66	331.23	0.00	1.25	1670.52	474.79	0.09
1	682	100YR	1330.00	323.47	331.40	326.90	331.42	0.00	1.33	1759.58	482.08	0.09
1	682	250YR	1530.00	323.47	331.61	327.11	331.63	0.00	1.45	1862.27	492.72	0.10
1	682	500YR	1720.00	323.47	331.84	327.31	331.86	0.00	1.55	1976.22	508.63	0.10
1	798	2YR	560.00	322.49	327.23	325.86	327.41	0.00	3.41	164.52	155.89	0.40
1	798	5YR	750.00	322.49	329.05	326.27	329.09	0.00	1.84	637.15	361.13	0.16
1	798	10YR	880.00	322.49	330.12	326.51	330.14	0.00	1.39	1047.56	427.43	0.11
1	798	25YR	1060.00	322.49	330.95	326.79	330.96	0.00	1.29	1446.90	503.34	0.09
1	798	50YR	1190.00	322.49	331.22	326.98	331.24	0.00	1.34	1591.62	541.98	0.09
1	798	100YR	1330.00	322.49	331.41	327.16	331.43	0.00	1.42	1695.51	562.25	0.10
1	798	250YR	1530.00	322.49	331.62	327.38	331.65	0.00	1.54	1816.49	576.84	0.11
1	798	500YR	1720.00	322.49	331.85	327.59	331.88	0.00	1.62	1950.45	589.26	0.11
1	824 Michael Meagher		Culvert									
1	850	2YR	560.00	321.47	327.65	324.88	327.73	0.00	2.29	245.31	175.95	0.22
1	850	5YR	750.00	321.47	329.87	325.33	329.92	0.00	1.80	418.91	382.21	0.14
1	850	10YR	880.00	321.47	330.70	325.59	330.72	0.00	1.21	1283.22	443.80	0.09
1	850	25YR	1060.00	321.47	331.09	325.90	331.11	0.00	1.31	1459.86	466.42	0.09
1	850	50YR	1190.00	321.47	331.29	326.11	331.31	0.00	1.39	1552.87	474.81	0.09
1	850	100YR	1330.00	321.47	331.45	326.32	331.48	0.00	1.48	1633.57	482.44	0.10
1	850	250YR	1530.00	321.47	331.65	326.60	331.68	0.00	1.63	1729.12	496.13	0.11
1	850	500YR	1720.00	321.47	331.90	326.85	331.93	0.00	1.72	1857.01	546.35	0.11
1	903	2YR	560.00	324.30	327.69	326.51	327.82	0.00	3.36	229.87	199.68	0.36
1	903	5YR	750.00	324.30	329.90	326.81	329.94	0.00	1.94	624.69	330.55	0.15
1	903	10YR	880.00	324.30	330.71	327.06	330.72	0.00	1.37	1296.55	437.58	0.10
1	903	25YR	1060.00	324.30	331.10	327.26	331.11	0.00	1.48	1472.41	470.49	0.11
1	903	50YR	1190.00	324.30	331.29	327.40	331.31	0.00	1.57	1567.23	483.98	0.1
1	903	100YR	1330.00	324.30	331.46	327.54	331.48	0.00	1.67	1650.10	491.09	0.12
1	903	250YR	1530.00	324.30	331.66	327.72	331.69	0.00	1.81	1747.75	495.90	0.12
1	903	500YR	1720.00	324.30	331.91	327.73	331.94	0.00	1.90	1872.98	502.40	0.13
1	1032	2YR	560.00	324.75	328.00		328.21	0.00	4.14	211.83	177.66	0.47
1	1032	5YR	750.00	324.75	329.95		329.99	0.00	2.16	626.14	267.52	0.18
1	1032	10YR	880.00	324.75	330.72		330.75	0.00	1.93	853.42	341.38	0.15

HEC-RAS Plan: CowEast_Ult River: CowEast Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1032	25YR	1060.00	324.75	331.11		331.14	0.00	2.07	994.42	382.15	0.16
1	1032	50YR	1190.00	324.75	331.31		331.35	0.00	2.23	1071.84	393.59	0.17
1	1032	100YR	1330.00	324.75	331.48		331.52	0.00	2.34	1139.38	396.29	0.17
1	1032	250YR	1530.00	324.75	331.68		331.73	0.00	2.51	1218.90	399.88	0.18
1	1032	500YR	1720.00	324.75	331.93		331.98	0.00	2.60	1320.54	412.11	0.18
1	1357 B	2YR	370.00	323.66	329.17		329.39	0.00	3.74	100.67	46.15	0.42
1	1357 B	5YR	510.00	323.66	330.10		330.28	0.00	3.56	187.23	162.09	0.34
1	1357 B	10YR	610.00	323.66	330.82		330.93	0.00	3.02	337.58	239.01	0.26
1	1357 B	25YR	750.00	323.66	331.21		331.32	0.00	3.12	443.05	293.96	0.26
1	1357 B	50YR	870.00	323.66	331.42		331.54	0.00	3.27	507.77	311.96	0.27
1	1357 B	100YR	990.00	323.66	331.60		331.73	0.00	3.42	564.62	324.46	0.27
1	1357 B	250YR	1190.00	323.66	331.82		331.96	0.00	3.73	635.34	338.48	0.29
1	1357 B	500YR	1350.00	323.66	332.07		332.21	0.00	3.78	723.68	353.16	0.29
1	1607	2YR	370.00	324.80	330.09		330.26	0.00	3.31	111.73	62.40	0.44
1	1607	5YR	510.00	324.80	330.71		330.88	0.00	3.27	161.63	128.78	0.40
1	1607	10YR	610.00	324.80	331.16		331.30	0.00	3.10	232.48	196.19	0.34
1	1607	25YR	750.00	324.80	331.52		331.66	0.00	3.16	312.85	234.09	0.33
1	1607	50YR	870.00	324.80	331.74		331.89	0.00	3.30	364.78	246.07	0.33
1	1607	100YR	990.00	324.80	331.92		332.08	0.00	3.46	413.00	281.31	0.34
1	1607	250YR	1190.00	324.80	332.17		332.35	0.00	3.71	484.71	302.79	0.35
1	1607	500YR	1350.00	324.80	332.40		332.58	0.00	3.78	557.94	315.21	0.34
1	1718	2YR	370.00	326.60	330.49	329.65	330.83	0.01	4.88	96.35	88.38	0.52
1	1718	5YR	510.00	326.60	331.02	330.25	331.34	0.01	5.02	154.51	131.21	0.49
1	1718	10YR	610.00	326.60	331.37	330.63	331.66	0.00	4.91	208.86	163.22	0.46
1	1718	25YR	750.00	326.60	331.71	331.00	331.99	0.00	5.06	268.44	200.75	0.45
1	1718	50YR	870.00	326.60	331.92	331.28	332.21	0.00	5.27	316.39	252.16	0.46
1	1718	100YR	990.00	326.60	332.11	331.40	332.42	0.00	5.53	367.94	287.38	0.47
1	1718	250YR	1190.00	326.60	332.38	331.61	332.67	0.00	5.62	449.64	320.04	0.46
1	1718	500YR	1350.00	326.60	332.62	331.86	332.88	0.00	5.47	525.48	332.03	0.44
1	1826 C	2YR	370.00	327.20	331.31	329.91	331.50	0.01	3.55	104.14	64.32	0.47
1	1826 C	5YR	510.00	327.20	331.69	330.36	331.94	0.01	4.01	127.13	76.39	0.49
1	1826 C	10YR	610.00	327.20	331.90	330.82	332.20	0.01	4.37	139.71	96.81	0.50
1	1826 C	25YR	750.00	327.20	332.19	331.24	332.54	0.01	4.78	157.05	122.43	0.52
1	1826 C	50YR	870.00	327.20	332.40	331.43	332.81	0.01	5.14	169.33	161.23	0.54
1	1826 C	100YR	990.00	327.20	332.59	331.61	333.05	0.01	5.47	180.84	230.63	0.56
1	1826 C	250YR	1190.00	327.20	332.81	331.88	333.39	0.01	6.13	194.00	375.25	0.60
1	1826 C	500YR	1350.00	327.20	332.96	332.08	333.64	0.01	6.64	203.17	411.54	0.64
1	1860 Morris Ln.		Culvert									
1	1883 D	2YR	370.00	328.48	331.25	330.52	331.58	0.00	4.56	81.46	47.17	0.57
1	1883 D	5YR	510.00	328.48	331.61	330.92	332.05	0.00	5.34	99.61	53.90	0.61
1	1883 D	10YR	610.00	328.48	331.66	331.16	332.26	0.00	6.25	102.14	54.67	0.71
1	1883 D	25YR	750.00	328.48	332.04	331.46	332.71	0.00	6.59	123.61	86.56	0.69
1	1883 D	50YR	870.00	328.48	332.30	331.71	333.04	0.00	6.99	139.69	104.56	0.70
1	1883 D	100YR	990.00	328.48	332.58	331.93	333.37	0.00	7.24	157.97	140.95	0.70
1	1883 D	250YR	1190.00	328.48	333.10	332.28	333.94	0.00	7.44	192.26	260.98	0.67
1	1883 D	500YR	1350.00	328.48	333.60	332.56	334.42	0.00	7.42	224.43	414.07	0.62
1	1950	2YR	370.00	328.99	331.74	331.74	332.55	0.03	7.19	51.46	32.17	1.00
1	1950	5YR	510.00	328.99	332.17	332.17	333.10	0.02	7.75	65.85	35.31	1.00
1	1950	10YR	610.00	328.99	332.74	332.74	333.38	0.01	6.62	112.89	138.18	0.76
1	1950	25YR	750.00	328.99	332.98	332.98	333.65	0.01	6.94	140.03	184.18	0.76
1	1950	50YR	870.00	328.99	333.14	333.14	333.86	0.01	7.31	157.53	200.96	0.78
1	1950	100YR	990.00	328.99	333.29	333.29	334.05	0.01	7.60	175.14	227.21	0.78
1	1950	250YR	1190.00	328.99	333.51	333.51	334.34	0.01	8.10	200.70	253.74	0.81
1	1950	500YR	1350.00	328.99	333.99	333.68	334.62	0.01	7.23	259.93	287.29	0.67
1	2063 E	2YR	370.00	329.42	333.38	332.59	333.61	0.00	3.94	105.24	80.99	0.49
1	2063 E	5YR	510.00	329.42	333.83	332.97	334.09	0.00	4.26	151.48	120.00	0.48
1	2063 E	10YR	610.00	329.42	333.93	333.19	334.26	0.00	4.82	163.66	120.00	0.53
1	2063 E	25YR	750.00	329.42	334.16	333.44	334.54	0.01	5.25	191.89	120.00	0.55
1	2063 E	50YR	870.00	329.42	334.36	333.78	334.77	0.01	5.55	215.04	120.00	0.56
1	2063 E	100YR	990.00	329.42	334.53	333.96	334.98	0.01	5.84	235.52	120.00	0.58
1	2063 E	250YR	1190.00	329.42	334.79	334.19	335.30	0.01	6.29	267.40	120.00	0.60
1	2063 E	500YR	1350.00	329.42	334.86	334.38	335.48	0.01	6.94	275.49	120.00	0.65
1	2161	2YR	370.00	330.00	333.79		334.04	0.00	3.98	95.75	54.78	0.48
1	2161	5YR	510.00	330.00	334.20		334.52	0.00	4.57	122.53	91.49	0.50
1	2161	10YR	610.00	330.00	334.37		334.76	0.00	5.08	139.85	106.00	0.54
1	2161	25YR	750.00	330.00	334.62		335.08	0.01	5.56	166.60	106.00	0.57
1	2161	50YR	870.00	330.00	334.82		335.32	0.01	5.92	187.62	106.00	0.58
1	2161	100YR	990.00	330.00	335.00		335.55	0.01	6.25	206.77	106.00	0.60
1	2161	250YR	1190.00	330.00	335.28		335.90	0.01	6.74	236.19	106.00	0.62
1	2161	500YR	1350.00	330.00	335.44		336.15	0.01	7.21	253.47	106.00	0.65
1	2249 F	2YR	370.00	329.92	334.14		334.18	0.00	1.65	224.20	64.50	0.16
1	2249 F	5YR	510.00	329.92	334.63		334.69	0.00	1.99	262.01	95.00	0.18
1	2249 F	10YR	610.00	329.92	334.88		334.96	0.00	2.23	286.48	95.00	0.19
1	2249 F	25YR	750.00	329.92	335.21		335.31	0.00	2.53	317.31	95.00	0.21
1	2249 F	50YR	870.00	329.92	335.46		335.57	0.00	2.76	341.04	95.00	0.22
1	2249 F	100YR	990.00	329.92	335.69		335.82	0.00	2.98	362.81	95.00	0.23
1	2249 F	250YR	1190.00	329.92	336.04		336.20	0.00	3.32	396.06	95.00	0.25
1	2249 F	500YR	1350.00	329.92	336.28		336.48	0.00	3.59	419.59	95.00	0.27

HEC-RAS Plan: CowEast_Ult River: CowEast Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2263 Apartment Culver		Culvert									
1	2310	2YR	370.00	329.92	334.28	331.37	334.31	0.00	1.53	277.02	183.85	0.1
1	2310	5YR	510.00	329.92	334.71	331.64	334.75	0.00	1.81	346.25	277.10	0.16
1	2310	10YR	610.00	329.92	334.95	331.84	335.00	0.00	1.98	392.74	323.71	0.17
1	2310	25YR	750.00	329.92	335.27	332.07	335.33	0.00	2.16	464.15	458.59	0.18
1	2310	50YR	870.00	329.92	335.53	332.27	335.60	0.00	2.27	523.04	491.13	0.18
1	2310	100YR	990.00	329.92	335.78	332.46	335.85	0.00	2.37	577.61	525.46	0.19
1	2310	250YR	1190.00	329.92	336.15	332.75	336.23	0.00	2.51	662.65	574.34	0.19
1	2310	500YR	1350.00	329.92	336.43	332.95	336.51	0.00	2.62	723.91	607.60	0.19
1	2327	2YR	370.00	330.44	334.27	331.77	334.33	0.00	2.00	188.00	75.40	0.19
1	2327	5YR	510.00	330.44	334.69	332.08	334.78	0.00	2.42	227.07	109.77	0.22
1	2327	10YR	610.00	330.44	334.93	332.28	335.04	0.00	2.69	255.17	128.95	0.24
1	2327	25YR	750.00	330.44	335.25	332.54	335.38	0.00	2.99	300.34	172.34	0.25
1	2327	50YR	870.00	330.44	335.50	332.75	335.65	0.00	3.19	347.99	243.52	0.26
1	2327	100YR	990.00	330.44	335.74	332.95	335.90	0.00	3.36	399.65	332.30	0.27
1	2327	250YR	1190.00	330.44	336.12	333.27	336.28	0.00	3.48	489.08	470.30	0.27
1	2327	500YR	1350.00	330.44	336.40	333.50	336.56	0.00	3.55	553.56	496.16	0.27
1	2350 Northwood Dr.		Culvert									
1	2373 G	2YR	370.00	331.23	334.46	332.57	334.56	0.00	2.43	152.49	52.95	0.25
1	2373 G	5YR	510.00	331.23	335.12	332.87	335.23	0.00	2.71	192.38	79.94	0.26
1	2373 G	10YR	610.00	331.23	335.47	333.08	335.60	0.00	2.90	226.08	109.00	0.26
1	2373 G	25YR	750.00	331.23	335.84	333.33	335.99	0.00	3.17	271.18	138.68	0.27
1	2373 G	50YR	870.00	331.23	336.07	333.54	336.24	0.00	3.41	306.57	184.30	0.29
1	2373 G	100YR	990.00	331.23	336.27	333.74	336.46	0.00	3.63	339.78	298.13	0.30
1	2373 G	250YR	1190.00	331.23	336.55	334.06	336.76	0.00	3.94	393.41	365.25	0.31
1	2373 G	500YR	1350.00	331.23	336.74	334.30	336.97	0.00	4.16	437.11	428.93	0.32
1	2427	2YR	370.00	330.76	334.45	333.85	334.88	0.01	5.27	71.75	41.19	0.64
1	2427	5YR	510.00	330.76	335.10	334.30	335.53	0.01	5.41	104.09	61.32	0.57
1	2427	10YR	610.00	330.76	335.46	334.59	335.89	0.01	5.47	138.48	116.06	0.55
1	2427	25YR	750.00	330.76	335.85	334.97	336.24	0.01	5.43	190.03	214.66	0.51
1	2427	50YR	870.00	330.76	336.11	335.53	336.48	0.00	5.46	227.58	250.54	0.50
1	2427	100YR	990.00	330.76	336.31	335.82	336.70	0.00	5.68	259.99	322.52	0.50
1	2427	250YR	1190.00	330.76	336.62	336.05	336.99	0.00	5.73	325.05	370.06	0.49
1	2427	500YR	1350.00	330.76	336.83	336.18	337.18	0.00	5.73	370.56	406.19	0.48
1	2561	2YR	370.00	332.17	335.68	334.87	335.93	0.01	4.07	93.23	102.29	0.5
1	2561	5YR	510.00	332.17	336.12	335.24	336.41	0.01	4.43	127.93	156.78	0.5
1	2561	10YR	610.00	332.17	336.37	335.48	336.69	0.01	4.62	153.19	235.73	0.50
1	2561	25YR	750.00	332.17	336.62	335.83	336.98	0.01	4.99	183.15	295.73	0.52
1	2561	50YR	870.00	332.17	336.81	336.14	337.19	0.01	5.23	209.94	316.89	0.53
1	2561	100YR	990.00	332.17	337.01	336.34	337.39	0.01	5.35	241.54	331.16	0.52
1	2561	250YR	1190.00	332.17	337.26	336.70	337.66	0.01	5.64	283.11	343.11	0.53
1	2561	500YR	1350.00	332.17	337.43	336.91	337.86	0.01	5.92	314.66	368.61	0.55
1	2790	2YR	370.00	333.61	336.70	335.77	336.79	0.00	2.78	174.61	315.65	0.33
1	2790	5YR	510.00	333.61	337.10	336.06	337.21	0.00	3.00	229.71	358.71	0.33
1	2790	10YR	610.00	333.61	337.34	336.23	337.46	0.00	3.15	267.03	378.52	0.33
1	2790	25YR	750.00	333.61	337.63	336.45	337.75	0.00	3.32	314.04	388.06	0.33
1	2790	50YR	870.00	333.61	337.83	336.58	337.97	0.00	3.49	349.29	396.08	0.34
1	2790	100YR	990.00	333.61	338.03	336.69	338.17	0.00	3.64	383.64	406.04	0.34
1	2790	250YR	1190.00	333.61	338.30	336.90	338.46	0.00	3.89	436.23	421.23	0.35
1	2790	500YR	1350.00	333.61	338.50	337.06	338.68	0.00	4.06	478.62	444.21	0.36
1	2892 H	2YR	370.00	332.17	336.92	335.27	337.06	0.00	3.00	129.32	115.43	0.33
1	2892 H	5YR	510.00	332.17	337.32	335.71	337.49	0.00	3.43	178.61	263.65	0.35
1	2892 H	10YR	610.00	332.17	337.56	335.99	337.75	0.00	3.65	210.64	318.94	0.36
1	2892 H	25YR	750.00	332.17	337.84	336.31	338.05	0.00	3.99	253.63	377.73	0.38
1	2892 H	50YR	870.00	332.17	338.04	336.54	338.27	0.00	4.16	289.67	381.01	0.38
1	2892 H	100YR	990.00	332.17	338.24	336.76	338.48	0.00	4.32	324.58	439.03	0.39
1	2892 H	250YR	1190.00	332.17	338.52	337.40	338.77	0.00	4.55	385.89	502.30	0.39
1	2892 H	500YR	1350.00	332.17	338.73	337.58	338.99	0.00	4.69	433.90	549.47	0.39

HEC-RAS Plan: CowWest_Ult River: CowWest Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	577	2YR	700.00	309.51	314.37	312.54	314.55	0.00	3.36	208.12	68.95	0.34
1	577	5YR	940.00	309.51	314.98	312.95	315.20	0.00	3.73	255.83	93.56	0.35
1	577	10YR	1110.00	309.51	315.22	313.20	315.48	0.00	4.11	280.77	129.55	0.38
1	577	25YR	1360.00	309.51	315.46	313.55	315.79	0.00	4.67	318.07	192.38	0.42
1	577	50YR	1560.00	309.51	315.63	313.81	316.02	0.00	5.07	351.20	238.84	0.45
1	577	100YR	1770.00	309.51	315.80	314.05	316.24	0.01	5.43	392.64	295.89	0.47
1	577	250YR	2110.00	309.51	316.03	314.44	316.54	0.01	5.95	454.00	323.17	0.50
1	577	500YR	2430.00	309.51	316.24	314.79	316.82	0.01	6.39	514.07	376.67	0.52
1	849 A	2YR	700.00	309.50	317.73	317.73	318.40	0.02	7.28	128.16	159.58	0.82
1	849 A	5YR	940.00	309.50	318.07	318.07	318.82	0.02	7.86	164.36	204.78	0.83
1	849 A	10YR	1110.00	309.50	318.27	318.27	319.07	0.02	8.29	186.20	215.95	0.84
1	849 A	25YR	1360.00	309.50	318.54	318.54	319.41	0.02	8.78	217.77	232.65	0.85
1	849 A	50YR	1560.00	309.50	318.72	318.72	319.66	0.03	9.20	239.87	241.87	0.87
1	849 A	100YR	1770.00	309.50	318.92	318.92	319.91	0.03	9.51	264.66	251.62	0.88
1	849 A	250YR	2110.00	309.50	319.18	319.18	320.27	0.03	10.12	298.24	265.59	0.90
1	849 A	500YR	2430.00	309.50	319.43	319.43	320.59	0.03	10.56	331.12	287.51	0.91
1	1243	2YR	700.00	309.50	318.99	314.22	319.04	0.00	1.87	391.71	218.65	0.15
1	1243	5YR	940.00	309.50	319.50	314.76	319.58	0.00	2.23	458.05	268.45	0.17
1	1243	10YR	1110.00	309.50	319.82	315.09	319.91	0.00	2.46	499.25	294.40	0.18
1	1243	25YR	1360.00	309.50	320.24	315.52	320.35	0.00	2.77	552.82	306.01	0.20
1	1243	50YR	1560.00	309.50	320.54	315.84	320.67	0.00	2.99	591.96	316.85	0.21
1	1243	100YR	1770.00	309.50	320.83	316.15	320.98	0.00	3.21	629.39	326.73	0.22
1	1243	250YR	2110.00	309.50	321.27	316.60	321.45	0.00	3.54	686.10	346.32	0.23
1	1243	500YR	2430.00	309.50	321.65	316.98	321.85	0.00	3.83	734.44	383.29	0.24
1	1279	2YR	700.00	309.50	319.00	314.46	319.06	0.00	2.04	350.46	179.87	0.16
1	1279	5YR	940.00	309.50	319.51	314.94	319.61	0.00	2.48	393.51	284.34	0.18
1	1279	10YR	1110.00	309.50	319.83	315.25	319.95	0.00	2.76	421.16	294.41	0.20
1	1279	25YR	1360.00	309.50	320.24	315.66	320.39	0.00	3.15	456.98	311.49	0.22
1	1279	50YR	1560.00	309.50	320.54	315.97	320.72	0.00	3.43	483.05	325.22	0.23
1	1279	100YR	1770.00	309.50	320.83	316.29	321.04	0.00	3.72	507.90	336.30	0.25
1	1279	250YR	2110.00	309.50	321.26	316.75	321.52	0.00	4.15	545.39	351.61	0.27
1	1279	500YR	2430.00	309.50	321.63	317.16	321.93	0.00	4.53	577.17	365.10	0.28
1	2392	2YR	700.00	319.12	323.10		323.71	0.01	6.28	111.51	46.56	0.71
1	2392	5YR	940.00	319.12	323.72		324.40	0.01	6.62	142.08	52.06	0.71
1	2392	10YR	1110.00	319.12	324.13		324.84	0.01	6.76	164.94	67.62	0.69
1	2392	25YR	1360.00	319.12	326.44		326.75	0.00	4.52	313.16	218.14	0.35
1	2392	50YR	1560.00	319.12	328.70		328.89	0.00	3.54	464.58	337.26	0.23
1	2392	100YR	1770.00	319.12	331.33		331.35	0.00	1.47	2754.53	792.41	0.08
1	2392	250YR	2110.00	319.12	336.19		336.19	0.00	0.66	6666.90	805.86	0.03
1	2392	500YR	2430.00	319.12	341.43		341.43	0.00	0.43	10889.59	805.86	0.02
1	2415	2YR	500.00	319.22	323.74	322.12	323.94	0.00	3.59	139.28	52.17	0.39
1	2415	5YR	680.00	319.22	324.40	322.57	324.63	0.00	3.89	176.43	82.84	0.38
1	2415	10YR	800.00	319.22	324.82	322.84	325.07	0.00	4.02	201.47	106.72	0.38
1	2415	25YR	980.00	319.22	326.70	323.19	326.83	0.00	3.02	363.98	224.81	0.23
1	2415	50YR	1130.00	319.22	328.85	323.47	328.93	0.00	2.35	554.03	433.67	0.15
1	2415	100YR	1290.00	319.22	331.34	323.74	331.35	0.00	1.01	2938.22	799.22	0.06
1	2415	250YR	1540.00	319.22	336.19	324.12	336.19	0.00	0.46	6838.71	804.65	0.02
1	2415	500YR	1750.00	319.22	341.43	324.40	341.43	0.00	0.30	11054.13	804.65	0.01
1	2650 Interstate 30		Culvert									
1	2691 B	2YR	500.00	320.36	327.71	323.46	327.73	0.00	1.40	375.23	235.12	0.11
1	2691 B	5YR	680.00	320.36	328.96	323.93	328.99	0.00	1.44	495.54	409.50	0.10
1	2691 B	10YR	800.00	320.36	329.74	324.19	329.77	0.00	1.47	569.79	455.68	0.10
1	2691 B	25YR	980.00	320.36	330.83	324.54	330.87	0.00	1.52	674.52	530.52	0.10
1	2691 B	50YR	1130.00	320.36	331.62	324.80	331.66	0.00	1.57	749.75	585.49	0.09
1	2691 B	100YR	1290.00	320.36	334.18	325.06	334.18	0.00	0.51	3937.88	784.39	0.03
1	2691 B	250YR	1540.00	320.36	336.26	325.41	336.26	0.00	0.41	5698.14	883.56	0.02
1	2691 B	500YR	1750.00	320.36	341.44	325.68	341.44	0.00	0.23	10269.31	883.56	0.01
1	2853	2YR	500.00	322.95	327.75	324.89	327.77	0.00	1.23	426.83	371.45	0.11
1	2853	5YR	680.00	322.95	329.00	325.15	329.02	0.00	1.22	576.20	481.38	0.10
1	2853	10YR	800.00	322.95	329.79	325.29	329.79	0.00	0.79	1280.65	539.42	0.06
1	2853	25YR	980.00	322.95	330.88	325.48	330.89	0.00	0.73	1651.97	594.60	0.05
1	2853	50YR	1130.00	322.95	331.67	325.63	331.67	0.00	0.71	1919.29	635.02	0.04
1	2853	100YR	1290.00	322.95	334.18	325.77	334.18	0.00	0.41	4580.21	819.82	0.02
1	2853	250YR	1540.00	322.95	336.26	325.97	336.26	0.00	0.35	6421.28	964.93	0.02
1	2853	500YR	1750.00	322.95	341.44	326.12	341.44	0.00	0.20	11412.60	964.93	0.01
1	2920 Saint Michael Dr		Culvert									
1	3001	2YR	500.00	323.35	328.09	326.00	328.13	0.00	1.83	295.76	420.15	0.19
1	3001	5YR	680.00	323.35	329.60	326.33	329.64	0.00	1.49	489.23	488.29	0.12
1	3001	10YR	800.00	323.35	330.64	326.55	330.66	0.00	1.36	620.78	581.04	0.10
1	3001	25YR	980.00	323.35	331.54	326.88	331.55	0.00	0.56	2315.83	601.14	0.04
1	3001	50YR	1130.00	323.35	331.86	327.05	331.86	0.00	0.60	2507.52	628.80	0.04
1	3001	100YR	1290.00	323.35	334.19	327.21	334.19	0.00	0.40	4422.50	1066.13	0.02
1	3001	250YR	1540.00	323.35	336.27	327.45	336.27	0.00	0.32	6684.31	1086.96	0.02
1	3001	500YR	1750.00	323.35	341.44	327.62	341.44	0.00	0.19	12302.72	1086.96	0.01

HEC-RAS Plan: CowWest_Ult River: CowWest Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3039	2YR	500.00	324.12	328.13	326.09	328.16	0.00	1.65	365.80	394.81	0.17
1	3039	5YR	680.00	324.12	329.63	326.39	329.65	0.00	1.19	675.50	522.06	0.10
1	3039	10YR	800.00	324.12	330.66	326.56	330.67	0.00	1.04	887.29	560.66	0.0
1	3039	25YR	980.00	324.12	331.54	326.83	331.55	0.00	0.58	2292.07	621.05	0.04
1	3039	50YR	1130.00	324.12	331.86	327.13	331.86	0.00	0.61	2491.19	657.57	0.04
1	3039	100YR	1290.00	324.12	334.19	327.28	334.19	0.00	0.40	4384.39	957.47	0.02
1	3039	250YR	1540.00	324.12	336.27	327.47	336.27	0.00	0.33	6483.94	1040.92	0.02
1	3039	500YR	1750.00	324.12	341.44	327.63	341.44	0.00	0.20	11864.27	1040.92	0.01
1	3148	2YR	500.00	325.32	328.20	327.86	328.33	0.00	3.34	211.55	330.49	0.44
1	3148	5YR	680.00	325.32	329.66	328.06	329.67	0.00	1.23	754.51	486.93	0.12
1	3148	10YR	800.00	325.32	330.68	328.18	330.68	0.00	0.88	1163.97	553.11	0.08
1	3148	25YR	980.00	325.32	331.55	328.31	331.55	0.00	0.68	1882.18	575.00	0.05
1	3148	50YR	1130.00	325.32	331.86	328.39	331.86	0.00	0.71	2063.73	595.99	0.05
1	3148	100YR	1290.00	325.32	334.19	328.47	334.19	0.00	0.46	3797.01	1014.69	0.03
1	3148	250YR	1540.00	325.32	336.27	328.59	336.27	0.00	0.35	6074.16	1140.17	0.02
1	3148	500YR	1750.00	325.32	341.44	328.63	341.44	0.00	0.19	11967.12	1140.17	0.01
1	3268	2YR	500.00	324.87	328.66		328.78	0.00	3.14	205.07	180.12	0.38
1	3268	5YR	680.00	324.87	329.69		329.74	0.00	2.07	413.90	281.17	0.21
1	3268	10YR	800.00	324.87	330.68		330.71	0.00	1.42	778.85	428.22	0.12
1	3268	25YR	980.00	324.87	331.55		331.56	0.00	1.17	1192.39	517.82	0.09
1	3268	50YR	1130.00	324.87	331.86		331.88	0.00	1.18	1354.84	521.88	0.09
1	3268	100YR	1290.00	324.87	334.19		334.19	0.00	0.65	2766.55	883.73	0.04
1	3268	250YR	1540.00	324.87	336.27		336.27	0.00	0.47	4743.28	993.60	0.03
1	3268	500YR	1750.00	324.87	341.44		341.44	0.00	0.25	9878.41	993.60	0.01
1	3395 C	2YR	500.00	327.95	329.33		329.63	0.02	4.72	123.29	149.16	0.75
1	3395 C	5YR	680.00	327.95	329.83		330.03	0.01	4.00	208.19	191.03	0.54
1	3395 C	10YR	800.00	327.95	330.72		330.79	0.00	2.48	404.23	244.93	0.27
1	3395 C	25YR	980.00	327.95	331.57		331.61	0.00	1.95	656.34	366.04	0.18
1	3395 C	50YR	1130.00	327.95	331.88		331.92	0.00	1.96	779.12	412.01	0.18
1	3395 C	100YR	1290.00	327.95	334.19		334.20	0.00	0.93	2147.02	786.03	0.07
1	3395 C	250YR	1540.00	327.95	336.27		336.28	0.00	0.63	3888.78	877.17	0.04
1	3395 C	500YR	1750.00	327.95	341.44		341.44	0.00	0.31	8532.07	900.49	0.01

HEC-RAS Plan: Howard_Ultimate River: Howard Creek Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1526	2 YR	2060.00	247.16	258.53	256.58	258.95	0.00	6.48	883.93	989.35	0.40
1	1526	5 YR	2950.00	247.16	259.24	257.57	259.63	0.00	6.85	1275.01	1136.82	0.40
1	1526	10 YR	3490.00	247.16	259.59	258.87	259.96	0.00	7.02	1471.76	1201.25	0.41
1	1526	25 YR	4410.00	247.16	260.12	259.23	260.47	0.00	7.28	1774.88	1250.46	0.41
1	1526	50 YR	5510.00	247.16	260.68	259.55	261.03	0.00	7.57	2103.74	1319.98	0.41
1	1526	100 YR	6450.00	247.16	261.12	259.80	261.46	0.00	7.77	2361.97	1346.17	0.42
1	1526	250 YR	8590.00	247.16	262.07	260.29	262.42	0.00	8.22	2951.12	1555.95	0.42
1	1526	500 YR	10470.00	247.16	262.76	260.67	263.12	0.00	8.55	3398.93	1648.17	0.43
1	1890	2 YR	2060.00	248.43	259.78	257.66	260.16	0.00	6.00	923.70	990.44	0.38
1	1890	5 YR	2950.00	248.43	260.50	259.66	260.84	0.00	6.30	1345.73	1154.77	0.38
1	1890	10 YR	3490.00	248.43	260.85	260.01	261.19	0.00	6.52	1565.04	1267.37	0.38
1	1890	25 YR	4410.00	248.43	261.38	260.33	261.70	0.00	6.73	1900.01	1351.11	0.39
1	1890	50 YR	5510.00	248.43	261.95	260.77	262.26	0.00	6.95	2258.86	1381.02	0.39
1	1890	100 YR	6450.00	248.43	262.39	261.00	262.70	0.00	7.14	2534.89	1444.04	0.39
1	1890	250 YR	8590.00	248.43	263.33	261.48	263.63	0.00	7.43	3130.33	1699.71	0.39
1	1890	500 YR	10470.00	248.43	264.03	261.83	264.34	0.00	7.75	3571.15	1791.99	0.39
1	2182	2 YR	2060.00	251.50	260.66	258.45	261.08	0.00	6.11	622.82	856.42	0.39
1	2182	5 YR	2950.00	251.50	261.40	259.67	261.97	0.00	7.36	755.94	896.22	0.44
1	2182	10 YR	3490.00	251.50	261.77	260.13	262.43	0.00	8.04	822.68	932.60	0.47
1	2182	25 YR	4410.00	251.50	262.30	260.85	263.12	0.01	9.14	917.42	955.43	0.52
1	2182	50 YR	5510.00	251.50	262.84	261.46	263.86	0.01	10.32	1015.84	993.42	0.58
1	2182	100 YR	6450.00	251.50	263.26	261.93	264.44	0.01	11.25	1090.21	1054.13	0.61
1	2182	250 YR	8590.00	251.50	264.09	262.85	265.64	0.01	13.12	1240.87	1273.95	0.69
1	2182	500 YR	10470.00	251.50	264.71	263.59	266.59	0.01	14.63	1351.92	1471.72	0.75
1	2253 Railroad		Bridge									
1	2308	2 YR	2060.00	252.00	261.50	258.69	261.73	0.00	4.84	850.32	909.55	0.30
1	2308	5 YR	2950.00	252.00	262.58	259.36	262.85	0.00	5.51	1069.58	952.20	0.32
1	2308	10 YR	3490.00	252.00	263.16	260.17	263.46	0.00	5.85	1186.72	975.23	0.33
1	2308	25 YR	4410.00	252.00	264.05	260.83	264.39	0.00	6.37	1367.59	1037.34	0.34
1	2308	50 YR	5510.00	252.00	265.20	261.37	265.56	0.00	6.73	1601.19	1174.29	0.34
1	2308	100 YR	6450.00	252.00	265.71	261.79	266.14	0.00	7.37	1705.10	1236.86	0.37
1	2308	250 YR	8590.00	252.00	267.27	262.65	267.79	0.00	8.17	2022.14	1464.39	0.38
1	2308	500 YR	10470.00	252.00	268.04	263.32	268.68	0.00	9.20	2177.58	1524.36	0.42
1	2373	2 YR	2060.00	252.13	261.54	260.72	262.02	0.00	6.81	648.04	789.30	0.46
1	2373	5 YR	2950.00	252.13	262.67	261.35	263.10	0.00	6.94	954.50	894.39	0.43
1	2373	10 YR	3490.00	252.13	263.27	261.67	263.67	0.00	7.00	1140.72	957.48	0.42
1	2373	25 YR	4410.00	252.13	264.19	262.15	264.58	0.00	7.16	1434.29	1006.06	0.41
1	2373	50 YR	5510.00	252.13	265.38	262.69	265.72	0.00	6.93	1817.39	1095.40	0.37
1	2373	100 YR	6450.00	252.13	265.96	263.07	266.32	0.00	7.29	2002.51	1171.30	0.38
1	2373	250 YR	8590.00	252.13	267.63	263.95	267.99	0.00	7.46	2536.93	1404.79	0.37
1	2373	500 YR	10470.00	252.13	268.62	264.47	268.94	0.00	7.57	3798.54	1572.07	0.36
1	2566	2 YR	2090.00	251.90	262.14	258.73	262.63	0.00	6.05	480.98	771.10	0.37
1	2566	5 YR	2960.00	251.90	263.16	259.85	263.85	0.00	7.33	571.72	859.72	0.42
1	2566	10 YR	3490.00	251.90	263.68	260.38	264.50	0.00	8.04	618.90	888.71	0.45
1	2566	25 YR	4740.00	251.90	264.46	261.75	265.67	0.01	9.88	687.90	935.86	0.53
1	2566	50 YR	5640.00	251.90	265.47	262.65	266.80	0.01	10.45	778.30	969.19	0.54
1	2566	100 YR	6420.00	251.90	266.15	263.23	267.16	0.00	9.79	1279.08	1014.89	0.49
1	2566	250 YR	8890.00	251.90	267.63	264.82	269.01	0.01	11.64	1690.43	1353.29	0.55
1	2566	500 YR	10820.00	251.90	268.55	266.33	269.94	0.01	12.16	2005.87	1593.28	0.56
1	2613 Railroad		Bridge									
1	2644	2 YR	2090.00	252.10	263.24	257.72	263.43	0.00	3.89	704.85	686.52	0.22
1	2644	5 YR	2960.00	252.10	264.84	258.66	265.11	0.00	4.61	845.53	824.09	0.24
1	2644	10 YR	3490.00	252.10	265.75	259.13	266.06	0.00	4.96	926.08	967.53	0.25
1	2644	25 YR	4740.00	252.10	268.06	260.30	268.44	0.00	5.54	1129.07	1463.36	0.26
1	2644	50 YR	5640.00	252.10	268.95	260.93	269.42	0.00	6.16	1207.10	1633.45	0.28
1	2644	100 YR	6420.00	252.10	270.25	261.46	270.40	0.00	4.21	3486.63	2073.61	0.18
1	2644	250 YR	8890.00	252.10	271.73	262.97	271.76	0.00	2.17	9902.61	2615.07	0.09
1	2644	500 YR	10820.00	252.10	271.97	264.04	272.00	0.00	2.57	10125.42	2627.50	0.11
1	2693	2 YR	2090.00	251.80	263.29	259.28	263.49	0.00	3.96	602.60	466.94	0.24
1	2693	5 YR	2960.00	251.80	264.92	260.14	265.17	0.00	4.37	787.76	576.17	0.24
1	2693	10 YR	3490.00	251.80	265.87	260.56	266.14	0.00	4.55	896.56	673.14	0.24
1	2693	25 YR	4740.00	251.80	268.30	261.49	268.54	0.00	4.37	1386.49	1121.03	0.21
1	2693	50 YR	5640.00	251.80	269.27	262.04	269.53	0.00	4.69	1561.45	1495.18	0.22
1	2693	100 YR	6420.00	251.80	270.27	262.49	270.44	0.00	4.06	2729.41	1779.47	0.18
1	2693	250 YR	8890.00	251.80	271.74	263.88	271.76	0.00	2.26	8737.28	2580.47	0.10
1	2693	500 YR	10820.00	251.80	271.98	264.80	272.01	0.00	2.65	9010.57	2597.20	0.11
1	2718 Railroad		Bridge									
1	2745	2 YR	2090.00	251.80	263.78	258.98	264.06	0.00	4.49	534.73	95.98	0.27
1	2745	5 YR	2960.00	251.80	265.28	260.10	265.62	0.00	5.07	701.61	257.60	0.28
1	2745	10 YR	3490.00	251.80	266.51	260.67	266.84	0.00	5.05	853.27	379.65	0.26
1	2745	25 YR	4740.00	251.80	269.19	261.96	269.32	0.00	3.65	1936.54	1341.59	0.17
1	2745	50 YR	5640.00	251.80	269.50	262.70	269.59	0.00	3.52	3140.74	1440.94	0.16
1	2745	100 YR	6420.00	251.80	270.41	263.26	270.48	0.00	3.17	3874.82	1781.83	0.14
1	2745	250 YR	8890.00	251.80	271.78	265.42	271.86	0.00	3.24	4990.21	2184.76	0.14
1	2745	500 YR	10820.00	251.80	272.09	266.64	272.14	0.00	2.92	7308.18	2297.49	0.12
1	2811	2 YR	2090.00	251.80	263.87	258.21	264.16	0.00	4.47	526.71	181.49	0.26

HEC-RAS Plan: Howard_Ultimate River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2811	5 YR	2960.00	251.80	265.38	259.42	265.74	0.00	5.07	680.97	256.51	0.27
1	2811	10 YR	3490.00	251.80	266.60	260.00	266.95	0.00	5.08	812.11	433.53	0.26
1	2811	25 YR	4740.00	251.80	269.31	261.60	269.39	0.00	3.08	2593.21	1622.08	0.14
1	2811	50 YR	5640.00	251.80	269.56	262.43	269.66	0.00	3.47	2717.92	1660.67	0.1
1	2811	100 YR	6420.00	251.80	270.47	263.06	270.53	0.00	2.90	4248.84	1809.38	0.13
1	2811	250 YR	8890.00	251.80	271.84	265.40	271.90	0.00	2.96	5457.27	2216.74	0.13
1	2811	500 YR	10820.00	251.80	272.13	266.34	272.17	0.00	2.70	7748.50	2326.52	0.11
1	2856 Railroad		Bridge									
1	2891	2 YR	2090.00	252.70	264.15	258.29	264.39	0.00	3.90	557.63	69.70	0.23
1	2891	5 YR	2960.00	252.70	265.76	259.27	266.10	0.00	4.68	687.22	174.24	0.25
1	2891	10 YR	3490.00	252.70	267.25	259.82	267.60	0.00	4.74	845.59	644.34	0.24
1	2891	25 YR	4740.00	252.70	269.72	260.94	269.84	0.00	3.53	2414.11	1594.78	0.16
1	2891	50 YR	5640.00	252.70	269.86	261.67	270.02	0.00	4.08	2485.34	1635.20	0.19
1	2891	100 YR	6420.00	252.70	270.51	262.27	270.60	0.00	3.37	4196.55	1888.28	0.15
1	2891	250 YR	8890.00	252.70	271.95	264.07	272.02	0.00	3.21	5778.94	2193.39	0.14
1	2891	500 YR	10820.00	252.70	272.20	265.24	272.25	0.00	2.91	7840.06	2286.33	0.12
1	3078	2 YR	2090.00	253.73	264.48	261.21	264.58	0.00	3.00	906.76	257.06	0.20
1	3078	5 YR	2960.00	253.73	266.22	261.79	266.29	0.00	2.78	1449.13	385.39	0.16
1	3078	10 YR	3490.00	253.73	267.71	262.09	267.76	0.00	2.38	2016.88	716.58	0.13
1	3078	25 YR	4740.00	253.73	269.88	262.74	269.91	0.00	1.99	3571.98	1510.46	0.10
1	3078	50 YR	5640.00	253.73	270.07	263.18	270.12	0.00	2.28	3698.65	1587.03	0.11
1	3078	100 YR	6420.00	253.73	270.62	263.59	270.66	0.00	2.24	5155.83	1755.32	0.11
1	3078	250 YR	8890.00	253.73	272.04	264.47	272.06	0.00	2.14	7361.33	2110.21	0.10
1	3078	500 YR	10820.00	253.73	272.25	265.12	272.28	0.00	2.49	7646.90	2184.14	0.11
1	3376	2 YR	2090.00	253.98	264.71	260.63	264.85	0.00	3.28	762.69	320.79	0.21
1	3376	5 YR	2960.00	253.98	266.34	261.38	266.50	0.00	3.54	1000.71	470.78	0.21
1	3376	10 YR	3490.00	253.98	267.76	261.77	267.91	0.00	3.43	1214.88	570.43	0.19
1	3376	25 YR	4740.00	253.98	269.93	262.78	269.97	0.00	2.25	3854.85	991.30	0.11
1	3376	50 YR	5640.00	253.98	270.13	263.22	270.18	0.00	2.60	4046.03	1112.19	0.13
1	3376	100 YR	6420.00	253.98	270.67	263.58	270.72	0.00	2.62	4591.69	1312.80	0.13
1	3376	250 YR	8890.00	253.98	272.07	264.65	272.12	0.00	2.77	6378.21	1824.89	0.13
1	3376	500 YR	10820.00	253.98	272.30	265.38	272.36	0.00	3.20	6685.77	1872.08	0.15
1	3461	2 YR	2090.00	255.08	264.82	259.82	264.93	0.00	2.98	868.78	277.43	0.18
1	3461	5 YR	2960.00	255.08	266.44	260.77	266.58	0.00	3.32	1115.20	463.61	0.18
1	3461	10 YR	3490.00	255.08	267.84	261.23	267.97	0.00	3.27	1347.68	692.64	0.17
1	3461	25 YR	4740.00	255.08	269.95	262.05	269.99	0.00	2.23	4050.30	956.66	0.10
1	3461	50 YR	5640.00	255.08	270.17	262.50	270.21	0.00	2.52	4237.63	997.01	0.12
1	3461	100 YR	6420.00	255.08	270.70	262.90	270.75	0.00	2.56	4720.55	1175.43	0.12
1	3461	250 YR	8890.00	255.08	272.10	264.01	272.15	0.00	2.90	6234.10	1650.02	0.13
1	3461	500 YR	10820.00	255.08	272.33	264.78	272.40	0.00	3.36	6526.44	1696.24	0.15
1	3544 Buchanan Rd.		Bridge									
1	3662 A	2 YR	2090.00	254.40	265.14	259.67	265.25	0.00	3.14	1072.04	779.79	0.18
1	3662 A	5 YR	2960.00	254.40	266.78	261.18	266.89	0.00	3.41	1398.05	1074.99	0.18
1	3662 A	10 YR	3490.00	254.40	268.14	261.81	268.25	0.00	3.33	1670.74	1180.48	0.16
1	3662 A	25 YR	4740.00	254.40	270.15	262.66	270.17	0.00	1.85	5882.02	1351.28	0.08
1	3662 A	50 YR	5640.00	254.40	270.41	262.92	270.43	0.00	2.10	6131.11	1378.76	0.09
1	3662 A	100 YR	6420.00	254.40	270.89	263.73	270.92	0.00	2.23	6617.95	1483.60	0.10
1	3662 A	250 YR	8890.00	254.40	272.21	264.74	272.23	0.00	2.49	8008.22	1591.01	0.11
1	3662 A	500 YR	10820.00	254.40	272.48	265.41	272.50	0.00	2.18	10940.15	1620.93	0.09
1	3801	2 YR	2090.00	253.81	265.29	260.81	265.34	0.00	2.28	1773.83	899.99	0.15
1	3801	5 YR	2960.00	253.81	266.93	261.41	266.97	0.00	2.20	2604.45	1199.03	0.13
1	3801	10 YR	3490.00	253.81	268.28	261.67	268.32	0.00	2.02	3286.93	1295.40	0.11
1	3801	25 YR	4740.00	253.81	270.17	262.61	270.19	0.00	1.38	7542.53	1502.09	0.07
1	3801	50 YR	5640.00	253.81	270.44	263.10	270.45	0.00	1.57	7869.50	1525.09	0.08
1	3801	100 YR	6420.00	253.81	270.92	263.54	270.94	0.00	1.64	8488.30	1550.35	0.08
1	3801	250 YR	8890.00	253.81	272.24	264.36	272.26	0.00	1.66	11369.50	1598.21	0.08
1	3801	500 YR	10820.00	253.81	272.50	265.17	272.52	0.00	1.93	11785.36	1618.34	0.09
1	4481 B	2 YR	2250.00	254.71	265.76	264.05	265.81	0.00	3.15	1940.75	991.06	0.19
1	4481 B	5 YR	3120.00	254.71	267.21	264.70	267.23	0.00	2.24	3347.32	1096.05	0.12
1	4481 B	10 YR	3700.00	254.71	268.46	264.81	268.48	0.00	1.75	4595.10	1134.62	0.09
1	4481 B	25 YR	4780.00	254.71	270.24	265.14	270.25	0.00	1.37	7030.38	1196.86	0.07
1	4481 B	50 YR	5590.00	254.71	270.52	265.28	270.53	0.00	1.51	7362.44	1208.39	0.07
1	4481 B	100 YR	6370.00	254.71	271.01	265.40	271.02	0.00	1.56	7960.71	1231.00	0.07
1	4481 B	250 YR	8980.00	254.71	272.32	265.77	272.34	0.00	1.80	9717.94	1452.39	0.08
1	4481 B	500 YR	10900.00	254.71	272.61	266.01	272.63	0.00	2.08	10134.71	1469.71	0.09
1	5380	2 YR	1930.00	256.86	266.53		266.56	0.00	1.87	2079.40	913.29	0.13
1	5380	5 YR	2790.00	256.86	267.68		267.71	0.00	2.03	3349.57	1190.14	0.13
1	5380	10 YR	3180.00	256.86	268.71		268.72	0.00	1.60	4596.55	1231.25	0.10
1	5380	25 YR	3570.00	256.86	270.36		270.36	0.00	1.16	6651.24	1275.63	0.06
1	5380	50 YR	3840.00	256.86	270.64		270.65	0.00	1.17	7022.17	1297.91	0.06
1	5380	100 YR	4460.00	256.86	271.14		271.15	0.00	1.22	7681.32	1374.81	0.07
1	5380	250 YR	5860.00	256.86	272.46		272.47	0.00	1.29	9605.80	1579.11	0.06
1	5380	500 YR	7020.00	256.86	272.80		272.81	0.00	1.51	10142.96	1650.49	0.08
1	5987	2 YR	1930.00	259.44	267.06		267.25	0.00	4.80	790.96	391.57	0.35
1	5987	5 YR	2790.00	259.44	268.16		268.32	0.00	4.86	1399.30	689.40	0.32
1	5987	10 YR	3180.00	259.44	268.96		269.05	0.00	3.94	1997.39	816.32	0.25
1	5987	25 YR	3570.00	259.44	270.45		270.49	0.00	2.63	3534.02	1130.87	0.15

HEC-RAS Plan: Howard_Ultimate River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5987	50 YR	3840.00	259.44	270.74		270.77	0.00	2.56	3863.49	1185.44	0.15
1	5987	100 YR	4460.00	259.44	271.23		271.26	0.00	2.55	4476.34	1268.39	0.14
1	5987	250 YR	5860.00	259.44	272.55		272.57	0.00	2.31	6267.07	1416.63	0.12
1	5987	500 YR	7020.00	259.44	272.90		272.93	0.00	2.53	6772.91	1432.85	0.13
1	6710	2 YR	1940.00	261.87	267.74		267.74	0.00	0.93	3076.99	1092.08	0.09
1	6710	5 YR	2810.00	261.87	268.73		268.74	0.00	1.04	4231.94	1257.92	0.08
1	6710	10 YR	3200.00	261.87	269.33		269.34	0.00	0.99	4992.61	1280.34	0.08
1	6710	25 YR	3560.00	261.87	270.61		270.61	0.00	0.81	6671.23	1339.12	0.06
1	6710	50 YR	3840.00	261.87	270.88		270.89	0.00	0.83	7042.33	1346.11	0.06
1	6710	100 YR	4560.00	261.87	271.38		271.38	0.00	0.89	7708.16	1355.82	0.06
1	6710	250 YR	5810.00	261.87	272.66		272.67	0.00	0.91	9457.20	1372.72	0.05
1	6710	500 YR	6850.00	261.87	273.03		273.04	0.00	1.02	9970.53	1377.89	0.06
1	7328 C	2 YR	1940.00	262.02	267.92		267.92	0.00	1.09	2964.59	917.29	0.09
1	7328 C	5 YR	2810.00	262.02	268.90		268.91	0.00	1.23	3921.71	1024.44	0.09
1	7328 C	10 YR	3200.00	262.02	269.47		269.47	0.00	1.20	4510.78	1057.63	0.08
1	7328 C	25 YR	3560.00	262.02	270.68		270.69	0.00	1.00	5799.43	1065.16	0.06
1	7328 C	50 YR	3840.00	262.02	270.95		270.96	0.00	1.02	6092.36	1066.48	0.06
1	7328 C	100 YR	4560.00	262.02	271.45		271.46	0.00	1.10	6623.26	1068.87	0.07
1	7328 C	250 YR	5810.00	262.02	272.72		272.73	0.00	1.14	7985.02	1074.97	0.06
1	7328 C	500 YR	6850.00	262.02	273.11		273.12	0.00	1.27	8398.29	1076.81	0.07
1	7742	2 YR	1940.00	262.25	268.14	265.27	268.17	0.00	1.87	1599.91	808.62	0.15
1	7742	5 YR	2810.00	262.25	269.11	265.79	269.14	0.00	1.96	2203.92	892.40	0.15
1	7742	10 YR	3200.00	262.25	269.64	265.98	269.67	0.00	1.93	2570.91	945.32	0.14
1	7742	25 YR	3560.00	262.25	270.78	266.18	270.80	0.00	1.70	3446.64	1024.27	0.11
1	7742	50 YR	3840.00	262.25	271.05	266.27	271.07	0.00	1.71	3662.95	1027.84	0.11
1	7742	100 YR	4560.00	262.25	271.55	266.48	271.58	0.00	1.81	4062.90	1034.33	0.11
1	7742	250 YR	5810.00	262.25	272.81	266.79	272.83	0.00	1.80	5071.93	1048.12	0.10
1	7742	500 YR	6850.00	262.25	273.19	267.03	273.21	0.00	1.50	7166.21	1052.06	0.09
1	8797	2 YR	1940.00	265.09	270.77	269.66	271.60	0.04	8.93	297.45	129.44	0.77
1	8797	5 YR	2810.00	265.09	271.22	270.87	272.69	0.06	12.58	371.34	196.94	1.03
1	8797	10 YR	3200.00	265.09	271.30	270.90	273.05	0.07	13.83	386.82	202.13	1.12
1	8797	25 YR	3560.00	265.09	271.96	271.96	273.12	0.04	11.75	536.84	276.33	0.89
1	8797	50 YR	3840.00	265.09	272.49	272.49	273.37	0.03	10.79	755.13	520.08	0.78
1	8797	100 YR	4560.00	265.09	272.86	272.86	273.63	0.03	10.66	954.60	562.87	0.75
1	8797	250 YR	5810.00	265.09	273.69		274.12	0.02	8.60	1443.66	607.89	0.57
1	8797	500 YR	6850.00	265.09	273.66		274.28	0.02	10.31	1423.32	606.25	0.68
1	9598 D	2 YR	1940.00	269.15	275.17		275.22	0.00	2.71	1353.58	611.00	0.21
1	9598 D	5 YR	2810.00	269.15	276.03		276.08	0.00	2.71	1908.10	671.54	0.19
1	9598 D	10 YR	3200.00	269.15	276.35		276.40	0.00	2.74	2130.60	695.41	0.19
1	9598 D	25 YR	3560.00	269.15	276.44		276.50	0.00	2.95	2191.43	699.53	0.20
1	9598 D	50 YR	3840.00	269.15	276.57		276.63	0.00	3.05	2279.11	704.73	0.21
1	9598 D	100 YR	4560.00	269.15	276.89		276.95	0.00	3.25	2506.71	717.28	0.21
1	9598 D	250 YR	5810.00	269.15	277.26		277.35	0.00	3.69	2783.34	749.07	0.24
1	9598 D	500 YR	6850.00	269.15	277.71		277.81	0.00	3.81	3121.19	758.19	0.24
1	10119	2 YR	1950.00	268.32	276.26		276.33	0.00	3.45	1322.50	598.56	0.22
1	10119	5 YR	2800.00	268.32	276.99		277.06	0.00	3.61	1797.42	670.31	0.22
1	10119	10 YR	3160.00	268.32	277.27		277.34	0.00	3.60	1986.56	674.67	0.22
1	10119	25 YR	3520.00	268.32	277.45		277.52	0.00	3.73	2107.65	678.93	0.22
1	10119	50 YR	3780.00	268.32	277.60		277.67	0.00	3.78	2209.02	681.78	0.23
1	10119	100 YR	4390.00	268.32	277.95		278.03	0.00	3.87	2451.90	688.45	0.23
1	10119	250 YR	5570.00	268.32	278.48		278.57	0.00	4.14	2817.29	698.36	0.24
1	10119	500 YR	6520.00	268.32	278.92		279.02	0.00	4.27	3128.87	709.12	0.24
1	10653	2 YR	1950.00	268.12	277.61		277.75	0.00	4.49	1004.98	485.89	0.28
1	10653	5 YR	2800.00	268.12	278.31		278.45	0.00	4.79	1363.28	523.32	0.29
1	10653	10 YR	3160.00	268.12	278.55		278.69	0.00	4.88	1488.96	529.21	0.29
1	10653	25 YR	3520.00	268.12	278.76		278.91	0.00	4.98	1603.85	534.09	0.29
1	10653	50 YR	3780.00	268.12	278.91		279.06	0.00	5.05	1685.43	537.63	0.29
1	10653	100 YR	4390.00	268.12	279.26		279.41	0.00	5.18	1871.36	549.51	0.29
1	10653	250 YR	5570.00	268.12	279.84		280.00	0.00	5.43	2202.66	596.93	0.30
1	10653	500 YR	6520.00	268.12	280.28		280.44	0.00	5.58	2476.28	644.98	0.30
1	11204	2 YR	1950.00	267.91	278.64		278.72	0.00	2.91	1446.21	645.03	0.18
1	11204	5 YR	2800.00	267.91	279.34		279.42	0.00	3.15	1908.04	672.59	0.18
1	11204	10 YR	3160.00	267.91	279.59		279.67	0.00	3.26	2078.29	695.30	0.19
1	11204	25 YR	3520.00	267.91	279.82		279.90	0.00	3.35	2239.05	703.06	0.19
1	11204	50 YR	3780.00	267.91	279.98		280.06	0.00	3.40	2349.89	707.31	0.19
1	11204	100 YR	4390.00	267.91	280.33		280.41	0.00	3.52	2599.43	716.77	0.20
1	11204	250 YR	5570.00	267.91	280.95		281.04	0.00	3.78	3063.97	817.76	0.20
1	11204	500 YR	6520.00	267.91	281.39		281.49	0.00	3.93	3445.92	866.93	0.21
1	11754	2 YR	1950.00	273.24	279.79		279.92	0.01	4.27	915.40	590.43	0.37
1	11754	5 YR	2800.00	273.24	280.43		280.55	0.01	4.27	1358.43	710.62	0.34
1	11754	10 YR	3160.00	273.24	280.66		280.77	0.01	4.21	1522.55	718.31	0.33
1	11754	25 YR	3520.00	273.24	280.88		280.99	0.01	4.21	1678.18	736.31	0.32
1	11754	50 YR	3780.00	273.24	281.02		281.13	0.01	4.20	1785.45	741.56	0.32
1	11754	100 YR	4390.00	273.24	281.35		281.45	0.00	4.19	2028.15	753.32	0.31
1	11754	250 YR	5570.00	273.24	281.94		282.05	0.00	4.18	2480.91	769.87	0.29
1	11754	500 YR	6520.00	273.24	282.37		282.48	0.00	4.22	2812.09	780.34	0.29
1	12159	2 YR	1950.00	273.80	281.01	278.01	281.06	0.00	2.57	1555.44	686.20	0.18
1	12159	5 YR	2800.00	273.80	281.61	278.59	281.67	0.00	2.85	1988.64	752.88	0.19

HEC-RAS Plan: Howard_Ultimate River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	12159	10 YR	3160.00	273.80	281.82	278.82	281.88	0.00	2.96	2146.03	772.27	0.20
1	12159	25 YR	3520.00	273.80	282.02	279.02	282.08	0.00	3.05	2302.61	790.88	0.20
1	12159	50 YR	3780.00	273.80	282.16	279.12	282.22	0.00	3.12	2411.18	808.38	0.20
1	12159	100 YR	4390.00	273.80	282.46	279.56	282.53	0.00	3.27	2668.36	876.15	0.2
1	12159	250 YR	5570.00	273.80	283.00	280.30	283.07	0.00	3.46	3151.66	906.36	0.21
1	12159	500 YR	6520.00	273.80	283.40	280.31	283.47	0.00	3.57	3510.77	917.01	0.21
1	12270	2 YR	1950.00	272.86	281.16	278.16	281.21	0.00	2.65	1434.85	543.99	0.17
1	12270	5 YR	2800.00	272.86	281.78	279.34	281.85	0.00	3.11	1790.72	601.93	0.20
1	12270	10 YR	3160.00	272.86	281.99	280.00	282.07	0.00	3.26	1920.24	620.12	0.20
1	12270	25 YR	3520.00	272.86	282.20	280.20	282.28	0.00	3.42	2053.91	681.21	0.21
1	12270	50 YR	3780.00	272.86	282.34	280.20	282.42	0.00	3.53	2152.98	720.81	0.22
1	12270	100 YR	4390.00	272.86	282.65	280.21	282.74	0.00	3.71	2386.03	747.29	0.22
1	12270	250 YR	5570.00	272.86	283.20	280.21	283.30	0.00	3.98	2799.46	770.61	0.23
1	12270	500 YR	6520.00	272.86	283.60	280.26	283.70	0.00	4.21	3109.01	797.78	0.24
1	12305 Flower Acres Rd.		Culvert									
1	12329 E	2 YR	1950.00	272.86	281.50	278.26	281.54	0.00	2.33	1622.97	521.76	0.16
1	12329 E	5 YR	2800.00	272.86	282.07	279.29	282.13	0.00	2.86	1934.01	582.83	0.18
1	12329 E	10 YR	3160.00	272.86	282.28	279.77	282.35	0.00	3.05	2064.33	630.39	0.19
1	12329 E	25 YR	3520.00	272.86	282.46	280.20	282.53	0.00	3.23	2177.52	649.72	0.20
1	12329 E	50 YR	3780.00	272.86	282.58	280.20	282.66	0.00	3.35	2258.47	660.24	0.21
1	12329 E	100 YR	4390.00	272.86	282.84	280.20	282.93	0.00	3.63	2435.38	694.12	0.22
1	12329 E	250 YR	5570.00	272.86	283.31	280.21	283.42	0.00	4.07	2765.96	716.97	0.24
1	12329 E	500 YR	6520.00	272.86	283.67	280.23	283.79	0.00	4.34	3024.99	729.89	0.25
1	12394	2 YR	1950.00	274.28	281.56	279.98	281.63	0.00	3.10	1315.17	481.44	0.22
1	12394	5 YR	2800.00	274.28	282.15	280.21	282.24	0.00	3.58	1601.70	491.93	0.24
1	12394	10 YR	3160.00	274.28	282.37	280.36	282.46	0.00	3.75	1710.96	495.86	0.25
1	12394	25 YR	3520.00	274.28	282.55	280.47	282.66	0.00	3.95	1802.37	499.12	0.26
1	12394	50 YR	3780.00	274.28	282.68	280.54	282.79	0.00	4.09	1866.77	503.60	0.27
1	12394	100 YR	4390.00	274.28	282.95	280.77	283.08	0.00	4.41	2005.97	514.53	0.28
1	12394	250 YR	5570.00	274.28	283.44	281.08	283.59	0.00	4.90	2258.54	522.07	0.30
1	12394	500 YR	6520.00	274.28	283.81	281.31	283.98	0.00	5.23	2451.20	540.27	0.32
1	12648	2 YR	1950.00	272.79	281.94	279.38	282.03	0.00	3.19	1239.46	515.52	0.22
1	12648	5 YR	2800.00	272.79	282.59	280.68	282.70	0.00	3.63	1593.79	585.46	0.24
1	12648	10 YR	3160.00	272.79	282.83	280.84	282.94	0.00	3.77	1739.21	629.84	0.25
1	12648	25 YR	3520.00	272.79	283.05	280.91	283.17	0.00	4.04	1878.64	651.65	0.26
1	12648	50 YR	3780.00	272.79	283.19	281.10	283.32	0.00	4.12	1974.19	657.24	0.26
1	12648	100 YR	4390.00	272.79	283.51	281.31	283.65	0.00	4.32	2184.08	672.11	0.27
1	12648	250 YR	5570.00	272.79	284.06	281.65	284.21	0.00	4.67	2561.12	705.44	0.2
1	12648	500 YR	6520.00	272.79	284.46	281.95	284.62	0.00	4.88	2851.09	724.89	0.29
1	12975	2 YR	1950.00	273.26	282.47		282.55	0.00	3.49	1314.51	556.11	0.23
1	12975	5 YR	2800.00	273.26	283.16		283.24	0.00	3.71	1707.08	595.33	0.24
1	12975	10 YR	3160.00	273.26	283.41		283.50	0.00	3.84	1860.68	615.22	0.24
1	12975	25 YR	3520.00	273.26	283.67		283.75	0.00	3.90	2017.76	625.44	0.24
1	12975	50 YR	3780.00	273.26	283.82		283.90	0.00	3.97	2113.53	631.15	0.24
1	12975	100 YR	4390.00	273.26	284.15		284.24	0.00	4.12	2326.69	644.83	0.25
1	12975	250 YR	5570.00	273.26	284.73		284.83	0.00	4.39	2707.31	664.00	0.25
1	12975	500 YR	6520.00	273.26	285.15		285.26	0.00	4.58	2988.03	674.91	0.26
1	13197	2 YR	1960.00	273.40	282.92		283.04	0.00	3.64	1008.43	355.36	0.25
1	13197	5 YR	2790.00	273.40	283.63		283.79	0.00	4.34	1282.82	409.05	0.28
1	13197	10 YR	3140.00	273.40	283.90		284.06	0.00	4.50	1392.02	418.13	0.29
1	13197	25 YR	3480.00	273.40	284.15		284.31	0.00	4.64	1497.19	428.12	0.29
1	13197	50 YR	3740.00	273.40	284.31		284.48	0.00	4.77	1565.87	434.79	0.30
1	13197	100 YR	4200.00	273.40	284.64		284.82	0.00	4.87	1714.47	443.87	0.30
1	13197	250 YR	5350.00	273.40	285.25		285.45	0.00	5.33	1987.99	470.37	0.31
1	13197	500 YR	6240.00	273.40	285.68		285.90	0.00	5.63	2198.27	497.57	0.32
1	13823	2 YR	1960.00	276.53	284.39		284.47	0.00	3.86	1201.72	551.53	0.27
1	13823	5 YR	2790.00	276.53	285.16		285.24	0.00	3.78	1659.30	651.34	0.25
1	13823	10 YR	3140.00	276.53	285.42		285.49	0.00	3.79	1827.30	669.21	0.24
1	13823	25 YR	3480.00	276.53	285.65		285.72	0.00	3.79	1986.59	680.73	0.24
1	13823	50 YR	3740.00	276.53	285.82		285.89	0.00	3.80	2098.78	685.12	0.24
1	13823	100 YR	4200.00	276.53	286.11		286.18	0.00	3.79	2299.25	693.02	0.23
1	13823	250 YR	5350.00	276.53	286.74		286.81	0.00	3.86	2739.82	707.58	0.23
1	13823	500 YR	6240.00	276.53	287.18		287.26	0.00	3.91	3051.24	712.35	0.23
1	14445	2 YR	1960.00	276.66	285.15	282.88	285.19	0.00	2.45	1265.07	577.33	0.17
1	14445	5 YR	2790.00	276.66	285.81	283.42	285.86	0.00	2.53	1789.58	655.64	0.16
1	14445	10 YR	3140.00	276.66	286.05	283.57	286.10	0.00	2.60	1948.87	670.70	0.17
1	14445	25 YR	3480.00	276.66	286.28	283.71	286.33	0.00	2.66	2099.82	687.77	0.17
1	14445	50 YR	3740.00	276.66	286.43	283.80	286.49	0.00	2.71	2208.74	701.24	0.17
1	14445	100 YR	4200.00	276.66	286.71	283.98	286.76	0.00	2.78	2405.19	724.03	0.17
1	14445	250 YR	5350.00	276.66	287.32	284.37	287.38	0.00	2.94	2865.35	802.72	0.17
1	14445	500 YR	6240.00	276.66	287.74	284.65	287.81	0.00	3.03	3226.28	882.41	0.17
1	14538	2 YR	1960.00	276.00	285.26	283.65	285.33	0.00	3.20	1237.67	723.03	0.2
1	14538	5 YR	2790.00	276.00	285.92	284.62	285.97	0.00	2.99	1809.65	787.22	0.19
1	14538	10 YR	3140.00	276.00	286.16	285.00	286.21	0.00	2.96	1999.35	794.18	0.18
1	14538	25 YR	3480.00	276.00	286.38	285.00	286.43	0.00	2.94	2176.18	799.93	0.18
1	14538	50 YR	3740.00	276.00	286.54	285.01	286.59	0.00	2.93	2303.72	815.39	0.18
1	14538	100 YR	4200.00	276.00	286.81	285.01	286.86	0.00	2.91	2531.24	831.07	0.17
1	14538	250 YR	5350.00	276.00	287.42	285.12	287.48	0.00	2.92	3068.86	1064.04	0.17

HEC-RAS Plan: Howard_Ultimate River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	14538	500 YR	6240.00	276.00	287.85	285.27	287.91	0.00	2.92	3535.19	1115.55	0.16
1	14609 Lake Dr.		Culvert									
1	14699 F	2 YR	1960.00	276.26	286.80	281.27	286.82	0.00	1.23	2749.41	1110.25	0.08
1	14699 F	5 YR	2790.00	276.26	287.34	282.02	287.36	0.00	1.40	3611.00	1206.44	0.08
1	14699 F	10 YR	3140.00	276.26	287.49	282.30	287.51	0.00	1.52	3745.91	1241.78	0.09
1	14699 F	25 YR	3480.00	276.26	287.65	282.62	287.67	0.00	1.61	3888.28	1276.58	0.10
1	14699 F	50 YR	3740.00	276.26	287.76	282.79	287.78	0.00	1.69	3985.53	1299.00	0.10
1	14699 F	100 YR	4200.00	276.26	287.92	283.09	287.94	0.00	1.82	4134.09	1341.30	0.11
1	14699 F	250 YR	5350.00	276.26	288.29	283.74	288.32	0.00	2.12	4480.61	1371.61	0.12
1	14699 F	500 YR	6240.00	276.26	288.54	284.19	288.58	0.00	2.33	4720.67	1386.15	0.13
1	14776	2 YR	1960.00	275.56	286.82	279.82	286.83	0.00	0.89	3159.70	696.26	0.05
1	14776	5 YR	2790.00	275.56	287.36	280.53	287.37	0.00	1.13	3663.42	718.32	0.06
1	14776	10 YR	3140.00	275.56	287.51	280.75	287.53	0.00	1.24	3774.69	725.92	0.07
1	14776	25 YR	3480.00	275.56	287.67	280.92	287.69	0.00	1.33	3891.33	732.72	0.07
1	14776	50 YR	3740.00	275.56	287.78	281.04	287.80	0.00	1.40	3970.19	736.74	0.08
1	14776	100 YR	4200.00	275.56	287.94	281.28	287.96	0.00	1.53	4090.70	747.30	0.08
1	14776	250 YR	5350.00	275.56	288.32	281.78	288.35	0.00	1.82	4388.72	836.08	0.10
1	14776	500 YR	6240.00	275.56	288.57	282.17	288.61	0.00	2.03	4608.72	888.93	0.11
1	15095	2 YR	1960.00	277.03	286.85		286.89	0.00	2.14	1453.60	410.68	0.14
1	15095	5 YR	2790.00	277.03	287.41		287.47	0.00	2.65	1686.62	442.42	0.17
1	15095	10 YR	3140.00	277.03	287.57		287.64	0.00	2.87	1759.72	455.37	0.18
1	15095	25 YR	3480.00	277.03	287.74		287.81	0.00	3.05	1836.58	462.35	0.19
1	15095	50 YR	3740.00	277.03	287.85		287.93	0.00	3.18	1889.24	466.86	0.19
1	15095	100 YR	4200.00	277.03	288.02		288.12	0.00	3.42	1971.25	475.84	0.21
1	15095	250 YR	5350.00	277.03	288.43		288.55	0.00	3.97	2167.08	495.29	0.23
1	15095	500 YR	6240.00	277.03	288.70		288.85	0.00	4.35	2307.43	517.74	0.25
1	15330	2 YR	1960.00	276.09	286.97		286.98	0.00	1.38	2255.15	719.24	0.09
1	15330	5 YR	2790.00	276.09	287.56		287.58	0.00	1.61	2690.21	743.55	0.10
1	15330	10 YR	3140.00	276.09	287.74		287.77	0.00	1.71	2826.39	747.66	0.10
1	15330	25 YR	3480.00	276.09	287.93		287.95	0.00	1.79	2964.01	754.19	0.11
1	15330	50 YR	3740.00	276.09	288.05		288.08	0.00	1.86	3059.49	759.09	0.11
1	15330	100 YR	4200.00	276.09	288.26		288.29	0.00	2.01	3216.47	789.14	0.12
1	15330	250 YR	5350.00	276.09	288.72		288.76	0.00	2.28	3589.87	821.80	0.13
1	15330	500 YR	6240.00	276.09	289.04		289.09	0.00	2.46	3860.12	864.38	0.14
1	15596	2 YR	1960.00	275.69	287.06		287.09	0.00	1.76	1697.50	625.60	0.12
1	15596	5 YR	2790.00	275.69	287.67		287.70	0.00	1.95	2083.56	644.87	0.13
1	15596	10 YR	3140.00	275.69	287.86		287.90	0.00	2.05	2208.02	652.55	0.14
1	15596	25 YR	3480.00	275.69	288.05		288.09	0.00	2.13	2332.85	660.75	0.14
1	15596	50 YR	3740.00	275.69	288.18		288.23	0.00	2.21	2421.47	676.87	0.14
1	15596	100 YR	4200.00	275.69	288.40		288.45	0.00	2.31	2567.88	682.29	0.15
1	15596	250 YR	5350.00	275.69	288.89		288.94	0.00	2.55	2903.42	697.57	0.16
1	15596	500 YR	6240.00	275.69	289.22		289.29	0.00	2.72	3141.60	711.46	0.16
1	16351 G	2 YR	1960.00	279.20	287.95		288.05	0.00	3.84	933.23	405.25	0.27
1	16351 G	5 YR	2690.00	279.20	288.59		288.69	0.00	4.01	1209.24	455.95	0.27
1	16351 G	10 YR	3030.00	279.20	288.83		288.94	0.00	4.11	1319.01	472.84	0.27
1	16351 G	25 YR	3360.00	279.20	289.05		289.16	0.00	4.17	1423.41	487.24	0.27
1	16351 G	50 YR	3600.00	279.20	289.21		289.32	0.00	4.20	1503.44	500.44	0.27
1	16351 G	100 YR	3810.00	279.20	289.42		289.53	0.00	4.13	1612.22	518.51	0.26
1	16351 G	250 YR	4100.00	279.20	289.88		289.97	0.00	3.77	1856.18	575.48	0.23
1	16351 G	500 YR	4300.00	279.20	290.24		290.32	0.00	3.73	2073.62	616.05	0.23
1	16964	2 YR	1960.00	280.04	289.18		289.28	0.00	2.62	943.48	310.03	0.20
1	16964	5 YR	2690.00	280.04	289.87		289.99	0.00	3.01	1162.40	328.55	0.21
1	16964	10 YR	3030.00	280.04	290.14		290.27	0.00	3.17	1251.44	334.67	0.22
1	16964	25 YR	3360.00	280.04	290.38		290.52	0.00	3.32	1332.53	340.14	0.23
1	16964	50 YR	3600.00	280.04	290.55		290.69	0.00	3.42	1390.62	344.01	0.23
1	16964	100 YR	3810.00	280.04	290.72		290.87	0.00	3.49	1448.96	347.85	0.23
1	16964	250 YR	4100.00	280.04	291.00		291.15	0.00	3.53	1547.58	358.38	0.23
1	16964	500 YR	4300.00	280.04	291.27		291.42	0.00	3.50	1647.29	371.47	0.22
1	17396 H	2 YR	1960.00	282.80	290.10	289.24	290.29	0.01	5.11	665.82	315.13	0.38
1	17396 H	5 YR	2690.00	282.80	290.80	289.55	290.99	0.01	5.08	875.87	349.86	0.36
1	17396 H	10 YR	3030.00	282.80	291.09	289.67	291.28	0.01	5.11	962.22	359.71	0.35
1	17396 H	25 YR	3360.00	282.80	291.34	289.78	291.54	0.00	5.17	1041.12	376.32	0.35
1	17396 H	50 YR	3600.00	282.80	291.52	289.87	291.72	0.00	5.21	1096.83	399.48	0.35
1	17396 H	100 YR	3810.00	282.80	291.68	289.93	291.89	0.00	5.24	1148.26	408.61	0.34
1	17396 H	250 YR	4100.00	282.80	291.93	290.02	292.13	0.00	5.23	1227.03	419.04	0.34
1	17396 H	500 YR	4300.00	282.80	292.13	290.09	292.33	0.00	5.16	1295.75	427.06	0.33
1	17475	2 YR	1960.00	282.40	290.47	287.96	290.62	0.00	3.60	762.17	824.57	0.27
1	17475	5 YR	2690.00	282.40	291.13	289.23	291.31	0.00	4.04	923.69	980.52	0.28
1	17475	10 YR	3030.00	282.40	291.40	289.33	291.60	0.00	4.22	991.08	992.00	0.29
1	17475	25 YR	3360.00	282.40	291.66	289.49	291.86	0.00	4.38	1053.48	1008.14	0.29
1	17475	50 YR	3600.00	282.40	291.84	289.60	292.05	0.00	4.49	1097.08	1029.51	0.30
1	17475	100 YR	3810.00	282.40	291.99	289.69	292.22	0.00	4.58	1136.25	1045.82	0.30
1	17475	250 YR	4100.00	282.40	292.23	289.81	292.46	0.00	4.67	1193.48	1087.85	0.30
1	17475	500 YR	4300.00	282.40	292.42	289.90	292.65	0.00	4.69	1240.81	1101.82	0.30
1	17490 Findley St.		Culvert									
1	17532	2 YR	1960.00	282.63	290.60	287.72	290.68	0.00	2.80	1022.02	1247.18	0.20

HEC-RAS Plan: Howard_Ultimate River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	17532	5 YR	2690.00	282.63	291.27	288.37	291.39	0.00	3.30	1183.87	1326.55	0.23
1	17532	10 YR	3030.00	282.63	291.53	288.37	291.66	0.00	3.52	1245.90	1333.13	0.24
1	17532	25 YR	3360.00	282.63	291.79	288.39	291.93	0.00	3.71	1308.64	1342.69	0.25
1	17532	50 YR	3600.00	282.63	291.99	288.49	292.14	0.00	3.83	1355.47	1348.56	0.2
1	17532	100 YR	3810.00	282.63	292.13	288.59	292.29	0.00	3.95	1390.74	1352.16	0.26
1	17532	250 YR	4100.00	282.63	292.39	288.74	292.56	0.00	4.06	1453.26	1356.44	0.26
1	17532	500 YR	4300.00	282.63	292.58	288.83	292.75	0.00	4.12	1497.51	1359.47	0.26
1	17550	2 YR	1960.00	283.34	290.46	288.84	290.93	0.01	6.59	429.26	1238.55	0.47
1	17550	5 YR	2690.00	283.34	291.07	289.46	291.72	0.01	7.92	487.63	1280.02	0.54
1	17550	10 YR	3030.00	283.34	291.29	289.73	292.05	0.01	8.53	508.84	1294.58	0.57
1	17550	25 YR	3360.00	283.34	291.51	289.97	292.36	0.01	9.05	530.71	1301.47	0.59
1	17550	50 YR	3600.00	283.34	291.68	290.14	292.60	0.01	9.39	547.20	1303.80	0.61
1	17550	100 YR	3810.00	283.34	291.80	290.28	292.78	0.01	9.71	559.06	1305.48	0.62
1	17550	250 YR	4100.00	283.34	292.04	290.48	293.08	0.01	10.02	581.83	1317.45	0.63
1	17550	500 YR	4300.00	283.34	292.21	290.61	293.28	0.01	10.21	598.12	1334.32	0.64
1	17572 Railroad		Bridge									
1	17606 I	2 YR	1960.00	283.34	291.61	288.52	291.83	0.00	4.65	628.52	936.06	0.30
1	17606 I	5 YR	2690.00	283.34	292.66	289.10	292.94	0.00	5.35	743.43	953.08	0.33
1	17606 I	10 YR	3030.00	283.34	293.10	289.34	293.42	0.00	5.64	792.41	959.11	0.34
1	17606 I	25 YR	3360.00	283.34	293.53	289.58	293.87	0.00	5.89	839.69	964.94	0.34
1	17606 I	50 YR	3600.00	283.34	293.84	289.74	294.20	0.00	6.05	873.65	969.12	0.35
1	17606 I	100 YR	3810.00	283.34	294.10	289.87	294.48	0.00	6.19	902.33	972.65	0.35
1	17606 I	250 YR	4100.00	283.34	294.47	290.05	294.87	0.00	6.37	942.92	977.65	0.35
1	17606 I	500 YR	4300.00	283.34	294.72	290.19	295.13	0.00	6.48	970.58	981.06	0.36
1	17698	2 YR	1960.00	282.51	291.90	287.21	291.92	0.00	1.46	1674.71	899.47	0.09
1	17698	5 YR	2690.00	282.51	293.03	287.53	293.06	0.00	1.63	2007.32	915.74	0.09
1	17698	10 YR	3030.00	282.51	293.51	287.68	293.54	0.00	1.70	2149.54	923.33	0.10
1	17698	25 YR	3360.00	282.51	293.97	287.82	294.01	0.00	1.75	2286.02	938.54	0.10
1	17698	50 YR	3600.00	282.51	294.30	287.92	294.34	0.00	1.79	2383.75	948.36	0.10
1	17698	100 YR	3810.00	282.51	294.58	288.00	294.62	0.00	1.83	2466.51	955.04	0.10
1	17698	250 YR	4100.00	282.51	294.98	288.10	295.02	0.00	1.87	2582.61	964.43	0.10
1	17698	500 YR	4300.00	282.51	295.24	288.19	295.28	0.00	1.89	2661.60	970.81	0.10
1	18119	2 YR	1960.00	283.20	292.07	290.76	292.22	0.00	4.94	953.86	484.66	0.31
1	18119	5 YR	2690.00	283.20	293.21	291.14	293.34	0.00	4.73	1368.97	539.21	0.27
1	18119	10 YR	3030.00	283.20	293.70	291.29	293.82	0.00	4.61	1561.98	554.16	0.26
1	18119	25 YR	3360.00	283.20	294.17	291.43	294.28	0.00	4.65	1755.63	595.21	0.26
1	18119	50 YR	3600.00	283.20	294.50	291.53	294.60	0.00	4.53	1904.08	600.23	0.25
1	18119	100 YR	3810.00	283.20	294.78	291.62	294.88	0.00	4.44	2030.89	604.48	0.2
1	18119	250 YR	4100.00	283.20	295.17	291.71	295.27	0.00	4.33	2209.91	610.40	0.23
1	18119	500 YR	4300.00	283.20	295.44	291.79	295.53	0.00	4.27	2332.82	614.43	0.22
1	18643	2 YR	2030.00	284.77	292.92	290.04	292.95	0.00	2.70	1731.80	478.93	0.18
1	18643	5 YR	2740.00	284.77	293.92	290.34	293.95	0.00	2.78	2235.40	523.39	0.17
1	18643	10 YR	3020.00	284.77	294.34	290.38	294.38	0.00	2.75	2457.79	533.02	0.16
1	18643	25 YR	3360.00	284.77	294.77	290.47	294.81	0.00	2.77	2691.74	544.89	0.16
1	18643	50 YR	3630.00	284.77	295.07	290.77	295.11	0.00	2.82	2855.55	557.92	0.16
1	18643	100 YR	3820.00	284.77	295.33	290.83	295.36	0.00	2.83	2999.73	572.92	0.16
1	18643	250 YR	4250.00	284.77	295.69	290.97	295.73	0.00	2.93	3212.84	588.42	0.16
1	18643	500 YR	4670.00	284.77	295.95	291.07	296.00	0.00	3.07	3367.83	611.29	0.17
1	19050 J	2 YR	2030.00	285.84	293.33	290.85	293.40	0.00	3.68	1215.09	705.62	0.25
1	19050 J	5 YR	2740.00	285.84	294.27	291.21	294.35	0.00	3.77	1529.34	821.36	0.24
1	19050 J	10 YR	3020.00	285.84	294.67	291.34	294.74	0.00	3.77	1659.36	862.54	0.23
1	19050 J	25 YR	3360.00	285.84	295.08	291.48	295.16	0.00	3.81	1796.76	889.25	0.23
1	19050 J	50 YR	3630.00	285.84	295.38	291.59	295.45	0.00	3.87	1893.88	901.16	0.23
1	19050 J	100 YR	3820.00	285.84	295.62	291.68	295.70	0.00	3.88	1974.63	912.87	0.22
1	19050 J	250 YR	4250.00	285.84	295.99	291.84	296.08	0.00	4.02	2097.41	929.65	0.23
1	19050 J	500 YR	4670.00	285.84	296.27	291.98	296.36	0.00	4.20	2188.21	934.16	0.23
1	19176	2 YR	2030.00	286.21	293.52	291.95	293.95	0.01	6.34	491.00	686.20	0.45
1	19176	5 YR	2740.00	286.21	294.41	292.51	294.91	0.01	7.02	595.34	903.59	0.47
1	19176	10 YR	3020.00	286.21	294.77	292.71	295.30	0.01	7.19	638.49	948.69	0.47
1	19176	25 YR	3360.00	286.21	295.17	292.95	295.72	0.01	7.44	684.62	973.11	0.47
1	19176	50 YR	3630.00	286.21	295.44	293.13	296.03	0.01	7.65	717.41	987.15	0.47
1	19176	100 YR	3820.00	286.21	295.67	293.24	296.27	0.01	7.75	744.53	998.77	0.47
1	19176	250 YR	4250.00	286.21	296.03	293.51	296.68	0.01	8.14	786.20	1016.61	0.49
1	19176	500 YR	4670.00	286.21	296.29	293.76	297.01	0.01	8.59	817.01	1029.80	0.51
1	19253 Loop 151		Culvert									
1	19897	2 YR	2030.00	285.21	295.71	293.04	295.78	0.00	2.87	1051.07	529.15	0.18
1	19897	5 YR	2740.00	285.21	297.46	293.47	297.52	0.00	2.48	1521.59	911.54	0.14
1	19897	10 YR	3020.00	285.21	298.72	293.64	298.76	0.00	2.15	1858.64	1028.68	0.11
1	19897	25 YR	3360.00	285.21	300.06	293.80	300.10	0.00	1.93	2220.47	1386.73	0.10
1	19897	50 YR	3630.00	285.21	301.17	293.92	301.20	0.00	1.80	2518.00	1517.99	0.09
1	19897	100 YR	3820.00	285.21	302.02	294.04	302.05	0.00	1.71	2746.81	1581.62	0.0
1	19897	250 YR	4250.00	285.21	303.90	294.20	303.92	0.00	1.57	3250.58	1761.07	0.07
1	19897	500 YR	4670.00	285.21	305.80	294.34	305.82	0.00	1.46	3761.79	1980.26	0.06
1	19989	2 YR	2030.00	285.63	295.78	293.30	295.84	0.00	2.60	1153.45	457.05	0.18
1	19989	5 YR	2740.00	285.63	297.51	293.69	297.55	0.00	2.00	1851.46	772.78	0.12
1	19989	10 YR	3020.00	285.63	298.75	293.82	298.78	0.00	1.65	2351.44	1066.07	0.09
1	19989	25 YR	3360.00	285.63	300.09	293.94	300.12	0.00	1.43	2890.65	1408.81	0.08

HEC-RAS Plan: Howard_Ultimate River: Howard Creek Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	19989	50 YR	3630.00	285.63	301.20	293.96	301.22	0.00	1.31	3334.76	1618.89	0.07
1	19989	100 YR	3820.00	285.63	302.05	294.22	302.06	0.00	1.23	3576.48	1673.07	0.06
1	19989	250 YR	4250.00	285.63	303.92	294.36	303.93	0.00	1.10	4429.51	1785.22	0.05
1	19989	500 YR	4670.00	285.63	305.82	294.49	305.83	0.00	1.01	5194.13	1955.68	0.04

HEC-RAS Plan: S_Wagner_Ult River: South_Wagner Reach: South_Wagner

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)	
South_Wagner	462	2 YR	890.00	259.00	269.30	268.69	269.50	0.01	4.42	449.88	673.72	0.40
South_Wagner	462	5 YR	1210.00	259.00	269.85	269.14	269.94	0.00	3.55	864.03	805.77	0.30
South_Wagner	462	10 YR	1520.00	259.00	270.17	269.40	270.24	0.00	3.33	1124.99	825.19	0.27
South_Wagner	462	25 YR	1920.00	259.00	270.77	269.66	270.81	0.00	2.73	1632.70	885.17	0.2
South_Wagner	462	50 YR	2230.00	259.00	271.37	269.78	271.40	0.00	2.26	2213.24	1029.32	0.16
South_Wagner	462	100 YR	2570.00	259.00	271.96	269.87	271.98	0.00	1.96	2832.96	1067.52	0.14
South_Wagner	462	250 YR	3140.00	259.00	272.41	270.00	272.43	0.00	1.99	3314.98	1071.84	0.13
South_Wagner	462	500 YR	3650.00	259.00	272.95	270.10	272.97	0.00	1.90	3893.78	1071.84	0.12
South_Wagner	625	2 YR	890.00	260.50	269.63	263.69	269.70	0.00	2.25	779.75	789.46	0.15
South_Wagner	625	5 YR	1210.00	260.50	270.03	264.36	270.12	0.00	2.63	1124.13	951.33	0.17
South_Wagner	625	10 YR	1520.00	260.50	270.34	264.93	270.44	0.00	2.90	1440.70	1064.71	0.18
South_Wagner	625	25 YR	1920.00	260.50	270.90	265.62	270.98	0.00	2.88	2046.78	1126.48	0.17
South_Wagner	625	50 YR	2230.00	260.50	271.46	266.22	271.52	0.00	2.64	2681.99	1131.52	0.15
South_Wagner	625	100 YR	2570.00	260.50	272.02	266.77	272.07	0.00	2.45	3323.79	1131.52	0.14
South_Wagner	625	250 YR	3140.00	260.50	272.47	267.46	272.52	0.00	2.58	3832.89	1131.52	0.14
South_Wagner	625	500 YR	3650.00	260.50	273.01	267.99	273.05	0.00	2.55	4434.87	1131.52	0.14
South_Wagner	645 Buchanan Rd.		Culvert									
South_Wagner	710	2 YR	890.00	260.29	269.69	263.90	269.71	0.00	1.31	1622.41	1005.52	0.08
South_Wagner	710	5 YR	1210.00	260.29	270.11	264.49	270.13	0.00	1.46	2053.51	1058.45	0.09
South_Wagner	710	10 YR	1520.00	260.29	270.43	264.95	270.45	0.00	1.60	2394.05	1083.05	0.10
South_Wagner	710	25 YR	1920.00	260.29	270.96	265.53	270.98	0.00	1.63	2989.61	1141.72	0.10
South_Wagner	710	50 YR	2230.00	260.29	271.51	265.95	271.52	0.00	1.54	3611.56	1144.49	0.09
South_Wagner	710	100 YR	2570.00	260.29	272.07	266.41	272.08	0.00	1.48	4248.91	1144.49	0.08
South_Wagner	710	250 YR	3140.00	260.29	272.51	267.26	272.52	0.00	1.58	4757.66	1144.49	0.09
South_Wagner	710	500 YR	3650.00	260.29	273.03	267.71	273.05	0.00	1.60	5357.95	1144.49	0.08
South_Wagner	859	2 YR	890.00	261.20	269.71		269.77	0.00	2.32	857.83	868.58	0.19
South_Wagner	859	5 YR	1210.00	261.20	270.13		270.18	0.00	2.34	1254.96	991.25	0.19
South_Wagner	859	10 YR	1520.00	261.20	270.46		270.50	0.00	2.36	1587.07	1050.35	0.18
South_Wagner	859	25 YR	1920.00	261.20	271.00		271.03	0.00	2.15	2161.93	1087.79	0.16
South_Wagner	859	50 YR	2230.00	261.20	271.53		271.56	0.00	1.90	2768.64	1178.91	0.13
South_Wagner	859	100 YR	2570.00	261.20	272.09		272.10	0.00	1.72	3424.34	1189.23	0.12
South_Wagner	859	250 YR	3140.00	261.20	272.53		272.55	0.00	1.77	3954.75	1189.23	0.12
South_Wagner	859	500 YR	3650.00	261.20	273.06		273.07	0.00	1.73	4576.81	1189.23	0.11
South_Wagner	1479	2 YR	890.00	265.10	270.86		271.17	0.01	4.94	292.48	228.56	0.41
South_Wagner	1479	5 YR	1210.00	265.10	271.19		271.59	0.01	5.76	380.88	314.17	0.46
South_Wagner	1479	10 YR	1520.00	265.10	271.44		271.92	0.01	6.48	468.45	374.88	0.50
South_Wagner	1479	25 YR	1920.00	265.10	271.67	271.27	272.21	0.01	7.20	558.99	417.88	0.55
South_Wagner	1479	50 YR	2230.00	265.10	271.96		272.45	0.01	7.12	691.48	471.03	0.5
South_Wagner	1479	100 YR	2570.00	265.10	272.40		272.76	0.01	6.48	911.09	524.57	0.46
South_Wagner	1479	250 YR	3140.00	265.10	272.85		273.17	0.01	6.43	1151.82	539.74	0.44
South_Wagner	1479	500 YR	3650.00	265.10	273.35		273.59	0.01	5.99	1420.26	555.64	0.40
South_Wagner	2073	2 YR	890.00	266.63	272.53	270.20	272.63	0.00	2.67	470.19	333.44	0.26
South_Wagner	2073	5 YR	1210.00	266.63	273.06	270.69	273.18	0.00	3.00	651.34	431.00	0.27
South_Wagner	2073	10 YR	1520.00	266.63	273.47	271.14	273.60	0.00	3.22	824.59	503.76	0.28
South_Wagner	2073	25 YR	1920.00	266.63	273.86	271.60	274.01	0.00	3.52	1010.59	576.35	0.29
South_Wagner	2073	50 YR	2230.00	266.63	274.09	271.91	274.26	0.00	3.76	1126.48	617.11	0.30
South_Wagner	2073	100 YR	2570.00	266.63	274.28	272.16	274.47	0.00	4.05	1227.14	654.28	0.32
South_Wagner	2073	250 YR	3140.00	266.63	274.64	272.60	274.84	0.00	4.38	1421.33	684.00	0.33
South_Wagner	2073	500 YR	3650.00	266.63	274.93	272.83	275.15	0.00	4.65	1584.88	714.02	0.34
South_Wagner	2196	2 YR	890.00	266.80	272.71	269.99	272.94	0.00	3.89	229.02	87.46	0.38
South_Wagner	2196	5 YR	1210.00	266.80	273.24	271.02	273.53	0.00	4.38	336.37	327.83	0.41
South_Wagner	2196	10 YR	1520.00	266.80	273.65	271.60	273.95	0.00	4.60	480.02	388.90	0.41
South_Wagner	2196	25 YR	1920.00	266.80	274.05	272.21	274.36	0.00	4.88	633.33	438.27	0.41
South_Wagner	2196	50 YR	2230.00	266.80	274.29	272.61	274.62	0.00	5.10	730.03	466.68	0.42
South_Wagner	2196	100 YR	2570.00	266.80	274.51	273.59	274.85	0.00	5.38	816.51	485.78	0.43
South_Wagner	2196	250 YR	3140.00	266.80	274.87	273.86	275.24	0.00	5.69	967.70	510.00	0.44
South_Wagner	2196	500 YR	3650.00	266.80	275.18	274.21	275.53	0.00	5.75	1169.29	564.07	0.43
South_Wagner	2226 West St.		Culvert									
South_Wagner	2282 A	2 YR	890.00	265.94	274.05	269.56	274.18	0.00	2.93	365.16	208.36	0.22
South_Wagner	2282 A	5 YR	1210.00	265.94	274.61	270.25	274.78	0.00	3.44	499.31	362.67	0.25
South_Wagner	2282 A	10 YR	1520.00	265.94	274.90	270.87	275.12	0.00	3.99	591.85	436.75	0.28
South_Wagner	2282 A	25 YR	1920.00	265.94	275.14	271.57	275.43	0.00	4.64	731.01	529.19	0.32
South_Wagner	2282 A	50 YR	2230.00	265.94	275.26	272.05	275.60	0.00	5.16	787.84	546.14	0.35
South_Wagner	2282 A	100 YR	2570.00	265.94	275.35	272.53	275.78	0.00	5.78	836.90	559.94	0.39
South_Wagner	2282 A	250 YR	3140.00	265.94	275.47	273.23	276.04	0.00	6.73	900.86	574.42	0.45
South_Wagner	2282 A	500 YR	3650.00	265.94	275.52	274.64	276.25	0.00	7.69	924.23	578.98	0.51
South_Wagner	2390	2 YR	890.00	266.60	274.11		274.48	0.00	4.93	191.36	82.28	0.47
South_Wagner	2390	5 YR	1210.00	266.60	274.67		275.14	0.00	5.61	242.77	108.72	0.50
South_Wagner	2390	10 YR	1520.00	266.60	274.97		275.58	0.01	6.42	279.40	133.69	0.55
South_Wagner	2390	25 YR	1920.00	266.60	275.22	274.32	276.03	0.01	7.49	314.63	152.01	0.62
South_Wagner	2390	50 YR	2230.00	266.60	275.34	274.81	276.33	0.01	8.36	333.20	158.42	0.6
South_Wagner	2390	100 YR	2570.00	266.60	275.46	275.33	276.66	0.01	9.27	352.28	164.38	0.75
South_Wagner	2390	250 YR	3140.00	266.60	275.89	275.89	277.19	0.01	9.83	429.90	210.03	0.76
South_Wagner	2390	500 YR	3650.00	266.60	276.32	276.32	277.57	0.01	9.91	544.17	327.10	0.74
South_Wagner	2617	2 YR	860.00	268.00	275.14		275.33	0.00	3.51	268.32	215.37	0.37
South_Wagner	2617	5 YR	1110.00	268.00	275.75		275.91	0.00	3.41	429.82	311.90	0.33
South_Wagner	2617	10 YR	1290.00	268.00	276.18		276.31	0.00	3.22	576.58	356.83	0.29

HEC-RAS Plan: S_Wagner_Ult River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	C'it 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)	
South_Wagner	2617	25 YR	1550.00	268.00	276.64		276.76	0.00	3.12	749.21	376.73	0.27
South_Wagner	2617	50 YR	1750.00	268.00	276.97		277.08	0.00	3.07	874.07	385.74	0.25
South_Wagner	2617	100 YR	1980.00	268.00	277.32		277.42	0.00	3.04	1008.28	394.03	0.24
South_Wagner	2617	250 YR	2330.00	268.00	277.80		277.90	0.00	3.02	1203.72	407.55	0.23
South_Wagner	2617	500 YR	2640.00	268.00	278.15		278.25	0.00	3.08	1347.27	420.70	0.23
South_Wagner	2773	2 YR	860.00	268.90	275.57	273.80	275.81	0.00	3.99	253.33	164.60	0.38
South_Wagner	2773	5 YR	1110.00	268.90	276.08	274.21	276.34	0.00	4.27	359.99	261.38	0.38
South_Wagner	2773	10 YR	1290.00	268.90	276.43	274.49	276.68	0.00	4.30	461.30	305.74	0.36
South_Wagner	2773	25 YR	1550.00	268.90	276.85	274.88	277.09	0.00	4.37	597.25	351.05	0.35
South_Wagner	2773	50 YR	1750.00	268.90	277.15	275.15	277.38	0.00	4.36	705.73	369.98	0.34
South_Wagner	2773	100 YR	1980.00	268.90	277.48	275.61	277.69	0.00	4.32	827.89	378.53	0.33
South_Wagner	2773	250 YR	2330.00	268.90	277.95	276.14	278.14	0.00	4.28	1008.66	396.69	0.31
South_Wagner	2773	500 YR	2640.00	268.90	278.29	276.50	278.48	0.00	4.37	1150.17	427.16	0.31
South_Wagner	2827	2 YR	860.00	269.30	275.83	272.46	275.95	0.00	2.91	382.27	231.36	0.26
South_Wagner	2827	5 YR	1110.00	269.30	276.35	273.10	276.48	0.00	3.09	507.22	281.60	0.26
South_Wagner	2827	10 YR	1290.00	269.30	276.67	273.78	276.81	0.00	3.24	591.42	321.23	0.26
South_Wagner	2827	25 YR	1550.00	269.30	277.06	274.21	277.21	0.00	3.41	702.26	339.97	0.27
South_Wagner	2827	50 YR	1750.00	269.30	277.34	274.50	277.49	0.00	3.52	781.56	349.97	0.27
South_Wagner	2827	100 YR	1980.00	269.30	277.63	274.80	277.79	0.00	3.64	868.19	372.08	0.27
South_Wagner	2827	250 YR	2330.00	269.30	278.08	275.16	278.23	0.00	3.64	1125.69	410.23	0.26
South_Wagner	2827	500 YR	2640.00	269.30	278.42	275.64	278.57	0.00	3.78	1268.98	449.53	0.26
South_Wagner	2845 Garber St.		Culvert									
South_Wagner	2911 B	2 YR	860.00	269.30	276.60	272.73	276.74	0.00	3.00	301.56	320.65	0.22
South_Wagner	2911 B	5 YR	1110.00	269.30	277.52	273.32	277.59	0.00	2.42	843.78	488.41	0.17
South_Wagner	2911 B	10 YR	1290.00	269.30	277.77	273.65	277.85	0.00	2.61	983.57	560.18	0.18
South_Wagner	2911 B	25 YR	1550.00	269.30	278.03	274.04	278.13	0.00	2.96	1110.12	619.52	0.20
South_Wagner	2911 B	50 YR	1750.00	269.30	278.16	274.31	278.28	0.00	3.24	1182.64	641.60	0.22
South_Wagner	2911 B	100 YR	1980.00	269.30	278.32	274.60	278.45	0.00	3.49	1264.90	661.71	0.23
South_Wagner	2911 B	250 YR	2330.00	269.30	278.53	275.04	278.68	0.00	3.81	1381.23	674.51	0.25
South_Wagner	2911 B	500 YR	2640.00	269.30	278.69	275.43	278.86	0.00	4.10	1468.90	683.56	0.27
South_Wagner	2964	2 YR	860.00	267.18	276.64	271.15	276.78	0.00	3.00	306.09	379.55	0.20
South_Wagner	2964	5 YR	1110.00	267.18	277.58	271.71	277.62	0.00	2.04	1226.39	568.03	0.13
South_Wagner	2964	10 YR	1290.00	267.18	277.83	272.08	277.88	0.00	2.26	1338.70	608.64	0.14
South_Wagner	2964	25 YR	1550.00	267.18	278.10	272.58	278.16	0.00	2.52	1469.21	638.39	0.15
South_Wagner	2964	50 YR	1750.00	267.18	278.26	272.93	278.33	0.00	2.72	1545.07	644.19	0.16
South_Wagner	2964	100 YR	1980.00	267.18	278.43	273.35	278.50	0.00	2.93	1625.66	648.95	0.18
South_Wagner	2964	250 YR	2330.00	267.18	278.65	274.00	278.74	0.00	3.24	1737.80	655.53	0.19
South_Wagner	2964	500 YR	2640.00	267.18	278.82	274.53	278.93	0.00	3.50	1823.55	660.52	0.20
South_Wagner	3639	2 YR	860.00	268.70	276.97		276.97	0.00	0.80	1679.61	400.35	0.06
South_Wagner	3639	5 YR	1110.00	268.70	277.74		277.75	0.00	0.88	1999.83	423.74	0.06
South_Wagner	3639	10 YR	1290.00	268.70	278.01		278.02	0.00	0.97	2117.07	428.20	0.07
South_Wagner	3639	25 YR	1550.00	268.70	278.33		278.34	0.00	1.09	2251.30	434.97	0.07
South_Wagner	3639	50 YR	1750.00	268.70	278.51		278.52	0.00	1.19	2332.89	440.71	0.08
South_Wagner	3639	100 YR	1980.00	268.70	278.71		278.72	0.00	1.30	2421.26	447.11	0.09
South_Wagner	3639	250 YR	2330.00	268.70	278.99		279.01	0.00	1.46	2546.95	455.18	0.09
South_Wagner	3639	500 YR	2640.00	268.70	279.21		279.23	0.00	1.61	2648.65	466.21	0.10
South_Wagner	3973	2 YR	860.00	269.53	277.02	272.98	277.04	0.00	1.36	924.98	473.82	0.10
South_Wagner	3973	5 YR	1110.00	269.53	277.80	273.22	277.82	0.00	1.48	1128.38	517.08	0.10
South_Wagner	3973	10 YR	1290.00	269.53	278.08	273.34	278.10	0.00	1.62	1212.74	556.34	0.11
South_Wagner	3973	25 YR	1550.00	269.53	278.40	273.72	278.43	0.00	1.82	1325.49	596.05	0.12
South_Wagner	3973	50 YR	1750.00	269.53	278.60	273.83	278.63	0.00	1.97	1397.23	603.05	0.13
South_Wagner	3973	100 YR	1980.00	269.53	278.81	273.96	278.85	0.00	2.13	1475.45	610.56	0.14
South_Wagner	3973	250 YR	2330.00	269.53	279.11	274.15	279.15	0.00	2.36	1587.62	621.10	0.15
South_Wagner	3973	500 YR	2640.00	269.53	279.35	274.30	279.40	0.00	2.55	1679.84	629.58	0.16
South_Wagner	4326	2 YR	860.00	272.16	277.21	273.80	277.24	0.00	1.85	696.31	642.10	0.16
South_Wagner	4326	5 YR	1110.00	272.16	277.98	274.02	278.01	0.00	2.02	839.22	665.06	0.16
South_Wagner	4326	10 YR	1290.00	272.16	278.28	274.16	278.32	0.00	2.21	899.85	676.03	0.17
South_Wagner	4326	25 YR	1550.00	272.16	278.64	274.35	278.69	0.00	2.49	973.31	681.23	0.19
South_Wagner	4326	50 YR	1750.00	272.16	278.87	274.49	278.93	0.00	2.70	1019.86	683.55	0.20
South_Wagner	4326	100 YR	1980.00	272.16	279.11	274.65	279.18	0.00	2.92	1069.97	686.02	0.21
South_Wagner	4326	250 YR	2330.00	272.16	279.45	274.87	279.53	0.00	3.24	1140.72	689.72	0.23
South_Wagner	4326	500 YR	2640.00	272.16	279.73	275.06	279.82	0.00	3.50	1199.17	697.08	0.24
South_Wagner	4396 C	2 YR	860.00	271.75	277.06	276.12	277.77	0.02	6.75	127.46	56.18	0.65
South_Wagner	4396 C	5 YR	1110.00	271.75	277.78	276.64	278.57	0.02	7.14	155.39	100.86	0.64
South_Wagner	4396 C	10 YR	1290.00	271.75	278.03	277.00	278.97	0.03	7.79	165.57	105.65	0.68
South_Wagner	4396 C	25 YR	1550.00	271.75	278.30	277.46	279.50	0.03	8.77	176.74	131.45	0.75
South_Wagner	4396 C	50 YR	1750.00	271.75	278.44	277.79	279.87	0.04	9.59	182.54	148.17	0.81
South_Wagner	4396 C	100 YR	1980.00	271.75	278.57	278.16	280.29	0.04	10.53	188.05	167.73	0.88
South_Wagner	4396 C	250 YR	2330.00	271.75	278.70	278.69	280.95	0.06	12.03	193.67	193.01	1.00
South_Wagner	4396 C	500 YR	2640.00	271.75	279.12	279.12	281.53	0.06	12.46	211.91	287.43	1.00
South_Wagner	4407 Findley St.		Bridge									
South_Wagner	4453	2 YR	860.00	271.75	277.90	275.40	278.25	0.00	4.74	181.53	99.60	0.39
South_Wagner	4453	5 YR	1110.00	271.75	278.70	275.93	279.12	0.00	5.18	214.27	116.66	0.40
South_Wagner	4453	10 YR	1290.00	271.75	279.14	276.31	279.62	0.00	5.54	232.98	177.96	0.42
South_Wagner	4453	25 YR	1550.00	271.75	279.75	276.81	280.30	0.00	5.96	266.13	222.84	0.43
South_Wagner	4453	50 YR	1750.00	271.75	280.22	277.15	280.82	0.00	6.21	298.38	231.77	0.43
South_Wagner	4453	100 YR	1980.00	271.75	281.09	277.54	281.65	0.00	6.08	363.05	234.11	0.40

HEC-RAS Plan: S_Wagner_Ult River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South_Wagner	4453	250 YR	2330.00	271.75	282.20	278.09	282.74	0.00	6.06	446.39	270.12	0.37
South_Wagner	4453	500 YR	2640.00	271.75	283.13	278.54	283.66	0.00	6.06	516.19	380.55	0.35
South_Wagner	4462	2 YR	860.00	271.75	277.88	276.12	278.34	0.01	5.45	157.91	99.18	0.4
South_Wagner	4462	5 YR	1110.00	271.75	278.69	276.65	279.21	0.01	5.82	190.68	116.28	0.48
South_Wagner	4462	10 YR	1290.00	271.75	279.13	277.01	279.72	0.01	6.16	209.67	176.57	0.49
South_Wagner	4462	25 YR	1550.00	271.75	279.74	277.47	280.40	0.01	6.53	251.42	222.56	0.49
South_Wagner	4462	50 YR	1750.00	271.75	280.22	277.80	280.90	0.00	6.69	293.70	231.65	0.49
South_Wagner	4462	100 YR	1980.00	271.75	281.10	278.19	281.69	0.00	6.36	377.33	234.12	0.43
South_Wagner	4462	250 YR	2330.00	271.75	282.24	278.72	282.77	0.00	6.13	485.58	271.71	0.38
South_Wagner	4462	500 YR	2640.00	271.75	283.20	279.17	283.70	0.00	5.99	577.24	405.23	0.35
South_Wagner	4479 Railroad		Bridge									
South_Wagner	4524 D	2 YR	860.00	271.60	278.61	276.26	278.78	0.00	3.35	266.36	80.37	0.30
South_Wagner	4524 D	5 YR	1110.00	271.60	279.48	276.74	279.66	0.00	3.49	340.09	89.19	0.28
South_Wagner	4524 D	10 YR	1290.00	271.60	279.99	276.98	280.19	0.00	3.62	387.65	94.45	0.28
South_Wagner	4524 D	25 YR	1550.00	271.60	280.69	277.30	280.90	0.00	3.79	455.82	101.50	0.27
South_Wagner	4524 D	50 YR	1750.00	271.60	281.20	277.53	281.42	0.00	3.90	508.68	110.09	0.27
South_Wagner	4524 D	100 YR	1980.00	271.60	281.95	277.78	282.17	0.00	3.88	592.03	291.75	0.25
South_Wagner	4524 D	250 YR	2330.00	271.60	283.00	278.15	283.21	0.00	3.88	718.66	505.47	0.24
South_Wagner	4524 D	500 YR	2640.00	271.60	283.92	278.45	284.12	0.00	3.84	838.72	733.03	0.22
South_Wagner	4588	2 YR	860.00	271.80	278.67	275.78	278.98	0.00	4.57	237.78	306.28	0.36
South_Wagner	4588	5 YR	1110.00	271.80	279.55	276.41	279.81	0.00	4.44	401.09	366.13	0.32
South_Wagner	4588	10 YR	1290.00	271.80	280.07	276.80	280.31	0.00	4.37	508.96	414.10	0.30
South_Wagner	4588	25 YR	1550.00	271.80	280.79	277.36	280.99	0.00	4.25	683.80	485.71	0.28
South_Wagner	4588	50 YR	1750.00	271.80	281.34	277.75	281.51	0.00	4.08	818.19	548.91	0.26
South_Wagner	4588	100 YR	1980.00	271.80	282.12	279.07	282.26	0.00	3.78	1009.41	612.57	0.23
South_Wagner	4588	250 YR	2330.00	271.80	283.18	279.46	283.29	0.00	3.52	1269.78	688.20	0.20
South_Wagner	4588	500 YR	2640.00	271.80	284.10	279.74	284.19	0.00	3.36	1494.11	758.05	0.18
South_Wagner	4891	2 YR	860.00	273.00	279.43	276.92	279.48	0.00	2.25	583.18	368.79	0.20
South_Wagner	4891	5 YR	1110.00	273.00	280.13	277.34	280.18	0.00	2.14	791.99	382.15	0.17
South_Wagner	4891	10 YR	1290.00	273.00	280.59	277.61	280.63	0.00	2.11	925.60	403.36	0.16
South_Wagner	4891	25 YR	1550.00	273.00	281.22	278.46	281.26	0.00	2.09	1111.49	442.94	0.15
South_Wagner	4891	50 YR	1750.00	273.00	281.70	278.62	281.74	0.00	2.07	1254.49	474.88	0.14
South_Wagner	4891	100 YR	1980.00	273.00	282.40	278.77	282.44	0.00	1.98	1459.73	508.87	0.13
South_Wagner	4891	250 YR	2330.00	273.00	283.39	278.97	283.43	0.00	1.91	1753.33	632.14	0.12
South_Wagner	4891	500 YR	2640.00	273.00	284.27	279.12	284.30	0.00	1.86	2012.33	721.45	0.11
South_Wagner	5308	2 YR	860.00	274.74	279.85		279.87	0.00	1.72	706.12	353.63	0.1
South_Wagner	5308	5 YR	1110.00	274.74	280.46		280.48	0.00	1.72	944.99	423.51	0.1
South_Wagner	5308	10 YR	1290.00	274.74	280.86		280.89	0.00	1.72	1133.43	476.86	0.15
South_Wagner	5308	25 YR	1550.00	274.74	281.45		281.47	0.00	1.67	1419.13	507.81	0.14
South_Wagner	5308	50 YR	1750.00	274.74	281.90		281.92	0.00	1.61	1653.74	527.90	0.13
South_Wagner	5308	100 YR	1980.00	274.74	282.55		282.57	0.00	1.48	2004.26	546.66	0.11
South_Wagner	5308	250 YR	2330.00	274.74	283.51		283.52	0.00	1.36	2559.15	610.09	0.09
South_Wagner	5308	500 YR	2640.00	274.74	284.37		284.38	0.00	1.27	3093.97	641.29	0.08
South_Wagner	5785	2 YR	780.00	275.40	280.59	279.47	280.73	0.00	3.49	321.07	190.74	0.38
South_Wagner	5785	5 YR	1020.00	275.40	281.07	279.86	281.21	0.00	3.52	415.72	202.85	0.36
South_Wagner	5785	10 YR	1190.00	275.40	281.40	280.02	281.53	0.00	3.55	482.73	211.76	0.34
South_Wagner	5785	25 YR	1430.00	275.40	281.86	280.23	281.99	0.00	3.56	583.66	226.10	0.32
South_Wagner	5785	50 YR	1620.00	275.40	282.23	280.37	282.36	0.00	3.58	671.72	245.17	0.31
South_Wagner	5785	100 YR	1850.00	275.40	282.78	280.60	282.90	0.00	3.40	811.34	272.84	0.28
South_Wagner	5785	250 YR	2220.00	275.40	283.66	280.82	283.76	0.00	3.20	1073.41	315.68	0.24
South_Wagner	5785	500 YR	2530.00	275.40	284.47	280.99	284.55	0.00	2.96	1341.77	357.91	0.21
South_Wagner	6126 E	2 YR	780.00	275.86	282.25		282.68	0.01	5.25	148.67	35.48	0.45
South_Wagner	6126 E	5 YR	1020.00	275.86	282.66		283.26	0.01	6.23	166.30	62.17	0.52
South_Wagner	6126 E	10 YR	1190.00	275.86	282.87		283.60	0.01	6.89	182.52	87.29	0.56
South_Wagner	6126 E	25 YR	1430.00	275.86	283.13	281.68	284.02	0.01	7.70	206.88	101.83	0.62
South_Wagner	6126 E	50 YR	1620.00	275.86	283.34	282.03	284.33	0.01	8.19	229.15	110.41	0.64
South_Wagner	6126 E	100 YR	1850.00	275.86	283.54	282.60	284.66	0.01	8.78	252.10	118.54	0.68
South_Wagner	6126 E	250 YR	2220.00	275.86	284.07	283.77	285.15	0.01	8.91	321.32	143.96	0.66
South_Wagner	6126 E	500 YR	2530.00	275.86	284.72		285.58	0.01	8.26	425.25	176.38	0.58
South_Wagner	6491	2 YR	780.00	278.42	284.25		284.47	0.00	3.81	223.93	86.51	0.36
South_Wagner	6491	5 YR	1020.00	278.42	284.94		285.16	0.00	3.98	286.21	95.45	0.35
South_Wagner	6491	10 YR	1190.00	278.42	285.34		285.58	0.00	4.13	326.11	100.96	0.35
South_Wagner	6491	25 YR	1430.00	278.42	285.84		286.10	0.00	4.37	378.05	111.04	0.35
South_Wagner	6491	50 YR	1620.00	278.42	286.20		286.50	0.00	4.62	423.17	138.96	0.35
South_Wagner	6491	100 YR	1850.00	278.42	286.57		286.88	0.00	4.80	475.91	149.69	0.36
South_Wagner	6491	250 YR	2220.00	278.42	286.99		287.34	0.00	5.13	540.53	154.38	0.37
South_Wagner	6491	500 YR	2530.00	278.42	287.25		287.63	0.00	5.48	580.31	161.63	0.38
South_Wagner	6693 F	2 YR	780.00	278.87	284.90	282.14	285.09	0.00	3.46	225.57	52.57	0.29
South_Wagner	6693 F	5 YR	1020.00	278.87	285.56	282.58	285.80	0.00	3.91	260.75	54.79	0.32
South_Wagner	6693 F	10 YR	1190.00	278.87	285.96	282.88	286.24	0.00	4.20	283.30	56.66	0.33
South_Wagner	6693 F	25 YR	1430.00	278.87	286.49	283.26	286.81	0.00	4.55	314.53	62.63	0.36
South_Wagner	6693 F	50 YR	1620.00	278.87	286.87	283.56	287.23	0.00	4.77	339.44	66.20	0.37
South_Wagner	6693 F	100 YR	1850.00	278.87	287.23	283.88	287.63	0.00	5.10	363.61	69.44	0.38
South_Wagner	6693 F	250 YR	2220.00	278.87	287.68	284.37	288.17	0.00	5.66	395.52	108.72	0.41
South_Wagner	6693 F	500 YR	2530.00	278.87	287.97	284.76	288.56	0.00	6.14	417.65	128.32	0.43
South_Wagner	6723 Robison Rd.		Culvert									

HEC-RAS Plan: S_Wagner_Ult River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South_Wagner	6829 G	2 YR	780.00	280.07	286.23	283.10	286.37	0.00	2.99	261.04	59.87	0.25
South_Wagner	6829 G	5 YR	1020.00	280.07	287.19	283.54	287.35	0.00	3.19	319.89	63.53	0.25
South_Wagner	6829 G	10 YR	1190.00	280.07	287.81	283.83	287.98	0.00	3.30	360.42	65.94	0.25
South_Wagner	6829 G	25 YR	1430.00	280.07	288.65	284.20	288.83	0.00	3.43	416.41	136.80	0.24
South_Wagner	6829 G	50 YR	1620.00	280.07	289.28	284.48	289.48	0.00	3.53	459.20	391.04	0.24
South_Wagner	6829 G	100 YR	1850.00	280.07	290.35	284.80	290.53	0.00	3.48	530.98	522.82	0.22
South_Wagner	6829 G	250 YR	2220.00	280.07	291.75	285.27	291.95	0.00	3.55	625.75	601.49	0.21
South_Wagner	6829 G	500 YR	2530.00	280.07	292.11	285.61	292.15	0.00	2.01	2120.19	609.71	0.11
South_Wagner	7010	2 YR	780.00	280.20	286.61	286.11	287.59	0.02	7.95	98.38	40.00	0.82
South_Wagner	7010	5 YR	1020.00	280.20	287.60	286.90	288.32	0.02	7.01	183.93	134.49	0.70
South_Wagner	7010	10 YR	1190.00	280.20	288.24	287.59	288.75	0.01	6.13	293.07	211.25	0.57
South_Wagner	7010	25 YR	1430.00	280.20	289.04	288.09	289.33	0.01	5.04	497.91	313.72	0.43
South_Wagner	7010	50 YR	1620.00	280.20	289.64	288.23	289.84	0.00	4.40	663.55	343.88	0.35
South_Wagner	7010	100 YR	1850.00	280.20	290.68	288.60	290.79	0.00	3.47	954.33	442.47	0.25
South_Wagner	7010	250 YR	2220.00	280.20	292.06	288.87	292.14	0.00	2.88	1342.59	613.30	0.19
South_Wagner	7010	500 YR	2530.00	280.20	292.17	289.05	292.26	0.00	3.21	1371.74	618.06	0.21
South_Wagner	7475	2 YR	780.00	280.75	290.20		290.35	0.00	3.57	406.55	249.01	0.24
South_Wagner	7475	5 YR	1020.00	280.75	290.69		290.84	0.00	3.79	537.11	281.86	0.25
South_Wagner	7475	10 YR	1190.00	280.75	290.90		291.07	0.00	4.07	599.09	300.89	0.26
South_Wagner	7475	25 YR	1430.00	280.75	291.11		291.30	0.00	4.52	662.21	319.10	0.29
South_Wagner	7475	50 YR	1620.00	280.75	291.28		291.49	0.00	4.78	719.32	334.73	0.30
South_Wagner	7475	100 YR	1850.00	280.75	291.68		291.86	0.00	4.67	856.15	359.94	0.29
South_Wagner	7475	250 YR	2220.00	280.75	292.62		292.73	0.00	3.97	1227.03	415.63	0.23
South_Wagner	7475	500 YR	2530.00	280.75	292.83		292.95	0.00	4.23	1314.06	432.30	0.24
South_Wagner	7954 H	2 YR	780.00	282.70	291.34		291.48	0.00	3.40	381.05	166.71	0.24
South_Wagner	7954 H	5 YR	1020.00	282.70	291.88		292.04	0.00	3.75	476.56	191.28	0.26
South_Wagner	7954 H	10 YR	1190.00	282.70	292.19		292.36	0.00	3.98	539.90	217.08	0.27
South_Wagner	7954 H	25 YR	1430.00	282.70	292.59		292.79	0.00	4.38	637.31	263.79	0.29
South_Wagner	7954 H	50 YR	1620.00	282.70	292.86		293.07	0.00	4.59	716.88	307.35	0.29
South_Wagner	7954 H	100 YR	1850.00	282.70	293.17		293.39	0.00	4.79	819.98	350.66	0.30
South_Wagner	7954 H	250 YR	2220.00	282.70	293.71		293.91	0.00	4.83	1025.82	409.52	0.29
South_Wagner	7954 H	500 YR	2530.00	282.70	294.00		294.21	0.00	5.02	1148.79	442.81	0.30
South_Wagner	8499	2 YR	630.00	284.60	292.93		293.19	0.01	4.26	189.16	111.92	0.35
South_Wagner	8499	5 YR	830.00	284.60	293.55		293.83	0.01	4.57	285.05	199.72	0.35
South_Wagner	8499	10 YR	980.00	284.60	293.91		294.18	0.00	4.67	367.03	245.78	0.35
South_Wagner	8499	25 YR	1270.00	284.60	294.45		294.72	0.00	4.87	522.16	326.90	0.35
South_Wagner	8499	50 YR	1510.00	284.60	294.79		295.04	0.00	4.99	638.10	365.40	0.34
South_Wagner	8499	100 YR	1770.00	284.60	295.12		295.36	0.00	5.04	761.46	384.19	0.34
South_Wagner	8499	250 YR	2150.00	284.60	295.55		295.79	0.00	5.21	947.74	467.19	0.34
South_Wagner	8499	500 YR	2470.00	284.60	295.85		296.08	0.00	5.26	1091.16	490.34	0.34
South_Wagner	9030	2 YR	630.00	285.80	294.12		294.19	0.00	2.22	477.97	256.55	0.15
South_Wagner	9030	5 YR	830.00	285.80	294.74		294.80	0.00	2.34	645.30	284.56	0.15
South_Wagner	9030	10 YR	980.00	285.80	295.10		295.16	0.00	2.45	749.51	300.69	0.16
South_Wagner	9030	25 YR	1270.00	285.80	295.66		295.73	0.00	2.66	929.39	338.30	0.16
South_Wagner	9030	50 YR	1510.00	285.80	296.02		296.09	0.00	2.84	1054.98	362.31	0.17
South_Wagner	9030	100 YR	1770.00	285.80	296.36		296.44	0.00	3.03	1181.15	385.85	0.18
South_Wagner	9030	250 YR	2150.00	285.80	296.83		296.92	0.00	3.25	1373.75	426.97	0.19
South_Wagner	9030	500 YR	2470.00	285.80	297.14		297.23	0.00	3.43	1509.10	446.47	0.19
South_Wagner	9490	2 YR	630.00	285.80	294.46		294.50	0.00	1.83	591.52	217.25	0.12
South_Wagner	9490	5 YR	830.00	285.80	295.09		295.14	0.00	2.04	736.21	248.97	0.13
South_Wagner	9490	10 YR	980.00	285.80	295.46		295.51	0.00	2.20	834.01	276.02	0.13
South_Wagner	9490	25 YR	1270.00	285.80	296.06		296.12	0.00	2.47	1014.97	330.38	0.15
South_Wagner	9490	50 YR	1510.00	285.80	296.45		296.52	0.00	2.64	1147.74	354.62	0.15
South_Wagner	9490	100 YR	1770.00	285.80	296.83		296.90	0.00	2.87	1293.31	413.08	0.16
South_Wagner	9490	250 YR	2150.00	285.80	297.33		297.41	0.00	3.06	1507.25	435.88	0.17
South_Wagner	9490	500 YR	2470.00	285.80	297.67		297.76	0.00	3.23	1659.53	453.04	0.18
South_Wagner	9607 I	2 YR	630.00	291.70	294.43	293.71	294.85	0.01	5.24	120.32	52.22	0.61
South_Wagner	9607 I	5 YR	830.00	291.70	295.06	294.09	295.50	0.01	5.38	154.25	55.95	0.57
South_Wagner	9607 I	10 YR	980.00	291.70	295.42	294.33	295.91	0.01	5.59	175.21	58.14	0.57
South_Wagner	9607 I	25 YR	1270.00	291.70	296.00	294.80	296.57	0.01	6.05	210.05	61.60	0.58
South_Wagner	9607 I	50 YR	1510.00	291.70	296.37	295.14	297.02	0.01	6.49	232.84	63.76	0.60
South_Wagner	9607 I	100 YR	1770.00	291.70	296.72	295.48	297.47	0.01	6.92	255.70	94.30	0.61
South_Wagner	9607 I	250 YR	2150.00	291.70	297.18	295.94	298.04	0.01	7.45	321.41	175.39	0.63
South_Wagner	9607 I	500 YR	2470.00	291.70	297.50	296.31	298.43	0.01	7.84	387.50	246.91	0.64
South_Wagner	9613 Falvey Ave.		Culvert									
South_Wagner	9708 J	2 YR	630.00	289.25	297.32	293.19	297.38	0.00	1.99	316.71	66.33	0.15
South_Wagner	9708 J	5 YR	830.00	289.25	298.29	293.59	298.37	0.00	2.20	395.76	109.49	0.16
South_Wagner	9708 J	10 YR	980.00	289.25	298.72	294.02	298.81	0.00	2.39	470.60	233.55	0.16
South_Wagner	9708 J	25 YR	1270.00	289.25	299.09	294.47	299.21	0.00	2.83	572.03	339.97	0.19
South_Wagner	9708 J	50 YR	1510.00	289.25	299.29	294.76	299.43	0.00	3.19	646.45	413.03	0.21
South_Wagner	9708 J	100 YR	1770.00	289.25	299.45	295.07	299.62	0.00	3.57	717.60	488.50	0.23
South_Wagner	9708 J	250 YR	2150.00	289.25	299.69	295.48	299.91	0.00	4.03	854.60	611.99	0.26
South_Wagner	9708 J	500 YR	2470.00	289.25	299.89	295.81	300.12	0.00	4.29	975.35	637.10	0.27
South_Wagner	9754	2 YR	630.00	289.50	297.35	294.17	297.44	0.00	2.65	321.65	146.98	0.21
South_Wagner	9754	5 YR	830.00	289.50	298.32	294.72	298.41	0.00	2.62	512.96	314.93	0.19
South_Wagner	9754	10 YR	980.00	289.50	298.78	295.08	298.85	0.00	2.60	664.36	393.07	0.18
South_Wagner	9754	25 YR	1270.00	289.50	299.17	295.95	299.26	0.00	2.92	825.79	551.99	0.20
South_Wagner	9754	50 YR	1510.00	289.50	299.40	296.33	299.50	0.00	3.17	926.07	568.58	0.21

HEC-RAS Plan: S_Wagner_Ult River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South_Wagner	9754	100 YR	1770.00	289.50	299.59	296.67	299.71	0.00	3.44	1014.03	583.44	0.23
South_Wagner	9754	250 YR	2150.00	289.50	299.88	297.12	300.01	0.00	3.75	1151.99	605.97	0.24
South_Wagner	9754	500 YR	2470.00	289.50	300.08	297.46	300.23	0.00	3.99	1253.86	623.50	0.26
South_Wagner	10104	2 YR	630.00	291.19	297.84		297.88	0.00	2.47	625.10	444.15	0.19
South_Wagner	10104	5 YR	830.00	291.19	298.66		298.68	0.00	1.92	999.80	482.44	0.14
South_Wagner	10104	10 YR	980.00	291.19	299.07		299.08	0.00	1.85	1205.43	511.49	0.13
South_Wagner	10104	25 YR	1270.00	291.19	299.50		299.52	0.00	1.95	1427.30	518.60	0.13
South_Wagner	10104	50 YR	1510.00	291.19	299.75		299.78	0.00	2.08	1561.51	522.86	0.14
South_Wagner	10104	100 YR	1770.00	291.19	299.99		300.01	0.00	2.22	1683.98	526.81	0.15
South_Wagner	10104	250 YR	2150.00	291.19	300.32		300.35	0.00	2.39	1860.04	532.49	0.15
South_Wagner	10104	500 YR	2470.00	291.19	300.57		300.60	0.00	2.54	1991.87	538.96	0.16
South_Wagner	10271	2 YR	630.00	291.80	298.00		298.02	0.00	1.76	773.65	384.49	0.14
South_Wagner	10271	5 YR	830.00	291.80	298.74		298.76	0.00	1.63	1079.27	434.17	0.12
South_Wagner	10271	10 YR	980.00	291.80	299.14		299.16	0.00	1.64	1256.93	457.51	0.11
South_Wagner	10271	25 YR	1270.00	291.80	299.58		299.60	0.00	1.81	1461.08	482.00	0.12
South_Wagner	10271	50 YR	1510.00	291.80	299.84		299.86	0.00	1.96	1590.33	493.70	0.13
South_Wagner	10271	100 YR	1770.00	291.80	300.08		300.11	0.00	2.12	1711.15	502.78	0.14
South_Wagner	10271	250 YR	2150.00	291.80	300.43		300.46	0.00	2.32	1884.77	514.11	0.15
South_Wagner	10271	500 YR	2470.00	291.80	300.68		300.72	0.00	2.48	2017.43	525.36	0.16
South_Wagner	10502	2 YR	630.00	293.90	298.44	298.44	298.93	0.02	6.53	197.60	248.27	0.69
South_Wagner	10502	5 YR	830.00	293.90	298.71	298.71	299.19	0.02	6.89	269.45	282.72	0.70
South_Wagner	10502	10 YR	980.00	293.90	299.19		299.45	0.01	5.52	419.00	334.61	0.52
South_Wagner	10502	25 YR	1270.00	293.90	299.68		299.88	0.01	5.24	596.12	393.72	0.46
South_Wagner	10502	50 YR	1510.00	293.90	299.97		300.16	0.01	5.33	713.88	418.03	0.45
South_Wagner	10502	100 YR	1770.00	293.90	300.24		300.42	0.01	5.35	828.02	428.47	0.44
South_Wagner	10502	250 YR	2150.00	293.90	300.61		300.78	0.00	5.38	989.06	442.77	0.43
South_Wagner	10502	500 YR	2470.00	293.90	300.88		301.05	0.00	5.45	1112.19	453.41	0.42
South_Wagner	10562 K	2 YR	630.00	294.40	299.18	297.83	299.44	0.00	4.15	151.82	222.91	0.44
South_Wagner	10562 K	5 YR	830.00	294.40	299.37	298.23	299.77	0.01	5.11	162.38	279.93	0.53
South_Wagner	10562 K	10 YR	980.00	294.40	299.56	298.51	299.85	0.00	4.71	339.76	320.64	0.47
South_Wagner	10562 K	25 YR	1270.00	294.40	299.96	298.96	300.26	0.00	5.02	432.16	329.11	0.48
South_Wagner	10562 K	50 YR	1510.00	294.40	300.22	299.28	300.56	0.00	5.32	495.57	342.61	0.49
South_Wagner	10562 K	100 YR	1770.00	294.40	300.47	299.64	300.84	0.00	5.67	561.41	389.20	0.50
South_Wagner	10562 K	250 YR	2150.00	294.40	300.80	299.90	301.24	0.01	6.28	663.07	431.21	0.53
South_Wagner	10562 K	500 YR	2470.00	294.40	301.05	300.10	301.52	0.01	6.55	746.82	458.81	0.54
South_Wagner	10582 Kilgore St.		Culvert									
South_Wagner	10652 L	2 YR	630.00	295.20	300.31	298.03	300.41	0.00	2.62	268.85	354.28	0.24
South_Wagner	10652 L	5 YR	830.00	295.20	301.05	298.37	301.16	0.00	2.74	358.18	490.45	0.23
South_Wagner	10652 L	10 YR	980.00	295.20	301.61	298.57	301.66	0.00	2.08	754.39	590.70	0.16
South_Wagner	10652 L	25 YR	1270.00	295.20	302.09	298.95	302.14	0.00	2.18	963.88	708.15	0.16
South_Wagner	10652 L	50 YR	1510.00	295.20	302.38	299.25	302.44	0.00	2.27	1106.86	735.15	0.17
South_Wagner	10652 L	100 YR	1770.00	295.20	302.63	299.58	302.69	0.00	2.40	1231.93	752.37	0.17
South_Wagner	10652 L	250 YR	2150.00	295.20	302.94	300.06	303.00	0.00	2.61	1386.09	761.09	0.18
South_Wagner	10652 L	500 YR	2470.00	295.20	303.14	300.49	303.21	0.00	2.77	1493.10	766.27	0.19
South_Wagner	10682	2 YR	630.00	295.10	300.42	298.12	300.45	0.00	1.59	583.67	363.61	0.15
South_Wagner	10682	5 YR	830.00	295.10	301.17	298.34	301.20	0.00	1.62	846.27	496.01	0.14
South_Wagner	10682	10 YR	980.00	295.10	301.65	298.50	301.67	0.00	1.61	1048.13	550.93	0.13
South_Wagner	10682	25 YR	1270.00	295.10	302.13	298.75	302.16	0.00	1.61	1479.07	658.85	0.12
South_Wagner	10682	50 YR	1510.00	295.10	302.43	298.93	302.45	0.00	1.71	1680.58	726.23	0.13
South_Wagner	10682	100 YR	1770.00	295.10	302.68	299.12	302.71	0.00	1.83	1866.59	756.60	0.13
South_Wagner	10682	250 YR	2150.00	295.10	302.99	299.38	303.02	0.00	1.97	2101.65	766.01	0.14
South_Wagner	10682	500 YR	2470.00	295.10	303.20	299.58	303.23	0.00	2.09	2265.12	771.26	0.15
South_Wagner	10858	2 YR	630.00	294.70	300.52		300.60	0.00	3.00	450.94	320.33	0.29
South_Wagner	10858	5 YR	830.00	294.70	301.25		301.30	0.00	2.62	716.57	403.51	0.23
South_Wagner	10858	10 YR	980.00	294.70	301.72		301.76	0.00	2.47	913.93	465.91	0.20
South_Wagner	10858	25 YR	1270.00	294.70	302.19		302.24	0.00	2.61	1156.81	542.16	0.21
South_Wagner	10858	50 YR	1510.00	294.70	302.49		302.54	0.00	2.79	1330.69	623.10	0.21
South_Wagner	10858	100 YR	1770.00	294.70	302.74		302.79	0.00	2.91	1493.52	644.60	0.22
South_Wagner	10858	250 YR	2150.00	294.70	303.06		303.11	0.00	3.09	1699.23	666.31	0.22
South_Wagner	10858	500 YR	2470.00	294.70	303.28		303.33	0.00	3.25	1846.21	680.87	0.23
South_Wagner	10955	2 YR	660.00	294.50	300.67		300.72	0.00	2.59	697.89	362.70	0.20
South_Wagner	10955	5 YR	920.00	294.50	301.34		301.39	0.00	2.71	985.65	484.10	0.20
South_Wagner	10955	10 YR	1090.00	294.50	301.79		301.83	0.00	2.68	1216.65	541.32	0.19
South_Wagner	10955	25 YR	1330.00	294.50	302.26		302.31	0.00	2.72	1482.15	575.45	0.19
South_Wagner	10955	50 YR	1530.00	294.50	302.56		302.61	0.00	2.81	1657.53	594.06	0.19
South_Wagner	10955	100 YR	1760.00	294.50	302.82		302.87	0.00	2.97	1813.58	619.22	0.20
South_Wagner	10955	250 YR	2100.00	294.50	303.14		303.19	0.00	3.19	2012.64	632.86	0.21
South_Wagner	10955	500 YR	2400.00	294.50	303.36		303.42	0.00	3.40	2154.77	643.62	0.22
South_Wagner	10978	2 YR	660.00	294.40	300.68	297.77	300.76	0.00	2.69	504.54	261.34	0.22
South_Wagner	10978	5 YR	920.00	294.40	301.35	298.46	301.43	0.00	2.87	715.75	373.51	0.22
South_Wagner	10978	10 YR	1090.00	294.40	301.79	298.87	301.87	0.00	2.89	898.47	456.90	0.21
South_Wagner	10978	25 YR	1330.00	294.40	302.27	299.40	302.34	0.00	2.98	1134.76	526.67	0.21
South_Wagner	10978	50 YR	1530.00	294.40	302.57	299.81	302.64	0.00	3.09	1301.54	576.55	0.21
South_Wagner	10978	100 YR	1760.00	294.40	302.83	300.26	302.91	0.00	3.24	1452.42	589.17	0.22
South_Wagner	10978	250 YR	2100.00	294.40	303.15	300.51	303.23	0.00	3.46	1642.60	604.71	0.23
South_Wagner	10978	500 YR	2400.00	294.40	303.37	300.51	303.46	0.00	3.68	1778.96	615.60	0.24
South_Wagner	10987 Abandoned Rd.		Bridge									

HEC-RAS Plan: S_Wagner_Ult River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South_Wagner	11028 M	2 YR	660.00	294.40	301.13	297.76	301.35	0.00	3.68	179.35	183.60	0.29
South_Wagner	11028 M	5 YR	920.00	294.40	301.90	298.46	302.08	0.00	3.67	475.32	353.89	0.27
South_Wagner	11028 M	10 YR	1090.00	294.40	302.14	298.87	302.34	0.00	4.02	568.84	445.58	0.29
South_Wagner	11028 M	25 YR	1330.00	294.40	302.37	299.40	302.60	0.00	4.45	676.42	483.96	0.31
South_Wagner	11028 M	50 YR	1530.00	294.40	302.51	299.82	302.78	0.00	4.81	749.18	503.26	0.34
South_Wagner	11028 M	100 YR	1760.00	294.40	302.67	300.26	302.97	0.00	5.18	831.38	524.19	0.36
South_Wagner	11028 M	250 YR	2100.00	294.40	302.96	301.53	303.27	0.00	5.51	987.33	552.84	0.37
South_Wagner	11028 M	500 YR	2400.00	294.40	303.18	302.05	303.50	0.00	5.78	1108.90	580.80	0.38
South_Wagner	11075	2 YR	660.00	294.56	301.39		301.42	0.00	1.62	721.62	358.91	0.13
South_Wagner	11075	5 YR	920.00	294.56	302.10		302.14	0.00	1.81	1017.23	476.64	0.14
South_Wagner	11075	10 YR	1090.00	294.56	302.37		302.41	0.00	1.98	1147.33	511.69	0.15
South_Wagner	11075	25 YR	1330.00	294.56	302.63		302.69	0.00	2.22	1287.52	538.61	0.16
South_Wagner	11075	50 YR	1530.00	294.56	302.81		302.88	0.00	2.41	1385.67	550.79	0.17
South_Wagner	11075	100 YR	1760.00	294.56	303.01		303.08	0.00	2.61	1492.49	565.50	0.18
South_Wagner	11075	250 YR	2100.00	294.56	303.31		303.39	0.00	2.86	1667.01	592.39	0.20
South_Wagner	11075	500 YR	2400.00	294.56	303.53		303.63	0.00	3.07	1802.54	614.02	0.21
South_Wagner	11352	2 YR	660.00	294.60	301.49		301.53	0.00	1.64	554.79	276.41	0.15
South_Wagner	11352	5 YR	920.00	294.60	302.20		302.25	0.00	1.79	810.53	416.36	0.15
South_Wagner	11352	10 YR	1090.00	294.60	302.48		302.53	0.00	1.95	931.63	465.68	0.16
South_Wagner	11352	25 YR	1330.00	294.60	302.76		302.82	0.00	2.18	1068.02	486.80	0.17
South_Wagner	11352	50 YR	1530.00	294.60	302.96		303.03	0.00	2.35	1164.68	501.68	0.19
South_Wagner	11352	100 YR	1760.00	294.60	303.17		303.25	0.00	2.55	1273.64	538.86	0.20
South_Wagner	11352	250 YR	2100.00	294.60	303.49		303.58	0.00	2.77	1454.84	586.78	0.21
South_Wagner	11352	500 YR	2400.00	294.60	303.73		303.83	0.00	2.93	1598.63	599.57	0.22
South_Wagner	11634	2 YR	660.00	296.10	301.70		301.85	0.00	4.16	390.65	359.44	0.44
South_Wagner	11634	5 YR	920.00	296.10	302.41		302.48	0.00	3.38	681.20	490.30	0.32
South_Wagner	11634	10 YR	1090.00	296.10	302.70		302.77	0.00	3.35	838.13	579.07	0.30
South_Wagner	11634	25 YR	1330.00	296.10	303.01		303.09	0.00	3.57	1028.92	656.28	0.31
South_Wagner	11634	50 YR	1530.00	296.10	303.23		303.30	0.00	3.60	1174.90	680.79	0.30
South_Wagner	11634	100 YR	1760.00	296.10	303.46		303.53	0.00	3.60	1337.07	699.53	0.30
South_Wagner	11634	250 YR	2100.00	296.10	303.81		303.87	0.00	3.57	1585.88	746.58	0.28
South_Wagner	11634	500 YR	2400.00	296.10	304.06		304.13	0.00	3.58	1780.99	764.76	0.28
South_Wagner	11711 N	2 YR	660.00	296.80	301.94	299.16	302.05	0.00	2.81	376.03	404.92	0.27
South_Wagner	11711 N	5 YR	920.00	296.80	302.53	299.72	302.63	0.00	2.83	695.86	584.32	0.25
South_Wagner	11711 N	10 YR	1090.00	296.80	302.81	300.04	302.90	0.00	2.87	867.67	624.72	0.24
South_Wagner	11711 N	25 YR	1330.00	296.80	303.13	300.47	303.22	0.00	3.01	1074.67	690.48	0.25
South_Wagner	11711 N	50 YR	1530.00	296.80	303.34	301.55	303.44	0.00	3.11	1224.91	707.42	0.25
South_Wagner	11711 N	100 YR	1760.00	296.80	303.57	301.70	303.67	0.00	3.19	1388.71	716.49	0.25
South_Wagner	11711 N	250 YR	2100.00	296.80	303.91	302.19	304.00	0.00	3.28	1630.00	731.08	0.25
South_Wagner	11711 N	500 YR	2400.00	296.80	304.16	302.45	304.25	0.00	3.39	1820.47	772.09	0.25
South_Wagner	11721 Waco St.		Culvert									
South_Wagner	11803	2 YR	660.00	296.44	302.48	299.38	302.56	0.00	2.37	422.06	455.02	0.21
South_Wagner	11803	5 YR	920.00	296.44	302.76	299.90	302.87	0.00	2.88	560.00	532.17	0.24
South_Wagner	11803	10 YR	1090.00	296.44	302.89	300.20	303.02	0.00	3.21	627.63	554.65	0.27
South_Wagner	11803	25 YR	1330.00	296.44	303.13	300.59	303.27	0.00	3.45	766.00	624.69	0.28
South_Wagner	11803	50 YR	1530.00	296.44	303.35	300.89	303.49	0.00	3.53	909.72	666.57	0.28
South_Wagner	11803	100 YR	1760.00	296.44	303.56	301.21	303.70	0.00	3.66	1052.24	690.56	0.28
South_Wagner	11803	250 YR	2100.00	296.44	303.90	301.79	304.03	0.00	3.66	1293.32	719.08	0.27
South_Wagner	11803	500 YR	2400.00	296.44	304.17	302.76	304.29	0.00	3.66	1489.30	738.10	0.27
South_Wagner	11897 O	2 YR	660.00	297.00	302.56		302.74	0.00	3.47	248.83	270.11	0.36
South_Wagner	11897 O	5 YR	920.00	297.00	302.87		303.11	0.00	4.12	346.97	363.40	0.41
South_Wagner	11897 O	10 YR	1090.00	297.00	303.02		303.29	0.00	4.48	402.80	390.48	0.44
South_Wagner	11897 O	25 YR	1330.00	297.00	303.27		303.55	0.00	4.73	514.93	473.05	0.45
South_Wagner	11897 O	50 YR	1530.00	297.00	303.49		303.76	0.00	4.76	623.98	524.25	0.44
South_Wagner	11897 O	100 YR	1760.00	297.00	303.70		303.97	0.00	4.84	741.12	583.97	0.43
South_Wagner	11897 O	250 YR	2100.00	297.00	304.03		304.28	0.00	4.91	954.36	700.83	0.42
South_Wagner	11897 O	500 YR	2400.00	297.00	304.29		304.52	0.00	4.81	1144.91	736.15	0.40
South_Wagner	12213	2 YR	660.00	297.50	303.56		303.89	0.00	4.60	148.57	78.96	0.46
South_Wagner	12213	5 YR	920.00	297.50	304.07		304.49	0.01	5.30	203.94	128.44	0.50
South_Wagner	12213	10 YR	1090.00	297.50	304.32	302.94	304.79	0.01	5.68	243.09	198.42	0.52
South_Wagner	12213	25 YR	1330.00	297.50	304.61	303.51	305.14	0.01	6.17	316.59	300.59	0.54
South_Wagner	12213	50 YR	1530.00	297.50	304.77	304.08	305.35	0.01	6.54	369.73	351.80	0.57
South_Wagner	12213	100 YR	1760.00	297.50	304.95	304.69	305.55	0.01	6.86	435.07	380.84	0.58
South_Wagner	12213	250 YR	2100.00	297.50	305.20	304.98	305.82	0.01	7.21	534.86	420.64	0.59
South_Wagner	12213	500 YR	2400.00	297.50	305.34	305.24	306.02	0.01	7.66	596.81	440.74	0.62
South_Wagner	12385	2 YR	660.00	298.00	304.31	302.45	304.58	0.00	4.18	166.02	89.45	0.41
South_Wagner	12385	5 YR	920.00	298.00	304.90	303.08	305.24	0.00	4.74	227.08	120.18	0.43
South_Wagner	12385	10 YR	1090.00	298.00	305.20	303.43	305.58	0.00	5.08	268.04	153.29	0.44
South_Wagner	12385	25 YR	1330.00	298.00	305.54	303.88	305.97	0.00	5.52	330.42	211.88	0.46
South_Wagner	12385	50 YR	1530.00	298.00	305.76	304.42	306.23	0.00	5.87	378.94	237.45	0.48
South_Wagner	12385	100 YR	1760.00	298.00	305.96	304.82	306.48	0.00	6.28	431.74	273.31	0.50
South_Wagner	12385	250 YR	2100.00	298.00	306.21	305.25	306.81	0.01	6.84	504.55	340.70	0.53
South_Wagner	12385	500 YR	2400.00	298.00	306.44	305.77	307.07	0.01	7.17	575.18	440.60	0.55
South_Wagner	12537	2 YR	660.00	298.60	304.83		305.02	0.00	3.57	200.10	85.65	0.34
South_Wagner	12537	5 YR	920.00	298.60	305.45		305.70	0.00	4.11	271.23	159.13	0.36
South_Wagner	12537	10 YR	1090.00	298.60	305.77		306.06	0.00	4.41	335.95	224.69	0.37
South_Wagner	12537	25 YR	1330.00	298.60	306.16		306.47	0.00	4.69	433.21	279.72	0.38

HEC-RAS Plan: S_Wagner_Ult River: South_Wagner Reach: South_Wagner (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South_Wagner	12537	50 YR	1530.00	298.60	306.42		306.75	0.00	4.91	513.70	350.68	0.39
South_Wagner	12537	100 YR	1760.00	298.60	306.69		307.03	0.00	5.13	619.50	440.38	0.39
South_Wagner	12537	250 YR	2100.00	298.60	307.03		307.39	0.00	5.46	788.37	552.29	0.41
South_Wagner	12537	500 YR	2400.00	298.60	307.29		307.67	0.00	5.65	951.90	669.38	0.4
South_Wagner	12576	2 YR	660.00	298.80	304.98	301.66	305.10	0.00	2.80	253.62	81.38	0.23
South_Wagner	12576	5 YR	920.00	298.80	305.62	302.31	305.79	0.00	3.36	330.01	164.97	0.26
South_Wagner	12576	10 YR	1090.00	298.80	305.95	302.67	306.15	0.00	3.67	395.52	253.27	0.28
South_Wagner	12576	25 YR	1330.00	298.80	306.33	303.12	306.56	0.00	4.04	504.60	338.01	0.29
South_Wagner	12576	50 YR	1530.00	298.80	306.59	303.45	306.85	0.00	4.29	601.16	402.55	0.31
South_Wagner	12576	100 YR	1760.00	298.80	306.86	303.76	307.13	0.00	4.52	718.68	473.58	0.31
South_Wagner	12576	250 YR	2100.00	298.80	307.23	304.23	307.51	0.00	4.76	915.63	594.82	0.32
South_Wagner	12576	500 YR	2400.00	298.80	307.48	304.63	307.78	0.00	4.99	1086.04	698.32	0.33
South_Wagner	12590 Private Dr.		Culvert									
South_Wagner	12622	2 YR	660.00	299.40	306.05	302.21	306.13	0.00	2.33	417.67	183.76	0.18
South_Wagner	12622	5 YR	920.00	299.40	306.47	302.76	306.58	0.00	2.92	508.82	249.71	0.21
South_Wagner	12622	10 YR	1090.00	299.40	306.65	303.11	306.80	0.00	3.30	560.11	301.90	0.24
South_Wagner	12622	25 YR	1330.00	299.40	306.90	303.55	307.08	0.00	3.76	645.24	397.17	0.27
South_Wagner	12622	50 YR	1530.00	299.40	307.05	303.90	307.26	0.00	4.13	707.51	434.09	0.29
South_Wagner	12622	100 YR	1760.00	299.40	307.19	304.26	307.44	0.00	4.52	774.40	465.95	0.31
South_Wagner	12622	250 YR	2100.00	299.40	307.37	305.35	307.67	0.00	5.09	858.26	506.26	0.35
South_Wagner	12622	500 YR	2400.00	299.40	307.51	305.54	307.87	0.00	5.56	931.87	536.77	0.38
South_Wagner	12641	2 YR	660.00	300.24	306.06		306.14	0.00	2.50	395.66	187.26	0.20
South_Wagner	12641	5 YR	920.00	300.24	306.48		306.60	0.00	3.10	481.67	247.05	0.24
South_Wagner	12641	10 YR	1090.00	300.24	306.67		306.82	0.00	3.46	535.30	311.11	0.26
South_Wagner	12641	25 YR	1330.00	300.24	306.92		307.10	0.00	3.89	626.17	404.69	0.29
South_Wagner	12641	50 YR	1530.00	300.24	307.07		307.29	0.00	4.25	692.65	458.85	0.31
South_Wagner	12641	100 YR	1760.00	300.24	307.22		307.49	0.00	4.75	762.00	495.53	0.34
South_Wagner	12641	250 YR	2100.00	300.24	307.39		307.72	0.00	5.32	853.28	521.96	0.38
South_Wagner	12641	500 YR	2400.00	300.24	307.55		307.92	0.00	5.74	933.21	539.25	0.40
South_Wagner	12673 P	2 YR	400.00	300.33	306.17	302.25	306.17	0.00	0.72	639.83	305.84	0.06
South_Wagner	12673 P	5 YR	510.00	300.33	306.63	302.50	306.64	0.00	0.80	808.59	418.17	0.06
South_Wagner	12673 P	10 YR	590.00	300.33	306.86	302.67	306.87	0.00	0.87	911.84	488.53	0.07
South_Wagner	12673 P	25 YR	790.00	300.33	307.15	303.05	307.17	0.00	1.06	1066.82	596.81	0.08
South_Wagner	12673 P	50 YR	940.00	300.33	307.34	303.34	307.36	0.00	1.18	1184.69	656.60	0.09
South_Wagner	12673 P	100 YR	1070.00	300.33	307.56	303.55	307.58	0.00	1.25	1324.19	726.18	0.09
South_Wagner	12673 P	250 YR	1310.00	300.33	307.81	303.93	307.83	0.00	1.39	1499.21	841.19	0.10
South_Wagner	12673 P	500 YR	1490.00	300.33	308.01	304.20	308.04	0.00	1.48	1648.19	884.83	0.1
South_Wagner	12692 US Highway 67		Culvert									
South_Wagner	12842 Q	2 YR	400.00	300.90	307.72	303.45	307.73	0.00	1.08	663.65	701.17	0.09
South_Wagner	12842 Q	5 YR	510.00	300.90	307.99	303.81	308.00	0.00	1.16	821.57	822.32	0.09
South_Wagner	12842 Q	10 YR	590.00	300.90	308.08	304.03	308.10	0.00	1.29	878.18	860.12	0.10
South_Wagner	12842 Q	25 YR	790.00	300.90	308.28	304.52	308.30	0.00	1.53	1003.41	914.26	0.12
South_Wagner	12842 Q	50 YR	940.00	300.90	308.36	304.84	308.39	0.00	1.73	1054.84	924.49	0.13
South_Wagner	12842 Q	100 YR	1070.00	300.90	308.46	305.09	308.49	0.00	1.87	1113.25	930.96	0.14
South_Wagner	12842 Q	250 YR	1310.00	300.90	308.59	305.48	308.63	0.00	2.12	1199.37	942.16	0.16
South_Wagner	12842 Q	500 YR	1490.00	300.90	308.69	305.73	308.74	0.00	2.28	1264.57	955.42	0.17
South_Wagner	12944	2 YR	400.00	302.69	307.73		307.77	0.00	1.67	270.48	219.58	0.19
South_Wagner	12944	5 YR	510.00	302.69	308.00		308.05	0.00	1.85	337.30	273.55	0.20
South_Wagner	12944	10 YR	590.00	302.69	308.09		308.15	0.00	2.04	363.48	284.95	0.21
South_Wagner	12944	25 YR	790.00	302.69	308.30		308.38	0.00	2.44	423.54	301.71	0.25
South_Wagner	12944	50 YR	940.00	302.69	308.38		308.49	0.00	2.77	449.65	311.71	0.28
South_Wagner	12944	100 YR	1070.00	302.69	308.48		308.59	0.00	3.00	479.50	321.66	0.29
South_Wagner	12944	250 YR	1310.00	302.69	308.61		308.76	0.00	3.41	524.87	333.60	0.33
South_Wagner	12944	500 YR	1490.00	302.69	308.72		308.89	0.00	3.68	559.97	342.55	0.35
South_Wagner	13029 R	2 YR	400.00	304.39	307.81		307.84	0.00	1.46	349.71	332.61	0.18
South_Wagner	13029 R	5 YR	510.00	304.39	308.08		308.11	0.00	1.54	444.39	354.63	0.18
South_Wagner	13029 R	10 YR	590.00	304.39	308.19		308.23	0.00	1.66	483.59	371.92	0.19
South_Wagner	13029 R	25 YR	790.00	304.39	308.43		308.47	0.00	1.92	574.69	404.31	0.21
South_Wagner	13029 R	50 YR	940.00	304.39	308.54		308.60	0.00	2.13	623.48	430.43	0.22
South_Wagner	13029 R	100 YR	1070.00	304.39	308.66		308.72	0.00	2.28	673.45	443.09	0.24
South_Wagner	13029 R	250 YR	1310.00	304.39	308.84		308.91	0.00	2.55	754.57	457.05	0.26
South_Wagner	13029 R	500 YR	1490.00	304.39	308.97		309.05	0.00	2.70	814.79	464.59	0.26

HEC-RAS Plan: WC1_Ultimate River: Stream_WC1 Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1608	2 YR	580.00	301.52	306.43	305.73	306.66	0.01	4.65	170.68	95.00	0.42
1	1608	5 YR	790.00	301.52	306.87	306.03	307.12	0.01	5.01	223.30	175.39	0.43
1	1608	10 YR	970.00	301.52	307.15	306.14	307.40	0.01	5.23	279.34	241.31	0.44
1	1608	25 YR	1330.00	301.52	307.57	306.81	307.82	0.01	5.56	404.00	362.84	0.44
1	1608	50 YR	1600.00	301.52	307.90	307.19	308.15	0.00	5.81	523.14	400.22	0.45
1	1608	100 YR	1900.00	301.52	308.09	307.42	308.33	0.01	5.94	590.49	403.62	0.45
1	1608	250 YR	2330.00	301.52	308.31	307.65	308.56	0.01	6.11	704.82	407.78	0.45
1	1608	500 YR	2760.00	301.52	308.52	307.66	308.78	0.01	6.26	791.25	411.54	0.46
1	1794	2 YR	580.00	301.60	307.11	305.43	307.22	0.00	3.34	226.76	86.33	0.27
1	1794	5 YR	790.00	301.60	307.58	305.77	307.73	0.00	3.84	269.08	99.62	0.29
1	1794	10 YR	970.00	301.60	307.88	306.04	308.07	0.00	4.30	302.96	157.97	0.32
1	1794	25 YR	1330.00	301.60	308.39	306.49	308.66	0.00	5.61	375.18	300.62	0.40
1	1794	50 YR	1600.00	301.60	308.71	306.79	309.00	0.00	5.80	426.23	313.60	0.40
1	1794	100 YR	1900.00	301.60	308.92	307.11	309.26	0.00	6.28	459.90	317.23	0.43
1	1794	250 YR	2330.00	301.60	309.18	307.53	309.46	0.00	6.40	673.88	322.26	0.43
1	1794	500 YR	2760.00	301.60	309.41	308.07	309.71	0.00	6.69	747.88	327.84	0.44
1	1953	2 YR	580.00	301.03	307.38	305.77	307.50	0.00	3.36	227.62	95.34	0.26
1	1953	5 YR	790.00	301.03	307.90	306.17	308.05	0.00	3.77	272.99	105.17	0.28
1	1953	10 YR	970.00	301.03	308.24	306.44	308.42	0.00	4.07	304.37	111.93	0.29
1	1953	25 YR	1330.00	301.03	308.90	306.88	309.12	0.00	4.54	363.01	225.24	0.31
1	1953	50 YR	1600.00	301.03	309.20	307.18	309.48	0.00	5.01	390.15	282.08	0.34
1	1953	100 YR	1900.00	301.03	309.48	307.47	309.82	0.00	5.70	425.37	300.16	0.38
1	1953	250 YR	2330.00	301.03	309.75	307.91	310.05	0.00	6.10	677.91	336.37	0.39
1	1953	500 YR	2760.00	301.03	310.01	308.20	310.32	0.00	6.38	765.87	345.80	0.41
1	2010 University Ave.		Culvert									
1	2057 A	2 YR	580.00	301.73	307.25	307.25	307.92	0.01	7.04	109.10	85.07	0.63
1	2057 A	5 YR	790.00	301.73	308.04	307.62	308.46	0.01	6.12	179.32	94.23	0.50
1	2057 A	10 YR	970.00	301.73	308.54	307.86	308.91	0.01	5.88	228.16	100.10	0.46
1	2057 A	25 YR	1330.00	301.73	309.42	308.27	309.74	0.00	5.57	317.94	110.33	0.40
1	2057 A	50 YR	1600.00	301.73	310.02	308.54	310.33	0.00	5.41	380.62	117.45	0.37
1	2057 A	100 YR	1900.00	301.73	310.73	308.85	311.03	0.00	5.55	465.17	157.33	0.36
1	2057 A	250 YR	2330.00	301.73	311.18	309.16	311.58	0.00	6.87	569.85	238.67	0.43
1	2057 A	500 YR	2760.00	301.73	311.47	309.46	311.96	0.01	7.79	652.07	315.54	0.48
1	2179	2 YR	580.00	303.57	308.75		309.20	0.01	6.23	124.85	70.87	0.56
1	2179	5 YR	790.00	303.57	309.00		309.63	0.01	7.47	143.32	75.58	0.65
1	2179	10 YR	970.00	303.57	309.33		310.00	0.01	7.85	169.15	81.72	0.65
1	2179	25 YR	1330.00	303.57	309.98		310.67	0.01	8.23	226.28	95.94	0.64
1	2179	50 YR	1600.00	303.57	310.48		311.17	0.01	8.46	278.92	118.34	0.63
1	2179	100 YR	1900.00	303.57	311.14		311.80	0.01	8.70	378.95	200.57	0.61
1	2179	250 YR	2330.00	303.57	311.78		312.28	0.01	8.06	528.49	273.25	0.54
1	2179	500 YR	2760.00	303.57	312.21		312.65	0.01	7.77	655.53	308.00	0.50
1	2735	2 YR	580.00	306.63	311.64	310.70	311.82	0.00	4.08	206.61	138.91	0.36
1	2735	5 YR	790.00	306.63	312.19		312.37	0.00	4.26	303.84	203.26	0.35
1	2735	10 YR	970.00	306.63	312.53		312.71	0.00	4.44	379.50	234.80	0.35
1	2735	25 YR	1330.00	306.63	313.07		313.24	0.00	4.70	515.67	274.38	0.35
1	2735	50 YR	1600.00	306.63	313.43		313.60	0.00	4.76	619.15	295.06	0.35
1	2735	100 YR	1900.00	306.63	313.84		314.00	0.00	4.76	746.22	323.57	0.33
1	2735	250 YR	2330.00	306.63	314.15		314.33	0.00	5.07	850.34	336.73	0.35
1	2735	500 YR	2760.00	306.63	314.43		314.62	0.00	5.35	945.33	347.06	0.36
1	3017	2 YR	450.00	309.72	313.91	313.91	314.50	0.02	7.26	98.77	109.14	0.76
1	3017	5 YR	660.00	309.72	314.37	314.37	314.84	0.02	7.10	164.78	160.78	0.69
1	3017	10 YR	900.00	309.72	314.71	314.71	315.15	0.02	7.31	230.65	206.72	0.68
1	3017	25 YR	1240.00	309.72	314.91	314.91	315.46	0.02	8.39	272.74	213.59	0.76
1	3017	50 YR	1510.00	309.72	315.06	315.06	315.67	0.02	9.06	304.04	218.56	0.80
1	3017	100 YR	1770.00	309.72	315.20	315.20	315.86	0.02	9.51	335.55	223.45	0.83
1	3017	250 YR	2190.00	309.72	315.43	315.43	316.15	0.03	10.05	388.27	235.66	0.85
1	3017	500 YR	2650.00	309.72	315.63	315.63	316.43	0.03	10.66	436.08	243.05	0.88
1	3117 B	2 YR	450.00	308.29	314.87	312.33	314.92	0.00	2.12	270.66	355.90	0.17
1	3117 B	5 YR	660.00	308.29	315.22	312.71	315.31	0.00	2.78	299.34	397.65	0.21
1	3117 B	10 YR	900.00	308.29	315.56	313.06	315.69	0.00	3.44	327.03	422.98	0.25
1	3117 B	25 YR	1240.00	308.29	315.96	313.52	316.17	0.00	4.25	359.96	462.73	0.30
1	3117 B	50 YR	1510.00	308.29	316.24	313.82	316.29	0.00	2.65	969.64	473.84	0.18
1	3117 B	100 YR	1770.00	308.29	316.32	314.28	316.39	0.00	2.98	1004.06	476.73	0.21
1	3117 B	250 YR	2190.00	308.29	316.64	314.66	316.71	0.00	3.19	1134.40	489.35	0.22
1	3117 B	500 YR	2650.00	308.29	316.95	315.03	317.04	0.00	3.39	1265.66	500.00	0.22
1	3175 Gibson Ln.		Culvert									
1	3216 C	2 YR	450.00	312.28	315.59	314.39	315.71	0.00	3.02	169.54	135.18	0.31
1	3216 C	5 YR	660.00	312.28	316.23	314.71	316.38	0.00	3.41	215.33	160.34	0.32
1	3216 C	10 YR	900.00	312.28	316.88	315.01	317.06	0.00	3.75	261.95	198.54	0.32
1	3216 C	25 YR	1240.00	312.28	317.73	315.40	317.96	0.00	4.12	323.10	250.97	0.32
1	3216 C	50 YR	1510.00	312.28	318.88	315.68	318.95	0.00	2.57	906.16	527.07	0.18
1	3216 C	100 YR	1770.00	312.28	319.00	315.95	319.08	0.00	2.86	965.30	566.93	0.20
1	3216 C	250 YR	2190.00	312.28	319.57	316.35	319.64	0.00	2.92	1259.51	645.11	0.20
1	3216 C	500 YR	2650.00	312.28	319.99	316.76	320.05	0.00	2.95	1706.94	731.51	0.19

HEC-RAS Plan: WC1_Ultimate River: Stream_WC1 Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3310	2 YR	450.00	312.08	315.84	314.65	315.90	0.00	2.38	269.30	208.60	0.24
1	3310	5 YR	660.00	312.08	316.50	315.14	316.56	0.00	2.38	392.04	260.48	0.2
1	3310	10 YR	900.00	312.08	317.18	315.36	317.23	0.00	2.37	536.79	307.15	0.2
1	3310	25 YR	1240.00	312.08	318.07	315.62	318.12	0.00	2.37	749.54	357.12	0.18
1	3310	50 YR	1510.00	312.08	318.98	315.79	319.00	0.00	1.90	1270.25	398.50	0.13
1	3310	100 YR	1770.00	312.08	319.12	315.95	319.15	0.00	2.13	1325.58	403.52	0.15
1	3310	250 YR	2190.00	312.08	319.67	316.19	319.70	0.00	2.24	1546.07	425.37	0.15
1	3310	500 YR	2650.00	312.08	320.06	316.41	320.10	0.00	2.45	1726.39	445.41	0.16
1	3854 D	2 YR	380.00	315.64	317.68		317.97	0.04	6.56	118.12	141.28	0.85
1	3854 D	5 YR	600.00	315.64	317.99		318.32	0.04	7.31	163.59	154.63	0.88
1	3854 D	10 YR	820.00	315.64	318.35		318.68	0.04	7.69	223.25	190.28	0.85
1	3854 D	25 YR	1140.00	315.64	318.97		319.20	0.02	6.60	352.18	222.36	0.66
1	3854 D	50 YR	1380.00	315.64	319.42		319.60	0.01	5.94	453.10	228.22	0.55
1	3854 D	100 YR	1620.00	315.64	319.65		319.85	0.01	6.11	507.78	231.33	0.55
1	3854 D	250 YR	2010.00	315.64	320.19		320.38	0.01	5.96	633.85	243.75	0.50
1	3854 D	500 YR	2420.00	315.64	320.63		320.83	0.01	6.18	747.41	265.92	0.50
1	4351	2 YR	380.00	317.25	320.89	319.78	320.91	0.00	1.96	410.23	317.86	0.20
1	4351	5 YR	600.00	317.25	321.36	320.00	321.39	0.00	2.21	574.23	385.84	0.21
1	4351	10 YR	820.00	317.25	321.72	320.17	321.74	0.00	2.39	720.08	427.01	0.22
1	4351	25 YR	1140.00	317.25	322.08		322.11	0.00	2.70	881.47	468.65	0.23
1	4351	50 YR	1380.00	317.25	322.32		322.36	0.00	2.91	999.85	512.79	0.25
1	4351	100 YR	1620.00	317.25	322.56		322.60	0.00	3.03	1126.59	543.05	0.25
1	4351	250 YR	2010.00	317.25	322.91		322.95	0.00	3.20	1319.74	601.16	0.25
1	4351	500 YR	2420.00	317.25	323.28		323.32	0.00	3.32	1552.87	641.34	0.25
1	4890 E	2 YR	280.00	319.25	322.71	322.15	322.81	0.01	3.43	133.35	122.44	0.42
1	4890 E	5 YR	550.00	319.25	323.37	322.57	323.49	0.01	4.06	240.54	205.34	0.43
1	4890 E	10 YR	750.00	319.25	323.72	322.82	323.85	0.01	4.30	319.62	279.72	0.43
1	4890 E	25 YR	1020.00	319.25	324.16	323.19	324.28	0.01	4.40	432.53	379.76	0.41
1	4890 E	50 YR	1240.00	319.25	324.48	323.40	324.60	0.01	4.55	533.03	477.98	0.41
1	4890 E	100 YR	1430.00	319.25	324.69	323.54	324.81	0.01	4.62	607.85	510.72	0.40
1	4890 E	250 YR	1770.00	319.25	325.03	323.77	325.16	0.01	4.86	734.97	556.65	0.41
1	4890 E	500 YR	1980.00	319.25	325.29	323.90	325.41	0.01	4.85	838.01	611.69	0.40
1	5383	2 YR	280.00	323.05	324.52		324.53	0.00	0.80	312.81	255.25	0.17
1	5383	5 YR	550.00	323.05	325.21		325.23	0.00	1.01	514.51	330.40	0.18
1	5383	10 YR	750.00	323.05	325.55		325.57	0.00	1.12	629.38	348.68	0.19
1	5383	25 YR	1020.00	323.05	325.93		325.95	0.00	1.34	765.14	367.65	0.20
1	5383	50 YR	1240.00	323.05	326.22		326.26	0.00	1.53	877.52	391.52	0.20
1	5383	100 YR	1430.00	323.05	326.43		326.46	0.00	1.66	958.93	402.05	0.21
1	5383	250 YR	1770.00	323.05	326.78		326.82	0.00	1.86	1103.78	417.83	0.22
1	5383	500 YR	1980.00	323.05	326.99		327.03	0.00	1.97	1189.60	427.59	0.22
1	5493 F	2 YR	280.00	321.44	324.92	324.18	325.26	0.02	4.72	62.68	278.56	0.54
1	5493 F	5 YR	550.00	321.44	325.52	325.10	325.56	0.00	2.42	453.39	353.89	0.25
1	5493 F	10 YR	750.00	321.44	325.85	325.25	325.89	0.00	2.54	575.93	384.78	0.25
1	5493 F	25 YR	1020.00	321.44	326.24	325.25	326.28	0.00	2.75	739.59	458.38	0.25
1	5493 F	50 YR	1240.00	321.44	326.53	325.26	326.58	0.00	2.82	876.11	469.87	0.25
1	5493 F	100 YR	1430.00	321.44	326.73	325.26	326.78	0.00	2.87	973.05	474.84	0.25
1	5493 F	250 YR	1770.00	321.44	327.08	325.43	327.13	0.00	2.95	1139.59	483.59	0.25
1	5493 F	500 YR	1980.00	321.44	327.28	325.51	327.34	0.00	3.01	1237.22	489.92	0.24
1	5540 Jonathan St.		Culvert									
1	5571 G	2 YR	280.00	323.37	327.86	326.02	327.86	0.00	0.40	1143.28	511.07	0.04
1	5571 G	5 YR	550.00	323.37	328.22	326.98	328.23	0.00	0.69	1287.05	518.60	0.06
1	5571 G	10 YR	750.00	323.37	328.41	327.36	328.41	0.00	0.88	1360.91	524.10	0.07
1	5571 G	25 YR	1020.00	323.37	328.61	327.36	328.61	0.00	1.08	1599.46	537.66	0.09
1	5571 G	50 YR	1240.00	323.37	328.76	327.36	328.77	0.00	1.24	1682.96	560.22	0.10
1	5571 G	100 YR	1430.00	323.37	328.85	327.37	328.87	0.00	1.39	1738.54	568.37	0.11
1	5571 G	250 YR	1770.00	323.37	329.06	327.37	329.08	0.00	1.61	1855.72	580.86	0.12
1	5571 G	500 YR	1980.00	323.37	329.17	327.37	329.19	0.00	1.74	1919.18	585.09	0.13
1	5641	2 YR	280.00	322.39	327.86	324.37	327.87	0.00	0.41	1295.18	470.23	0.03
1	5641	5 YR	550.00	322.39	328.23	324.88	328.23	0.00	0.70	1450.18	498.74	0.05
1	5641	10 YR	750.00	322.39	328.42	325.21	328.43	0.00	0.90	1531.00	520.43	0.07
1	5641	25 YR	1020.00	322.39	328.63	325.73	328.63	0.00	1.11	1748.27	530.40	0.08
1	5641	50 YR	1240.00	322.39	328.79	325.96	328.79	0.00	1.29	1832.84	545.61	0.09
1	5641	100 YR	1430.00	322.39	328.89	326.10	328.90	0.00	1.44	1890.59	555.41	0.10
1	5641	250 YR	1770.00	322.39	329.10	326.32	329.12	0.00	1.67	2010.70	568.33	0.12
1	5641	500 YR	1980.00	322.39	329.22	326.44	329.24	0.00	1.81	2076.50	575.17	0.13
1	5956	2 YR	280.00	324.66	327.89		327.89	0.00	0.77	671.18	340.41	0.08
1	5956	5 YR	550.00	324.66	328.30		328.30	0.00	1.24	813.20	357.34	0.12
1	5956	10 YR	750.00	324.66	328.52		328.53	0.00	1.54	893.27	363.49	0.14
1	5956	25 YR	1020.00	324.66	328.77		328.79	0.00	1.90	984.45	371.92	0.17
1	5956	50 YR	1240.00	324.66	328.96		328.99	0.00	2.15	1057.19	378.51	0.19
1	5956	100 YR	1430.00	324.66	329.10		329.13	0.00	2.36	1110.16	383.28	0.20
1	5956	250 YR	1770.00	324.66	329.37		329.41	0.00	2.68	1213.50	392.98	0.22
1	5956	500 YR	1980.00	324.66	329.51		329.56	0.00	2.86	1271.50	398.90	0.24

HEC-RAS Plan: WC1_Ultimate River: Stream_WC1 Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	6355 H	2 YR	340.00	327.58	328.89	328.89	329.19	0.04	5.56	95.86	149.24	0.90
1	6355 H	5 YR	460.00	327.58	329.02	329.02	329.37	0.04	6.18	115.71	153.70	0.95
1	6355 H	10 YR	600.00	327.58	329.17	329.17	329.57	0.04	6.71	137.98	159.25	0.98
1	6355 H	25 YR	790.00	327.58	329.46		329.82	0.03	6.47	186.32	169.58	0.86
1	6355 H	50 YR	920.00	327.58	329.78		330.06	0.02	5.74	242.54	180.94	0.70
1	6355 H	100 YR	1050.00	327.58	330.02		330.28	0.02	5.55	286.89	190.57	0.64
1	6355 H	250 YR	1260.00	327.58	330.39		330.62	0.01	5.36	360.47	208.20	0.58
1	6355 H	500 YR	1440.00	327.58	330.61		330.85	0.01	5.47	409.12	221.87	0.57
1	6661	2 YR	340.00	327.83	331.69	331.21	331.74	0.00	2.85	267.86	314.34	0.29
1	6661	5 YR	460.00	327.83	331.90	331.30	331.96	0.00	2.97	336.83	323.27	0.29
1	6661	10 YR	600.00	327.83	332.12	331.41	332.17	0.00	3.10	406.99	331.28	0.30
1	6661	25 YR	790.00	327.83	332.33	331.67	332.39	0.00	3.36	478.26	339.23	0.31
1	6661	50 YR	920.00	327.83	332.43	331.74	332.50	0.00	3.62	511.15	343.12	0.33
1	6661	100 YR	1050.00	327.83	332.54	331.81	332.62	0.00	3.78	550.84	347.56	0.34
1	6661	250 YR	1260.00	327.83	332.72	331.91	332.81	0.00	3.98	613.94	357.95	0.35
1	6661	500 YR	1440.00	327.83	332.89	331.99	332.98	0.00	4.08	673.80	369.42	0.35
1	6790 I	2 YR	340.00	328.74	332.24	332.10	332.46	0.01	4.72	139.82	204.58	0.51
1	6790 I	5 YR	460.00	328.74	332.44	332.32	332.67	0.01	5.07	182.47	217.42	0.53
1	6790 I	10 YR	600.00	328.74	332.65	332.46	332.87	0.01	5.33	228.14	230.51	0.54
1	6790 I	25 YR	790.00	328.74	332.89	332.65	333.13	0.01	5.72	290.71	291.62	0.55
1	6790 I	50 YR	920.00	328.74	333.03	332.68	333.27	0.01	5.90	334.87	315.83	0.56
1	6790 I	100 YR	1050.00	328.74	333.16	332.89	333.40	0.01	5.94	376.25	323.90	0.55
1	6790 I	250 YR	1260.00	328.74	333.35	333.06	333.58	0.01	6.03	439.70	346.86	0.55
1	6790 I	500 YR	1440.00	328.74	333.51	333.15	333.74	0.01	6.11	496.71	380.44	0.54
1	6831 McKnight Rd.		Culvert									
1	6858 J	2 YR	340.00	330.28	335.02	333.00	335.02	0.00	0.58	1058.33	624.15	0.05
1	6858 J	5 YR	460.00	330.28	335.14	333.31	335.14	0.00	0.73	1133.17	632.15	0.06
1	6858 J	10 YR	600.00	330.28	335.25	333.63	335.26	0.00	0.89	1209.66	659.44	0.08
1	6858 J	25 YR	790.00	330.28	335.38	334.01	335.39	0.00	1.09	1292.85	672.25	0.09
1	6858 J	50 YR	920.00	330.28	335.46	334.26	335.47	0.00	1.22	1346.65	684.17	0.10
1	6858 J	100 YR	1050.00	330.28	335.52	334.37	335.53	0.00	1.34	1388.68	694.60	0.11
1	6858 J	250 YR	1260.00	330.28	335.65	334.37	335.66	0.00	1.51	1476.99	714.69	0.13
1	6858 J	500 YR	1440.00	330.28	335.72	334.37	335.73	0.00	1.67	1524.00	722.85	0.14
1	7153	2 YR	340.00	330.92	335.04		335.05	0.00	1.16	500.85	314.26	0.11
1	7153	5 YR	460.00	330.92	335.17		335.18	0.00	1.44	541.93	320.33	0.13
1	7153	10 YR	600.00	330.92	335.30		335.32	0.00	1.72	584.32	327.32	0.16
1	7153	25 YR	790.00	330.92	335.44		335.47	0.00	2.08	632.03	335.84	0.19
1	7153	50 YR	920.00	330.92	335.54		335.57	0.00	2.29	663.21	341.30	0.20
1	7153	100 YR	1050.00	330.92	335.61		335.65	0.00	2.50	689.21	345.38	0.22
1	7153	250 YR	1260.00	330.92	335.76		335.81	0.00	2.77	739.71	352.53	0.24
1	7153	500 YR	1440.00	330.92	335.84		335.91	0.00	3.02	772.16	385.61	0.26
1	7441 K	2 YR	340.00	332.22	335.14	334.12	335.22	0.00	2.92	151.21	195.16	0.32
1	7441 K	5 YR	460.00	332.22	335.31	334.31	335.44	0.00	3.59	164.89	199.20	0.38
1	7441 K	10 YR	600.00	332.22	335.48	334.51	335.66	0.00	4.28	179.06	203.34	0.44
1	7441 K	25 YR	790.00	332.22	335.68	334.76	335.95	0.01	5.12	195.59	207.06	0.51
1	7441 K	50 YR	920.00	332.22	335.80	334.91	336.13	0.01	5.64	206.01	209.25	0.55
1	7441 K	100 YR	1050.00	332.22	335.91	335.07	336.31	0.01	6.14	215.32	211.22	0.59
1	7441 K	250 YR	1260.00	332.22	336.09	335.29	336.58	0.01	6.86	229.95	214.61	0.64
1	7441 K	500 YR	1440.00	332.22	336.21	335.48	336.80	0.01	7.48	240.38	217.37	0.69
1	7639	2 YR	340.00	333.68	335.79	335.60	336.30	0.02	5.78	60.20	43.37	0.81
1	7639	5 YR	460.00	333.68	336.14	335.92	336.74	0.02	6.30	76.09	46.95	0.80
1	7639	10 YR	600.00	333.68	336.49	336.25	337.19	0.01	6.85	92.94	50.46	0.80
1	7639	25 YR	790.00	333.68	336.89	336.64	337.72	0.01	7.50	114.04	54.54	0.81
1	7639	50 YR	920.00	333.68	337.13	336.89	338.04	0.01	7.90	127.41	56.97	0.82
1	7639	100 YR	1050.00	333.68	337.35	337.13	338.34	0.01	8.27	140.61	59.59	0.82
1	7639	250 YR	1260.00	333.68	337.69	337.45	338.80	0.01	8.81	161.12	64.36	0.83
1	7639	500 YR	1440.00	333.68	337.95	337.75	339.15	0.01	9.21	178.71	68.18	0.84
1	7891 L	2 YR	340.00	333.18	337.77		338.01	0.00	4.67	103.87	51.77	0.40
1	7891 L	5 YR	460.00	333.18	338.22		338.50	0.00	5.21	128.32	57.89	0.43
1	7891 L	10 YR	600.00	333.18	338.67		339.00	0.00	5.74	156.23	66.87	0.45
1	7891 L	25 YR	790.00	333.18	339.20		339.57	0.00	6.31	195.55	82.71	0.47
1	7891 L	50 YR	920.00	333.18	339.52		339.91	0.00	6.58	223.33	92.63	0.48
1	7891 L	100 YR	1050.00	333.18	339.81		340.21	0.00	6.80	251.42	101.99	0.48
1	7891 L	250 YR	1260.00	333.18	340.22		340.63	0.00	6.98	295.90	110.85	0.48
1	7891 L	500 YR	1440.00	333.18	340.54		340.95	0.00	7.09	331.74	115.47	0.48
1	8222	2 YR	160.00	335.50	338.58		338.62	0.00	1.64	100.96	44.64	0.18
1	8222	5 YR	200.00	335.50	339.07		339.11	0.00	1.71	123.62	47.88	0.17
1	8222	10 YR	230.00	335.50	339.55		339.59	0.00	1.67	147.65	50.74	0.15
1	8222	25 YR	280.00	335.50	340.13		340.17	0.00	1.72	177.62	54.09	0.15
1	8222	50 YR	310.00	335.50	340.46		340.50	0.00	1.75	196.07	57.05	0.14
1	8222	100 YR	360.00	335.50	340.77		340.82	0.00	1.88	214.63	62.38	0.15
1	8222	250 YR	420.00	335.50	341.19		341.24	0.00	1.99	242.01	69.50	0.15
1	8222	500 YR	480.00	335.50	341.51		341.57	0.00	2.12	265.10	74.98	0.16
1	8274	2 YR	160.00	335.82	338.61	336.97	338.66	0.00	1.70	95.42	43.23	0.19

HEC-RAS Plan: WC1_Ultimate River: Stream_WC1 Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	8274	5 YR	200.00	335.82	339.10	337.12	339.15	0.00	1.75	116.85	45.38	0.18
1	8274	10 YR	230.00	335.82	339.58	337.21	339.62	0.00	1.71	139.08	47.51	0.16
1	8274	25 YR	280.00	335.82	340.15	337.37	340.19	0.00	1.76	166.04	50.04	0.16
1	8274	50 YR	310.00	335.82	340.48	337.46	340.53	0.00	1.78	182.10	51.52	0.15
1	8274	100 YR	360.00	335.82	340.79	337.60	340.85	0.00	1.91	197.34	52.90	0.16
1	8274	250 YR	420.00	335.82	341.21	337.76	341.27	0.00	2.03	222.38	54.90	0.16
1	8274	500 YR	480.00	335.82	341.53	337.90	341.60	0.00	2.17	240.66	60.83	0.17
1	8316 Arista Blvd.		Culvert									
1	8363 M	2 YR	160.00	335.55	338.71	338.18	338.87	0.00	3.66	62.76	58.81	0.40
1	8363 M	5 YR	200.00	335.55	339.20	338.38	339.31	0.00	3.14	93.16	64.36	0.31
1	8363 M	10 YR	230.00	335.55	339.69	338.50	339.76	0.00	2.67	125.52	69.40	0.25
1	8363 M	25 YR	280.00	335.55	340.27	338.68	340.32	0.00	2.39	166.91	75.44	0.21
1	8363 M	50 YR	310.00	335.55	340.61	338.79	340.66	0.00	2.28	191.88	78.96	0.19
1	8363 M	100 YR	360.00	335.55	340.95	338.90	341.00	0.00	2.28	217.65	82.53	0.18
1	8363 M	250 YR	420.00	335.55	341.43	339.04	341.48	0.00	2.23	253.83	87.55	0.17
1	8363 M	500 YR	480.00	335.55	341.84	339.17	341.88	0.00	2.23	284.00	91.74	0.16
1	8431	2 YR	160.00	337.63	339.18	339.18	339.66	0.03	5.58	28.69	29.84	1.00
1	8431	5 YR	200.00	337.63	339.37	339.36	339.89	0.03	5.76	34.70	32.37	0.98
1	8431	10 YR	230.00	337.63	339.76	339.47	340.11	0.01	4.80	48.48	39.94	0.72
1	8431	25 YR	280.00	337.63	340.30	339.64	340.55	0.01	4.09	72.53	47.57	0.52
1	8431	50 YR	310.00	337.63	340.63	339.74	340.84	0.00	3.78	88.64	51.12	0.44
1	8431	100 YR	360.00	337.63	340.96	339.91	341.17	0.00	3.74	106.74	56.55	0.41
1	8431	250 YR	420.00	337.63	341.44	340.08	341.62	0.00	3.58	137.08	72.70	0.36
1	8431	500 YR	480.00	337.63	341.84	340.24	342.01	0.00	3.52	169.94	98.59	0.33
1	8609	2 YR	160.00	338.33	341.19		341.34	0.00	3.14	55.16	51.44	0.42
1	8609	5 YR	200.00	338.33	341.39	340.59	341.56	0.00	3.42	66.16	58.69	0.43
1	8609	10 YR	230.00	338.33	341.41	340.73	341.63	0.01	3.88	67.48	59.47	0.49
1	8609	25 YR	280.00	338.33	341.49	340.91	341.78	0.01	4.48	72.08	61.94	0.55
1	8609	50 YR	310.00	338.33	341.57		341.89	0.01	4.70	77.22	64.57	0.57
1	8609	100 YR	360.00	338.33	341.76		342.09	0.01	4.84	90.05	70.61	0.56
1	8609	250 YR	420.00	338.33	342.04		342.34	0.01	4.79	110.88	81.76	0.52
1	8609	500 YR	480.00	338.33	342.33		342.60	0.00	4.66	137.78	106.84	0.48
1	8920	2 YR	160.00	341.27	343.09		343.31	0.01	3.74	42.75	34.18	0.59
1	8920	5 YR	200.00	341.27	343.30		343.55	0.01	3.98	50.30	36.17	0.59
1	8920	10 YR	230.00	341.27	343.51		343.76	0.01	3.95	58.18	38.13	0.56
1	8920	25 YR	280.00	341.27	343.80		344.06	0.01	4.02	69.65	40.82	0.54
1	8920	50 YR	310.00	341.27	343.94		344.20	0.01	4.12	75.21	42.06	0.54
1	8920	100 YR	360.00	341.27	344.10		344.40	0.01	4.39	81.97	43.52	0.56
1	8920	250 YR	420.00	341.27	344.23		344.58	0.01	4.78	87.82	44.74	0.60
1	8920	500 YR	480.00	341.27	344.33		344.75	0.01	5.19	92.51	45.70	0.64
1	9169	2 YR	160.00	342.44	345.13		345.36	0.01	3.86	41.46	24.49	0.52
1	9169	5 YR	200.00	342.44	345.38		345.65	0.01	4.18	47.80	26.12	0.55
1	9169	10 YR	230.00	342.44	345.52		345.83	0.01	4.47	51.48	27.24	0.57
1	9169	25 YR	280.00	342.44	345.75		346.11	0.01	4.82	58.12	29.47	0.60
1	9169	50 YR	310.00	342.44	345.89		346.28	0.01	4.97	62.36	30.80	0.62
1	9169	100 YR	360.00	342.44	346.13		346.54	0.01	5.15	69.92	33.05	0.62
1	9169	250 YR	420.00	342.44	346.40		346.84	0.01	5.30	79.28	35.63	0.63
1	9169	500 YR	480.00	342.44	346.66		347.11	0.01	5.42	88.64	38.04	0.63
1	9225 N	2 YR	160.00	342.09	345.51		345.65	0.00	3.00	53.39	28.78	0.39
1	9225 N	5 YR	200.00	342.09	345.80		345.96	0.00	3.23	61.86	30.69	0.40
1	9225 N	10 YR	230.00	342.09	345.98		346.16	0.00	3.41	67.44	31.88	0.41
1	9225 N	25 YR	280.00	342.09	346.26		346.47	0.00	3.65	76.70	33.77	0.43
1	9225 N	50 YR	310.00	342.09	346.42		346.64	0.00	3.78	82.11	34.82	0.43
1	9225 N	100 YR	360.00	342.09	346.67		346.91	0.00	3.96	91.00	36.49	0.44
1	9225 N	250 YR	420.00	342.09	346.94		347.21	0.00	4.15	101.28	38.33	0.45
1	9225 N	500 YR	480.00	342.09	347.19		347.48	0.00	4.32	111.16	40.14	0.46

HEC-RAS Plan: WC2_Ultimate River: Stream WC-2 Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	704	2 YR	640.00	310.43	315.11	312.98	315.14	0.00	2.02	608.46	245.16	0.18
1	704	5 YR	950.00	310.43	315.21	313.21	315.26	0.00	2.87	633.17	248.89	0.25
1	704	10 YR	1190.00	310.43	315.49	313.48	315.56	0.00	3.23	704.62	264.05	0.28
1	704	25 YR	1580.00	310.43	315.79	313.75	315.88	0.00	3.85	785.78	279.25	0.32
1	704	50 YR	1870.00	310.43	316.27	313.92	316.36	0.00	3.91	923.90	296.98	0.31
1	704	100 YR	2210.00	310.43	316.52	314.11	316.63	0.00	4.30	999.87	314.60	0.33
1	704	250 YR	2710.00	310.43	317.11	314.37	317.22	0.00	4.44	1198.33	354.02	0.32
1	704	500 YR	3110.00	310.43	317.66	314.56	317.77	0.00	4.41	1400.92	383.07	0.31
1	944 A	2 YR	640.00	308.66	315.35		315.41	0.00	2.35	490.39	231.55	0.19
1	944 A	5 YR	950.00	308.66	315.65		315.74	0.00	3.07	560.42	247.23	0.24
1	944 A	10 YR	1190.00	308.66	315.98		316.08	0.00	3.35	646.82	265.68	0.26
1	944 A	25 YR	1580.00	308.66	316.40		316.52	0.00	3.79	760.48	278.51	0.28
1	944 A	50 YR	1870.00	308.66	316.83		316.96	0.00	3.86	883.22	290.18	0.27
1	944 A	100 YR	2210.00	308.66	317.15		317.28	0.00	4.15	977.91	322.10	0.29
1	944 A	250 YR	2710.00	308.66	317.70		317.84	0.00	4.30	1163.05	346.85	0.29
1	944 A	500 YR	3110.00	308.66	318.19		318.33	0.00	4.36	1345.73	398.49	0.28
1	1145	2 YR	620.00	308.70	315.70		315.76	0.00	3.10	429.93	213.67	0.25
1	1145	5 YR	960.00	308.70	316.17		316.25	0.00	3.73	546.77	278.41	0.28
1	1145	10 YR	1260.00	308.70	316.55		316.64	0.00	4.03	658.80	302.39	0.30
1	1145	25 YR	1580.00	308.70	317.02		317.11	0.00	4.09	806.99	335.58	0.29
1	1145	50 YR	1840.00	308.70	317.41		317.49	0.00	4.04	942.40	356.30	0.28
1	1145	100 YR	2130.00	308.70	317.75		317.83	0.00	4.08	1065.24	368.25	0.27
1	1145	250 YR	2590.00	308.70	318.27		318.36	0.00	4.10	1263.60	385.04	0.26
1	1145	500 YR	2950.00	308.70	318.72		318.81	0.00	4.03	1439.60	397.38	0.25
1	1599 B	2 YR	620.00	310.97	316.64		316.68	0.00	2.27	484.78	285.27	0.23
1	1599 B	5 YR	960.00	310.97	317.22		317.28	0.00	2.57	658.96	305.96	0.24
1	1599 B	10 YR	1260.00	310.97	317.65		317.71	0.00	2.80	790.36	317.53	0.25
1	1599 B	25 YR	1580.00	310.97	318.06		318.13	0.00	2.98	924.71	330.77	0.25
1	1599 B	50 YR	1840.00	310.97	318.38		318.45	0.00	3.10	1032.40	342.00	0.25
1	1599 B	100 YR	2130.00	310.97	318.69		318.77	0.00	3.24	1141.26	352.85	0.25
1	1599 B	250 YR	2590.00	310.97	319.17		319.25	0.00	3.42	1311.06	367.03	0.26
1	1599 B	500 YR	2950.00	310.97	319.54		319.63	0.00	3.51	1452.33	377.70	0.25
1	1824	2 YR	620.00	314.31	317.42	316.90	317.52	0.01	3.90	294.37	239.08	0.47
1	1824	5 YR	960.00	314.31	317.96	317.14	318.07	0.01	4.12	430.95	274.87	0.45
1	1824	10 YR	1260.00	314.31	318.36	317.33	318.47	0.01	4.23	544.51	296.60	0.43
1	1824	25 YR	1580.00	314.31	318.75	317.40	318.86	0.01	4.33	663.57	320.34	0.41
1	1824	50 YR	1840.00	314.31	319.04	317.40	319.15	0.01	4.38	758.29	332.76	0.40
1	1824	100 YR	2130.00	314.31	319.33	317.76	319.45	0.01	4.43	858.53	343.96	0.39
1	1824	250 YR	2590.00	314.31	319.78	318.00	319.90	0.00	4.56	1018.73	372.40	0.38
1	1824	500 YR	2950.00	314.31	320.12	318.17	320.25	0.00	4.59	1150.84	402.40	0.37
1	1946	2 YR	620.00	314.10	318.31	317.80	318.44	0.01	4.14	282.20	224.04	0.41
1	1946	5 YR	960.00	314.10	318.74	318.23	318.87	0.01	4.34	425.52	242.57	0.40
1	1946	10 YR	1260.00	314.10	319.10	318.24	319.24	0.01	4.66	513.52	257.36	0.41
1	1946	25 YR	1580.00	314.10	319.44	318.46	319.60	0.01	4.97	605.29	279.42	0.42
1	1946	50 YR	1840.00	314.10	319.69	318.51	319.86	0.01	5.16	678.32	295.57	0.42
1	1946	100 YR	2130.00	314.10	319.96	318.65	320.13	0.01	5.33	757.97	308.54	0.43
1	1946	250 YR	2590.00	314.10	320.36	318.88	320.55	0.01	5.53	887.31	331.53	0.42
1	1946	500 YR	2950.00	314.10	320.67	319.04	320.86	0.01	5.67	991.78	357.03	0.42
1	2002 C	2 YR	620.00	313.71	318.54	316.86	318.69	0.00	3.65	251.15	240.99	0.31
1	2002 C	5 YR	960.00	313.71	318.99	317.67	319.08	0.00	3.40	510.42	273.81	0.28
1	2002 C	10 YR	1260.00	313.71	319.35	318.31	319.47	0.00	3.90	621.60	328.98	0.31
1	2002 C	25 YR	1580.00	313.71	319.71	318.45	319.83	0.00	4.09	742.43	352.34	0.31
1	2002 C	50 YR	1840.00	313.71	319.97	318.70	320.10	0.00	4.25	837.57	375.98	0.32
1	2002 C	100 YR	2130.00	313.71	320.24	318.70	320.37	0.00	4.35	940.30	387.47	0.32
1	2002 C	250 YR	2590.00	313.71	320.64	318.86	320.78	0.00	4.46	1100.57	403.40	0.31
1	2002 C	500 YR	2950.00	313.71	320.95	319.02	321.09	0.00	4.53	1225.84	417.06	0.31
1	2050 Pleasant Grove R		Culvert									
1	2097 D	2 YR	620.00	314.45	321.73	316.68	321.75	0.00	1.13	906.88	574.60	0.08
1	2097 D	5 YR	960.00	314.45	322.44	317.22	322.45	0.00	1.08	2068.78	609.08	0.07
1	2097 D	10 YR	1260.00	314.45	322.75	317.63	322.76	0.00	1.31	2255.67	623.20	0.08
1	2097 D	25 YR	1580.00	314.45	323.00	318.02	323.02	0.00	1.54	2415.75	636.51	0.10
1	2097 D	50 YR	1840.00	314.45	323.13	318.30	323.15	0.00	1.74	2496.19	647.08	0.11
1	2097 D	100 YR	2130.00	314.45	323.32	318.63	323.35	0.00	1.93	2623.90	667.56	0.12
1	2097 D	250 YR	2590.00	314.45	323.53	319.09	323.57	0.00	2.23	2765.85	682.36	0.14
1	2097 D	500 YR	2950.00	314.45	323.69	319.44	323.73	0.00	2.45	2876.00	693.27	0.15
1	2160	2 YR	620.00	313.71	321.74	316.70	321.75	0.00	1.14	625.41	466.03	0.08
1	2160	5 YR	960.00	313.71	322.44	317.17	322.46	0.00	1.06	1843.25	578.04	0.07
1	2160	10 YR	1260.00	313.71	322.75	317.51	322.76	0.00	1.28	2023.52	618.74	0.08
1	2160	25 YR	1580.00	313.71	323.00	317.85	323.02	0.00	1.51	2188.15	659.83	0.10
1	2160	50 YR	1840.00	313.71	323.13	318.12	323.16	0.00	1.70	2272.19	665.81	0.11
1	2160	100 YR	2130.00	313.71	323.32	318.38	323.36	0.00	1.87	2402.73	676.70	0.12
1	2160	250 YR	2590.00	313.71	323.54	318.82	323.58	0.00	2.15	2547.88	690.19	0.13
1	2160	500 YR	2950.00	313.71	323.70	319.10	323.75	0.00	2.36	2660.99	707.07	0.14
1	2442 E	2 YR	620.00	316.21	321.76		321.78	0.00	1.04	885.80	294.09	0.09
1	2442 E	5 YR	960.00	316.21	322.46		322.48	0.00	1.33	1097.33	317.44	0.10
1	2442 E	10 YR	1260.00	316.21	322.77		322.80	0.00	1.62	1203.31	360.61	0.12
1	2442 E	25 YR	1580.00	316.21	323.03		323.08	0.00	1.91	1299.00	370.67	0.14
1	2442 E	50 YR	1840.00	316.21	323.17		323.22	0.00	2.16	1348.59	374.75	0.16

HEC-RAS Plan: WC2_Ultimate River: Stream WC-2 Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2442 E	100 YR	2130.00	316.21	323.36		323.43	0.00	2.40	1423.93	382.10	0.17
1	2442 E	250 YR	2590.00	316.21	323.59		323.68	0.00	2.79	1510.03	397.86	0.19
1	2442 E	500 YR	2950.00	316.21	323.75		323.86	0.00	3.07	1577.55	403.08	0.21
1	2795	2 YR	710.00	317.49	321.80		321.86	0.00	2.08	461.29	289.31	0.20
1	2795	5 YR	960.00	317.49	322.51		322.57	0.00	2.08	675.96	314.83	0.18
1	2795	10 YR	1200.00	317.49	322.84		322.91	0.00	2.29	781.62	327.48	0.19
1	2795	25 YR	1500.00	317.49	323.13		323.20	0.00	2.60	875.65	336.44	0.21
1	2795	50 YR	1760.00	317.49	323.28		323.38	0.00	2.90	928.11	341.12	0.23
1	2795	100 YR	2040.00	317.49	323.50		323.61	0.00	3.13	1003.47	348.58	0.25
1	2795	250 YR	2460.00	317.49	323.76		323.90	0.00	3.50	1095.63	358.52	0.27
1	2795	500 YR	2800.00	317.49	323.96		324.11	0.00	3.76	1166.65	364.75	0.28
1	3170 F	2 YR	400.00	319.01	322.05		322.12	0.00	2.15	189.23	115.91	0.28
1	3170 F	5 YR	560.00	319.01	322.69		322.77	0.00	2.19	269.85	133.40	0.25
1	3170 F	10 YR	700.00	319.01	323.04		323.12	0.00	2.39	316.99	142.64	0.25
1	3170 F	25 YR	880.00	319.01	323.35		323.46	0.00	2.69	364.16	163.53	0.27
1	3170 F	50 YR	1040.00	319.01	323.54		323.67	0.00	2.97	397.62	184.94	0.29
1	3170 F	100 YR	1220.00	319.01	323.78		323.94	0.00	3.21	444.20	200.46	0.30
1	3170 F	250 YR	1490.00	319.01	324.08		324.27	0.00	3.54	507.96	222.02	0.32
1	3170 F	500 YR	1690.00	319.01	324.31		324.51	0.00	3.73	560.60	241.44	0.33
1	3361	2 YR	400.00	320.75	322.89	322.89	323.58	0.01	6.76	62.61	50.29	0.96
1	3361	5 YR	560.00	320.75	323.28	323.28	324.08	0.01	7.35	83.90	59.35	0.93
1	3361	10 YR	700.00	320.75	323.59	323.59	324.44	0.01	7.69	103.62	67.06	0.90
1	3361	25 YR	880.00	320.75	323.89	323.89	324.84	0.01	8.22	124.94	72.49	0.91
1	3361	50 YR	1040.00	320.75	324.23	324.23	325.15	0.01	8.23	151.14	90.26	0.85
1	3361	100 YR	1220.00	320.75	324.47	324.47	325.45	0.01	8.58	175.50	105.41	0.85
1	3361	250 YR	1490.00	320.75	324.82	324.82	325.84	0.01	8.97	217.18	131.92	0.85
1	3361	500 YR	1690.00	320.75	325.03	325.03	326.10	0.01	9.29	246.52	141.85	0.85
1	3415 G	2 YR	400.00	321.06	323.47	322.86	323.89	0.00	5.22	77.57	45.25	0.61
1	3415 G	5 YR	560.00	321.06	323.74	323.27	324.40	0.00	6.51	87.18	48.38	0.72
1	3415 G	10 YR	670.00	321.06	324.08	323.52	324.75	0.00	6.67	111.46	52.33	0.70
1	3415 G	25 YR	830.00	321.06	324.22	323.89	325.14	0.00	7.84	118.89	53.95	0.80
1	3415 G	50 YR	970.00	321.06	324.44	324.21	325.50	0.00	8.45	131.14	56.52	0.83
1	3415 G	100 YR	1140.00	321.06	324.62	324.53	325.91	0.00	9.33	141.51	58.61	0.89
1	3415 G	250 YR	1380.00	321.06	325.15	325.15	326.41	0.00	9.43	195.51	149.04	0.84
1	3415 G	500 YR	1590.00	321.06	325.55	325.55	326.77	0.00	9.46	265.31	207.89	0.80
1	3452 Independence Cir		Culvert									
1	3489 H	2 YR	400.00	321.38	326.88	323.65	326.94	0.00	1.98	202.90	277.60	0.1
1	3489 H	5 YR	560.00	321.38	327.82	324.07	327.86	0.00	1.74	711.67	365.26	0.13
1	3489 H	10 YR	670.00	321.38	327.96	324.31	328.01	0.00	1.98	763.77	378.76	0.15
1	3489 H	25 YR	830.00	321.38	328.16	324.62	328.22	0.00	2.30	840.13	400.27	0.17
1	3489 H	50 YR	970.00	321.38	328.21	324.85	328.29	0.00	2.64	862.57	405.80	0.19
1	3489 H	100 YR	1140.00	321.38	328.34	325.13	328.43	0.00	2.98	913.88	418.18	0.22
1	3489 H	250 YR	1380.00	321.38	328.48	325.50	328.60	0.00	3.45	972.63	440.37	0.25
1	3489 H	500 YR	1590.00	321.38	328.58	325.81	328.74	0.00	3.85	1021.71	476.41	0.27
1	3542	2 YR	400.00	321.67	326.91	323.92	326.96	0.00	1.82	261.46	151.81	0.15
1	3542	5 YR	560.00	321.67	327.83	324.32	327.87	0.00	1.87	510.34	319.47	0.14
1	3542	10 YR	670.00	321.67	327.97	324.54	328.02	0.00	2.13	555.85	324.95	0.16
1	3542	25 YR	830.00	321.67	328.16	324.85	328.24	0.00	2.46	620.73	332.07	0.18
1	3542	50 YR	970.00	321.67	328.22	325.13	328.31	0.00	2.81	640.00	334.15	0.21
1	3542	100 YR	1140.00	321.67	328.35	325.44	328.46	0.00	3.17	682.72	339.88	0.23
1	3542	250 YR	1380.00	321.67	328.49	325.86	328.64	0.00	3.66	732.05	373.55	0.27
1	3542	500 YR	1590.00	321.67	328.60	326.13	328.79	0.00	4.10	773.41	384.11	0.30
1	3669	2 YR	400.00	322.46	326.94	324.75	327.00	0.00	2.35	329.67	271.04	0.21
1	3669	5 YR	560.00	322.46	327.86	325.18	327.90	0.00	2.10	600.42	315.62	0.17
1	3669	10 YR	670.00	322.46	328.01	325.44	328.06	0.00	2.35	648.40	320.73	0.19
1	3669	25 YR	830.00	322.46	328.22	326.09	328.28	0.00	2.67	716.89	327.87	0.21
1	3669	50 YR	970.00	322.46	328.29	326.42	328.38	0.00	3.03	741.79	331.27	0.23
1	3669	100 YR	1140.00	322.46	328.44	326.70	328.54	0.00	3.37	790.75	339.17	0.26
1	3669	250 YR	1380.00	322.46	328.61	326.96	328.74	0.00	3.83	850.67	354.72	0.29
1	3669	500 YR	1590.00	322.46	328.76	327.18	328.90	0.00	4.19	902.20	367.58	0.31
1	3843	2 YR	400.00	322.71	327.01	325.01	327.13	0.00	2.76	148.71	57.26	0.27
1	3843	5 YR	560.00	322.71	327.87	325.43	328.00	0.00	2.94	216.32	108.78	0.26
1	3843	10 YR	670.00	322.71	328.02	325.69	328.19	0.00	3.36	233.84	125.47	0.29
1	3843	25 YR	830.00	322.71	328.22	326.03	328.45	0.00	3.92	264.15	179.77	0.33
1	3843	50 YR	970.00	322.71	328.30	326.27	328.59	0.00	4.48	278.00	206.06	0.37
1	3843	100 YR	1140.00	322.71	328.43	326.56	328.80	0.00	5.05	308.03	239.25	0.42
1	3843	250 YR	1380.00	322.71	328.59	326.95	329.07	0.00	5.80	347.68	252.35	0.47
1	3843	500 YR	1590.00	322.71	328.72	327.34	329.29	0.00	6.39	381.06	259.68	0.51
1	3882 I	2 YR	400.00	323.21	326.97	325.44	327.24	0.00	4.32	101.04	36.39	0.40
1	3882 I	5 YR	560.00	323.21	327.81	325.95	328.13	0.00	4.70	150.64	77.99	0.39
1	3882 I	10 YR	670.00	323.21	327.94	326.27	328.35	0.00	5.40	161.08	90.23	0.4
1	3882 I	25 YR	830.00	323.21	328.11	326.69	328.67	0.00	6.33	179.03	115.74	0.51
1	3882 I	50 YR	970.00	323.21	328.14	327.01	328.88	0.00	7.34	182.04	118.46	0.59
1	3882 I	100 YR	1140.00	323.21	328.21	327.70	329.18	0.00	8.41	191.54	128.41	0.68
1	3882 I	250 YR	1380.00	323.21	328.35	328.35	329.63	0.00	9.74	210.75	158.08	0.77
1	3882 I	500 YR	1590.00	323.21	328.89	328.89	329.97	0.00	9.31	326.86	237.74	0.70
1	3909 Lexington Pl.		Culvert									

HEC-RAS Plan: WC2_Ultimate River: Stream WC-2 Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3936 J	2 YR	400.00	323.59	328.95	325.67	329.08	0.00	2.90	138.58	246.48	0.22
1	3936 J	5 YR	560.00	323.59	329.98	326.15	330.06	0.00	2.60	524.07	334.68	0.18
1	3936 J	10 YR	670.00	323.59	330.19	326.45	330.27	0.00	2.68	707.35	360.01	0.19
1	3936 J	25 YR	830.00	323.59	330.38	326.87	330.49	0.00	3.12	779.02	379.45	0.21
1	3936 J	50 YR	970.00	323.59	330.50	327.20	330.62	0.00	3.52	821.57	389.59	0.24
1	3936 J	100 YR	1140.00	323.59	330.66	327.61	330.81	0.00	3.94	885.53	404.52	0.26
1	3936 J	250 YR	1380.00	323.59	330.79	328.12	330.99	0.00	4.57	940.24	415.02	0.30
1	3936 J	500 YR	1590.00	323.59	330.98	328.57	331.22	0.00	4.96	1022.08	425.54	0.33
1	3971	2 YR	400.00	323.69	328.95	326.08	329.09	0.00	3.12	183.09	116.52	0.25
1	3971	5 YR	560.00	323.69	329.96	326.63	330.10	0.00	3.29	359.02	241.35	0.24
1	3971	10 YR	670.00	323.69	330.14	326.96	330.32	0.00	3.72	409.84	261.12	0.26
1	3971	25 YR	830.00	323.69	330.32	327.42	330.56	0.00	4.37	457.26	279.36	0.31
1	3971	50 YR	970.00	323.69	330.41	327.79	330.71	0.00	4.97	483.11	287.05	0.35
1	3971	100 YR	1140.00	323.69	330.55	328.23	330.93	0.00	5.62	523.46	298.82	0.39
1	3971	250 YR	1380.00	323.69	330.64	328.98	331.16	0.00	6.62	550.47	305.55	0.45
1	3971	500 YR	1590.00	323.69	330.80	329.42	331.42	0.00	7.28	601.10	318.53	0.49
1	4032	2 YR	400.00	324.37	328.96	326.81	329.10	0.00	3.30	145.28	58.38	0.28
1	4032	5 YR	560.00	324.37	329.96	327.43	330.11	0.00	3.41	257.85	240.49	0.26
1	4032	10 YR	670.00	324.37	330.16	327.73	330.33	0.00	3.81	335.26	268.30	0.29
1	4032	25 YR	830.00	324.37	330.34	328.10	330.57	0.00	4.45	385.91	283.92	0.33
1	4032	50 YR	970.00	324.37	330.45	328.41	330.73	0.00	5.03	415.28	292.46	0.37
1	4032	100 YR	1140.00	324.37	330.60	328.74	330.95	0.00	5.63	461.28	304.66	0.41
1	4032	250 YR	1380.00	324.37	330.72	329.28	331.19	0.00	6.56	499.96	321.32	0.47
1	4032	500 YR	1590.00	324.37	330.92	329.66	331.45	0.00	7.12	567.06	371.07	0.50
1	4238	2 YR	400.00	325.43	328.99	327.41	329.15	0.00	3.30	143.68	77.21	0.33
1	4238	5 YR	560.00	325.43	329.98	327.81	330.14	0.00	3.34	220.50	142.79	0.29
1	4238	10 YR	670.00	325.43	330.17	328.07	330.38	0.00	3.78	239.55	159.77	0.32
1	4238	25 YR	830.00	325.43	330.35	328.40	330.63	0.00	4.46	258.72	174.60	0.37
1	4238	50 YR	970.00	325.43	330.45	328.69	330.81	0.00	5.08	269.76	184.94	0.42
1	4238	100 YR	1140.00	325.43	330.59	329.04	331.06	0.00	5.75	288.48	208.02	0.47
1	4238	250 YR	1380.00	325.43	330.74	329.42	331.32	0.00	6.55	383.34	218.03	0.52
1	4238	500 YR	1590.00	325.43	330.92	329.72	331.61	0.00	7.17	424.47	234.53	0.56
1	4276 K	2 YR	400.00	325.56	328.88	327.95	329.28	0.00	5.22	100.43	63.95	0.53
1	4276 K	5 YR	560.00	325.56	329.91	328.53	330.23	0.00	4.93	187.37	100.09	0.43
1	4276 K	10 YR	670.00	325.56	330.09	328.89	330.49	0.00	5.54	204.33	109.36	0.47
1	4276 K	25 YR	830.00	325.56	330.24	329.37	330.78	0.00	6.52	218.91	122.54	0.55
1	4276 K	50 YR	970.00	325.56	330.30	329.70	331.01	0.00	7.47	225.30	130.85	0.63
1	4276 K	100 YR	1140.00	325.56	330.39	330.00	331.31	0.00	8.51	236.25	144.35	0.70
1	4276 K	250 YR	1380.00	325.56	330.43	330.43	331.73	0.00	10.15	249.78	149.85	0.84
1	4276 K	500 YR	1590.00	325.56	330.81	330.81	332.10	0.00	10.33	321.40	215.48	0.82
1	4308 Concord Pl.		Culvert									
1	4340 L	2 YR	400.00	325.95	330.64	328.95	330.96	0.00	4.59	119.49	173.96	0.44
1	4340 L	5 YR	560.00	325.95	331.02	329.59	331.45	0.00	5.47	201.53	313.50	0.50
1	4340 L	10 YR	670.00	325.95	331.13	329.97	331.66	0.00	6.17	230.55	322.34	0.56
1	4340 L	25 YR	830.00	325.95	331.16	331.16	331.95	0.00	7.54	237.52	324.46	0.68
1	4340 L	50 YR	970.00	325.95	331.39	331.39	332.20	0.00	7.84	297.65	342.59	0.69
1	4340 L	100 YR	1140.00	325.95	331.63	331.63	332.46	0.00	8.21	360.09	361.17	0.70
1	4340 L	250 YR	1380.00	325.95	331.92	331.92	332.66	0.00	8.21	527.80	378.15	0.68
1	4340 L	500 YR	1590.00	325.95	332.08	332.08	332.88	0.00	8.72	588.17	386.67	0.71
1	4446	2 YR	400.00	326.04	330.65	329.21	331.08	0.00	5.45	137.88	138.91	0.50
1	4446	5 YR	560.00	326.04	331.01	329.93	331.61	0.00	6.57	190.61	151.96	0.59
1	4446	10 YR	670.00	326.04	331.10	330.82	331.89	0.00	7.59	204.46	158.34	0.68
1	4446	25 YR	830.00	326.04	331.22	331.22	332.31	0.00	8.99	223.13	165.89	0.79
1	4446	50 YR	970.00	326.04	331.42	331.42	332.66	0.00	9.72	258.18	192.16	0.84
1	4446	100 YR	1140.00	326.04	331.78	331.78	333.07	0.00	10.10	346.56	293.62	0.85
1	4446	250 YR	1380.00	326.04	332.51	332.51	333.37	0.00	8.94	609.43	408.73	0.70
1	4446	500 YR	1590.00	326.04	332.75	332.75	333.63	0.00	9.28	709.76	438.29	0.71
1	4699 M	2 YR	400.00	326.46	330.66	329.68	331.39	0.00	6.94	81.12	90.72	0.63
1	4699 M	5 YR	560.00	326.46	330.90	330.48	332.11	0.00	8.97	113.88	165.21	0.79
1	4699 M	10 YR	670.00	326.46	331.46	331.46	332.47	0.00	8.61	220.97	207.26	0.71
1	4699 M	25 YR	830.00	326.46	331.85	331.85	332.90	0.00	9.11	306.02	224.47	0.72
1	4699 M	50 YR	970.00	326.46	332.15	332.15	333.23	0.00	9.47	375.87	237.68	0.73
1	4699 M	100 YR	1140.00	326.46	332.46	332.46	333.58	0.00	9.96	450.05	250.95	0.74
1	4699 M	250 YR	1380.00	326.46	332.81	332.81	334.03	0.00	10.65	542.76	266.52	0.77
1	4699 M	500 YR	1590.00	326.46	333.11	333.11	334.37	0.00	11.12	624.32	279.46	0.79
1	4974	2 YR	280.00	330.53	333.13	333.13	333.39	0.02	5.40	90.38	170.13	0.77
1	4974	5 YR	390.00	330.53	333.26	333.26	333.56	0.03	6.03	113.02	180.72	0.82
1	4974	10 YR	470.00	330.53	333.35	333.35	333.66	0.03	6.36	128.88	187.77	0.85
1	4974	25 YR	590.00	330.53	333.45	333.45	333.81	0.03	6.88	149.18	195.78	0.89
1	4974	50 YR	680.00	330.53	333.83		334.02	0.01	5.10	227.53	237.10	0.60
1	4974	100 YR	780.00	330.53	334.19		334.31	0.01	4.20	317.73	269.27	0.46
1	4974	250 YR	940.00	330.53	334.62		334.71	0.00	3.62	448.24	323.09	0.37
1	4974	500 YR	1070.00	330.53	334.94		335.02	0.00	3.30	557.12	349.92	0.32
1	5219 N	2 YR	280.00	331.65	334.85		334.89	0.00	2.57	267.21	258.00	0.28
1	5219 N	5 YR	390.00	331.65	335.12		335.15	0.00	2.81	336.48	271.55	0.29
1	5219 N	10 YR	470.00	331.65	335.28		335.31	0.00	2.95	380.79	282.05	0.30
1	5219 N	25 YR	590.00	331.65	335.49		335.53	0.00	3.14	441.74	292.14	0.31

HEC-RAS Plan: WC2_Ultimate River: Stream WC-2 Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5219 N	50 YR	680.00	331.65	335.52		335.57	0.00	3.54	450.43	293.44	0.35
1	5219 N	100 YR	780.00	331.65	335.58		335.65	0.00	3.87	469.91	296.33	0.37
1	5219 N	250 YR	940.00	331.65	335.73		335.81	0.01	4.21	515.00	318.36	0.40
1	5219 N	500 YR	1070.00	331.65	335.88		335.96	0.01	4.41	565.44	347.10	0.4
1	5569	2 YR	280.00	333.95	336.10		336.16	0.01	2.75	168.10	184.27	0.37
1	5569	5 YR	390.00	333.95	336.36		336.42	0.00	2.93	217.47	202.33	0.37
1	5569	10 YR	470.00	333.95	336.52		336.59	0.00	3.05	251.72	213.96	0.37
1	5569	25 YR	590.00	333.95	336.74		336.82	0.00	3.21	299.87	229.07	0.37
1	5569	50 YR	680.00	333.95	336.90		336.99	0.00	3.28	339.21	240.97	0.36
1	5569	100 YR	780.00	333.95	337.07		337.15	0.00	3.39	379.02	253.54	0.36
1	5569	250 YR	940.00	333.95	337.29		337.38	0.00	3.55	438.20	268.51	0.37
1	5569	500 YR	1070.00	333.95	337.46		337.55	0.00	3.65	483.15	274.48	0.37
1	5776 O	2 YR	280.00	335.02	337.21		337.30	0.01	2.89	123.68	147.59	0.40
1	5776 O	5 YR	390.00	335.02	337.43		337.54	0.01	3.15	157.69	159.92	0.41
1	5776 O	10 YR	470.00	335.02	337.57		337.69	0.01	3.31	180.50	167.82	0.42
1	5776 O	25 YR	590.00	335.02	337.76		337.89	0.01	3.48	213.30	178.25	0.42
1	5776 O	50 YR	680.00	335.02	337.88		338.03	0.01	3.59	236.48	185.28	0.42
1	5776 O	100 YR	780.00	335.02	338.02		338.17	0.01	3.69	262.50	192.87	0.42
1	5776 O	250 YR	940.00	335.02	338.22		338.39	0.01	3.83	303.03	211.19	0.42
1	5776 O	500 YR	1070.00	335.02	338.37		338.54	0.01	3.95	335.68	230.17	0.42
1	6011	2 YR	280.00	336.33	338.52		338.61	0.00	2.77	138.29	111.68	0.36
1	6011	5 YR	390.00	336.33	338.79		338.89	0.01	3.15	168.15	115.86	0.39
1	6011	10 YR	470.00	336.33	338.95		339.08	0.01	3.40	187.70	118.52	0.40
1	6011	25 YR	590.00	336.33	339.17		339.32	0.01	3.74	213.71	121.97	0.42
1	6011	50 YR	680.00	336.33	339.31		339.48	0.01	3.98	231.38	124.26	0.44
1	6011	100 YR	780.00	336.33	339.46		339.65	0.01	4.23	249.63	126.58	0.45
1	6011	250 YR	940.00	336.33	339.67		339.90	0.01	4.60	276.92	130.06	0.47
1	6011	500 YR	1070.00	336.33	339.83		340.08	0.01	4.88	297.64	132.66	0.49
1	6343	2 YR	200.00	337.63	340.01		340.08	0.00	2.53	102.69	72.01	0.31
1	6343	5 YR	270.00	337.63	340.34		340.43	0.00	2.77	127.63	77.02	0.32
1	6343	10 YR	320.00	337.63	340.56		340.65	0.00	2.92	144.47	80.87	0.32
1	6343	25 YR	390.00	337.63	340.84		340.93	0.00	3.09	167.82	85.76	0.32
1	6343	50 YR	450.00	337.63	341.04		341.14	0.00	3.24	185.06	88.44	0.33
1	6343	100 YR	510.00	337.63	341.24		341.35	0.00	3.35	203.00	91.20	0.33
1	6343	250 YR	610.00	337.63	341.53		341.66	0.00	3.53	230.62	95.25	0.33
1	6343	500 YR	690.00	337.63	341.75		341.88	0.00	3.66	251.83	98.16	0.33
1	6593 P	2 YR	200.00	340.88	342.36	342.36	342.66	0.03	5.08	47.30	80.10	0.87
1	6593 P	5 YR	270.00	340.88	342.52	342.52	342.86	0.03	5.38	61.51	98.70	0.86
1	6593 P	10 YR	320.00	340.88	342.64	342.64	342.97	0.03	5.34	74.61	111.38	0.82
1	6593 P	25 YR	390.00	340.88	342.74	342.74	343.11	0.03	5.63	86.65	116.08	0.83
1	6593 P	50 YR	450.00	340.88	342.82	342.82	343.22	0.03	5.94	95.36	120.11	0.85
1	6593 P	100 YR	510.00	340.88	342.90	342.90	343.33	0.03	6.15	105.40	125.70	0.86
1	6593 P	250 YR	610.00	340.88	343.03	343.03	343.48	0.03	6.39	122.48	132.87	0.86
1	6593 P	500 YR	690.00	340.88	343.16	343.12	343.59	0.02	6.22	140.57	138.55	0.80

HEC-RAS Plan: Swampoodle_Ult River: Swampoodle Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	765	2 YR	3120.00	261.35	273.31	267.43	273.60	0.00	4.33	733.31	575.45	0.27
1	765	5 YR	4010.00	261.35	273.76	268.28	274.19	0.00	5.25	782.35	696.22	0.32
1	765	10 YR	4910.00	261.35	274.07	269.06	274.66	0.00	6.20	817.59	739.21	0.37
1	765	25 YR	5740.00	261.35	274.62	269.73	275.33	0.00	6.79	889.68	868.09	0.39
1	765	50 YR	6560.00	261.35	275.02	270.36	275.86	0.00	7.41	957.82	934.58	0.42
1	765	100 YR	7570.00	261.35	275.41	271.20	276.42	0.01	8.16	1045.79	1024.71	0.45
1	765	250 YR	9280.00	261.35	275.81	272.26	277.17	0.01	9.51	1160.27	1125.48	0.52
1	765	500 YR	10410.00	261.35	276.32	272.87	277.78	0.01	9.96	1322.16	1179.28	0.53
1	1194	2 YR	3120.00	261.33	274.20	269.34	274.54	0.00	4.68	676.85	349.48	0.29
1	1194	5 YR	4010.00	261.33	274.94	270.08	275.41	0.00	5.51	742.88	546.30	0.32
1	1194	10 YR	4910.00	261.33	275.58	270.75	276.19	0.00	6.29	801.31	648.30	0.36
1	1194	25 YR	5740.00	261.33	276.27	271.33	276.99	0.00	6.84	873.92	793.27	0.38
1	1194	50 YR	6560.00	261.33	276.85	271.87	277.68	0.00	7.37	949.87	916.72	0.39
1	1194	100 YR	7570.00	261.33	277.49	272.47	278.46	0.00	7.98	1051.07	1009.98	0.41
1	1194	250 YR	9280.00	261.33	278.43	273.43	279.62	0.00	8.88	1219.63	1084.13	0.44
1	1194	500 YR	10410.00	261.33	279.02	274.02	280.31	0.01	9.38	1329.18	1098.81	0.46
1	1282	2 YR	3120.00	263.11	274.46	269.65	274.74	0.00	4.27	754.39	162.74	0.26
1	1282	5 YR	4010.00	263.11	275.28	270.29	275.66	0.00	4.98	837.77	351.29	0.29
1	1282	10 YR	4910.00	263.11	276.00	270.87	276.48	0.00	5.63	915.90	551.09	0.32
1	1282	25 YR	5740.00	263.11	276.74	271.38	277.31	0.00	6.09	1003.71	631.67	0.33
1	1282	50 YR	6560.00	263.11	277.38	271.86	278.03	0.00	6.54	1084.72	714.39	0.35
1	1282	100 YR	7570.00	263.11	278.10	272.40	278.85	0.00	7.03	1183.15	746.39	0.36
1	1282	250 YR	9280.00	263.11	279.13	273.31	280.05	0.00	7.84	1324.75	856.26	0.39
1	1282	500 YR	10410.00	263.11	279.74	273.87	280.77	0.00	8.34	1408.86	872.76	0.40
1	1370 Railroad		Bridge									
1	1460 A	2 YR	3120.00	265.43	275.68	272.11	276.28	0.00	6.37	558.02	460.06	0.40
1	1460 A	5 YR	4010.00	265.43	276.87	273.05	277.47	0.00	6.57	731.58	477.23	0.39
1	1460 A	10 YR	4910.00	265.43	277.94	273.90	278.54	0.00	6.71	890.49	481.73	0.37
1	1460 A	25 YR	5740.00	265.43	278.92	275.40	279.51	0.00	6.77	1036.25	649.78	0.36
1	1460 A	50 YR	6560.00	265.43	279.79	276.01	280.39	0.00	6.87	1167.97	856.39	0.35
1	1460 A	100 YR	7570.00	265.43	282.20	276.57	282.64	0.00	5.99	1536.92	961.15	0.28
1	1460 A	250 YR	9280.00	265.43	283.29	277.37	283.84	0.00	6.62	1722.15	1129.12	0.30
1	1460 A	500 YR	10410.00	265.43	284.50	277.83	285.04	0.00	6.63	1984.26	1295.51	0.29
1	1523	2 YR	3120.00	266.38	275.90	273.15	276.47	0.00	6.09	517.11	328.20	0.44
1	1523	5 YR	4010.00	266.38	277.02	273.89	277.64	0.00	6.42	689.44	537.01	0.42
1	1523	10 YR	4910.00	266.38	278.08	274.56	278.69	0.00	6.49	891.85	773.14	0.40
1	1523	25 YR	5740.00	266.38	279.10	275.10	279.65	0.00	6.34	1107.01	877.07	0.37
1	1523	50 YR	6560.00	266.38	280.02	275.61	280.53	0.00	6.22	1306.38	895.24	0.34
1	1523	100 YR	7570.00	266.38	282.41	276.72	282.74	0.00	5.14	1829.50	993.84	0.26
1	1523	250 YR	9280.00	266.38	283.58	277.70	283.95	0.00	5.50	2089.70	1090.37	0.26
1	1523	500 YR	10410.00	266.38	284.78	278.26	285.15	0.00	5.45	2430.03	1423.64	0.25
1	1606	2 YR	3120.00	265.79	275.89	274.16	276.99	0.01	8.55	397.32	325.34	0.59
1	1606	5 YR	4010.00	265.79	276.99	275.17	278.10	0.01	8.83	549.71	539.90	0.57
1	1606	10 YR	4910.00	265.79	278.09	276.05	279.05	0.00	8.55	736.03	658.29	0.51
1	1606	25 YR	5740.00	265.79	279.10	277.28	279.93	0.00	8.18	922.52	832.55	0.46
1	1606	50 YR	6560.00	265.79	280.02	277.73	280.77	0.00	7.94	1097.31	898.50	0.43
1	1606	100 YR	7570.00	265.79	282.56	278.24	282.81	0.00	4.99	2146.26	1115.02	0.24
1	1606	250 YR	9280.00	265.79	283.79	278.95	284.03	0.00	5.03	2789.67	1465.13	0.23
1	1606	500 YR	10410.00	265.79	285.01	279.37	285.21	0.00	4.75	3383.19	1612.49	0.21
1	1693	2 YR	3120.00	265.83	276.95	273.27	277.46	0.00	6.01	622.93	490.01	0.36
1	1693	5 YR	4010.00	265.83	277.99	274.21	278.54	0.00	6.40	781.86	538.37	0.37
1	1693	10 YR	4910.00	265.83	278.82	275.09	279.41	0.00	6.77	925.54	580.74	0.37
1	1693	25 YR	5740.00	265.83	279.62	275.68	280.22	0.00	6.93	1067.17	625.98	0.37
1	1693	50 YR	6560.00	265.83	280.41	276.91	281.01	0.00	7.02	1205.96	725.30	0.36
1	1693	100 YR	7570.00	265.83	282.69	277.39	282.88	0.00	4.48	2399.64	1132.46	0.21
1	1693	250 YR	9280.00	265.83	283.92	278.41	284.10	0.00	4.46	3233.08	1313.91	0.20
1	1693	500 YR	10410.00	265.83	285.11	278.87	285.27	0.00	4.23	3868.00	1407.82	0.18
1	1765 Railroad		Bridge									
1	1828 B	2 YR	3120.00	266.89	278.83	273.56	279.20	0.00	5.10	789.99	685.97	0.29
1	1828 B	5 YR	4010.00	266.89	281.16	274.51	281.46	0.00	4.78	1182.33	891.96	0.25
1	1828 B	10 YR	4910.00	266.89	281.91	275.33	282.28	0.00	5.36	1308.79	930.73	0.27
1	1828 B	25 YR	5740.00	266.89	283.06	276.06	283.45	0.00	5.54	1503.18	1034.36	0.26
1	1828 B	50 YR	6560.00	266.89	283.49	276.79	283.95	0.00	6.07	1574.84	1054.64	0.29
1	1828 B	100 YR	7570.00	266.89	286.70	277.94	286.80	0.00	3.44	4139.97	1312.51	0.15
1	1828 B	250 YR	9280.00	266.89	287.93	279.12	288.00	0.00	3.19	6049.55	1539.37	0.13
1	1828 B	500 YR	10410.00	266.89	288.51	279.68	288.59	0.00	3.34	6514.77	1603.07	0.13
1	1855	2 YR	3120.00	266.38	279.02	273.65	279.28	0.00	4.35	1045.54	766.78	0.25
1	1855	5 YR	4010.00	266.38	281.31	274.42	281.52	0.00	4.04	1532.38	938.13	0.21
1	1855	10 YR	4910.00	266.38	282.11	275.12	282.35	0.00	4.50	1700.23	975.42	0.22
1	1855	25 YR	5740.00	266.38	283.27	275.76	283.52	0.00	4.63	1946.72	1048.06	0.22
1	1855	50 YR	6560.00	266.38	283.73	276.33	284.03	0.00	5.04	2045.89	1070.92	0.23
1	1855	100 YR	7570.00	266.38	286.75	277.44	286.82	0.00	2.94	4937.81	1313.35	0.12
1	1855	250 YR	9280.00	266.38	287.96	278.61	288.01	0.00	2.85	6889.69	1526.03	0.12
1	1855	500 YR	10410.00	266.38	288.54	279.10	288.60	0.00	2.98	7391.73	1636.66	0.12
1	1930	2 YR	3120.00	267.08	279.16	274.05	279.36	0.00	3.92	1137.95	759.17	0.23
1	1930	5 YR	4010.00	267.08	281.40	274.71	281.57	0.00	3.76	1583.44	904.22	0.19
1	1930	10 YR	4910.00	267.08	282.20	275.27	282.41	0.00	4.20	1742.96	949.43	0.21

HEC-RAS Plan: Swampoodle_Ult River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	1930	25 YR	5740.00	267.08	283.36	275.76	283.57	0.00	4.36	1972.46	1008.39	0.21
1	1930	50 YR	6560.00	267.08	283.83	276.21	284.09	0.00	4.76	2067.77	1031.83	0.22
1	1930	100 YR	7570.00	267.08	286.81	276.72	286.84	0.00	2.05	8473.90	1241.67	0.09
1	1930	250 YR	9280.00	267.08	288.01	277.66	288.03	0.00	2.10	11501.59	1536.14	0.0
1	1930	500 YR	10410.00	267.08	288.59	278.38	288.62	0.00	2.17	12430.76	1628.72	0.09
1	1970	2 YR	3120.00	267.32	279.15	274.49	279.46	0.00	4.62	839.85	679.59	0.28
1	1970	5 YR	4010.00	267.32	281.39	275.27	281.64	0.00	4.29	1246.28	835.94	0.23
1	1970	10 YR	4910.00	267.32	282.19	275.99	282.49	0.00	4.75	1391.35	920.90	0.25
1	1970	25 YR	5740.00	267.32	283.34	276.63	283.65	0.00	4.87	1600.56	978.93	0.24
1	1970	50 YR	6560.00	267.32	283.82	277.30	284.18	0.00	5.30	1687.07	991.87	0.26
1	1970	100 YR	7570.00	267.32	286.81	277.91	286.85	0.00	2.28	7488.18	1332.15	0.10
1	1970	250 YR	9280.00	267.32	288.01	279.11	288.04	0.00	2.27	10602.76	1596.19	0.10
1	1970	500 YR	10410.00	267.32	288.59	279.65	288.62	0.00	2.32	11553.36	1644.81	0.10
1	2015 Railroad		Bridge									
1	2080 C	2 YR	3120.00	267.23	279.68	273.70	279.81	0.00	3.24	1390.65	677.63	0.18
1	2080 C	5 YR	4010.00	267.23	281.84	274.50	281.95	0.00	3.17	1822.34	757.87	0.16
1	2080 C	10 YR	4910.00	267.23	282.75	275.04	282.88	0.00	3.53	2003.01	804.45	0.17
1	2080 C	25 YR	5740.00	267.23	283.93	275.90	284.08	0.00	3.68	2239.48	942.83	0.17
1	2080 C	50 YR	6560.00	267.23	284.61	276.49	284.78	0.00	3.95	2375.26	1004.74	0.18
1	2080 C	100 YR	7570.00	267.23	287.21	276.93	287.24	0.00	1.94	9124.47	1313.47	0.08
1	2080 C	250 YR	9280.00	267.23	288.14	277.58	288.16	0.00	2.11	11016.70	1435.73	0.09
1	2080 C	500 YR	10410.00	267.23	288.68	277.97	288.71	0.00	2.22	11828.17	1561.24	0.09
1	2117	2 YR	3120.00	267.24	279.80	273.06	279.84	0.00	2.08	2323.38	825.18	0.12
1	2117	5 YR	4010.00	267.24	281.95	273.61	281.99	0.00	1.96	3185.07	896.59	0.10
1	2117	10 YR	4910.00	267.24	282.88	274.16	282.92	0.00	2.14	3556.63	944.22	0.10
1	2117	25 YR	5740.00	267.24	284.07	274.54	284.12	0.00	2.19	4034.32	1035.30	0.10
1	2117	50 YR	6560.00	267.24	284.77	274.94	284.82	0.00	2.34	4314.95	1099.13	0.11
1	2117	100 YR	7570.00	267.24	287.22	275.33	287.24	0.00	1.64	9383.42	1386.65	0.07
1	2117	250 YR	9280.00	267.24	288.15	275.90	288.17	0.00	1.81	12057.95	1517.34	0.07
1	2117	500 YR	10410.00	267.24	288.69	276.27	288.71	0.00	1.88	12893.35	1572.54	0.08
1	2138	2 YR	3120.00	265.60	279.70	273.41	279.90	0.00	4.01	1224.82	466.53	0.21
1	2138	5 YR	4010.00	265.60	281.86	274.28	282.04	0.00	3.91	1853.22	657.61	0.19
1	2138	10 YR	4910.00	265.60	282.78	275.08	282.97	0.00	4.23	2195.44	790.30	0.20
1	2138	25 YR	5740.00	265.60	283.98	275.68	284.17	0.00	4.26	2678.03	840.69	0.19
1	2138	50 YR	6560.00	265.60	284.68	276.21	284.87	0.00	4.43	2967.52	851.47	0.19
1	2138	100 YR	7570.00	265.60	287.19	276.79	287.26	0.00	3.02	5960.60	1136.89	0.12
1	2138	250 YR	9280.00	265.60	288.11	277.97	288.19	0.00	3.32	6882.03	1316.31	0.1
1	2138	500 YR	10410.00	265.60	288.65	278.68	288.73	0.00	3.44	7478.73	1390.54	0.1
1	2219	2 YR	3120.00	266.49	279.89	273.03	279.98	0.00	2.90	1714.18	596.06	0.16
1	2219	5 YR	4010.00	266.49	282.03	273.60	282.10	0.00	2.65	2473.41	739.52	0.13
1	2219	10 YR	4910.00	266.49	282.97	274.12	283.05	0.00	2.85	2809.18	773.12	0.14
1	2219	25 YR	5740.00	266.49	284.16	274.55	284.24	0.00	2.87	3241.54	817.93	0.13
1	2219	50 YR	6560.00	266.49	284.86	274.98	284.95	0.00	3.06	3514.50	857.44	0.14
1	2219	100 YR	7570.00	266.49	287.22	275.46	287.28	0.00	2.68	4835.67	1268.47	0.11
1	2219	250 YR	9280.00	266.49	288.14	276.23	288.22	0.00	2.93	5632.97	1408.22	0.12
1	2219	500 YR	10410.00	266.49	288.68	276.71	288.76	0.00	3.08	6160.81	1529.24	0.12
1	2264 Texas Viaduct Rd		Bridge									
1	2299	2 YR	3120.00	268.03	279.89	275.42	280.29	0.00	5.53	749.38	509.31	0.33
1	2299	5 YR	4010.00	268.03	282.09	276.50	282.27	0.00	4.13	1347.70	670.19	0.22
1	2299	10 YR	4910.00	268.03	283.04	278.19	283.22	0.00	4.13	1632.10	723.40	0.21
1	2299	25 YR	5740.00	268.03	284.23	279.44	284.39	0.00	3.87	2029.47	835.21	0.19
1	2299	50 YR	6560.00	268.03	284.93	279.95	285.10	0.00	3.93	2349.81	979.89	0.19
1	2299	100 YR	7570.00	268.03	287.26	280.61	287.35	0.00	3.02	3913.88	1320.05	0.13
1	2299	250 YR	9280.00	268.03	288.18	281.11	288.28	0.00	3.18	4734.15	1419.97	0.14
1	2299	500 YR	10410.00	268.03	288.72	281.42	288.82	0.00	3.25	5247.03	1447.41	0.14
1	2376	2 YR	3120.00	267.88	280.09	276.31	280.56	0.00	5.95	708.50	563.17	0.37
1	2376	5 YR	4010.00	267.88	282.16	277.39	282.35	0.00	4.17	1335.37	687.36	0.23
1	2376	10 YR	4910.00	267.88	283.10	279.63	283.28	0.00	4.09	1626.04	721.12	0.22
1	2376	25 YR	5740.00	267.88	284.28	280.38	284.43	0.00	3.78	1989.21	739.56	0.19
1	2376	50 YR	6560.00	267.88	284.98	280.67	285.14	0.00	3.82	2208.25	748.72	0.19
1	2376	100 YR	7570.00	267.88	287.27	280.99	287.38	0.00	3.09	3370.05	1212.00	0.14
1	2376	250 YR	9280.00	267.88	288.19	281.45	288.31	0.00	3.26	4086.02	1295.18	0.14
1	2376	500 YR	10410.00	267.88	288.73	281.72	288.85	0.00	3.35	4526.72	1308.30	0.15
1	2477	2 YR	3120.00	269.09	280.38	275.88	280.75	0.00	5.13	865.45	601.62	0.30
1	2477	5 YR	4010.00	269.09	282.20	276.69	282.43	0.00	4.46	1534.95	797.77	0.24
1	2477	10 YR	4910.00	269.09	283.14	277.47	283.35	0.00	4.47	1919.69	818.92	0.23
1	2477	25 YR	5740.00	269.09	284.30	278.16	284.48	0.00	4.20	2405.42	850.33	0.21
1	2477	50 YR	6560.00	269.09	285.01	279.48	285.18	0.00	4.27	2702.51	862.38	0.21
1	2477	100 YR	7570.00	269.09	287.28	280.62	287.40	0.00	3.63	3831.44	1082.37	0.16
1	2477	250 YR	9280.00	269.09	288.20	281.47	288.33	0.00	3.92	4407.51	1133.78	0.17
1	2477	500 YR	10410.00	269.09	288.74	281.95	288.88	0.00	4.11	4771.24	1183.45	0.1
1	2510	2 YR	3120.00	269.00	280.46	275.33	280.79	0.00	4.69	777.46	583.89	0.28
1	2510	5 YR	4010.00	269.00	282.20	276.18	282.47	0.00	4.40	1278.33	691.89	0.24
1	2510	10 YR	4910.00	269.00	283.13	276.95	283.40	0.00	4.62	1574.75	751.97	0.24
1	2510	25 YR	5740.00	269.00	284.29	277.57	284.52	0.00	4.45	2022.26	825.00	0.22
1	2510	50 YR	6560.00	269.00	284.99	278.11	285.23	0.00	4.59	2312.23	876.82	0.22
1	2510	100 YR	7570.00	269.00	287.28	278.78	287.42	0.00	3.81	3456.06	1091.83	0.17

HEC-RAS Plan: Swampoodle_Ult River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2510	250 YR	9280.00	269.00	288.20	281.04	288.36	0.00	4.13	4062.75	1212.92	0.18
1	2510	500 YR	10410.00	269.00	288.74	281.58	288.91	0.00	4.30	4453.98	1246.95	0.19
1	2545 Broad St.		Culvert									
1	2574 D	2 YR	3120.00	268.71	281.45	276.00	281.84	0.00	5.05	688.35	519.88	0.30
1	2574 D	5 YR	4010.00	268.71	283.02	276.95	283.38	0.00	5.02	1077.03	662.67	0.28
1	2574 D	10 YR	4910.00	268.71	283.79	277.81	284.17	0.00	5.39	1302.39	693.43	0.29
1	2574 D	25 YR	5740.00	268.71	284.57	278.53	284.97	0.00	5.57	1551.68	749.63	0.29
1	2574 D	50 YR	6560.00	268.71	285.09	279.19	285.51	0.00	5.85	1735.84	779.15	0.29
1	2574 D	100 YR	7570.00	268.71	287.25	280.00	287.49	0.00	4.79	2742.28	1025.24	0.22
1	2574 D	250 YR	9280.00	268.71	288.16	282.11	288.42	0.00	5.12	3274.99	1075.15	0.23
1	2574 D	500 YR	10410.00	268.71	288.69	282.95	288.97	0.00	5.33	3600.84	1103.92	0.24
1	2642	2 YR	3120.00	269.91	281.30	278.24	282.15	0.00	7.66	511.89	423.27	0.46
1	2642	5 YR	4010.00	269.91	282.90	279.39	283.64	0.00	7.51	799.61	595.43	0.42
1	2642	10 YR	4910.00	269.91	283.66	280.16	284.44	0.00	7.96	988.45	638.34	0.43
1	2642	25 YR	5740.00	269.91	284.47	281.58	285.19	0.00	7.91	1203.69	657.40	0.41
1	2642	50 YR	6560.00	269.91	285.00	282.50	285.74	0.00	8.20	1347.32	670.82	0.41
1	2642	100 YR	7570.00	269.91	287.19	283.53	287.62	0.00	6.61	1989.17	781.50	0.31
1	2642	250 YR	9280.00	269.91	288.10	284.24	288.56	0.00	7.12	2384.36	922.98	0.32
1	2642	500 YR	10410.00	269.91	288.63	284.65	289.11	0.00	7.39	2643.71	937.75	0.33
1	2717	2 YR	3120.00	269.99	281.44	278.80	282.33	0.00	7.74	473.78	291.15	0.50
1	2717	5 YR	4010.00	269.99	283.01	279.83	283.76	0.00	7.45	754.86	524.07	0.43
1	2717	10 YR	4910.00	269.99	283.78	280.86	284.56	0.00	7.83	918.95	560.64	0.44
1	2717	25 YR	5740.00	269.99	284.57	281.94	285.31	0.00	7.87	1139.77	617.79	0.42
1	2717	50 YR	6560.00	269.99	285.10	282.99	285.86	0.00	8.14	1313.30	693.39	0.43
1	2717	100 YR	7570.00	269.99	287.27	283.49	287.67	0.00	6.42	2199.57	866.39	0.31
1	2717	250 YR	9280.00	269.99	288.20	284.37	288.62	0.00	6.78	2634.00	902.53	0.32
1	2717	500 YR	10410.00	269.99	288.74	284.81	289.17	0.00	7.02	2891.11	926.46	0.32
1	2836	2 YR	3300.00	268.17	281.98	277.91	282.65	0.00	6.78	578.73	271.08	0.39
1	2836	5 YR	4450.00	268.17	283.22	279.15	284.02	0.00	7.60	761.10	388.63	0.41
1	2836	10 YR	5320.00	268.17	283.98	279.97	284.84	0.00	8.08	891.13	440.81	0.42
1	2836	25 YR	6580.00	268.17	284.67	281.26	285.70	0.00	8.99	1044.34	601.30	0.46
1	2836	50 YR	7500.00	268.17	285.18	282.53	286.27	0.00	9.43	1216.44	691.86	0.47
1	2836	100 YR	8500.00	268.17	287.33	283.34	287.87	0.00	7.28	2265.98	939.99	0.33
1	2836	250 YR	9930.00	268.17	288.30	284.38	288.77	0.00	7.12	2791.69	990.58	0.32
1	2836	500 YR	10960.00	268.17	288.85	285.04	289.31	0.00	7.17	3102.16	1034.33	0.31
1	2880 Texas Viaduct Rd		Bridge									
1	2924	2 YR	3300.00	267.81	282.40	277.14	282.90	0.00	5.75	612.53	303.01	0.34
1	2924	5 YR	4450.00	267.81	283.68	278.45	284.30	0.00	6.51	805.19	443.22	0.36
1	2924	10 YR	5320.00	267.81	284.46	279.31	285.15	0.00	6.95	952.76	502.22	0.37
1	2924	25 YR	6580.00	267.81	285.27	280.43	286.07	0.00	7.66	1117.99	538.89	0.39
1	2924	50 YR	7500.00	267.81	285.82	281.21	286.70	0.00	8.10	1238.56	569.01	0.41
1	2924	100 YR	8500.00	267.81	287.58	282.14	288.19	0.00	7.10	1838.00	848.19	0.33
1	2924	250 YR	9930.00	267.81	288.53	283.69	289.11	0.00	7.18	2307.80	979.27	0.33
1	2924	500 YR	10960.00	267.81	289.09	284.44	289.67	0.00	7.29	2608.15	1025.70	0.33
1	2957	2 YR	3300.00	268.70	282.30	278.71	283.11	0.00	7.37	514.39	230.48	0.44
1	2957	5 YR	4450.00	268.70	283.55	279.97	284.55	0.00	8.35	674.72	369.00	0.46
1	2957	10 YR	5320.00	268.70	284.32	280.90	285.42	0.00	8.92	808.16	430.01	0.48
1	2957	25 YR	6580.00	268.70	285.10	282.44	286.37	0.00	9.78	964.21	470.54	0.51
1	2957	50 YR	7500.00	268.70	285.66	283.19	287.00	0.00	10.24	1083.89	493.48	0.52
1	2957	100 YR	8500.00	268.70	287.49	284.29	288.37	0.00	8.78	1644.06	827.11	0.41
1	2957	250 YR	9930.00	268.70	288.44	285.21	289.29	0.00	8.92	2098.79	960.99	0.41
1	2957	500 YR	10960.00	268.70	289.00	285.86	289.84	0.00	9.06	2408.52	1016.53	0.41
1	2972	2 YR	3300.00	268.22	282.33	278.19	283.14	0.00	7.47	533.66	211.17	0.41
1	2972	5 YR	4450.00	268.22	283.56	279.65	284.60	0.00	8.66	694.22	308.75	0.45
1	2972	10 YR	5320.00	268.22	284.32	280.61	285.48	0.00	9.29	822.83	368.87	0.47
1	2972	25 YR	6580.00	268.22	285.09	282.23	286.45	0.00	10.29	972.69	459.56	0.50
1	2972	50 YR	7500.00	268.22	285.64	283.30	287.09	0.00	10.84	1087.41	511.38	0.52
1	2972	100 YR	8500.00	268.22	287.46	284.27	288.44	0.00	9.47	1682.59	868.30	0.43
1	2972	250 YR	9930.00	268.22	288.44	285.32	289.32	0.00	9.36	2215.94	1035.97	0.41
1	2972	500 YR	10960.00	268.22	289.00	285.92	289.88	0.00	9.55	2577.12	1142.86	0.41
1	3035 3rd St.		Bridge									
1	3081 E	2 YR	3300.00	269.70	283.21	277.34	283.51	0.00	4.58	895.23	349.40	0.26
1	3081 E	5 YR	4450.00	269.70	284.92	278.53	285.23	0.00	4.83	1286.40	495.41	0.26
1	3081 E	10 YR	5320.00	269.70	285.83	279.32	286.15	0.00	5.03	1566.41	609.48	0.26
1	3081 E	25 YR	6580.00	269.70	286.79	280.38	287.14	0.00	5.37	1898.54	649.21	0.26
1	3081 E	50 YR	7500.00	269.70	287.64	281.40	287.80	0.00	4.22	3426.04	669.36	0.20
1	3081 E	100 YR	8500.00	269.70	288.71	282.17	288.84	0.00	3.95	4159.04	695.88	0.18
1	3081 E	250 YR	9930.00	269.70	289.57	283.21	289.70	0.00	4.02	4767.55	714.94	0.18
1	3081 E	500 YR	10960.00	269.70	290.13	283.88	290.26	0.00	4.09	5170.68	735.76	0.18
1	3130	2 YR	3300.00	270.35	283.15	279.15	283.66	0.00	6.14	736.20	394.74	0.36
1	3130	5 YR	4450.00	270.35	284.94	280.36	285.27	0.00	5.42	1399.57	513.63	0.29
1	3130	10 YR	5320.00	270.35	285.89	281.84	286.19	0.00	5.43	1740.67	617.09	0.28
1	3130	25 YR	6580.00	270.35	287.06	282.77	287.22	0.00	4.47	3068.75	669.96	0.22
1	3130	50 YR	7500.00	270.35	287.67	283.44	287.82	0.00	4.48	3490.27	715.25	0.21
1	3130	100 YR	8500.00	270.35	288.74	283.93	288.86	0.00	4.14	4277.70	757.80	0.19
1	3130	250 YR	9930.00	270.35	289.61	284.41	289.72	0.00	4.17	4951.16	800.49	0.19

HEC-RAS Plan: Swampoodle_Ult River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3130	500 YR	10960.00	270.35	290.17	284.30	290.28	0.00	4.22	5436.80	927.37	0.18
1	3211	2 YR	3300.00	270.27	283.34	278.95	283.77	0.00	5.43	680.28	403.30	0.33
1	3211	5 YR	4450.00	270.27	285.19	280.14	285.36	0.00	4.00	2007.45	637.10	0.2
1	3211	10 YR	5320.00	270.27	286.14	281.00	286.28	0.00	3.79	2629.90	672.21	0.20
1	3211	25 YR	6580.00	270.27	287.13	281.93	287.26	0.00	3.78	3352.77	776.88	0.19
1	3211	50 YR	7500.00	270.27	287.74	282.49	287.86	0.00	3.81	3830.76	800.60	0.19
1	3211	100 YR	8500.00	270.27	288.79	283.09	288.89	0.00	3.55	4690.37	830.26	0.17
1	3211	250 YR	9930.00	270.27	289.65	283.96	289.75	0.00	3.59	5413.15	851.09	0.17
1	3211	500 YR	10960.00	270.27	290.21	284.40	290.31	0.00	3.65	5893.64	875.56	0.17
1	3258 Texas Viaduct Rd		Bridge									
1	3284	2 YR	3300.00	271.08	284.62	279.24	284.97	0.00	5.35	1002.29	588.82	0.28
1	3284	5 YR	4450.00	271.08	285.48	280.71	285.75	0.00	5.21	1879.06	690.77	0.26
1	3284	10 YR	5320.00	271.08	286.15	281.16	286.38	0.00	5.12	2355.67	719.84	0.25
1	3284	25 YR	6580.00	271.08	287.12	283.17	287.31	0.00	4.89	3114.28	809.98	0.23
1	3284	50 YR	7500.00	271.08	287.74	284.33	287.90	0.00	4.80	3616.83	823.40	0.22
1	3284	100 YR	8500.00	271.08	288.84	285.15	288.96	0.00	4.29	4532.26	844.62	0.19
1	3284	250 YR	9930.00	271.08	289.70	285.52	289.81	0.00	4.26	5265.81	869.67	0.19
1	3284	500 YR	10960.00	271.08	290.25	285.77	290.36	0.00	4.27	5754.39	887.85	0.18
1	3293	2 YR	3300.00	271.13	284.72	279.27	285.00	0.00	4.69	1057.86	596.90	0.26
1	3293	5 YR	4450.00	271.13	285.56	280.42	285.78	0.00	4.51	1960.84	707.88	0.24
1	3293	10 YR	5320.00	271.13	286.21	281.22	286.40	0.00	4.55	2433.22	759.35	0.24
1	3293	25 YR	6580.00	271.13	287.15	282.81	287.32	0.00	4.45	3168.48	791.16	0.22
1	3293	50 YR	7500.00	271.13	287.76	283.37	287.91	0.00	4.43	3650.62	812.00	0.22
1	3293	100 YR	8500.00	271.13	288.84	283.94	288.96	0.00	4.03	4551.40	844.49	0.19
1	3293	250 YR	9930.00	271.13	289.70	284.00	289.81	0.00	4.04	5286.00	868.32	0.18
1	3293	500 YR	10960.00	271.13	290.26	285.44	290.37	0.00	4.07	5772.99	887.22	0.18
1	3299	2 YR	3300.00	271.22	284.67	279.27	285.06	0.00	5.49	981.75	555.22	0.29
1	3299	5 YR	4450.00	271.22	285.47	280.65	285.88	0.00	6.07	1574.30	693.22	0.31
1	3299	10 YR	5320.00	271.22	286.13	281.58	286.48	0.00	5.97	2050.82	743.55	0.30
1	3299	25 YR	6580.00	271.22	287.11	283.65	287.37	0.00	5.66	2810.44	800.06	0.27
1	3299	50 YR	7500.00	271.22	287.72	285.24	287.95	0.00	5.50	3310.10	823.33	0.26
1	3299	100 YR	8500.00	271.22	288.83	285.68	288.98	0.00	4.83	4238.00	857.06	0.22
1	3299	250 YR	9930.00	271.22	289.69	286.05	289.83	0.00	4.76	4989.46	888.72	0.21
1	3299	500 YR	10960.00	271.22	290.25	286.21	290.38	0.00	4.74	5491.56	908.04	0.20
1	3325 4th St.		Culvert									
1	3362 F	2 YR	3300.00	271.08	285.10	279.53	285.15	0.00	2.56	2890.92	900.65	0.1
1	3362 F	5 YR	4450.00	271.08	285.87	280.83	285.92	0.00	2.82	3464.05	937.27	0.14
1	3362 F	10 YR	5320.00	271.08	286.48	281.51	286.53	0.00	2.92	3937.03	984.98	0.14
1	3362 F	25 YR	6580.00	271.08	287.36	282.37	287.41	0.00	3.00	4666.18	1048.63	0.14
1	3362 F	50 YR	7500.00	271.08	287.93	282.96	287.99	0.00	3.07	5161.71	1074.47	0.14
1	3362 F	100 YR	8500.00	271.08	288.98	284.00	289.03	0.00	2.90	6083.66	1088.51	0.13
1	3362 F	250 YR	9930.00	271.08	289.81	283.83	289.86	0.00	2.98	6828.06	1104.75	0.13
1	3362 F	500 YR	10960.00	271.08	290.38	284.06	290.43	0.00	3.03	7335.04	1117.88	0.13
1	3443	2 YR	3300.00	271.61	285.11	280.33	285.17	0.00	2.74	2660.97	834.05	0.15
1	3443	5 YR	4450.00	271.61	285.88	281.41	285.94	0.00	2.98	3269.75	849.12	0.16
1	3443	10 YR	5320.00	271.61	286.49	281.85	286.55	0.00	3.07	3778.07	920.57	0.16
1	3443	25 YR	6580.00	271.61	287.37	283.60	287.43	0.00	3.12	4561.47	962.05	0.16
1	3443	50 YR	7500.00	271.61	287.94	283.92	288.00	0.00	3.17	5090.08	1002.74	0.16
1	3443	100 YR	8500.00	271.61	288.99	284.00	289.04	0.00	2.97	6068.74	1030.75	0.14
1	3443	250 YR	9930.00	271.61	289.82	284.01	289.87	0.00	3.04	6856.19	1060.56	0.14
1	3443	500 YR	10960.00	271.61	290.39	284.13	290.44	0.00	3.08	7389.35	1069.26	0.14
1	3574	2 YR	3300.00	271.30	285.12	280.19	285.21	0.00	3.16	2237.34	805.39	0.18
1	3574	5 YR	4450.00	271.30	285.89	281.61	285.98	0.00	3.39	2884.65	872.31	0.19
1	3574	10 YR	5320.00	271.30	286.50	282.24	286.59	0.00	3.45	3438.99	961.22	0.18
1	3574	25 YR	6580.00	271.30	287.38	283.42	287.47	0.00	3.44	4353.50	1082.54	0.18
1	3574	50 YR	7500.00	271.30	287.96	283.73	288.04	0.00	3.44	4986.27	1110.27	0.17
1	3574	100 YR	8500.00	271.30	289.00	284.08	289.06	0.00	3.15	6161.19	1149.79	0.15
1	3574	250 YR	9930.00	271.30	289.84	284.13	289.90	0.00	3.18	7155.25	1209.14	0.15
1	3574	500 YR	10960.00	271.30	290.40	284.13	290.46	0.00	3.18	7839.54	1217.56	0.15
1	3668	2 YR	3300.00	271.59	285.18	279.92	285.25	0.00	2.82	1864.71	753.26	0.16
1	3668	5 YR	4450.00	271.59	285.95	280.98	286.03	0.00	2.93	2378.46	828.78	0.16
1	3668	10 YR	5320.00	271.59	286.57	283.13	286.63	0.00	2.81	3087.89	884.30	0.15
1	3668	25 YR	6580.00	271.59	287.45	283.61	287.50	0.00	2.71	3896.50	974.35	0.14
1	3668	50 YR	7500.00	271.59	288.02	283.85	288.07	0.00	2.67	4483.40	1060.61	0.13
1	3668	100 YR	8500.00	271.59	289.05	284.17	289.09	0.00	2.36	5617.06	1135.21	0.11
1	3668	250 YR	9930.00	271.59	289.88	284.53	289.92	0.00	2.32	6581.58	1175.44	0.11
1	3668	500 YR	10960.00	271.59	290.44	284.84	290.48	0.00	2.30	7247.31	1193.26	0.10
1	3705 5th St.		Bridge									
1	3757 G	2 YR	3300.00	271.58	285.21	280.42	285.29	0.00	3.25	2322.24	799.53	0.17
1	3757 G	5 YR	4450.00	271.58	286.01	281.96	286.07	0.00	3.28	3345.51	907.45	0.16
1	3757 G	10 YR	5320.00	271.58	286.61	282.64	286.68	0.00	3.33	3899.60	941.48	0.16
1	3757 G	25 YR	6580.00	271.58	287.56	283.25	287.62	0.00	3.28	4836.05	1011.35	0.15
1	3757 G	50 YR	7500.00	271.58	288.12	283.68	288.17	0.00	3.32	5407.94	1064.66	0.15
1	3757 G	100 YR	8500.00	271.58	289.11	283.95	289.16	0.00	3.09	6504.56	1123.34	0.14
1	3757 G	250 YR	9930.00	271.58	289.93	284.32	289.98	0.00	3.12	7438.89	1146.62	0.14
1	3757 G	500 YR	10960.00	271.58	290.49	284.53	290.54	0.00	3.15	8080.74	1160.32	0.13

HEC-RAS Plan: Swampoodle_Ult River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	3848	2 YR	3300.00	271.25	285.25	280.04	285.32	0.00	2.88	2619.04	785.06	0.16
1	3848	5 YR	4450.00	271.25	286.04	281.22	286.11	0.00	3.16	3308.71	816.19	0.17
1	3848	10 YR	5320.00	271.25	286.63	283.07	286.71	0.00	3.30	3809.43	856.44	0.17
1	3848	25 YR	6580.00	271.25	287.58	283.50	287.65	0.00	3.34	4667.02	944.73	0.17
1	3848	50 YR	7500.00	271.25	288.13	283.77	288.21	0.00	3.42	5198.39	969.04	0.17
1	3848	100 YR	8500.00	271.25	289.12	283.99	289.18	0.00	3.25	6185.65	1057.28	0.15
1	3848	250 YR	9930.00	271.25	289.94	284.31	290.01	0.00	3.33	7076.77	1091.93	0.15
1	3848	500 YR	10960.00	271.25	290.50	284.50	290.56	0.00	3.38	7686.62	1106.20	0.15
1	4130	2 YR	3300.00	271.01	285.27	279.79	285.50	0.00	4.41	1525.81	643.59	0.25
1	4130	5 YR	4450.00	271.01	286.08	281.15	286.29	0.00	4.66	2053.54	671.09	0.25
1	4130	10 YR	5320.00	271.01	286.68	282.44	286.88	0.00	4.70	2467.89	699.86	0.25
1	4130	25 YR	6580.00	271.01	287.63	284.87	287.80	0.00	4.59	3176.54	780.19	0.23
1	4130	50 YR	7500.00	271.01	288.19	285.04	288.35	0.00	4.62	3624.12	822.73	0.23
1	4130	100 YR	8500.00	271.01	289.17	285.48	289.30	0.00	4.28	4466.22	888.22	0.20
1	4130	250 YR	9930.00	271.01	289.99	285.82	290.12	0.00	4.29	5206.54	931.91	0.20
1	4130	500 YR	10960.00	271.01	290.55	286.05	290.67	0.00	4.36	5746.16	993.13	0.20
1	4313	2 YR	3300.00	273.16	285.35	281.20	285.71	0.00	5.28	979.44	379.34	0.31
1	4313	5 YR	4450.00	273.16	286.10	282.56	286.54	0.00	6.10	1302.58	500.00	0.35
1	4313	10 YR	5320.00	273.16	286.67	283.53	287.15	0.00	6.48	1663.69	706.04	0.36
1	4313	25 YR	6580.00	273.16	287.64	284.43	288.01	0.00	6.18	2414.24	813.38	0.33
1	4313	50 YR	7500.00	273.16	288.22	285.22	288.54	0.00	6.03	2885.32	828.70	0.31
1	4313	100 YR	8500.00	273.16	289.21	285.75	289.43	0.00	5.38	3722.39	861.46	0.27
1	4313	250 YR	9930.00	273.16	290.03	286.31	290.23	0.00	5.25	4442.69	875.23	0.25
1	4313	500 YR	10960.00	273.16	290.59	287.18	290.78	0.00	5.19	4938.82	912.32	0.24
1	4443	2 YR	3300.00	274.04	285.41	281.47	286.00	0.00	6.25	616.54	198.41	0.38
1	4443	5 YR	4450.00	274.04	286.14	282.56	286.95	0.00	7.46	827.25	412.40	0.44
1	4443	10 YR	5320.00	274.04	286.71	283.28	287.57	0.00	7.90	1114.47	560.65	0.45
1	4443	25 YR	6580.00	274.04	287.67	284.50	288.35	0.00	7.58	1683.10	620.35	0.41
1	4443	50 YR	7500.00	274.04	288.24	286.93	288.84	0.00	7.45	2044.84	667.92	0.39
1	4443	100 YR	8500.00	274.04	289.22	287.34	289.64	0.00	6.62	2754.51	745.55	0.34
1	4443	250 YR	9930.00	274.04	290.05	287.76	290.41	0.00	6.40	3404.28	796.70	0.31
1	4443	500 YR	10960.00	274.04	290.61	288.02	290.94	0.00	6.30	3871.58	892.57	0.30
1	4509 7th St.		Culvert									
1	4567 H	2 YR	3300.00	275.06	286.57	280.58	286.88	0.00	4.59	1006.88	554.21	0.26
1	4567 H	5 YR	4450.00	275.06	286.97	281.67	287.42	0.00	5.66	1235.48	589.19	0.31
1	4567 H	10 YR	5320.00	275.06	287.32	282.39	287.84	0.00	6.22	1455.06	659.91	0.34
1	4567 H	25 YR	6580.00	275.06	287.87	283.36	288.43	0.00	6.71	1836.54	719.76	0.36
1	4567 H	50 YR	7500.00	275.06	288.36	283.97	288.88	0.00	6.74	2173.28	730.67	0.35
1	4567 H	100 YR	8500.00	275.06	289.33	284.60	289.70	0.00	6.06	2841.35	743.18	0.30
1	4567 H	250 YR	9930.00	275.06	290.13	287.67	290.46	0.00	5.95	3402.22	751.88	0.29
1	4567 H	500 YR	10960.00	275.06	290.70	287.94	291.00	0.00	5.88	3794.40	759.73	0.28
1	4632	2 YR	3300.00	275.43	286.55	283.00	287.04	0.00	6.02	825.11	345.24	0.37
1	4632	5 YR	4450.00	275.43	286.94	284.17	287.66	0.00	7.45	962.15	474.61	0.45
1	4632	10 YR	5320.00	275.43	287.28	284.91	288.13	0.00	8.25	1103.42	570.59	0.48
1	4632	25 YR	6580.00	275.43	287.81	286.61	288.79	0.00	9.09	1404.96	727.95	0.52
1	4632	50 YR	7500.00	275.43	288.34	287.29	289.19	0.00	8.86	1723.38	740.60	0.49
1	4632	100 YR	8500.00	275.43	289.34	288.10	289.89	0.00	7.65	2333.86	760.12	0.41
1	4632	250 YR	9930.00	275.43	290.15	288.45	290.62	0.00	7.33	2836.10	794.06	0.37
1	4632	500 YR	10960.00	275.43	290.72	288.66	291.14	0.00	7.16	3184.33	800.75	0.36
1	4717	2 YR	3300.00	275.23	286.83	283.06	287.18	0.00	5.29	1099.30	551.23	0.32
1	4717	5 YR	4450.00	275.23	287.40	284.18	287.85	0.00	6.25	1376.32	698.25	0.37
1	4717	10 YR	5320.00	275.23	287.90	284.93	288.34	0.00	6.43	1658.98	710.13	0.37
1	4717	25 YR	6580.00	275.23	288.60	286.22	289.02	0.00	6.57	2050.33	722.60	0.36
1	4717	50 YR	7500.00	275.23	288.97	287.02	289.40	0.00	6.82	2257.28	729.15	0.37
1	4717	100 YR	8500.00	275.23	289.66	287.67	290.03	0.00	6.57	2649.21	741.06	0.34
1	4717	250 YR	9930.00	275.23	290.38	288.04	290.74	0.00	6.58	3063.96	752.89	0.33
1	4717	500 YR	10960.00	275.23	290.91	288.26	291.25	0.00	6.56	3364.11	760.62	0.33
1	4812	2 YR	2260.00	275.13	287.21	281.96	287.32	0.00	3.36	1457.57	730.50	0.18
1	4812	5 YR	3060.00	275.13	287.92	283.45	288.03	0.00	3.64	1866.66	743.48	0.19
1	4812	10 YR	3600.00	275.13	288.41	284.30	288.52	0.00	3.73	2151.08	750.43	0.19
1	4812	25 YR	4430.00	275.13	289.08	285.12	289.19	0.00	3.86	2534.91	758.94	0.19
1	4812	50 YR	5120.00	275.13	289.45	285.66	289.57	0.00	4.08	2753.16	763.29	0.20
1	4812	100 YR	5890.00	275.13	290.07	286.19	290.18	0.00	4.10	3109.84	770.42	0.20
1	4812	250 YR	6850.00	275.13	290.77	286.98	290.88	0.00	4.14	3518.26	780.71	0.19
1	4812	500 YR	7680.00	275.13	291.27	287.23	291.38	0.00	4.23	3811.70	789.40	0.20
1	4882 8th St.		Bridge									
1	4944 I	2 YR	2260.00	275.13	287.27	281.87	287.36	0.00	3.25	1822.88	659.80	0.18
1	4944 I	5 YR	3060.00	275.13	287.99	283.05	288.09	0.00	3.60	2260.29	721.06	0.19
1	4944 I	10 YR	3600.00	275.13	288.48	283.69	288.58	0.00	3.74	2563.22	743.37	0.19
1	4944 I	25 YR	4430.00	275.13	289.15	284.46	289.26	0.00	3.95	2974.03	768.57	0.20
1	4944 I	50 YR	5120.00	275.13	289.54	284.85	289.65	0.00	4.21	3210.88	779.75	0.21
1	4944 I	100 YR	5890.00	275.13	290.15	285.53	290.26	0.00	4.29	3589.69	806.35	0.21
1	4944 I	250 YR	6850.00	275.13	290.85	286.29	290.97	0.00	4.40	4023.79	875.69	0.21
1	4944 I	500 YR	7680.00	275.13	291.35	287.03	291.47	0.00	4.53	4337.36	912.31	0.21
1	5062	2 YR	2260.00	276.53	287.28	283.15	287.42	0.00	3.53	1532.35	728.81	0.22
1	5062	5 YR	3060.00	276.53	288.01	283.95	288.14	0.00	3.76	2063.25	748.11	0.23

HEC-RAS Plan: Swampoodle_Ult River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5062	10 YR	3600.00	276.53	288.50	284.46	288.63	0.00	3.80	2430.61	758.82	0.22
1	5062	25 YR	4430.00	276.53	289.18	285.35	289.30	0.00	3.90	2928.24	772.65	0.22
1	5062	50 YR	5120.00	276.53	289.57	285.67	289.70	0.00	4.10	3216.46	820.21	0.23
1	5062	100 YR	5890.00	276.53	290.18	285.67	290.31	0.00	4.11	3673.27	986.89	0.2
1	5062	250 YR	6850.00	276.53	290.88	286.60	291.00	0.00	4.14	4196.49	1015.40	0.22
1	5062	500 YR	7680.00	276.53	291.39	287.63	291.51	0.00	4.23	4575.06	1025.93	0.22
1	5656 J	2 YR	2260.00	277.30	287.62	284.23	287.87	0.00	4.59	621.88	181.15	0.27
1	5656 J	5 YR	3060.00	277.30	288.33	285.20	288.63	0.00	5.26	785.19	259.25	0.30
1	5656 J	10 YR	3600.00	277.30	288.80	285.80	289.12	0.00	5.52	917.57	288.67	0.30
1	5656 J	25 YR	4430.00	277.30	289.44	286.36	289.78	0.00	5.82	1110.32	311.91	0.31
1	5656 J	50 YR	5120.00	277.30	289.84	286.88	290.21	0.00	6.14	1234.84	365.14	0.32
1	5656 J	100 YR	5890.00	277.30	290.42	287.37	290.79	0.00	6.22	1426.75	586.87	0.32
1	5656 J	250 YR	6850.00	277.30	291.10	288.07	291.46	0.00	6.29	1676.22	737.01	0.31
1	5656 J	500 YR	7680.00	277.30	291.60	288.42	291.96	0.00	6.41	1872.17	795.89	0.31
1	6252	2 YR	2220.00	276.85	288.17		288.52	0.00	5.34	638.57	136.29	0.30
1	6252	5 YR	3010.00	276.85	288.98		289.46	0.00	6.36	764.39	202.22	0.34
1	6252	10 YR	3560.00	276.85	289.48		290.02	0.00	6.90	877.17	245.99	0.36
1	6252	25 YR	4370.00	276.85	290.15		290.77	0.00	7.55	1078.25	334.80	0.39
1	6252	50 YR	5030.00	276.85	290.59		291.27	0.00	8.04	1262.29	455.74	0.41
1	6252	100 YR	5810.00	276.85	291.15		291.85	0.00	8.36	1539.12	518.84	0.41
1	6252	250 YR	6730.00	276.85	291.81		292.48	0.00	8.52	1881.84	529.04	0.41
1	6252	500 YR	7560.00	276.85	292.30		292.97	0.00	8.71	2145.89	536.38	0.41
1	6873	2 YR	2220.00	276.62	288.59	284.89	289.14	0.00	6.01	384.46	73.22	0.41
1	6873	5 YR	3010.00	276.62	289.47	286.41	290.24	0.00	7.13	451.85	80.23	0.46
1	6873	10 YR	3560.00	276.62	289.98	287.05	290.90	0.00	7.83	493.76	83.99	0.49
1	6873	25 YR	4370.00	276.62	290.63	287.86	291.79	0.00	8.81	549.92	117.75	0.53
1	6873	50 YR	5030.00	276.62	291.05	288.47	292.41	0.00	9.56	616.93	196.77	0.56
1	6873	100 YR	5810.00	276.62	291.54	289.15	293.07	0.00	10.25	801.07	517.43	0.58
1	6873	250 YR	6730.00	276.62	292.16	289.90	293.67	0.00	10.49	1202.43	679.82	0.58
1	6873	500 YR	7560.00	276.62	292.71	290.54	294.10	0.00	10.42	1577.18	705.87	0.56
1	7003	2 YR	2220.00	278.61	288.74	286.06	289.41	0.00	6.62	335.81	59.88	0.49
1	7003	5 YR	3010.00	278.61	289.64	287.10	290.56	0.00	7.73	391.78	64.25	0.54
1	7003	10 YR	3560.00	278.61	290.16	287.75	291.26	0.00	8.43	426.20	66.76	0.57
1	7003	25 YR	4370.00	278.61	290.83	288.57	292.20	0.00	9.42	471.61	69.66	0.61
1	7003	50 YR	5030.00	278.61	291.26	289.17	292.88	0.00	10.24	501.89	76.74	0.64
1	7003	100 YR	5810.00	278.61	291.71	289.85	293.63	0.00	11.16	545.08	112.89	0.68
1	7003	250 YR	6730.00	278.61	292.15	290.55	294.44	0.00	12.23	604.19	167.73	0.73
1	7003	500 YR	7560.00	278.61	292.45	291.16	295.11	0.00	13.20	686.33	386.05	0.7
1	7055 13th St.		Bridge									
1	7116 K	2 YR	2220.00	279.58	289.39	285.69	289.82	0.00	5.30	418.93	69.71	0.38
1	7116 K	5 YR	3010.00	279.58	290.53	286.68	291.09	0.00	6.00	502.25	75.81	0.41
1	7116 K	10 YR	3560.00	279.58	291.23	287.29	291.87	0.00	6.43	556.40	79.51	0.41
1	7116 K	25 YR	4370.00	279.58	292.13	288.10	292.90	0.00	7.03	629.98	84.28	0.43
1	7116 K	50 YR	5030.00	279.58	292.53	288.72	293.45	0.00	7.72	670.33	139.37	0.46
1	7116 K	100 YR	5810.00	279.58	293.94	289.37	294.65	0.00	7.04	1363.36	699.08	0.39
1	7116 K	250 YR	6730.00	279.58	295.13	290.10	295.63	0.00	6.33	2265.83	810.54	0.33
1	7116 K	500 YR	7560.00	279.58	295.63	290.64	296.11	0.00	6.41	2687.53	878.37	0.33
1	7237	2 YR	2220.00	280.09	289.55	287.24	290.26	0.01	6.73	329.82	67.57	0.54
1	7237	5 YR	3010.00	280.09	290.71	288.27	291.54	0.01	7.34	413.86	78.37	0.53
1	7237	10 YR	3560.00	280.09	291.40	288.94	292.32	0.01	7.73	470.70	86.86	0.53
1	7237	25 YR	4370.00	280.09	292.31	289.77	293.34	0.01	8.22	557.52	103.47	0.53
1	7237	50 YR	5030.00	280.09	292.74	290.29	293.93	0.01	8.87	605.92	216.37	0.55
1	7237	100 YR	5810.00	280.09	294.40	290.94	294.91	0.00	6.54	1498.64	817.75	0.37
1	7237	250 YR	6730.00	280.09	295.60	291.67	295.83	0.00	4.96	2512.60	857.40	0.26
1	7237	500 YR	7560.00	280.09	296.11	292.36	296.31	0.00	4.75	2953.16	871.19	0.25
1	7747	2 YR	2130.00	280.55	290.63	286.61	291.16	0.00	5.95	423.05	85.50	0.37
1	7747	5 YR	2790.00	280.55	291.83	287.59	292.46	0.00	6.60	532.50	96.85	0.38
1	7747	10 YR	3380.00	280.55	292.53	288.42	293.29	0.00	7.30	602.70	103.48	0.40
1	7747	25 YR	4190.00	280.55	293.43	289.52	294.37	0.00	8.19	704.25	128.97	0.43
1	7747	50 YR	4790.00	280.55	293.98	290.19	295.05	0.00	8.81	781.53	154.19	0.46
1	7747	100 YR	5400.00	280.55	294.82	290.79	295.93	0.00	9.04	939.19	252.28	0.45
1	7747	250 YR	6400.00	280.55	295.55	291.71	296.80	0.00	9.78	1095.30	394.23	0.48
1	7747	500 YR	7200.00	280.55	295.93	292.39	297.32	0.00	10.44	1340.48	420.48	0.50
1	8122	2 YR	2070.00	282.51	290.60	289.83	291.86	0.00	9.02	232.51	59.05	0.75
1	8122	5 YR	2710.00	282.51	291.80	290.59	293.11	0.00	9.21	311.35	72.32	0.68
1	8122	10 YR	3280.00	282.51	292.51	291.23	293.97	0.00	9.82	365.48	81.22	0.68
1	8122	25 YR	4060.00	282.51	293.45	292.05	295.07	0.00	10.41	447.05	92.55	0.68
1	8122	50 YR	4600.00	282.51	294.04	292.62	295.76	0.00	10.78	504.33	101.88	0.68
1	8122	100 YR	5220.00	282.51	294.88	293.18	296.59	0.00	10.86	596.41	117.89	0.65
1	8122	250 YR	6210.00	282.51	295.54	293.99	297.55	0.00	11.83	679.21	220.05	0.68
1	8122	500 YR	7000.00	282.51	295.86	294.63	298.16	0.00	12.76	774.03	238.17	0.72
1	8222	2 YR	2070.00	282.41	291.10	289.09	292.17	0.00	8.33	250.44	44.80	0.59
1	8222	5 YR	2710.00	282.41	292.00	290.13	293.39	0.00	9.48	292.83	49.23	0.63
1	8222	10 YR	3280.00	282.41	292.64	290.85	294.33	0.00	10.47	325.19	52.53	0.67
1	8222	25 YR	4060.00	282.41	293.46	291.82	295.54	0.00	11.64	371.01	60.90	0.70
1	8222	50 YR	4600.00	282.41	293.96	292.47	296.33	0.00	12.42	407.00	78.78	0.73
1	8222	100 YR	5220.00	282.41	294.72	292.92	297.20	0.00	12.81	475.50	101.48	0.72
1	8222	250 YR	6210.00	282.41	295.31	294.62	298.28	0.00	14.16	539.69	118.55	0.78

HEC-RAS Plan: Swampoodle_Ult River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	8222	500 YR	7000.00	282.41	295.53	295.53	299.08	0.00	15.51	566.88	124.60	0.84
1	8241 17th St.		Bridge									
1	8290 L	2 YR	2070.00	282.64	291.77	289.07	292.61	0.00	7.35	281.80	45.57	0.52
1	8290 L	5 YR	2710.00	282.64	294.57	290.08	295.19	0.00	6.39	466.74	113.51	0.39
1	8290 L	10 YR	3280.00	282.64	295.10	290.89	295.88	0.00	7.18	533.49	134.22	0.42
1	8290 L	25 YR	4060.00	282.64	295.24	291.88	296.39	0.00	8.70	553.56	139.94	0.51
1	8290 L	50 YR	4600.00	282.64	295.53	292.49	296.88	0.00	9.47	595.86	152.69	0.55
1	8290 L	100 YR	5220.00	282.64	295.81	293.18	297.39	0.00	10.34	642.22	187.69	0.59
1	8290 L	250 YR	6210.00	282.64	296.53	294.54	298.30	0.00	11.10	808.73	263.69	0.61
1	8290 L	500 YR	7000.00	282.64	297.55	295.40	299.10	0.00	10.70	1139.24	378.90	0.56
1	8403	2 YR	2070.00	282.47	292.09	289.30	292.81	0.00	6.82	305.78	55.03	0.49
1	8403	5 YR	2710.00	282.47	294.70	290.35	295.29	0.00	6.17	468.51	70.24	0.37
1	8403	10 YR	3280.00	282.47	295.23	291.12	295.98	0.00	7.02	509.95	84.10	0.41
1	8403	25 YR	4060.00	282.47	295.45	291.94	296.54	0.00	8.47	529.45	99.24	0.49
1	8403	50 YR	4600.00	282.47	295.73	292.47	297.04	0.00	9.27	569.34	182.06	0.52
1	8403	100 YR	5220.00	282.47	296.06	293.07	297.59	0.00	10.10	626.27	217.02	0.56
1	8403	250 YR	6210.00	282.47	296.72	293.96	298.50	0.00	11.01	745.35	271.02	0.59
1	8403	500 YR	7000.00	282.47	297.68	294.64	299.29	0.00	10.75	1116.18	372.45	0.55
1	8697	2 YR	2070.00	284.19	292.28	290.54	293.47	0.00	8.74	240.21	48.54	0.63
1	8697	5 YR	2710.00	284.19	294.73	291.55	295.66	0.00	7.84	384.69	68.16	0.48
1	8697	10 YR	3280.00	284.19	295.25	292.37	296.42	0.00	8.85	421.19	71.96	0.53
1	8697	25 YR	4060.00	284.19	295.47	293.42	297.16	0.00	10.65	437.05	73.55	0.63
1	8697	50 YR	4600.00	284.19	295.74	294.04	297.76	0.00	11.65	457.62	75.56	0.67
1	8697	100 YR	5220.00	284.19	296.01	294.71	298.44	0.00	12.80	478.34	79.10	0.73
1	8697	250 YR	6210.00	284.19	296.49	295.70	299.55	0.00	14.42	517.84	86.86	0.80
1	8697	500 YR	7000.00	284.19	297.10	296.25	300.39	0.00	15.06	590.54	175.08	0.81
1	8897	2 YR	2070.00	286.80	292.62	292.62	294.59	0.00	11.26	183.88	46.88	1.00
1	8897	5 YR	2710.00	286.80	294.73		296.07	0.00	9.28	296.34	61.43	0.69
1	8897	10 YR	3280.00	286.80	295.26		296.88	0.00	10.23	330.17	65.92	0.73
1	8897	25 YR	4060.00	286.80	295.50	294.92	297.79	0.00	12.18	345.90	67.91	0.85
1	8897	50 YR	4600.00	286.80	295.79	295.43	298.46	0.00	13.16	366.16	70.38	0.90
1	8897	100 YR	5220.00	286.80	296.10	296.03	299.22	0.00	14.24	388.38	72.94	0.95
1	8897	250 YR	6210.00	286.80	296.88	296.88	300.38	0.00	15.12	447.62	79.19	0.96
1	8897	500 YR	7000.00	286.80	297.46	297.46	301.24	0.00	15.76	495.12	83.87	0.96
1	9025	2 YR	2070.00	288.15	294.19	292.95	295.20	0.00	8.04	257.39	57.46	0.67
1	9025	5 YR	2710.00	288.15	295.22	293.76	296.34	0.00	8.49	319.17	62.40	0.66
1	9025	10 YR	3280.00	288.15	295.98	294.40	297.21	0.00	8.92	367.53	66.01	0.67
1	9025	25 YR	4060.00	288.15	296.96	295.19	298.31	0.00	9.34	434.51	70.63	0.66
1	9025	50 YR	4600.00	288.15	297.73	295.67	299.09	0.00	9.38	490.17	74.24	0.64
1	9025	100 YR	5220.00	288.15	298.60	296.22	299.97	0.00	9.40	560.17	85.96	0.61
1	9025	250 YR	6210.00	288.15	299.76	297.03	301.20	0.00	9.64	669.91	250.88	0.58
1	9025	500 YR	7000.00	288.15	300.66	297.62	302.12	0.00	9.77	792.83	602.23	0.56
1	9110 US Highway 82		Culvert									
1	9180 M	2 YR	2070.00	288.22	297.40	293.10	297.81	0.00	5.13	414.63	72.57	0.33
1	9180 M	5 YR	2710.00	288.22	298.20	293.95	298.76	0.00	6.04	476.72	83.23	0.37
1	9180 M	10 YR	3280.00	288.22	298.97	294.65	299.64	0.00	6.65	561.78	157.67	0.39
1	9180 M	25 YR	4060.00	288.22	299.46	295.52	300.36	0.00	7.70	648.18	191.22	0.44
1	9180 M	50 YR	4600.00	288.22	299.65	296.07	300.74	0.00	8.52	685.53	217.57	0.48
1	9180 M	100 YR	5220.00	288.22	299.76	296.62	301.13	0.00	9.54	711.36	251.08	0.54
1	9180 M	250 YR	6210.00	288.22	299.92	297.52	301.76	0.00	11.08	755.78	307.48	0.62
1	9180 M	500 YR	7000.00	288.22	300.07	298.18	302.30	0.00	12.24	802.05	388.90	0.68
1	9277	2 YR	2070.00	287.89	297.58	292.90	297.88	0.00	4.37	473.43	73.06	0.30
1	9277	5 YR	2710.00	287.89	298.46	293.71	298.85	0.00	5.05	542.44	84.47	0.33
1	9277	10 YR	3280.00	287.89	299.28	294.38	299.75	0.00	5.48	620.74	106.00	0.34
1	9277	25 YR	4060.00	287.89	299.88	295.21	300.49	0.00	6.30	693.46	142.28	0.37
1	9277	50 YR	4600.00	287.89	300.18	295.73	300.91	0.00	6.87	747.11	245.28	0.40
1	9277	100 YR	5220.00	287.89	300.48	296.30	301.35	0.00	7.52	830.54	382.03	0.43
1	9277	250 YR	6210.00	287.89	301.06	297.12	302.08	0.00	8.27	997.25	514.15	0.46
1	9277	500 YR	7000.00	287.89	301.63	297.67	302.72	0.00	8.63	1162.71	628.32	0.47
1	9854 N	2 YR	2000.00	288.16	297.87		298.22	0.00	5.50	513.92	118.30	0.33
1	9854 N	5 YR	2620.00	288.16	298.81		299.21	0.00	6.01	630.22	128.91	0.35
1	9854 N	10 YR	3160.00	288.16	299.70		300.11	0.00	6.20	754.02	156.85	0.34
1	9854 N	25 YR	3890.00	288.16	300.45		300.92	0.00	6.71	879.21	172.88	0.36
1	9854 N	50 YR	4400.00	288.16	300.88		301.39	0.00	7.07	955.69	194.64	0.37
1	9854 N	100 YR	4940.00	288.16	301.35		301.88	0.00	7.36	1067.80	312.84	0.38
1	9854 N	250 YR	5950.00	288.16	302.13		302.67	0.00	7.72	1327.40	345.58	0.38
1	9854 N	500 YR	6760.00	288.16	302.79		303.32	0.00	7.80	1563.47	371.76	0.38
1	10292	2 YR	1990.00	287.76	298.50		298.89	0.00	5.40	463.32	111.00	0.35
1	10292	5 YR	2590.00	287.76	299.45		299.89	0.00	5.86	573.12	119.32	0.35
1	10292	10 YR	3120.00	287.76	300.30		300.76	0.00	6.10	677.25	126.92	0.35
1	10292	25 YR	3840.00	287.76	301.08		301.62	0.00	6.63	779.90	134.59	0.37
1	10292	50 YR	4330.00	287.76	301.54		302.12	0.00	7.00	842.45	140.48	0.38
1	10292	100 YR	4860.00	287.76	302.01		302.64	0.00	7.34	912.06	153.72	0.39
1	10292	250 YR	5870.00	287.76	302.77		303.48	0.00	7.87	1047.59	206.05	0.40
1	10292	500 YR	6700.00	287.76	303.38		304.12	0.00	8.19	1185.45	243.12	0.41
1	10601	2 YR	1920.00	289.25	299.01	296.73	299.41	0.00	5.69	456.21	112.39	0.36

HEC-RAS Plan: Swampoodle_Ult River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	10601	5 YR	2520.00	289.25	299.97	297.51	300.41	0.00	6.12	569.04	127.18	0.37
1	10601	10 YR	3020.00	289.25	300.80	298.01	301.25	0.00	6.27	684.65	149.79	0.36
1	10601	25 YR	3720.00	289.25	301.64	298.59	302.13	0.00	6.76	831.88	198.18	0.37
1	10601	50 YR	4190.00	289.25	302.15	298.94	302.65	0.00	6.91	937.84	221.58	0.3
1	10601	100 YR	4670.00	289.25	302.68	299.28	303.17	0.00	6.98	1063.78	259.18	0.37
1	10601	250 YR	5560.00	289.25	303.53	299.88	304.01	0.00	7.17	1332.48	373.60	0.36
1	10601	500 YR	6240.00	289.25	304.19	300.30	304.65	0.00	7.19	1606.46	423.62	0.35
1	10765	2 YR	1920.00	291.04	298.55	298.32	300.07	0.00	10.66	286.63	95.02	0.77
1	10765	5 YR	2520.00	291.04	299.44	299.08	301.08	0.00	11.44	373.71	101.50	0.77
1	10765	10 YR	3020.00	291.04	300.26	299.65	301.89	0.00	11.64	460.81	112.93	0.74
1	10765	25 YR	3720.00	291.04	301.00	300.37	302.82	0.00	12.54	552.16	134.13	0.76
1	10765	50 YR	4190.00	291.04	301.42	300.83	303.38	0.00	13.15	611.50	145.96	0.78
1	10765	100 YR	4670.00	291.04	301.88	301.27	303.93	0.00	13.60	681.19	158.90	0.78
1	10765	250 YR	5560.00	291.04	302.55	302.04	304.96	0.00	14.87	803.20	231.51	0.83
1	10765	500 YR	6240.00	291.04	303.16	301.97	305.50	0.00	15.00	967.98	337.98	0.81
1	10842	2 YR	1870.00	290.77	298.93	298.15	300.23	0.00	9.50	273.54	95.41	0.67
1	10842	5 YR	2470.00	290.77	299.59	299.15	301.23	0.00	10.90	338.01	100.89	0.73
1	10842	10 YR	2960.00	290.77	300.37	299.76	302.04	0.00	11.19	420.06	107.49	0.71
1	10842	25 YR	3630.00	290.77	301.13	300.49	302.97	0.00	12.00	503.46	113.80	0.73
1	10842	50 YR	4080.00	290.77	301.55	301.00	303.53	0.00	12.56	552.75	117.37	0.74
1	10842	100 YR	4550.00	290.77	301.98	301.07	304.10	0.00	13.09	604.65	125.13	0.76
1	10842	250 YR	5430.00	290.77	303.02	302.01	305.14	0.00	13.41	751.94	168.46	0.73
1	10842	500 YR	6100.00	290.77	303.17	302.80	305.71	0.00	14.73	777.83	178.20	0.80
1	10978	2 YR	1870.00	291.53	300.20	296.84	300.60	0.00	5.06	370.70	130.98	0.35
1	10978	5 YR	2470.00	291.53	301.29	297.62	301.70	0.00	5.32	625.56	153.40	0.34
1	10978	10 YR	2960.00	291.53	302.04	298.15	302.50	0.00	5.66	745.77	167.47	0.35
1	10978	25 YR	3630.00	291.53	302.96	298.80	303.47	0.00	6.07	907.41	194.60	0.35
1	10978	50 YR	4080.00	291.53	303.52	299.21	304.06	0.00	6.33	1033.89	270.40	0.36
1	10978	100 YR	4550.00	291.53	304.08	299.60	304.66	0.00	6.57	1207.50	356.14	0.36
1	10978	250 YR	5430.00	291.53	305.09	300.33	305.68	0.00	6.80	1657.70	530.82	0.36
1	10978	500 YR	6100.00	291.53	305.80	300.84	306.39	0.00	6.93	2058.39	585.90	0.35
1	11049 Richmond Rd.		Culvert									
1	11101 O	2 YR	1870.00	289.01	303.09	293.45	303.20	0.00	2.68	720.95	78.62	0.14
1	11101 O	5 YR	2470.00	289.01	305.46	294.28	305.55	0.00	2.62	1308.37	434.26	0.12
1	11101 O	10 YR	2960.00	289.01	306.23	294.89	306.32	0.00	2.66	1657.24	526.91	0.12
1	11101 O	25 YR	3630.00	289.01	306.84	295.68	306.93	0.00	2.87	1940.77	688.04	0.13
1	11101 O	50 YR	4080.00	289.01	307.15	296.16	307.25	0.00	3.02	2089.95	745.11	0.1
1	11101 O	100 YR	4550.00	289.01	307.43	296.65	307.54	0.00	3.17	2229.78	803.94	0.1
1	11101 O	250 YR	5430.00	289.01	307.86	297.49	307.99	0.00	3.47	2458.40	851.50	0.15
1	11101 O	500 YR	6100.00	289.01	308.03	298.10	308.18	0.00	3.77	2546.45	871.27	0.16
1	11262	2 YR	1870.00	287.75	303.15	296.16	303.43	0.00	4.32	461.89	64.82	0.24
1	11262	5 YR	2470.00	287.75	305.49	297.46	305.72	0.00	4.11	954.10	420.21	0.21
1	11262	10 YR	2960.00	287.75	306.27	298.33	306.47	0.00	4.10	1288.17	433.12	0.20
1	11262	25 YR	3630.00	287.75	306.88	299.30	307.09	0.00	4.36	1553.62	437.86	0.21
1	11262	50 YR	4080.00	287.75	307.19	299.88	307.41	0.00	4.57	1691.34	440.14	0.21
1	11262	100 YR	4550.00	287.75	307.48	300.49	307.71	0.00	4.78	1817.85	442.23	0.22
1	11262	250 YR	5430.00	287.75	307.93	301.53	308.19	0.00	5.19	2015.68	445.41	0.24
1	11262	500 YR	6100.00	287.75	308.10	302.34	308.40	0.00	5.62	2093.54	446.64	0.26
1	11858	2 YR	1870.00	293.31	304.20	299.17	304.37	0.00	3.60	693.16	153.36	0.22
1	11858	5 YR	2470.00	293.31	306.21	300.05	306.34	0.00	3.36	1035.36	198.38	0.18
1	11858	10 YR	2960.00	293.31	306.93	300.84	307.07	0.00	3.56	1184.68	216.35	0.19
1	11858	25 YR	3630.00	293.31	307.58	302.11	307.74	0.00	3.94	1328.15	231.89	0.20
1	11858	50 YR	4080.00	293.31	307.93	302.47	308.12	0.00	4.19	1411.64	240.97	0.21
1	11858	100 YR	4550.00	293.31	308.26	302.78	308.47	0.00	4.45	1496.53	268.02	0.22
1	11858	250 YR	5430.00	293.31	308.80	303.34	309.04	0.00	4.90	1647.65	316.00	0.24
1	11858	500 YR	6100.00	293.31	309.09	303.74	309.38	0.00	5.27	1737.06	339.85	0.25
1	12163 P	2 YR	1890.00	293.50	304.55		305.09	0.00	6.50	402.39	93.42	0.39
1	12163 P	5 YR	2540.00	293.50	306.40		306.86	0.00	6.37	662.40	292.66	0.35
1	12163 P	10 YR	3000.00	293.50	307.16		307.53	0.00	6.05	941.09	404.24	0.32
1	12163 P	25 YR	3640.00	293.50	307.87		308.19	0.00	6.04	1236.57	432.22	0.31
1	12163 P	50 YR	4080.00	293.50	308.26		308.56	0.00	5.94	1408.27	441.98	0.30
1	12163 P	100 YR	4550.00	293.50	308.63		308.90	0.00	5.92	1571.72	455.11	0.29
1	12163 P	250 YR	5400.00	293.50	309.22		309.48	0.00	5.93	1848.31	477.81	0.29
1	12163 P	500 YR	6070.00	293.50	309.58		309.84	0.00	6.03	2019.46	484.86	0.29
1	12567 Q	2 YR	1890.00	293.22	305.84		306.23	0.00	4.98	388.85	69.37	0.33
1	12567 Q	5 YR	2540.00	293.22	307.34		307.78	0.00	5.41	506.67	87.55	0.33
1	12567 Q	10 YR	3000.00	293.22	307.93		308.45	0.00	5.92	560.17	94.44	0.35
1	12567 Q	25 YR	3640.00	293.22	308.53		309.19	0.00	6.65	624.99	149.24	0.38
1	12567 Q	50 YR	4080.00	293.22	308.84		309.60	0.00	7.15	687.26	251.04	0.40
1	12567 Q	100 YR	4550.00	293.22	309.14		309.99	0.00	7.61	771.59	307.75	0.42
1	12567 Q	250 YR	5400.00	293.22	309.64	305.73	310.62	0.00	8.33	938.81	352.22	0.45
1	12567 Q	500 YR	6070.00	293.22	309.97	306.37	311.02	0.00	8.80	1056.07	368.73	0.4
1	12894	2 YR	1210.00	298.64	306.74		307.28	0.01	5.89	208.85	58.45	0.50
1	12894	5 YR	1680.00	298.64	308.12		308.67	0.00	6.03	304.85	84.88	0.45
1	12894	10 YR	2000.00	298.64	308.77		309.36	0.00	6.29	366.39	104.41	0.44
1	12894	25 YR	2440.00	298.64	309.51		310.15	0.00	6.65	467.70	169.88	0.44
1	12894	50 YR	2730.00	298.64	309.98		310.60	0.00	6.68	554.86	195.11	0.43
1	12894	100 YR	2990.00	298.64	310.43		311.01	0.00	6.58	647.10	212.95	0.41

HEC-RAS Plan: Swampoodle_Ult River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	12894	250 YR	3400.00	298.64	311.15		311.66	0.00	6.36	813.50	251.93	0.38
1	12894	500 YR	3720.00	298.64	311.60		312.09	0.00	6.36	936.30	316.76	0.37
1	13336	2 YR	800.00	297.77	308.02		308.12	0.00	2.58	313.81	63.78	0.20
1	13336	5 YR	1140.00	297.77	309.27		309.40	0.00	2.96	402.37	81.93	0.20
1	13336	10 YR	1370.00	297.77	309.93		310.09	0.00	3.20	462.76	100.69	0.21
1	13336	25 YR	1700.00	297.77	310.71		310.89	0.00	3.50	546.52	114.76	0.22
1	13336	50 YR	1940.00	297.77	311.13		311.33	0.00	3.74	596.26	121.92	0.23
1	13336	100 YR	2190.00	297.77	311.49		311.72	0.00	3.99	642.03	128.06	0.24
1	13336	250 YR	2560.00	297.77	312.06		312.32	0.00	4.28	716.58	133.88	0.25
1	13336	500 YR	2860.00	297.77	312.46		312.74	0.00	4.51	770.26	137.92	0.25
1	13576 R	2 YR	800.00	298.42	308.19	304.67	308.38	0.00	3.47	235.86	55.29	0.27
1	13576 R	5 YR	1140.00	298.42	309.43	305.50	309.66	0.00	3.90	309.32	63.59	0.27
1	13576 R	10 YR	1370.00	298.42	310.09	305.98	310.35	0.00	4.19	352.77	68.45	0.28
1	13576 R	25 YR	1700.00	298.42	310.86	306.57	311.17	0.00	4.61	407.93	74.86	0.29
1	13576 R	50 YR	1940.00	298.42	311.28	306.96	311.63	0.00	4.93	440.33	78.39	0.30
1	13576 R	100 YR	2190.00	298.42	311.65	307.31	312.05	0.00	5.28	469.93	81.49	0.32
1	13576 R	250 YR	2560.00	298.42	312.20	307.82	312.69	0.00	5.78	522.48	166.46	0.34
1	13576 R	500 YR	2860.00	298.42	312.60	308.22	313.13	0.00	6.07	576.91	231.08	0.35
1	13805	2 YR	800.00	298.93	308.48	304.17	308.63	0.00	3.21	275.22	58.38	0.22
1	13805	5 YR	1130.00	298.93	309.72	305.00	309.91	0.00	3.66	350.19	62.60	0.23
1	13805	10 YR	1360.00	298.93	310.39	305.50	310.61	0.00	3.98	394.51	70.17	0.24
1	13805	25 YR	1700.00	298.93	311.18	306.18	311.45	0.00	4.43	453.56	79.13	0.26
1	13805	50 YR	1940.00	298.93	311.63	306.65	311.94	0.00	4.75	490.29	83.72	0.27
1	13805	100 YR	2190.00	298.93	312.03	307.13	312.38	0.00	5.11	524.89	118.60	0.28
1	13805	250 YR	2570.00	298.93	312.64	307.66	313.05	0.00	5.56	581.90	194.12	0.30
1	13805	500 YR	2860.00	298.93	313.06	308.03	313.51	0.00	5.87	623.77	243.81	0.31
1	13977	2 YR	800.00	300.82	308.44	305.26	308.76	0.00	4.55	176.91	39.03	0.36
1	13977	5 YR	1130.00	300.82	309.64	306.16	310.06	0.00	5.17	232.95	53.16	0.36
1	13977	10 YR	1360.00	300.82	310.29	306.72	310.77	0.00	5.62	268.91	58.79	0.38
1	13977	25 YR	1700.00	300.82	311.03	307.45	311.64	0.00	6.30	315.33	65.36	0.40
1	13977	50 YR	1940.00	300.82	311.45	307.91	312.16	0.00	6.80	343.21	68.71	0.42
1	13977	100 YR	2190.00	300.82	311.81	308.35	312.63	0.00	7.32	368.59	71.13	0.44
1	13977	250 YR	2570.00	300.82	312.36	308.97	313.34	0.00	8.03	409.35	77.71	0.47
1	13977	500 YR	2860.00	300.82	312.72	309.40	313.83	0.00	8.59	438.84	90.30	0.50
1	14117	2 YR	640.00	301.22	308.41	306.12	308.85	0.00	5.28	121.16	29.43	0.46
1	14117	5 YR	970.00	301.22	309.58	307.30	310.17	0.00	6.15	157.65	33.09	0.50
1	14117	10 YR	1200.00	301.22	310.20	307.94	310.90	0.00	6.71	178.85	35.04	0.52
1	14117	25 YR	1540.00	301.22	310.92	308.74	311.80	0.00	7.52	204.90	37.30	0.57
1	14117	50 YR	1770.00	301.22	311.32	309.23	312.33	0.00	8.04	220.96	42.96	0.59
1	14117	100 YR	2000.00	301.22	311.68	309.67	312.82	0.00	8.56	237.12	46.96	0.61
1	14117	250 YR	2370.00	301.22	312.21	310.35	313.56	0.00	9.32	263.31	52.44	0.64
1	14117	500 YR	2650.00	301.22	312.55	310.81	314.07	0.00	9.89	282.01	56.77	0.66
1	14208	2 YR	640.00	303.40	308.72	308.72	310.48	0.00	10.64	60.14	17.14	1.00
1	14208	5 YR	970.00	303.40	309.97	309.97	312.08	0.00	11.64	83.35	19.77	1.00
1	14208	10 YR	1200.00	303.40	310.66	310.66	313.02	0.00	12.33	98.31	25.27	0.99
1	14208	25 YR	1540.00	303.40	311.58	311.58	314.28	0.00	13.21	125.40	33.07	0.98
1	14208	50 YR	1770.00	303.40	312.17	312.17	315.06	0.00	13.70	146.10	37.60	0.96
1	14208	100 YR	2000.00	303.40	312.71	312.71	315.79	0.00	14.17	167.65	41.80	0.96
1	14208	250 YR	2370.00	303.40	313.66	313.66	316.86	0.00	14.55	212.89	72.36	0.92
1	14208	500 YR	2650.00	303.40	314.20	314.20	317.59	0.00	15.06	240.05	102.24	0.92
1	14249 College Dr.		Culvert									
1	14310 S	2 YR	540.00	304.43	314.46	309.13	314.56	0.00	2.53	227.35	62.55	0.18
1	14310 S	5 YR	740.00	304.43	315.34	309.86	315.48	0.00	3.01	285.53	94.44	0.20
1	14310 S	10 YR	880.00	304.43	315.77	310.32	315.94	0.00	3.35	314.91	114.59	0.22
1	14310 S	25 YR	1080.00	304.43	316.28	310.89	316.50	0.00	3.83	349.75	140.72	0.24
1	14310 S	50 YR	1250.00	304.43	316.67	311.33	316.94	0.00	4.21	376.48	165.24	0.26
1	14310 S	100 YR	1410.00	304.43	317.06	311.72	317.37	0.00	4.51	403.85	196.83	0.27
1	14310 S	250 YR	1690.00	304.43	317.63	312.34	318.01	0.00	5.04	443.93	210.92	0.29
1	14310 S	500 YR	1920.00	304.43	318.05	312.80	318.50	0.00	5.46	474.16	225.66	0.31
1	14367	2 YR	540.00	304.43	314.49		314.57	0.00	2.32	244.90	62.73	0.17
1	14367	5 YR	740.00	304.43	315.37		315.49	0.00	2.74	309.40	86.22	0.19
1	14367	10 YR	880.00	304.43	315.82		315.96	0.00	3.04	352.21	107.00	0.20
1	14367	25 YR	1080.00	304.43	316.34		316.52	0.00	3.45	412.83	124.24	0.22
1	14367	50 YR	1250.00	304.43	316.74		316.96	0.00	3.76	465.83	138.96	0.23
1	14367	100 YR	1410.00	304.43	317.15		317.39	0.00	3.99	524.25	145.77	0.24
1	14367	250 YR	1690.00	304.43	317.76		318.05	0.00	4.40	616.68	175.55	0.26
1	14367	500 YR	1920.00	304.43	318.21		318.54	0.00	4.75	709.11	224.14	0.27
1	14616	2 YR	540.00	310.80	315.21	315.21	316.78	0.00	10.05	53.71	17.22	1.00
1	14616	5 YR	740.00	310.80	316.12	316.12	317.79	0.00	10.36	71.45	21.48	1.00
1	14616	10 YR	880.00	310.80	316.63	316.63	318.38	0.00	10.60	83.04	23.85	1.00
1	14616	25 YR	1080.00	310.80	317.25	317.25	319.11	0.00	10.94	98.70	26.73	1.00
1	14616	50 YR	1250.00	310.80	317.68	317.68	319.67	0.00	11.33	110.48	29.68	1.01
1	14616	100 YR	1410.00	310.80	318.06	318.06	320.16	0.00	11.61	122.76	33.77	1.00
1	14616	250 YR	1690.00	310.80	318.67	318.67	320.95	0.00	12.11	145.23	39.56	0.99
1	14616	500 YR	1920.00	310.80	319.10	319.10	321.54	0.00	12.56	163.06	43.06	0.98
1	14812	2 YR	540.00	311.32	315.83	315.75	317.33	0.00	9.83	54.93	17.38	0.97
1	14812	5 YR	740.00	311.32	316.58	316.57	318.38	0.00	10.78	68.63	19.11	1.00

HEC-RAS Plan: Swampoodle_Ult River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	14812	10 YR	880.00	311.32	317.07	317.07	319.03	0.00	11.23	78.34	20.25	1.01
1	14812	25 YR	1080.00	311.32	317.74	317.74	319.86	0.00	11.70	92.33	21.78	1.00
1	14812	50 YR	1250.00	311.32	318.20	318.20	320.50	0.00	12.18	102.71	22.96	1.01
1	14812	100 YR	1410.00	311.32	318.64	318.64	321.07	0.00	12.51	113.04	24.15	1.01
1	14812	250 YR	1690.00	311.32	319.25	319.25	322.00	0.00	13.30	128.85	27.52	1.00
1	14812	500 YR	1920.00	311.32	319.77	319.77	322.72	0.00	13.78	143.96	30.43	0.99
1	15035	2 YR	540.00	312.47	316.70	316.70	318.27	0.00	10.04	53.76	17.40	1.01
1	15035	5 YR	740.00	312.47	317.51	317.51	319.32	0.00	10.80	68.53	19.19	1.01
1	15035	10 YR	880.00	312.47	318.02	318.02	319.97	0.00	11.19	78.65	20.32	1.00
1	15035	25 YR	1080.00	312.47	318.68	318.68	320.80	0.00	11.66	92.59	22.15	1.01
1	15035	50 YR	1250.00	312.47	319.23	319.23	321.42	0.00	11.87	105.28	24.08	1.00
1	15035	100 YR	1410.00	312.47	319.68	319.68	321.96	0.00	12.11	116.39	25.65	1.00
1	15035	250 YR	1690.00	312.47	320.29	320.29	322.82	0.00	12.77	132.74	28.10	1.00
1	15035	500 YR	1920.00	312.47	320.76	320.76	323.49	0.00	13.27	146.40	30.03	1.00
1	15246	2 YR	540.00	313.41	317.64	317.64	319.16	0.00	9.87	54.69	17.96	1.00
1	15246	5 YR	740.00	313.41	318.42	318.42	320.19	0.00	10.67	69.33	19.79	1.00
1	15246	10 YR	880.00	313.41	318.90	318.90	320.82	0.00	11.11	79.21	20.93	1.01
1	15246	25 YR	1080.00	313.41	319.54	319.54	321.63	0.00	11.61	92.99	22.42	1.01
1	15246	50 YR	1250.00	313.41	320.01	320.01	322.26	0.00	12.06	103.72	23.58	1.00
1	15246	100 YR	1410.00	313.41	320.40	320.40	322.83	0.00	12.50	113.22	24.75	1.00
1	15246	250 YR	1690.00	313.41	321.01	321.01	323.76	0.00	13.32	128.84	26.63	1.00
1	15246	500 YR	1920.00	313.41	321.52	321.52	324.48	0.00	13.82	142.88	28.21	1.00
1	15462	2 YR	440.00	313.91	319.08		319.55	0.00	5.50	79.99	23.23	0.52
1	15462	5 YR	600.00	313.91	320.08		320.59	0.00	5.74	104.58	26.35	0.51
1	15462	10 YR	710.00	313.91	320.69		321.22	0.00	5.85	121.34	28.27	0.50
1	15462	25 YR	870.00	313.91	321.47		322.04	0.00	6.02	144.51	30.74	0.49
1	15462	50 YR	1000.00	313.91	322.09		322.67	0.00	6.09	164.19	32.70	0.48
1	15462	100 YR	1150.00	313.91	322.61		323.24	0.00	6.35	181.56	34.93	0.48
1	15462	250 YR	1380.00	313.91	323.51		324.17	0.00	6.55	214.72	38.86	0.46
1	15462	500 YR	1570.00	313.91	324.20		324.90	0.00	6.72	242.64	41.77	0.44
1	15633 T	2 YR	440.00	314.05	319.09		319.76	0.00	6.53	67.36	18.71	0.61
1	15633 T	5 YR	600.00	314.05	320.04		320.80	0.00	6.98	86.02	20.72	0.60
1	15633 T	10 YR	710.00	314.05	320.63		321.43	0.00	7.21	98.53	21.97	0.60
1	15633 T	25 YR	870.00	314.05	321.38		322.26	0.00	7.52	115.66	23.80	0.60
1	15633 T	50 YR	1000.00	314.05	321.97		322.89	0.00	7.68	130.63	26.69	0.59
1	15633 T	100 YR	1150.00	314.05	322.45		323.47	0.00	8.11	143.86	29.14	0.59
1	15633 T	250 YR	1380.00	314.05	323.30		324.41	0.00	8.46	170.54	33.54	0.58
1	15633 T	500 YR	1570.00	314.05	323.96		325.14	0.00	8.73	193.82	36.96	0.57
1	15839	2 YR	440.00	315.07	318.94	318.85	320.29	0.00	9.30	47.33	16.44	0.97
1	15839	5 YR	600.00	315.07	319.92	319.59	321.27	0.00	9.32	64.40	18.56	0.88
1	15839	10 YR	710.00	315.07	320.51		321.88	0.00	9.37	75.81	19.86	0.84
1	15839	25 YR	870.00	315.07	321.27		322.68	0.00	9.51	91.52	21.51	0.81
1	15839	50 YR	1000.00	315.07	321.84		323.28	0.00	9.63	104.34	23.64	0.77
1	15839	100 YR	1150.00	315.07	322.27		323.87	0.00	10.15	114.95	25.35	0.78
1	15839	250 YR	1380.00	315.07	323.08		324.80	0.00	10.54	136.67	28.53	0.76
1	15839	500 YR	1570.00	315.07	323.71	322.52	325.52	0.00	10.83	155.42	31.02	0.74
1	16026	2 YR	440.00	317.37	320.77	320.77	321.94	0.00	8.68	50.69	21.98	1.01
1	16026	5 YR	600.00	317.37	321.37	321.37	322.71	0.00	9.27	64.69	24.52	1.01
1	16026	10 YR	710.00	317.37	321.75	321.75	323.17	0.00	9.57	74.16	26.09	1.00
1	16026	25 YR	870.00	317.37	322.19	322.19	323.78	0.00	10.09	86.19	27.54	1.01
1	16026	50 YR	1000.00	317.37	322.55	322.55	324.23	0.00	10.40	96.12	28.66	1.00
1	16026	100 YR	1150.00	317.37	322.90	322.90	324.71	0.00	10.81	106.36	29.78	1.01
1	16026	250 YR	1380.00	317.37	323.43	323.43	325.40	0.00	11.26	122.53	31.46	1.01
1	16026	500 YR	1570.00	317.37	323.82	323.79	325.92	0.00	11.63	135.15	32.71	0.99
1	16205	2 YR	440.00	315.65	321.83		322.19	0.00	4.78	92.13	22.33	0.41
1	16205	5 YR	600.00	315.65	322.49		322.98	0.00	5.58	108.16	26.74	0.46
1	16205	10 YR	710.00	315.65	322.87		323.45	0.00	6.09	118.83	29.93	0.49
1	16205	25 YR	870.00	315.65	323.36		324.07	0.00	6.78	134.26	33.53	0.52
1	16205	50 YR	1000.00	315.65	323.70		324.52	0.00	7.31	146.10	35.60	0.54
1	16205	100 YR	1150.00	315.65	324.06		325.02	0.00	7.89	159.31	37.76	0.56
1	16205	250 YR	1380.00	315.65	324.53		325.71	0.00	8.77	177.68	41.45	0.60
1	16205	500 YR	1570.00	315.65	324.86		326.23	0.00	9.46	191.93	43.36	0.64
1	16356	2 YR	440.00	317.27	321.51		322.50	0.00	7.98	55.16	19.52	0.84
1	16356	5 YR	600.00	317.27	322.12	321.79	323.34	0.00	8.89	67.53	21.30	0.88
1	16356	10 YR	710.00	317.27	322.45	322.20	323.85	0.00	9.51	74.68	22.27	0.91
1	16356	25 YR	870.00	317.27	322.86	322.72	324.52	0.00	10.35	84.15	24.35	0.96
1	16356	50 YR	1000.00	317.27	323.12	323.12	325.03	0.00	11.08	90.92	26.33	0.99
1	16356	100 YR	1150.00	317.27	323.51	323.51	325.59	0.00	11.56	101.66	29.28	0.99
1	16356	250 YR	1380.00	317.27	324.05	324.05	326.38	0.00	12.27	118.70	33.59	0.99
1	16356	500 YR	1570.00	317.27	324.52	324.52	327.00	0.00	12.66	135.40	37.33	0.98
1	16568	2 YR	440.00	317.46	321.61	321.61	323.27	0.00	10.34	42.57	12.92	1.00
1	16568	5 YR	600.00	317.46	322.64	322.64	324.30	0.00	10.32	58.11	17.68	1.00
1	16568	10 YR	710.00	317.46	323.19	323.19	324.86	0.00	10.37	68.49	20.48	1.00
1	16568	25 YR	870.00	317.46	323.70	323.70	325.56	0.00	10.96	79.84	24.91	1.01
1	16568	50 YR	1000.00	317.46	324.10	324.10	326.09	0.00	11.35	90.75	29.37	0.99
1	16568	100 YR	1150.00	317.46	324.52	324.52	326.67	0.00	11.79	104.64	36.71	0.98
1	16568	250 YR	1380.00	317.46	325.20	325.20	327.48	0.00	12.20	135.96	57.33	0.94
1	16568	500 YR	1570.00	317.46	325.75	325.75	328.07	0.00	12.38	172.88	74.99	0.91

HEC-RAS Plan: Swampoodle_Ult River: Swampoodle Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	16806	2 YR	440.00	319.85	323.12	323.12	324.23	0.00	8.45	52.13	24.14	0.99
1	16806	5 YR	600.00	319.85	323.75	323.71	324.97	0.00	8.89	69.42	30.91	0.93
1	16806	10 YR	710.00	319.85	324.33	324.07	325.42	0.00	8.49	89.17	36.40	0.81
1	16806	25 YR	870.00	319.85	325.11	324.55	326.05	0.00	8.08	119.03	41.39	0.70
1	16806	50 YR	1000.00	319.85	325.65	324.86	326.55	0.00	7.96	144.90	54.31	0.64
1	16806	100 YR	1150.00	319.85	326.27	325.17	327.10	0.00	7.82	188.54	95.81	0.60
1	16806	250 YR	1380.00	319.85	327.12	325.67	327.88	0.00	7.69	300.17	199.55	0.54
1	16806	500 YR	1570.00	319.85	327.78	326.05	328.45	0.00	7.44	437.19	214.28	0.50
1	16925	2 YR	440.00	320.42	324.02	324.02	325.50	0.00	9.78	48.37	21.91	0.98
1	16925	5 YR	600.00	320.42	324.75	324.75	326.50	0.00	10.70	66.40	35.16	0.96
1	16925	10 YR	710.00	320.42	325.20	325.20	327.11	0.00	11.22	79.83	43.93	0.95
1	16925	25 YR	870.00	320.42	325.77	325.77	327.93	0.00	12.01	98.73	54.80	0.96
1	16925	50 YR	1000.00	320.42	326.35	326.35	328.55	0.00	12.18	125.56	92.89	0.92
1	16925	100 YR	1150.00	320.42	326.92	326.92	329.14	0.00	12.38	173.18	130.87	0.89
1	16925	250 YR	1380.00	320.42	328.25	328.25	329.75	0.00	10.80	406.79	252.32	0.70
1	16925	500 YR	1570.00	320.42	328.55	328.55	330.14	0.00	11.34	471.18	262.80	0.72
1	16969 40th St.		Culvert									
1	17013 U	2 YR	440.00	320.42	326.28	324.00	326.64	0.00	4.83	99.82	87.31	0.41
1	17013 U	5 YR	600.00	320.42	326.72	324.71	327.25	0.00	5.86	133.18	113.34	0.48
1	17013 U	10 YR	710.00	320.42	326.83	325.13	327.52	0.00	6.75	142.85	118.83	0.54
1	17013 U	25 YR	870.00	320.42	327.04	325.71	327.95	0.00	7.83	164.21	143.45	0.62
1	17013 U	50 YR	1000.00	320.42	327.91	326.33	328.57	0.00	6.98	317.14	225.96	0.51
1	17013 U	100 YR	1150.00	320.42	328.67	326.92	329.17	0.00	6.38	475.60	248.65	0.44
1	17013 U	250 YR	1380.00	320.42	329.27	327.87	329.76	0.00	6.55	612.05	282.25	0.43
1	17013 U	500 YR	1570.00	320.42	329.61	328.19	330.14	0.00	6.93	703.32	324.96	0.44
1	17057	2 YR	440.00	321.20	326.18		326.86	0.00	6.64	66.25	19.97	0.64
1	17057	5 YR	600.00	321.20	326.54		327.57	0.00	8.13	73.81	21.32	0.77
1	17057	10 YR	710.00	321.20	326.56	326.25	327.98	0.00	9.59	74.07	22.13	0.90
1	17057	25 YR	870.00	321.20	326.87	326.87	328.66	0.00	10.76	82.96	30.64	0.98
1	17057	50 YR	1000.00	321.20	327.46	327.25	329.19	0.00	10.59	102.00	33.78	0.91
1	17057	100 YR	1150.00	321.20	328.18	327.66	329.79	0.00	10.28	156.19	171.11	0.82
1	17057	250 YR	1380.00	321.20	329.05	329.05	330.22	0.00	9.30	339.71	253.28	0.68
1	17057	500 YR	1570.00	321.20	329.37	329.37	330.55	0.00	9.54	425.85	271.60	0.68
1	17178	2 YR	290.00	320.42	326.87		326.99	0.00	2.79	116.59	56.16	0.22
1	17178	5 YR	380.00	320.42	327.60		327.75	0.00	3.10	166.43	86.59	0.23
1	17178	10 YR	450.00	320.42	328.05		328.21	0.00	3.33	210.35	112.09	0.24
1	17178	25 YR	540.00	320.42	328.76		328.93	0.00	3.41	312.77	169.50	0.23
1	17178	50 YR	610.00	320.42	329.28		329.43	0.00	3.40	408.77	198.95	0.22
1	17178	100 YR	690.00	320.42	329.87		330.01	0.00	3.32	530.12	211.35	0.21
1	17178	250 YR	830.00	320.42	330.24		330.40	0.00	3.66	608.90	218.55	0.23
1	17178	500 YR	940.00	320.42	330.55		330.72	0.00	3.86	678.44	224.71	0.23
1	17307	2 YR	290.00	322.23	326.46	326.46	327.51	0.05	8.24	35.21	16.67	1.00
1	17307	5 YR	380.00	322.23	327.08	326.94	328.12	0.04	8.21	46.30	22.45	0.93
1	17307	10 YR	450.00	322.23	327.62	327.38	328.53	0.03	7.71	63.03	70.65	0.83
1	17307	25 YR	540.00	322.23	328.83	328.13	329.01	0.01	4.03	213.43	181.85	0.37
1	17307	50 YR	610.00	322.23	329.40	328.40	329.50	0.00	3.20	297.50	188.39	0.28
1	17307	100 YR	690.00	322.23	330.00	328.50	330.06	0.00	2.71	385.56	194.35	0.22
1	17307	250 YR	830.00	322.23	330.39	328.65	330.46	0.00	2.78	444.26	198.23	0.22
1	17307	500 YR	940.00	322.23	330.72	328.76	330.79	0.00	2.79	493.36	202.66	0.21
1	17423	2 YR	230.00	325.83	329.04	328.45	329.13	0.01	2.92	122.86	249.89	0.35
1	17423	5 YR	300.00	325.83	329.37	328.72	329.45	0.00	2.86	160.69	264.82	0.32
1	17423	10 YR	350.00	325.83	329.58	328.81	329.66	0.00	2.84	185.96	273.64	0.30
1	17423	25 YR	430.00	325.83	329.55	328.92	329.67	0.01	3.57	182.15	272.31	0.38
1	17423	50 YR	490.00	325.83	329.81	329.01	329.92	0.00	3.43	212.28	280.51	0.35
1	17423	100 YR	560.00	325.83	330.24	329.09	330.33	0.00	3.09	263.28	286.73	0.29
1	17423	250 YR	660.00	325.83	330.62	329.20	330.70	0.00	3.06	307.28	292.07	0.28
1	17423	500 YR	750.00	325.83	330.93	329.30	331.01	0.00	3.07	344.03	297.61	0.27
1	17570	2 YR	230.00	326.66	330.13	329.95	330.51	0.02	5.25	61.56	108.77	0.64
1	17570	5 YR	300.00	326.66	330.32	330.32	330.71	0.02	5.53	83.92	119.17	0.65
1	17570	10 YR	350.00	326.66	330.42	330.42	330.82	0.02	5.85	95.71	129.77	0.67
1	17570	25 YR	430.00	326.66	330.70	330.56	331.00	0.01	5.40	134.45	146.44	0.58
1	17570	50 YR	490.00	326.66	330.80	330.66	331.11	0.01	5.59	149.62	152.50	0.59
1	17570	100 YR	560.00	326.66	330.95		331.24	0.01	5.57	172.95	157.82	0.58
1	17570	250 YR	660.00	326.66	331.22		331.46	0.01	5.27	216.35	166.22	0.52
1	17570	500 YR	750.00	326.66	331.47		331.69	0.01	5.15	260.52	188.63	0.49
1	17716 V	2 YR	230.00	327.35	331.77		331.90	0.01	3.24	123.02	155.95	0.36
1	17716 V	5 YR	300.00	327.35	332.00	331.04	332.13	0.01	3.43	160.39	169.24	0.37
1	17716 V	10 YR	350.00	327.35	332.15	331.58	332.28	0.01	3.52	185.16	174.51	0.37
1	17716 V	25 YR	430.00	327.35	332.27		332.42	0.01	3.90	206.62	178.94	0.41
1	17716 V	50 YR	490.00	327.35	332.40	331.89	332.55	0.01	4.01	229.82	183.61	0.41
1	17716 V	100 YR	560.00	327.35	332.51	331.99	332.67	0.01	4.18	251.30	186.15	0.42
1	17716 V	250 YR	660.00	327.35	332.64	332.12	332.82	0.01	4.49	275.65	189.00	0.44
1	17716 V	500 YR	750.00	327.35	332.77	332.22	332.96	0.01	4.68	300.02	191.93	0.45

HEC-RAS Plan: SwamEast_Ult River: Swampoodle_East Reach: Swampoodle_East

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)	
Swampoodle_East	595	2 YR	690.00	301.53	306.10	305.10	306.83	0.00	6.87	100.99	30.59	0.64
Swampoodle_East	595	5 YR	920.00	301.53	307.56	305.74	308.20	0.00	6.46	151.28	39.12	0.51
Swampoodle_East	595	10 YR	1070.00	301.53	308.16	306.09	308.85	0.00	6.68	176.28	44.20	0.50
Swampoodle_East	595	25 YR	1310.00	301.53	308.81	306.61	309.62	0.00	7.30	208.26	55.55	0.5
Swampoodle_East	595	50 YR	1650.00	301.53	309.16	307.32	310.30	0.00	8.67	228.94	62.61	0.59
Swampoodle_East	595	100 YR	2020.00	301.53	309.49	308.01	311.02	0.00	10.05	250.70	69.26	0.67
Swampoodle_East	595	250 YR	2530.00	301.53	310.04	308.97	312.03	0.00	11.54	293.59	112.33	0.74
Swampoodle_East	595	500 YR	2960.00	301.53	310.41	309.76	312.87	0.00	12.84	352.40	240.12	0.81
Swampoodle_East	837	2 YR	690.00	304.39	307.98	307.98	309.36	0.00	9.43	73.20	26.46	1.00
Swampoodle_East	837	5 YR	920.00	304.39	308.61	308.61	310.21	0.00	10.15	90.79	30.68	1.00
Swampoodle_East	837	10 YR	1070.00	304.39	308.96	308.96	310.72	0.00	10.65	102.32	34.95	0.99
Swampoodle_East	837	25 YR	1310.00	304.39	309.53	309.53	311.46	0.00	11.19	123.79	40.74	0.97
Swampoodle_East	837	50 YR	1650.00	304.39	310.24	310.24	312.41	0.00	11.93	155.31	49.11	0.95
Swampoodle_East	837	100 YR	2020.00	304.39	311.25	311.25	313.31	0.00	11.76	252.18	145.60	0.86
Swampoodle_East	837	250 YR	2530.00	304.39	312.38	312.38	314.22	0.00	11.50	482.11	241.88	0.77
Swampoodle_East	837	500 YR	2960.00	304.39	312.65	312.65	314.83	0.00	12.66	551.54	273.89	0.83
Swampoodle_East	966	2 YR	690.00	305.61	309.20	309.20	310.58	0.00	9.42	73.25	26.47	1.00
Swampoodle_East	966	5 YR	920.00	305.61	309.83	309.83	311.43	0.00	10.17	90.48	28.76	1.00
Swampoodle_East	966	10 YR	1070.00	305.61	310.17	310.17	311.94	0.00	10.70	100.53	30.47	1.00
Swampoodle_East	966	25 YR	1310.00	305.61	310.69	310.69	312.70	0.00	11.40	117.21	33.10	0.99
Swampoodle_East	966	50 YR	1650.00	305.61	311.39	311.39	313.69	0.00	12.20	141.76	37.23	0.98
Swampoodle_East	966	100 YR	2020.00	305.61	312.28	312.28	314.66	0.00	12.46	190.12	83.00	0.92
Swampoodle_East	966	250 YR	2530.00	305.61	313.43	313.43	315.68	0.00	12.42	344.55	182.20	0.84
Swampoodle_East	966	500 YR	2960.00	305.61	314.53	314.53	316.27	0.00	11.41	691.44	367.91	0.71
Swampoodle_East	1060 State Loop 14		Culvert									
Swampoodle_East	1134	2 YR	690.00	306.34	313.20	310.43	313.58	0.00	5.37	185.34	215.27	0.38
Swampoodle_East	1134	5 YR	920.00	306.34	313.16	311.25	313.89	0.01	7.29	179.13	213.30	0.51
Swampoodle_East	1134	10 YR	1070.00	306.34	313.40	313.40	314.11	0.01	7.50	221.67	243.69	0.52
Swampoodle_East	1134	25 YR	1310.00	306.34	313.68	313.68	314.28	0.01	7.46	324.46	274.31	0.50
Swampoodle_East	1134	50 YR	1650.00	306.34	314.23	313.98	314.64	0.00	6.78	495.53	395.97	0.44
Swampoodle_East	1134	100 YR	2020.00	306.34	314.68	314.18	314.98	0.00	6.23	696.28	472.19	0.39
Swampoodle_East	1134	250 YR	2530.00	306.34	315.59	314.59	315.70	0.00	4.40	1176.72	575.31	0.26
Swampoodle_East	1134	500 YR	2960.00	306.34	316.20	314.76	316.28	0.00	3.65	1568.77	722.22	0.21
Swampoodle_East	1455 A	2 YR	690.00	307.00	313.65	312.23	314.08	0.00	6.38	230.76	362.00	0.44
Swampoodle_East	1455 A	5 YR	920.00	307.00	314.07	313.33	314.61	0.00	7.38	270.34	386.03	0.49
Swampoodle_East	1455 A	10 YR	1070.00	307.00	314.20	313.59	314.86	0.00	8.22	282.83	391.75	0.55
Swampoodle_East	1455 A	25 YR	1310.00	307.00	314.52	313.95	314.85	0.00	6.91	686.10	413.69	0.4
Swampoodle_East	1455 A	50 YR	1650.00	307.00	314.72	314.39	315.10	0.00	7.72	772.12	428.78	0.4
Swampoodle_East	1455 A	100 YR	2020.00	307.00	315.03	314.67	315.43	0.00	8.27	914.29	516.08	0.52
Swampoodle_East	1455 A	250 YR	2530.00	307.00	315.72	314.82	315.96	0.00	7.13	1297.75	569.74	0.43
Swampoodle_East	1455 A	500 YR	2960.00	307.00	316.28	315.19	316.45	0.00	6.50	1626.69	618.55	0.38
Swampoodle_East	1567	2 YR	690.00	307.56	313.38	312.94	314.44	0.00	9.09	143.18	116.58	0.67
Swampoodle_East	1567	5 YR	920.00	307.56	313.60	312.94	315.12	0.00	11.12	163.31	126.09	0.81
Swampoodle_East	1567	10 YR	1070.00	307.56	314.43	314.43	315.20	0.00	8.88	319.61	306.50	0.60
Swampoodle_East	1567	25 YR	1310.00	307.56	314.88	314.88	315.47	0.00	8.51	524.95	374.94	0.56
Swampoodle_East	1567	50 YR	1650.00	307.56	315.13	315.13	315.76	0.00	9.20	621.04	384.48	0.60
Swampoodle_East	1567	100 YR	2020.00	307.56	315.35	315.35	316.02	0.00	9.91	706.36	389.05	0.63
Swampoodle_East	1567	250 YR	2530.00	307.56	315.60	315.60	316.33	0.00	10.86	802.44	395.34	0.68
Swampoodle_East	1567	500 YR	2960.00	307.56	316.19	315.79	316.67	0.00	9.56	1039.67	416.39	0.58
Swampoodle_East	1708	2 YR	580.00	308.10	313.69	312.89	314.80	0.00	8.85	104.29	46.17	0.67
Swampoodle_East	1708	5 YR	790.00	308.10	313.89	313.86	315.74	0.00	11.49	114.07	53.21	0.85
Swampoodle_East	1708	10 YR	940.00	308.10	315.34	315.34	316.09	0.00	8.33	371.67	330.34	0.55
Swampoodle_East	1708	25 YR	1300.00	308.10	315.88	315.88	316.53	0.00	8.60	584.84	423.95	0.55
Swampoodle_East	1708	50 YR	1620.00	308.10	316.15	316.15	316.80	0.00	9.13	705.04	469.63	0.57
Swampoodle_East	1708	100 YR	1970.00	308.10	316.37	316.37	317.06	0.00	9.80	812.50	496.32	0.61
Swampoodle_East	1708	250 YR	2490.00	308.10	316.57	316.57	317.40	0.00	11.14	912.99	515.28	0.68
Swampoodle_East	1708	500 YR	2900.00	308.10	316.91	316.91	317.65	0.00	11.12	1087.67	534.59	0.67
Swampoodle_East	1782	2 YR	580.00	309.04	314.06	313.01	314.98	0.00	7.89	99.00	38.29	0.64
Swampoodle_East	1782	5 YR	790.00	309.04	314.83	313.88	316.01	0.00	9.03	135.53	83.64	0.67
Swampoodle_East	1782	10 YR	940.00	309.04	314.86	314.42	316.51	0.00	10.67	138.17	89.12	0.79
Swampoodle_East	1782	25 YR	1300.00	309.04	316.46	316.46	317.20	0.00	8.36	576.74	428.13	0.55
Swampoodle_East	1782	50 YR	1620.00	309.04	316.64	316.64	317.55	0.00	9.56	654.66	449.96	0.62
Swampoodle_East	1782	100 YR	1970.00	309.04	317.12	317.12	317.85	0.00	9.27	899.64	537.35	0.58
Swampoodle_East	1782	250 YR	2490.00	309.04	317.46	317.46	318.19	0.00	9.88	1096.10	619.03	0.61
Swampoodle_East	1782	500 YR	2900.00	309.04	317.48	317.48	318.45	0.00	11.38	1112.16	626.67	0.70
Swampoodle_East	1874 Main St.		Culvert									
Swampoodle_East	1959 B	2 YR	580.00	309.04	315.18	313.00	315.71	0.00	6.12	170.00	179.59	0.44
Swampoodle_East	1959 B	5 YR	790.00	309.04	315.80	313.89	316.42	0.00	6.91	287.11	251.19	0.48
Swampoodle_East	1959 B	10 YR	940.00	309.04	315.83	314.38	316.69	0.00	8.15	292.48	253.04	0.56
Swampoodle_East	1959 B	25 YR	1300.00	309.04	316.30	316.30	317.38	0.00	9.59	451.10	284.21	0.64
Swampoodle_East	1959 B	50 YR	1620.00	309.04	316.82	316.82	317.89	0.00	10.03	612.84	336.37	0.6
Swampoodle_East	1959 B	100 YR	1970.00	309.04	317.17	317.17	318.32	0.00	10.80	734.80	363.04	0.68
Swampoodle_East	1959 B	250 YR	2490.00	309.04	317.61	317.61	318.88	0.00	11.82	905.24	402.90	0.72
Swampoodle_East	1959 B	500 YR	2900.00	309.04	318.08	318.08	319.23	0.00	11.83	1102.30	434.35	0.70
Swampoodle_East	2010	2 YR	580.00	309.08	315.21		315.77	0.00	6.29	144.51	50.44	0.45
Swampoodle_East	2010	5 YR	790.00	309.08	315.76	313.99	316.57	0.00	7.64	218.37	193.87	0.52
Swampoodle_East	2010	10 YR	940.00	309.08	315.77	314.54	316.91	0.00	9.09	218.57	194.41	0.62

HEC-RAS Plan: SwamEast_Ult River: Swampoodle_East Reach: Swampoodle_East (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Swampoodle_East	2010	25 YR	1300.00	309.08	316.74	316.74	317.79	0.00	9.38	464.37	305.89	0.60
Swampoodle_East	2010	50 YR	1620.00	309.08	317.12	317.12	318.25	0.00	10.18	582.39	324.69	0.64
Swampoodle_East	2010	100 YR	1970.00	309.08	317.41	317.41	318.69	0.00	11.17	680.44	346.89	0.69
Swampoodle_East	2010	250 YR	2490.00	309.08	318.09	318.09	319.22	0.00	11.27	944.26	404.75	0.67
Swampoodle_East	2010	500 YR	2900.00	309.08	318.30	318.30	319.57	0.00	12.23	1030.25	415.37	0.71
Swampoodle_East	2117	2 YR	580.00	309.50	314.77	314.08	316.22	0.00	9.74	74.62	61.28	0.76
Swampoodle_East	2117	5 YR	790.00	309.50	316.13	316.13	316.95	0.00	8.24	299.57	280.27	0.57
Swampoodle_East	2117	10 YR	940.00	309.50	316.42	316.42	317.22	0.00	8.55	382.04	294.66	0.58
Swampoodle_East	2117	25 YR	1300.00	309.50	317.60		318.00	0.00	7.12	754.72	345.07	0.45
Swampoodle_East	2117	50 YR	1620.00	309.50	318.09		318.48	0.00	7.40	931.88	372.97	0.45
Swampoodle_East	2117	100 YR	1970.00	309.50	318.55		318.94	0.00	7.75	1116.23	435.93	0.46
Swampoodle_East	2117	250 YR	2490.00	309.50	318.99		319.46	0.00	8.78	1326.13	492.16	0.51
Swampoodle_East	2117	500 YR	2900.00	309.50	319.39		319.84	0.00	8.91	1528.04	516.22	0.50
Swampoodle_East	2186	2 YR	580.00	309.60	315.05	314.08	316.49	0.00	9.63	63.48	41.08	0.74
Swampoodle_East	2186	5 YR	790.00	309.60	316.31	316.31	317.37	0.00	8.95	214.68	195.38	0.62
Swampoodle_East	2186	10 YR	940.00	309.60	316.92	316.92	317.69	0.00	8.28	385.85	333.59	0.55
Swampoodle_East	2186	25 YR	1300.00	309.60	317.58	317.42	318.20	0.00	8.30	627.70	390.20	0.53
Swampoodle_East	2186	50 YR	1620.00	309.60	318.13		318.61	0.00	8.04	848.19	415.88	0.49
Swampoodle_East	2186	100 YR	1970.00	309.60	318.62		319.04	0.00	7.94	1057.82	433.52	0.47
Swampoodle_East	2186	250 YR	2490.00	309.60	319.21		319.58	0.00	8.08	1318.55	457.08	0.46
Swampoodle_East	2186	500 YR	2900.00	309.60	319.58		319.95	0.00	8.32	1493.33	475.08	0.47
Swampoodle_East	2196 Pedestrian Bridg		Bridge									
Swampoodle_East	2206	2 YR	580.00	309.70	316.48	314.18	317.03	0.00	6.46	220.54	196.42	0.44
Swampoodle_East	2206	5 YR	790.00	309.70	317.42	316.49	317.78	0.00	5.95	488.83	358.22	0.38
Swampoodle_East	2206	10 YR	940.00	309.70	317.67	317.02	318.04	0.00	6.34	578.70	389.77	0.40
Swampoodle_East	2206	25 YR	1300.00	309.70	318.14	317.57	318.53	0.00	7.00	768.45	410.22	0.43
Swampoodle_East	2206	50 YR	1620.00	309.70	318.53	317.95	318.91	0.00	7.35	930.01	421.45	0.44
Swampoodle_East	2206	100 YR	1970.00	309.70	318.96	318.19	319.32	0.00	7.57	1114.85	443.27	0.44
Swampoodle_East	2206	250 YR	2490.00	309.70	319.49	318.50	319.85	0.00	7.92	1359.42	468.17	0.45
Swampoodle_East	2206	500 YR	2900.00	309.70	319.86	318.73	320.21	0.00	8.16	1533.23	480.94	0.46
Swampoodle_East	2231	2 YR	580.00	309.72	316.44	314.22	317.14	0.00	7.06	173.94	200.09	0.49
Swampoodle_East	2231	5 YR	790.00	309.72	317.40	315.50	317.86	0.00	6.48	414.15	325.21	0.42
Swampoodle_East	2231	10 YR	940.00	309.72	317.64	317.12	318.13	0.00	6.95	495.82	365.81	0.44
Swampoodle_East	2231	25 YR	1300.00	309.72	318.11		318.63	0.00	7.72	678.97	405.28	0.48
Swampoodle_East	2231	50 YR	1620.00	309.72	318.50		319.01	0.00	8.05	841.85	416.74	0.48
Swampoodle_East	2231	100 YR	1970.00	309.72	318.95		319.40	0.00	8.17	1029.87	433.39	0.48
Swampoodle_East	2231	250 YR	2490.00	309.72	319.49		319.92	0.00	8.43	1273.43	455.63	0.48
Swampoodle_East	2231	500 YR	2900.00	309.72	319.86		320.28	0.00	8.68	1442.69	469.17	0.49
Swampoodle_East	2248	2 YR	580.00	309.80	316.44	314.30	317.18	0.00	7.23	168.29	205.29	0.50
Swampoodle_East	2248	5 YR	790.00	309.80	317.41	316.83	317.89	0.00	6.57	406.66	309.81	0.43
Swampoodle_East	2248	10 YR	940.00	309.80	317.65	317.17	318.16	0.00	7.02	486.97	352.79	0.45
Swampoodle_East	2248	25 YR	1300.00	309.80	318.13		318.66	0.00	7.80	662.63	385.16	0.48
Swampoodle_East	2248	50 YR	1620.00	309.80	318.51		319.04	0.00	8.24	814.18	418.76	0.50
Swampoodle_East	2248	100 YR	1970.00	309.80	318.95		319.43	0.00	8.36	1004.37	437.41	0.49
Swampoodle_East	2248	250 YR	2490.00	309.80	319.51		319.95	0.00	8.49	1252.27	446.09	0.49
Swampoodle_East	2248	500 YR	2900.00	309.80	319.88		320.30	0.00	8.70	1419.83	455.43	0.49
Swampoodle_East	2279	2 YR	580.00	309.83	316.91	314.33	317.38	0.00	6.04	259.80	241.40	0.41
Swampoodle_East	2279	5 YR	790.00	309.83	317.45	316.74	317.93	0.00	6.55	400.91	283.79	0.43
Swampoodle_East	2279	10 YR	940.00	309.83	317.69	317.18	318.21	0.00	7.00	474.51	324.83	0.45
Swampoodle_East	2279	25 YR	1300.00	309.83	318.17	317.82	318.76	0.00	8.01	642.83	373.15	0.50
Swampoodle_East	2279	50 YR	1620.00	309.83	318.55	318.23	319.15	0.00	8.52	790.73	409.86	0.52
Swampoodle_East	2279	100 YR	1970.00	309.83	318.98	318.56	319.55	0.00	8.71	975.17	436.30	0.52
Swampoodle_East	2279	250 YR	2490.00	309.83	319.54	318.96	320.06	0.00	8.91	1231.39	485.97	0.51
Swampoodle_East	2279	500 YR	2900.00	309.83	319.91	319.21	320.41	0.00	9.15	1418.64	524.38	0.52
Swampoodle_East	2308 Pine St.		Culvert									
Swampoodle_East	2341 C	2 YR	580.00	310.05	316.96	314.57	317.41	0.00	5.91	254.27	237.69	0.40
Swampoodle_East	2341 C	5 YR	790.00	310.05	317.47	315.60	317.93	0.00	6.50	390.24	278.91	0.43
Swampoodle_East	2341 C	10 YR	940.00	310.05	317.69	317.23	318.21	0.00	7.08	455.50	304.35	0.46
Swampoodle_East	2341 C	25 YR	1300.00	310.05	318.29	317.85	318.78	0.00	7.49	646.99	335.38	0.47
Swampoodle_East	2341 C	50 YR	1620.00	310.05	318.65	318.18	319.16	0.00	8.05	769.93	349.13	0.49
Swampoodle_East	2341 C	100 YR	1970.00	310.05	319.05	318.49	319.55	0.00	8.37	914.23	362.69	0.50
Swampoodle_East	2341 C	250 YR	2490.00	310.05	319.58	318.88	320.10	0.00	8.91	1112.92	397.06	0.52
Swampoodle_East	2341 C	500 YR	2900.00	310.05	319.87	319.10	320.44	0.00	9.60	1234.30	434.17	0.55
Swampoodle_East	2402	2 YR	580.00	310.26	317.03		317.57	0.00	6.36	165.75	82.35	0.44
Swampoodle_East	2402	5 YR	790.00	310.26	317.50	315.77	318.31	0.00	7.87	230.70	193.85	0.52
Swampoodle_East	2402	10 YR	940.00	310.26	317.71	316.54	318.71	0.00	8.85	275.72	220.51	0.58
Swampoodle_East	2402	25 YR	1300.00	310.26	318.31	318.31	319.40	0.00	9.89	423.25	289.65	0.62
Swampoodle_East	2402	50 YR	1620.00	310.26	318.93	318.93	319.81	0.00	9.64	627.93	353.65	0.58
Swampoodle_East	2402	100 YR	1970.00	310.26	319.23	319.23	320.15	0.00	10.30	735.26	360.16	0.61
Swampoodle_East	2402	250 YR	2490.00	310.26	319.63	319.48	320.60	0.00	11.16	881.05	374.87	0.65
Swampoodle_East	2402	500 YR	2900.00	310.26	319.93	319.77	320.93	0.00	11.67	998.42	391.41	0.67

HEC-RAS Plan: SwamWest_Ult River: Swampoodle_West Reach: Swampoodle_West

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)	
Swampoodle_West	49	2 YR	460.00	303.63	307.05	304.75	307.14	0.00	2.58	194.56	91.21	0.30
Swampoodle_West	49	5 YR	630.00	303.63	308.40	305.19	308.48	0.00	2.58	289.64	181.78	0.24
Swampoodle_West	49	10 YR	720.00	303.63	309.05	305.38	309.13	0.00	2.59	338.73	210.84	0.22
Swampoodle_West	49	25 YR	790.00	303.63	309.80	305.51	309.88	0.00	2.52	406.14	269.74	0.2
Swampoodle_West	49	50 YR	810.00	303.63	310.25	305.56	310.32	0.00	2.36	448.93	327.50	0.18
Swampoodle_West	49	100 YR	830.00	303.63	310.68	305.60	310.74	0.00	2.23	491.54	396.04	0.16
Swampoodle_West	49	250 YR	860.00	303.63	311.36	305.65	311.41	0.00	2.06	562.99	502.33	0.14
Swampoodle_West	49	500 YR	880.00	303.63	311.80	305.69	311.85	0.00	1.97	625.67	610.99	0.13
Swampoodle_West	62	2 YR	460.00	304.65	307.05	305.44	307.25	0.01	2.08	135.89	58.38	0.35
Swampoodle_West	62	5 YR	630.00	304.65	308.41	305.95	308.54	0.00	2.17	224.47	72.51	0.27
Swampoodle_West	62	10 YR	720.00	304.65	309.06	306.18	309.17	0.00	2.11	273.46	79.79	0.24
Swampoodle_West	62	25 YR	790.00	304.65	309.81	306.36	309.90	0.00	1.96	334.67	88.52	0.21
Swampoodle_West	62	50 YR	810.00	304.65	310.26	306.39	310.34	0.00	1.87	373.46	95.40	0.18
Swampoodle_West	62	100 YR	830.00	304.65	310.69	306.44	310.75	0.00	1.80	411.37	107.03	0.17
Swampoodle_West	62	250 YR	860.00	304.65	311.37	306.50	311.42	0.00	1.69	477.54	193.25	0.14
Swampoodle_West	62	500 YR	880.00	304.65	311.81	306.55	311.85	0.00	1.65	537.58	297.75	0.13
Swampoodle_West	100 Railroad		Mult Open									
Swampoodle_West	134 A	2 YR	460.00	305.24	310.43	305.61	310.45	0.00	1.01	401.03	118.66	0.10
Swampoodle_West	134 A	5 YR	630.00	305.24	312.19	306.06	312.21	0.00	1.01	579.15	185.66	0.08
Swampoodle_West	134 A	10 YR	720.00	305.24	313.05	306.25	313.06	0.00	1.03	669.18	407.26	0.08
Swampoodle_West	134 A	25 YR	790.00	305.24	313.98	306.39	314.00	0.00	1.00	768.09	646.46	0.07
Swampoodle_West	134 A	50 YR	810.00	305.24	314.30	306.42	314.31	0.00	0.99	800.88	647.73	0.07
Swampoodle_West	134 A	100 YR	830.00	305.24	314.61	306.47	314.63	0.00	0.97	834.10	650.40	0.06
Swampoodle_West	134 A	250 YR	860.00	305.24	314.62	306.52	314.63	0.00	1.01	834.68	650.61	0.07
Swampoodle_West	134 A	500 YR	880.00	305.24	315.26	306.55	315.27	0.00	0.96	902.00	728.31	0.06
Swampoodle_West	172	2 YR	460.00	305.60	310.44	308.58	310.53	0.00	2.47	204.40	82.53	0.25
Swampoodle_West	172	5 YR	630.00	305.60	312.19	308.90	312.25	0.00	2.03	376.24	171.34	0.16
Swampoodle_West	172	10 YR	720.00	305.60	313.05	309.06	313.09	0.00	1.86	516.03	426.92	0.14
Swampoodle_West	172	25 YR	790.00	305.60	313.99	309.18	314.02	0.00	1.54	844.40	753.49	0.11
Swampoodle_West	172	50 YR	810.00	305.60	314.30	309.20	314.32	0.00	1.40	979.88	776.65	0.09
Swampoodle_West	172	100 YR	830.00	305.60	314.62	309.24	314.64	0.00	1.27	1118.65	784.57	0.08
Swampoodle_West	172	250 YR	860.00	305.60	314.63	309.28	314.64	0.00	1.32	1121.33	784.68	0.09
Swampoodle_West	172	500 YR	880.00	305.60	315.27	309.32	315.28	0.00	1.07	1403.20	796.26	0.07
Swampoodle_West	452	2 YR	70.00	304.28	310.86		310.86	0.00	0.56	133.61	34.33	0.04
Swampoodle_West	452	5 YR	70.00	304.28	312.40		312.40	0.00	0.42	191.36	40.50	0.03
Swampoodle_West	452	10 YR	70.00	304.28	313.20		313.21	0.00	0.36	225.14	43.71	0.02
Swampoodle_West	452	25 YR	80.00	304.28	314.09		314.09	0.00	0.36	265.32	47.24	0.0
Swampoodle_West	452	50 YR	120.00	304.28	314.38		314.39	0.00	0.52	279.52	48.89	0.0
Swampoodle_West	452	100 YR	180.00	304.28	314.68		314.69	0.00	0.74	319.93	207.07	0.04
Swampoodle_West	452	250 YR	280.00	304.28	314.70		314.71	0.00	1.15	322.07	210.10	0.07
Swampoodle_West	452	500 YR	370.00	304.28	315.31		315.33	0.00	1.32	462.11	242.30	0.08
Swampoodle_West	710	2 YR	70.00	305.89	310.89		310.89	0.00	0.55	128.80	40.83	0.05
Swampoodle_West	710	5 YR	70.00	305.89	312.41		312.41	0.00	0.37	198.44	50.52	0.03
Swampoodle_West	710	10 YR	70.00	305.89	313.21		313.21	0.00	0.31	240.55	54.60	0.02
Swampoodle_West	710	25 YR	80.00	305.89	314.09		314.09	0.00	0.30	290.48	58.58	0.02
Swampoodle_West	710	50 YR	120.00	305.89	314.39		314.40	0.00	0.43	308.37	60.14	0.03
Swampoodle_West	710	100 YR	180.00	305.89	314.70		314.71	0.00	0.62	327.36	61.84	0.04
Swampoodle_West	710	250 YR	280.00	305.89	314.74		314.76	0.00	0.96	329.73	62.05	0.06
Swampoodle_West	710	500 YR	370.00	305.89	315.37		315.39	0.00	1.15	369.49	65.45	0.07
Swampoodle_West	935	2 YR	70.00	305.31	310.93		310.94	0.00	0.80	100.68	35.59	0.07
Swampoodle_West	935	5 YR	70.00	305.31	312.42		312.43	0.00	0.53	157.49	40.42	0.04
Swampoodle_West	935	10 YR	70.00	305.31	313.22		313.22	0.00	0.45	190.60	42.98	0.03
Swampoodle_West	935	25 YR	80.00	305.31	314.10		314.10	0.00	0.43	230.35	49.47	0.03
Swampoodle_West	935	50 YR	120.00	305.31	314.40		314.41	0.00	0.62	246.12	53.67	0.04
Swampoodle_West	935	100 YR	180.00	305.31	314.72		314.73	0.00	0.88	263.97	58.06	0.06
Swampoodle_West	935	250 YR	280.00	305.31	314.78		314.81	0.00	1.35	267.60	58.91	0.09
Swampoodle_West	935	500 YR	370.00	305.31	315.42		315.45	0.00	1.60	307.76	67.49	0.10
Swampoodle_West	1003	2 YR	220.00	304.53	310.96		311.08	0.00	2.77	84.62	27.02	0.25
Swampoodle_West	1003	5 YR	220.00	304.53	312.42		312.48	0.00	1.95	127.75	32.01	0.15
Swampoodle_West	1003	10 YR	220.00	304.53	313.21		313.25	0.00	1.66	154.66	37.16	0.12
Swampoodle_West	1003	25 YR	250.00	304.53	314.09		314.13	0.00	1.61	191.30	46.18	0.11
Swampoodle_West	1003	50 YR	300.00	304.53	314.40		314.45	0.00	1.83	205.94	49.33	0.12
Swampoodle_West	1003	100 YR	370.00	304.53	314.72		314.78	0.00	2.13	222.33	52.38	0.13
Swampoodle_West	1003	250 YR	490.00	304.53	314.79		314.90	0.00	2.78	225.96	52.90	0.18
Swampoodle_West	1003	500 YR	590.00	304.53	315.43		315.55	0.00	3.00	261.41	59.11	0.18
Swampoodle_West	1028 Weir		Inl Struct									
Swampoodle_West	1068	2 YR	220.00	300.95	311.13	303.24	311.14	0.00	0.96	311.60	59.39	0.06
Swampoodle_West	1068	5 YR	220.00	300.95	312.49	303.24	312.50	0.00	0.81	397.03	66.25	0.05
Swampoodle_West	1068	10 YR	220.00	300.95	313.26	303.24	313.27	0.00	0.74	449.66	70.16	0.04
Swampoodle_West	1068	25 YR	250.00	300.95	314.13	303.41	314.14	0.00	0.77	513.60	76.72	0.04
Swampoodle_West	1068	50 YR	300.00	300.95	314.46	303.68	314.47	0.00	0.89	538.71	79.48	0.0
Swampoodle_West	1068	100 YR	370.00	300.95	314.79	304.02	314.81	0.00	1.06	565.77	82.09	0.05
Swampoodle_West	1068	250 YR	490.00	300.95	314.89	304.54	314.92	0.00	1.40	573.94	82.86	0.07
Swampoodle_West	1068	500 YR	590.00	300.95	315.53	304.95	315.57	0.00	1.58	628.93	88.05	0.08
Swampoodle_West	1107	2 YR	220.00	300.95	311.13	303.24	311.14	0.00	0.95	319.53	62.51	0.06
Swampoodle_West	1107	5 YR	220.00	300.95	312.49	303.24	312.50	0.00	0.80	410.18	70.77	0.04
Swampoodle_West	1107	10 YR	220.00	300.95	313.26	303.24	313.27	0.00	0.73	466.59	75.46	0.04

HEC-RAS Plan: SwamWest_Ult River: Swampoodle_West Reach: Swampoodle_West (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Swampoodle_West	1107	25 YR	250.00	300.95	314.13	303.42	314.14	0.00	0.76	534.95	80.77	0.04
Swampoodle_West	1107	50 YR	300.00	300.95	314.46	303.69	314.47	0.00	0.88	561.23	82.73	0.05
Swampoodle_West	1107	100 YR	370.00	300.95	314.79	304.04	314.81	0.00	1.05	589.32	84.79	0.05
Swampoodle_West	1107	250 YR	490.00	300.95	314.89	304.56	314.92	0.00	1.37	597.91	86.90	0.07
Swampoodle_West	1107	500 YR	590.00	300.95	315.54	304.95	315.57	0.00	1.55	658.35	100.48	0.08
Swampoodle_West	1247	2 YR	220.00	301.18	311.13	303.35	311.14	0.00	0.96	318.03	62.51	0.06
Swampoodle_West	1247	5 YR	220.00	301.18	312.49	303.35	312.50	0.00	0.80	408.66	70.78	0.05
Swampoodle_West	1247	10 YR	220.00	301.18	313.26	303.35	313.27	0.00	0.74	465.07	75.46	0.04
Swampoodle_West	1247	25 YR	250.00	301.18	314.14	303.52	314.14	0.00	0.76	533.42	80.78	0.04
Swampoodle_West	1247	50 YR	300.00	301.18	314.46	303.78	314.47	0.00	0.88	559.72	82.73	0.05
Swampoodle_West	1247	100 YR	370.00	301.18	314.79	304.13	314.81	0.00	1.05	587.82	84.80	0.05
Swampoodle_West	1247	250 YR	490.00	301.18	314.89	304.65	314.92	0.00	1.38	596.43	86.78	0.07
Swampoodle_West	1247	500 YR	590.00	301.18	315.54	305.03	315.57	0.00	1.58	656.43	98.78	0.08
Swampoodle_West	1338	2 YR	220.00	301.37	311.12	304.02	311.15	0.00	1.27	220.12	54.25	0.08
Swampoodle_West	1338	5 YR	220.00	301.37	312.49	304.02	312.50	0.00	1.05	307.47	74.95	0.06
Swampoodle_West	1338	10 YR	220.00	301.37	313.26	304.02	313.27	0.00	0.95	375.89	101.57	0.05
Swampoodle_West	1338	25 YR	250.00	301.37	314.13	304.23	314.15	0.00	0.96	487.58	164.89	0.05
Swampoodle_West	1338	50 YR	300.00	301.37	314.45	304.54	314.47	0.00	1.09	545.85	191.33	0.06
Swampoodle_West	1338	100 YR	370.00	301.37	314.79	304.92	314.81	0.00	1.28	611.66	202.84	0.07
Swampoodle_West	1338	250 YR	490.00	301.37	314.89	305.54	314.93	0.00	1.67	631.84	205.85	0.09
Swampoodle_West	1338	500 YR	590.00	301.37	315.53	305.98	315.58	0.00	1.82	771.24	229.46	0.09
Swampoodle_West	1385 College Dr.		Culvert									
Swampoodle_West	1439 B	2 YR	350.00	301.87	311.50	304.88	311.53	0.00	1.55	281.32	61.28	0.10
Swampoodle_West	1439 B	5 YR	490.00	301.87	312.72	305.49	312.77	0.00	1.84	365.17	82.43	0.11
Swampoodle_West	1439 B	10 YR	590.00	301.87	313.39	305.87	313.45	0.00	2.03	427.00	101.74	0.12
Swampoodle_West	1439 B	25 YR	740.00	301.87	314.14	306.39	314.22	0.00	2.33	534.41	200.58	0.13
Swampoodle_West	1439 B	50 YR	850.00	301.87	314.44	306.74	314.54	0.00	2.58	599.61	232.64	0.14
Swampoodle_West	1439 B	100 YR	980.00	301.87	314.73	307.12	314.84	0.00	2.84	666.68	239.12	0.15
Swampoodle_West	1439 B	250 YR	1180.00	301.87	314.81	307.62	314.97	0.00	3.37	686.80	241.12	0.18
Swampoodle_West	1439 B	500 YR	1340.00	301.87	315.44	308.01	315.60	0.00	3.44	846.68	278.89	0.18
Swampoodle_West	1496	2 YR	350.00	300.77	311.53	303.66	311.54	0.00	0.85	518.78	85.81	0.05
Swampoodle_West	1496	5 YR	490.00	300.77	312.76	304.12	312.78	0.00	1.03	631.19	97.08	0.06
Swampoodle_West	1496	10 YR	590.00	300.77	313.44	304.40	313.46	0.00	1.16	699.33	103.31	0.06
Swampoodle_West	1496	25 YR	740.00	300.77	314.21	304.73	314.24	0.00	1.36	792.31	147.07	0.07
Swampoodle_West	1496	50 YR	850.00	300.77	314.52	304.93	314.56	0.00	1.51	842.67	182.59	0.08
Swampoodle_West	1496	100 YR	980.00	300.77	314.82	305.17	314.86	0.00	1.69	902.76	224.01	0.09
Swampoodle_West	1496	250 YR	1180.00	300.77	314.94	305.50	315.00	0.00	2.02	932.00	257.10	0.10
Swampoodle_West	1496	500 YR	1340.00	300.77	315.56	305.75	315.63	0.00	2.14	1111.96	301.78	0.11

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	572	2 YR	4280.00	252.62	263.38	259.11	263.53	0.00	3.76	1849.64	3946.44	0.22
1	572	5 YR	6140.00	252.62	263.70	260.53	263.96	0.00	5.08	1961.65	4092.01	0.29
1	572	10 YR	7240.00	252.62	264.02	260.93	264.34	0.00	5.65	2073.64	4206.07	0.32
1	572	25 YR	11160.00	252.62	264.56	262.14	265.19	0.00	7.96	2262.64	4253.65	0.4
1	572	50 YR	13380.00	252.62	264.98	262.65	265.76	0.01	8.94	2409.65	4351.18	0.48
1	572	100 YR	16220.00	252.62	265.25	263.23	266.30	0.01	10.40	2504.14	4404.46	0.55
1	572	250 YR	21250.00	252.62	265.71	264.17	267.28	0.01	12.76	2665.14	4615.57	0.66
1	572	500 YR	25340.00	252.62	266.20	264.86	268.13	0.01	14.24	2836.65	4659.57	0.72
1	678	2 YR	4280.00	251.45	263.47	258.04	263.71	0.00	4.42	1385.07	4010.35	0.24
1	678	5 YR	6140.00	251.45	263.86	259.33	264.29	0.00	5.96	1487.51	4053.41	0.32
1	678	10 YR	7240.00	251.45	264.20	259.99	264.73	0.00	6.66	1579.31	4112.35	0.35
1	678	25 YR	11160.00	251.45	264.90	262.50	265.90	0.01	9.29	1763.05	4205.26	0.47
1	678	50 YR	13380.00	251.45	265.38	263.21	266.62	0.01	10.44	1890.03	4294.74	0.52
1	678	100 YR	16220.00	251.45	265.77	264.00	267.40	0.01	12.02	1995.07	4364.52	0.59
1	678	250 YR	21250.00	251.45	266.46	265.22	268.78	0.01	14.47	2178.07	4422.02	0.69
1	678	500 YR	25340.00	251.45	267.08	266.07	269.89	0.01	16.07	2341.01	4497.24	0.75
1	750 Railroad		Bridge									
1	863	2 YR	4280.00	251.00	263.96	257.23	264.09	0.00	3.32	1944.81	3026.90	0.17
1	863	5 YR	6140.00	251.00	264.75	258.33	264.95	0.00	4.20	2201.91	3209.05	0.21
1	863	10 YR	7240.00	251.00	265.32	258.91	265.55	0.00	4.56	2387.30	3271.31	0.23
1	863	25 YR	11160.00	251.00	266.97	260.95	267.31	0.00	5.67	2923.36	3715.65	0.26
1	863	50 YR	13380.00	251.00	267.21	261.77	267.67	0.00	6.61	3001.67	3793.59	0.31
1	863	100 YR	16220.00	251.00	267.66	263.25	268.26	0.00	7.61	3147.22	3885.79	0.35
1	863	250 YR	21250.00	251.00	269.70	264.28	270.36	0.00	8.11	3807.85	4171.50	0.35
1	863	500 YR	25340.00	251.00	271.37	265.01	272.08	0.00	8.35	4353.16	4303.50	0.34
1	980	2 YR	4280.00	250.99	264.04	257.97	264.19	0.00	3.72	1955.51	2377.92	0.20
1	980	5 YR	6140.00	250.99	264.86	259.88	265.10	0.00	4.65	2268.85	2562.46	0.24
1	980	10 YR	7240.00	250.99	265.45	260.50	265.71	0.00	5.01	2490.69	2683.85	0.25
1	980	25 YR	11160.00	250.99	267.14	262.15	267.50	0.00	6.14	3138.95	3002.56	0.29
1	980	50 YR	13380.00	250.99	267.43	263.27	267.92	0.00	7.10	3253.14	3043.84	0.33
1	980	100 YR	16220.00	250.99	267.94	263.94	268.57	0.00	8.10	3450.59	3163.44	0.37
1	980	250 YR	21250.00	250.99	269.98	264.94	270.64	0.00	8.54	4275.51	3635.86	0.37
1	980	500 YR	25340.00	250.99	272.30	265.67	272.34	0.00	2.82	21707.19	4245.19	0.11
1	1131	2 YR	4280.00	252.92	264.21	259.97	264.36	0.00	4.02	2318.23	2749.06	0.23
1	1131	5 YR	6140.00	252.92	265.14	261.56	265.32	0.00	4.56	2924.62	2895.92	0.24
1	1131	10 YR	7240.00	252.92	265.77	262.94	265.94	0.00	4.68	3331.61	2954.26	0.2
1	1131	25 YR	11160.00	252.92	267.58	263.83	267.77	0.00	5.15	4523.13	3115.60	0.25
1	1131	50 YR	13380.00	252.92	268.02	264.22	268.25	0.00	5.76	4813.33	3130.02	0.27
1	1131	100 YR	16220.00	252.92	268.69	264.67	268.96	0.00	6.31	5257.97	3151.41	0.29
1	1131	250 YR	21250.00	252.92	270.74	265.36	271.00	0.00	6.36	6642.96	3566.50	0.28
1	1131	500 YR	25340.00	252.92	272.22	265.86	272.48	0.00	6.41	7797.77	3805.24	0.27
1	1325	2 YR	4280.00	252.35	264.43	258.32	264.58	0.00	3.45	2038.47	2761.56	0.19
1	1325	5 YR	6140.00	252.35	265.39	259.50	265.57	0.00	4.13	2494.91	2823.07	0.22
1	1325	10 YR	7240.00	252.35	266.00	259.99	266.20	0.00	4.38	2789.19	2883.13	0.22
1	1325	25 YR	11160.00	252.35	267.80	261.63	268.06	0.00	5.15	3652.93	3059.08	0.25
1	1325	50 YR	13380.00	252.35	268.28	263.80	268.60	0.00	5.79	3882.79	3117.99	0.27
1	1325	100 YR	16220.00	252.35	268.98	264.43	269.37	0.00	6.43	4217.89	3193.31	0.29
1	1325	250 YR	21250.00	252.35	271.09	265.34	271.20	0.00	3.99	10120.46	3658.68	0.17
1	1325	500 YR	25340.00	252.35	272.56	265.97	272.66	0.00	4.02	11790.94	3800.42	0.17
1	1455	2 YR	4280.00	253.13	264.55	259.53	264.77	0.00	4.31	1647.42	2947.88	0.24
1	1455	5 YR	6140.00	253.13	265.53	260.96	265.82	0.00	5.12	2028.80	3013.09	0.28
1	1455	10 YR	7240.00	253.13	266.15	261.79	266.46	0.00	5.43	2269.13	3045.12	0.29
1	1455	25 YR	11160.00	253.13	267.95	264.07	268.36	0.00	6.39	2974.41	3157.54	0.31
1	1455	50 YR	13380.00	253.13	268.46	264.64	268.96	0.00	7.17	3172.63	3196.80	0.34
1	1455	100 YR	16220.00	253.13	269.18	265.28	269.79	0.00	7.96	3453.95	3270.04	0.37
1	1455	250 YR	21250.00	253.13	271.22	266.26	271.28	0.00	3.38	13226.61	3391.14	0.15
1	1455	500 YR	25340.00	253.13	272.67	266.94	272.74	0.00	3.41	15215.79	3709.87	0.14
1	1545 Railroad		Bridge									
1	1616	2 YR	4280.00	254.36	265.43	263.65	265.66	0.00	5.39	1731.58	2894.39	0.31
1	1616	5 YR	6140.00	254.36	266.54	264.29	266.79	0.00	5.87	2229.34	2950.57	0.32
1	1616	10 YR	7240.00	254.36	267.17	264.59	267.43	0.00	6.04	2515.13	2971.03	0.32
1	1616	25 YR	11160.00	254.36	268.42	265.49	268.78	0.00	7.40	3076.67	3017.29	0.37
1	1616	50 YR	13380.00	254.36	269.26	265.91	269.65	0.00	7.76	3455.79	3060.53	0.37
1	1616	100 YR	16220.00	254.36	270.41	266.41	270.82	0.00	8.01	3971.21	3141.04	0.37
1	1616	250 YR	21250.00	254.36	271.97	267.17	272.00	0.00	2.72	16578.26	3355.97	0.12
1	1616	500 YR	25340.00	254.36	272.94	267.75	272.97	0.00	2.90	18177.20	3599.05	0.12
1	1729 A	2 YR	4280.00	253.36	265.76	259.37	265.80	0.00	2.10	3793.13	2866.87	0.11
1	1729 A	5 YR	6140.00	253.36	266.88	260.21	266.93	0.00	2.51	4523.58	2956.04	0.13
1	1729 A	10 YR	7240.00	253.36	267.52	260.69	267.58	0.00	2.69	4937.53	3001.70	0.13
1	1729 A	25 YR	11160.00	253.36	268.90	261.68	268.99	0.00	3.47	5833.88	3112.87	0.16
1	1729 A	50 YR	13380.00	253.36	269.76	262.53	269.87	0.00	3.77	6397.49	3188.45	0.17
1	1729 A	100 YR	16220.00	253.36	270.92	263.16	271.04	0.00	4.05	7146.18	3375.05	0.18
1	1729 A	250 YR	21250.00	253.36	272.01	263.94	272.03	0.00	2.09	20929.84	3515.08	0.09
1	1729 A	500 YR	25340.00	253.36	272.98	264.57	273.00	0.00	2.26	22752.30	3602.02	0.09

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2758	2 YR	4440.00	257.22	266.06	260.78	266.08	0.00	1.92	3975.36	2007.77	0.13
1	2758	5 YR	6190.00	257.22	267.23	261.20	267.26	0.00	2.17	4852.34	2082.44	0.14
1	2758	10 YR	7280.00	257.22	267.88	261.43	267.92	0.00	2.31	5342.60	2134.41	0.14
1	2758	25 YR	11390.00	257.22	269.21	262.03	269.22	0.00	1.52	12816.12	2200.85	0.09
1	2758	50 YR	13460.00	257.22	270.10	262.33	270.11	0.00	1.63	14189.17	2287.72	0.09
1	2758	100 YR	16450.00	257.22	271.23	262.75	271.24	0.00	1.51	20236.82	2363.17	0.08
1	2758	250 YR	21360.00	257.22	272.12	263.36	272.14	0.00	1.77	22348.29	2519.90	0.09
1	2758	500 YR	25400.00	257.22	273.10	263.84	273.12	0.00	1.89	24684.69	2637.68	0.09
1	2899	2 YR	4440.00	254.11	266.10	261.50	266.25	0.00	3.90	2365.76	1886.25	0.22
1	2899	5 YR	6190.00	254.11	267.27	262.53	267.44	0.00	4.38	2942.97	1975.57	0.23
1	2899	10 YR	7280.00	254.11	267.92	262.72	268.10	0.00	4.63	3265.40	2023.91	0.24
1	2899	25 YR	11390.00	254.11	269.09	264.46	269.48	0.00	6.86	4679.80	2116.02	0.34
1	2899	50 YR	13460.00	254.11	270.06	265.04	270.28	0.00	5.74	6909.16	2140.79	0.27
1	2899	100 YR	16450.00	254.11	271.24	266.00	271.31	0.00	3.94	12828.84	2177.39	0.18
1	2899	250 YR	21360.00	254.11	272.14	266.84	272.22	0.00	4.31	14796.37	2224.07	0.19
1	2899	500 YR	25400.00	254.11	273.12	267.45	273.19	0.00	4.36	16958.40	2365.17	0.19
1	2949 Railroad		Mult Open									
1	2994 B	2 YR	4440.00	254.55	266.72	263.07	266.83	0.00	3.29	2292.19	1981.59	0.20
1	2994 B	5 YR	6190.00	254.55	267.81	263.78	267.94	0.00	3.70	2814.50	2019.87	0.21
1	2994 B	10 YR	7280.00	254.55	268.10	264.12	268.38	0.00	5.28	3026.55	2025.92	0.30
1	2994 B	25 YR	11390.00	254.55	269.33	265.24	269.61	0.00	5.68	4558.24	2067.25	0.30
1	2994 B	50 YR	13460.00	254.55	270.44	265.73	270.57	0.00	4.18	7409.66	2118.26	0.21
1	2994 B	100 YR	16450.00	254.55	271.59	266.23	271.64	0.00	2.98	13407.18	2156.73	0.14
1	2994 B	250 YR	21360.00	254.55	272.04	266.96	272.10	0.00	3.57	14361.85	2176.39	0.17
1	2994 B	500 YR	25400.00	254.55	273.25	267.52	273.31	0.00	3.48	16947.66	2379.81	0.16
1	3133	2 YR	4440.00	255.74	266.87	262.85	266.93	0.00	2.83	3522.54	1647.26	0.17
1	3133	5 YR	6190.00	255.74	267.98	263.48	268.04	0.00	2.88	4673.58	1853.73	0.16
1	3133	10 YR	7280.00	255.74	268.49	263.81	268.57	0.00	3.46	5277.49	1907.40	0.19
1	3133	25 YR	11390.00	255.74	269.70	264.83	269.79	0.00	3.89	7056.72	2026.70	0.20
1	3133	50 YR	13460.00	255.74	270.57	265.31	270.65	0.00	3.77	8357.31	2106.09	0.19
1	3133	100 YR	16450.00	255.74	271.63	265.70	271.68	0.00	3.23	12940.71	2215.76	0.16
1	3133	250 YR	21360.00	255.74	272.10	266.47	272.17	0.00	3.83	13976.49	2257.62	0.18
1	3133	500 YR	25400.00	255.74	273.30	267.28	273.36	0.00	3.74	16739.07	2337.20	0.17
1	3350	2 YR	4440.00	255.13	266.98	263.44	267.11	0.00	3.87	2534.07	1578.02	0.23
1	3350	5 YR	6190.00	255.13	268.10	264.41	268.17	0.00	3.39	4715.86	1710.55	0.19
1	3350	10 YR	7280.00	255.13	268.65	264.76	268.72	0.00	3.38	5493.01	1851.74	0.18
1	3350	25 YR	11390.00	255.13	269.87	266.01	269.96	0.00	3.99	7380.32	1978.90	0.20
1	3350	50 YR	13460.00	255.13	270.72	266.06	270.80	0.00	3.88	8748.20	2038.38	0.19
1	3350	100 YR	16450.00	255.13	271.73	266.41	271.78	0.00	3.36	12664.40	2095.99	0.16
1	3350	250 YR	21360.00	255.13	272.23	267.85	272.29	0.00	3.98	13716.66	2135.78	0.19
1	3350	500 YR	25400.00	255.13	273.41	268.05	273.47	0.00	3.87	16290.48	2217.26	0.17
1	3539	2 YR	4440.00	256.39	266.98	264.04	267.58	0.00	6.84	914.17	639.81	0.41
1	3539	5 YR	6190.00	256.39	268.12	265.12	268.48	0.00	6.14	2503.13	1489.54	0.35
1	3539	10 YR	7280.00	256.39	268.71	265.79	268.97	0.00	5.73	3398.51	1617.38	0.31
1	3539	25 YR	11390.00	256.39	270.01	268.46	270.18	0.00	5.36	5595.47	1841.42	0.28
1	3539	50 YR	13460.00	256.39	270.84	268.78	270.97	0.00	4.86	7130.65	2007.13	0.24
1	3539	100 YR	16450.00	256.39	271.81	269.08	271.90	0.00	4.41	9290.13	2059.75	0.21
1	3539	250 YR	21360.00	256.39	272.34	269.46	272.46	0.00	5.01	10383.56	2098.09	0.24
1	3539	500 YR	25400.00	256.39	273.50	269.76	273.60	0.00	4.60	12905.94	2233.32	0.21
1	3674 C	2 YR	4440.00	256.76	267.52	264.05	268.13	0.00	6.84	876.74	426.18	0.39
1	3674 C	5 YR	6190.00	256.76	268.42	265.51	269.10	0.00	7.70	1554.37	697.19	0.42
1	3674 C	10 YR	7280.00	256.76	268.91	266.24	269.57	0.00	7.88	1925.23	826.82	0.42
1	3674 C	25 YR	11390.00	256.76	270.09	269.26	270.78	0.00	8.94	3187.43	1384.86	0.45
1	3674 C	50 YR	13460.00	256.76	270.93	269.45	271.39	0.00	7.97	4487.66	1613.87	0.39
1	3674 C	100 YR	16450.00	256.76	271.89	270.59	272.19	0.00	7.07	6131.92	1785.62	0.33
1	3674 C	250 YR	21360.00	256.76	272.44	271.02	272.78	0.00	7.73	7133.32	1813.98	0.36
1	3674 C	500 YR	25400.00	256.76	273.59	271.31	273.82	0.00	6.76	9269.61	1994.13	0.30
1	3743 Lake Dr.		Mult Open									
1	3848 D	2 YR	4440.00	256.76	268.13	264.21	268.61	0.00	6.29	1286.83	806.76	0.36
1	3848 D	5 YR	6190.00	256.76	270.00	266.96	270.18	0.00	4.83	3410.16	1188.90	0.25
1	3848 D	10 YR	7280.00	256.76	270.82	267.44	270.93	0.00	4.19	4797.95	1360.57	0.21
1	3848 D	25 YR	11390.00	256.76	271.73	268.97	271.89	0.00	5.17	6210.58	1612.58	0.25
1	3848 D	50 YR	13460.00	256.76	272.01	269.71	272.21	0.00	5.69	6673.68	1650.89	0.27
1	3848 D	100 YR	16450.00	256.76	272.53	270.02	272.73	0.00	6.11	7541.48	1720.20	0.29
1	3848 D	250 YR	21360.00	256.76	272.97	270.62	273.24	0.00	7.15	8311.01	1796.73	0.33
1	3848 D	500 YR	25400.00	256.76	273.70	270.79	273.95	0.00	7.24	9654.10	1922.72	0.33
1	4010	2 YR	4440.00	260.44	268.80	267.99	269.18	0.00	6.71	1612.75	904.05	0.48
1	4010	5 YR	6190.00	260.44	270.30	268.43	270.45	0.00	4.94	3510.65	1250.21	0.32
1	4010	10 YR	7280.00	260.44	271.00	268.83	271.11	0.00	4.51	4409.96	1340.34	0.28
1	4010	25 YR	11390.00	260.44	271.99	269.56	272.12	0.00	5.29	5833.80	1516.58	0.31
1	4010	50 YR	13460.00	260.44	272.31	269.87	272.46	0.00	5.71	6343.42	1600.78	0.32
1	4010	100 YR	16450.00	260.44	272.85	270.30	273.02	0.00	6.03	7221.29	1638.81	0.33
1	4010	250 YR	21360.00	260.44	273.39	270.12	273.59	0.00	6.85	8112.37	1691.53	0.37
1	4010	500 YR	25400.00	260.44	274.09	270.12	274.29	0.00	6.96	9315.03	1762.28	0.36

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	4191	2 YR	4440.00	258.93	269.58		269.77	0.00	5.12	2205.88	943.91	0.33
1	4191	5 YR	6190.00	258.93	270.64		270.79	0.00	4.97	3428.09	1270.60	0.30
1	4191	10 YR	7280.00	258.93	271.26		271.38	0.00	4.77	4238.49	1345.16	0.29
1	4191	25 YR	11390.00	258.93	272.29		272.43	0.00	5.43	5685.33	1462.04	0.3
1	4191	50 YR	13460.00	258.93	272.66		272.81	0.00	5.87	6235.35	1544.88	0.32
1	4191	100 YR	16450.00	258.93	273.21		273.38	0.00	6.22	7119.83	1625.38	0.33
1	4191	250 YR	21360.00	258.93	273.82		274.03	0.00	6.99	8138.14	1721.03	0.36
1	4191	500 YR	25400.00	258.93	274.51		274.72	0.00	7.32	9351.18	1814.77	0.37
1	4514	2 YR	3940.00	261.30	270.19		270.30	0.00	3.82	2436.63	1098.77	0.25
1	4514	5 YR	5500.00	261.30	271.14		271.24	0.00	3.81	3597.40	1311.29	0.23
1	4514	10 YR	6940.00	261.30	271.71		271.81	0.00	4.05	4367.27	1393.94	0.24
1	4514	25 YR	10980.00	261.30	272.81		272.93	0.00	4.68	5961.65	1470.27	0.26
1	4514	50 YR	12830.00	261.30	273.23		273.36	0.00	4.96	6592.51	1512.37	0.27
1	4514	100 YR	15940.00	261.30	273.83		273.97	0.00	5.40	7507.78	1583.23	0.29
1	4514	250 YR	20650.00	261.30	274.55		274.72	0.00	6.04	8675.59	1703.43	0.31
1	4514	500 YR	24540.00	261.30	275.27		275.46	0.00	6.53	9993.46	1938.64	0.33
1	4605	2 YR	3940.00	258.09	270.26	265.12	270.39	0.00	3.63	2609.21	1205.86	0.20
1	4605	5 YR	5500.00	258.09	271.21	267.29	271.32	0.00	3.74	3861.84	1430.73	0.20
1	4605	10 YR	6940.00	258.09	271.77	268.79	271.89	0.00	4.01	4701.95	1506.39	0.21
1	4605	25 YR	10980.00	258.09	272.89	270.01	273.02	0.00	4.64	6432.87	1586.59	0.23
1	4605	50 YR	12830.00	258.09	273.32	270.47	273.46	0.00	4.88	7118.48	1618.21	0.24
1	4605	100 YR	15940.00	258.09	273.92	270.81	274.08	0.00	5.33	8127.34	1711.12	0.25
1	4605	250 YR	20650.00	258.09	274.66	271.52	274.84	0.00	5.88	9407.89	1791.13	0.27
1	4605	500 YR	24540.00	258.09	275.40	271.94	275.58	0.00	6.08	10818.36	2041.19	0.27
1	4679 Garber St.		Bridge									
1	4797 E	2 YR	3940.00	258.14	270.62	264.74	270.73	0.00	3.29	3021.86	1196.43	0.18
1	4797 E	5 YR	5500.00	258.14	271.52	265.88	271.63	0.00	3.53	4106.87	1221.49	0.19
1	4797 E	10 YR	6940.00	258.14	272.10	267.04	272.22	0.00	3.84	4825.37	1255.67	0.20
1	4797 E	25 YR	10980.00	258.14	273.26	269.65	273.42	0.00	4.65	6326.20	1312.90	0.23
1	4797 E	50 YR	12830.00	258.14	273.71	270.61	273.88	0.00	4.98	6917.58	1351.08	0.24
1	4797 E	100 YR	15940.00	258.14	274.37	271.08	274.57	0.00	5.54	7839.21	1467.90	0.26
1	4797 E	250 YR	20650.00	258.14	275.14	271.65	275.37	0.00	6.22	8947.78	1584.32	0.29
1	4797 E	500 YR	24540.00	258.14	275.85	272.08	276.10	0.00	6.52	10165.80	1720.61	0.29
1	4928	2 YR	3940.00	255.58	270.75	262.56	270.79	0.00	2.08	4395.98	1109.26	0.11
1	4928	5 YR	5500.00	255.58	271.64	263.65	271.69	0.00	2.42	5408.81	1177.12	0.12
1	4928	10 YR	6940.00	255.58	272.23	264.84	272.29	0.00	2.73	6109.24	1215.11	0.1
1	4928	25 YR	10980.00	255.58	273.42	266.82	273.51	0.00	3.52	7591.57	1267.24	0.16
1	4928	50 YR	12830.00	255.58	273.87	267.75	273.98	0.00	3.84	8176.15	1305.18	0.17
1	4928	100 YR	15940.00	255.58	274.56	268.52	274.69	0.00	4.30	9081.65	1353.87	0.19
1	4928	250 YR	20650.00	255.58	275.34	269.73	275.51	0.00	5.03	10178.51	1495.49	0.22
1	4928	500 YR	24540.00	255.58	276.05	270.53	276.24	0.00	5.49	11238.66	1627.41	0.23
1	5421	2 YR	3940.00	258.37	270.87		270.93	0.00	2.79	3871.56	1090.56	0.15
1	5421	5 YR	5500.00	258.37	271.79		271.85	0.00	3.20	4908.16	1176.65	0.16
1	5421	10 YR	6940.00	258.37	272.40		272.47	0.00	3.47	5637.58	1204.75	0.17
1	5421	25 YR	10980.00	258.37	273.67		273.76	0.00	4.18	7283.78	1440.82	0.20
1	5421	50 YR	12830.00	258.37	274.17		274.26	0.00	4.43	8005.25	1490.26	0.21
1	5421	100 YR	15940.00	258.37	274.90		275.00	0.00	4.79	9114.37	1518.34	0.22
1	5421	250 YR	20650.00	258.37	275.78		275.90	0.00	5.33	10470.43	1596.75	0.24
1	5421	500 YR	24540.00	258.37	276.53		276.67	0.00	5.62	11722.17	1715.65	0.24
1	6038	2 YR	3960.00	260.47	271.13	267.04	271.23	0.00	3.53	2824.87	901.79	0.20
1	6038	5 YR	5510.00	260.47	272.08	268.49	272.19	0.00	3.88	3626.92	999.38	0.21
1	6038	10 YR	7050.00	260.47	272.72	268.72	272.84	0.00	4.29	4229.88	1094.65	0.22
1	6038	25 YR	11490.00	260.47	274.08	270.39	274.25	0.00	5.33	5625.93	1235.59	0.26
1	6038	50 YR	12820.00	260.47	274.59	270.63	274.75	0.00	5.42	6194.31	1285.79	0.26
1	6038	100 YR	16040.00	260.47	275.37	271.19	275.56	0.00	6.09	7114.32	1369.51	0.29
1	6038	250 YR	20640.00	260.47	276.30	271.84	276.53	0.00	6.72	8292.30	1617.96	0.31
1	6038	500 YR	24530.00	260.47	277.07	272.34	277.31	0.00	7.00	9288.17	1815.91	0.31
1	6255	2 YR	3960.00	258.08	271.25	268.83	271.54	0.00	5.63	1804.51	950.91	0.33
1	6255	5 YR	5510.00	258.08	272.22	270.06	272.49	0.00	5.88	2567.60	1125.91	0.33
1	6255	10 YR	7050.00	258.08	272.89	270.79	273.16	0.00	6.15	3157.53	1168.86	0.34
1	6255	25 YR	11490.00	258.08	274.32	271.98	274.62	0.00	7.13	4547.20	1330.41	0.36
1	6255	50 YR	12820.00	258.08	274.83	272.39	275.11	0.00	7.07	5085.75	1370.10	0.35
1	6255	100 YR	16040.00	258.08	275.66	272.85	275.94	0.00	7.38	5996.83	1427.93	0.36
1	6255	250 YR	20640.00	258.08	276.63	273.48	276.93	0.00	7.82	7124.28	1572.21	0.37
1	6255	500 YR	24530.00	258.08	277.40	273.95	277.71	0.00	8.13	8053.43	1790.21	0.37
1	6339	2 YR	3960.00	259.38	271.24	269.22	272.06	0.00	8.23	1127.41	917.15	0.48
1	6339	5 YR	5510.00	259.38	272.27	271.67	272.90	0.00	8.05	1877.67	1124.83	0.45
1	6339	10 YR	7050.00	259.38	272.97	272.19	273.53	0.00	8.19	2460.94	1239.91	0.44
1	6339	25 YR	11490.00	259.38	274.46	273.19	274.95	0.00	8.72	3861.94	1357.98	0.44
1	6339	50 YR	12820.00	259.38	274.96	273.42	275.41	0.00	8.60	4363.63	1421.76	0.42
1	6339	100 YR	16040.00	259.38	275.79	273.93	276.23	0.00	8.88	5256.44	1540.34	0.42
1	6339	250 YR	20640.00	259.38	276.77	274.53	277.21	0.00	9.20	6358.60	1650.85	0.43
1	6339	500 YR	24530.00	259.38	277.56	274.97	277.98	0.00	9.39	7247.79	1842.38	0.42
1	6400 Findley St.		Bridge									

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	6449 F	2 YR	3960.00	259.43	272.56	267.59	272.70	0.00	4.05	2226.68	1220.65	0.21
1	6449 F	5 YR	5510.00	259.43	273.32	270.76	273.47	0.00	4.45	2801.56	1321.19	0.23
1	6449 F	10 YR	7050.00	259.43	273.92	271.45	274.08	0.00	4.80	3274.85	1414.20	0.24
1	6449 F	25 YR	11490.00	259.43	275.29	272.60	275.49	0.00	5.61	4359.44	1566.72	0.26
1	6449 F	50 YR	12820.00	259.43	275.71	272.81	275.92	0.00	5.73	4691.73	1681.78	0.27
1	6449 F	100 YR	16040.00	259.43	276.49	273.28	276.73	0.00	6.17	5305.69	1853.24	0.28
1	6449 F	250 YR	20640.00	259.43	277.42	273.83	277.70	0.00	6.78	6040.67	1880.44	0.30
1	6449 F	500 YR	24530.00	259.43	278.16	274.23	278.48	0.00	7.19	6626.38	1915.97	0.31
1	6607	2 YR	3960.00	260.85	272.69	270.15	272.95	0.00	5.09	1583.15	1162.86	0.32
1	6607	5 YR	5510.00	260.85	273.46	271.72	273.74	0.00	5.53	2041.93	1230.91	0.33
1	6607	10 YR	7050.00	260.85	274.07	272.36	274.37	0.00	5.92	2408.76	1277.71	0.34
1	6607	25 YR	11490.00	260.85	275.46	273.37	275.83	0.00	6.88	3244.82	1430.28	0.37
1	6607	50 YR	12820.00	260.85	275.88	273.57	276.25	0.00	7.05	3495.44	1502.60	0.37
1	6607	100 YR	16040.00	260.85	276.67	274.06	277.09	0.00	7.61	3966.04	1705.03	0.39
1	6607	250 YR	20640.00	260.85	277.61	274.67	278.11	0.00	8.38	4530.38	1940.43	0.41
1	6607	500 YR	24530.00	260.85	278.35	275.12	278.92	0.00	8.92	4976.59	1986.33	0.43
1	6895	2 YR	3960.00	260.43	273.11	267.41	273.29	0.00	3.95	1920.80	1197.89	0.22
1	6895	5 YR	5510.00	260.43	273.87	269.01	274.11	0.00	4.78	2242.32	1328.95	0.25
1	6895	10 YR	7050.00	260.43	274.47	270.53	274.78	0.00	5.52	2500.50	1393.25	0.28
1	6895	25 YR	11490.00	260.43	275.92	272.46	276.41	0.00	7.25	3113.56	1723.53	0.35
1	6895	50 YR	12820.00	260.43	276.33	272.81	276.87	0.00	7.65	3289.14	1791.46	0.37
1	6895	100 YR	16040.00	260.43	277.13	273.62	277.81	0.00	8.65	3630.98	1912.08	0.40
1	6895	250 YR	20640.00	260.43	278.10	274.53	278.97	0.00	9.96	4042.50	2063.72	0.45
1	6895	500 YR	24530.00	260.43	278.85	275.21	279.88	0.00	10.93	4361.94	2150.63	0.48
1	6953 Railroad		Bridge									
1	7013 G	2 YR	3960.00	261.33	273.34	268.38	273.55	0.00	4.35	1792.21	1252.79	0.23
1	7013 G	5 YR	5510.00	261.33	274.19	269.53	274.46	0.00	5.16	2177.94	1281.33	0.27
1	7013 G	10 YR	7050.00	261.33	274.89	270.48	275.22	0.00	5.84	2495.91	1402.25	0.29
1	7013 G	25 YR	11490.00	261.33	276.61	272.86	277.08	0.00	7.32	3280.51	1627.46	0.34
1	7013 G	50 YR	12820.00	261.33	277.09	273.43	277.59	0.00	7.67	3495.30	1726.09	0.36
1	7013 G	100 YR	16040.00	261.33	278.21	274.22	278.78	0.00	8.34	4005.33	1776.18	0.37
1	7013 G	250 YR	20640.00	261.33	279.83	275.15	280.46	0.00	8.99	4741.57	1999.94	0.38
1	7013 G	500 YR	24530.00	261.33	281.46	275.84	282.09	0.00	9.15	5483.35	2232.98	0.37
1	7125	2 YR	3960.00	260.76	273.53	270.13	273.68	0.00	4.13	2355.17	1190.64	0.24
1	7125	5 YR	5510.00	260.76	274.46	271.90	274.62	0.00	4.52	2991.01	1354.10	0.25
1	7125	10 YR	7050.00	260.76	275.24	272.46	275.41	0.00	4.86	3518.13	1484.77	0.26
1	7125	25 YR	11490.00	260.76	277.13	273.43	277.33	0.00	5.62	4802.74	1725.96	0.27
1	7125	50 YR	12820.00	260.76	277.64	273.67	277.85	0.00	5.80	5149.22	1836.69	0.28
1	7125	100 YR	16040.00	260.76	278.83	274.18	279.06	0.00	6.15	5958.87	1951.51	0.28
1	7125	250 YR	20640.00	260.76	280.50	274.83	280.75	0.00	6.50	7096.23	2167.41	0.28
1	7125	500 YR	24530.00	260.76	282.11	275.32	282.36	0.00	6.57	8193.69	2266.83	0.27
1	7267	2 YR	3960.00	261.42	273.66	269.19	273.86	0.00	4.67	2295.44	1444.36	0.25
1	7267	5 YR	5510.00	261.42	274.61	272.36	274.80	0.00	4.88	3178.20	1708.57	0.26
1	7267	10 YR	7050.00	261.42	275.41	272.96	275.59	0.00	5.02	3926.05	1843.87	0.25
1	7267	25 YR	11490.00	261.42	277.35	274.03	277.52	0.00	5.41	5814.26	2073.48	0.25
1	7267	50 YR	12820.00	261.42	277.87	274.03	278.03	0.00	5.45	6341.24	2109.81	0.25
1	7267	100 YR	16040.00	261.42	279.08	274.83	279.24	0.00	5.53	7564.75	2138.44	0.24
1	7267	250 YR	20640.00	261.42	280.77	275.38	280.92	0.00	5.59	9267.98	2219.43	0.24
1	7267	500 YR	24530.00	261.42	282.37	275.80	282.51	0.00	5.47	10889.57	2326.19	0.22
1	7416 H	2 YR	3960.00	261.69	273.84	269.93	274.07	0.00	4.67	2235.97	1614.01	0.27
1	7416 H	5 YR	5500.00	261.69	274.80	272.55	274.99	0.00	4.78	3315.98	1870.17	0.27
1	7416 H	10 YR	7190.00	261.69	275.59	273.46	275.77	0.00	4.89	4255.18	1937.99	0.26
1	7416 H	25 YR	11610.00	261.69	277.54	274.52	277.68	0.00	4.90	6739.87	2101.01	0.24
1	7416 H	50 YR	12780.00	261.69	278.06	274.72	278.19	0.00	4.85	7429.34	2176.11	0.23
1	7416 H	100 YR	16170.00	261.69	279.26	275.16	279.38	0.00	4.94	9077.07	2249.80	0.23
1	7416 H	250 YR	20630.00	261.69	280.93	275.53	281.04	0.00	4.84	11432.16	2324.63	0.21
1	7416 H	500 YR	24530.00	261.69	282.52	275.72	282.62	0.00	4.65	13739.59	2386.40	0.19
1	7511	2 YR	3960.00	262.72	274.06	269.41	274.20	0.00	3.59	2765.49	1903.30	0.21
1	7511	5 YR	5500.00	262.72	274.99	270.55	275.11	0.00	3.71	3990.27	2052.78	0.21
1	7511	10 YR	7190.00	262.72	275.76	272.46	275.88	0.00	3.88	5041.01	2113.71	0.21
1	7511	25 YR	11610.00	262.72	277.66	274.17	277.77	0.00	4.01	7760.55	2179.85	0.20
1	7511	50 YR	12780.00	262.72	278.17	274.32	278.27	0.00	3.99	8497.88	2203.16	0.20
1	7511	100 YR	16170.00	262.72	279.36	274.83	279.46	0.00	4.11	10256.28	2301.90	0.19
1	7511	250 YR	20630.00	262.72	281.02	275.32	281.11	0.00	4.11	12794.66	2382.98	0.18
1	7511	500 YR	24530.00	262.72	282.59	275.69	282.67	0.00	3.99	15221.12	2430.64	0.17
1	7586 Jameson St.		Bridge									
1	7635	2 YR	3960.00	263.14	274.71	270.38	274.86	0.00	4.03	2141.80	1281.72	0.22
1	7635	5 YR	5500.00	263.14	275.88	271.61	276.01	0.00	4.19	3092.48	1760.91	0.22
1	7635	10 YR	7190.00	263.14	276.72	272.66	276.86	0.00	4.38	4169.07	2054.53	0.22
1	7635	25 YR	11610.00	263.14	278.10	274.55	278.23	0.00	4.79	6135.94	2196.64	0.23
1	7635	50 YR	12780.00	263.14	278.52	274.60	278.65	0.00	4.75	6756.62	2253.30	0.22
1	7635	100 YR	16170.00	263.14	279.59	275.44	279.71	0.00	4.70	8514.45	2468.33	0.21
1	7635	250 YR	20630.00	263.14	281.18	276.43	281.27	0.00	4.40	11270.07	2591.82	0.19
1	7635	500 YR	24530.00	263.14	282.71	276.95	282.78	0.00	4.05	14064.27	2701.36	0.17

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	7656	2 YR	3960.00	263.10	274.71	270.10	274.89	0.00	4.17	1834.09	1173.07	0.24
1	7656	5 YR	5500.00	263.10	275.88	271.35	276.05	0.00	4.31	2715.10	1661.36	0.23
1	7656	10 YR	7190.00	263.10	276.72	273.11	276.89	0.00	4.52	3711.98	2111.96	0.23
1	7656	25 YR	11610.00	263.10	278.10	274.79	278.26	0.00	4.91	5714.49	2205.37	0.2
1	7656	50 YR	12780.00	263.10	278.52	274.97	278.67	0.00	4.85	6345.49	2300.42	0.23
1	7656	100 YR	16170.00	263.10	279.60	275.92	279.73	0.00	4.79	8096.00	2468.50	0.22
1	7656	250 YR	20630.00	263.10	281.18	276.79	281.29	0.00	4.45	10857.63	2587.19	0.19
1	7656	500 YR	24530.00	263.10	282.71	277.22	282.79	0.00	4.08	13687.61	2726.70	0.17
1	7681	2 YR	3960.00	262.30	274.68	268.50	274.98	0.00	4.47	975.27	778.04	0.25
1	7681	5 YR	5500.00	262.30	275.79	269.69	276.19	0.00	5.29	1498.54	1356.01	0.28
1	7681	10 YR	7190.00	262.30	276.61	270.69	277.06	0.00	5.87	2264.01	1910.03	0.30
1	7681	25 YR	11610.00	262.30	278.01	273.06	278.41	0.00	6.37	4329.09	2305.85	0.31
1	7681	50 YR	12780.00	262.30	278.45	273.61	278.81	0.00	6.20	5055.79	2393.42	0.29
1	7681	100 YR	16170.00	262.30	279.56	277.43	279.82	0.00	5.80	6933.31	2478.31	0.26
1	7681	250 YR	20630.00	262.30	281.17	278.02	281.33	0.00	5.12	9851.84	2674.03	0.22
1	7681	500 YR	24530.00	262.30	282.70	278.47	282.82	0.00	4.56	12848.25	2790.47	0.19
1	7703 Railroad		Bridge									
1	7751 I	2 YR	3960.00	260.11	275.21	268.21	275.27	0.00	2.58	3071.49	1276.97	0.14
1	7751 I	5 YR	5500.00	260.11	276.15	269.87	276.22	0.00	2.90	3856.66	1495.61	0.15
1	7751 I	10 YR	7190.00	260.11	277.00	270.72	277.08	0.00	3.15	4710.87	1689.69	0.16
1	7751 I	25 YR	11610.00	260.11	278.33	273.20	278.44	0.00	3.86	6608.45	2318.29	0.18
1	7751 I	50 YR	12780.00	260.11	278.72	273.53	278.83	0.00	3.91	7259.31	2350.65	0.18
1	7751 I	100 YR	16170.00	260.11	279.86	274.17	279.96	0.00	3.95	9197.33	2446.75	0.18
1	7751 I	250 YR	20630.00	260.11	281.34	275.22	281.43	0.00	3.87	11945.91	2700.90	0.16
1	7751 I	500 YR	24530.00	260.11	282.82	275.71	282.89	0.00	3.66	14895.16	2811.73	0.15
1	7926	2 YR	3960.00	261.00	275.30	268.62	275.32	0.00	1.45	4777.39	1331.81	0.08
1	7926	5 YR	5500.00	261.00	276.26	269.14	276.28	0.00	1.67	5647.22	1375.29	0.09
1	7926	10 YR	7190.00	261.00	277.12	269.63	277.14	0.00	1.88	6460.69	1467.76	0.09
1	7926	25 YR	11610.00	261.00	278.48	270.45	278.53	0.00	2.47	7894.02	1836.82	0.12
1	7926	50 YR	12780.00	261.00	278.87	270.56	278.92	0.00	2.57	8379.45	1986.46	0.12
1	7926	100 YR	16170.00	261.00	279.99	271.41	280.04	0.00	2.76	10198.84	2308.02	0.12
1	7926	250 YR	20630.00	261.00	281.44	272.18	281.50	0.00	2.88	12915.55	2664.09	0.12
1	7926	500 YR	24530.00	261.00	282.89	272.64	282.95	0.00	2.82	16035.47	2922.46	0.12
1	8838	2 YR	3960.00	262.49	275.54	269.92	275.63	0.00	3.22	2386.87	870.17	0.18
1	8838	5 YR	5500.00	262.49	276.54	270.59	276.63	0.00	3.51	3256.83	1050.78	0.19
1	8838	10 YR	7190.00	262.49	277.43	271.22	277.53	0.00	3.67	4132.80	1178.43	0.1
1	8838	25 YR	11610.00	262.49	278.93	272.63	279.05	0.00	4.32	5797.10	1493.54	0.2
1	8838	50 YR	12780.00	262.49	279.33	272.98	279.45	0.00	4.36	6274.61	1599.12	0.21
1	8838	100 YR	16170.00	262.49	280.46	274.00	280.57	0.00	4.46	8100.74	2154.84	0.20
1	8838	250 YR	20630.00	262.49	281.86	274.91	281.94	0.00	4.00	12459.35	2595.48	0.18
1	8838	500 YR	24530.00	262.49	283.23	274.97	283.29	0.00	3.59	15913.55	3070.88	0.15
1	10041 J	2 YR	3920.00	266.31	276.87	273.49	276.95	0.00	3.65	2390.21	1391.98	0.22
1	10041 J	5 YR	5450.00	266.31	277.88	274.21	277.97	0.00	3.85	3160.10	1650.16	0.22
1	10041 J	10 YR	7170.00	266.31	278.77	274.77	278.86	0.00	4.11	4070.79	2161.58	0.22
1	10041 J	25 YR	11560.00	266.31	280.38	275.87	280.47	0.00	4.35	6473.09	2823.56	0.22
1	10041 J	50 YR	12730.00	266.31	280.74	276.10	280.82	0.00	4.33	7103.93	2875.27	0.21
1	10041 J	100 YR	16110.00	266.31	281.53	276.79	281.57	0.00	3.46	11377.26	3008.57	0.17
1	10041 J	250 YR	20550.00	266.31	282.52	277.43	282.55	0.00	2.72	18135.44	3211.74	0.13
1	10041 J	500 YR	24430.00	266.31	283.73	277.92	283.75	0.00	2.53	22121.21	3369.33	0.11
1	11738	2 YR	3310.00	265.19	278.79	273.51	278.90	0.00	3.28	1560.65	555.67	0.19
1	11738	5 YR	4720.00	265.19	279.95	274.84	280.11	0.00	3.95	1839.61	714.56	0.21
1	11738	10 YR	6370.00	265.19	280.43	275.69	280.67	0.00	5.01	1952.97	775.37	0.26
1	11738	25 YR	8270.00	265.19	281.99	276.37	282.06	0.00	3.35	5342.16	1115.72	0.17
1	11738	50 YR	9550.00	265.19	282.37	276.79	282.45	0.00	3.62	5787.63	1195.01	0.18
1	11738	100 YR	11680.00	265.19	282.78	277.41	282.88	0.00	4.06	6286.13	1236.66	0.19
1	11738	250 YR	15250.00	265.19	283.40	278.35	283.53	0.00	4.67	7070.52	1309.60	0.22
1	11738	500 YR	18220.00	265.19	284.45	279.05	284.57	0.00	4.76	8481.96	1424.95	0.22
1	11919	2 YR	3310.00	265.19	278.81	273.85	279.41	0.00	6.28	569.22	370.10	0.35
1	11919	5 YR	4720.00	265.19	279.90	275.33	280.84	0.00	7.93	661.26	508.94	0.42
1	11919	10 YR	6370.00	265.19	280.62	276.81	281.17	0.00	7.11	1829.80	658.61	0.37
1	11919	25 YR	8270.00	265.19	281.98	278.45	282.37	0.00	6.64	2949.20	993.50	0.32
1	11919	50 YR	9550.00	265.19	282.38	279.52	282.77	0.00	6.88	3365.90	1096.03	0.33
1	11919	100 YR	11680.00	265.19	282.80	280.98	283.23	0.00	7.45	3846.68	1197.98	0.35
1	11919	250 YR	15250.00	265.19	283.44	281.55	283.91	0.00	8.15	4625.82	1230.43	0.38
1	11919	500 YR	18220.00	265.19	284.51	282.55	284.84	0.00	7.31	5969.78	1364.05	0.33
1	11948 Railroad Access		Bridge									
1	11984 K	2 YR	3310.00	267.08	279.53	274.35	280.13	0.00	6.24	559.66	293.51	0.35
1	11984 K	5 YR	4720.00	267.08	280.89	275.78	281.80	0.00	7.74	693.37	718.71	0.40
1	11984 K	10 YR	6370.00	267.08	281.86	277.26	282.20	0.00	5.95	2113.06	824.01	0.30
1	11984 K	25 YR	8270.00	267.08	282.56	278.78	282.89	0.00	6.14	2707.15	863.36	0.30
1	11984 K	50 YR	9550.00	267.08	282.83	279.86	283.19	0.00	6.53	2940.55	890.70	0.31
1	11984 K	100 YR	11680.00	267.08	283.17	281.89	283.59	0.00	7.22	3254.45	953.13	0.34
1	11984 K	250 YR	15250.00	267.08	283.58	282.45	284.17	0.00	8.74	3661.24	1019.97	0.41
1	11984 K	500 YR	18220.00	267.08	284.39	282.80	284.95	0.00	8.96	4618.89	1345.70	0.41

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	12109	2 YR	3310.00	263.40	280.15	272.95	280.51	0.00	5.18	834.22	585.64	0.26
1	12109	5 YR	4720.00	263.40	281.92	274.99	282.28	0.00	5.50	1244.20	730.88	0.25
1	12109	10 YR	6370.00	263.40	282.26	277.18	282.42	0.00	4.49	2676.91	750.35	0.21
1	12109	25 YR	8270.00	263.40	282.91	279.59	283.09	0.00	4.93	3198.67	831.18	0.22
1	12109	50 YR	9550.00	263.40	283.20	280.43	283.41	0.00	5.34	3446.27	884.90	0.24
1	12109	100 YR	11680.00	263.40	283.59	282.20	283.84	0.00	5.95	3815.90	951.83	0.26
1	12109	250 YR	15250.00	263.40	284.22	282.21	284.52	0.00	6.66	4443.93	1039.38	0.29
1	12109	500 YR	18220.00	263.40	284.99	282.21	285.28	0.00	6.80	5319.07	1242.80	0.29
1	12467	2 YR	3350.00	263.40	280.78		280.88	0.00	3.24	1986.61	614.67	0.16
1	12467	5 YR	4760.00	263.40	282.52		282.61	0.00	3.21	3208.42	782.56	0.15
1	12467	10 YR	6650.00	263.40	282.62		282.77	0.00	4.41	3281.66	793.07	0.20
1	12467	25 YR	8280.00	263.40	283.32		283.49	0.00	4.87	3894.58	996.34	0.21
1	12467	50 YR	9690.00	263.40	283.66		283.86	0.00	5.26	4245.31	1035.67	0.23
1	12467	100 YR	11820.00	263.40	284.15		284.38	0.00	5.74	4771.04	1090.04	0.25
1	12467	250 YR	15250.00	263.40	284.88		285.14	0.00	6.39	5588.74	1162.31	0.27
1	12467	500 YR	18190.00	263.40	285.64		285.90	0.00	6.56	6506.41	1245.05	0.27
1	13532 L	2 YR	3350.00	267.81	281.60		281.81	0.00	4.95	1572.24	789.05	0.28
1	13532 L	5 YR	4760.00	267.81	283.10		283.20	0.00	3.89	2859.53	997.01	0.21
1	13532 L	10 YR	6650.00	267.81	283.58		283.70	0.00	4.60	3335.99	1017.75	0.24
1	13532 L	25 YR	8280.00	267.81	284.31		284.43	0.00	4.54	4097.04	1046.24	0.23
1	13532 L	50 YR	9690.00	267.81	284.74		284.86	0.00	4.71	4550.10	1065.22	0.23
1	13532 L	100 YR	11820.00	267.81	285.32		285.45	0.00	4.94	5173.85	1079.91	0.24
1	13532 L	250 YR	15250.00	267.81	286.17		286.31	0.00	5.25	6095.47	1103.57	0.25
1	13532 L	500 YR	18190.00	267.81	286.90		287.05	0.00	5.41	6905.69	1139.77	0.25
1	13867	2 YR	3350.00	268.21	281.99	277.58	282.71	0.00	6.95	556.17	223.14	0.39
1	13867	5 YR	4760.00	268.21	283.07	279.08	283.98	0.00	8.12	832.39	305.78	0.43
1	13867	10 YR	6650.00	268.21	283.37	280.91	284.88	0.01	10.67	920.82	371.10	0.56
1	13867	25 YR	8280.00	268.21	283.86	283.62	285.71	0.01	12.10	1142.04	475.91	0.62
1	13867	50 YR	9690.00	268.21	284.60	284.60	286.15	0.01	11.72	1514.26	545.40	0.59
1	13867	100 YR	11820.00	268.21	285.33	285.33	286.78	0.01	11.98	2003.31	790.29	0.58
1	13867	250 YR	15250.00	268.21	286.17	286.17	287.49	0.01	12.24	2794.78	1003.15	0.58
1	13867	500 YR	18190.00	268.21	287.04	286.57	288.05	0.00	11.50	3695.35	1132.84	0.52
1	13973 M	2 YR	3350.00	270.17	282.10	278.53	282.90	0.00	7.40	557.19	94.81	0.43
1	13973 M	5 YR	4760.00	270.17	283.09	279.99	284.37	0.00	9.36	660.49	117.33	0.52
1	13973 M	10 YR	6650.00	270.17	283.29	281.57	285.68	0.00	12.81	685.90	136.57	0.71
1	13973 M	25 YR	8280.00	270.17	283.51	282.76	287.03	0.00	15.58	720.82	186.37	0.85
1	13973 M	50 YR	9690.00	270.17	286.10	286.10	287.96	0.00	12.34	1998.22	772.38	0.60
1	13973 M	100 YR	11820.00	270.17	287.05	287.05	288.75	0.00	12.46	2897.52	1114.42	0.59
1	13973 M	250 YR	15250.00	270.17	287.98	287.98	289.60	0.00	13.03	4024.51	1252.08	0.59
1	13973 M	500 YR	18190.00	270.17	288.50	288.50	290.19	0.00	13.84	4674.22	1269.33	0.62
1	14054 US Highway 67		Bridge									
1	14110	2 YR	3350.00	270.17	282.78	278.39	283.28	0.00	5.73	634.00	100.75	0.34
1	14110	5 YR	4760.00	270.17	284.22	279.53	284.94	0.00	6.91	779.49	241.80	0.38
1	14110	10 YR	6650.00	270.17	284.43	280.93	285.76	0.00	9.44	801.86	265.10	0.52
1	14110	25 YR	8280.00	270.17	285.54	282.07	287.03	0.00	10.16	1389.46	608.79	0.53
1	14110	50 YR	9690.00	270.17	286.81	282.92	287.98	0.00	9.52	2380.10	917.32	0.47
1	14110	100 YR	11820.00	270.17	287.64	286.47	288.77	0.00	9.83	3176.67	1029.88	0.47
1	14110	250 YR	15250.00	270.17	288.23	287.61	289.63	0.00	11.30	3799.89	1064.70	0.53
1	14110	500 YR	18190.00	270.17	288.39	288.27	290.22	0.00	13.05	3973.86	1070.30	0.61
1	14157	2 YR	3350.00	269.22	282.83	278.09	283.31	0.00	5.59	618.95	89.42	0.34
1	14157	5 YR	4760.00	269.22	284.27	279.43	284.98	0.00	6.77	749.91	244.66	0.38
1	14157	10 YR	6650.00	269.22	284.54	280.81	285.84	0.00	9.19	776.83	275.35	0.50
1	14157	25 YR	8280.00	269.22	285.68	281.88	287.11	0.00	9.86	1277.77	539.80	0.51
1	14157	50 YR	9690.00	269.22	286.81	282.77	288.06	0.00	9.63	2188.44	915.35	0.48
1	14157	100 YR	11820.00	269.22	287.63	284.02	288.85	0.00	9.98	2972.77	988.14	0.48
1	14157	250 YR	15250.00	269.22	288.22	287.72	289.72	0.00	11.47	3563.79	1017.64	0.54
1	14157	500 YR	18190.00	269.22	288.37	288.35	290.35	0.00	13.29	3718.61	1025.54	0.62
1	14179	2 YR	3350.00	270.02	282.87	278.40	283.33	0.00	5.45	624.81	83.16	0.33
1	14179	5 YR	4760.00	270.02	284.34	279.61	285.00	0.00	6.55	748.38	227.18	0.37
1	14179	10 YR	6650.00	270.02	284.69	280.92	285.89	0.00	8.83	779.51	254.24	0.49
1	14179	25 YR	8280.00	270.02	285.84	281.92	287.16	0.00	9.45	1331.54	536.95	0.50
1	14179	50 YR	9690.00	270.02	286.82	282.73	288.09	0.00	9.56	2005.11	879.38	0.48
1	14179	100 YR	11820.00	270.02	287.61	283.89	288.90	0.00	10.04	2775.56	991.50	0.49
1	14179	250 YR	15250.00	270.02	288.19	287.76	289.80	0.00	11.59	3362.63	1042.07	0.55
1	14179	500 YR	18190.00	270.02	288.45	288.45	290.46	0.00	13.16	3635.57	1078.83	0.62
1	14224 Robison Rd.		Bridge									
1	14302 N	2 YR	3350.00	270.10	283.54	279.43	283.89	0.00	5.91	1055.53	381.80	0.31
1	14302 N	5 YR	4760.00	270.10	285.86	280.66	286.04	0.00	5.08	2484.86	820.39	0.24
1	14302 N	10 YR	6650.00	270.10	286.21	281.99	286.53	0.00	6.73	2692.75	924.35	0.31
1	14302 N	25 YR	8280.00	270.10	286.89	282.88	287.19	0.00	6.92	3809.18	1068.82	0.32
1	14302 N	50 YR	9690.00	270.10	287.90	283.56	288.11	0.00	6.22	4954.16	1203.94	0.27
1	14302 N	100 YR	11820.00	270.10	288.75	284.50	288.92	0.00	6.10	6005.15	1294.03	0.26
1	14302 N	250 YR	15250.00	270.10	289.65	285.31	289.82	0.00	6.34	7314.10	1584.44	0.27
1	14302 N	500 YR	18190.00	270.10	290.32	286.69	290.48	0.00	6.45	8465.78	1853.28	0.27

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	14437	2 YR	3350.00	269.28	284.00	276.86	284.08	0.00	2.75	2068.85	783.38	0.14
1	14437	5 YR	4760.00	269.28	286.12	277.92	286.13	0.00	1.29	7047.12	1007.58	0.06
1	14437	10 YR	6650.00	269.28	286.66	278.99	286.68	0.00	1.68	7565.70	1110.69	0.08
1	14437	25 YR	8280.00	269.28	287.31	280.55	287.33	0.00	1.91	8489.53	1391.82	0.0
1	14437	50 YR	9690.00	269.28	288.19	281.10	288.21	0.00	1.96	9736.81	1421.62	0.09
1	14437	100 YR	11820.00	269.28	289.00	281.84	289.02	0.00	2.13	10889.79	1448.33	0.09
1	14437	250 YR	15250.00	269.28	289.89	282.74	289.92	0.00	2.44	12230.14	1543.27	0.10
1	14437	500 YR	18190.00	269.28	290.55	283.69	290.59	0.00	2.68	13283.92	1703.80	0.11
1	15547 O	2 YR	3350.00	269.28	284.49		284.52	0.00	2.27	2996.31	506.24	0.12
1	15547 O	5 YR	4760.00	269.28	286.26		286.29	0.00	2.43	3915.33	551.26	0.12
1	15547 O	10 YR	6650.00	269.28	286.87		286.93	0.00	3.12	4274.16	623.64	0.15
1	15547 O	25 YR	8280.00	269.28	287.56		287.64	0.00	3.52	4740.75	727.30	0.16
1	15547 O	50 YR	9690.00	269.28	288.44		288.52	0.00	3.64	5409.82	778.61	0.16
1	15547 O	100 YR	11820.00	269.28	289.27		289.36	0.00	3.94	6065.95	809.50	0.17
1	15547 O	250 YR	15250.00	269.28	290.22		290.33	0.00	4.45	6908.72	1060.46	0.19
1	15547 O	500 YR	18190.00	269.28	290.92		291.04	0.00	4.79	7677.21	1126.17	0.20
1	16554	2 YR	3670.00	270.62	284.89		284.93	0.00	2.79	2488.77	651.04	0.15
1	16554	5 YR	5490.00	270.62	286.62		286.67	0.00	2.88	3964.96	1025.14	0.14
1	16554	10 YR	6750.00	270.62	287.35		287.40	0.00	3.00	4717.06	1044.46	0.14
1	16554	25 YR	8630.00	270.62	288.11		288.17	0.00	3.26	5549.81	1102.51	0.15
1	16554	50 YR	10530.00	270.62	288.98		289.04	0.00	3.35	6538.88	1156.75	0.15
1	16554	100 YR	12280.00	270.62	289.83		289.88	0.00	3.35	7519.60	1176.58	0.15
1	16554	250 YR	16240.00	270.62	290.88		290.94	0.00	3.79	8790.18	1245.19	0.16
1	16554	500 YR	18960.00	270.62	291.62		291.69	0.00	3.95	9722.56	1253.57	0.17
1	17149 P	2 YR	3670.00	272.99	285.29	281.50	285.33	0.00	2.44	3012.10	695.70	0.15
1	17149 P	5 YR	5490.00	272.99	286.99	282.35	287.03	0.00	2.53	4221.85	808.36	0.14
1	17149 P	10 YR	6750.00	272.99	287.73	282.65	287.78	0.00	2.75	4803.34	969.75	0.15
1	17149 P	25 YR	8630.00	272.99	288.55	283.03	288.61	0.00	3.06	5557.75	1117.32	0.16
1	17149 P	50 YR	10530.00	272.99	289.43	283.38	289.49	0.00	3.24	6475.13	1291.32	0.16
1	17149 P	100 YR	12280.00	272.99	290.25	283.67	290.32	0.00	3.31	7411.74	1618.04	0.16
1	17149 P	250 YR	16240.00	272.99	291.36	284.27	291.43	0.00	3.53	10175.68	2152.62	0.16
1	17149 P	500 YR	18960.00	272.99	292.12	284.62	292.19	0.00	3.64	11901.48	2405.32	0.16
1	18168	2 YR	3670.00	275.26	286.03	281.73	286.21	0.00	3.84	1460.12	961.51	0.23
1	18168	5 YR	5490.00	275.26	287.62	282.93	287.82	0.00	4.33	2006.36	1553.02	0.24
1	18168	10 YR	6750.00	275.26	288.40	283.60	288.63	0.00	4.72	2287.27	1869.50	0.25
1	18168	25 YR	8630.00	275.26	289.28	284.62	289.57	0.00	5.33	2605.59	1907.35	0.28
1	18168	50 YR	10530.00	275.26	290.16	285.24	290.50	0.00	5.79	2922.48	1954.59	0.2
1	18168	100 YR	12280.00	275.26	290.86	285.74	290.99	0.00	4.23	6454.90	2220.01	0.21
1	18168	250 YR	16240.00	275.26	291.98	286.79	292.12	0.00	4.61	7673.75	2562.46	0.22
1	18168	500 YR	18960.00	275.26	292.58	287.39	292.63	0.00	3.31	14921.48	2686.29	0.15
1	18225 Railroad		Mult Open									
1	18279 Q	2 YR	3670.00	274.83	287.58	282.91	287.76	0.00	4.34	1684.78	1345.63	0.22
1	18279 Q	5 YR	5490.00	274.83	289.29	284.89	289.48	0.00	4.80	2308.62	1756.22	0.23
1	18279 Q	10 YR	6750.00	274.83	289.86	285.64	290.10	0.00	5.36	2534.06	1920.53	0.25
1	18279 Q	25 YR	8630.00	274.83	290.16	286.50	290.50	0.00	6.52	2652.93	2069.85	0.31
1	18279 Q	50 YR	10530.00	274.83	291.23	287.14	291.59	0.00	6.82	3076.31	2376.96	0.31
1	18279 Q	100 YR	12280.00	274.83	291.50	287.58	291.95	0.00	7.66	3183.18	2427.98	0.34
1	18279 Q	250 YR	16240.00	274.83	293.56	288.47	293.57	0.00	2.40	18355.75	2697.03	0.10
1	18279 Q	500 YR	18960.00	274.83	293.97	289.03	293.99	0.00	2.62	19483.98	2721.72	0.11
1	18801	2 YR	3670.00	272.91	287.97	281.53	288.00	0.00	1.96	4384.77	1298.42	0.11
1	18801	5 YR	5490.00	272.91	289.68	282.39	289.71	0.00	2.03	6154.98	1655.05	0.10
1	18801	10 YR	6750.00	272.91	290.33	283.01	290.35	0.00	2.22	6867.48	1965.86	0.11
1	18801	25 YR	8630.00	272.91	290.82	283.53	290.85	0.00	2.60	7476.03	2128.99	0.12
1	18801	50 YR	10530.00	272.91	291.89	284.08	291.93	0.00	2.62	8830.03	2318.11	0.12
1	18801	100 YR	12280.00	272.91	292.31	285.38	292.35	0.00	2.86	9358.62	2362.68	0.13
1	18801	250 YR	16240.00	272.91	293.64	286.10	293.66	0.00	2.39	16160.45	2605.86	0.10
1	18801	500 YR	18960.00	272.91	294.07	286.44	294.10	0.00	2.60	17288.39	2649.65	0.11
1	19254	2 YR	3670.00	275.08	288.24		288.42	0.00	4.52	2262.86	1110.98	0.26
1	19254	5 YR	5490.00	275.08	289.93		290.01	0.00	3.55	4347.40	1458.27	0.19
1	19254	10 YR	6750.00	275.08	290.60		290.66	0.00	3.49	5389.34	1663.25	0.18
1	19254	25 YR	8630.00	275.08	291.16		291.23	0.00	3.74	6354.63	1740.72	0.19
1	19254	50 YR	10530.00	275.08	292.19		292.25	0.00	3.42	8278.02	1941.93	0.16
1	19254	100 YR	12280.00	275.08	292.65		292.71	0.00	3.65	9180.24	1995.71	0.17
1	19254	250 YR	16240.00	275.08	293.87		293.93	0.00	3.63	11704.25	2133.25	0.16
1	19254	500 YR	18960.00	275.08	294.33		294.39	0.00	3.84	12687.90	2178.71	0.17
1	19365	2 YR	3780.00	274.81	288.40		288.79	0.00	5.72	1255.41	450.29	0.30
1	19365	5 YR	5570.00	274.81	289.98		290.30	0.00	5.80	2244.42	838.48	0.28
1	19365	10 YR	6820.00	274.81	290.63		290.96	0.00	6.18	2889.13	1178.23	0.30
1	19365	25 YR	8860.00	274.81	291.21		291.57	0.00	6.82	3619.06	1378.24	0.32
1	19365	50 YR	10550.00	274.81	292.25		292.50	0.00	6.13	5193.39	1576.60	0.28
1	19365	100 YR	12570.00	274.81	292.73		292.98	0.00	6.40	5964.82	1654.13	0.29
1	19365	250 YR	16340.00	274.81	293.96		294.16	0.00	6.25	8106.33	1819.73	0.27
1	19365	500 YR	18860.00	274.81	294.43		294.63	0.00	6.41	8972.97	1863.06	0.27
1	20188	2 YR	3780.00	272.76	290.03		290.33	0.00	5.20	1979.55	1332.53	0.24
1	20188	5 YR	5570.00	272.76	291.34		291.51	0.00	4.69	3943.32	1578.33	0.21

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	20188	10 YR	6820.00	272.76	291.98		292.12	0.00	4.55	4979.95	1621.03	0.20
1	20188	25 YR	8860.00	272.76	292.68		292.81	0.00	4.72	6126.36	1669.64	0.20
1	20188	50 YR	10550.00	272.76	293.40		293.51	0.00	4.58	7341.07	1705.33	0.19
1	20188	100 YR	12570.00	272.76	293.92		294.03	0.00	4.75	8232.15	1725.75	0.20
1	20188	250 YR	16340.00	272.76	295.01		295.10	0.00	4.79	10133.39	1771.64	0.19
1	20188	500 YR	18860.00	272.76	295.50		295.60	0.00	4.99	11015.50	1791.16	0.20
1	20846	2 YR	3780.00	274.53	290.89	284.03	291.00	0.00	3.47	1949.90	724.21	0.17
1	20846	5 YR	5570.00	274.53	292.02	285.32	292.20	0.00	4.38	2341.74	1039.42	0.21
1	20846	10 YR	6820.00	274.53	292.64	286.08	292.85	0.00	4.93	2554.08	1143.99	0.23
1	20846	25 YR	8860.00	274.53	293.33	287.12	293.50	0.00	4.87	4622.47	1256.82	0.22
1	20846	50 YR	10550.00	274.53	294.01	287.86	294.19	0.00	5.20	5731.73	1318.65	0.23
1	20846	100 YR	12570.00	274.53	294.56	288.96	294.75	0.00	5.54	6467.51	1357.48	0.24
1	20846	250 YR	16340.00	274.53	295.62	289.97	295.81	0.00	5.84	7941.96	1417.64	0.24
1	20846	500 YR	18860.00	274.53	296.15	290.52	296.35	0.00	6.13	8695.48	1447.42	0.25
1	21074 R	2 YR	3750.00	277.80	291.00	287.50	291.46	0.00	6.03	864.25	177.54	0.35
1	21074 R	5 YR	5520.00	277.80	292.17	288.97	292.85	0.00	7.46	1039.34	304.51	0.41
1	21074 R	10 YR	6760.00	277.80	292.82	289.70	293.61	0.00	8.24	1370.84	620.17	0.43
1	21074 R	25 YR	8780.00	277.80	293.31	290.72	294.51	0.01	10.19	1702.35	849.36	0.53
1	21074 R	50 YR	10450.00	277.80	294.08	291.53	295.15	0.01	10.28	2609.02	1103.73	0.51
1	21074 R	100 YR	12420.00	277.80	294.75	292.86	295.60	0.01	9.83	3380.41	1173.70	0.48
1	21074 R	250 YR	16090.00	277.80	295.91	294.94	296.49	0.00	9.05	4803.15	1336.06	0.42
1	21074 R	500 YR	18560.00	277.80	296.47	295.26	297.00	0.00	8.96	5582.27	1443.54	0.41
1	21115 Piney Rd.		Bridge									
1	21181 S	2 YR	3750.00	277.80	291.93	287.30	292.42	0.00	5.93	713.71	131.46	0.33
1	21181 S	5 YR	5520.00	277.80	293.40	288.85	294.13	0.00	7.33	865.26	169.96	0.38
1	21181 S	10 YR	6760.00	277.80	294.81	289.75	295.54	0.00	7.65	1436.00	800.34	0.37
1	21181 S	25 YR	8780.00	277.80	296.37	291.04	296.78	0.00	6.48	2596.57	1178.05	0.30
1	21181 S	50 YR	10450.00	277.80	297.52	292.02	297.70	0.00	5.08	4562.14	1507.11	0.22
1	21181 S	100 YR	12420.00	277.80	297.58	295.41	297.83	0.00	5.91	4659.30	1515.06	0.26
1	21181 S	250 YR	16090.00	277.80	298.06	296.37	298.36	0.00	6.68	5403.92	1563.53	0.29
1	21181 S	500 YR	18560.00	277.80	298.34	296.82	298.66	0.00	7.06	5835.02	1593.33	0.30
1	21236	2 YR	3750.00	277.90	292.07	287.37	292.53	0.00	6.07	809.21	171.34	0.32
1	21236	5 YR	5520.00	277.90	293.84	289.22	294.32	0.00	6.52	1250.33	532.62	0.32
1	21236	10 YR	6760.00	277.90	295.48	290.19	295.76	0.00	5.58	2165.94	901.38	0.25
1	21236	25 YR	8780.00	277.90	296.65	291.46	296.89	0.00	5.51	3020.23	965.99	0.24
1	21236	50 YR	10450.00	277.90	297.61	291.92	297.76	0.00	4.77	4656.00	1152.60	0.20
1	21236	100 YR	12420.00	277.90	297.71	294.30	297.90	0.00	5.51	4767.28	1154.58	0.23
1	21236	250 YR	16090.00	277.90	298.21	295.15	298.45	0.00	6.19	5351.27	1165.10	0.26
1	21236	500 YR	18560.00	277.90	298.48	295.80	298.75	0.00	6.65	5664.25	1171.38	0.28
1	21273	2 YR	3750.00	276.81	292.08	286.89	292.67	0.00	6.49	721.03	156.76	0.34
1	21273	5 YR	5520.00	276.81	293.82	288.98	294.49	0.00	7.34	1120.09	442.19	0.36
1	21273	10 YR	6760.00	276.81	295.49	290.07	295.83	0.00	5.90	2124.87	884.86	0.27
1	21273	25 YR	8780.00	276.81	296.68	291.77	296.93	0.00	5.46	3044.64	974.36	0.24
1	21273	50 YR	10450.00	276.81	297.62	294.81	297.79	0.00	4.95	4458.32	1136.45	0.21
1	21273	100 YR	12420.00	276.81	297.73	295.10	297.95	0.00	5.70	4574.10	1138.13	0.24
1	21273	250 YR	16090.00	276.81	298.23	295.94	298.50	0.00	6.39	5155.93	1146.52	0.27
1	21273	500 YR	18560.00	276.81	298.51	296.32	298.81	0.00	6.85	5468.64	1151.01	0.29
1	21317 US Highway 59 N		Bridge									
1	21343	2 YR	3750.00	276.81	292.28	286.89	292.84	0.00	6.35	760.96	202.08	0.33
1	21343	5 YR	5520.00	276.81	294.29	288.96	294.72	0.00	6.18	1588.60	590.11	0.30
1	21343	10 YR	6760.00	276.81	295.74	290.08	295.96	0.00	5.00	2606.67	779.44	0.23
1	21343	25 YR	8780.00	276.81	296.89	291.74	297.07	0.00	4.77	3563.26	925.24	0.21
1	21343	50 YR	10450.00	276.81	297.73	294.49	297.88	0.00	4.60	4430.50	1085.15	0.20
1	21343	100 YR	12420.00	276.81	297.87	294.90	298.07	0.00	5.27	4587.31	1096.86	0.23
1	21343	250 YR	16090.00	276.81	298.41	295.63	298.67	0.00	6.28	5177.20	1114.44	0.26
1	21343	500 YR	18560.00	276.81	298.72	295.92	299.01	0.00	6.68	5530.55	1119.48	0.28
1	21361	2 YR	3750.00	276.81	292.33	286.88	292.88	0.00	6.28	765.44	184.75	0.33
1	21361	5 YR	5520.00	276.81	294.33	288.94	294.74	0.00	6.13	1594.93	601.42	0.29
1	21361	10 YR	6760.00	276.81	295.75	290.08	295.97	0.00	5.01	2577.28	763.55	0.23
1	21361	25 YR	8780.00	276.81	296.90	291.71	297.08	0.00	4.79	3501.04	905.05	0.21
1	21361	50 YR	10450.00	276.81	297.73	291.87	297.91	0.00	4.97	4359.66	1078.90	0.21
1	21361	100 YR	12420.00	276.81	297.88	294.93	298.10	0.00	5.67	4516.99	1086.67	0.24
1	21361	250 YR	16090.00	276.81	298.43	295.56	298.69	0.00	6.34	5118.28	1105.81	0.27
1	21361	500 YR	18560.00	276.81	298.74	295.97	299.04	0.00	6.74	5471.37	1111.91	0.28
1	21382	2 YR	3750.00	276.81	292.82	284.24	293.01	0.00	3.57	1259.83	328.24	0.18
1	21382	5 YR	5520.00	276.81	294.63	285.91	294.83	0.00	3.98	2006.25	509.04	0.19
1	21382	10 YR	6760.00	276.81	295.83	286.71	296.00	0.00	3.91	2784.14	721.96	0.18
1	21382	25 YR	8780.00	276.81	296.93	287.95	297.10	0.00	4.07	3629.12	850.47	0.18
1	21382	50 YR	10450.00	276.81	297.74	288.91	297.92	0.00	4.36	4431.96	1051.24	0.19
1	21382	100 YR	12420.00	276.81	297.89	289.99	298.13	0.00	5.04	4586.28	1066.40	0.21
1	21382	250 YR	16090.00	276.81	298.43	291.96	298.73	0.00	5.80	5177.43	1100.80	0.24
1	21382	500 YR	18560.00	276.81	298.75	294.50	299.09	0.00	6.25	5528.11	1113.91	0.26
1	21437 US Highway 59 S		Bridge									

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	21481	2 YR	3750.00	277.40	293.01	284.43	293.18	0.00	3.50	1300.09	277.35	0.18
1	21481	5 YR	5520.00	277.40	294.84	286.03	295.04	0.00	3.93	2017.88	531.77	0.18
1	21481	10 YR	6760.00	277.40	296.06	286.85	296.23	0.00	3.86	2741.97	623.83	0.17
1	21481	25 YR	8780.00	277.40	297.19	288.08	297.38	0.00	4.18	3475.60	855.61	0.1
1	21481	50 YR	10450.00	277.40	298.01	289.02	298.20	0.00	4.37	4315.77	953.83	0.19
1	21481	100 YR	12420.00	277.40	298.18	290.13	298.42	0.00	5.03	4478.16	970.78	0.21
1	21481	250 YR	16090.00	277.40	298.75	291.96	299.07	0.00	5.87	5058.34	1177.20	0.24
1	21481	500 YR	18560.00	277.40	299.09	294.47	299.44	0.00	6.36	5476.48	1306.19	0.26
1	21524	2 YR	3750.00	278.13	293.00	285.08	293.25	0.00	4.41	1067.45	191.22	0.21
1	21524	5 YR	5520.00	278.13	294.81	286.92	295.13	0.00	5.13	1658.15	515.10	0.23
1	21524	10 YR	6760.00	278.13	296.05	288.17	296.30	0.00	4.89	2388.17	688.36	0.21
1	21524	25 YR	8780.00	278.13	297.20	290.04	297.42	0.00	4.93	3124.19	794.52	0.21
1	21524	50 YR	10450.00	278.13	298.03	291.22	298.24	0.00	5.00	3959.34	870.09	0.21
1	21524	100 YR	12420.00	278.13	298.20	292.63	298.47	0.00	5.75	4113.02	908.53	0.24
1	21524	250 YR	16090.00	278.13	298.78	294.75	299.13	0.00	6.67	4685.41	1114.98	0.27
1	21524	500 YR	18560.00	278.13	299.12	296.18	299.52	0.00	7.27	5086.71	1265.86	0.29
1	21607	2 YR	3750.00	278.19	293.15	284.91	293.33	0.00	3.55	1188.63	148.92	0.18
1	21607	5 YR	5520.00	278.19	294.95	286.37	295.21	0.00	4.32	1634.30	485.60	0.20
1	21607	10 YR	6760.00	278.19	296.11	287.20	296.35	0.00	4.43	2248.45	650.33	0.20
1	21607	25 YR	8780.00	278.19	297.24	288.42	297.51	0.00	4.87	2990.95	874.55	0.21
1	21607	50 YR	10450.00	278.19	298.07	289.23	298.31	0.00	4.83	3905.62	953.65	0.21
1	21607	100 YR	12420.00	278.19	298.26	290.60	298.56	0.00	5.50	4088.35	975.09	0.23
1	21607	250 YR	16090.00	278.19	298.86	292.32	299.23	0.00	6.26	4723.85	1157.25	0.26
1	21607	500 YR	18560.00	278.19	299.21	293.32	299.64	0.00	6.80	5154.33	1290.10	0.28
1	21749 Westlawn Dr.		Bridge									
1	21869 T	2 YR	3750.00	278.88	293.64	287.15	293.92	0.00	4.51	1203.65	439.64	0.23
1	21869 T	5 YR	5520.00	278.88	295.23	288.52	295.50	0.00	4.87	2338.40	615.81	0.24
1	21869 T	10 YR	6760.00	278.88	296.14	289.35	296.40	0.00	5.02	3031.15	922.23	0.24
1	21869 T	25 YR	8780.00	278.88	297.32	290.57	297.54	0.00	4.96	4282.84	1227.79	0.22
1	21869 T	50 YR	10450.00	278.88	298.15	291.16	298.34	0.00	4.86	5401.89	1442.83	0.21
1	21869 T	100 YR	12420.00	278.88	298.37	294.36	298.59	0.00	5.45	5719.48	1460.99	0.24
1	21869 T	250 YR	16090.00	278.88	299.02	295.46	299.27	0.00	5.97	6682.17	1497.86	0.26
1	21869 T	500 YR	18560.00	278.88	299.41	296.03	299.67	0.00	6.29	7277.21	1537.25	0.27
1	22112	2 YR	3750.00	278.29	293.90	288.71	294.19	0.00	4.84	1351.60	671.24	0.26
1	22112	5 YR	5520.00	278.29	295.57	290.21	295.74	0.00	4.36	3158.00	1112.51	0.22
1	22112	10 YR	6760.00	278.29	296.50	291.00	296.62	0.00	3.98	4234.48	1241.18	0.1
1	22112	25 YR	8780.00	278.29	297.63	293.32	297.72	0.00	3.74	5765.82	1388.74	0.17
1	22112	50 YR	10450.00	278.29	298.42	294.21	298.50	0.00	3.58	6904.94	1509.80	0.16
1	22112	100 YR	12420.00	278.29	298.70	294.06	298.79	0.00	3.96	7327.10	1537.47	0.18
1	22112	250 YR	16090.00	278.29	299.38	295.78	299.49	0.00	4.45	8425.38	1665.54	0.20
1	22112	500 YR	18560.00	278.29	299.79	296.07	299.91	0.00	4.74	9130.83	1739.48	0.21
1	22528	2 YR	4010.00	282.04	294.45		294.54	0.00	3.33	3347.56	1595.78	0.18
1	22528	5 YR	5730.00	282.04	295.90		295.94	0.00	2.61	5741.80	1681.61	0.13
1	22528	10 YR	7040.00	282.04	296.75		296.78	0.00	2.43	7181.05	1724.25	0.12
1	22528	25 YR	9090.00	282.04	297.82		297.85	0.00	2.34	9060.54	1765.26	0.11
1	22528	50 YR	10830.00	282.04	298.58		298.61	0.00	2.33	10414.16	1803.07	0.11
1	22528	100 YR	12440.00	282.04	298.89		298.92	0.00	2.51	10969.99	1810.30	0.12
1	22528	250 YR	16140.00	282.04	299.61		299.65	0.00	2.82	12271.14	1834.38	0.13
1	22528	500 YR	18600.00	282.04	300.04		300.09	0.00	3.00	13072.24	1854.48	0.13
1	22746	2 YR	4010.00	280.57	294.61		294.67	0.00	2.93	3253.36	1459.33	0.15
1	22746	5 YR	5730.00	280.57	295.98		296.01	0.00	2.36	5287.47	1509.89	0.11
1	22746	10 YR	7040.00	280.57	296.81		296.83	0.00	2.21	6543.77	1535.28	0.10
1	22746	25 YR	9090.00	280.57	297.87		297.90	0.00	2.13	8193.63	1572.43	0.10
1	22746	50 YR	10830.00	280.57	298.63		298.66	0.00	2.13	9408.80	1623.91	0.09
1	22746	100 YR	12440.00	280.57	298.94		298.97	0.00	2.29	9918.19	1633.95	0.10
1	22746	250 YR	16140.00	280.57	299.67		299.71	0.00	2.57	11108.66	1657.15	0.11
1	22746	500 YR	18600.00	280.57	300.10		300.15	0.00	2.73	11839.88	1676.33	0.11
1	22796	2 YR	4010.00	280.38	294.64		294.70	0.00	3.03	3119.16	1405.72	0.15
1	22796	5 YR	5730.00	280.38	296.00		296.03	0.00	2.49	5087.99	1478.75	0.12
1	22796	10 YR	7040.00	280.38	296.82		296.85	0.00	2.33	6315.24	1506.83	0.11
1	22796	25 YR	9090.00	280.38	297.88		297.91	0.00	2.24	7946.06	1559.44	0.10
1	22796	50 YR	10830.00	280.38	298.64		298.67	0.00	2.24	9143.20	1597.57	0.10
1	22796	100 YR	12440.00	280.38	298.95		298.99	0.00	2.40	9646.53	1607.79	0.10
1	22796	250 YR	16140.00	280.38	299.68		299.72	0.00	2.69	10823.50	1636.23	0.11
1	22796	500 YR	18600.00	280.38	300.12		300.17	0.00	2.85	11550.24	1673.33	0.12
1	22845 Utility Crossing		Culvert									
1	22876	2 YR	4010.00	279.82	294.68	290.95	294.71	0.00	2.48	4780.65	1398.62	0.12
1	22876	5 YR	5730.00	279.82	296.02	292.15	296.05	0.00	2.38	6683.60	1432.94	0.11
1	22876	10 YR	7040.00	279.82	296.84	292.54	296.86	0.00	2.40	7860.27	1454.70	0.1
1	22876	25 YR	9090.00	279.82	297.90	293.07	297.92	0.00	2.56	9471.73	1575.37	0.11
1	22876	50 YR	10830.00	279.82	298.66	293.36	298.68	0.00	2.64	10679.63	1614.64	0.11
1	22876	100 YR	12440.00	279.82	298.97	293.64	299.00	0.00	2.88	11192.32	1638.50	0.12
1	22876	250 YR	16140.00	279.82	299.70	294.02	299.74	0.00	3.28	12411.57	1689.75	0.14
1	22876	500 YR	18600.00	279.82	300.14	294.17	300.19	0.00	3.53	13165.76	1721.74	0.15

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	22939	2 YR	4010.00	279.47	294.72		294.73	0.00	1.66	6038.99	1425.66	0.08
1	22939	5 YR	5730.00	279.47	296.05		296.06	0.00	1.70	7957.04	1451.60	0.08
1	22939	10 YR	7040.00	279.47	296.86		296.88	0.00	1.76	9147.65	1485.77	0.08
1	22939	25 YR	9090.00	279.47	297.93		297.94	0.00	1.92	10775.98	1565.70	0.08
1	22939	50 YR	10830.00	279.47	298.68		298.70	0.00	2.02	11972.11	1593.26	0.09
1	22939	100 YR	12440.00	279.47	299.00		299.02	0.00	2.21	12483.48	1604.89	0.09
1	22939	250 YR	16140.00	279.47	299.74		299.77	0.00	2.57	13687.75	1672.11	0.11
1	22939	500 YR	18600.00	279.47	300.19		300.22	0.00	2.78	14441.49	1701.75	0.11
1	24261 U	2 YR	3660.00	280.16	295.01		295.15	0.00	3.67	2219.26	817.21	0.19
1	24261 U	5 YR	5210.00	280.16	296.31		296.42	0.00	3.64	3466.98	1027.83	0.18
1	24261 U	10 YR	6410.00	280.16	297.12		297.22	0.00	3.70	4331.73	1128.55	0.18
1	24261 U	25 YR	8240.00	280.16	298.20		298.29	0.00	3.68	5585.31	1199.69	0.17
1	24261 U	50 YR	9790.00	280.16	298.96		299.04	0.00	3.70	6510.65	1225.82	0.17
1	24261 U	100 YR	11800.00	280.16	299.33		299.43	0.00	4.13	6968.83	1235.25	0.18
1	24261 U	250 YR	15050.00	280.16	300.14		300.26	0.00	4.51	7977.97	1255.79	0.20
1	24261 U	500 YR	17660.00	280.16	300.64		300.77	0.00	4.85	8607.89	1269.19	0.21
1	25720	2 YR	3660.00	282.75	296.88		297.03	0.00	4.74	2021.49	734.00	0.26
1	25720	5 YR	5210.00	282.75	297.87		298.01	0.00	4.74	2760.20	748.83	0.25
1	25720	10 YR	6410.00	282.75	298.57		298.69	0.00	4.74	3283.30	755.47	0.24
1	25720	25 YR	8240.00	282.75	299.49		299.61	0.00	4.84	3985.79	767.73	0.24
1	25720	50 YR	9790.00	282.75	300.18		300.30	0.00	4.95	4516.52	778.25	0.24
1	25720	100 YR	11800.00	282.75	300.75		300.90	0.00	5.35	4968.16	795.40	0.25
1	25720	250 YR	15050.00	282.75	301.70		301.86	0.00	5.83	5733.21	826.99	0.27
1	25720	500 YR	17660.00	282.75	302.34		302.53	0.00	6.23	6273.19	857.88	0.28
1	26793 V	2 YR	3780.00	284.31	298.06		298.13	0.00	3.00	3302.63	1313.79	0.17
1	26793 V	5 YR	5380.00	284.31	298.93		298.99	0.00	3.09	4468.65	1359.20	0.17
1	26793 V	10 YR	6630.00	284.31	299.55		299.61	0.00	3.14	5332.07	1399.60	0.16
1	26793 V	25 YR	8430.00	284.31	300.40		300.45	0.00	3.15	6525.00	1420.21	0.16
1	26793 V	50 YR	10060.00	284.31	301.05		301.11	0.00	3.20	7460.39	1429.82	0.16
1	26793 V	100 YR	12140.00	284.31	301.69		301.75	0.00	3.36	8370.37	1447.13	0.16
1	26793 V	250 YR	15200.00	284.31	302.67		302.73	0.00	3.49	9800.99	1485.33	0.16
1	26793 V	500 YR	17770.00	284.31	303.36		303.42	0.00	3.63	10839.74	1514.14	0.16
1	28085	2 YR	3780.00	288.89	298.94		299.02	0.00	3.48	2262.83	717.72	0.21
1	28085	5 YR	5380.00	288.89	299.75		299.83	0.00	3.80	2853.74	752.47	0.22
1	28085	10 YR	6630.00	288.89	300.32		300.41	0.00	3.98	3301.07	796.48	0.23
1	28085	25 YR	8430.00	288.89	301.09		301.19	0.00	4.16	3930.41	824.55	0.23
1	28085	50 YR	10060.00	288.89	301.72		301.82	0.00	4.31	4446.48	840.28	0.23
1	28085	100 YR	12140.00	288.89	302.36		302.48	0.00	4.56	4998.33	887.60	0.24
1	28085	250 YR	15200.00	288.89	303.31		303.45	0.00	4.81	5874.86	938.35	0.24
1	28085	500 YR	17770.00	288.89	304.00		304.15	0.00	5.02	6549.09	1003.55	0.24
1	28703	2 YR	3780.00	287.31	299.68	298.51	299.73	0.00	3.33	3002.61	1267.94	0.20
1	28703	5 YR	5380.00	287.31	300.47	299.31	300.52	0.00	3.38	3972.52	1298.38	0.20
1	28703	10 YR	6630.00	287.31	301.03	299.50	301.08	0.00	3.40	4661.80	1307.73	0.19
1	28703	25 YR	8430.00	287.31	301.77	299.50	301.82	0.00	3.44	5579.87	1320.16	0.19
1	28703	50 YR	10060.00	287.31	302.38	299.51	302.44	0.00	3.50	6331.28	1330.35	0.19
1	28703	100 YR	12140.00	287.31	303.04	299.51	303.10	0.00	3.63	7149.30	1352.83	0.19
1	28703	250 YR	15200.00	287.31	303.99	299.65	304.05	0.00	3.70	8759.90	1407.08	0.18
1	28703	500 YR	17770.00	287.31	304.69	299.86	304.75	0.00	3.81	9751.71	1441.25	0.18
1	28955	2 YR	3780.00	288.03	299.95	297.19	300.04	0.00	3.76	3015.95	1236.56	0.22
1	28955	5 YR	5380.00	288.03	300.73	298.48	300.82	0.00	3.95	3951.59	1264.90	0.22
1	28955	10 YR	6630.00	288.03	301.28	299.28	301.37	0.00	4.06	4622.06	1302.64	0.22
1	28955	25 YR	8430.00	288.03	302.02	299.91	302.10	0.00	4.17	5520.99	1381.43	0.22
1	28955	50 YR	10060.00	288.03	302.62	299.91	302.70	0.00	4.27	6261.55	1401.41	0.22
1	28955	100 YR	12140.00	288.03	303.28	299.98	303.37	0.00	4.44	7077.33	1410.51	0.22
1	28955	250 YR	15200.00	288.03	304.21	300.31	304.29	0.00	4.46	8943.75	1473.13	0.21
1	28955	500 YR	17770.00	288.03	304.90	300.57	304.99	0.00	4.57	9975.73	1495.58	0.21
1	29020 US Highway 82		Bridge									
1	29075 W	2 YR	3780.00	290.86	301.43	297.58	301.45	0.00	2.29	4201.36	1256.07	0.13
1	29075 W	5 YR	5380.00	290.86	302.04	298.51	302.07	0.00	2.73	4889.85	1318.19	0.15
1	29075 W	10 YR	6630.00	290.86	302.40	299.17	302.44	0.00	3.06	5302.62	1344.75	0.17
1	29075 W	25 YR	8430.00	290.86	302.83	300.03	302.88	0.00	3.48	5809.28	1365.24	0.18
1	29075 W	50 YR	10060.00	290.86	303.16	300.60	303.23	0.00	3.85	6198.52	1374.80	0.20
1	29075 W	100 YR	12140.00	290.86	303.61	300.61	303.67	0.00	4.02	7474.50	1388.60	0.21
1	29075 W	250 YR	15200.00	290.86	304.38	300.61	304.44	0.00	4.30	8549.94	1427.10	0.21
1	29075 W	500 YR	17770.00	290.86	305.03	300.61	305.11	0.00	4.44	9486.12	1444.27	0.21
1	29154	2 YR	3780.00	291.75	301.47	299.26	301.49	0.00	1.97	3989.59	1357.20	0.13
1	29154	5 YR	5380.00	291.75	302.09	299.84	302.12	0.00	2.27	4738.59	1368.49	0.14
1	29154	10 YR	6630.00	291.75	302.46	300.25	302.49	0.00	2.50	5179.25	1375.72	0.16
1	29154	25 YR	8430.00	291.75	302.90	300.60	302.94	0.00	2.82	5732.77	1432.19	0.17
1	29154	50 YR	10060.00	291.75	303.25	300.60	303.30	0.00	3.08	6167.28	1441.67	0.18
1	29154	100 YR	12140.00	291.75	303.69	300.60	303.75	0.00	3.35	6728.77	1452.20	0.19
1	29154	250 YR	15200.00	291.75	304.47	300.61	304.52	0.00	3.17	8881.52	1465.64	0.18
1	29154	500 YR	17770.00	291.75	305.12	300.61	305.18	0.00	3.29	9839.31	1477.03	0.18
1	29999 X	2 YR	3250.00	290.42	301.99		302.12	0.00	4.31	1863.21	631.04	0.26
1	29999 X	5 YR	4740.00	290.42	302.70		302.85	0.00	4.91	2319.45	647.22	0.28

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	29999 X	10 YR	5820.00	290.42	303.14		303.31	0.00	5.28	2606.66	656.85	0.29
1	29999 X	25 YR	8110.00	290.42	303.75		303.97	0.00	6.24	3008.43	671.64	0.34
1	29999 X	50 YR	10090.00	290.42	304.22		304.48	0.00	6.94	3327.20	687.84	0.37
1	29999 X	100 YR	12230.00	290.42	304.76		305.06	0.00	7.50	3703.02	713.77	0.3
1	29999 X	250 YR	15250.00	290.42	305.35		305.71	0.00	8.30	4136.22	739.93	0.42
1	29999 X	500 YR	17690.00	290.42	305.98		306.35	0.00	8.57	4608.85	766.55	0.42
1	31276 Y	2 YR	3220.00	291.35	304.30		304.47	0.00	4.61	1090.67	264.21	0.26
1	31276 Y	5 YR	4690.00	291.35	305.30		305.50	0.00	5.16	1458.67	492.19	0.27
1	31276 Y	10 YR	5760.00	291.35	305.87		306.09	0.00	5.40	1796.29	646.71	0.28
1	31276 Y	25 YR	8050.00	291.35	306.90		307.12	0.00	5.79	2531.31	749.66	0.29
1	31276 Y	50 YR	10020.00	291.35	307.60		307.82	0.00	5.95	3079.37	826.46	0.29
1	31276 Y	100 YR	12110.00	291.35	308.25		308.47	0.00	6.06	3646.55	937.24	0.29
1	31276 Y	250 YR	15100.00	291.35	309.05		309.28	0.00	6.23	4445.92	1032.19	0.29
1	31276 Y	500 YR	17480.00	291.35	309.64		309.87	0.00	6.33	5068.71	1094.55	0.28
1	32251	2 YR	3220.00	293.95	304.97		304.98	0.00	1.66	3750.73	952.41	0.10
1	32251	5 YR	4690.00	293.95	306.01		306.02	0.00	1.78	4754.30	980.92	0.10
1	32251	10 YR	5760.00	293.95	306.60		306.62	0.00	1.89	5344.38	997.66	0.10
1	32251	25 YR	8050.00	293.95	307.67		307.70	0.00	2.11	6423.31	1028.85	0.11
1	32251	50 YR	10020.00	293.95	308.40		308.43	0.00	2.31	7183.50	1061.71	0.11
1	32251	100 YR	12110.00	293.95	309.07		309.12	0.00	2.49	7911.37	1086.35	0.12
1	32251	250 YR	15100.00	293.95	309.92		309.97	0.00	2.76	8844.34	1142.44	0.13
1	32251	500 YR	17480.00	293.95	310.52		310.59	0.00	2.94	9545.13	1166.97	0.13
1	33218	2 YR	2900.00	297.97	305.31	301.96	305.35	0.00	2.37	1875.15	1585.98	0.17
1	33218	5 YR	4250.00	297.97	306.34	302.41	306.40	0.00	2.63	2359.98	1770.15	0.18
1	33218	10 YR	5180.00	297.97	306.94	302.68	307.01	0.00	2.80	2643.46	1883.71	0.18
1	33218	25 YR	7050.00	297.97	307.95	303.13	307.98	0.00	1.95	5492.80	2026.03	0.12
1	33218	50 YR	8620.00	297.97	308.61	303.48	308.62	0.00	1.36	9085.21	2070.68	0.08
1	33218	100 YR	10300.00	297.97	309.30	303.84	309.31	0.00	1.41	10211.83	2103.96	0.08
1	33218	250 YR	12710.00	297.97	310.16	304.34	310.18	0.00	1.48	11655.62	2179.27	0.08
1	33218	500 YR	14650.00	297.97	310.78	304.76	310.80	0.00	1.54	12733.05	2267.48	0.08
1	33444 Z	2 YR	2900.00	297.19	305.57	302.22	305.79	0.00	4.25	820.64	1124.69	0.29
1	33444 Z	5 YR	4250.00	297.19	306.59	303.19	306.92	0.00	5.24	967.84	1277.48	0.33
1	33444 Z	10 YR	5180.00	297.19	307.18	303.62	307.38	0.00	4.48	1691.62	1371.20	0.27
1	33444 Z	25 YR	7050.00	297.19	308.01	304.42	308.27	0.00	5.23	2017.11	1488.73	0.30
1	33444 Z	50 YR	8620.00	297.19	308.68	305.02	308.74	0.00	3.13	5140.08	1627.68	0.17
1	33444 Z	100 YR	10300.00	297.19	309.36	305.63	309.42	0.00	3.20	5948.67	1714.44	0.17
1	33444 Z	250 YR	12710.00	297.19	310.22	306.44	310.29	0.00	3.30	7050.55	1851.59	0.17
1	33444 Z	500 YR	14650.00	297.19	310.84	307.17	310.91	0.00	3.49	7915.91	1963.01	0.18
1	33616 I-30		Mult Open									
1	33743	2 YR	2900.00	297.58	306.22	302.47	306.45	0.00	4.40	791.98	1027.10	0.27
1	33743	5 YR	4250.00	297.58	307.68	303.41	308.01	0.00	5.19	973.50	1649.80	0.29
1	33743	10 YR	5180.00	297.58	308.53	303.90	308.91	0.00	5.67	1078.51	1783.25	0.31
1	33743	25 YR	7050.00	297.58	310.23	304.80	310.26	0.00	2.13	5351.22	1938.13	0.11
1	33743	50 YR	8620.00	297.58	310.47	305.48	310.49	0.00	1.83	8452.53	1990.56	0.09
1	33743	100 YR	10300.00	297.58	310.81	306.15	310.83	0.00	2.03	8955.33	2078.34	0.10
1	33743	250 YR	12710.00	297.58	311.23	307.06	311.25	0.00	2.30	9577.64	2139.35	0.11
1	33743	500 YR	14650.00	297.58	311.55	307.74	311.58	0.00	2.49	10049.95	2155.96	0.12
1	33753	2 YR	2900.00	297.58	306.31	302.50	306.48	0.00	3.89	948.55	1344.85	0.24
1	33753	5 YR	4250.00	297.58	307.82	303.43	308.04	0.00	4.46	1197.03	1684.53	0.25
1	33753	10 YR	5180.00	297.58	308.71	303.93	308.96	0.00	4.80	1341.99	1765.59	0.26
1	33753	25 YR	7050.00	297.58	310.25	304.74	310.27	0.00	1.63	6331.97	1896.21	0.08
1	33753	50 YR	8620.00	297.58	310.48	305.33	310.49	0.00	1.48	9513.09	1906.70	0.07
1	33753	100 YR	10300.00	297.58	310.82	305.90	310.84	0.00	1.67	10008.97	1989.88	0.08
1	33753	250 YR	12710.00	297.58	311.24	306.70	311.27	0.00	1.93	10630.57	2108.51	0.09
1	33753	500 YR	14650.00	297.58	311.56	307.25	311.59	0.00	2.11	11104.06	2143.30	0.10
1	33761	2 YR	2900.00	298.59	306.44	301.61	306.51	0.00	2.36	1475.26	1492.65	0.15
1	33761	5 YR	4250.00	298.59	308.00	302.31	308.09	0.00	2.70	1864.30	1677.72	0.16
1	33761	10 YR	5180.00	298.59	308.91	302.87	309.01	0.00	2.91	2092.19	1736.23	0.16
1	33761	25 YR	7050.00	298.59	310.25	303.57	310.27	0.00	1.39	6777.53	1875.94	0.07
1	33761	50 YR	8620.00	298.59	310.48	304.05	310.49	0.00	1.28	10049.46	1884.41	0.07
1	33761	100 YR	10300.00	298.59	310.82	304.52	310.84	0.00	1.45	10546.90	1915.90	0.07
1	33761	250 YR	12710.00	298.59	311.24	305.11	311.27	0.00	1.69	11170.47	2018.29	0.08
1	33761	500 YR	14650.00	298.59	311.57	305.62	311.59	0.00	1.87	11647.82	2069.50	0.09
1	33812 I-30 Frontage		Mult Open									
1	33882 AA	2 YR	2900.00	297.52	306.99	301.72	307.04	0.00	2.20	1641.60	1383.25	0.13
1	33882 AA	5 YR	4250.00	297.52	309.22	302.56	309.28	0.00	2.29	2255.27	1419.77	0.12
1	33882 AA	10 YR	5180.00	297.52	309.92	303.12	309.99	0.00	2.55	2447.55	1445.80	0.13
1	33882 AA	25 YR	7050.00	297.52	310.84	304.09	310.87	0.00	1.68	5875.34	1491.97	0.08
1	33882 AA	50 YR	8620.00	297.52	311.15	304.54	311.16	0.00	1.37	9813.99	1552.81	0.07
1	33882 AA	100 YR	10300.00	297.52	311.51	304.97	311.53	0.00	1.55	10317.59	1584.85	0.08
1	33882 AA	250 YR	12710.00	297.52	311.94	305.52	311.96	0.00	1.79	10927.08	1685.37	0.09
1	33882 AA	500 YR	14650.00	297.52	312.24	305.94	312.27	0.00	1.97	11364.38	1814.04	0.09
1	34191	2 YR	2900.00	299.49	307.11	304.51	307.14	0.00	2.03	2655.67	1319.31	0.15
1	34191	5 YR	4250.00	299.49	309.32	304.90	309.33	0.00	1.34	5426.91	1567.32	0.08

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	34191	10 YR	5180.00	299.49	310.04	305.12	310.05	0.00	1.27	7252.61	1626.86	0.08
1	34191	25 YR	7050.00	299.49	310.89	305.52	310.90	0.00	1.41	8650.79	1673.27	0.08
1	34191	50 YR	8620.00	299.49	311.17	305.77	311.19	0.00	1.61	9128.72	1685.65	0.09
1	34191	100 YR	10300.00	299.49	311.53	306.05	311.55	0.00	1.79	9741.68	1701.40	0.10
1	34191	250 YR	12710.00	299.49	311.97	306.38	312.00	0.00	2.02	10488.44	1720.61	0.11
1	34191	500 YR	14650.00	299.49	312.28	306.69	312.31	0.00	2.20	11022.85	1734.34	0.12
1	34611	2 YR	2750.00	295.97	307.36	303.94	307.41	0.00	2.59	1755.95	458.62	0.16
1	34611	5 YR	4050.00	295.97	309.40	304.46	309.45	0.00	2.38	2784.38	557.04	0.13
1	34611	10 YR	4940.00	295.97	310.10	304.78	310.15	0.00	2.52	3186.25	611.65	0.13
1	34611	25 YR	6740.00	295.97	310.95	305.33	311.02	0.00	2.92	3703.38	725.11	0.15
1	34611	50 YR	8250.00	295.97	311.25	305.71	311.34	0.00	3.38	3891.29	763.59	0.17
1	34611	100 YR	9870.00	295.97	311.62	306.29	311.73	0.00	3.85	4131.69	835.96	0.19
1	34611	250 YR	12170.00	295.97	312.08	306.69	312.22	0.00	4.43	4674.50	906.39	0.22
1	34611	500 YR	14020.00	295.97	312.41	306.99	312.56	0.00	4.76	4978.40	968.15	0.23
1	35626	2 YR	2750.00	297.91	307.85		307.87	0.00	1.81	2418.44	733.33	0.12
1	35626	5 YR	4050.00	297.91	309.69		309.71	0.00	1.53	3804.00	772.41	0.09
1	35626	10 YR	4940.00	297.91	310.39		310.41	0.00	1.59	4354.74	795.40	0.09
1	35626	25 YR	6740.00	297.91	311.29		311.33	0.00	1.84	5092.07	836.46	0.10
1	35626	50 YR	8250.00	297.91	311.69		311.74	0.00	2.12	5430.43	862.05	0.11
1	35626	100 YR	9870.00	297.91	312.16		312.21	0.00	2.36	5837.89	886.56	0.12
1	35626	250 YR	12170.00	297.91	312.73		312.80	0.00	2.66	6351.13	913.11	0.13
1	35626	500 YR	14020.00	297.91	313.13		313.21	0.00	2.87	6720.70	927.60	0.14
1	36714 AB	2 YR	3410.00	299.30	308.72	307.58	308.85	0.00	5.04	1716.36	731.08	0.33
1	36714 AB	5 YR	4950.00	299.30	310.13	308.00	310.21	0.00	4.08	2781.95	775.60	0.24
1	36714 AB	10 YR	6050.00	299.30	310.82	308.27	310.89	0.00	4.05	3325.64	813.22	0.23
1	36714 AB	25 YR	7600.00	299.30	311.75	308.43	311.82	0.00	3.99	4093.71	914.74	0.22
1	36714 AB	50 YR	8810.00	299.30	312.22	308.73	312.30	0.00	4.17	4507.33	993.04	0.22
1	36714 AB	100 YR	10130.00	299.30	312.74	308.91	312.82	0.00	4.27	4968.85	1066.48	0.22
1	36714 AB	250 YR	12240.00	299.30	313.39	309.15	313.48	0.00	4.55	5567.22	1135.79	0.23
1	36714 AB	500 YR	13900.00	299.30	313.86	309.37	313.96	0.00	4.82	6373.73	1192.30	0.24
1	37617	2 YR	3410.00	299.97	311.06	308.82	311.17	0.00	4.45	1809.36	563.23	0.26
1	37617	5 YR	4950.00	299.97	311.93	309.41	312.07	0.00	5.19	2297.23	667.94	0.29
1	37617	10 YR	6050.00	299.97	312.50	309.71	312.64	0.00	5.42	2632.49	742.05	0.30
1	37617	25 YR	7600.00	299.97	313.27	310.04	313.42	0.00	5.69	3106.57	806.26	0.30
1	37617	50 YR	8810.00	299.97	313.78	310.35	313.94	0.00	5.91	3425.65	858.44	0.30
1	37617	100 YR	10130.00	299.97	314.30	310.56	314.47	0.00	6.20	3770.90	927.42	0.31
1	37617	250 YR	12240.00	299.97	315.02	311.05	315.21	0.00	6.54	4262.66	1027.68	0.32
1	37617	500 YR	13900.00	299.97	315.57	311.53	315.77	0.00	6.81	4653.40	1220.74	0.33
1	38728	2 YR	3410.00	303.63	312.54	309.65	312.60	0.00	3.44	2199.90	523.15	0.24
1	38728	5 YR	4950.00	303.63	313.60	310.08	313.69	0.00	3.95	2767.25	544.79	0.25
1	38728	10 YR	6050.00	303.63	314.23	310.36	314.33	0.00	4.31	3117.09	566.12	0.26
1	38728	25 YR	7600.00	303.63	315.07	310.71	315.19	0.00	4.78	3649.42	752.90	0.28
1	38728	50 YR	8810.00	303.63	315.72	310.95	315.86	0.00	5.35	4147.54	922.71	0.30
1	38728	100 YR	10130.00	303.63	316.29	311.19	316.44	0.00	5.62	4675.21	1056.96	0.31
1	38728	250 YR	12240.00	303.63	317.07	311.65	317.23	0.00	6.00	5449.98	1150.42	0.32
1	38728	500 YR	13900.00	303.63	317.64	311.84	317.81	0.00	6.18	6046.03	1281.74	0.32
1	39286	2 YR	3410.00	302.20	313.03		313.06	0.00	2.78	2793.94	811.67	0.18
1	39286	5 YR	4950.00	302.20	314.10		314.14	0.00	2.93	3679.36	859.26	0.18
1	39286	10 YR	6050.00	302.20	314.75		314.79	0.00	3.05	4276.52	948.08	0.18
1	39286	25 YR	7600.00	302.20	315.61		315.65	0.00	3.15	5112.71	1026.47	0.18
1	39286	50 YR	8810.00	302.20	316.29		316.33	0.00	3.20	5824.07	1057.97	0.18
1	39286	100 YR	10130.00	302.20	316.87		316.91	0.00	3.27	6440.44	1077.50	0.17
1	39286	250 YR	12240.00	302.20	317.66		317.71	0.00	3.42	7311.30	1145.58	0.18
1	39286	500 YR	13900.00	302.20	318.22		318.27	0.00	3.50	7973.54	1205.46	0.18
1	39436	2 YR	3410.00	304.49	313.18	311.47	313.27	0.00	4.86	2236.74	757.76	0.31
1	39436	5 YR	4950.00	304.49	314.24	311.99	314.33	0.00	4.99	3108.81	846.69	0.30
1	39436	10 YR	6050.00	304.49	314.89	312.24	314.97	0.00	5.07	3667.06	884.44	0.29
1	39436	25 YR	7600.00	304.49	315.73	312.56	315.81	0.00	5.05	4452.50	996.27	0.28
1	39436	50 YR	8810.00	304.49	316.40	312.75	316.48	0.00	5.07	5134.88	1026.19	0.27
1	39436	100 YR	10130.00	304.49	316.98	312.94	317.06	0.00	5.11	5749.33	1137.34	0.27
1	39436	250 YR	12240.00	304.49	317.77	313.20	317.85	0.00	5.20	6659.39	1176.05	0.26
1	39436	500 YR	13900.00	304.49	318.33	313.22	318.41	0.00	5.27	7328.20	1217.19	0.26
1	39488 FM 2878		Culvert									
1	39568 AC	2 YR	3410.00	304.49	313.54	311.67	313.73	0.00	6.41	1906.47	581.29	0.40
1	39568 AC	5 YR	4950.00	304.49	314.22	312.37	314.45	0.00	7.47	2351.02	741.61	0.45
1	39568 AC	10 YR	6050.00	304.49	314.79	312.86	315.02	0.00	7.75	2799.40	801.67	0.45
1	39568 AC	25 YR	7600.00	304.49	315.71	313.26	315.91	0.00	7.58	3584.34	899.82	0.42
1	39568 AC	50 YR	8810.00	304.49	316.37	313.51	316.56	0.00	7.50	4224.05	1026.33	0.40
1	39568 AC	100 YR	10130.00	304.49	316.97	313.92	317.15	0.00	7.44	4857.53	1064.44	0.39
1	39568 AC	250 YR	12240.00	304.49	317.71	314.40	317.88	0.00	7.62	5661.41	1108.40	0.39
1	39568 AC	500 YR	13900.00	304.49	318.27	314.66	318.44	0.00	7.75	6297.99	1171.47	0.38
1	39873	2 YR	3410.00	304.47	314.09		314.13	0.00	2.90	2597.71	662.91	0.19
1	39873	5 YR	4950.00	304.47	314.89		314.94	0.00	3.40	3135.46	689.52	0.21
1	39873	10 YR	6050.00	304.47	315.46		315.52	0.00	3.64	3534.36	711.42	0.22
1	39873	25 YR	7600.00	304.47	316.29		316.35	0.00	3.84	4136.35	739.15	0.22

HEC-RAS Plan: Wagner_Ultimate River: Wagner Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	39873	50 YR	8810.00	304.47	316.90		316.97	0.00	3.97	4595.86	759.72	0.22
1	39873	100 YR	10130.00	304.47	317.47		317.54	0.00	4.13	5029.94	777.08	0.22
1	39873	250 YR	12240.00	304.47	318.19		318.28	0.00	4.44	5599.26	797.26	0.23
1	39873	500 YR	13900.00	304.47	318.74		318.84	0.00	4.64	6041.54	812.24	0.2
1	40395	2 YR	3410.00	304.86	314.73	312.13	314.81	0.00	3.94	1837.49	477.60	0.25
1	40395	5 YR	4950.00	304.86	315.62	312.63	315.73	0.00	4.51	2274.37	497.45	0.27
1	40395	10 YR	6050.00	304.86	316.22	312.92	316.34	0.00	4.81	2575.50	512.05	0.28
1	40395	25 YR	7600.00	304.86	317.04	313.28	317.17	0.00	5.15	3005.60	539.31	0.29
1	40395	50 YR	8810.00	304.86	317.65	313.53	317.79	0.00	5.42	3345.15	577.72	0.29
1	40395	100 YR	10130.00	304.86	318.22	313.80	318.38	0.00	5.69	3688.06	614.09	0.30
1	40395	250 YR	12240.00	304.86	318.98	314.22	319.16	0.00	6.06	4164.98	677.48	0.31
1	40395	500 YR	13900.00	304.86	319.55	314.54	319.74	0.00	6.34	4540.35	744.66	0.32
1	41036	2 YR	2850.00	308.83	316.05	313.45	316.11	0.00	3.66	1524.21	435.94	0.27
1	41036	5 YR	4280.00	308.83	317.08	313.93	317.16	0.00	4.22	2012.43	512.85	0.28
1	41036	10 YR	5260.00	308.83	317.70	314.20	317.80	0.00	4.43	2344.15	554.55	0.28
1	41036	25 YR	6680.00	308.83	318.51	314.59	318.61	0.00	4.62	2804.16	582.21	0.28
1	41036	50 YR	7820.00	308.83	319.12	314.86	319.23	0.00	4.76	3169.79	616.73	0.28
1	41036	100 YR	9040.00	308.83	319.69	315.13	319.81	0.00	4.89	3536.54	642.28	0.28
1	41036	250 YR	10980.00	308.83	320.48	315.55	320.61	0.00	5.13	4052.34	756.78	0.28
1	41036	500 YR	12490.00	308.83	321.09	315.84	321.22	0.00	5.35	4584.04	921.15	0.29
1	41599 AD	2 YR	2850.00	309.00	316.73	313.72	316.76	0.00	2.31	2427.53	625.87	0.16
1	41599 AD	5 YR	4280.00	309.00	317.82	314.08	317.86	0.00	2.67	3159.23	736.99	0.17
1	41599 AD	10 YR	5260.00	309.00	318.46	314.31	318.50	0.00	2.87	3645.21	805.92	0.17
1	41599 AD	25 YR	6680.00	309.00	319.25	314.60	319.30	0.00	3.02	4287.66	821.47	0.18
1	41599 AD	50 YR	7820.00	309.00	319.85	314.81	319.90	0.00	3.15	4798.94	869.06	0.18
1	41599 AD	100 YR	9040.00	309.00	320.42	315.01	320.48	0.00	3.25	5297.72	883.67	0.18
1	41599 AD	250 YR	10980.00	309.00	321.21	315.34	321.28	0.00	3.43	6011.76	911.57	0.18
1	41599 AD	500 YR	12490.00	309.00	321.85	315.58	321.92	0.00	3.69	6655.23	1117.84	0.19

Table D.3
HEC-RAS Output
Existing vs. Ultimate Conditions

Existing vs Ultimate Water Surface Elevations											
						Existing		Ultimate		Difference	
River	Reach	River Sta	Profile	Min Ch El	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Clear Creek	1	15694 A	100 YR	296.7	5070	305.03	6100	305.14	1030	0.11
Clear Creek	1	16484 B	100 YR	297.52	5070	305.63	6100	305.97	1030	0.34
Clear Creek	1	17242 C	100 YR	299	4310	310.12	5150	310.7	840	0.58
Clear Creek	1	18012	100 YR	299.24	4310	310.96	5150	311.59	840	0.63
Clear Creek	1	18947	100 YR	302.48	4030	312.11	4810	312.77	780	0.66
Clear Creek	1	19427	100 YR	303.45	2770	313.2	3240	313.78	470	0.58
Clear Creek	1	20209 D	100 YR	306.19	2760	314.74	3230	315.2	470	0.46
Clear Creek	1	20643	100 YR	307.06	2760	316.29	3230	316.74	470	0.45
Clear Creek	1	21172 E	100 YR	308.49	1660	318.05	1970	318.45	310	0.4
Clear Creek	1	21725	100 YR	311.08	1580	319.03	1870	319.46	290	0.43
Clear Creek	1	22133 F	100 YR	313.18	1580	319.99	1870	320.4	290	0.41
Clear Creek	1	22725	100 YR	318.2	950	323.69	970	323.72	20	0.03
Clear Creek	1	22769 G	100 YR	321.24	950	325.97	970	326.09	20	0.12
Clear Creek	1	22788 Skyline Blvd.			Culvert		Culvert			
Clear Creek	1	22839	100 YR	322.05	950	330.2	970	330.23	20	0.03
Clear Creek	1	22842 H	100 YR	322.2	950	330.27	970	330.3	20	0.03
Clear Creek	1	22843 Weir			Inl Struct		Inl Struct			
Clear Creek	1	22854	100 YR	326	950	330.44	970	330.46	20	0.02
Clear Creek	1	22899	100 YR	326	1090	330.45	1110	330.46	20	0.01
Clear Creek	1	23092	100 YR	326	1090	330.45	1110	330.47	20	0.02
Clear Creek	1	23626	100 YR	326	1090	330.47	1110	330.49	20	0.02
Clear Creek	1	23891	100 YR	326	870	330.49	890	330.51	20	0.02
Clear Creek	1	24202	100 YR	326	870	330.57	890	330.59	20	0.02
Clear Creek	1	24418	100 YR	327.14	870	330.67	890	330.72	20	0.05
Clear Creek	1	24421 I	100 YR	328.7	870	331.95	890	332	20	0.05
Clear Creek	1	24426 Wyatt Rd.			Culvert		Culvert			
Clear Creek	1	24477 J	100 YR	329.5	870	335.51	890	335.51	20	0
Clear Creek	1	24488	100 YR	329.5	870	335.55	890	335.55	20	0
Corral Creek	1	1152	100 YR	261.76	3330	271.21	3740	271.5	410	0.29
Corral Creek	1	1422	100 YR	262.23	3330	272.8	3740	273.08	410	0.28
Corral Creek	1	1745	100 YR	262.23	3330	274.5	3740	274.82	410	0.32
Corral Creek	1	1937 A	100 YR	263.71	2310	274.77	2420	275.1	110	0.33
Corral Creek	1	3130 Culvert			Culvert		Culvert			
Corral Creek	1	4316 B	100 YR	272.52	2310	284.02	2420	284.51	110	0.49
Corral Creek	1	4391	100 YR	272.13	2310	284.08	2420	284.54	110	0.46
Corral Creek	1	4632	100 YR	272.46	2310	284.14	2420	284.6	110	0.46
Corral Creek	1	4753 C	100 YR	274.01	2310	284.26	2420	284.74	110	0.48
Corral Creek	1	4815 Chelf Rd.			Culvert		Culvert			
Corral Creek	1	4878 D	100 YR	273.23	2310	284.92	2420	285.11	110	0.19
Corral Creek	1	4923	100 YR	272.99	2310	284.92	2420	285.12	110	0.2
Corral Creek	1	5413	100 YR	273.48	2310	285.02	2540	285.16	230	0.14
Corral Creek	1	5817 E	100 YR	273.21	2310	285.18	2540	285.34	230	0.16
Corral Creek	1	6302	100 YR	275.94	2310	285.85	2540	286.07	230	0.22
Corral Creek	1	6385 F	100 YR	277.06	2310	286.08	2540	286.3	230	0.22
Corral Creek	1	6423 Martha Dr.			Culvert		Culvert			
Corral Creek	1	6450 G	100 YR	281.07	2310	288.2	2540	288.23	230	0.03
Corral Creek	1	6518	100 YR	280.71	2310	288.35	2540	288.42	230	0.07
Corral Creek	1	6933 H	100 YR	280.31	2310	288.85	2540	288.99	230	0.14
Corral Creek	1	7459 I	100 YR	280.82	1650	290.41	1800	290.61	150	0.2
Corral Creek	1	7784	100 YR	283.67	1650	291.07	1800	291.26	150	0.19
Corral Creek	1	7888 J	100 YR	284.46	1650	291.33	1800	291.51	150	0.18
Corral Creek	1	7952 Leopard Dr.			Culvert		Culvert			
Corral Creek	1	8021 K	100 YR	286.77	1650	294.58	1800	294.71	150	0.13
Corral Creek	1	8112	100 YR	287.32	1364.44	294.72	1211.88	294.92	-152.56	0.2
Corral Creek	1	8525 L	100 YR	288.09	1094.44	294.96	1151.88	295.04	57.44	0.08
Corral Creek	1	8934	100 YR	290.14	1094.44	295.5	1151.88	295.61	57.44	0.11
Corral Creek	1	9117 M	100 YR	290.36	1094.44	295.87	1151.88	295.99	57.44	0.12
Corral Creek	1	9438 Loop 151			Culvert		Culvert			
Corral Creek	1	9795	100 YR	292.24	1094.44	302.25	1151.88	303.06	57.44	0.81
Corral Creek	1	9850			Lat Struct		Lat Struct			
Corral Creek	1	9909 N	100 YR	291.19	1380	302.29	1740	303.09	360	0.8
Cowhorn Creek	1	716 A	100YR	269	5690	281.11	5970	281.2	280	0.09
Cowhorn Creek	1	926	100YR	269.14	5690	281.64	5970	281.73	280	0.09
Cowhorn Creek	1	1028	100YR	269.12	5690	282.05	5970	282.17	280	0.12
Cowhorn Creek	1	1164	100YR	270.44	5690	282.6	5970	282.69	280	0.09
Cowhorn Creek	1	1235 US Highway 67			Bridge		Bridge			
Cowhorn Creek	1	1350 B	100YR	268.32	5690	284.74	5970	284.83	280	0.09
Cowhorn Creek	1	1396	100YR	269.5	5690	284.92	5970	285.02	280	0.1
Cowhorn Creek	1	1521	100YR	270	5690	285.01	5970	285.11	280	0.1
Cowhorn Creek	1	1658	100YR	270.04	5690	284.93	5970	285.03	280	0.1
Cowhorn Creek	1	2184	100YR	271.67	5690	285.39	5970	285.51	280	0.12

Existing vs Ultimate Water Surface Elevations											
					Existing		Ultimate		Difference	
River	Reach	River Sta	Profile	Min Ch El	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Cowhorn Creek	1	2245 Railroad			Bridge		Bridge			
Cowhorn Creek	1	2273	100YR	272.12	5690	286.21	5970	286.34	280	0.13
Cowhorn Creek	1	2395 C	100YR	272.99	5690	286.33	5970	286.46	280	0.13
Cowhorn Creek	1	2916	100YR	274.69	5450	287.25	5690	287.39	240	0.14
Cowhorn Creek	1	3187	100YR	273.33	5450	287.47	5690	287.61	240	0.14
Cowhorn Creek	1	3779	100YR	272.46	5450	288.29	5690	288.42	240	0.13
Cowhorn Creek	1	4361	100YR	274.3	5450	288.81	5690	288.95	240	0.14
Cowhorn Creek	1	4640	100YR	275.48	5450	288.86	5690	289	240	0.14
Cowhorn Creek	1	4803	100YR	277	5450	289.1	5690	289.23	240	0.13
Cowhorn Creek	1	4887	100YR	276.1	5450	290.68	5690	290.83	240	0.15
Cowhorn Creek	1	4940 West 15th St.			Bridge		Bridge			
Cowhorn Creek	1	4988 D	100YR	277.29	5450	291.24	5690	291.38	240	0.14
Cowhorn Creek	1	5043	100YR	277.01	5450	291.35	5690	291.5	240	0.15
Cowhorn Creek	1	5369	100YR	277.44	5450	291.82	5690	291.96	240	0.14
Cowhorn Creek	1	5649	100YR	277.7	5370	292.06	5620	292.2	250	0.14
Cowhorn Creek	1	6145 E	100YR	278.67	5370	292.77	5620	292.91	250	0.14
Cowhorn Creek	1	6465	100YR	279.13	5050	293	5450	293.02	400	0.02
Cowhorn Creek	1	6576	100YR	279.79	5050	294.21	5450	294.5	400	0.29
Cowhorn Creek	1	6655 US Highway 82			Bridge		Bridge			
Cowhorn Creek	1	6704 F	100YR	280.93	5050	297.43	5450	298.19	400	0.76
Cowhorn Creek	1	6771	100YR	281	5050	297.51	5450	298.27	400	0.76
Cowhorn Creek	1	6920	100YR	280.77	5050	297.8	5450	298.52	400	0.72
Cowhorn Creek	1	7410	100YR	282.15	5050	298.16	5450	298.82	400	0.66
Cowhorn Creek	1	7816 G	100YR	283.67	5200	298.28	5590	298.89	390	0.61
Cowhorn Creek	1	8138	100YR	285.81	5200	298.69	5590	299.23	390	0.54
Cowhorn Creek	1	8442	100YR	286	5200	299.03	5590	299.5	390	0.47
Cowhorn Creek	1	8783	100YR	287.33	5200	299.55	5590	299.94	390	0.39
Cowhorn Creek	1	8858	100YR	287.87	5200	299.63	5590	300.01	390	0.38
Cowhorn Creek	1	8908 Rucker St.			Bridge		Bridge			
Cowhorn Creek	1	8952	100YR	288.17	5200	299.54	5590	299.96	390	0.42
Cowhorn Creek	1	8999 H	100YR	288.52	5200	299.66	5590	300.06	390	0.4
Cowhorn Creek	1	9251	100YR	289.64	5200	300.92	5590	301.04	390	0.12
Cowhorn Creek	1	9463	100YR	290	5200	301.38	5590	301.52	390	0.14
Cowhorn Creek	1	9503	100YR	286.89	5200	301.44	5590	301.58	390	0.14
Cowhorn Creek	1	9544 Martine St.			Culvert		Culvert			
Cowhorn Creek	1	9592	100YR	289.53	5200	301.61	5590	301.7	390	0.09
Cowhorn Creek	1	9613 I	100YR	290.98	5200	301.64	5590	301.73	390	0.09
Cowhorn Creek	1	9832	100YR	291.51	4810	302.44	5450	302.56	640	0.12
Cowhorn Creek	1	10296 J	100YR	291.72	4810	303.48	5450	303.79	640	0.31
Cowhorn Creek	1	10780	100YR	292.53	4260	304.15	4770	304.45	510	0.3
Cowhorn Creek	1	10810	100YR	293.69	4260	303.81	4770	304.49	510	0.68
Cowhorn Creek	1	10903 College Dr.			Bridge		Bridge			
Cowhorn Creek	1	10956	100YR	293.69	4260	305.88	4770	305.95	510	0.07
Cowhorn Creek	1	10993 K	100YR	294.37	4260	305.88	4770	305.95	510	0.07
Cowhorn Creek	1	11128	100YR	294.51	4260	306.04	4770	306.13	510	0.09
Cowhorn Creek	1	11290	100YR	296	4260	306.19	4770	306.31	510	0.12
Cowhorn Creek	1	11583 L	100YR	297	4260	306.41	4770	306.63	510	0.22
Cowhorn Creek	1	11697	100YR	297.53	4260	307.63	4770	307.88	510	0.25
Cowhorn Creek	1	11755	100YR	297.53	4260	307.73	4770	307.97	510	0.24
Cowhorn Creek	1	11825 Richmond Rd.			Culvert		Culvert			
Cowhorn Creek	1	11910 M	100YR	297.69	4260	309.84	4770	310.75	510	0.91
Cowhorn Creek	1	11945	100YR	298	4260	309.68	4770	310.78	510	1.1
Cowhorn Creek	1	12296	100YR	297.23	4410	310.89	4930	310.97	520	0.08
Cowhorn Creek	1	12690	100YR	296.4	4410	311.32	4930	311.49	520	0.17
Cowhorn Creek	1	13089	100YR	299.75	4410	312.08	4930	312.32	520	0.24
Cowhorn Creek	1	13346	100YR	302.2	4410	312.92	4930	313.21	520	0.29
Cowhorn Creek	1	13410	100YR	302.27	4410	312.81	4930	313.08	520	0.27
Cowhorn Creek	1	13461 Kennedy Ln.			Culvert		Culvert			
Cowhorn Creek	1	13538	100YR	304.61	4410	313.39	4930	313.59	520	0.2
Cowhorn Creek	1	13577 N	100YR	305.5	4410	313.52	4930	313.74	520	0.22
Cowhorn Creek	1	13879	100YR	304.75	4390	315.04	4890	315.25	500	0.21
Cowhorn Creek	1	14203	100YR	304.31	4390	315.93	4890	316.15	500	0.22
Cowhorn Creek	1	14387	100YR	306	3580	316.04	3960	316.28	380	0.24
Cowhorn Creek	1	14438	100YR	305.75	3580	316.38	3960	316.61	380	0.23
Cowhorn Creek	1	14569	100YR	305.62	3580	316.82	3960	317.04	380	0.22
Cowhorn Creek	1	14701	100YR	305.62	3580	316.9	3960	317.12	380	0.22
Cowhorn Creek	1	15010 O	100YR	307.5	3580	317.42	3960	317.64	380	0.22
Cowhorn Creek	1	15610	100YR	309.39	2710	319.3	2980	319.49	270	0.19
Cowhorn Creek	1	15691	100YR	309.39	2710	319.48	2980	319.67	270	0.19
Cowhorn Creek	1	15728 P	100YR	310	2710	319.76	2980	319.94	270	0.18
Cowhorn Creek	1	15792	100YR	311.04	2710	320.28	2980	320.5	270	0.22

Existing vs Ultimate Water Surface Elevations											
					Existing			Ultimate		Difference	
River	Reach	River Sta	Profile	Min Ch El	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Cowhorn Creek	1	16069	100YR	310.98	2690	321.31	2940	321.53	250	0.22
Cowhorn Creek	1	16514	100YR	312.75	2690	322.95	2940	323.13	250	0.18
Cowhorn Creek	1	16560 Q	100YR	312.3	2690	323	2940	323.17	250	0.17
Cowhorn Creek	1	16624 Mall Dr.			Culvert		Culvert			
Cowhorn Creek	1	16699	100YR	316.48	2690	327.94	2940	327.88	250	-0.06
Cowhorn Creek	1	16805	100YR	316.79	2690	327.94	2940	327.88	250	-0.06
Cowhorn Creek	1	16931 Interstate 30			Culvert		Culvert			
Cowhorn Creek	1	17038	100YR	317.11	2690	328.96	2940	329.09	250	0.13
Cowhorn Creek	1	17074	100YR	316.87	2690	328.96	2940	329.1	250	0.14
Cowhorn Creek	1	17114 Saint Michael Dr			Culvert		Culvert			
Cowhorn Creek	1	17175	100YR	316.87	2690	329.87	2940	330.04	250	0.17
Cowhorn Creek	1	17197 R	100YR	317.2	2690	329.88	2940	330.06	250	0.18
Cowhorn Creek	1	17707	100YR	320.17	1370	329.95	1560	330.13	190	0.18
Cowhorn Creek	1	17852	100YR	320.98	1370	329.96	1560	330.14	190	0.18
Cowhorn Creek	1	17959	100YR	321.05	1360	329.97	1560	330.15	200	0.18
Cowhorn Creek	1	18047	100YR	320.31	1360	329.97	1560	330.16	200	0.19
Cowhorn Creek	1	18087 Private Dr.			Culvert		Culvert			
Cowhorn Creek	1	18139 S	100YR	322.3	1360	331.3	1560	331.47	200	0.17
Cowhorn Creek	1	18179	100YR	322.08	1360	331.31	1560	331.48	200	0.17
Cowhorn Creek	1	18242	100YR	321.48	1360	331.32	1560	331.49	200	0.17
Cowhorn Creek	1	18302	100YR	319.97	1360	331.32	1560	331.5	200	0.18
Cowhorn Creek	1	18322 Pedestrian Bridg			Bridge		Bridge			
Cowhorn Creek	1	18339	100YR	321.19	1360	331.37	1560	331.55	200	0.18
Cowhorn Creek	1	18369	100YR	322	1360	331.39	1560	331.58	200	0.19
Cowhorn Creek	1	18454	100YR	323.52	1360	331.42	1560	331.61	200	0.19
Cowhorn Creek	1	18517	100YR	324.58	1360	331.46	1560	331.65	200	0.19
Cowhorn Creek	1	18565 Michael Meagher			Culvert		Culvert			
Cowhorn Creek	1	18601 T	100YR	323.27	1360	331.73	1560	331.91	200	0.18
Cowhorn Creek	1	18632	100YR	323.5	1360	331.74	1560	331.92	200	0.18
Cowhorn Creek	1	18931	100YR	325.23	1360	332.02	1560	332.23	200	0.21
Cowhorn Creek	1	19044	100YR	326.22	1360	332.11	1560	332.33	200	0.22
Cowhorn Creek	1	19175	100YR	327.2	1360	332.19	1560	332.41	200	0.22
Cowhorn Creek	1	19274	100YR	327.5	1360	332.25	1560	332.47	200	0.22
Cowhorn Creek	1	19408	100YR	328.01	1360	333.28	1560	333.32	200	0.04
Cowhorn Creek	1	19540	100YR	328.09	770	334.04	860	334.32	90	0.28
Cowhorn Creek	1	19612	100YR	328.65	770	334.19	860	334.43	90	0.24
Cowhorn Creek	1	19661 Cowhorn Creek Rd			Culvert		Culvert			
Cowhorn Creek	1	19719	100YR	329.53	770	334.85	860	335.14	90	0.29
Cowhorn Creek	1	19760	100YR	330.42	770	334.87	860	335.16	90	0.29
Cowhorn Creek	1	19937 U	100YR	331.88	670	334.95	750	335.24	80	0.29
Cowhorn Creek	1	20146	100YR	334.58	670	336.73	750	336.78	80	0.05
Cowhorn Creek	1	20432	100YR	335.34	670	338.8	750	338.96	80	0.16
Cowhorn Creek	1	20767	100YR	336.63	670	339.95	750	340.11	80	0.16
Cowhorn Creek	1	21052 V	100YR	338.25	670	341.14	750	341.29	80	0.15
Cowhorn East Creek	1	223	100YR	320.89	1270	329.95	1330	330.18	60	0.23
Cowhorn East Creek	1	308	100YR	321.85	1270	329.95	1330	330.18	60	0.23
Cowhorn East Creek	1	412	100YR	319.8	1270	329.96	1330	330.19	60	0.23
Cowhorn East Creek	1	467 Private Dr.			Culvert		Culvert			
Cowhorn East Creek	1	496 A	100YR	322.08	1270	331.27	1330	331.38	60	0.11
Cowhorn East Creek	1	537	100YR	322.25	1270	331.27	1330	331.39	60	0.12
Cowhorn East Creek	1	682	100YR	323.47	1270	331.29	1330	331.4	60	0.11
Cowhorn East Creek	1	798	100YR	322.49	1270	331.3	1330	331.41	60	0.11
Cowhorn East Creek	1	824 Michael Meagher			Culvert		Culvert			
Cowhorn East Creek	1	850	100YR	321.47	1270	331.36	1330	331.45	60	0.09
Cowhorn East Creek	1	903	100YR	324.3	1270	331.37	1330	331.46	60	0.09
Cowhorn East Creek	1	1032	100YR	324.75	1270	331.38	1330	331.48	60	0.1
Cowhorn East Creek	1	1357 B	100YR	323.66	940	331.51	990	331.6	50	0.09
Cowhorn East Creek	1	1607	100YR	324.8	940	331.83	990	331.92	50	0.09
Cowhorn East Creek	1	1718	100YR	326.6	940	332.01	990	332.11	50	0.1
Cowhorn East Creek	1	1826 C	100YR	327.2	940	332.51	990	332.59	50	0.08
Cowhorn East Creek	1	1860 Morris Ln.			Culvert		Culvert			
Cowhorn East Creek	1	1883 D	100YR	328.48	940	332.45	990	332.58	50	0.13
Cowhorn East Creek	1	1950	100YR	328.99	940	333.23	990	333.29	50	0.06
Cowhorn East Creek	1	2063 E	100YR	329.42	940	334.46	990	334.53	50	0.07
Cowhorn East Creek	1	2161	100YR	330	940	334.93	990	335	50	0.07
Cowhorn East Creek	1	2249 F	100YR	329.92	940	335.59	990	335.69	50	0.1
Cowhorn East Creek	1	2263 Apartment Culver			Culvert		Culvert			
Cowhorn East Creek	1	2310	100YR	329.92	940	335.68	990	335.78	50	0.1
Cowhorn East Creek	1	2327	100YR	330.44	940	335.65	990	335.74	50	0.09
Cowhorn East Creek	1	2350 Northwood Dr.			Culvert		Culvert			
Cowhorn East Creek	1	2373 G	100YR	331.23	940	336.19	990	336.27	50	0.08

Existing vs Ultimate Water Surface Elevations											
					Existing		Ultimate		Difference		
River	Reach	River Sta	Profile	Min Ch El	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	
Cowhorn East Creek	1	2427	100YR	330.76	940	336.23	990	336.31	50	0.08	
Cowhorn East Creek	1	2561	100YR	332.17	940	336.92	990	337.01	50	0.09	
Cowhorn East Creek	1	2790	100YR	333.61	940	337.95	990	338.03	50	0.08	
Cowhorn East Creek	1	2892 H	100YR	332.17	940	338.16	990	338.24	50	0.08	
Cowhorn West Creek	1	577	100YR	309.51	1610	315.63	1770	315.8	160	0.17	
Cowhorn West Creek	1	849 A	100YR	309.5	1610	318.78	1770	318.92	160	0.14	
Cowhorn West Creek	1	1243	100YR	309.5	1610	320.61	1770	320.83	160	0.22	
Cowhorn West Creek	1	1279	100YR	309.5	1610	320.61	1770	320.83	160	0.22	
Cowhorn West Creek	1	2392	100YR	319.12	1610	329.3	1770	331.33	160	2.03	
Cowhorn West Creek	1	2415	100YR	319.22	1170	329.33	1290	331.34	120	2.01	
Cowhorn West Creek	1	2650 Interstate 30			Culvert		Culvert				
Cowhorn West Creek	1	2691 B	100YR	320.36	1170	331.93	1290	334.18	120	2.25	
Cowhorn West Creek	1	2853	100YR	322.95	1170	331.98	1290	334.18	120	2.2	
Cowhorn West Creek	1	2920 Saint Michael Dr			Culvert		Culvert				
Cowhorn West Creek	1	3001	100YR	323.35	1170	332.04	1290	334.19	120	2.15	
Cowhorn West Creek	1	3039	100YR	324.12	1170	332.04	1290	334.19	120	2.15	
Cowhorn West Creek	1	3148	100YR	325.32	1170	332.04	1290	334.19	120	2.15	
Cowhorn West Creek	1	3268	100YR	324.87	1170	332.05	1290	334.19	120	2.14	
Cowhorn West Creek	1	3395 C	100YR	327.95	1170	332.06	1290	334.19	120	2.13	
Howard Creek	1	1890	100 YR	248.43	5250	261.82	6450	262.39	1200	0.57	
Howard Creek	1	2182	100 YR	251.5	5250	262.72	6450	263.26	1200	0.54	
Howard Creek	1	2253 Railroad			Bridge		Bridge				
Howard Creek	1	2308	100 YR	252	5250	265.12	6450	265.71	1200	0.59	
Howard Creek	1	2373	100 YR	252.13	5250	265.29	6450	265.96	1200	0.67	
Howard Creek	1	2566	100 YR	251.9	5370	265.38	6420	266.15	1050	0.77	
Howard Creek	1	2613 Railroad			Bridge		Bridge				
Howard Creek	1	2644	100 YR	252.1	5370	268.63	6420	270.25	1050	1.62	
Howard Creek	1	2693	100 YR	251.8	5370	268.93	6420	270.27	1050	1.34	
Howard Creek	1	2718 Railroad			Bridge		Bridge				
Howard Creek	1	2745	100 YR	251.8	5370	269.26	6420	270.41	1050	1.15	
Howard Creek	1	2811	100 YR	251.8	5370	269.41	6420	270.47	1050	1.06	
Howard Creek	1	2856 Railroad			Bridge		Bridge				
Howard Creek	1	2891	100 YR	252.7	5370	269.85	6420	270.51	1050	0.66	
Howard Creek	1	3078	100 YR	253.73	5370	270.05	6420	270.62	1050	0.57	
Howard Creek	1	3376	100 YR	253.98	5370	270.11	6420	270.67	1050	0.56	
Howard Creek	1	3461	100 YR	255.08	5370	270.13	6420	270.7	1050	0.57	
Howard Creek	1	3544 Buchanan Rd.			Bridge		Bridge				
Howard Creek	1	3662 A	100 YR	254.4	5370	270.36	6420	270.89	1050	0.53	
Howard Creek	1	3801	100 YR	253.81	5370	270.38	6420	270.92	1050	0.54	
Howard Creek	1	4481 B	100 YR	254.71	5320	270.46	6370	271.01	1050	0.55	
Howard Creek	1	5380	100 YR	256.86	3940	270.59	4460	271.14	520	0.55	
Howard Creek	1	5987	100 YR	259.44	3940	270.69	4460	271.23	520	0.54	
Howard Creek	1	6710	100 YR	261.87	3910	270.85	4560	271.38	650	0.53	
Howard Creek	1	7328 C	100 YR	262.02	3910	270.92	4560	271.45	650	0.53	
Howard Creek	1	7742	100 YR	262.25	3910	271.02	4560	271.55	650	0.53	
Howard Creek	1	8797	100 YR	265.09	3910	272.73	4560	272.86	650	0.13	
Howard Creek	1	9598 D	100 YR	269.15	3910	276.56	4560	276.89	650	0.33	
Howard Creek	1	10119	100 YR	268.32	3840	277.62	4390	277.95	550	0.33	
Howard Creek	1	10653	100 YR	268.12	3840	278.94	4390	279.26	550	0.32	
Howard Creek	1	11204	100 YR	267.91	3840	280.01	4390	280.33	550	0.32	
Howard Creek	1	11754	100 YR	273.24	3840	281.06	4390	281.35	550	0.29	
Howard Creek	1	12159	100 YR	273.8	3840	282.19	4390	282.46	550	0.27	
Howard Creek	1	12270	100 YR	272.86	3840	282.37	4390	282.65	550	0.28	
Howard Creek	1	12305 Flower Acres Rd.			Culvert		Culvert				
Howard Creek	1	12329 E	100 YR	272.86	3840	282.61	4390	282.84	550	0.23	
Howard Creek	1	12394	100 YR	274.28	3840	282.71	4390	282.95	550	0.24	
Howard Creek	1	12648	100 YR	272.79	3840	283.23	4390	283.51	550	0.28	
Howard Creek	1	12975	100 YR	273.26	3840	283.85	4390	284.15	550	0.3	
Howard Creek	1	13197	100 YR	273.4	3800	284.34	4200	284.64	400	0.3	
Howard Creek	1	13823	100 YR	276.53	3800	285.85	4200	286.11	400	0.26	
Howard Creek	1	14445	100 YR	276.66	3800	286.47	4200	286.71	400	0.24	
Howard Creek	1	14538	100 YR	276	3800	286.57	4200	286.81	400	0.24	
Howard Creek	1	14609 Lake Dr.			Culvert		Culvert				
Howard Creek	1	14699 F	100 YR	276.26	3800	287.79	4200	287.92	400	0.13	
Howard Creek	1	14776	100 YR	275.56	3800	287.81	4200	287.94	400	0.13	
Howard Creek	1	15095	100 YR	277.03	3800	287.88	4200	288.02	400	0.14	
Howard Creek	1	15330	100 YR	276.09	3800	288.09	4200	288.26	400	0.17	
Howard Creek	1	15596	100 YR	275.69	3800	288.22	4200	288.4	400	0.18	
Howard Creek	1	16351 G	100 YR	279.2	3640	289.24	3810	289.42	170	0.18	
Howard Creek	1	16964	100 YR	280.04	3640	290.58	3810	290.72	170	0.14	
Howard Creek	1	17396 H	100 YR	282.8	3640	291.55	3810	291.68	170	0.13	

Existing vs Ultimate Water Surface Elevations											
					Existing		Ultimate		Difference		
River	Reach	River Sta	Profile	Min Ch El	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	
Howard Creek	1	17475	100 YR	282.4	3640	291.86	3810	291.99	170	0.13	
Howard Creek	1	17490 Findley St.			Culvert		Culvert				
Howard Creek	1	17532	100 YR	282.63	3640	292.01	3810	292.13	170	0.12	
Howard Creek	1	17550	100 YR	283.34	3640	291.7	3810	291.8	170	0.1	
Howard Creek	1	17572 Railroad			Bridge		Bridge				
Howard Creek	1	17606 I	100 YR	283.34	3640	293.89	3810	294.1	170	0.21	
Howard Creek	1	17698	100 YR	282.51	3640	294.36	3810	294.58	170	0.22	
Howard Creek	1	18119	100 YR	283.2	3640	294.55	3810	294.78	170	0.23	
Howard Creek	1	18643	100 YR	284.77	3650	295.12	3820	295.33	170	0.21	
Howard Creek	1	19050 J	100 YR	285.84	3650	295.42	3820	295.62	170	0.2	
Howard Creek	1	19176	100 YR	286.21	3650	295.49	3820	295.67	170	0.18	
Howard Creek	1	19253 Loop 151			Culvert		Culvert				
Howard Creek	1	19897	100 YR	285.21	3650	301.28	3820	302.02	170	0.74	
Howard Creek	1	19989	100 YR	285.63	3650	301.3	3820	302.05	170	0.75	
Howard Creek	South_Wagner	462	100 YR	259	2360	271.37	2570	271.96	210	0.59	
South Wagner	South_Wagner	625	100 YR	260.5	2360	271.47	2570	272.02	210	0.55	
South Wagner	South_Wagner	645 Buchanan Rd.			Culvert		Culvert				
South Wagner	South_Wagner	710	100 YR	260.29	2360	271.52	2570	272.07	210	0.55	
South Wagner	South_Wagner	859	100 YR	261.2	2360	271.55	2570	272.09	210	0.54	
South Wagner	South_Wagner	1479	100 YR	265.1	2360	272.04	2570	272.4	210	0.36	
South Wagner	South_Wagner	2073	100 YR	266.63	2360	274.18	2570	274.28	210	0.1	
South Wagner	South_Wagner	2196	100 YR	266.8	2360	274.39	2570	274.51	210	0.12	
South Wagner	South_Wagner	2226 West St.			Culvert		Culvert				
South Wagner	South_Wagner	2282 A	100 YR	265.94	2360	275.28	2570	275.35	210	0.07	
South Wagner	South_Wagner	2390	100 YR	266.6	2360	275.38	2570	275.46	210	0.08	
South Wagner	South_Wagner	2617	100 YR	268	1900	277.11	1980	277.32	80	0.21	
South Wagner	South_Wagner	2773	100 YR	268.9	1900	277.3	1980	277.48	80	0.18	
South Wagner	South_Wagner	2827	100 YR	269.3	1900	277.48	1980	277.63	80	0.15	
South Wagner	South_Wagner	2845 Garber St.			Culvert		Culvert				
South Wagner	South_Wagner	2911 B	100 YR	269.3	1900	278.26	1980	278.32	80	0.06	
South Wagner	South_Wagner	2964	100 YR	267.18	1900	278.36	1980	278.43	80	0.07	
South Wagner	South_Wagner	3639	100 YR	268.7	1900	278.64	1980	278.71	80	0.07	
South Wagner	South_Wagner	3973	100 YR	269.53	1900	278.74	1980	278.81	80	0.07	
South Wagner	South_Wagner	4326	100 YR	272.16	1900	279.02	1980	279.11	80	0.09	
South Wagner	South_Wagner	4396 C	100 YR	271.75	1900	278.52	1980	278.57	80	0.05	
South Wagner	South_Wagner	4407 Findley St.			Bridge		Bridge				
South Wagner	South_Wagner	4453	100 YR	271.75	1900	280.85	1980	281.09	80	0.24	
South Wagner	South_Wagner	4462	100 YR	271.75	1900	280.85	1980	281.1	80	0.25	
South Wagner	South_Wagner	4479 Railroad			Bridge		Bridge				
South Wagner	South_Wagner	4524 D	100 YR	271.6	1900	281.73	1980	281.95	80	0.22	
South Wagner	South_Wagner	4588	100 YR	271.8	1900	281.88	1980	282.12	80	0.24	
South Wagner	South_Wagner	4891	100 YR	273	1900	282.18	1980	282.4	80	0.22	
South Wagner	South_Wagner	5308	100 YR	274.74	1900	282.35	1980	282.55	80	0.2	
South Wagner	South_Wagner	5785	100 YR	275.4	1740	282.6	1850	282.78	110	0.18	
South Wagner	South_Wagner	6126 E	100 YR	275.86	1740	283.42	1850	283.54	110	0.12	
South Wagner	South_Wagner	6491	100 YR	278.42	1740	286.4	1850	286.57	110	0.17	
South Wagner	South_Wagner	6693 F	100 YR	278.87	1740	287.07	1850	287.23	110	0.16	
South Wagner	South_Wagner	6723 Robison Rd.			Culvert		Culvert				
South Wagner	South_Wagner	6829 G	100 YR	280.07	1740	289.85	1850	290.35	110	0.5	
South Wagner	South_Wagner	7010	100 YR	280.2	1740	290.19	1850	290.68	110	0.49	
South Wagner	South_Wagner	7475	100 YR	280.75	1740	291.45	1850	291.68	110	0.23	
South Wagner	South_Wagner	7954 H	100 YR	282.7	1740	293.03	1850	293.17	110	0.14	
South Wagner	South_Wagner	8499	100 YR	284.6	1700	294.99	1770	295.12	70	0.13	
South Wagner	South_Wagner	9030	100 YR	285.8	1700	296.26	1770	296.36	70	0.1	
South Wagner	South_Wagner	9490	100 YR	285.8	1700	296.73	1770	296.83	70	0.1	
South Wagner	South_Wagner	9607 I	100 YR	291.7	1700	296.63	1770	296.72	70	0.09	
South Wagner	South_Wagner	9613 Falvey Ave.			Culvert		Culvert				
South Wagner	South_Wagner	9708 J	100 YR	289.25	1700	299.51	1770	299.45	70	-0.06	
South Wagner	South_Wagner	9754	100 YR	289.5	1700	299.63	1770	299.59	70	-0.04	
South Wagner	South_Wagner	10104	100 YR	291.19	1700	299.99	1770	299.99	70	0	
South Wagner	South_Wagner	10271	100 YR	291.8	1700	300.08	1770	300.08	70	0	
South Wagner	South_Wagner	10502	100 YR	293.9	1700	300.22	1770	300.24	70	0.02	
South Wagner	South_Wagner	10562 K	100 YR	294.4	1700	300.44	1770	300.47	70	0.03	
South Wagner	South_Wagner	10582 Kilgore St.			Culvert		Culvert				
South Wagner	South_Wagner	10652 L	100 YR	295.2	1700	302.57	1770	302.63	70	0.06	
South Wagner	South_Wagner	10682	100 YR	295.1	1700	302.61	1770	302.68	70	0.07	
South Wagner	South_Wagner	10858	100 YR	294.7	1700	302.68	1770	302.74	70	0.06	
South Wagner	South_Wagner	10955	100 YR	294.5	1690	302.76	1760	302.82	70	0.06	
South Wagner	South_Wagner	10978	100 YR	294.4	1690	302.76	1760	302.83	70	0.07	
South Wagner	South_Wagner	10987 Abandoned Rd.			Bridge		Bridge				
South Wagner	South_Wagner	11028 M	100 YR	294.4	1690	302.62	1760	302.67	70	0.05	

Existing vs Ultimate Water Surface Elevations											
					Existing		Ultimate		Difference		
River	Reach	River Sta	Profile	Min Ch El	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	
South Wagner	South_Wagner	11075	100 YR	294.56	1690	302.95	1760	303.01	70	0.06	
South Wagner	South_Wagner	11352	100 YR	294.6	1690	303.11	1760	303.17	70	0.06	
South Wagner	South_Wagner	11634	100 YR	296.1	1690	303.39	1760	303.46	70	0.07	
South Wagner	South_Wagner	11711 N	100 YR	296.8	1690	303.51	1760	303.57	70	0.06	
South Wagner	South_Wagner	11721 Waco St.			Culvert		Culvert				
South Wagner	South_Wagner	11803	100 YR	296.44	1690	303.49	1760	303.56	70	0.07	
South Wagner	South_Wagner	11897 O	100 YR	297	1690	303.64	1760	303.7	70	0.06	
South Wagner	South_Wagner	12213	100 YR	297.5	1690	304.9	1760	304.95	70	0.05	
South Wagner	South_Wagner	12385	100 YR	298	1690	305.9	1760	305.96	70	0.06	
South Wagner	South_Wagner	12537	100 YR	298.6	1690	306.61	1760	306.69	70	0.08	
South Wagner	South_Wagner	12576	100 YR	298.8	1690	306.79	1760	306.86	70	0.07	
South Wagner	South_Wagner	12590 Private Dr.			Culvert		Culvert				
South Wagner	South_Wagner	12622	100 YR	299.4	1690	307.16	1760	307.19	70	0.03	
South Wagner	South_Wagner	12641	100 YR	300.24	1690	307.18	1760	307.22	70	0.04	
South Wagner	South_Wagner	12673 P	100 YR	300.33	890	307.49	1070	307.56	180	0.07	
South Wagner	South_Wagner	12692 US Highway 67			Culvert		Culvert				
South Wagner	South_Wagner	12842 Q	100 YR	300.9	890	308.37	1070	308.46	180	0.09	
South Wagner	South_Wagner	12944	100 YR	302.69	890	308.38	1070	308.48	180	0.1	
South Wagner	South_Wagner	13029 R	100 YR	304.39	890	308.53	1070	308.66	180	0.13	
South Wagner	1	1608	100 YR	301.52	1500	307.84	1900	308.09	400	0.25	
Stream WC-1	1	1794	100 YR	301.6	1500	308.64	1900	308.92	400	0.28	
Stream WC-1	1	1953	100 YR	301.03	1500	309.11	1900	309.48	400	0.37	
Stream WC-1	1	2010 University Ave.			Culvert		Culvert				
Stream WC-1	1	2057 A	100 YR	301.73	1500	309.78	1900	310.73	400	0.95	
Stream WC-1	1	2179	100 YR	303.57	1500	310.28	1900	311.14	400	0.86	
Stream WC-1	1	2735	100 YR	306.63	1500	313.29	1900	313.84	400	0.55	
Stream WC-1	1	3017	100 YR	309.72	1380	314.99	1770	315.2	390	0.21	
Stream WC-1	1	3117 B	100 YR	308.29	1380	316.11	1770	316.32	390	0.21	
Stream WC-1	1	3175 Gibson Ln.			Culvert		Culvert				
Stream WC-1	1	3216 C	100 YR	312.28	1380	318.32	1770	319	390	0.68	
Stream WC-1	1	3310	100 YR	312.08	1380	318.63	1770	319.12	390	0.49	
Stream WC-1	1	3854 D	100 YR	315.64	1230	319.3	1620	319.65	390	0.35	
Stream WC-1	1	4351	100 YR	317.25	1230	322.15	1620	322.56	390	0.41	
Stream WC-1	1	4890 E	100 YR	319.25	1080	324.3	1430	324.69	350	0.39	
Stream WC-1	1	5383	100 YR	323.05	1080	326.02	1430	326.43	350	0.41	
Stream WC-1	1	5493 F	100 YR	321.44	1080	326.33	1430	326.73	350	0.4	
Stream WC-1	1	5540 Jonathan St.			Culvert		Culvert				
Stream WC-1	1	5571 G	100 YR	323.37	1080	328.65	1430	328.85	350	0.2	
Stream WC-1	1	5641	100 YR	322.39	1080	328.68	1430	328.89	350	0.21	
Stream WC-1	1	5956	100 YR	324.66	1080	328.83	1430	329.1	350	0.27	
Stream WC-1	1	6355 H	100 YR	327.58	780	329.53	1050	330.02	270	0.49	
Stream WC-1	1	6661	100 YR	327.83	780	332.29	1050	332.54	270	0.25	
Stream WC-1	1	6790 I	100 YR	328.74	780	332.88	1050	333.16	270	0.28	
Stream WC-1	1	6831 McKnight Rd.			Culvert		Culvert				
Stream WC-1	1	6858 J	100 YR	330.28	780	335.38	1050	335.52	270	0.14	
Stream WC-1	1	7153	100 YR	330.92	780	335.44	1050	335.61	270	0.17	
Stream WC-1	1	7441 K	100 YR	332.22	780	335.67	1050	335.91	270	0.24	
Stream WC-1	1	7639	100 YR	333.68	780	336.87	1050	337.35	270	0.48	
Stream WC-1	1	7891 L	100 YR	333.18	780	339.18	1050	339.81	270	0.63	
Stream WC-1	1	8222	100 YR	335.5	270	340.09	360	340.77	90	0.68	
Stream WC-1	1	8274	100 YR	335.82	270	340.11	360	340.79	90	0.68	
Stream WC-1	1	8316 Arista Blvd.			Culvert		Culvert				
Stream WC-1	1	8363 M	100 YR	335.55	270	340.23	360	340.95	90	0.72	
Stream WC-1	1	8431	100 YR	337.63	270	340.26	360	340.96	90	0.7	
Stream WC-1	1	8609	100 YR	338.33	270	341.45	360	341.76	90	0.31	
Stream WC-1	1	8920	100 YR	341.27	270	343.76	360	344.1	90	0.34	
Stream WC-1	1	9169	100 YR	342.44	270	345.7	360	346.13	90	0.43	
Stream WC-1	1	9225 N	100 YR	342.09	270	346.2	360	346.67	90	0.47	
Stream WC-1	1	704	100 YR	310.43	1850	316.44	2210	316.52	360	0.08	
Stream WC-2	1	944 A	100 YR	308.66	1850	316.93	2210	317.15	360	0.22	
Stream WC-2	1	1145	100 YR	308.7	1830	317.45	2130	317.75	300	0.3	
Stream WC-2	1	1599 B	100 YR	310.97	1830	318.39	2130	318.69	300	0.3	
Stream WC-2	1	1824	100 YR	314.31	1830	319.03	2130	319.33	300	0.3	
Stream WC-2	1	1946	100 YR	314.1	1830	319.69	2130	319.96	300	0.27	
Stream WC-2	1	2002 C	100 YR	313.71	1830	319.96	2130	320.24	300	0.28	
Stream WC-2	1	2050 Pleasant Grove R			Culvert		Culvert				
Stream WC-2	1	2097 D	100 YR	314.45	1830	323.14	2130	323.32	300	0.18	
Stream WC-2	1	2160	100 YR	313.71	1830	323.15	2130	323.32	300	0.17	
Stream WC-2	1	2442 E	100 YR	316.21	1830	323.18	2130	323.36	300	0.18	
Stream WC-2	1	2795	100 YR	317.49	1750	323.29	2040	323.5	290	0.21	
Stream WC-2	1	3170 F	100 YR	319.01	1080	323.55	1220	323.78	140	0.23	

Existing vs Ultimate Water Surface Elevations										
					Existing		Ultimate		Difference	
River	Reach	River Sta	Profile	Min Ch El	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Swampoodle Creek	1	17178	100 YR	320.42	500	329.09	690	329.87	190	0.78
Swampoodle Creek	1	17307	100 YR	322.23	500	329.17	690	330	190	0.83
Swampoodle Creek	1	17423	100 YR	325.83	400	329.57	560	330.24	160	0.67
Swampoodle Creek	1	17570	100 YR	326.66	400	330.59	560	330.95	160	0.36
Swampoodle Creek	1	17716 V	100 YR	327.35	400	332.23	560	332.51	160	0.28
Swampoodle East Creek	Swampoodle_East	595	100 YR	301.53	1840	309.41	2020	309.49	180	0.08
Swampoodle East Creek	Swampoodle_East	837	100 YR	304.39	1840	310.63	2020	311.25	180	0.62
Swampoodle East Creek	Swampoodle_East	966	100 YR	305.61	1840	311.78	2020	312.28	180	0.5
Swampoodle East Creek	Swampoodle_East	1060 State Loop 14			Culvert		Culvert			
Swampoodle East Creek	Swampoodle_East	1134	100 YR	306.34	1840	314.4	2020	314.68	180	0.28
Swampoodle East Creek	Swampoodle_East	1455 A	100 YR	307	1840	314.87	2020	315.03	180	0.16
Swampoodle East Creek	Swampoodle_East	1567	100 YR	307.56	1840	315.25	2020	315.35	180	0.1
Swampoodle East Creek	Swampoodle_East	1708	100 YR	308.1	1730	316.23	1970	316.37	240	0.14
Swampoodle East Creek	Swampoodle_East	1782	100 YR	309.04	1730	316.8	1970	317.12	240	0.32
Swampoodle East Creek	Swampoodle_East	1874 Main St.			Culvert		Culvert			
Swampoodle East Creek	Swampoodle_East	1959 B	100 YR	309.04	1730	316.95	1970	317.17	240	0.22
Swampoodle East Creek	Swampoodle_East	2010	100 YR	309.08	1730	317.25	1970	317.41	240	0.16
Swampoodle East Creek	Swampoodle_East	2117	100 YR	309.5	1730	318.23	1970	318.55	240	0.32
Swampoodle East Creek	Swampoodle_East	2186	100 YR	309.6	1730	318.28	1970	318.62	240	0.34
Swampoodle East Creek	Swampoodle_East	2196 Pedestrian Bridg			Bridge		Bridge			
Swampoodle East Creek	Swampoodle_East	2206	100 YR	309.7	1730	318.68	1970	318.96	240	0.28
Swampoodle East Creek	Swampoodle_East	2231	100 YR	309.72	1730	318.66	1970	318.95	240	0.29
Swampoodle East Creek	Swampoodle_East	2248	100 YR	309.8	1730	318.65	1970	318.95	240	0.3
Swampoodle East Creek	Swampoodle_East	2279	100 YR	309.83	1730	318.69	1970	318.98	240	0.29
Swampoodle East Creek	Swampoodle_East	2308 Pine St.			Culvert		Culvert			
Swampoodle East Creek	Swampoodle_East	2341 C	100 YR	310.05	1730	318.8	1970	319.05	240	0.25
Swampoodle East Creek	Swampoodle_East	2402	100 YR	310.26	1730	319	1970	319.23	240	0.23
Swampoodle West Creek	Swampoodle_West	49	100 YR	303.63	810	310.56	830	310.68	20	0.12
Swampoodle West Creek	Swampoodle_West	62	100 YR	304.65	810	310.57	830	310.69	20	0.12
Swampoodle West Creek	Swampoodle_West	100 Railroad			Mult Open		Mult Open			
Swampoodle West Creek	Swampoodle_West	134 A	100 YR	305.24	810	314.37	830	314.61	20	0.24
Swampoodle West Creek	Swampoodle_West	172	100 YR	305.6	810	314.38	830	314.62	20	0.24
Swampoodle West Creek	Swampoodle_West	452	100 YR	304.28	150	314.45	180	314.68	30	0.23
Swampoodle West Creek	Swampoodle_West	710	100 YR	305.89	150	314.47	180	314.7	30	0.23
Swampoodle West Creek	Swampoodle_West	935	100 YR	305.31	150	314.48	180	314.72	30	0.24
Swampoodle West Creek	Swampoodle_West	1003	100 YR	304.53	340	314.48	370	314.72	30	0.24
Swampoodle West Creek	Swampoodle_West	1028 Weir			Inl Struct		Inl Struct			
Swampoodle West Creek	Swampoodle_West	1068	100 YR	300.95	340	314.54	370	314.79	30	0.25
Swampoodle West Creek	Swampoodle_West	1107	100 YR	300.95	340	314.54	370	314.79	30	0.25
Swampoodle West Creek	Swampoodle_West	1247	100 YR	301.18	340	314.54	370	314.79	30	0.25
Swampoodle West Creek	Swampoodle_West	1338	100 YR	301.37	340	314.54	370	314.79	30	0.25
Swampoodle West Creek	Swampoodle_West	1385 College Dr.			Culvert		Culvert			
Swampoodle West Creek	Swampoodle_West	1439 B	100 YR	301.87	920	314.51	980	314.73	60	0.22
Swampoodle West Creek	Swampoodle_West	1496	100 YR	300.77	920	314.6	980	314.82	60	0.22
Wagner Creek	1	572	100 YR	252.62	13610	265.01	16220	265.25	2610	0.24
Wagner Creek	1	678	100 YR	251.45	13610	265.42	16220	265.77	2610	0.35
Wagner Creek	1	750 Railroad			Bridge		Bridge			
Wagner Creek	1	863	100 YR	251	13610	267.25	16220	267.66	2610	0.41
Wagner Creek	1	980	100 YR	250.99	13610	267.47	16220	267.94	2610	0.47
Wagner Creek	1	1131	100 YR	252.92	13610	268.07	16220	268.69	2610	0.62
Wagner Creek	1	1325	100 YR	252.35	13610	268.33	16220	268.98	2610	0.65
Wagner Creek	1	1455	100 YR	253.13	13610	268.52	16220	269.18	2610	0.66
Wagner Creek	1	1545 Railroad			Bridge		Bridge			
Wagner Creek	1	1616	100 YR	254.36	13610	269.36	16220	270.41	2610	1.05
Wagner Creek	1	1729 A	100 YR	253.36	13610	269.86	16220	270.92	2610	1.06
Wagner Creek	1	2758	100 YR	257.22	13660	270.2	16450	271.23	2790	1.03
Wagner Creek	1	2899	100 YR	254.11	13660	270.16	16450	271.24	2790	1.08
Wagner Creek	1	2949 Railroad			Mult Open		Mult Open			
Wagner Creek	1	2994 B	100 YR	254.55	13660	270.56	16450	271.59	2790	1.03
Wagner Creek	1	3133	100 YR	255.74	13660	270.69	16450	271.63	2790	0.94
Wagner Creek	1	3350	100 YR	255.13	13660	270.84	16450	271.73	2790	0.89
Wagner Creek	1	3539	100 YR	256.39	13660	270.96	16450	271.81	2790	0.85
Wagner Creek	1	3674 C	100 YR	256.76	13660	271.04	16450	271.89	2790	0.85
Wagner Creek	1	3743 Lake Dr.			Mult Open		Mult Open			
Wagner Creek	1	3848 D	100 YR	256.76	13660	272.05	16450	272.53	2790	0.48
Wagner Creek	1	4010	100 YR	260.44	13660	272.35	16450	272.85	2790	0.5
Wagner Creek	1	4191	100 YR	258.93	13660	272.7	16450	273.21	2790	0.51
Wagner Creek	1	4514	100 YR	261.3	13090	273.28	15940	273.83	2850	0.55
Wagner Creek	1	4605	100 YR	258.09	13090	273.36	15940	273.92	2850	0.56
Wagner Creek	1	4679 Garber St.			Bridge		Bridge			
Wagner Creek	1	4797 E	100 YR	258.14	13090	273.76	15940	274.37	2850	0.61

Existing vs Ultimate Water Surface Elevations											
					Existing		Ultimate		Difference		
River	Reach	River Sta	Profile	Min Ch El	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	
Wagner Creek	1	4928	100 YR	255.58	13090	273.93	15940	274.56	2850	0.63	
Wagner Creek	1	5421	100 YR	258.37	13090	274.22	15940	274.9	2850	0.68	
Wagner Creek	1	6038	100 YR	260.47	13090	274.65	16040	275.37	2950	0.72	
Wagner Creek	1	6255	100 YR	258.08	13090	274.9	16040	275.66	2950	0.76	
Wagner Creek	1	6339	100 YR	259.38	13090	275.03	16040	275.79	2950	0.76	
Wagner Creek	1	6400 Findley St.			Bridge		Bridge				
Wagner Creek	1	6449 F	100 YR	259.43	13090	275.78	16040	276.49	2950	0.71	
Wagner Creek	1	6607	100 YR	260.85	13090	275.95	16040	276.67	2950	0.72	
Wagner Creek	1	6895	100 YR	260.43	13090	276.4	16040	277.13	2950	0.73	
Wagner Creek	1	6953 Railroad			Bridge		Bridge				
Wagner Creek	1	7013 G	100 YR	261.33	13090	277.18	16040	278.21	2950	1.03	
Wagner Creek	1	7125	100 YR	260.76	13090	277.74	16040	278.83	2950	1.09	
Wagner Creek	1	7267	100 YR	261.42	13090	277.97	16040	279.08	2950	1.11	
Wagner Creek	1	7416 H	100 YR	261.69	13060	278.16	16170	279.26	3110	1.1	
Wagner Creek	1	7511	100 YR	262.72	13060	278.28	16170	279.36	3110	1.08	
Wagner Creek	1	7586 Jameson St.			Bridge		Bridge				
Wagner Creek	1	7635	100 YR	263.14	13060	278.61	16170	279.59	3110	0.98	
Wagner Creek	1	7656	100 YR	263.1	13060	278.62	16170	279.6	3110	0.98	
Wagner Creek	1	7681	100 YR	262.3	13060	278.54	16170	279.56	3110	1.02	
Wagner Creek	1	7703 Railroad			Bridge		Bridge				
Wagner Creek	1	7751 I	100 YR	260.11	13060	278.81	16170	279.86	3110	1.05	
Wagner Creek	1	7926	100 YR	261	13060	278.95	16170	279.99	3110	1.04	
Wagner Creek	1	8838	100 YR	262.49	13060	279.42	16170	280.46	3110	1.04	
Wagner Creek	1	10041 J	100 YR	266.31	13010	280.82	16110	281.53	3100	0.71	
Wagner Creek	1	11738	100 YR	265.19	10010	282.47	11680	282.78	1670	0.31	
Wagner Creek	1	11919	100 YR	265.19	10010	282.48	11680	282.8	1670	0.32	
Wagner Creek	1	11948 Railroad Access			Bridge		Bridge				
Wagner Creek	1	11984 K	100 YR	267.08	10010	282.91	11680	283.17	1670	0.26	
Wagner Creek	1	12109	100 YR	263.4	10010	283.28	11680	283.59	1670	0.31	
Wagner Creek	1	12467	100 YR	263.4	10040	283.78	11820	284.15	1780	0.37	
Wagner Creek	1	13532 L	100 YR	267.81	10040	284.86	11820	285.32	1780	0.46	
Wagner Creek	1	13867	100 YR	268.21	10040	284.65	11820	285.33	1780	0.68	
Wagner Creek	1	13973 M	100 YR	270.17	10040	286.2	11820	287.05	1780	0.85	
Wagner Creek	1	14054 US Highway 67			Bridge		Bridge				
Wagner Creek	1	14110	100 YR	270.17	10040	286.94	11820	287.64	1780	0.7	
Wagner Creek	1	14157	100 YR	269.22	10040	286.94	11820	287.63	1780	0.69	
Wagner Creek	1	14179	100 YR	270.02	10040	286.94	11820	287.61	1780	0.67	
Wagner Creek	1	14224 Robison Rd.			Bridge		Bridge				
Wagner Creek	1	14302 N	100 YR	270.1	10040	288.05	11820	288.75	1780	0.7	
Wagner Creek	1	14437	100 YR	269.28	10040	288.33	11820	289	1780	0.67	
Wagner Creek	1	15547 O	100 YR	269.28	10040	288.59	11820	289.27	1780	0.68	
Wagner Creek	1	16554	100 YR	270.62	10530	289.12	12280	289.83	1750	0.71	
Wagner Creek	1	17149 P	100 YR	272.99	10530	289.54	12280	290.25	1750	0.71	
Wagner Creek	1	18168	100 YR	275.26	10530	290.24	12280	290.86	1750	0.62	
Wagner Creek	1	18225 Railroad			Mult Open		Mult Open				
Wagner Creek	1	18279 Q	100 YR	274.83	10530	291.25	12280	291.5	1750	0.25	
Wagner Creek	1	18801	100 YR	272.91	10530	291.91	12280	292.31	1750	0.4	
Wagner Creek	1	19254	100 YR	275.08	10530	292.21	12280	292.65	1750	0.44	
Wagner Creek	1	19365	100 YR	274.81	10530	292.26	12570	292.73	2040	0.47	
Wagner Creek	1	20188	100 YR	272.76	10530	293.4	12570	293.92	2040	0.52	
Wagner Creek	1	20846	100 YR	274.53	10530	294.01	12570	294.56	2040	0.55	
Wagner Creek	1	21074 R	100 YR	277.8	10410	294.08	12420	294.75	2010	0.67	
Wagner Creek	1	21115 Piney Rd.			Bridge		Bridge				
Wagner Creek	1	21181 S	100 YR	277.8	10410	297.49	12420	297.58	2010	0.09	
Wagner Creek	1	21236	100 YR	277.9	10410	297.58	12420	297.71	2010	0.13	
Wagner Creek	1	21273	100 YR	276.81	10410	297.6	12420	297.73	2010	0.13	
Wagner Creek	1	21317 US Highway 59 N			Bridge		Bridge				
Wagner Creek	1	21343	100 YR	276.81	10410	297.71	12420	297.87	2010	0.16	
Wagner Creek	1	21361	100 YR	276.81	10410	297.71	12420	297.88	2010	0.17	
Wagner Creek	1	21382	100 YR	276.81	10410	297.72	12420	297.89	2010	0.17	
Wagner Creek	1	21437 US Highway 59 S			Bridge		Bridge				
Wagner Creek	1	21481	100 YR	277.4	10410	297.99	12420	298.18	2010	0.19	
Wagner Creek	1	21524	100 YR	278.13	10410	298	12420	298.2	2010	0.2	
Wagner Creek	1	21607	100 YR	278.19	10410	298.05	12420	298.26	2010	0.21	
Wagner Creek	1	21749 Westlawn Dr.			Bridge		Bridge				
Wagner Creek	1	21869 T	100 YR	278.88	10410	298.13	12420	298.37	2010	0.24	
Wagner Creek	1	22112	100 YR	278.29	10410	298.4	12420	298.7	2010	0.3	
Wagner Creek	1	22528	100 YR	282.04	10670	298.56	12440	298.89	1770	0.33	
Wagner Creek	1	22746	100 YR	280.57	10670	298.61	12440	298.94	1770	0.33	
Wagner Creek	1	22796	100 YR	280.38	10670	298.62	12440	298.95	1770	0.33	
Wagner Creek	1	22845 Utility Crossing			Culvert		Culvert				

Existing vs Ultimate Water Surface Elevations										
					Existing		Ultimate		Difference	
River	Reach	River Sta	Profile	Min Ch El	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Wagner Creek	1	22876	100 YR	279.82	10670	298.63	12440	298.97	1770	0.34
Wagner Creek	1	22939	100 YR	279.47	10670	298.66	12440	299	1770	0.34
Wagner Creek	1	24261 U	100 YR	280.16	10040	298.94	11800	299.33	1760	0.39
Wagner Creek	1	25720	100 YR	282.75	10040	300.22	11800	300.75	1760	0.53
Wagner Creek	1	26793 V	100 YR	284.31	10380	301.12	12140	301.69	1760	0.57
Wagner Creek	1	28085	100 YR	288.89	10380	301.79	12140	302.36	1760	0.57
Wagner Creek	1	28703	100 YR	287.31	10380	302.47	12140	303.04	1760	0.57
Wagner Creek	1	28955	100 YR	288.03	10380	302.71	12140	303.28	1760	0.57
Wagner Creek	1	29020 US Highway 82			Bridge		Bridge			
Wagner Creek	1	29075 W	100 YR	290.86	10380	303.23	12140	303.61	1760	0.38
Wagner Creek	1	29154	100 YR	291.75	10380	303.31	12140	303.69	1760	0.38
Wagner Creek	1	29999 X	100 YR	290.42	10400	304.3	12230	304.76	1830	0.46
Wagner Creek	1	31276 Y	100 YR	291.35	10290	307.69	12110	308.25	1820	0.56
Wagner Creek	1	32251	100 YR	293.95	10290	308.49	12110	309.07	1820	0.58
Wagner Creek	1	33218	100 YR	297.97	8740	308.7	10300	309.3	1560	0.6
Wagner Creek	1	33444 Z	100 YR	297.19	8740	308.77	10300	309.36	1560	0.59
Wagner Creek	1	33616 I-30			Mult Open		Mult Open			
Wagner Creek	1	33743	100 YR	297.58	8740	310.5	10300	310.81	1560	0.31
Wagner Creek	1	33753	100 YR	297.58	8740	310.5	10300	310.82	1560	0.32
Wagner Creek	1	33761	100 YR	298.59	8740	310.51	10300	310.82	1560	0.31
Wagner Creek	1	33812 I-30 Frontage			Mult Open		Mult Open			
Wagner Creek	1	33882 AA	100 YR	297.52	8740	311.18	10300	311.51	1560	0.33
Wagner Creek	1	34191	100 YR	299.49	8740	311.2	10300	311.53	1560	0.33
Wagner Creek	1	34611	100 YR	295.97	8310	311.28	9870	311.62	1560	0.34
Wagner Creek	1	35626	100 YR	297.91	8310	311.72	9870	312.16	1560	0.44
Wagner Creek	1	36714 AB	100 YR	299.3	8690	312.24	10130	312.74	1440	0.5
Wagner Creek	1	37617	100 YR	299.97	8690	313.75	10130	314.3	1440	0.55
Wagner Creek	1	38728	100 YR	303.63	8690	315.67	10130	316.29	1440	0.62
Wagner Creek	1	39286	100 YR	302.2	8690	316.24	10130	316.87	1440	0.63
Wagner Creek	1	39436	100 YR	304.49	8690	316.36	10130	316.98	1440	0.62
Wagner Creek	1	39488 FM 2878			Culvert		Culvert			
Wagner Creek	1	39568 AC	100 YR	304.49	8690	316.31	10130	316.97	1440	0.66
Wagner Creek	1	39873	100 YR	304.47	8690	316.84	10130	317.47	1440	0.63
Wagner Creek	1	40395	100 YR	304.86	8690	317.58	10130	318.22	1440	0.64
Wagner Creek	1	41036	100 YR	308.83	7650	319.05	9040	319.69	1390	0.64
Wagner Creek	1	41599 AD	100 YR	309	7650	319.78	9040	320.42	1390	0.64

HEC-RAS Plan: Clear_Ultimate River: CLEARCREEK Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	15694 A	2 YR	1820.00	296.70	302.71	298.59	302.73	0.00	1.13	1607.25	356.64	0.09
1	15694 A	5 YR	2680.00	296.70	303.23	298.97	303.26	0.00	1.50	1793.69	360.41	0.12
1	15694 A	10 YR	3310.00	296.70	303.60	299.21	303.65	0.00	1.72	1927.54	363.10	0.13
1	15694 A	25 YR	4290.00	296.70	304.20	299.55	304.26	0.00	2.00	2147.76	371.68	0.14
1	15694 A	50 YR	5140.00	296.70	304.66	299.82	304.74	0.00	2.23	2320.39	378.90	0.15
1	15694 A	100 YR	6100.00	296.70	305.14	300.11	305.23	0.00	2.46	2504.08	386.44	0.16
1	15694 A	250 YR	7490.00	296.70	305.81	300.47	305.93	0.00	2.74	2775.23	425.53	0.18
1	15694 A	500 YR	8690.00	296.70	306.35	300.74	306.49	0.00	2.96	3014.14	459.30	0.18
1	16484 B	2 YR	1830.00	297.52	304.18	304.18	304.94	0.01	8.33	441.66	302.31	0.67
1	16484 B	5 YR	2680.00	297.52	304.67	304.67	305.53	0.02	9.46	593.45	321.48	0.72
1	16484 B	10 YR	3310.00	297.52	305.00	305.00	305.88	0.02	9.97	701.35	330.71	0.74
1	16484 B	25 YR	4300.00	297.52	305.32	305.32	306.38	0.02	11.25	809.40	339.69	0.81
1	16484 B	50 YR	5150.00	297.52	305.64	305.64	306.76	0.02	11.85	920.09	348.65	0.83
1	16484 B	100 YR	6100.00	297.52	305.97	305.88	307.16	0.02	12.50	1035.85	362.42	0.85
1	16484 B	250 YR	7490.00	297.52	306.87		307.80	0.01	11.60	1381.75	403.82	0.74
1	16484 B	500 YR	8700.00	297.52	307.51		308.34	0.01	11.24	1648.76	424.80	0.69
1	17242 C	2 YR	1550.00	299.00	307.63	305.91	307.73	0.00	3.48	1014.28	381.95	0.23
1	17242 C	5 YR	2250.00	299.00	308.45	306.33	308.56	0.00	3.89	1344.70	429.88	0.25
1	17242 C	10 YR	2780.00	299.00	308.93	306.65	309.05	0.00	4.18	1560.17	458.51	0.26
1	17242 C	25 YR	3640.00	299.00	309.66	307.02	309.79	0.00	4.52	1907.28	501.42	0.27
1	17242 C	50 YR	4360.00	299.00	310.16	307.31	310.31	0.00	4.80	2170.65	537.87	0.28
1	17242 C	100 YR	5150.00	299.00	310.70	307.60	310.85	0.00	5.08	2477.64	598.09	0.28
1	17242 C	250 YR	6320.00	299.00	311.21		311.39	0.00	5.55	2793.94	631.12	0.30
1	17242 C	500 YR	7310.00	299.00	311.64		311.82	0.00	5.84	3066.15	649.78	0.31
1	18012	2 YR	1550.00	299.24	308.24		308.28	0.00	2.49	1498.20	373.25	0.15
1	18012	5 YR	2250.00	299.24	309.13		309.17	0.00	2.91	1835.87	390.88	0.17
1	18012	10 YR	2780.00	299.24	309.67		309.72	0.00	3.20	2049.92	401.66	0.18
1	18012	25 YR	3640.00	299.24	310.45		310.51	0.00	3.60	2369.39	417.22	0.20
1	18012	50 YR	4360.00	299.24	311.01		311.08	0.00	3.93	2608.33	433.32	0.21
1	18012	100 YR	5150.00	299.24	311.59		311.67	0.00	4.23	2864.73	449.75	0.22
1	18012	250 YR	6320.00	299.24	312.21		312.31	0.00	4.71	3149.82	462.50	0.24
1	18012	500 YR	7310.00	299.24	312.70		312.82	0.00	5.06	3378.05	472.45	0.25
1	18947	2 YR	1480.00	302.48	309.18		309.40	0.01	5.08	546.24	304.38	0.43
1	18947	5 YR	2090.00	302.48	310.12		310.29	0.00	4.80	851.14	342.03	0.37
1	18947	10 YR	2570.00	302.48	310.71		310.87	0.00	4.79	1057.25	361.22	0.35
1	18947	25 YR	3410.00	302.48	311.55		311.71	0.00	4.91	1371.63	383.47	0.33
1	18947	50 YR	4080.00	302.48	312.16		312.32	0.00	4.99	1610.60	397.06	0.32
1	18947	100 YR	4810.00	302.48	312.77		312.94	0.00	5.09	1858.47	410.69	0.32
1	18947	250 YR	5860.00	302.48	313.50		313.67	0.00	5.32	2161.55	426.75	0.32
1	18947	500 YR	6730.00	302.48	314.05		314.24	0.00	5.49	2402.04	439.08	0.32
1	19427	2 YR	910.00	303.45	310.81		310.88	0.00	2.98	560.84	249.04	0.22
1	19427	5 YR	1290.00	303.45	311.44		311.52	0.00	3.23	721.76	262.76	0.22
1	19427	10 YR	1620.00	303.45	311.92		312.00	0.00	3.41	849.69	274.02	0.23
1	19427	25 YR	2220.00	303.45	312.66		312.76	0.00	3.71	1063.72	297.76	0.24
1	19427	50 YR	2710.00	303.45	313.23		313.33	0.00	3.94	1247.40	334.68	0.24
1	19427	100 YR	3240.00	303.45	313.78		313.89	0.00	4.03	1434.91	342.81	0.24
1	19427	250 YR	4010.00	303.45	314.48		314.59	0.00	4.18	1677.61	353.05	0.24
1	19427	500 YR	4630.00	303.45	315.01		315.13	0.00	4.27	1868.93	360.92	0.24
1	20209 D	2 YR	910.00	306.19	312.34		312.51	0.00	4.66	336.37	147.99	0.37
1	20209 D	5 YR	1280.00	306.19	312.94		313.13	0.00	5.01	427.01	153.53	0.37
1	20209 D	10 YR	1600.00	306.19	313.40		313.61	0.00	5.27	498.45	157.76	0.38
1	20209 D	25 YR	2210.00	306.19	314.14		314.39	0.00	5.74	618.38	164.62	0.39
1	20209 D	50 YR	2700.00	306.19	314.70		314.98	0.00	6.01	711.85	169.77	0.39
1	20209 D	100 YR	3230.00	306.19	315.20		315.51	0.00	6.38	797.65	177.84	0.40
1	20209 D	250 YR	3980.00	306.19	315.84		316.20	0.00	6.82	916.90	190.76	0.41
1	20209 D	500 YR	4590.00	306.19	316.33		316.73	0.00	7.13	1012.57	200.53	0.42
1	20643	2 YR	910.00	307.06	313.97		314.26	0.01	5.05	293.76	174.39	0.43
1	20643	5 YR	1280.00	307.06	314.54		314.86	0.01	5.49	399.14	193.35	0.44
1	20643	10 YR	1600.00	307.06	314.98		315.30	0.01	5.77	486.40	207.75	0.44
1	20643	25 YR	2210.00	307.06	315.71		316.05	0.01	6.16	648.19	234.39	0.44
1	20643	50 YR	2700.00	307.06	316.23		316.58	0.00	6.38	775.15	251.55	0.44
1	20643	100 YR	3230.00	307.06	316.74		317.09	0.00	6.54	906.44	263.44	0.43
1	20643	250 YR	3980.00	307.06	317.39		317.74	0.00	6.74	1081.02	273.59	0.43
1	20643	500 YR	4590.00	307.06	317.88		318.24	0.00	6.87	1218.76	281.35	0.42
1	21172 E	2 YR	460.00	308.49	315.77		315.85	0.00	2.45	260.91	149.12	0.22
1	21172 E	5 YR	720.00	308.49	316.39		316.50	0.00	2.96	358.50	166.01	0.25
1	21172 E	10 YR	980.00	308.49	316.85		316.98	0.00	3.39	437.24	175.06	0.27
1	21172 E	25 YR	1360.00	308.49	317.53		317.68	0.00	3.75	560.34	184.93	0.28
1	21172 E	50 YR	1660.00	308.49	318.00		318.17	0.00	3.98	648.79	190.76	0.28
1	21172 E	100 YR	1970.00	308.49	318.45		318.63	0.00	4.18	735.82	196.05	0.29
1	21172 E	250 YR	2410.00	308.49	319.03		319.23	0.00	4.44	851.53	203.24	0.29
1	21172 E	500 YR	2790.00	308.49	319.49		319.70	0.00	4.69	947.63	217.67	0.30
1	21725	2 YR	440.00	311.08	316.58		316.66	0.00	2.29	238.03	148.93	0.22
1	21725	5 YR	680.00	311.08	317.29		317.38	0.00	2.63	354.35	174.61	0.23
1	21725	10 YR	950.00	311.08	317.85		317.96	0.00	2.99	455.89	188.29	0.25

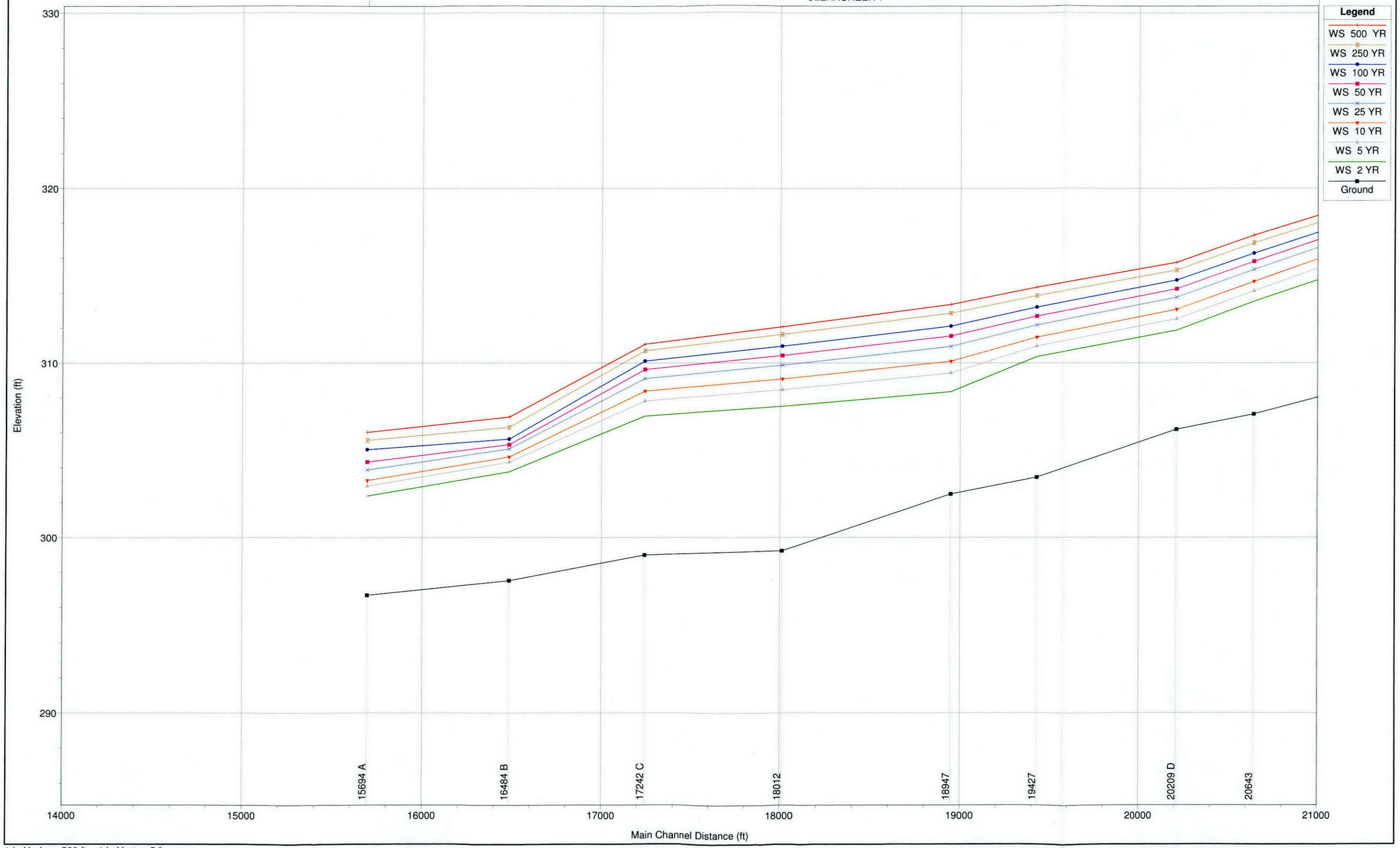
HEC-RAS Plan: Clear_Ultimate River: CLEARCREEK Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	21725	25 YR	1300.00	311.08	318.54		318.66	0.00	3.26	591.31	205.14	0.25
1	21725	50 YR	1590.00	311.08	319.01		319.15	0.00	3.47	691.59	215.64	0.26
1	21725	100 YR	1870.00	311.08	319.46		319.60	0.00	3.63	790.19	226.76	0.26
1	21725	250 YR	2270.00	311.08	320.04		320.19	0.00	3.83	925.88	241.35	0.2
1	21725	500 YR	2620.00	311.08	320.51		320.67	0.00	3.98	1042.02	254.05	0.26
1	22133 F	2 YR	440.00	313.18	317.81	317.18	318.21	0.02	5.19	100.94	109.19	0.67
1	22133 F	5 YR	680.00	313.18	318.45		318.75	0.01	4.84	199.58	172.50	0.57
1	22133 F	10 YR	950.00	313.18	318.98		319.24	0.01	4.74	292.57	181.00	0.51
1	22133 F	25 YR	1300.00	313.18	319.57		319.81	0.01	4.77	402.45	193.34	0.46
1	22133 F	50 YR	1590.00	313.18	320.00		320.25	0.01	4.86	488.64	204.11	0.44
1	22133 F	100 YR	1870.00	313.18	320.40		320.64	0.01	4.92	571.74	213.03	0.43
1	22133 F	250 YR	2270.00	313.18	320.93		321.17	0.00	5.02	687.07	223.90	0.41
1	22133 F	500 YR	2620.00	313.18	321.36		321.61	0.00	5.08	784.54	229.56	0.40
1	22725	2 YR	190.00	318.20	322.27		322.36	0.00	2.32	81.97	42.57	0.29
1	22725	5 YR	350.00	318.20	322.84		323.00	0.00	3.21	108.90	53.97	0.40
1	22725	10 YR	470.00	318.20	323.06		323.29	0.01	3.88	121.11	58.85	0.48
1	22725	25 YR	660.00	318.20	323.35		323.70	0.01	4.73	139.51	65.47	0.57
1	22725	50 YR	810.00	318.20	323.55		323.99	0.01	5.29	153.19	69.72	0.63
1	22725	100 YR	970.00	318.20	323.72		324.26	0.01	5.90	164.86	73.03	0.67
1	22725	250 YR	1180.00	318.20	323.93		324.60	0.01	6.58	180.83	77.34	0.72
1	22725	500 YR	1370.00	318.20	324.10		324.89	0.01	7.16	194.38	79.89	0.76
1	22769 G	2 YR	190.00	321.24	322.89	322.89	323.67	0.02	7.11	26.74	16.72	0.99
1	22769 G	5 YR	350.00	321.24	323.69	323.69	324.86	0.02	8.70	40.23	17.05	1.00
1	22769 G	10 YR	470.00	321.24	324.20	324.20	325.63	0.02	9.59	49.00	17.26	1.00
1	22769 G	25 YR	660.00	321.24	324.94	324.94	326.71	0.02	10.67	61.88	17.57	1.00
1	22769 G	50 YR	810.00	321.24	325.48	325.48	327.48	0.02	11.35	71.36	17.79	1.00
1	22769 G	100 YR	970.00	321.24	326.09	326.09	328.24	0.02	11.77	83.28	24.54	0.97
1	22769 G	250 YR	1180.00	321.24	327.91	327.91	328.86	0.01	8.54	218.15	142.86	0.59
1	22769 G	500 YR	1370.00	321.24	328.28	328.28	329.14	0.00	8.45	274.93	159.88	0.57
1	22788 Skyline Blvd.		Culvert									
1	22839	2 YR	190.00	322.05	326.16	323.73	326.28	0.00	2.72	69.82	18.69	0.25
1	22839	5 YR	350.00	322.05	329.41	324.54	329.46	0.00	1.93	327.19	258.84	0.13
1	22839	10 YR	470.00	322.05	329.71	325.06	329.76	0.00	2.25	409.44	285.87	0.15
1	22839	25 YR	660.00	322.05	329.94	325.79	330.02	0.00	2.78	476.92	294.94	0.18
1	22839	50 YR	810.00	322.05	330.01	326.32	330.12	0.00	3.29	497.97	326.63	0.22
1	22839	100 YR	970.00	322.05	330.23	326.82	330.34	0.00	3.53	561.84	370.83	0.25
1	22839	250 YR	1180.00	322.05	330.45	328.88	330.58	0.00	3.81	631.14	426.33	0.24
1	22839	500 YR	1370.00	322.05	330.61	329.19	330.75	0.00	4.09	679.68	496.32	0.26
1	22842 H	2 YR	190.00	322.20	326.14	324.12	326.31	0.00	3.35	56.74	16.82	0.32
1	22842 H	5 YR	350.00	322.20	329.44	325.04	329.46	0.00	1.40	407.06	273.92	0.13
1	22842 H	10 YR	470.00	322.20	329.75	325.61	329.77	0.00	1.59	494.20	290.41	0.14
1	22842 H	25 YR	660.00	322.20	329.99	326.42	330.03	0.00	1.95	567.36	305.04	0.17
1	22842 H	50 YR	810.00	322.20	330.09	326.99	330.14	0.00	2.28	595.39	313.40	0.19
1	22842 H	100 YR	970.00	322.20	330.30	328.51	330.36	0.00	2.43	661.30	362.40	0.20
1	22842 H	250 YR	1180.00	322.20	330.53	328.72	330.60	0.00	2.64	731.94	420.17	0.21
1	22842 H	500 YR	1370.00	322.20	330.70	328.91	330.77	0.00	2.83	782.47	471.77	0.23
1	22843 Weir		Inl Struct									
1	22854	2 YR	190.00	326.00	329.44	326.26	329.44	0.00	0.20	968.53	322.31	0.02
1	22854	5 YR	350.00	326.00	329.81	326.40	329.81	0.00	0.32	1088.63	330.15	0.03
1	22854	10 YR	470.00	326.00	329.98	326.48	329.98	0.00	0.41	1143.81	333.70	0.04
1	22854	25 YR	660.00	326.00	330.18	326.60	330.18	0.00	0.55	1210.33	337.97	0.05
1	22854	50 YR	810.00	326.00	330.31	326.69	330.32	0.00	0.65	1256.88	341.26	0.06
1	22854	100 YR	970.00	326.00	330.46	326.78	330.47	0.00	0.75	1308.10	356.39	0.07
1	22854	250 YR	1180.00	326.00	330.66	326.88	330.67	0.00	0.87	1383.10	381.71	0.07
1	22854	500 YR	1370.00	326.00	330.83	326.98	330.84	0.00	0.97	1446.90	389.20	0.08
1	22899	2 YR	390.00	326.00	329.44		329.44	0.00	0.35	1106.77	353.14	0.03
1	22899	5 YR	550.00	326.00	329.81		329.81	0.00	0.45	1237.91	359.05	0.04
1	22899	10 YR	660.00	326.00	329.98		329.98	0.00	0.51	1297.91	361.72	0.05
1	22899	25 YR	830.00	326.00	330.18		330.18	0.00	0.61	1370.04	364.91	0.05
1	22899	50 YR	960.00	326.00	330.31		330.32	0.00	0.68	1420.39	367.12	0.06
1	22899	100 YR	1110.00	326.00	330.46		330.47	0.00	0.76	1475.15	369.50	0.07
1	22899	250 YR	1350.00	326.00	330.66		330.67	0.00	0.88	1549.47	372.72	0.07
1	22899	500 YR	1540.00	326.00	330.83		330.84	0.00	0.97	1611.63	374.64	0.08
1	23092	2 YR	390.00	326.00	329.44		329.45	0.00	0.35	1100.68	333.30	0.03
1	23092	5 YR	550.00	326.00	329.81		329.82	0.00	0.45	1224.21	336.11	0.04
1	23092	10 YR	660.00	326.00	329.98		329.99	0.00	0.52	1280.48	337.42	0.05
1	23092	25 YR	830.00	326.00	330.18		330.19	0.00	0.62	1348.03	339.08	0.05
1	23092	50 YR	960.00	326.00	330.32		330.33	0.00	0.69	1395.05	340.24	0.06
1	23092	100 YR	1110.00	326.00	330.47		330.48	0.00	0.77	1446.06	341.49	0.07
1	23092	250 YR	1350.00	326.00	330.67		330.68	0.00	0.90	1515.21	343.17	0.07
1	23092	500 YR	1540.00	326.00	330.84		330.85	0.00	0.99	1572.85	346.01	0.08
1	23626	2 YR	390.00	326.00	329.45		329.46	0.00	0.61	638.93	218.05	0.06
1	23626	5 YR	550.00	326.00	329.82		329.83	0.00	0.77	724.50	240.56	0.07

Appendix D.4
HEC-RAS Profiles
Existing Conditions

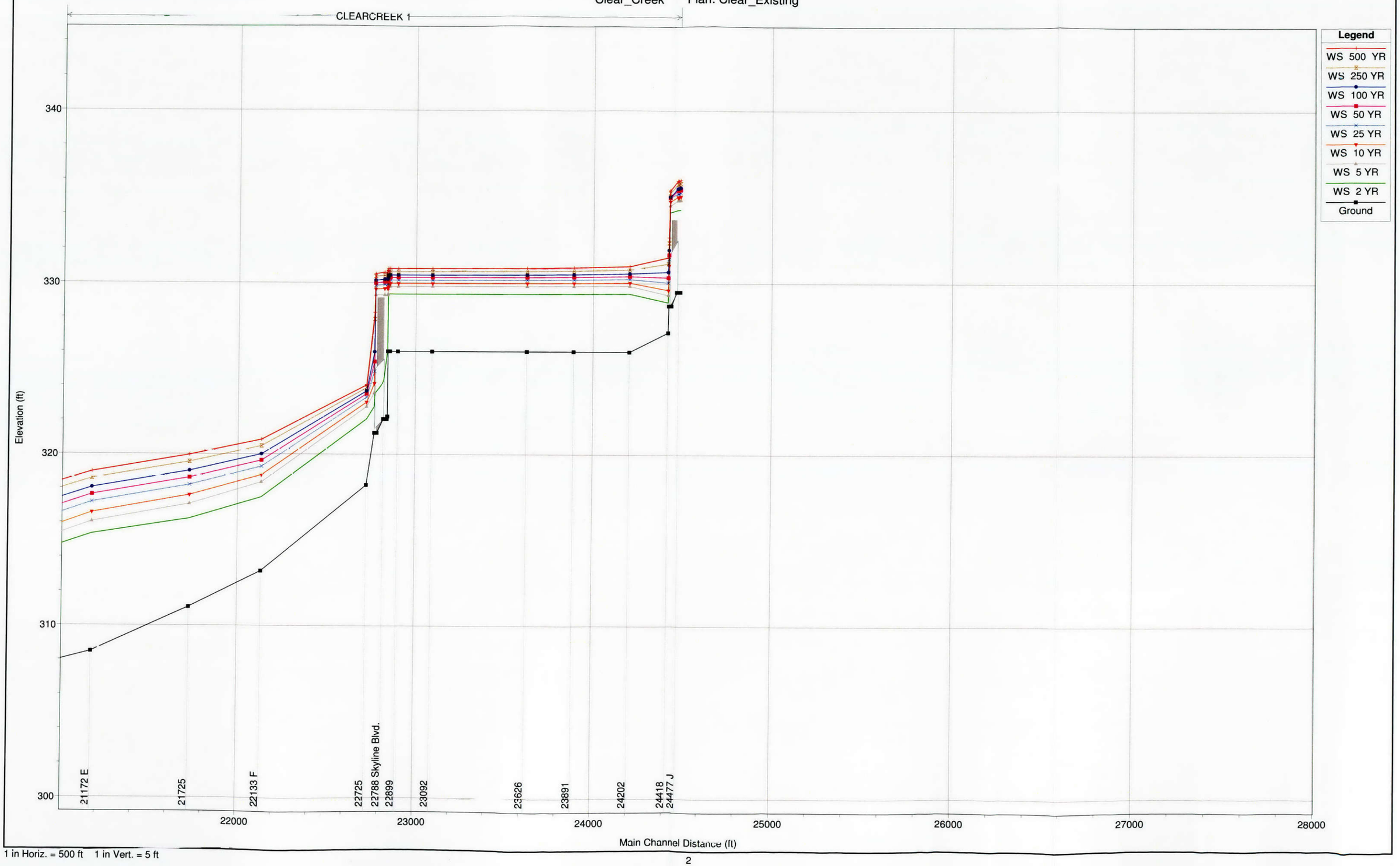
Clear_Creek Plan: Clear_Existing

CLEARCREEK 1



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

Clear_Creek Plan: Clear_Existing



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

Corral_Creek Plan: Corral_Existing

Corral 1

Legend

WS 500 YR
WS 250 YR
WS 100 YR
WS 50 YR
WS 25 YR
WS 10 YR
WS 5 YR
WS 2 YR
Ground

Elevation (ft)

290
280
270
260

1152
1422
1745
1937 A
3130 Culvert
4391
4632
4753 C
4815 Chelf Rd.
4923
5413
5817 E
6302
6385 F
6450 G
6518
6933 H

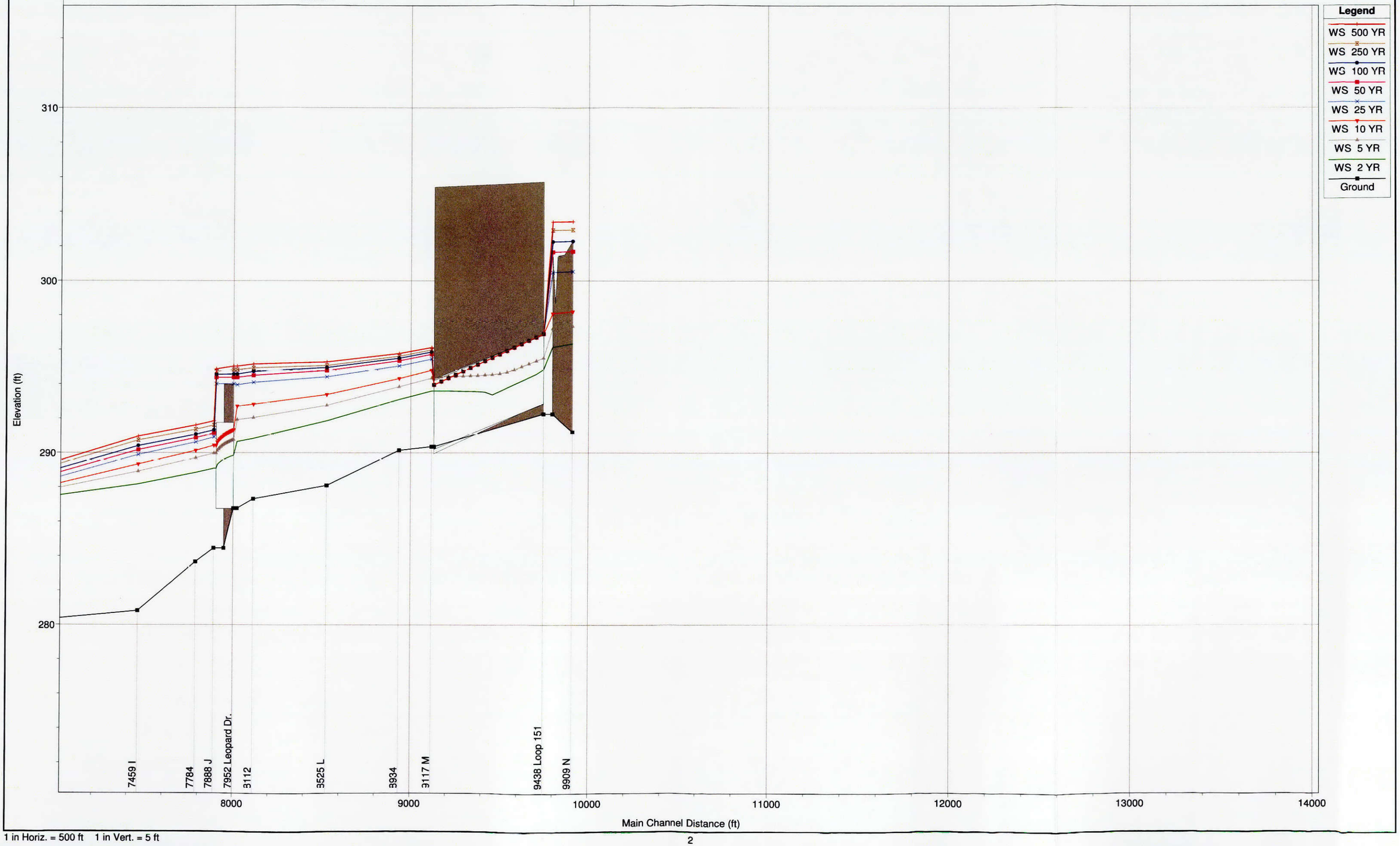
0
1000
2000
3000
4000
5000
6000
7000

Main Channel Distance (ft)

1 in Horiz. = 500 ft 1 in Vert. = 5 ft

Corral_Creek Plan: Corral_Existing

Corral 1

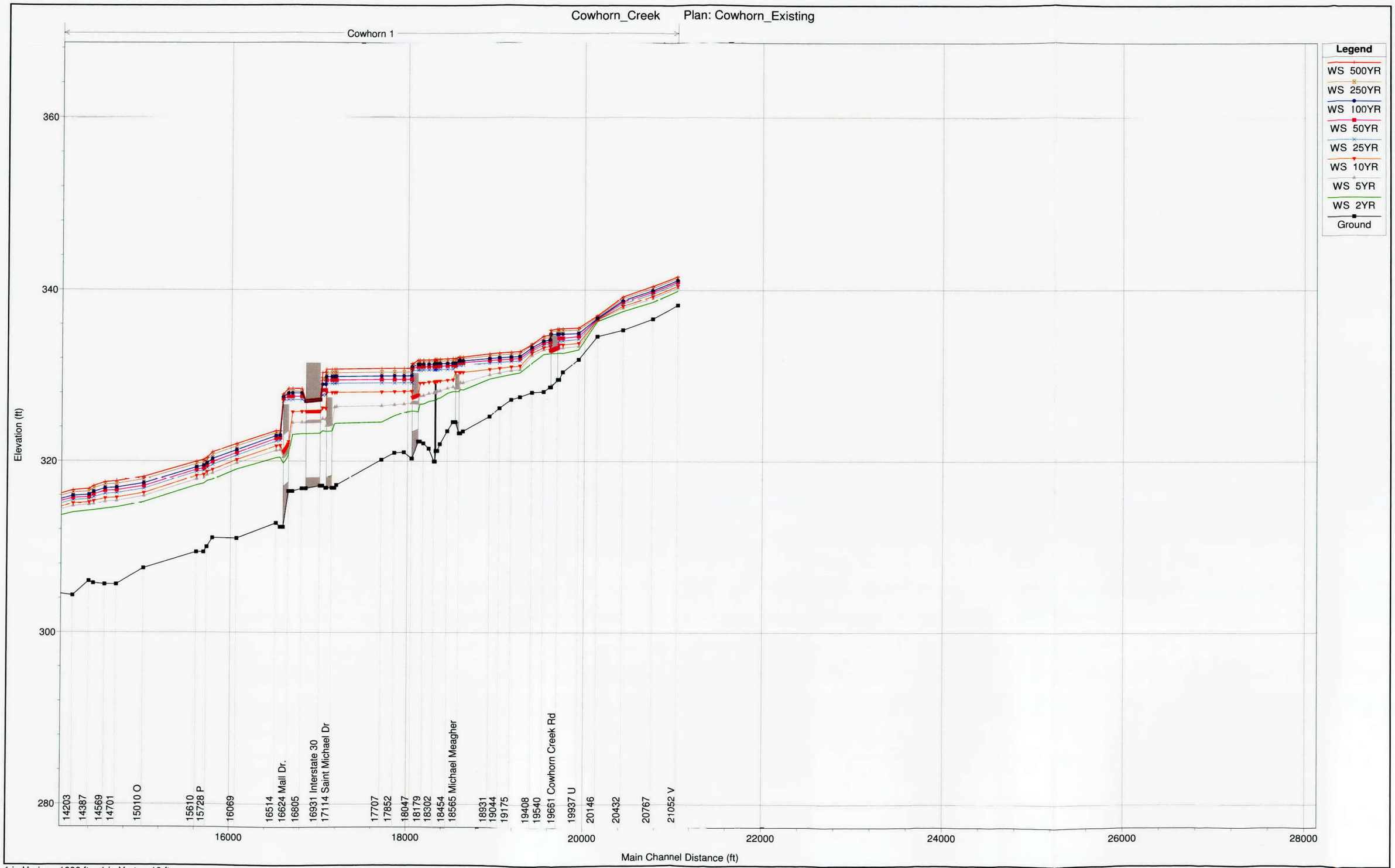


1 in Horiz. = 500 ft 1 in Vert. = 5 ft

Cowhorn_Creek Plan: Cowhorn_Existing

1 in Horiz. = 1000 ft 1 in Vert. = 10 ft

Cowhorn_Creek Plan: Cowhorn_Existing



1 in Horiz. = 1000 ft 1 in Vert. = 10 ft

Cowhorn_Creek Plan: Cowhorn_East_Existing

CowEast 1

Legend

- WS 500YR
- WS 250YR
- WS 100YR
- WS 50YR
- WS 25YR
- WS 10YR
- WS 5YR
- WS 2YR
- Ground

Elevation (ft)

350
340
330
320
310

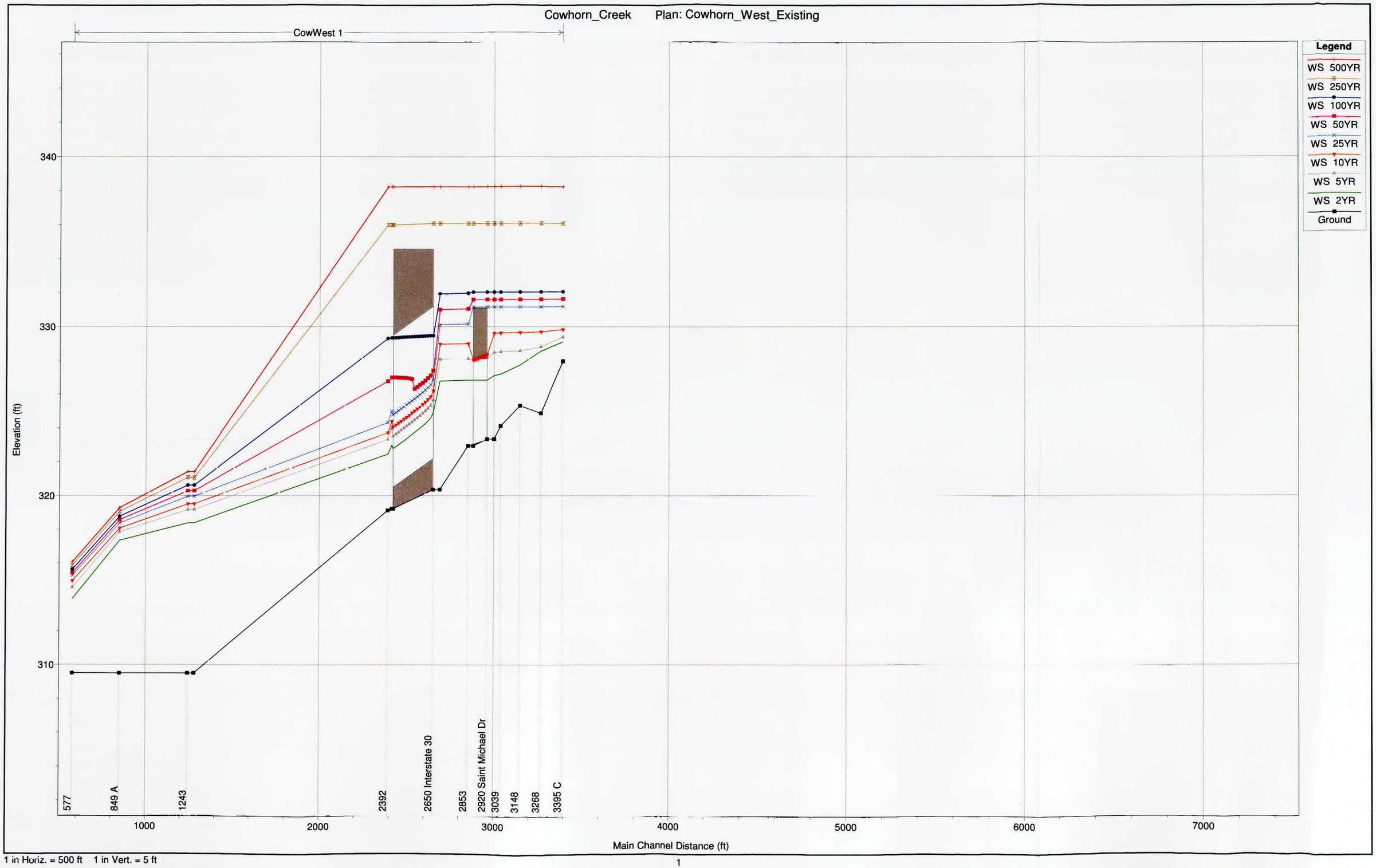
223
308
412
467 Private Dr.
682
798
903
1032
1357 B
1607
1718
1826 C
1860 Morris Ln.
1950
2063 E
2161
2249 F
2310
2350 Northwood Dr.
2427
2561
2790
2892 H

0
1000
2000
3000
4000
5000
6000
7000

Main Channel Distance (ft)

1 in Horiz. = 500 ft 1 in Vert. = 5 ft

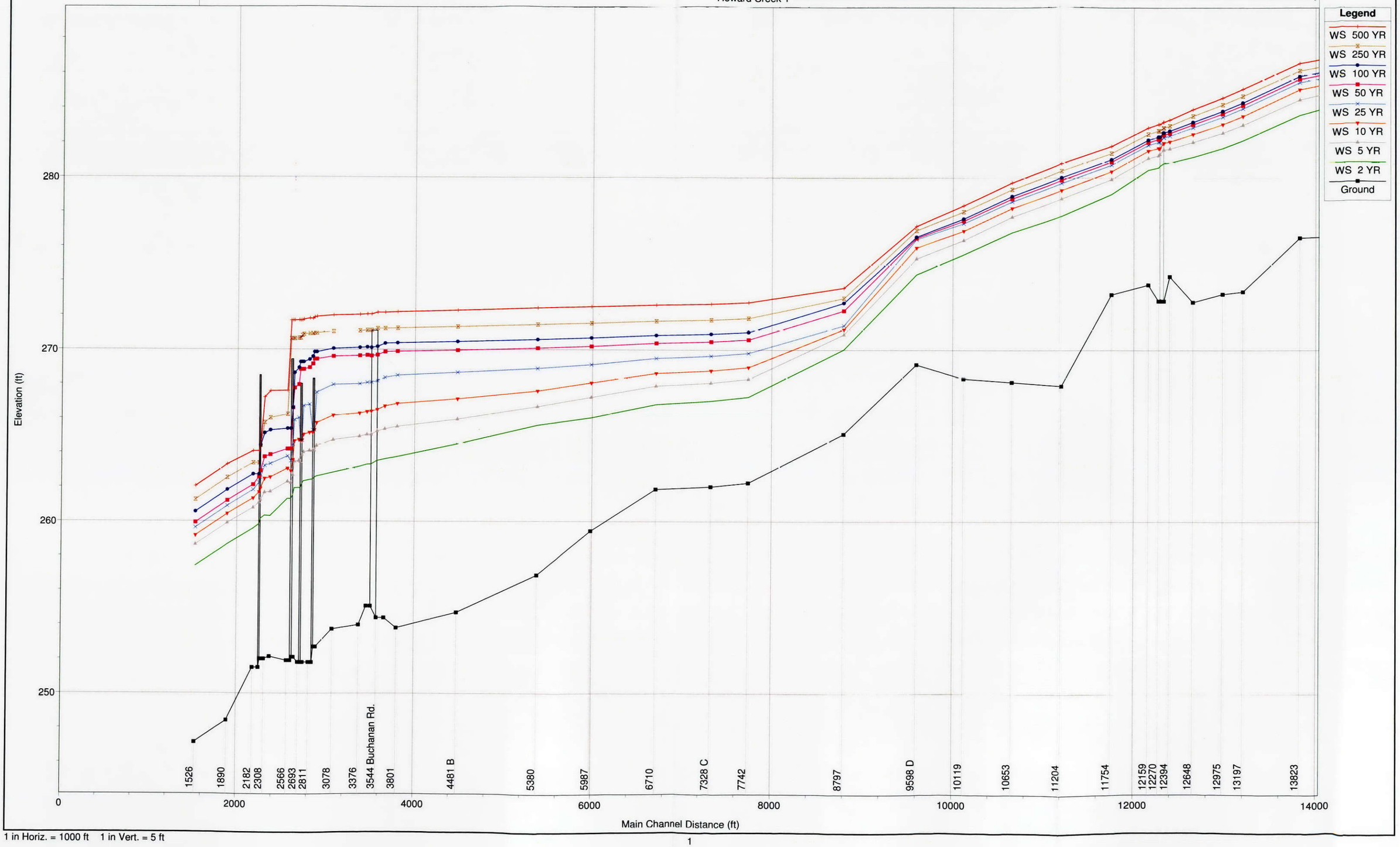
Cowhorn_Creek Plan: Cowhorn_West_Existing



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

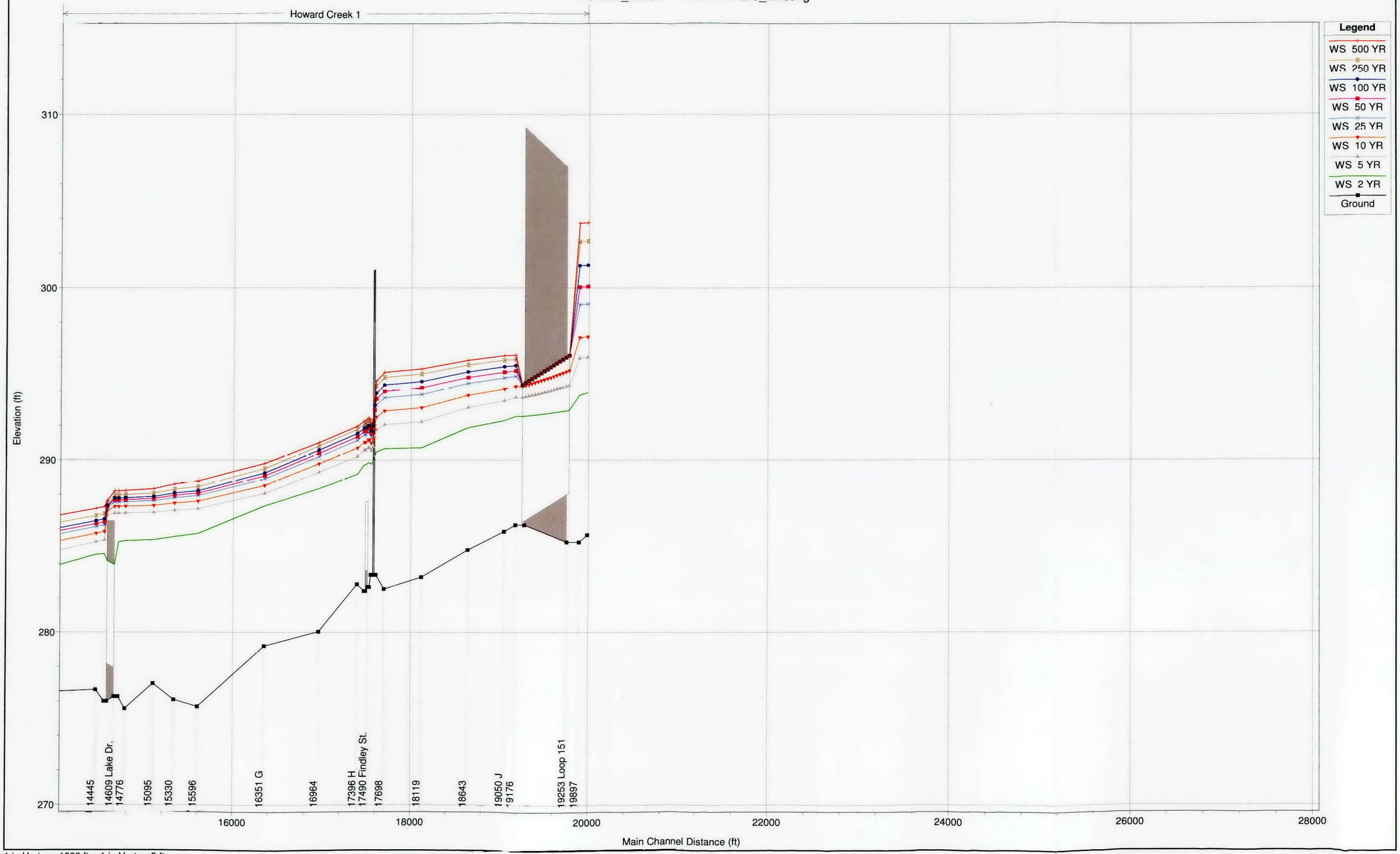
Howard_Creek Plan: Howard_Existing

Howard Creek 1



1 in Horiz. = 1000 ft 1 in Vert. = 5 ft

Howard_Creek Plan: Howard_Existing



1 in Horiz. = 1000 ft 1 in Vert. = 5 ft

South_Wagner Plan: South_Wagner_Existing

South_Wagner South_Wagner

Legend

WS 500 YR
WS 250 YR
WS 100 YR
WS 50 YR
WS 25 YR
WS 10 YR
WS 5 YR
WS 2 YR
Ground

Elevation (ft)

290
280
270
260

462
625
645 Buchanan Rd.
859
1479
2073
2196
2226 West St.
2390
2617
2773
2845 Garber St.
2964
3639
3973
4326
4396 C
4453
4524 D
4588
4891
5308
5785
6 26 E
6491
6693 F
6723 Robison Rd.
7010

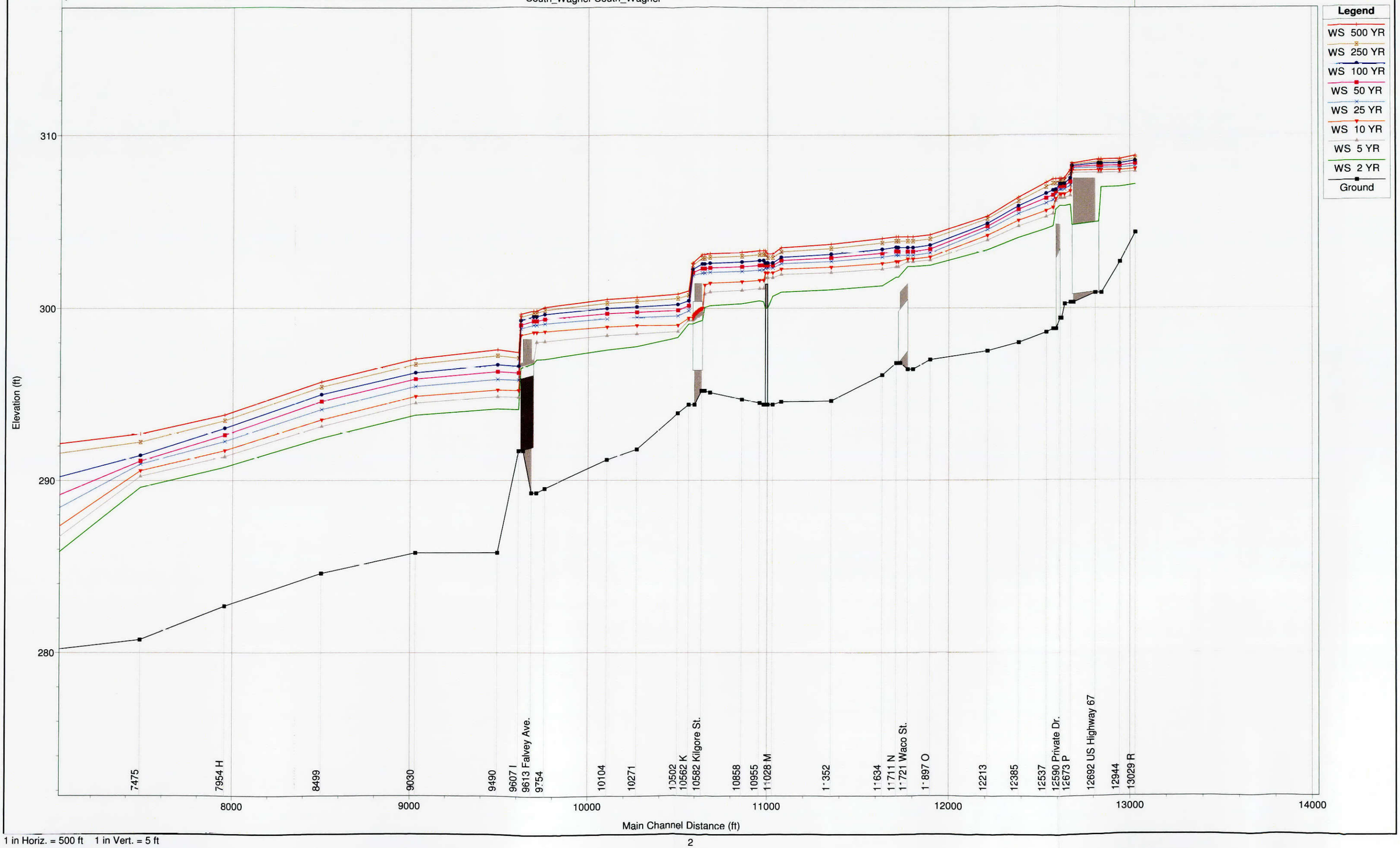
0
1000
2000
3000
4000
5000
6000
7000

Main Channel Distance (ft)

1 in Horiz. = 500 ft 1 in Vert. = 5 ft

South_Wagner Plan: South_Wagner_Existing

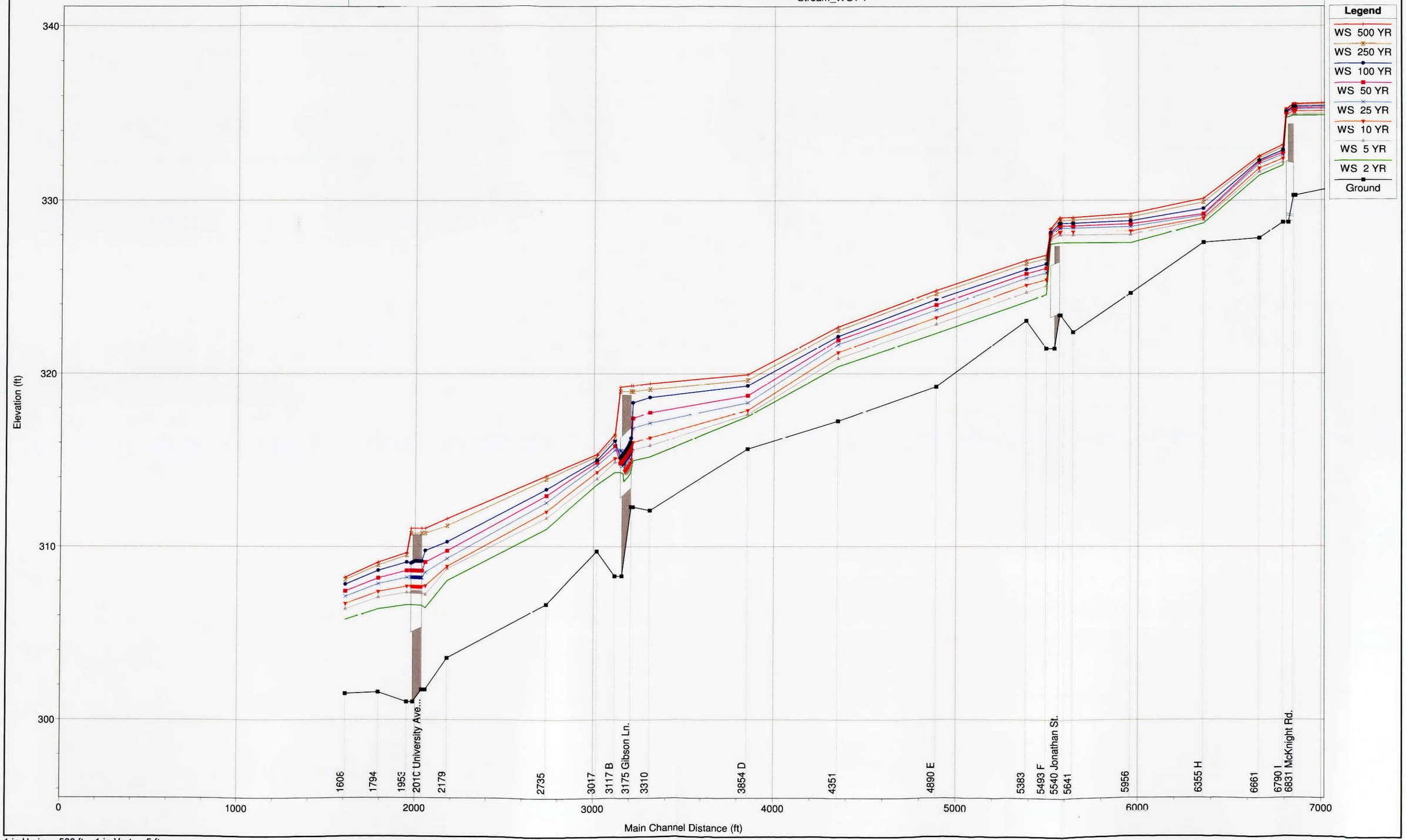
South_Wagner South_Wagner



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

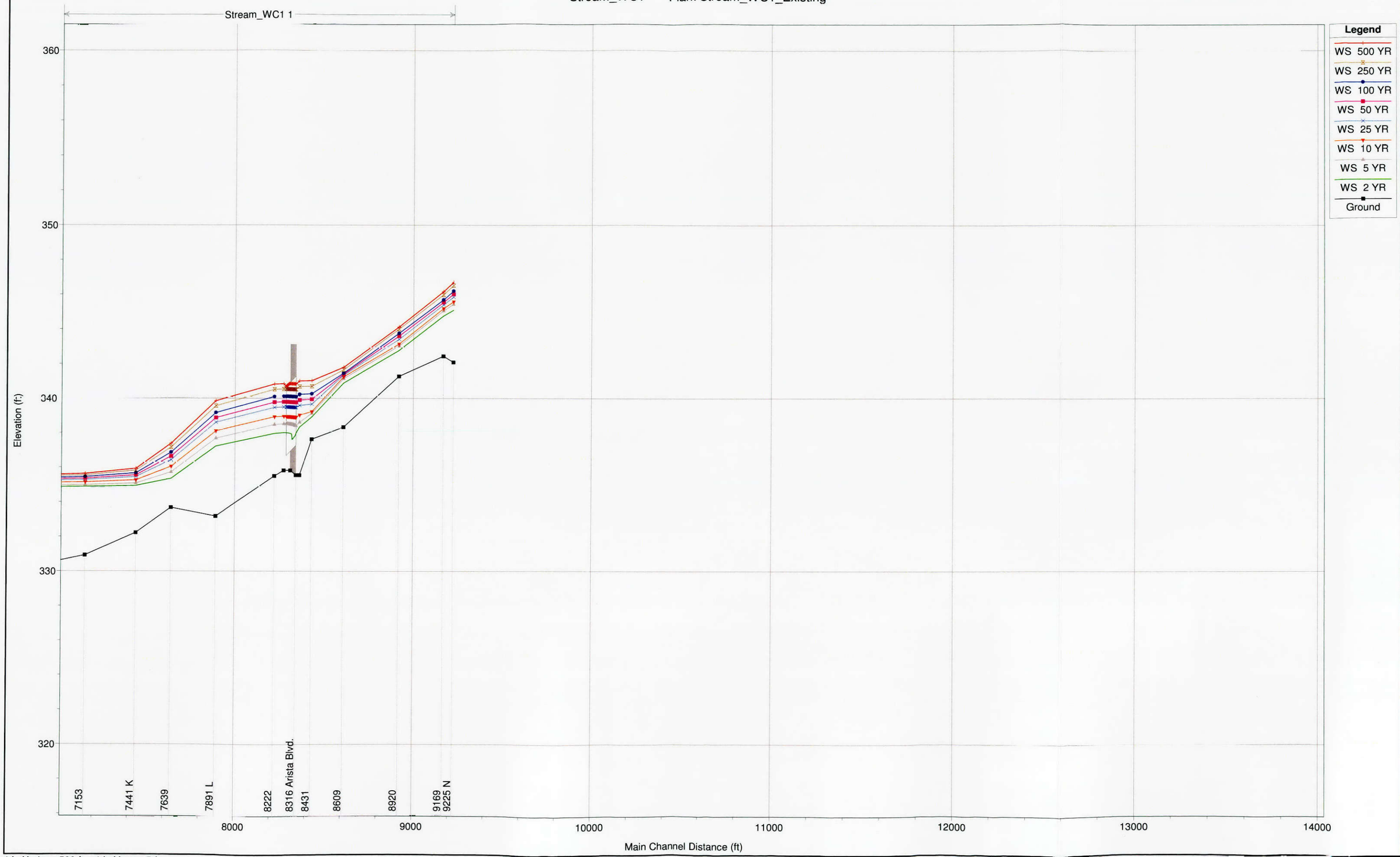
Stream_WC1 Plan: Stream_WC1_Existing

Stream_WC1 1



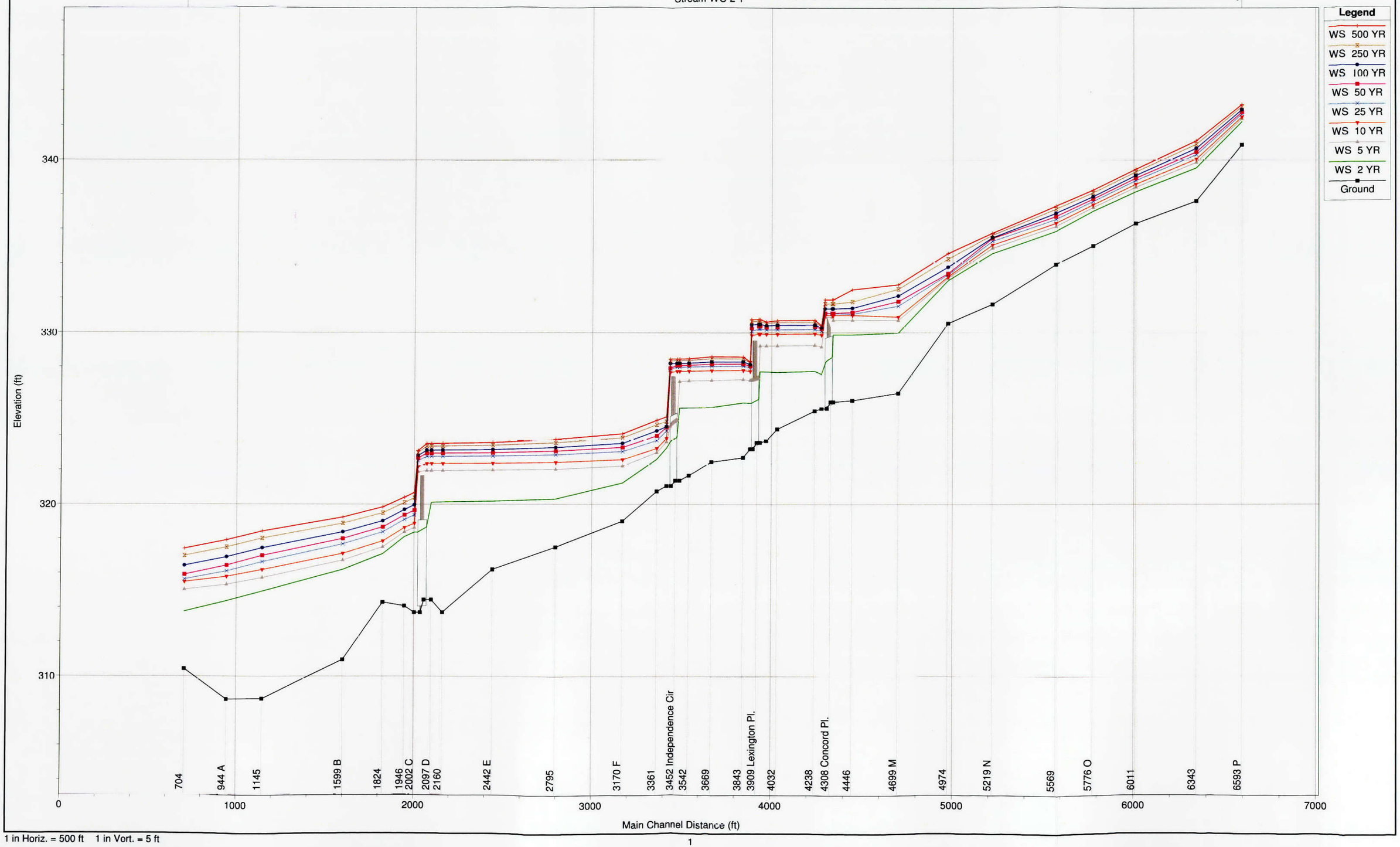
1 in Horiz. = 500 ft 1 in Vert. = 5 ft

Stream_WC1 Plan: Stream_WC1_Existing



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

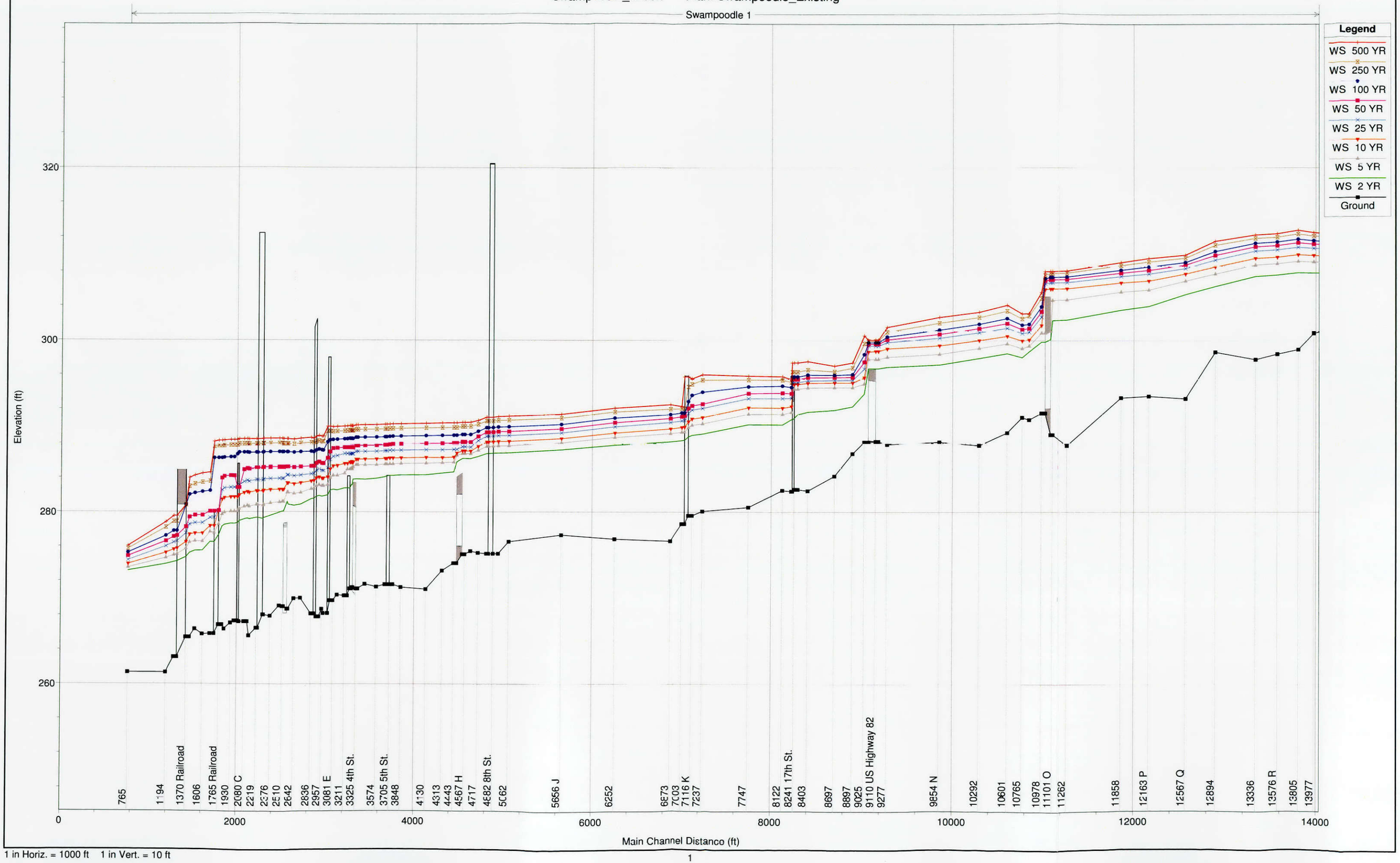
Stream_WC2 Plan: Stream_WC2_Existing



1 in Horiz. = 500 ft 1 in Vort. = 5 ft

Swampoodle_Creek Plan: Swampoodle_Existing

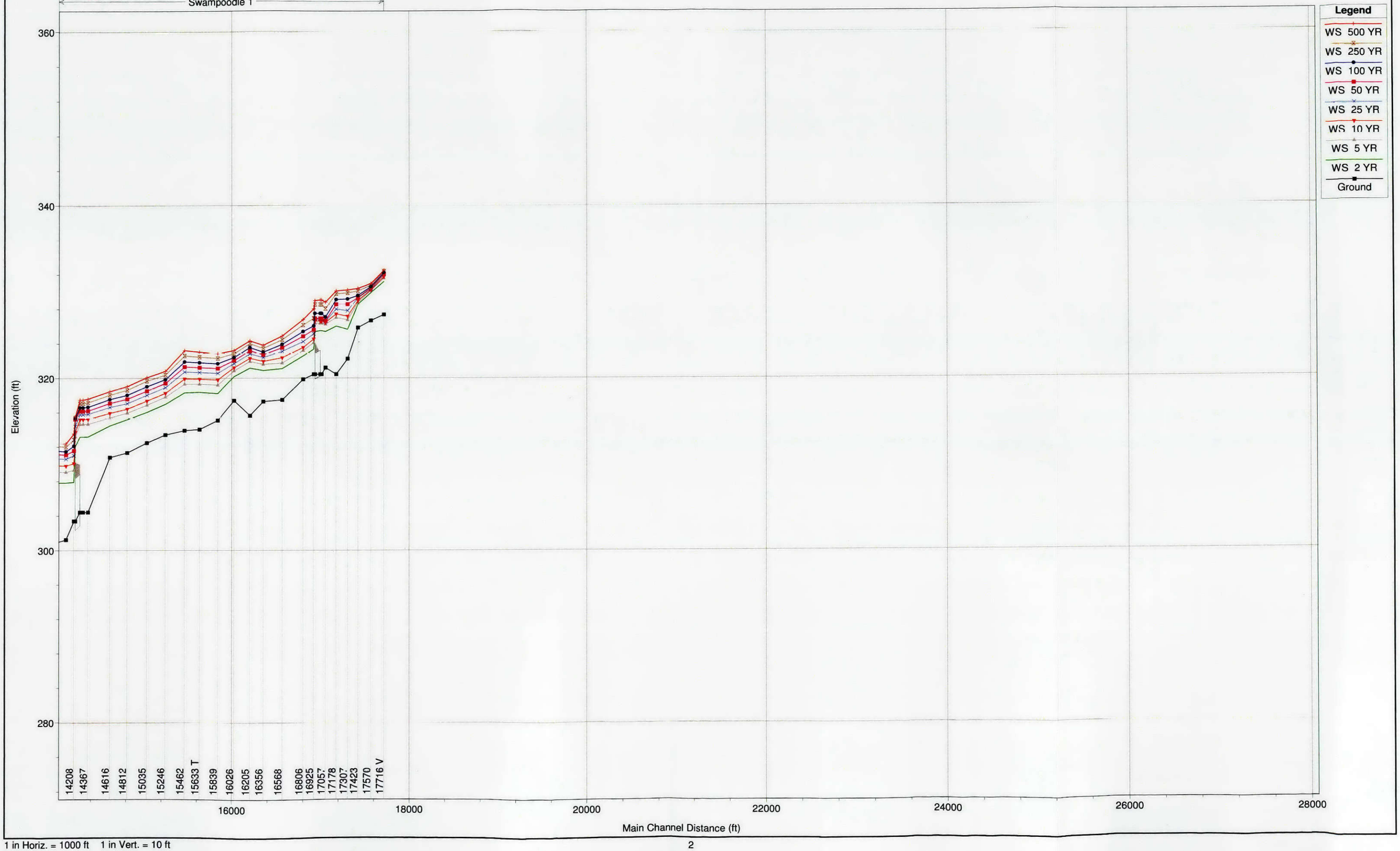
Swampoodle 1



1 in Horiz. = 1000 ft 1 in Vert. = 10 ft

Swampoodle_Creek Plan: Swampoodle_Existing

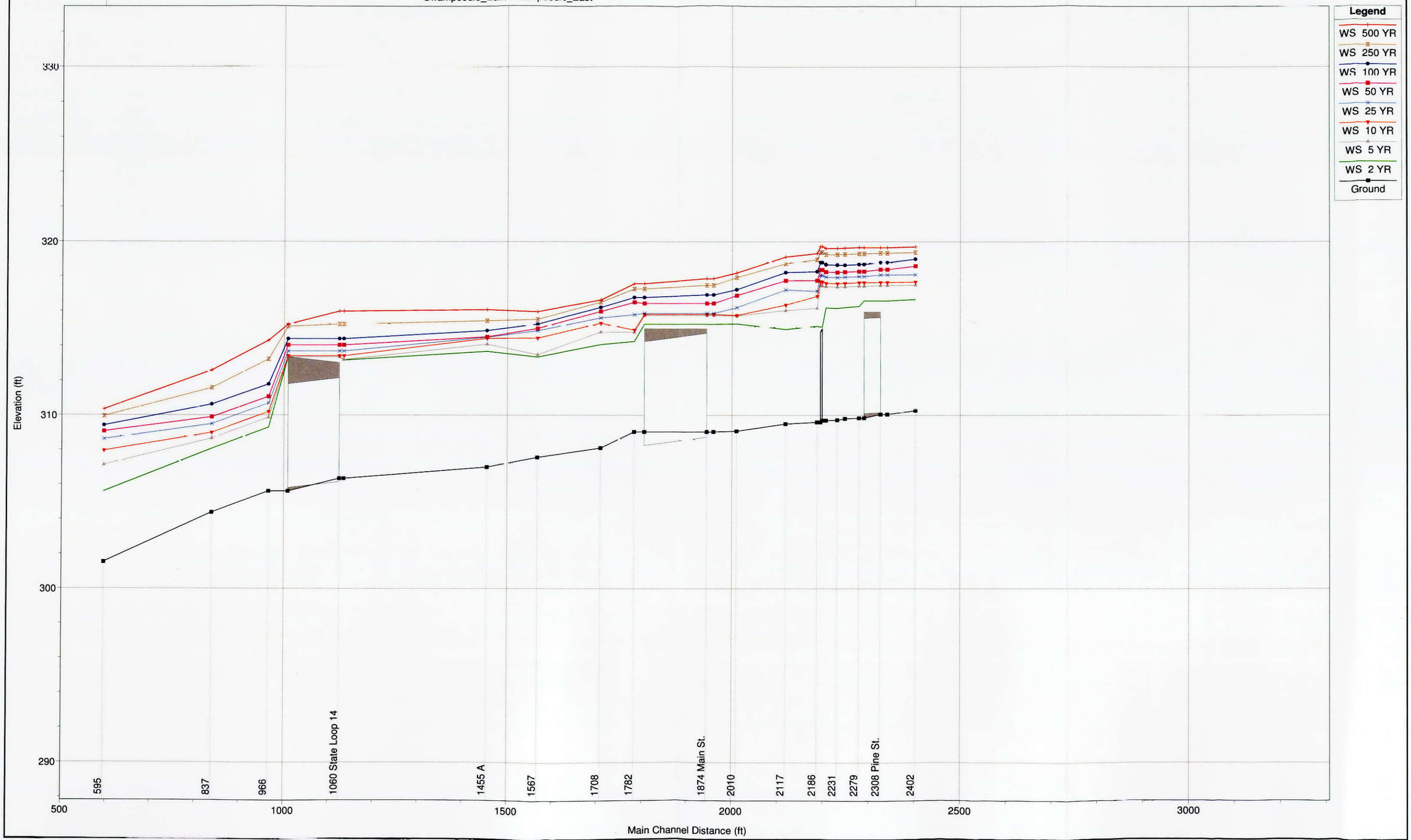
Swampoodle 1



1 in Horiz. = 1000 ft 1 in Vert. = 10 ft

Swampoodle_Creek Plan: Swampoodle_East_Existing

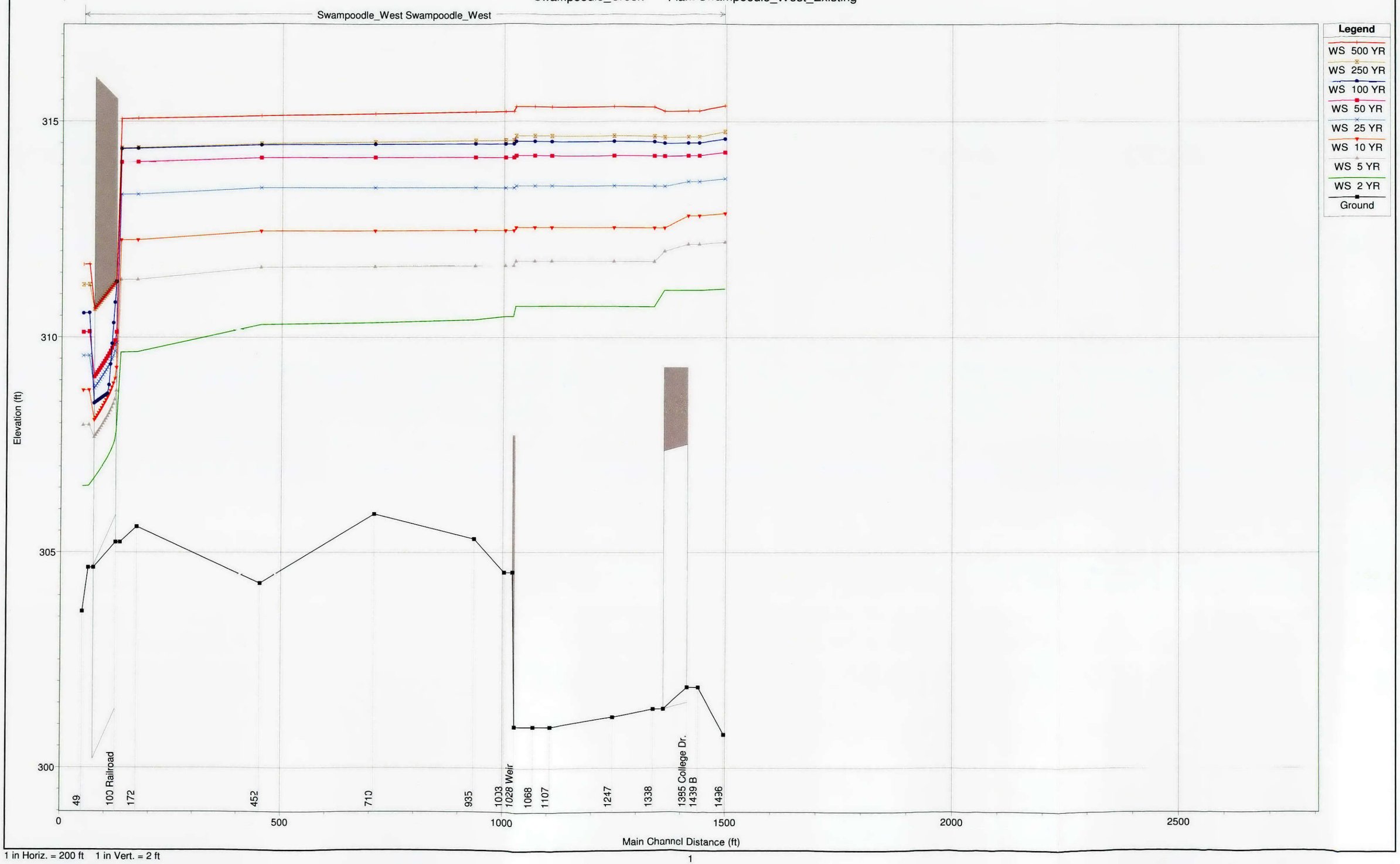
Swampoodle_East Swampoodle_East



1 in Horiz. = 200 ft 1 in Vert. = 5 ft

Swampoodle_Creek Plan: Swampoodle_West_Existing

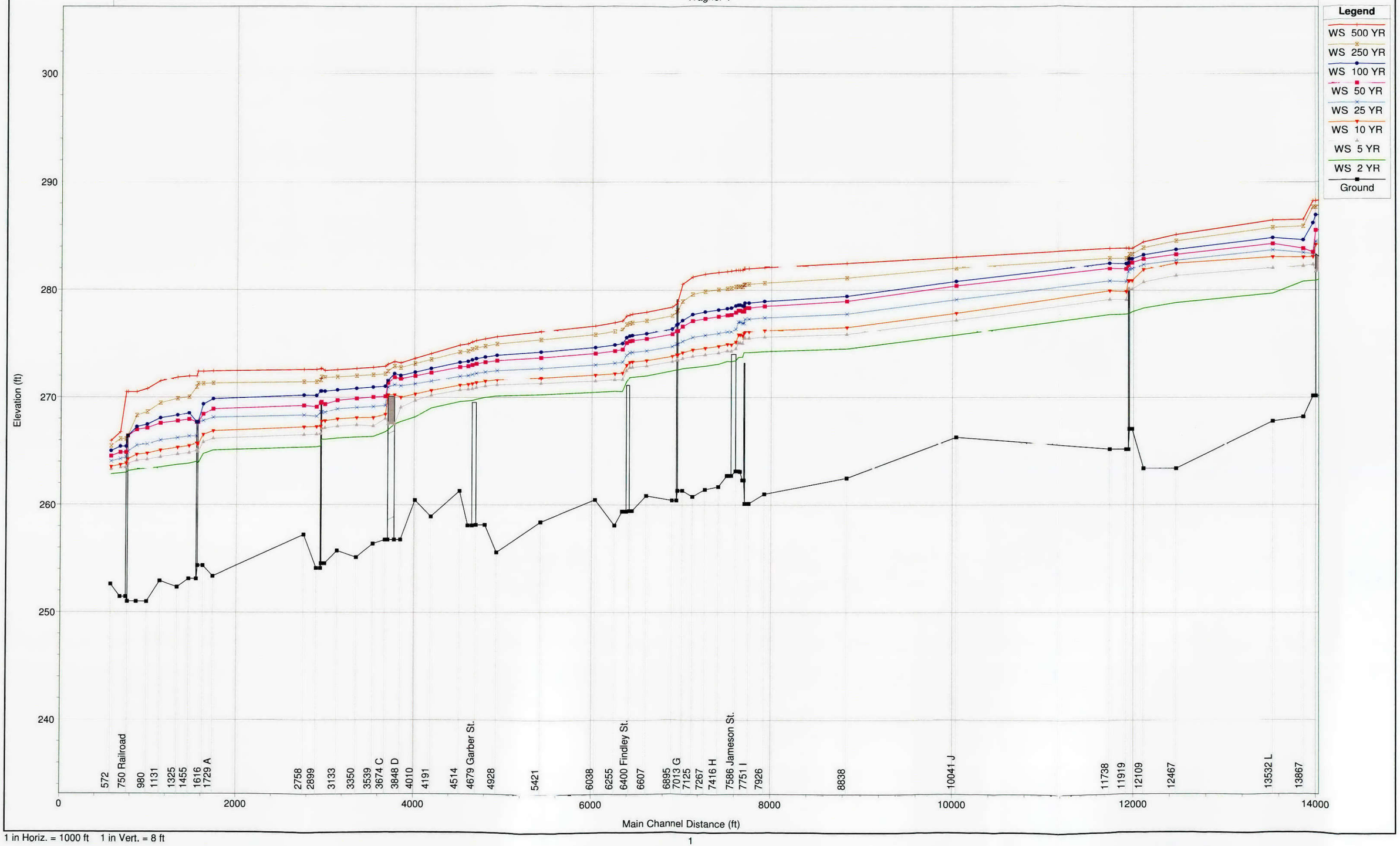
Swampoodle_West Swampoodle_West



1 in Horiz. = 200 ft 1 in Vert. = 2 ft

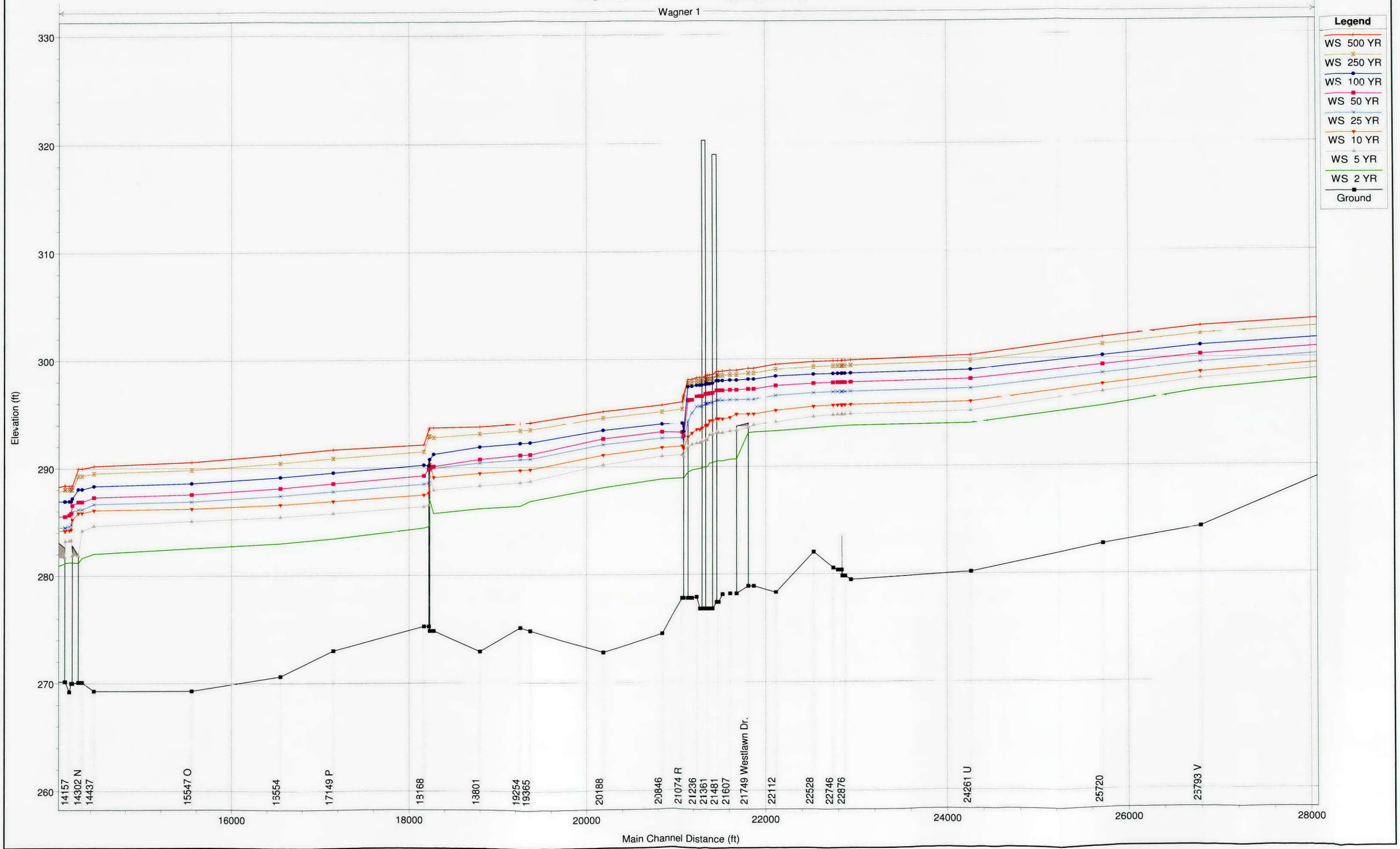
Wagner_Creek Plan: Wagner_Existing

Wagner 1



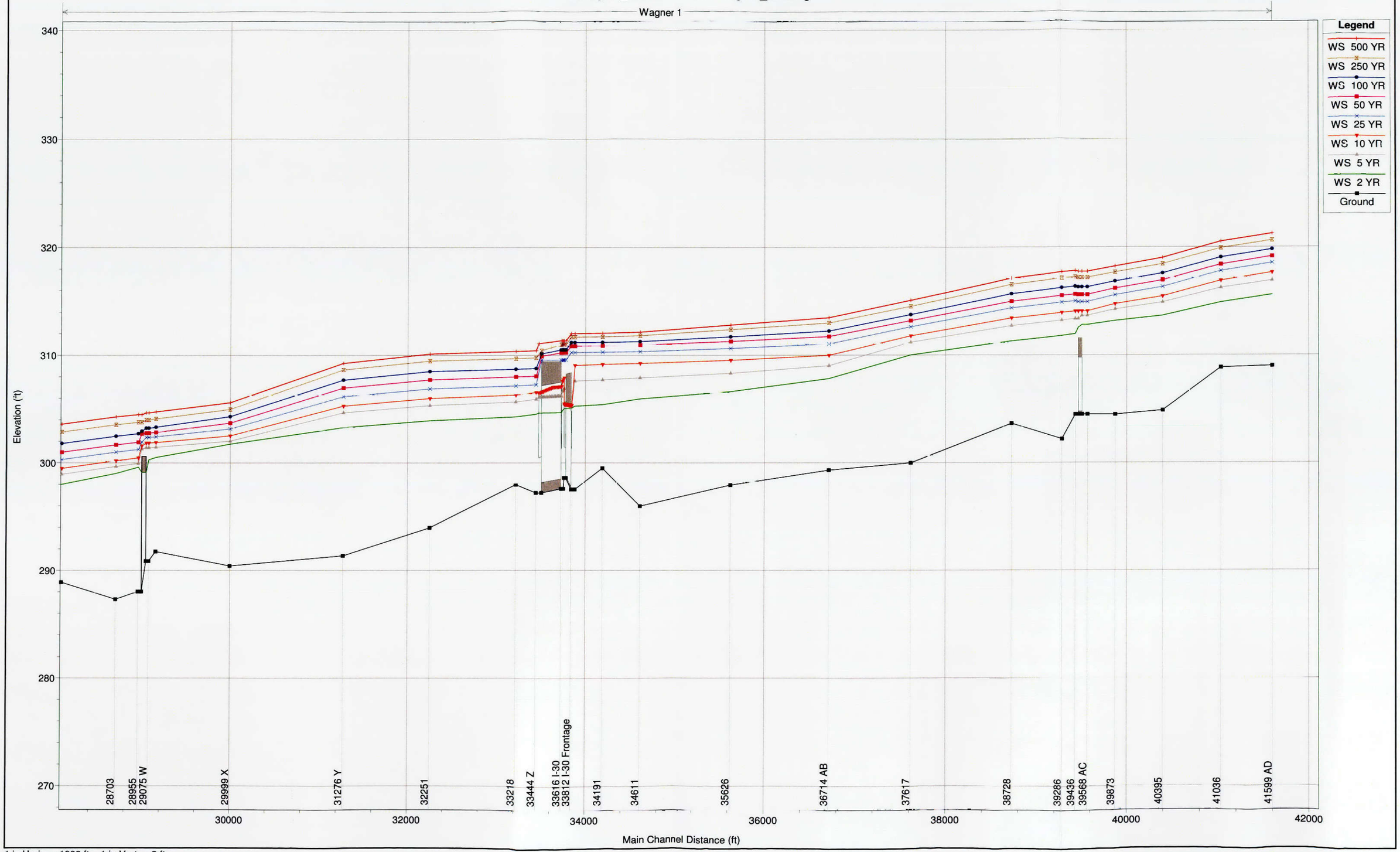
1 in Horiz. = 1000 ft 1 in Vert. = 8 ft

Wagner_Creek Plan: Wagner_Existing



1 in Horiz. = 1000 ft 1 in Vert. = 8 ft

Wagner_Creek Plan: Wagner_Existing



1 in Horiz. = 1000 ft 1 in Vert. = 8 ft

Appendix D.5
HEC-RAS Profiles
Ultimate Conditions

Clear_Creek Plan: Clear_Ultimate

CLEARCREEK 1

Legend

- WS 500 YR
- WS 250 YR
- WS 100 YR
- WS 50 YR
- WS 25 YR
- WS 10 YR
- WS 5 YR
- WS 2 YR
- Ground

Elevation (ft)

330
320
310
300
290

15694 A
16484 B
17242 C
18012
18947
19427
20209 D
20643

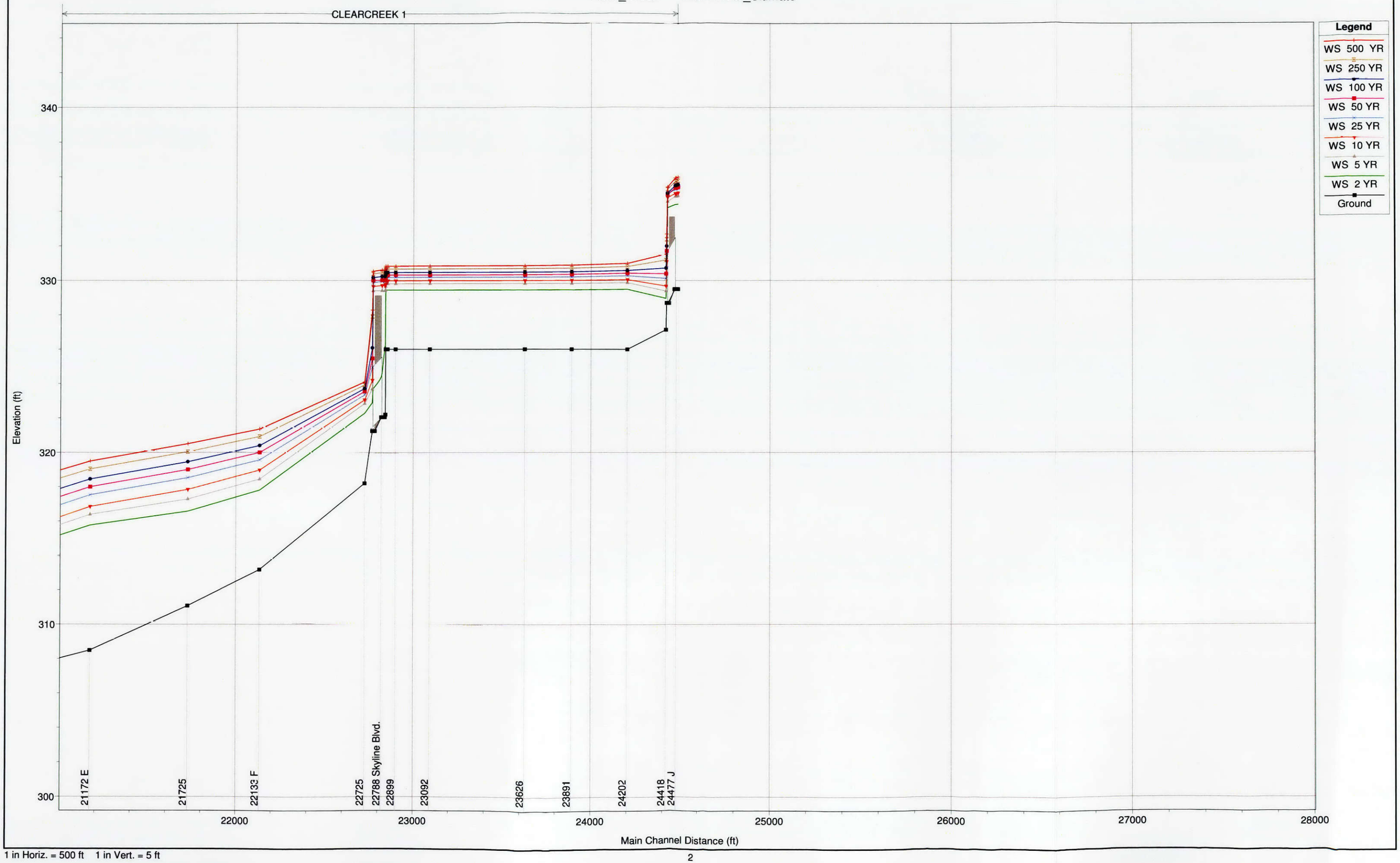
14000 15000 16000 17000 18000 19000 20000 21000

Main Channel Distance (ft)

1 in Horiz. = 500 ft 1 in Vert. = 5 ft

Clear_Creek Plan: Clear_Ultimate

CLEARCREEK 1



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

Corral_Creek Plan: Corral_Ultimate

Corral 1

Legend

WS 500 YR
WS 250 YR
WS 100 YR
WS 50 YR
WS 25 YR
WS 10 YR
WS 5 YR
WS 2 YR
Ground

Elevation (ft)

290
280
270
260

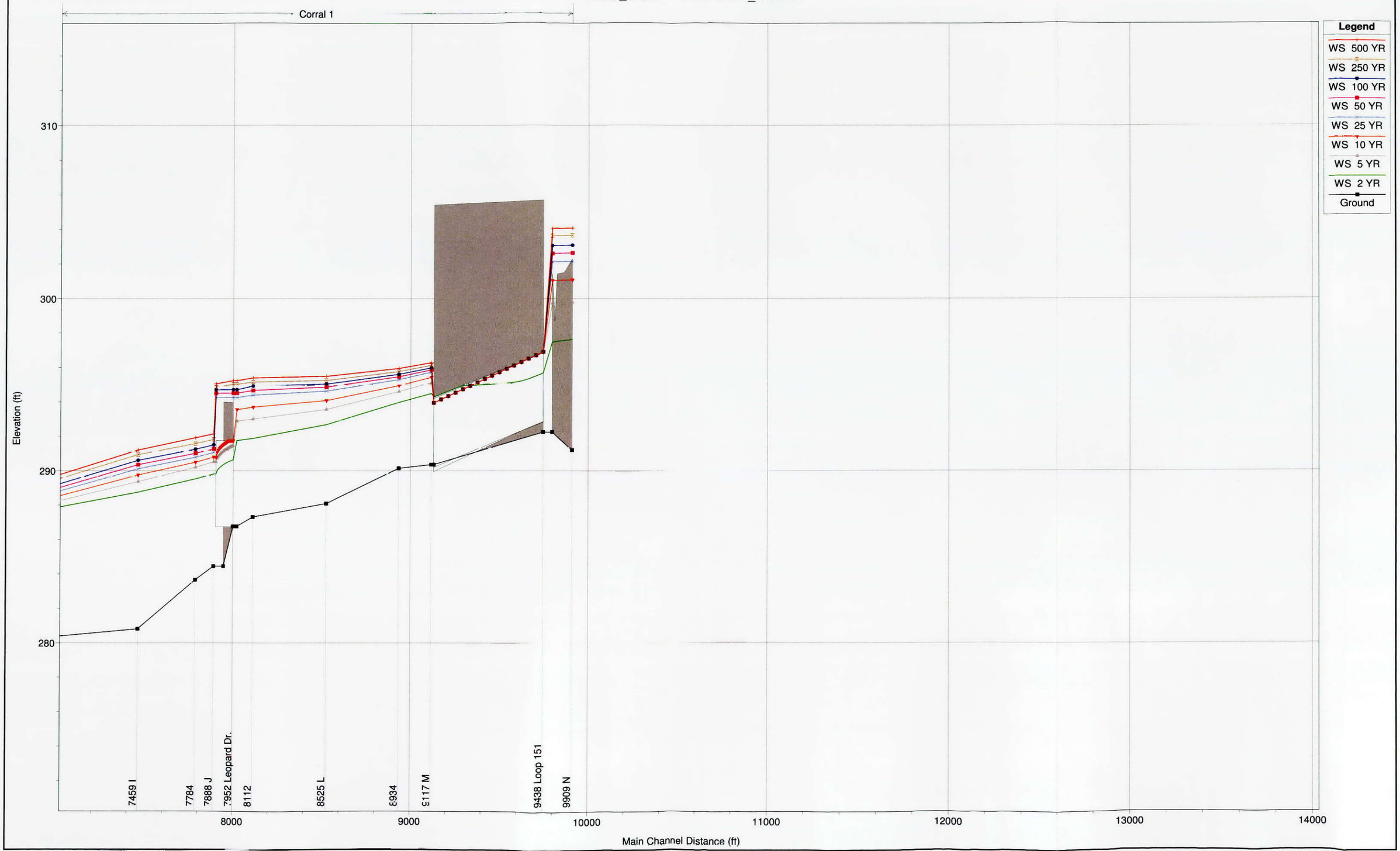
1152
1422
1745
1937 A
3130 Culvert
4391
4632
4753 C
4815 Chelf Rd.
4923
5413
5817 E
6302
6385 F
6450 G
6518
6933 H

0
1000
2000
3000
4000
5000
6000
7000

Main Channel Distance (ft)

1 in Horiz. = 500 ft 1 in Vert. = 5 ft

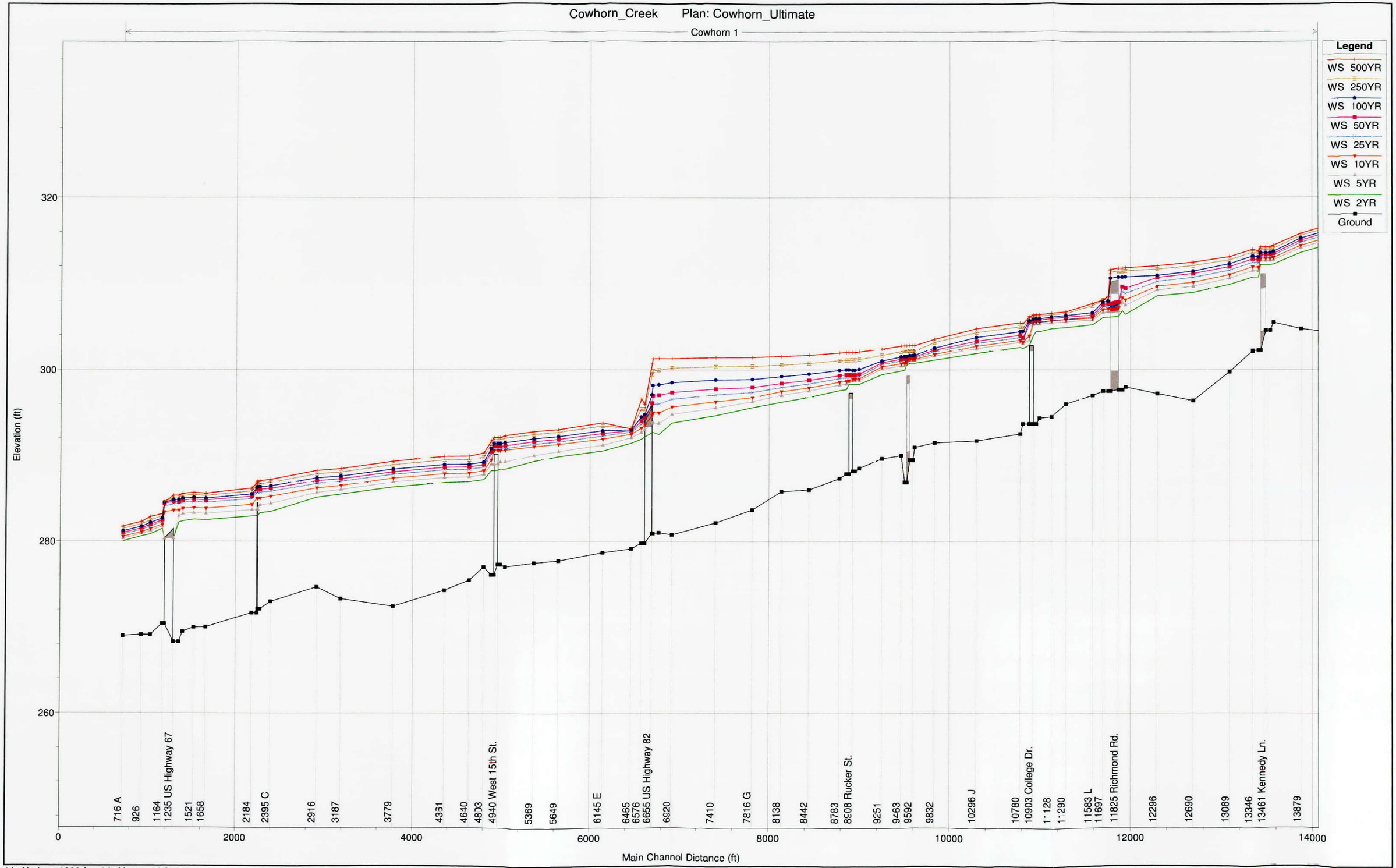
Corral_Creek Plan: Corral_Ultimate



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

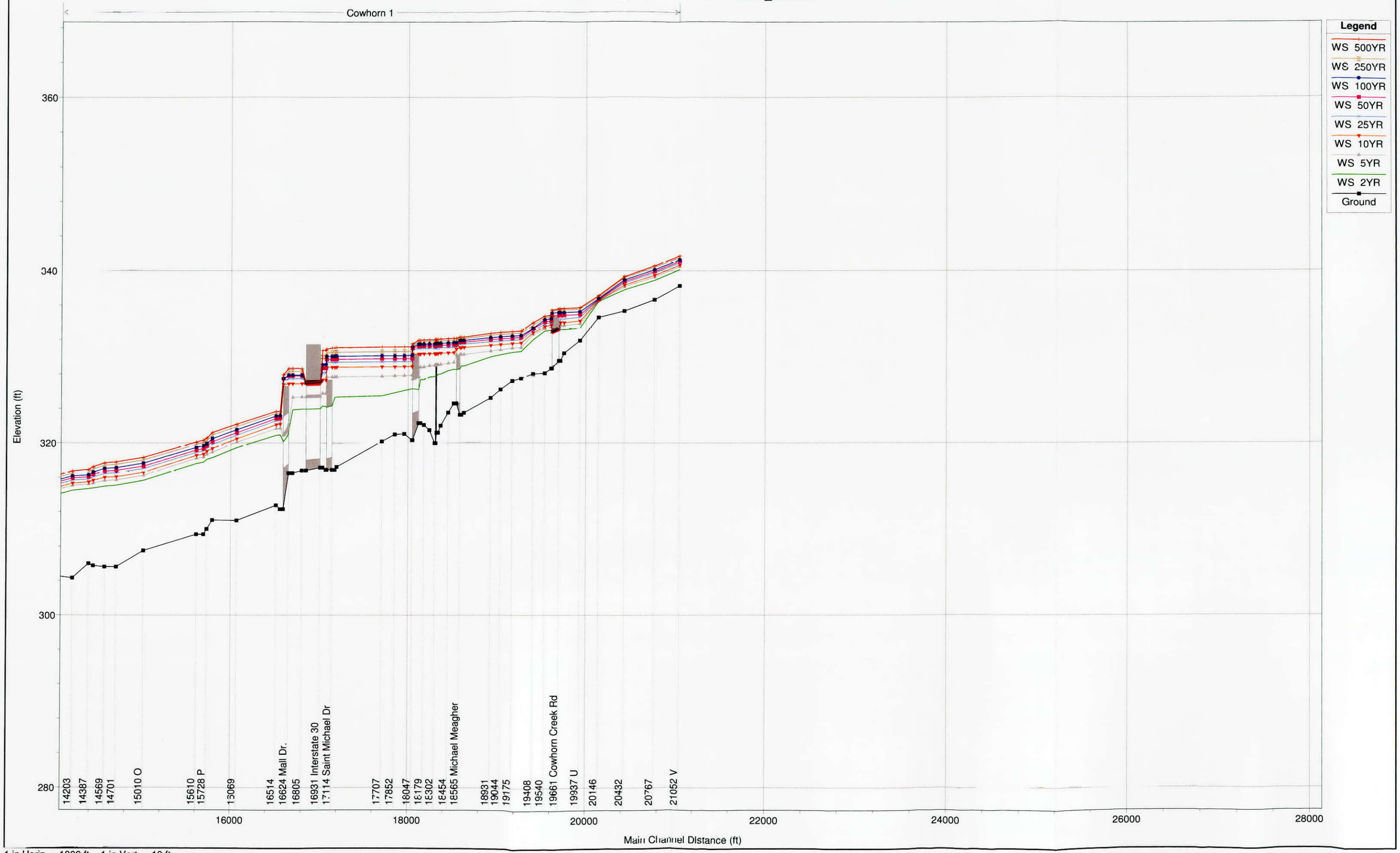
Cowhorn_Creek Plan: Cowhorn_Ultimate

Cowhorn 1



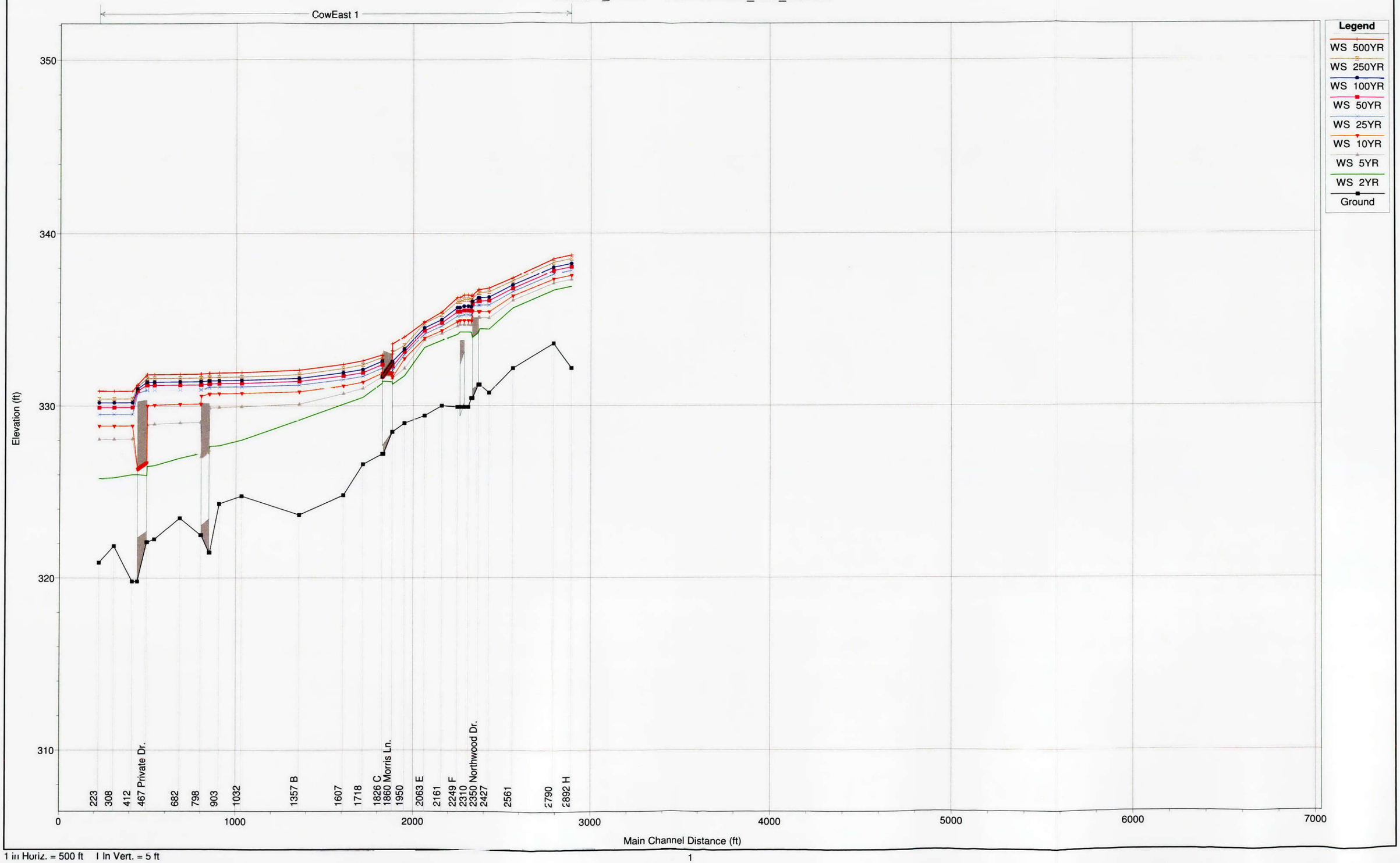
1 in Horiz. = 1000 ft 1 in Vert. = 10 ft

Cowhorn_Creek Plan: Cowhorn_Ultimate



1 in Horiz. = 1000 ft 1 in Vert. = 10 ft

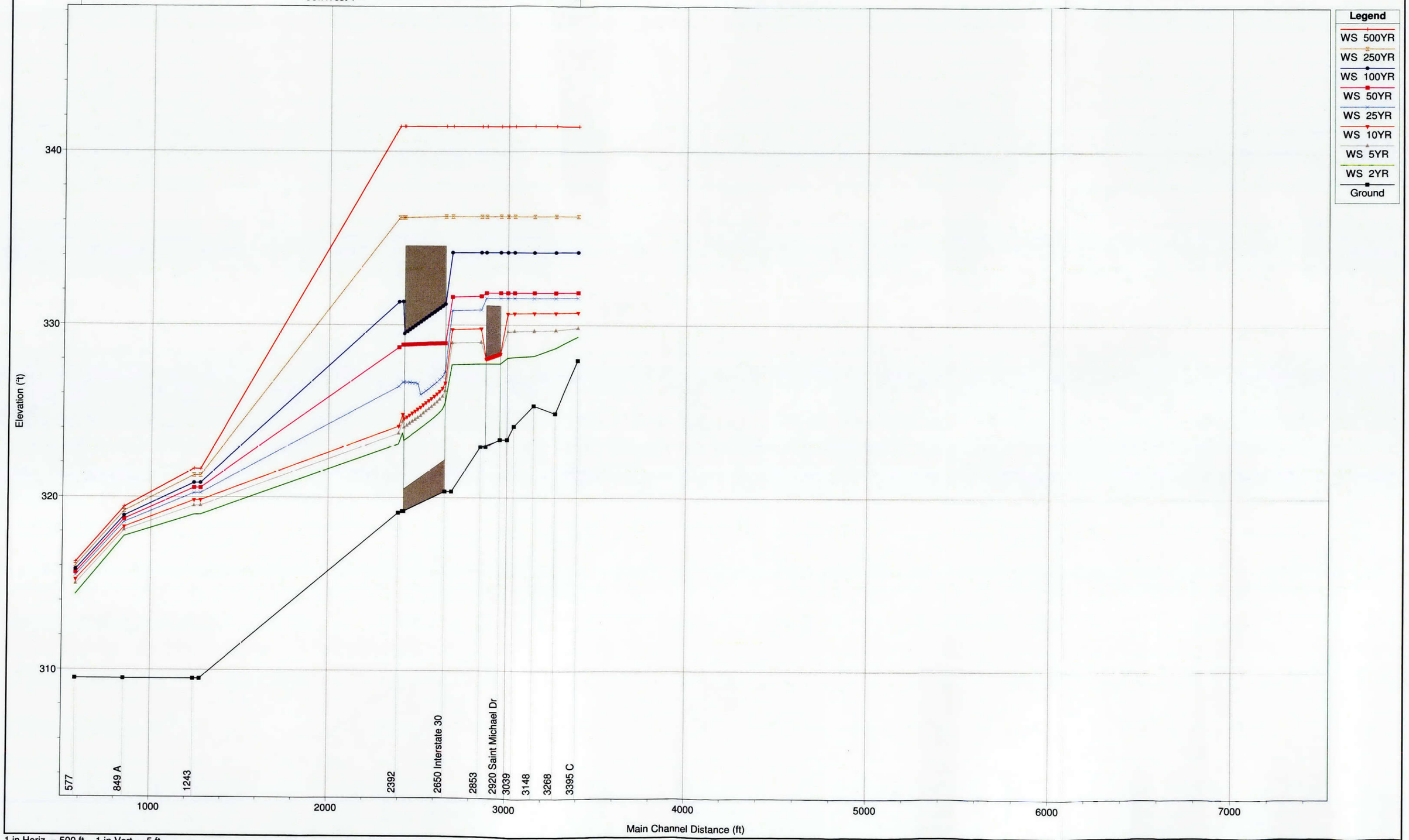
Cowhorn_Creek Plan: Cowhorn_East_Ultimate



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

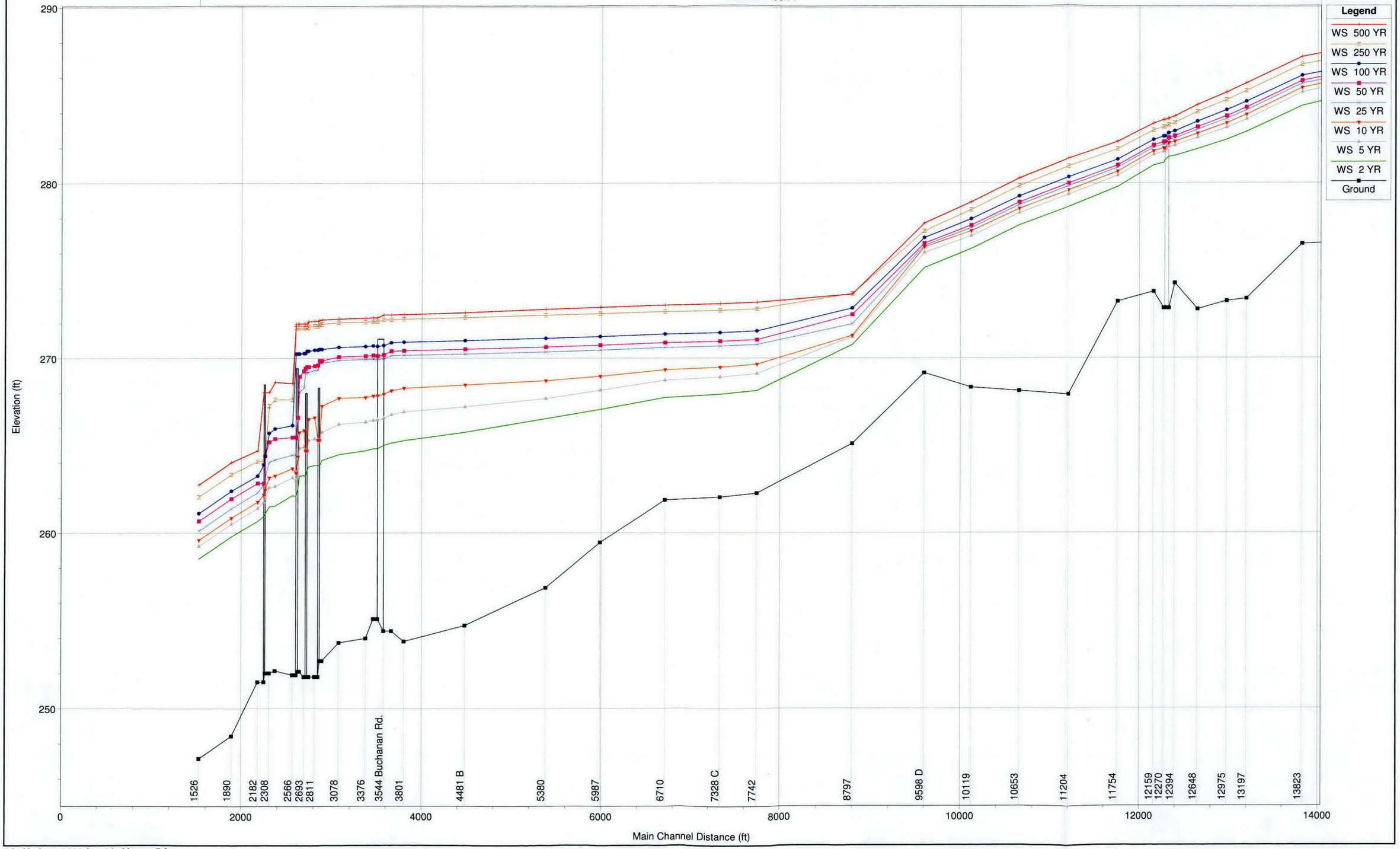
Cowhorn_Creek Plan: Cowhorn_West_Ultimate

CowWest 1



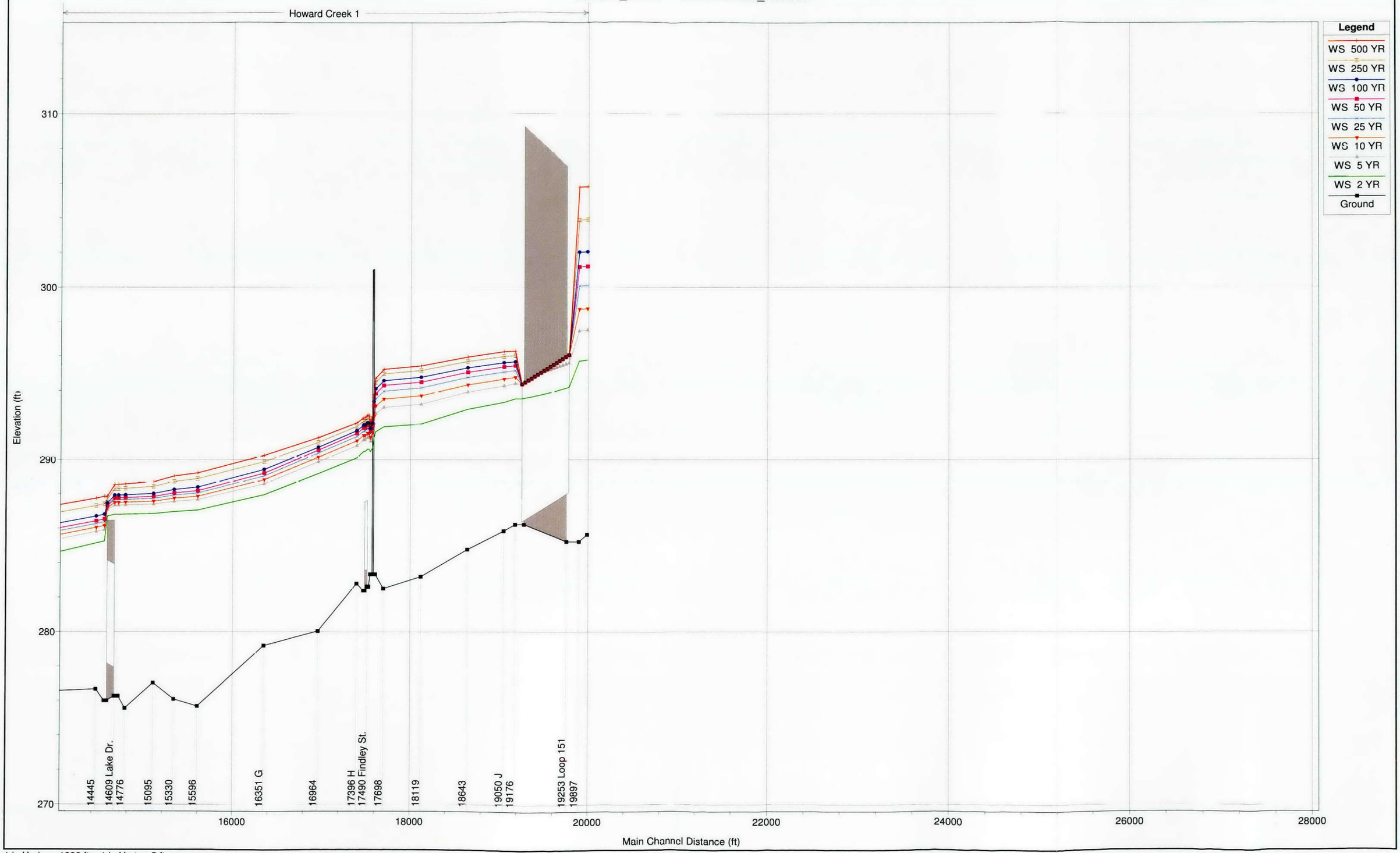
1 in Horiz. = 500 ft 1 in Vert. = 5 ft

Howard_Creek Plan: Howard_Ultimate



1 in Horiz. = 1000 ft 1 in Vert. = 5 ft

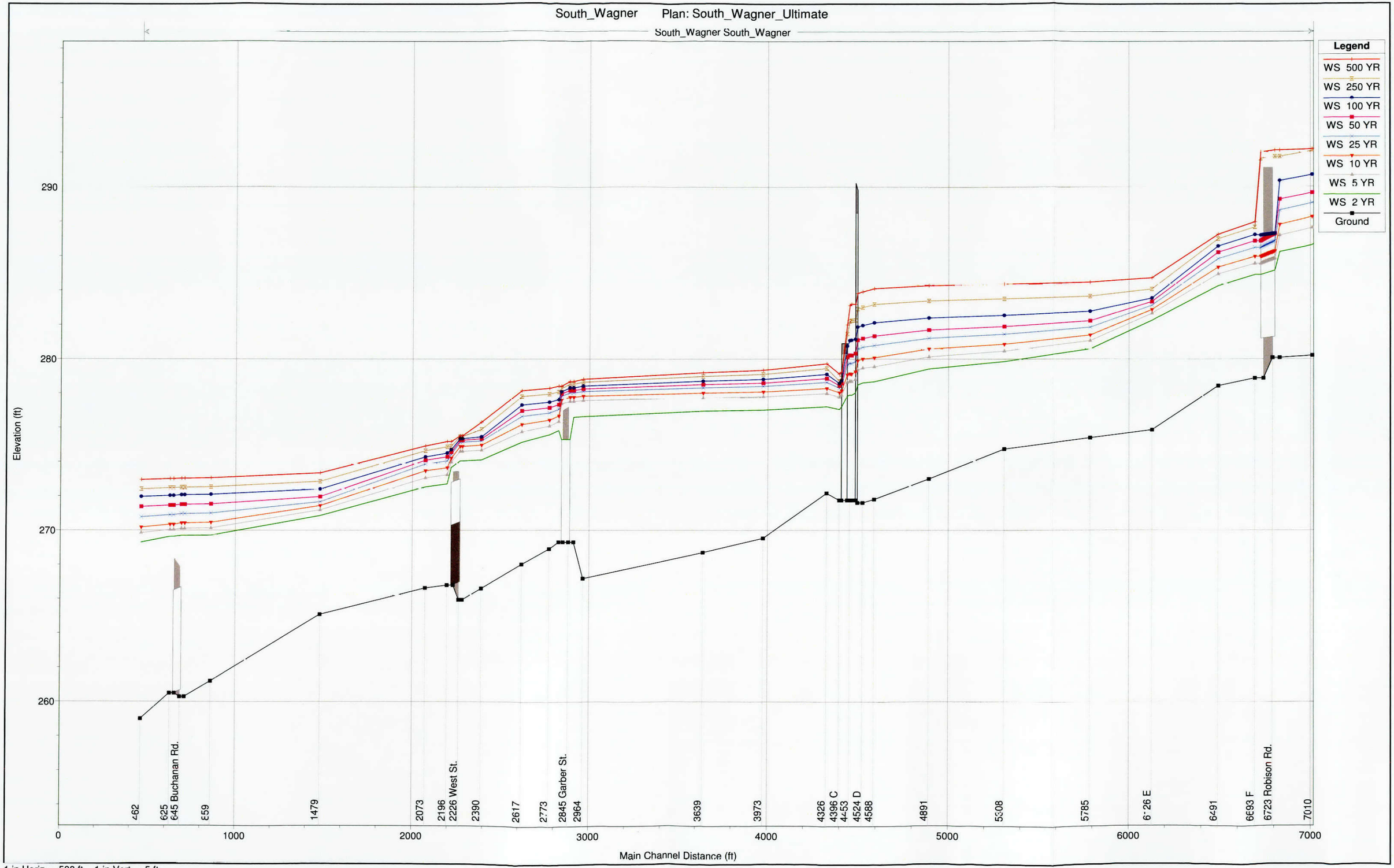
Howard_Creek Plan: Howard_Ultimate



1 in Horiz. = 1000 ft 1 in Vert. = 5 ft

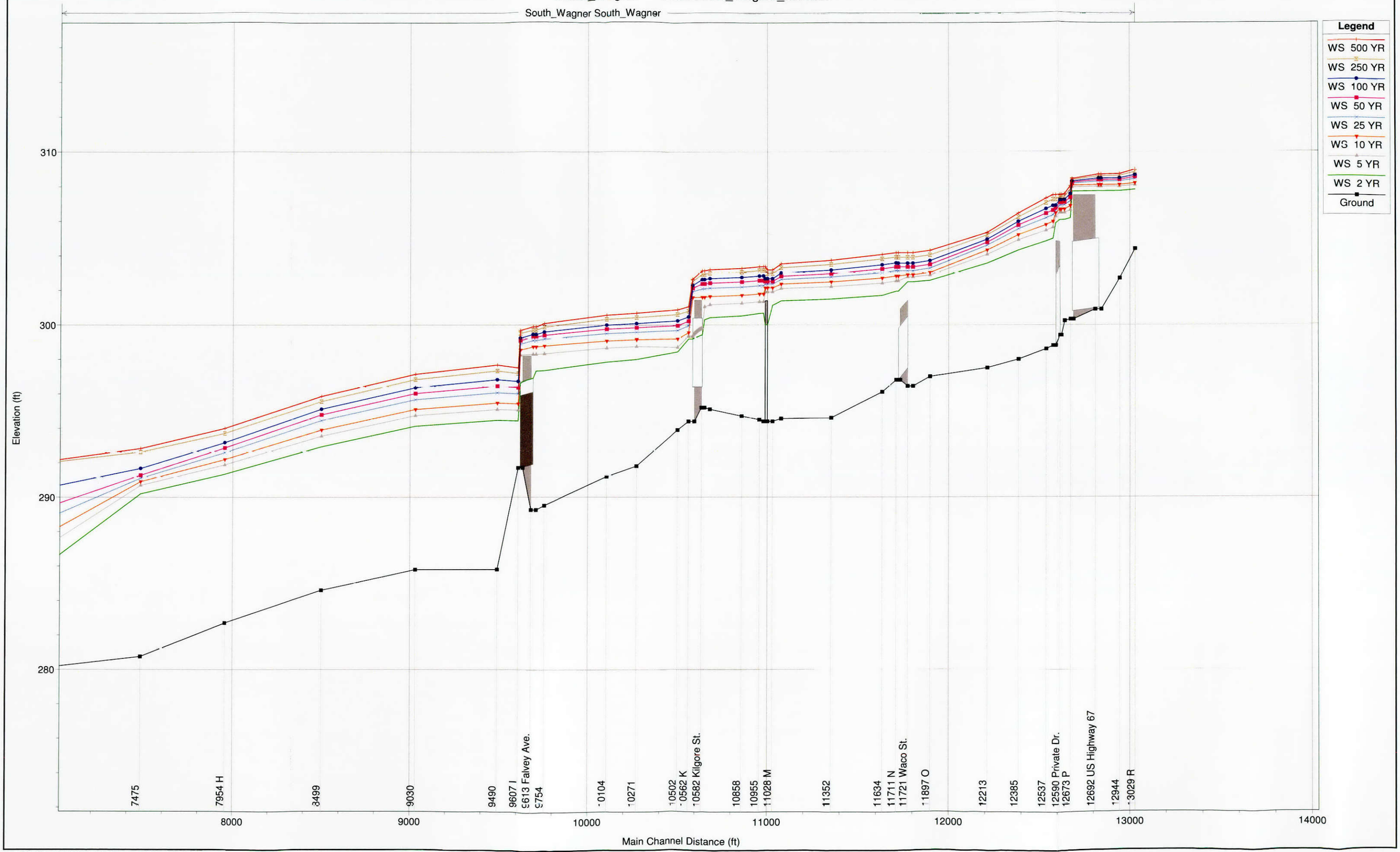
South_Wagner Plan: South_Wagner_Ultimate

South_Wagner South_Wagner



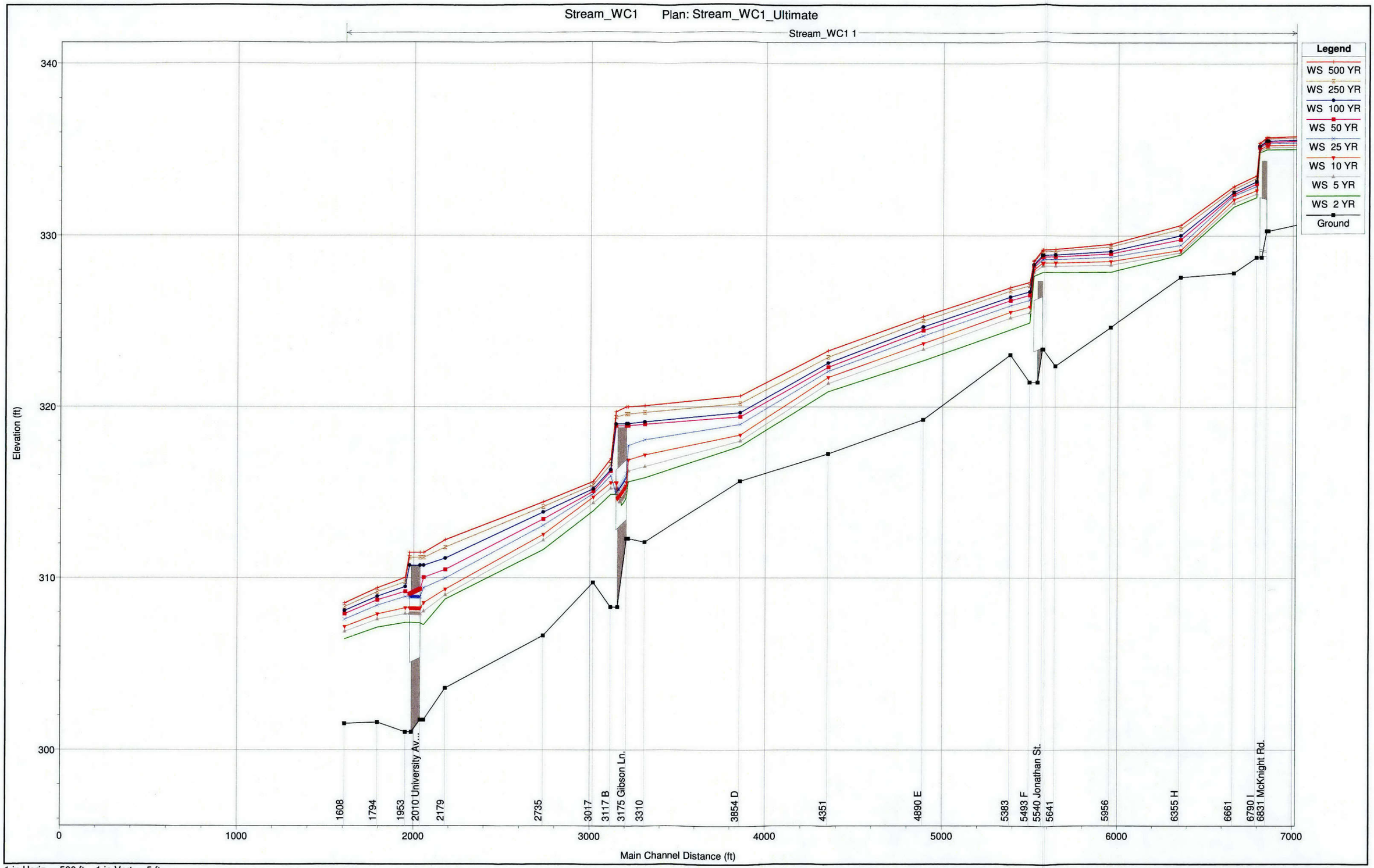
1 in Horiz. = 500 ft 1 in Vert. = 5 ft

South_Wagner Plan: South_Wagner_Ultimate



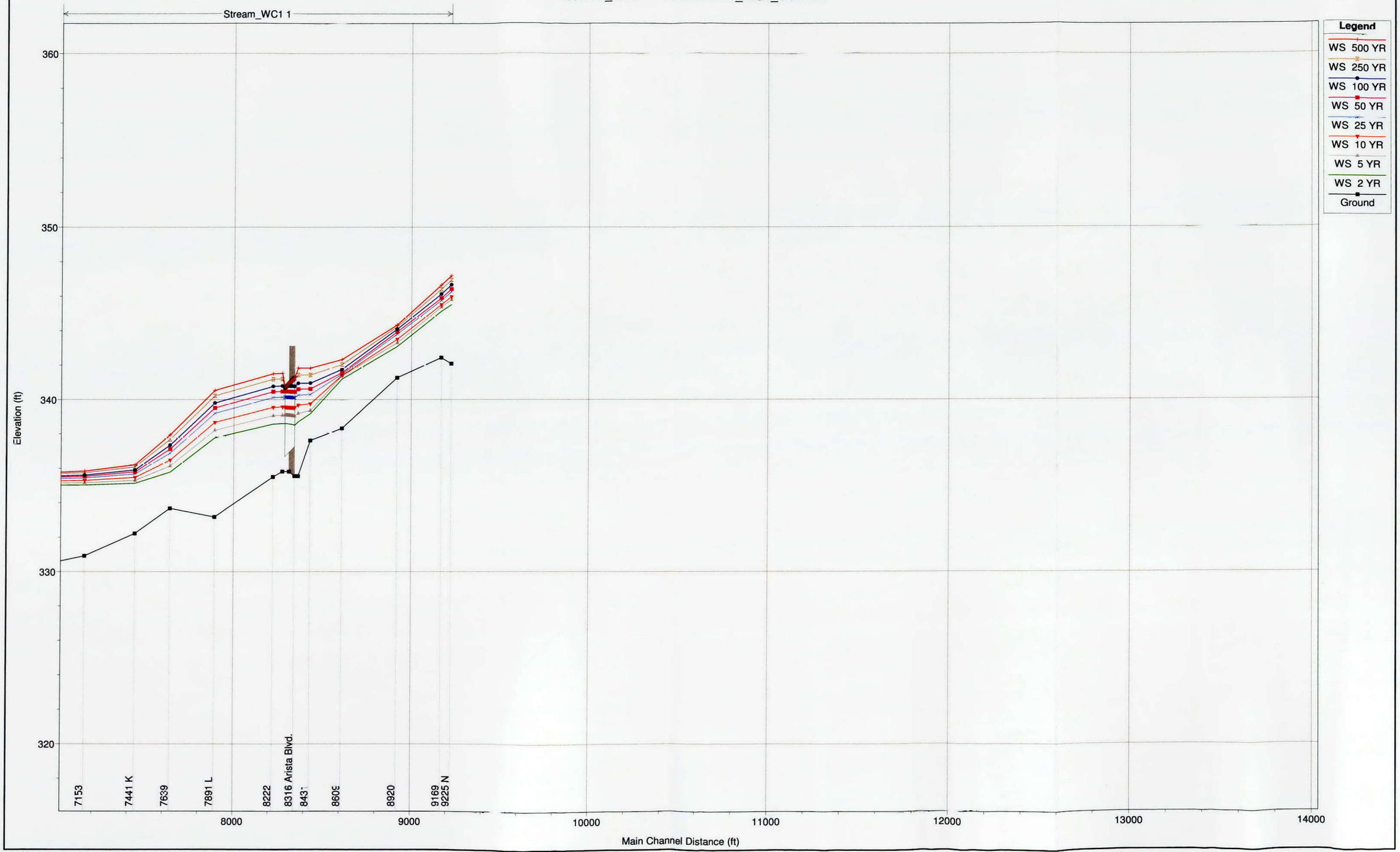
1 in Horiz. = 500 ft 1 in Vert. = 5 ft

Stream_WC1 Plan: Stream_WC1_Ultimate



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

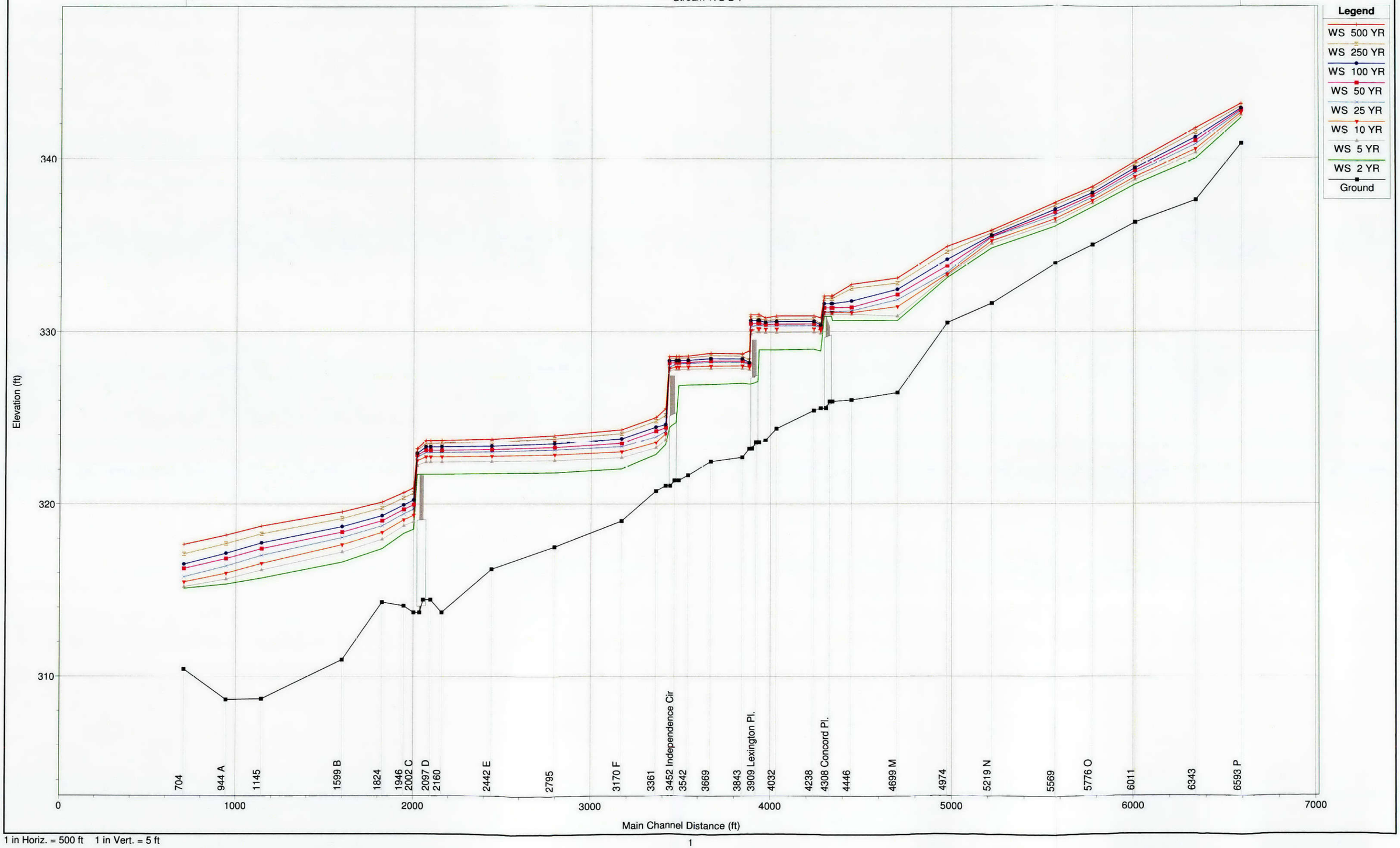
Stream_WC1 Plan: Stream_WC1_Ultimate



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

Stream_WC2 Plan: Stream_WC2_Ultimate

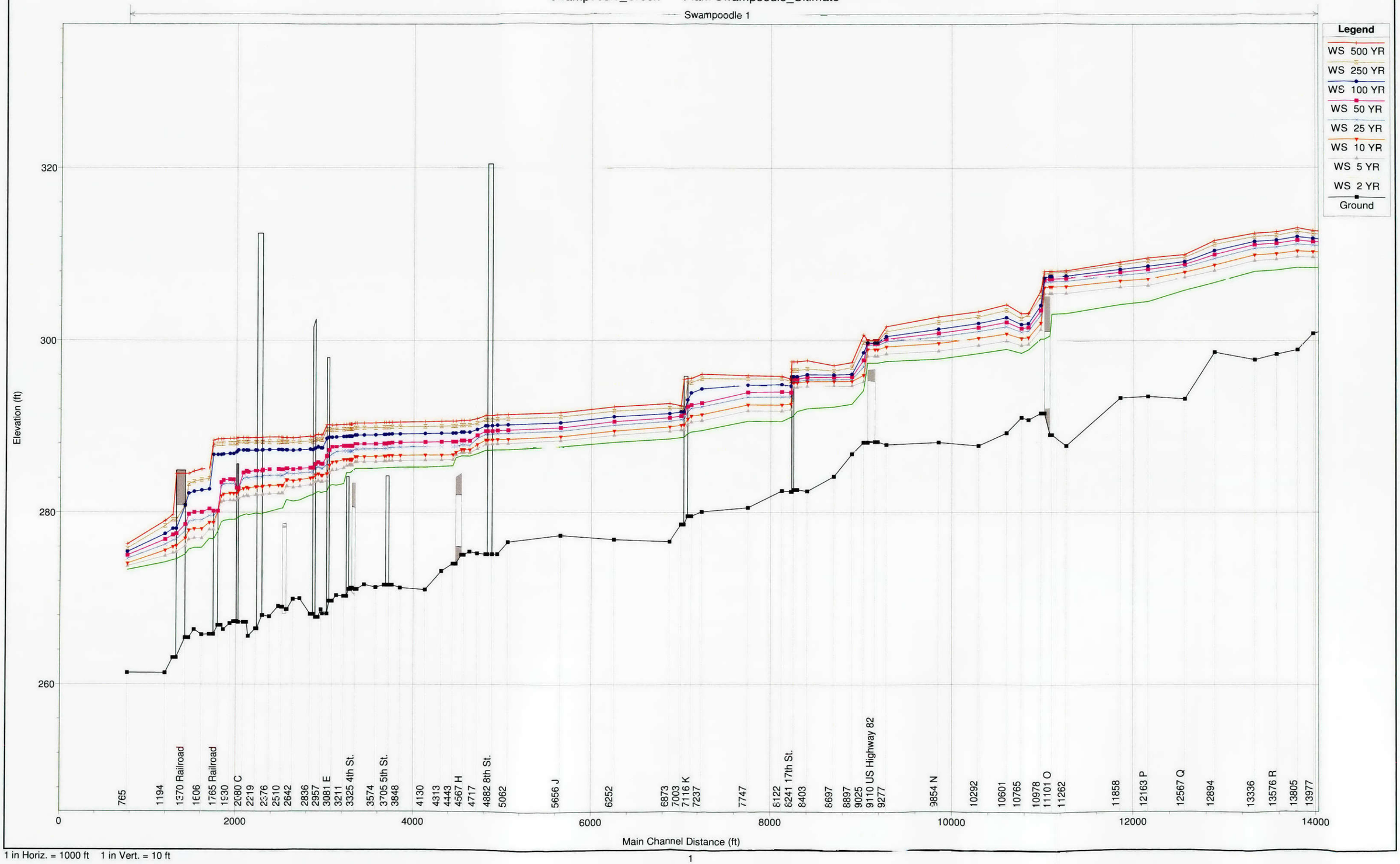
Stream WC-2 1



1 in Horiz. = 500 ft 1 in Vert. = 5 ft

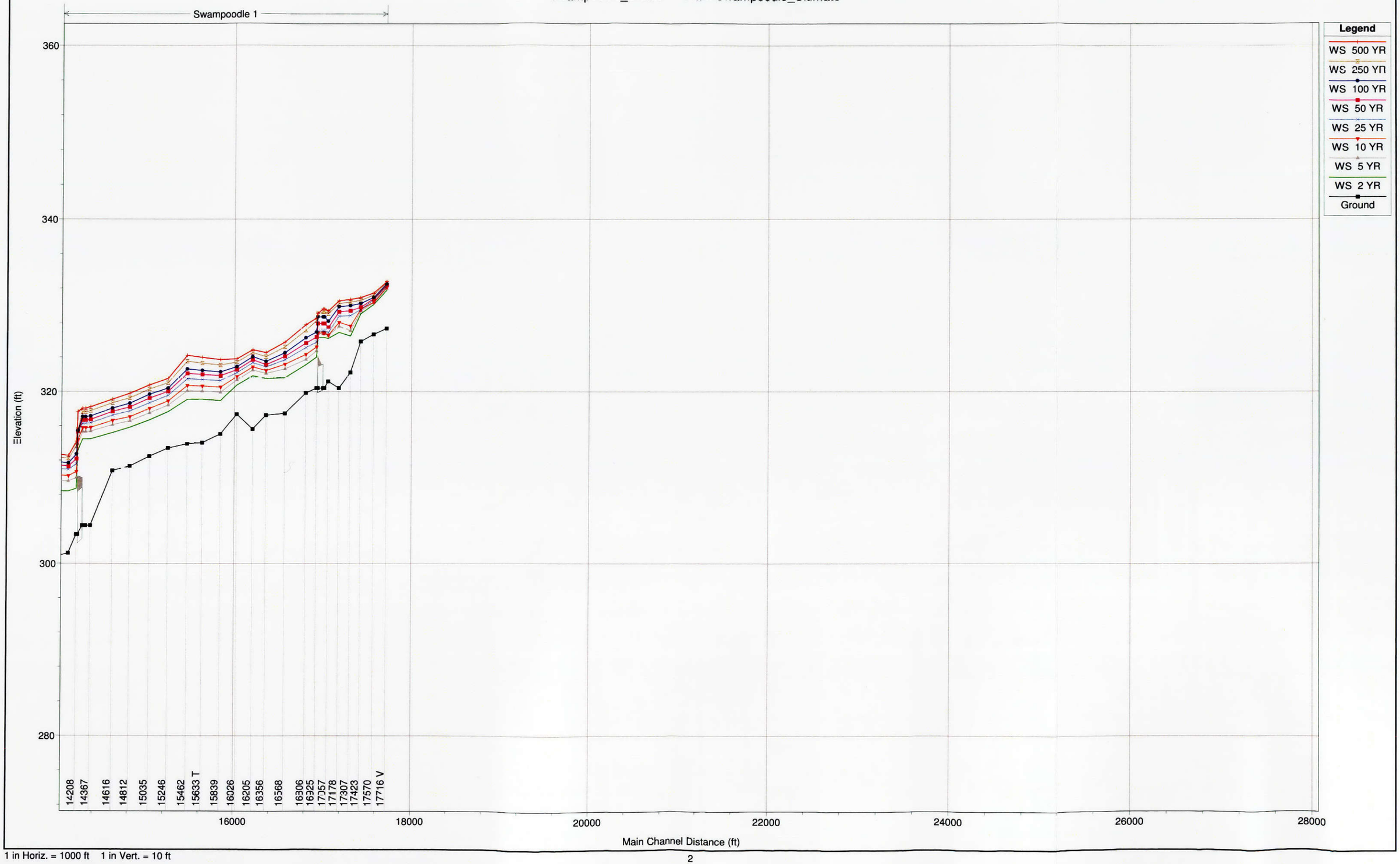
Swampoodle_Creek Plan: Swampoodle_Ultimate

Swampoodle 1



1 in Horiz. = 1000 ft 1 in Vert. = 10 ft

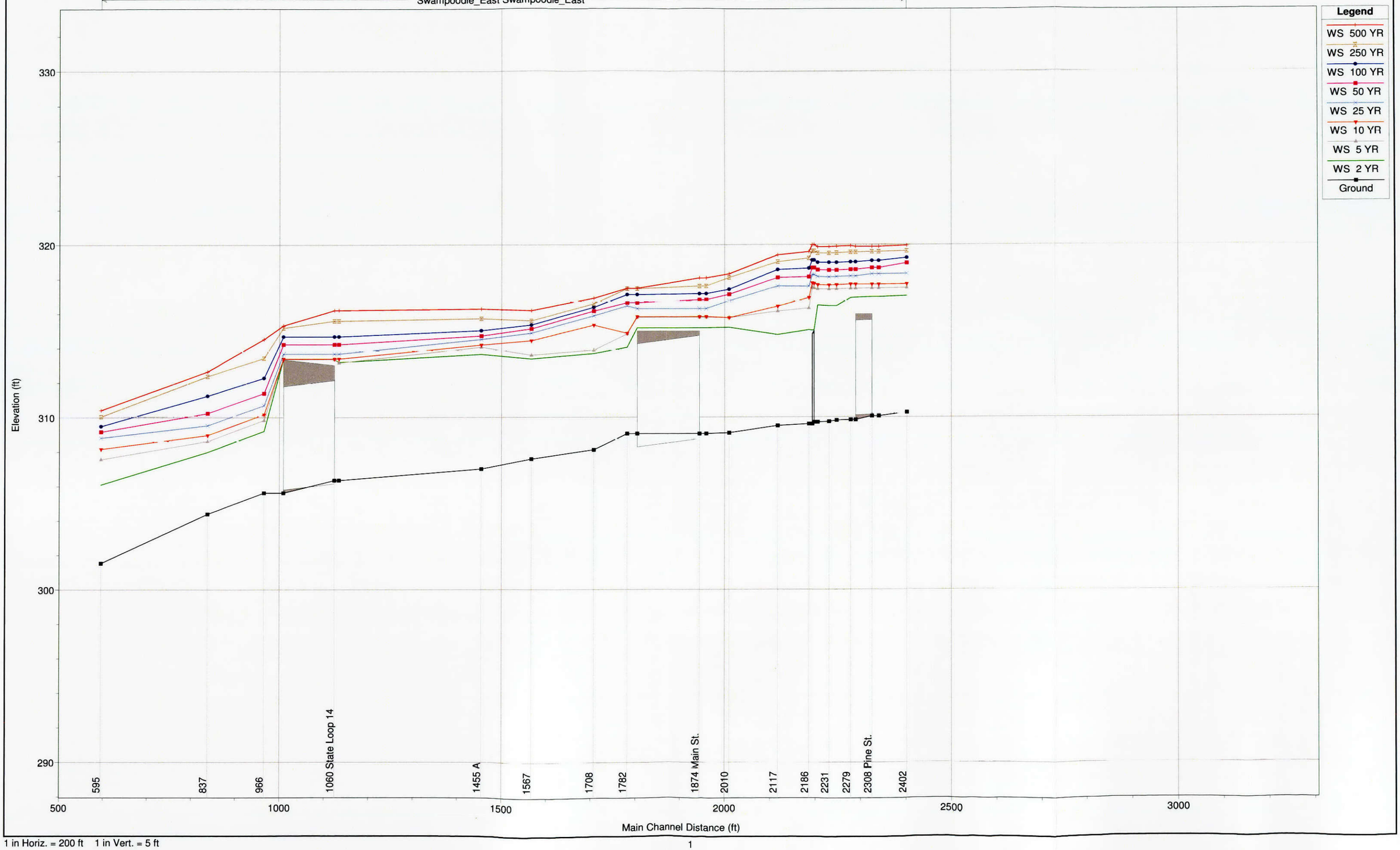
Swampoodle_Creek Plan: Swampoodle_Ultimate



1 in Horiz. = 1000 ft 1 in Vert. = 10 ft

Swampoodle_Creek Plan: Swampoodle_East_Ultimate

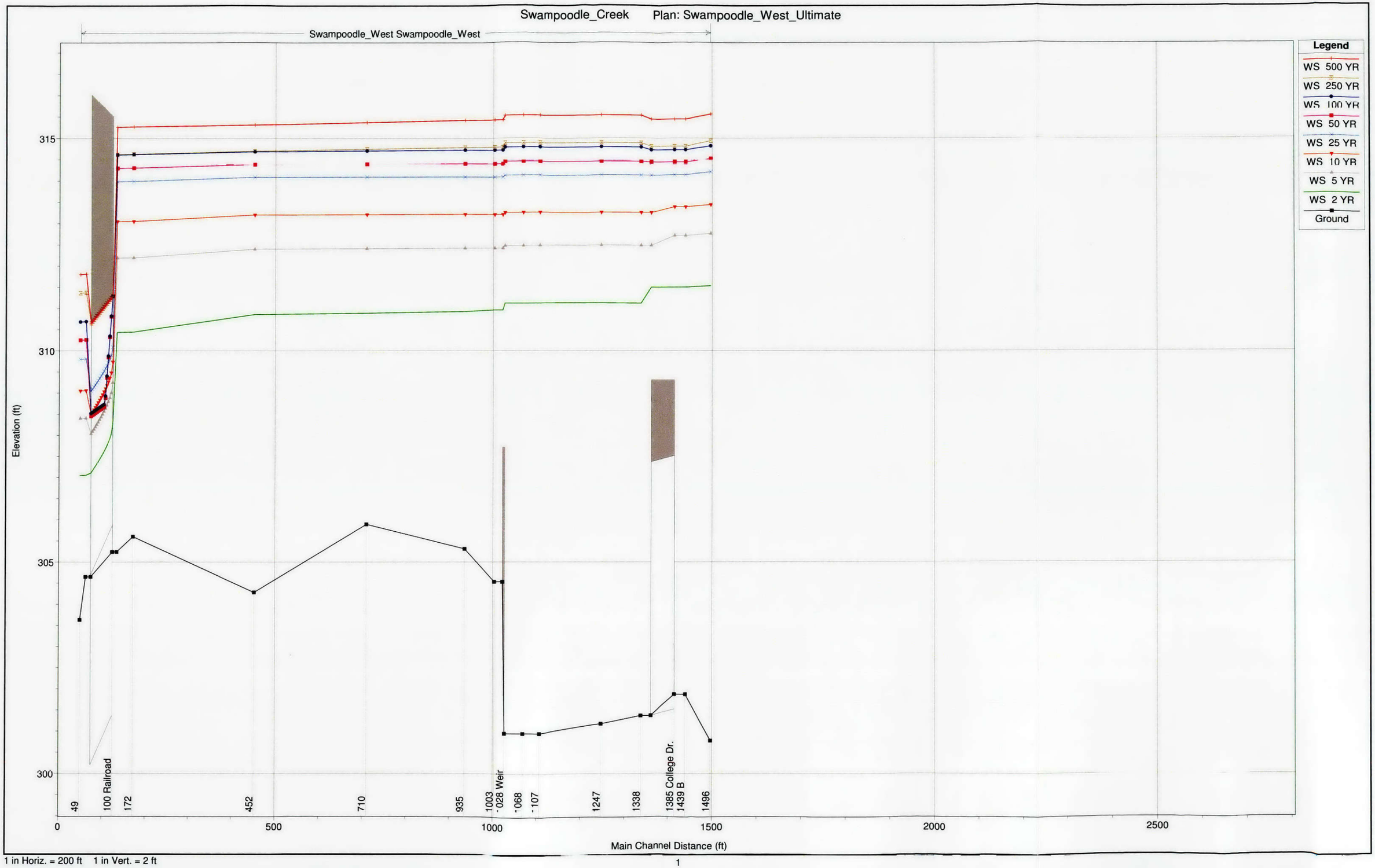
Swampoodle_East Swampoodle_East



1 in Horiz. = 200 ft 1 in Vert. = 5 ft

Swampoodle_Creek Plan: Swampoodle_West_Ultimate

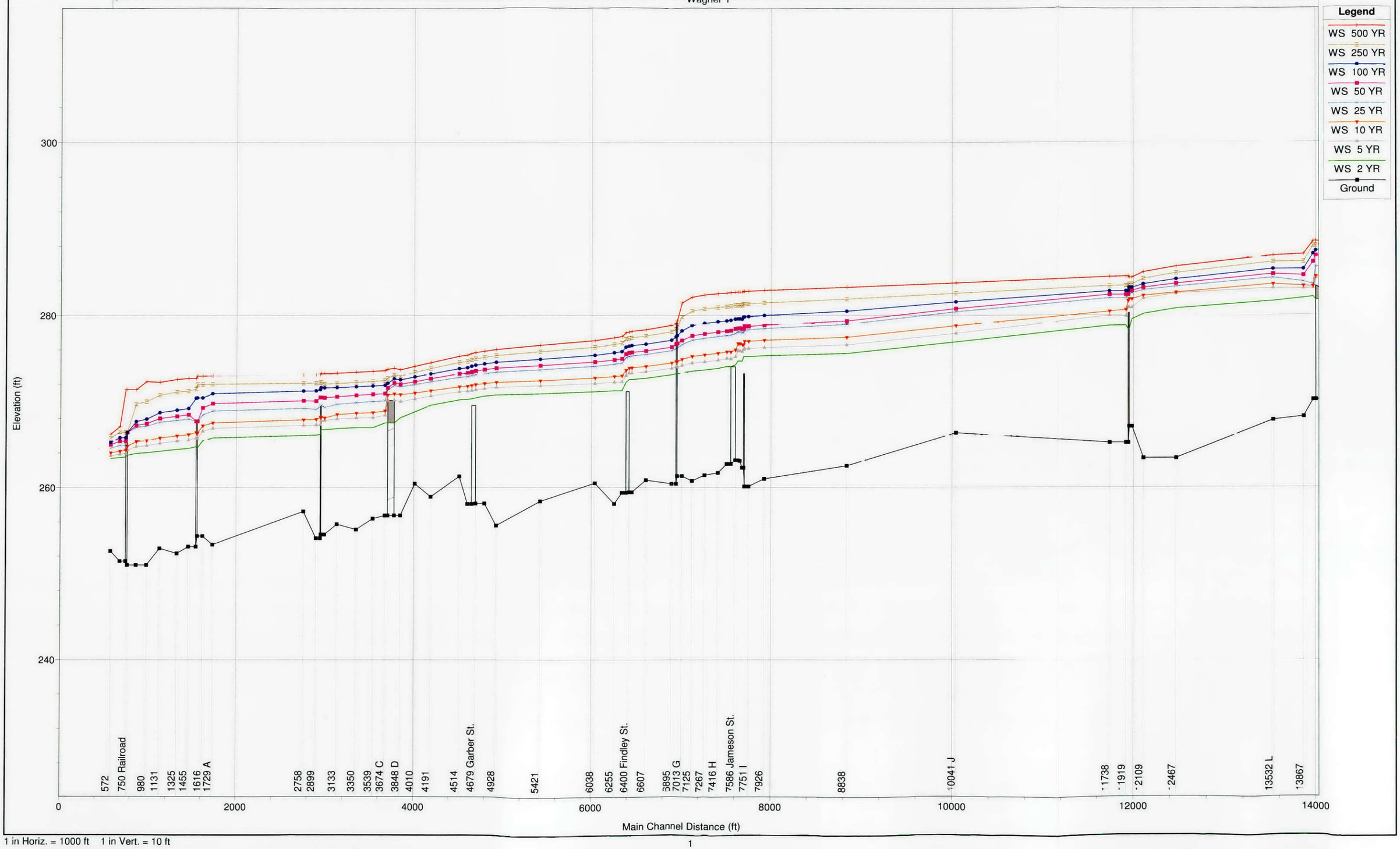
Swampoodle_West Swampoodle_West



1 in Horiz. = 200 ft 1 in Vert. = 2 ft

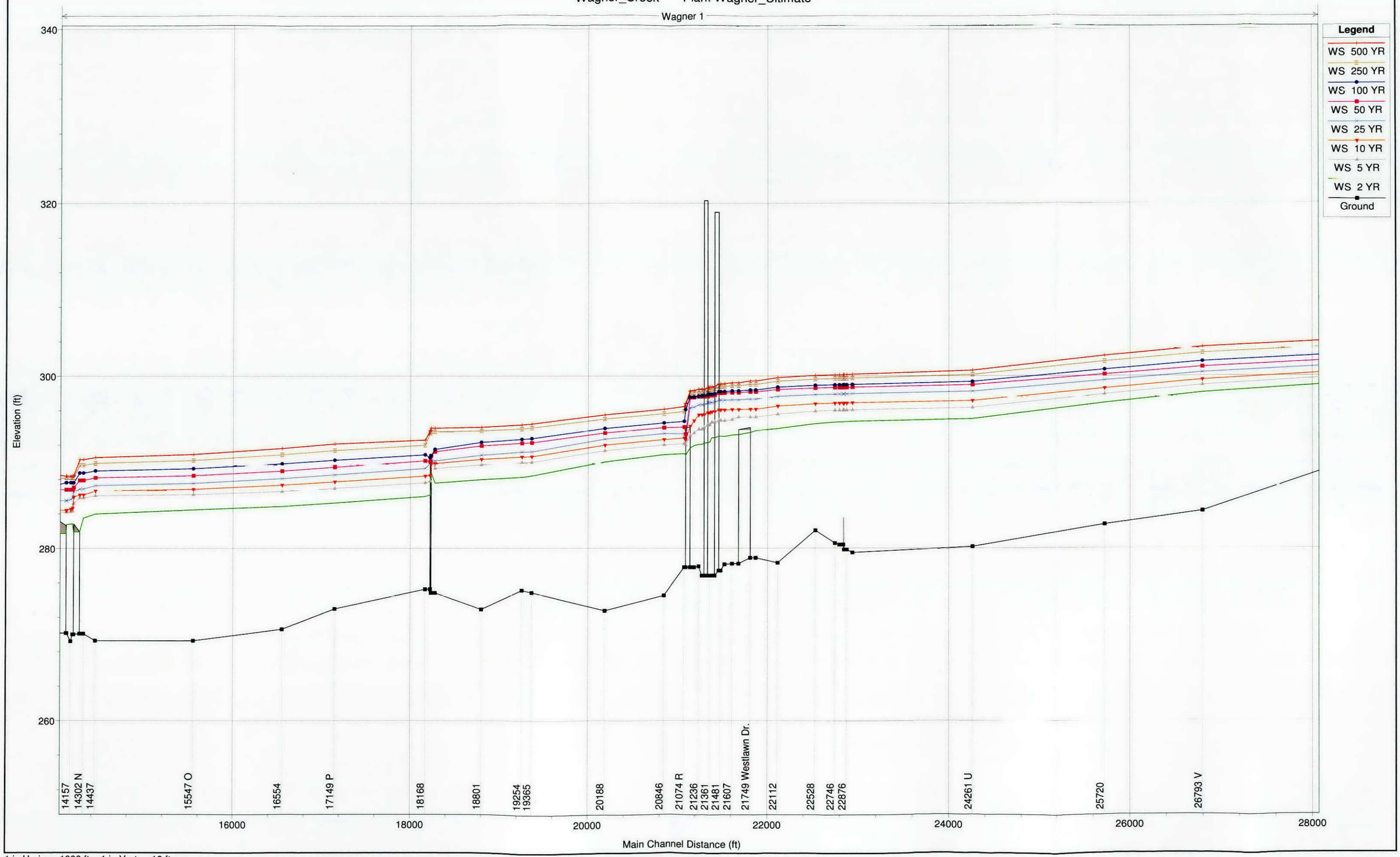
Wagner_Creek Plan: Wagner_Ultimate

Wagner 1



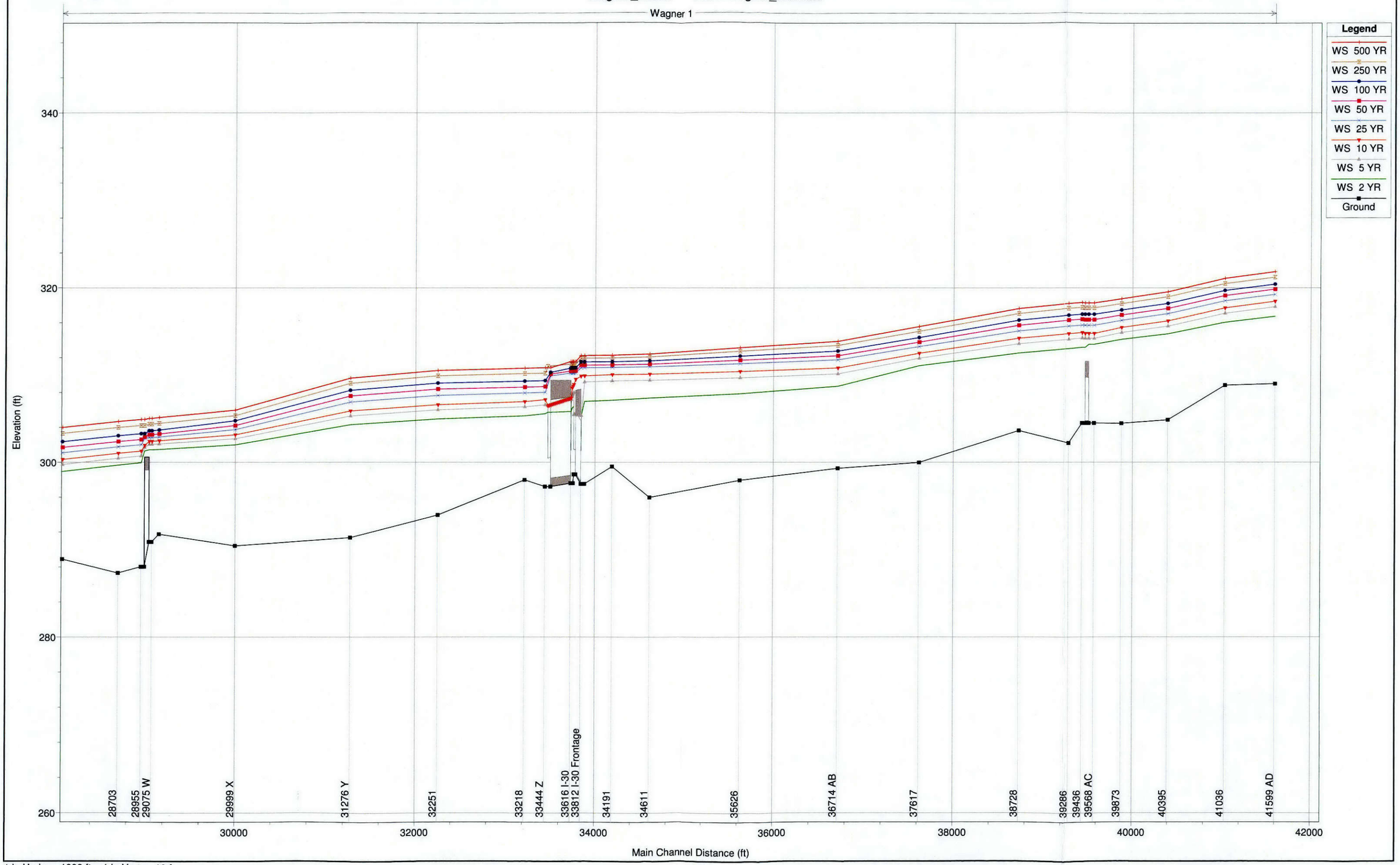
1 in Horiz. = 1000 ft 1 in Vert. = 10 ft

Wagner_Creek Plan: Wagner_Ultimate



1 in Horiz. = 1000 ft 1 in Vert. = 10 ft

Wagner_Creek Plan: Wagner_Ultimate



1 in Horiz. = 1000 ft 1 in Vert. = 10 ft

Appendix E
Cost Estimates

CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.1 - Probable Construction Cost DCI-ALTI

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Clearing	65	AC	$ 4,150	$ 269,800
	Grubbing	65	AC	$ 1,385	$ 90,000
	Mechanical Seeding	65	AC	$ 927	$ 60,300
	Mobilization	1	LS	$ 15,000	$ 15,000
	Easements (Channel)	65	AC	$ 3,000	$ 195,000
	Administrative (Easements)	1	LS	$ 20,000	$ 20,000
	SUBTOTAL				$ 650,100
	20% Contingency				$ 130,000
	SUBTOTAL (Construction)				**$ 780,000**
	15% Engineering & Survey				$ 117,000
	TOTAL				**$ 897,000**
	ANNUAL COST				**$ 53,000**
	Item Description				
Maintenance	Full-Width Mowing	1.5	MI	$ 10,000	$ 15,000
	SUBTOTAL				$ 15,000
	20% Contingency				$ 3,000
	TOTAL				**$ 18,000**
	ANNUAL COST				**$ 18,000**
TOTAL ANNUAL COST					**$ 71,000**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

This statement was prepared utilizing standard cost estimate practices. It is understood and agreed that this is an estimate only, and that Engineer shall not be liable to Owner or to a third party for any failure to accurately estimate the cost of the project, or any part thereof.

CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.2 - Probable Cost DCI-ALTII Buyout

Item No.	Description	Quantity	Unit	Amount[1]
1	DCI_PROP1	1	LS	$ 42,100
2	DCI_PROP2	1	LS	$ 23,100
3	DCI_PROP3	1	LS	$ 48,100
4	DCI_PROP4	1	LS	$ 53,500
5	DCI_PROP5	1	LS	$ 54,700
6	DCI_PROP6	1	LS	$ 24,500
7	DCI_PROP7	1	LS	$ 28,800
8	DCI_PROP8	1	LS	$ 19,800
9	DCI_PROP9	1	LS	$ 16,700
10	DCI_PROP10	1	LS	$ 45,500
11	DCI_PROP11	1	LS	$ 4,400
12	DCI_PROP12	1	LS	$ 1,400
13	DCI_PROP13	1	LS	$ 2,500
14	DCI_PROP14	1	LS	$ 33,700
15	DCI_PROP15	1	LS	$ 4,000
16	DCI_PROP16	1	LS	$ 4,000
17	DCI_PROP17	1	LS	$ 8,800
18	DCI_PROP18	1	LS	$ 40,200
19	DCI_PROP19	1	LS	$ 18,900
20	DCI_PROP20	1	LS	$ 38,700
21	DCI_PROP21	1	LS	$ 14,300
22	DCI_PROP22	1	LS	$ 6,400
23	DCI_PROP23	1	LS	$ 45,900
24	DCI_PROP24	1	LS	$ 11,200
25	DCI_PROP25	1	LS	$ 1,000
26	DCI_PROP26	1	LS	$ 52,000
27	DCI_PROP27	1	LS	$ 128,500
28	DCI_PROP28	1	LS	$ 153,500
29	DCI_PROP29	1	LS	$ 71,400
30	DCI_PROP30	1	LS	$ 30,500
31	DCI_PROP31	1	LS	$ 48,600
32	DCI_PROP32	1	LS	$ 7,600
	SUBTOTAL			$ 1,084,000
	15% Market Adjustment/Purchase Price			$ 1,247,000
	50% Closing/Relocation/Demolition Price			$ 624,000
	TOTAL			**$ 1,871,000**

TOTAL ANNUAL COST	**$ 111,000**

[1] Bowie Co. Appraised Value

This statement was prepared utilizing standard cost estimate practices. It is understood and agreed that this is an estimate only, and that Engineer shall not be liable to Owner or to a third party for any failure to accurately estimate the cost of the project, or any part thereof.

Table E.3 - Probable Construction Cost DCII-ALTI

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Excavation	27,800	CY	$ 12	$ 333,600
	Fine Grading/Fertilzer/Seeding	31,900	SY	$ 2	$ 63,800
	Soil Retention Blankets	13,000	SY	$ 8	$ 104,000
	Soil Retention Blankets (Temp)	18,900	SY	$ 2	$ 37,800
	Easements (Channel)	1	AC	$ 3,000	$ 3,000
	Administrative (Easements)	1	LS	$ 10,000	$ 10,000
	Mobilization	1	LS	$ 15,000	$ 15,000
	Detention				
	Excavation	6,500	CY	$ 12	$ 78,000
	Fine Grading/Fertilzer/Seeding	5,000	SY	$ 2	$ 10,000
	Outlet Structure	1	LS	$ 10,000	$ 10,000
	Land Acquisition	1	LS	$ 63,000	$ 63,000
	SUBTOTAL				$ 728,000
	20% Contingency				$ 145,600
	SUBTOTAL (Construction)				**$ 874,000**
	15% Engineering & Survey				$ 131,100
	TOTAL				**$ 1,005,000**
	ANNUAL COST				**$ 59,000**
	Item Description				
Maintenance	Brush Removal (1 time/year)	2,870	LF	$ 2	$ 5,700
	Full-Width Mowing (3 times/year)	7	AC	$ 530	$ 3,400
	SUBTOTAL				$ 9,000
	20% Contingency				$ 1,800
	TOTAL				**$ 11,000**
	ANNUAL COST				**$ 11,000**
TOTAL ANNUAL COST					**$ 70,000**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

This statement was prepared utilizing standard cost estimate practices. It is understood and agreed that this is an estimate only, and that Engineer shall not be liable to Owner or to a third party for any failure to accurately estimate the cost of the project, or any part thereof.

CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.4 - Probable Construction Cost DCII-ALTII

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Excavation	27,800	CY	$ 12	$ 333,600
	Fine Grading/Fertilzer/Seeding	31,900	SY	$ 2	$ 63,800
	Soil Retention Blankets	13,000	SY	$ 8	$ 104,000
	Soil Retention Blankets (Temp)	18,900	SY	$ 2	$ 37,800
	Easements (Channel)	1	AC	$ 3,000	$ 3,000
	Administrative (Easements)	1	LS	$ 10,000	$ 10,000
	Mobilization	1	LS	$ 10,000	$ 10,000
	Remove and Dispose Existing Bridge	4,800	SF	$ 10	$ 48,000
	New Bridge Construction	4,800	SF	$ 90	$ 432,000
	Pavement Repair	4,800	SF	$ 10	$ 48,000
	Detention				
	Excavation	6,500	CY	$ 12	$ 78,000
	Fine Grading/Fertilzer/Seeding	5,000	SY	$ 2	$ 10,000
	Outlet Structure	1	LS	$ 10,000	$ 10,000
	Land Acquisition	1	LS	$ 63,000	$ 63,000
	SUBTOTAL				$ 1,251,000
	20% Contingency				$ 250,200
	SUBTOTAL (Construction)				**$ 1,501,000**
	15% Engineering & Survey				$ 225,000
	TOTAL				**$ 1,726,000**
	ANNUAL COST				**$ 102,000**
	Item Description				
Maintenance	Brush Removal (1 time/year)	2,870	LF	$ 2	$ 5,700
	Full-Width Mowing (3 times/year)	7	AC	$ 530	$ 3,400
	SUBTOTAL				$ 9,000
	20% Contingency				$ 1,800
	TOTAL				**$11,000**
	ANNUAL COST				**$ 11,000**
TOTAL ANNUAL COST					**$ 113,000**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

This statement was prepared utilizing standard cost estimate practices. It is understood and agreed that this is an estimate only, and that Engineer shall not be liable to Owner or to a third party for any failure to accurately estimate the cost of the project, or any part thereof.

CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.5 - Probable Cost DCII-ALTIII Buyout

Item No.	Description	Quantity	Unit	Amount[1]
1	DCII_PROP1	1	LS	$ 8,800
2	DCII_PROP2	1	LS	$ 12,300
3	DCII_PROP3	1	LS	$ 7,700
4	DCII_PROP4	1	LS	$ 19,100
5	DCII_PROP5	1	LS	$ 4,000
6	DCII_PROP6	1	LS	$ 8,100
7	DCII_PROP7	1	LS	$ 8,100
8	DCII_PROP8	1	LS	$ 4,800
	SUBTOTAL			$ 73,000
	15% Market Adjustment/Purchase Price			$ 84,000
	50% Closing/Relocation/Demolition Price			$ 42,000
	TOTAL			**$126,000**

TOTAL ANNUAL COST	**$ 7,400**

[1] Bowie Co. Appraised Value

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.6 - Probable Construction Cost DCIII-ALTI

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Excavation	4,850	CY	$ 12	$ 58,200
	Remove Concrete	2,800	SY	$ 30	$ 84,000
	Concrete Channel	1,900	CY	$ 500	$ 950,000
	Easements (Channel)	1	AC	$ 3,000	$ 3,000
	Administrative (Easements)	1	LS	$ 10,000	$ 10,000
	Mobilization	1	LS	$ 15,000	$ 15,000
	BR02 - Main Street				
	Two - 9'x5' CBC	280	LF	$ 340	$ 95,200
	Pavement Repair	1,200	SF	$ 10	$ 12,000
	BR03 - Pine Street				
	Two - 9'x4' CBC	70	LF	$ 320	$ 22,400
	Pavement Repair	875	SF	$ 10	$ 8,800
	Detention				
	Excavation	13,000	CY	$ 12	$ 156,000
	Fine Grading/Fertilzer/Seeding	10,000	SY	$ 2	$ 20,000
	Outlet Structure	1	LS	$ 10,000	$ 10,000
	SUBTOTAL				$ 1,445,000
	20% Contingency				$ 289,000
	SUBTOTAL (Construction)				**$ 1,734,000**
	15% Engineering & Survey				$ 260,100
	TOTAL				**$ 1,994,000**
	ANNUAL COST				**$ 118,000**
	Item Description				
Maintenance	Brush Removal (1 time/year)	1,450	LF	$ 2	$ 2,900
	SUBTOTAL				$ 3,000
	20% Contingency				$ 600
	TOTAL				**$ 3,600**
	ANNUAL COST				**$ 3,600**
	Description	**Quantity**	**Unit**	**Price**	**Amount1**
Buyout					
	DCIII_PROP3	1	LS	-------	$ 144,100
	DCIII_PROP4	1	LS	-------	$ 141,900
	DCIII_PROP5	1	LS	-------	$ 72,400
	DCIII_PROP6	1	LS	-------	$ 202,300
	DCIII_PROP7	1	LS	-------	$ 106,700
	DCIII_PROP8	1	LS	-------	$ 120,500
	DCIII_PROP9	1	LS	-------	$ 153,000
	SUBTOTAL				$ 940,900
	15% Market Adjustment/Purchase Price				$ 141,100
					$ 1,082,000
	50% Closing/Relocation/Demolition Price				$ 541,000
	TOTAL				**$ 1,623,000**
	ANNUAL COST				**$ 96,000**
TOTAL ANNUAL COST					**$ 217,600**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

This statement was prepared utilizing standard cost estimate practices. It is understood and agreed that this is an estimate only and that Engineer shall not be liable to Owner or to a third party for any failure to accurately estimate the cost of the project, or any part thereof.

Table E.7 - Probable Construction Cost DCIII-ALTII

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Excavation	4,300	CY	$ 12	$ 51,600
	Fine Grading/Fertilzer/Seeding	8,000	SY	$ 2	$ 16,000
	Soil Retention Blankets	6,500	SY	$ 8	$ 52,000
	Soil Retention Blankets (Temp)	6,500	SY	$ 2	$ 13,000
	Easements (channel)	1	AC	$ 3,000	$ 3,000
	Administrative (Easements)	1	LS	$ 10,000	$ 10,000
	Mobilization	1	LS	$ 15,000	$ 15,000
	BR01 - State Loop 14				
	Remove and Dispose Existing Bridge	3,900	SF	$ 10	$ 39,000
	New Bridge Construction	3,900	SF	$ 90	$ 351,000
	Pavement Repair	3,900	SF	$ 10	$ 39,000
	BR02 - Main Street				
	Two - 8'x6' CBC	280	LF	$ 340	$ 95,200
	Pavement Repair	1,200	SF	$ 10	$ 12,000
	BR03 - Pine Street				
	Remove and Dispose Existing Bridge	1,500	SF	$ 10	$ 15,000
	New Bridge Construction	1,500	SF	$ 90	$ 135,000
	Pavement Repair	1,500	SF	$ 10	$ 15,000
	Detention				
	Excavation	13,000	CY	$ 12	$ 156,000
	Fine Grading/Fertilzer/Seeding	10,000	SY	$ 2	$ 20,000
	Outlet Structure	1	LS	$ 10,000	$ 10,000
	SUBTOTAL				$ 1,048,000
	20% Contingency				$ 209,600
	SUBTOTAL (Construction)				**$ 1,258,000**
	15% Engineering & Survey				$ 189,000
	TOTAL				**$ 1,447,000**
	ANNUAL COST				**$ 85,000**
	Item Description				
Maintenance	Brush Removal (1 time/year)	1,450	LF	$ 2	$ 2,900
	Full-Width Mowing (3 times/year)	1.65	AC	$ 530	$ 900
	SUBTOTAL				$ 4,000
	20% Contingency				$ 800
	TOTAL				**$ 4,800**
	ANNUAL COST				**$ 4,800**
	Description	**Quantity**	**Unit**	**Price**	**Amount[2]**
Buyout					
	DCIII_PROP3	1	LS	-------	$ 144,100
	DCIII_PROP4	1	LS	-------	$ 141,900
	DCIII_PROP5	1	LS	-------	$ 72,400
	DCIII_PROP6	1	LS	-------	$ 202,300
	DCIII_PROP7	1	LS	-------	$ 106,700
	DCIII_PROP8	1	LS	-------	$ 120,500
	DCIII_PROP9	1	LS	-------	$ 153,000
	SUBTOTAL				$ 941,000
	15% Market Adjustment/Purchase Price				$ 141,200
					$ 1,082,200
	50% Closing/Relocation/Demolition Price				$ 541,100
	TOTAL				**$ 1,623,000**
	ANNUAL COST				**$ 96,000**
TOTAL ANNUAL COST					**$ 185,800**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

[2] Bowie Co. Appraised Value

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.8 - Probable Cost DCIII-ALTIII Buyout

Item No.	Description	Quantity	Unit	Amount[1]
2	DCIII_PROP2	1	LS	$ 137,200
3	DCIII_PROP3	1	LS	$ 144,100
4	DCIII_PROP4	1	LS	$ 14[illegible],900
5	DCIII_PROP5	1	LS	$ 72,400
6	DCIII_PROP6	1	LS	$ 202,300
7	DCIII_PROP7	1	LS	$ 106,700
8	DCIII_PROP8	1	LS	$ 120,500
	SUBTOTAL			$ 925,000
	15% Market Adjustment/Purchase Price			$1,064,000
	50% Closing/Relocation/Demolition Price			$ 532,000
	TOTAL			**$1,596,000**

TOTAL ANNUAL COST	**$ 94,000**

[1] Bowie Co. Appraised Value

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.9 - Probable Construction Cost DCIV-ALTI

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Excavation	3,000	CY	$ 12	$ 36,000
	Fine Grading/Fertilzer/Seeding	4,400	SY	$ 2	$ 8,800
	Soil Retention Blankets	1,500	SY	$ 8	$ 12,000
	Soil Retention Blankets (Temp)	2,900	SY	$ 2	$ 5,800
	Easements (Channel)	1	AC	$ 3,000	$ 3,000
	Administrative (Easements)	1	LS	$ 10,000	$ 10,000
	Mobilization	1	LS	$ 15,000	$ 15,000
	Remove and Dispose Existing Bridge	4,500	SF	$ 10	$ 45,000
	New Bridge Construction	4,500	SF	$ 90	$ 405,000
	Pavement Repair	2,250	SF	$ 10	$ 22,500
	Misc. Concrete Channel Repair	1	LS	$ 10,000	$ 10,000
	SUBTOTAL				$ 573,000
	20% Contingency				$ 115,000
	SUBTOTAL (Construction)				**$ 688,000**
	15% Engineering & Survey				$ 103,000
	TOTAL				**$ 791,000**
	ANNUAL COST				**$ 47,000**
Maintenance	**Item Description**				
	Brush Removal (1 time/year)	600	LF	$ 2	$ 1,200
	Full-Width Mowing (3 times/year)	1	AC	$ 530	$ 500
	SUBTOTAL				$ 2,000
	20% Contingency				$ 400
	TOTAL				**$ 2,400**
	ANNUAL COST				**$ 2,800**
Combined					
	TOTAL ANNUAL COST				**$ 49,800**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

This statement was prepared utilizing standard cost estimate practices. It is understood and agreed that this is an estimate only, and that Engineer shall not be liable to Owner or to a third party for any failure to accurately estimate the cost of the project, or any part thereof.

CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.10 - Probable Construction Cost DCIV-ALTII

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Excavation	8,400	CY	$ 12	$ 100,800
	Fine Grading/Fertilzer/Seeding	10,000	SY	$ 2	$ 20,000
	Soil Retention Blankets	3,500	SY	$ 8	$ 28,000
	Soil Retention Blankets (Temp)	6,500	SY	$ 2	$ 13,000
	Easements (Channel)	3	AC	$ 3,000	$ 9,000
	Administrative (Easements)	1	LS	$ 10,000	$ 10,000
	Mobilization	1	LS	$ 15,000	$ 15,000
	Remove and Dispose Existing Bridge	4,500	SF	$ 10	$ 45,000
	New Bridge Construction	4,500	SF	$ 90	$ 405,000
	Pavement Repair	2,250	SF	$ 10	$ 22,500
	Misc. Concrete Channel Repair	1	LS	$ 10,000	$ 10,000
	SUBTOTAL				$ 678,000
	20% Contingency				$ 136,000
	SUBTOTAL (Construction)				**$ 814,000**
	15% Engineering & Survey				$ 122,000
	TOTAL				**$ 936,000**
	ANNUAL COST				**$ 55,000**
Maintenance	**Item Description**				
	Brush Removal (1 time/year)	1500	LF	$ 2	$ 3,000
	Full-Width Mowing (3 times/year)	3	AC	$ 530	$ 1,600
	SUBTOTAL				$ 5,000
	20% Contingency				$ 1,000
	TOTAL				**$ 6,000**
	ANNUAL COST				**$ 6,000**
Combined					
	TOTAL ANNUAL COST				**$ 61,000**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.11 - Probable Construction Cost DCIV-ALTIII

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Mobilization	1	LS	$ 15,000	$ 15,000
	Remove and Dispose Existing Bridge	4,500	SF	$ 10	$ 45,000
	New Bridge Construction	4,500	SF	$ 90	$ 405,000
	Pavement Repair	2,500	SF	$ 10	$ 25,000
	Misc. Concrete Channel Repair	1	LS	$ 10,000	$ 10,000
	SUBTOTAL				$ 500,000
	20% Contingency				$ 100,000
	SUBTOTAL (Construction)				**$ 600,000**
	15% Engineering & Survey				$ 90,000
	TOTAL				**$ 690,000**
	ANNUAL COST				**$ 41,000**
Maintenance	**Item Description**				
	Brush Removal (1 time/year)	100	LF	$ 2	$ 200
	SUBTOTAL				$ 200
	20% Contingency				$ 40
	TOTAL				**$ 240**
	ANNUAL COST				**$ 300**
Combined					
	TOTAL ANNUAL COST				**$ 41,300**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.12 - Probable Cost DCIV-ALTIV Buyout

Item No.	Description	Quantity	Unit	Amount[1]
1	DCIV_PROP1	1	LS	$ 82,500
2	DCIV_PROP2	1	LS	$ 81,900
3	DCIV_PROP3	1	LS	$ 50,200
4	DCIV_PROP4	1	LS	$ 156,700
5	DCIV_PROP5	1	LS	$ 81,200
6	DCIV_PROP6	1	LS	$ 76,800
7	DCIV_PROP7	1	LS	$ 63,900
8	DCIV_PROP8	1	LS	$ 79,000
9	DCIV_PROP9	1	LS	$ 84,300
10	DCIV_PROP10	1	LS	$ 90,800
11	DCIV_PROP11	1	LS	$ 105,700
12	DCIV_PROP12	1	LS	$ 87,900
13	DCIV_PROP13	1	LS	$ 91,200
14	DCIV_PROP14	1	LS	$ 104,700
15	DCIV_PROP15	1	LS	$ 90,200
16	DCIV_PROP16	1	LS	$ 95,700
17	DCIV_PROP17	1	LS	$ 52,500
	SUBTOTAL			$ 1,475,000
	15% Market Adjustment/Purchase Price			$ 1,696,000
	50% Closing/Relocation/Demolition Price			$ 848,000
	TOTAL			**$ 2,544,000**

TOTAL ANNUAL COST	**$ 150,000**

[1] Bowie Co. Appraised Value

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.13 - Probable Construction Cost DCV-ALTI

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Fine Grading/Fertilzer/Seeding	25,000	SY	$ 2	$ 50,000
	Clearing	5	AC	$ 4,150	$ 20,800
	Easements (Channel)	5	AC	$ 3,000	$ 15,000
	Administrative (Easements)	1	LS	$ 10,000	$ 10,000
	Mobilization	1	LS	$ 15,000	$ 15,000
	Two - 9'x5' CBC	120	LF	$ 425	$ 51,000
	Pavement Repair	9,000	SF	$ 10	$ 90,000
	SUBTOTAL				$ 252,000
	20% Contingency				$ 50,000
	SUBTOTAL (Construction)				**$ 302,000**
	15% Engineering & Survey				$ 45,000
	TOTAL				**$ 347,000**
	ANNUAL COST				**$ 20,000**
Maintenance	**Item Description**				
	Brush Removal (1 time/year)	900	LF	$ 2	$ 1,800
	Full-Width Mowing (3 times/year)	8	AC	$ 530	$ 4,200
	SUBTOTAL				$ 6,000
	20% Contingency				$ 1,200
	TOTAL				**$ 7,200**
	ANNUAL COST				**$ 7,200**
Combined					
	TOTAL ANNUAL COST				**$ 27,200**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.14 - Probable Construction Cost DCV-ALTII

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Fine Grading/Fertilzer/Seeding	25,000	SY	$ 2	$ 50,000
	Clearing	5	AC	$ 4,150	$ 20,800
	Easements (Channel)	5	AC	$ 3,000	$ 15,000
	Administrative (Easements)	1	LS	$ 10,000	$ 10,000
	Mobilization	1	LS	$ 15,000	$ 15,000
	SUBTOTAL				$ 111,000
	20% Contingency				$ 22,000
	SUBTOTAL (Construction)				**$ 133,000**
	15% Engineering & Survey				$ 20,000
	TOTAL				**$ 153,000**
	ANNUAL COST				**$ 9,000**
Maintenance	**Item Description**				
	Brush Removal (1 time/year)	900	LF	$ 2	$ 1,800
	Full-Width Mowing (3 times/year)	8	AC	$ 530	$ 4,200
	SUBTOTAL				$ 6,000
	20% Contingency				$ 1,200
	TOTAL				**$ 7,200**
	ANNUAL COST				**$ 7,200**
Combined					
	TOTAL ANNUAL COST				**$ 16,200**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.15 - Probable Cost DCV-ALTIII Buyout

Item No.	Description	Quantity	Unit	Amount[1]
1	DCV_PROP1	1	LS	$ 211,300
2	DCV_PROP2	1	LS	$ 144,300
3	DCV_PROP3	1	LS	$ 186,700
4	DCV_PROP4	1	LS	$ 124,800
5	DCV_PROP5	1	LS	$ 124,700
6	DCV_PROP6	1	LS	$ 160,700
7	DCV_PROP7	1	LS	$ 136,800
8	DCV_PROP8	1	LS	$ 132,800
9	DCV_PROP9	1	LS	$ 150,300
10	DCV_PROP10	1	LS	$ 135,500
	SUBTOTAL			$ 1,508,000
	15% Market Adjustment/Purchase Price			$ 1,734,000
	50% Closing/Relocation/Demolition Price			$ 867,000
	TOTAL			**$ 2,601,000**

TOTAL ANNUAL COST	**$ 154,000**

[1] Bowie Co. Appraised Value

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.16 - Probable Construction Cost DCVI-ALTI

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Excavation	1,300	CY	$ 12	$ 15,600
	Fine Grading/Fertilzer/Seeding	1,900	SY	$ 2	$ 3,800
	Soil Retention Blankets	350	SY	$ 8	$ 2,800
	Soil Retention Blankets (Temp)	1,550	SY	$ 2	$ 3,100
	Easements (channel)	0.6	AC	$ 3,000	$ 1,800
	Administrative (Easements)	1	LS	$ 10,000	$ 10,000
	Mobilization	1	LS	$ 15,000	$ 15,000
	SUBTOTAL				$ 52,000
	20% Contingency				$ 10,000
	SUBTOTAL (Construction)				**$ 62,000**
	15% Engineering & Survey				$ 9,000
	TOTAL				**$ 71,000**
	ANNUAL COST				**$ 4,000**
Maintenance	**Item Description**				
	Brush Removal (1 time/year)	300	LF	$ 2	$ 600
	Full-Width Mowing (3 times/year)	0.6	AC	$ 530	$ 300
	SUBTOTAL				$ 900
	20% Contingency				$ 200
	TOTAL				**$ 1,100**
	ANNUAL COST				**$ 1,100**
Combined					
	TOTAL ANNUAL COST				**$ 5,100**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

This statement was prepared utilizing standard cost estimate practices. It is understood and agreed that this is an estimate only, and that Engineer shall not be liable to Owner or to a third party for any failure to accurately estimate the cost of the project, or any part thereof.

CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.17 - Probable Construction Cost DCVII-ALTI

Category	Item Description	Quantity	Unit	Price[1]	Amount
Initial Costs	Mobilization	1	LS	$ 15,000	$ 15,000
	BR02 - Independence				
	Remove and Dispose Existing Bridge	1,700	SF	$ 10	$ 17,000
	New Bridge Construction	1,700	SF	$ 90	$ 153,000
	Pavement Repair	1,700	SF	$ 10	$ 17,000
	BR03 - Lexington				
	Remove and Dispose Existing Bridge	1,100	SF	$ 10	$ 11,000
	New Bridge Construction	1,100	SF	$ 90	$ 99,000
	Pavement Repair	1,100	SF	$ 10	$ 11,000
	SUBTOTAL				$ 323,000
	20% Contingency				$ 65,000
	SUBTOTAL (Construction)				**$ 388,000**
	15% Engineering & Survey				$ 58,000
	TOTAL				**$ 446,000**
	ANNUAL COST				**$ 26,000**
TOTAL ANNUAL COST					**$ 26,000**

[1] Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.18 - Probable Cost DCVII-ALTII Buyout

Item No.	Description	Quantity	Unit	Amount[1]
1	DCVII_PROP1	1	LS	$ 159,500
2	DCVII_PROP2	1	LS	$ 138,200
3	DCVII_PROP3	1	LS	$ 121,500
4	DCVII_PROP4	1	LS	$ 150,700
5	DCVII_PROP5	1	LS	$ 124,300
6	DCVII_PROP6	1	LS	$ 141,300
7	DCVII_PROP7	1	LS	$ 165,600
	SUBTOTAL			$ 1,001,000
	15% Market Adjustment/Purchase Price			$ 1,151,000
	50% Closing/Relocation/Demolition Price			$ 576,000
	TOTAL			**$ 1,727,000**

TOTAL ANNUAL COST	**$ 102,000**

[1] Bowie Co. Appraised Value

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.19 - Probable Cost DCVIII-ALTI Buyout All Structures

Item No.	Description	Quantity	Unit	Amount[1]
1	DCVIII_PROP1	1	LS	$ 31,600
2	DCVIII_PROP2	1	LS	$ 43,200
3	DCVIII_PROP3	1	LS	$ 89,200
4	DCVIII_PROP4	1	LS	$ 29,100
5	DCVIII_PROP5	1	LS	$ 48,600
6	DCVIII_PROP6	1	LS	$ 44,400
7	DCVIII_PROP7	1	LS	$ 12,800
8	DCVIII_PROP8	1	LS	$ 81,800
9	DCVIII_PROP9	1	LS	$ 18,400
10	DCVIII_PROP10	1	LS	$ 23,600
11	DCVIII_PROP11	1	LS	$ 21,900
12	DCVIII_PROP12	1	LS	$ 6,900
13	DCVIII_PROP13	1	LS	$ 22,200
14	DCVIII_PROP14	1	LS	$ 23,400
	SUBTOTAL			$ 497,000
	15% Market Adjustment/Purchase Price			$ 572,000
	50% Closing/Relocation/Demolition Price			$ 286,000
	TOTAL			**$ 858,000**

TOTAL ANNUAL COST	**$ 51,000**

[1] Bowie Co. Appraised Value

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CITY OF TEXARKANA
CITY-WIDE FLOOD PROTECTION PLANNING STUDY

Table E.20 - Probable Cost DCVIII-ALTII Buyout 5-Year Flooded Structures

Item No.	Description	Quantity	Unit	Amount[1]
1	DCVIII_PROP1	1	LS	$ 31,600
2	DCVIII_PROP2	1	LS	$ 43,200
4	DCVIII_PROP4	1	LS	$ 29,100
5	DCVIII_PROP5	1	LS	$ 48,600
7	DCVIII_PROP7	1	LS	$ 12,800
8	DCVIII_PROP8	1	LS	$ 81,800
9	DCVIII_PROP9	1	LS	$ 18,400
10	DCVIII_PROP10	1	LS	$ 23,600
11	DCVIII_PROP11	1	LS	$ 21,900
12	DCVIII_PROP12	1	LS	$ 6,900
13	DCVIII_PROP13	1	LS	$ 22,200
14	DCVIII_PROP14	1	LS	$ 23,400
	SUBTOTAL			$ 364,000
	15% Market Adjustment/Purchase Price			$ 419,000
	50% Closing/Relocation/Demolition Price			$ 209,500
	TOTAL			**$ 629,000**

TOTAL ANNUAL COST	**$ 37,000**

[1] Bowie Co. Appraised Value

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Appendix F
Quality Control Documents

Hydrology QA/QC Checklist

Hydrology QA/QC Checklist

Watershed Name: Clear Creek

Modeler's Name: Scott Rushing

Model Name: Clear Creek

Reviewer's Name: Cindy Mosier

WATERSHED DELINEATION:

Reviewer's Initials: chm Date: November 22, 2010

Modeler's Initials: SAR Date: October 25, 2010

DATA FILES RECEIVED:

- ☒ ArcMap project file (watershed boundaries (name and area), study stream centerlines, topographic data, images, and etc.
  N:\27000s\27093\GeoHMS\Clear_Creek_Watershed_Working.mxd
- ☐ Description of modeler's assumptions, notes, and special issues.

TECHNICAL REVIEW:

- ☒ DA breaks at headwater limits of detailed hydraulic study.
- ☒ DA breaks at pertinent locations such as confluences, detention facilities, major highways, gages, etc.
- ☒ DA breaks at location common to current effective if applicable and feasible.
- ☒ Compare DA to previous studies. *Comprehensive Drainage Report, Hennigson, Durham, and Richardson. July 1976*
- ☒ Is DA size reasonable for type of study?
- ☒ Do DA boundaries agree with available contours and images?

REVIEW COMMENTS:

Modeler's Comments:

1. Bookmark 1: There are 2 tribs joining Clear Creek at approximately the same location. GeoHMS created a small basin here but I attempted to delineate the basins in a way to remove the small basin. Would not route through the small stretch.
2. Note 1: I have not been able to find tribs CC-7, 8, & 9 from FIS for Q-break locations. I did break the basins at each trib between CC-6 and Skyline Blvd.

Reviewer's Comments:

1. Sent email to Scott asking him to double check for CE xsec and subbasins. Found basins in LDS report.
2. Let's extend the subbasins to the ds of lake to limits of AE. We will get the routing from the current effective model. We will explain that basically importing the ce so that have 1 ce model for AE within city. (after we check the #'s, we will probably use exactly current effective numbers ds.) Just more of an import than a redo.
3. QC1 - Will, you need to add that basin back in that was there for Stream CC-6 to match effective. (You can use my "preWill" file.)
4. QC-2 - you also need to add those back in. They were there to match effective.
5. QC-3 Consider merging CC-1, CC-4 and the tiny one upstream of there for the lake basin.
6. Go ahead and break CC_2 to match current effective.
7. QC-4 - that should probably look a lot more like effective.
8. See QC-5 in Response to modeler's comments #1 below
9.
10.
11.
12.. ********** March 6, 2011, WAW **********

1) Lake upstream of Skyline surface area is approximately 7 acres, top of road elevation along Skyline = 329.+ top of weir elevation = 327. approximately 14 AC-FT of storage when not accounting for loss of volume over weir

2) Routing table was entered manually on R CC1 because 250 Yr Profile was not ascending, (dips in profile)

RESPONSE TO COMMENTS:

Response to Modeler's Comments:
1. I always give the small extra area to the main stem so that the delineation is correct minus the tiny basin. QC-5 Fixed.
2. sounds good.

Response to Reviewer's Comments:
1. OK.
2. Done.
3. done, WAW
4. done, WAW
5. done, WAW
6. done, WAW
7. done, WAW
8. done, chm

approved chm 1-20-11

ADDITIONAL REVIEW COMMENTS:

1.

II. "SKELETON" MODEL:

Reviewer's Initials: ALW Date: April 8, 2011

Modeler's Initials: chm Date: _____

DATA FILES RECEIVED:

- ☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc. *N:\27000s\27093\GeoHMS\XXXXXX.mxd*
- ☐ Description of modeler's assumptions, data sources. _____
- ☒ HMS model paths *I:\27000s\27093\HEC_HMS_v4.0\XXXXX\XXXX.basin*
- ☒ Loss Rate computations *I:\27000s\27093\Admin\Documents\Excel*
- ☒ Time of Concentration / Lag Time computations *I:\27000s\27093\Admin\Documents\Excel*

TECHNICAL REVIEW:

Total Drainage Area: _____
Total No. of Subbasins: _____
Min DA sq. mi.: _____
Max DA sq. mi.: _____

Basin Models: Unit Hydrograph Method: SCS UH

Computation Interval: min
Peaking Factor: N/A
Min Tc / Lag: _____
Max Tc / Lag: _____

Loss Rate Method: SCS Curve Number- Raw soil CN used with percent impervious per Landuse
Min CN: _____
Max CN: _____
Min Initial Loss: default equation
Max Initial Loss: default equation
Min Uniform Loss: N/A
Max Uniform Loss: N/A
Rainfall Source: Atlas of Depth-Duration Frecuency of Precipitation Annual Maxima for Texas, USGS Scientific Investigation Report 2004-5041, Asquith 2004
Rainfall Distribution: Triangular.

REVIEW COMMENTS:

1. Modeler Comment: Can volume of pond upstream of Skyline be accounted?
2. Make background maps consitent with other Texarkana HMS models. You might add a shapefile of the Lake to your HMS.
3. Make HMS element names consistent with other Texarakan Basins (Ex. B_CC1, Junctions start with J_, and reaches start with R_). They are number upstream to downstream. Label the outlet too. I cannot tell from a first glance at your model where it should be located at.
4. Longest flow paths should be the same as the stream centerline.
5. Split channel section into 2 for sub-basins that you have the stream in the HEC-RAS model. Use flow master to calculate the velocity for the part of the stream without a RAS model and use RAS to get the velocity for the sections modeled in RAS.
6. CC_3 - Why does the longest flow path not go the sliver are above the road. Does this area belong with the other sub-basin
7. CC_8 and CC_14 longest flow paths look weird. If it flows through a neighborhcod it would probably hit a street until it is out of the neighborhcod. Is there a storm drain?
8. CC_16 - Investigate other flow paths. The current one does not seem like the longest.
9. Existing Conditions Landuse - Small moderate density percent impervious is 25% for a couple areas in the existing conditions landuse. Please explain or change to 35% to match others. Multi-family percent impervous should be 72% (see bookmark 6 in QAQC mxd). The LU Class for the MF areas were changed to small lot high density in your calculation shapefile.
10. Future conditions Landuse - Multi-fam ly has a percent impervious of 45%. Should this be 72%?
11. Please update the routing reach HEC-DSS export in HEC-RAS. I cannot tell which cross-sections were used for routing.
12. Is R CC_5 the routing reach just upstream of the lake? If yes then CC7 and CC8 should be connected downstream to J CC8. If no than update the location of R CC_5 in the model.
13.

RESPONSE TO COMMENTS:

1.need to review
2) done - agreed
3 done - agreed
4) done - agreed
5) need to review !
6) talk to CM
7) made minor revision to CC 8 flowpath, lets discuss flowpath on CC 14
8) I checked other options, this current length looks good
9) agreed and revised per comments
10) yes revised multifamily should be 72%
11) done - updated routing reach with current names of XS
12) done, in HMS revised connection of CC7 and CC8 to junction upstream of lake

III. FLOOD ROUTING:

Reviewer's Initials: _____ Date: _____

Modeler's Initials: _____ Date: _____

Data files received:

☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc.
N:\27000s\27093\GeoHMS\XXXXX.mxd
☐ Description of modeler's assumptions, notes, and special issues. _____
☐ Data sources, hydraulic models, computations, record plans, etc. _____

Routing Method(s):
Channel/Floodplain Storage: Modified Puls
Detention Routing:Modified Puls

Review Comments:

_____

Response to Comments:

_____

IV. FINAL MODEL:

Reviewer's Initials: _____ Date: 3-3-8

Modeler's Initials: bp Date: 2-4-8

Data files received:

- ☐ Calibration
- ☒ Frequency Analysis
- ☒ Table of Discharges
- ☒ Comparison of Discharges

Calibration Procedures/Results:

_____

Frequency Analysis Procedures/Results:

_____

Discharge differences greater than 10% of current FIS:

_____

Review Comments:

1.

Response to Comments:

1.

QA/QC APPROVAL:

Hydrologic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____ Date: _____

Task Leader:_____ Date: _____

Project Manager: _____ Date: _____

Principal in Charge: _____ Date: _____

Hydrology QA/QC Checklist

Watershed Name: Cowhorn Creek

Modeler's Name: Ben Pylant

Model Name: Cowhorn Creek

Reviewer's Name: Cindy Mosier

WATERSHED DELINEATION:

Reviewer's Initials: chm Date: December 1, 2008

Modeler's Initials: bp Date: November 25, 2008

DATA FILES RECEIVED:

- ☒ ArcMap project file (watershed boundaries (name and area), study stream centerlines, topographic data, images, and etc.
  N:\26000s\26541\GeoHMS\Cowhorn_GeoHMS_v2.mxd
- ☐ Description of modeler's assumptions, notes, and special issues.

TECHNICAL REVIEW:

- ☒ DA breaks at headwater limits of detailed hydraulic study.
- ☒ DA breaks at pertinent locations such as confluences, detention facilities, major highways, gages, etc.
- ☒ DA breaks at location common to current effective if applicable and feasible.
- ☒ Compare DA to previous studies. *Comprehensive Drainage Report, Hennigson, Durham, and Richardson, July 1976*
- ☒ Is DA size reasonable for type of study?
- ☒ Do DA boundaries agree with available contours and images?

REVIEW COMMENTS:

1. Did you consider comparing to orthos provided by Texarkana rather than the SID images? I think they are newer and better resolution.
2. files received - streams, lakes, etc.
3. I love that you burnt main centerline in so that RAS centerline and hydro centerline are th same, but I do like to run it once without it burnt as a check for the centerline. See Bookmark - centerline QC comment. No action necessary.
4. Will these breaks work for the proposed development?
5. How many da breaks does CE Cowhorn West have?
6. BKM 1 - I'd add a DA break at the LDS for Cowhorn West trib inside DrainID47. (by the way, give these da's a naming system). Or, the break may need to be at the upstream face of the long culvert. Plus, it will match the FIS this way.
7. IGNORE BKM 2 - how do you think that would look if you broke DrainID44 at Cork road instead so it would be at the headwater of water surveyed and potentially modeled? Then consider splitting DrainID42 so that it has a break at the proposed new road. All this is optional, I'm not sure how good it will look with the topo and it will probably create a butterfly da and a small da , but I'd like to check it out. (You don't have to rerun geohms, you can just draw it by hand on an exhibit and we can think about it.) IGNORE - this is not a good idea.
8. BKM 3 - what's the date of the topo vs. the improvements (or have those not been done yet)? Did the improvements change where this confluence is? Should we put DA's at the upstream face of those improvements?
9. BKM 4 - I think I'd go ahead and break the DrainID58 at the headwaters to the Zone A since this basin is so much bigger than the rest.
10. BK 5 - I think I would just go ahead and break this along the centerline of rd.
11. BKM 6 - I'd like to check this out in field and see if water crosses road.
12. BKM 7 - I'd like to check this out in field and see if water crosses road.
13. BKM 8 - Consider breaking DrainID48 at Summerhill Rd since bigger than rest.
14. BKM 9 - I think maybe all of this above Kennedy should be a part of Draiin ID55 and the west break should probably be along the highway.
15. BKM 10 - I wonder if this would look more like this along the road?
16. IGNORE BKM 11 - I wondered if this should be cut at road, but I think it is correct the way it is. IGNORE.
17. I didn't recommend splitting Drainage ID66 since it's closer to the size of surrounding basins and it does not even have a Zone A stream.
18. Did you check for any gages and if so a break at the gage?
19. You may know this, but I also like to check the hydraulic model for effective q's when you don't have the hydrology model. Not all the q breaks a required to be listed in the FIS. In this case, they were though.
20. BKM 12 - Consider breaking this at Tucker.
21. I think I'd have Scott rectify and digitize that HDR report Drainage Area and compare. Just eyeballing, they look really similar. Do a table comparing their areas (their areas are on that same map, the total matches great.)
22. BKM 13 - Added da break at detention basin near I30 per City comments. bp
23. BKM 14 - Added da break at detention basin near US Hwy 82 per City comments. - bp
24. BKM 15 - Set da boundary along Richmond road per City comments. bp There is a SD along Gibson. Some flow crosses Richmond from east to west, but all flow west of Richmond enters Gibson SD system. bp 12/11/08
25. BKM 16 - Adjusted CNT2 subbasin to more accurately include drainage ditch per City comments. -bp
26. BKM 17 - really?
27. BKM 18 - this one doesn't make sense now.
28. BKM 19 - city's BKM 15 - really? where does water go?

RESPONSE TO COMMENTS:

1. I used the Texarkana images but the load time was excessive.
2. We received the Texarkana streams file. I realigned the stream file to the City topo/aerial.
3. Ok
4. I think so. We could have a revised conditions hydrology model but it appears that the effects would be very minimal based on the change in da area.
5. Need to check if we receive the current effective model from FEMA.
6. DA Break added. Naming system assigned.
7. Ignored
8. Topo is from 2006. The improvements have not been built yet. Improvements may eventually change da but we may have to deal with that for the CLOMR/LOMR.
9. DA broken at Zone A headwaters.
10. DA broken at road.
11.
12. Changed area to not cross road as shown before.
13. DA broken at Summerhill.
14. DA broken along highway.
15. DA broken along road.
16. Ignored.
17. Agreed.
18. USGS does not have any gages. I will check with City.
19. Good idea.
20. DA broken at Tucker.
21. Will do. (fyi: all the differences are explainable: new construction, difference of opinion.)

22-25. agree chm.

26. No, adjustments made. Detention basin added.
27. South half of mall drains into Kennedy SD system which flows east to Cowhorn Creek and enters downstream of bridge per City comments. bp 12/11/08.
28. Water from east of Richmond flows down Richmond in SD to Gibson SD system, per City comments. - bp 12/11/08

There is no gauge stream gauge found on Cowhorn Creek and City is not aware of one either. bp 12/11/08

ADDITIONAL REVIEW COMMENTS:

1.

II. "SKELETON" MODEL:

Reviewer's Initials: chm Date: 2-20-8

Modeler's Initials: bbp Date: February 4, 2009

DATA FILES RECEIVED:

- ☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc. *N:\26000s\26541\GeoHMS\Cowhorn_GeoHMS_v2.mxd*
- ☒ Description of modeler's assumptions, data sources. *N:\26000s\26541\Word\Hydrology Assumptions.docs*
- ☒ HMS model paths *I:\26000s\26541\HECHMS_v3.3\CowHorn_HMS\Cowhorn_Existing2008.basin*
- ☒ Loss Rate computations *N:\26000s\26541\Excel\Cowhorn CN Calculations.xls*
- ☒ Time of Concentration / Lag Time computations *N:\26000s\26541\Excel\Tc_Cowhorn.xls*

TECHNICAL REVIEW:

Total Drainage Area: 5.516
Total No. of Subbasins: 26
Min DA sq. mi.: .035
Max DA sq. mi.: 0.540

Basin Models: Cowhorn_Existing2008 Unit Hydrograph Method: SCS UH

Computation Interval: 1 min
Peaking Factor: N/A
Min Tc / Lag: 9 min/6
Max Tc / Lag: 63 min/38

Loss Rate Method: SCS Curve Number- Raw soil CN used with percent impervious per Landuse
Min CN: 62
Max CN: 76
Min Initial Loss: default equation
Max Initial Loss: default equation
Min Uniform Loss: N/APercent Imp min13max 78
Max Uniform Loss: N/A

Rainfall Source: Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas, USGS Scientific Investigation Report 2004-5041, Asquith 2004

Rainfall Distribution: Triangular.

REVIEW COMMENTS:

1. HMS schematic looks good. No action necessary.
2. The basin areas match shapefile. No action necessary.
3. The Tc calcs seem reasonable and the calc spreadsheet matches the model. No action necessary.
4. The CN and % impervious in model match calc spreadsheet. The CN and % imp appear reasonable with soils map and land use map. Land use map matches current orthos.
5. I doubt this will make much difference, but I think your extrapolation for 5-minute should have been on log-log graph. Can you research this a little and possibly change. See N:\22206\HMS\Parameters\5-minute rainfall. I didn't have the old study, so if your 5 minute match good with theirs, you can forget this. ACTUALLY, ISWM Appendix A says they combined Asquith with Hydro-35. PLEASE use Hydro-35 for your 5-min. Show me results first.
6. The Asquith rainfall matches model. No action necessary.
7. I finally found it - Appendix A of ISWM clearly says Asquith is annual! Yahoo!
8. I'd like to see first Q break at 2395 instead of 1658 to be conservative at the railroad.
9. I would prefer the Q break at 9613 than 9592 so all 4 bridge sections have same Q.
10. Yikes! J_Cow13 for break 11910 should be J_Cow11.
11. I wonder if J_Cow14 break should be 10296 or 10780 instead of 10810 so that the Q is consistent on upstream and downstream face of bridge.
12. I'd prefer Q breat at 11910 to be at 11945 so all 4 bridge sections have same Q.
13. Consider moving the Q break for J_Cow2 be tot 19408 instead of 18632 since it's a shared floodplain until then.
14. I'd prefer J_Cow1 at 19760 instead of 19612 to be conservative through the bridge.
15. How'd you do StormCad Q's? Could we change q break from 1279 to 1243 just so upstream and downstream of culvert same Q? Inlets along way?

RESPONSE TO COMMENTS:

1. OK
2. OK
3. OK
4. OK
5. 5-min rainfall data was extrapolated from log-log graph. Seems more reasonable now.
6. OK
7. OK
8. Changed to 2395
9. Changed to 9613
10. Changed to J_Cow11
11. Changed to 10296
12. Changed to 11945
13. Changed to 19408
14. Changed to 19760
15. Changed to 1243. Yes, there are inlets along the storm drain and some in the surrounding areas, but it is difficult to tell which inlets go where without a storm drain layout.

III. FLOOD ROUTING:

Reviewer's Initials: chm Date: 3-1-9

Modeler's Initials: bbp Date: February 4, 2009

Data files received:

☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc.
N:\26000s\26541\GeoHMS\Cowhorn_GeoHMS_v2.mxd

☒ Description of modeler's assumptions, notes, and special issues.
N:\26000s\26541\Word\Hydrology Assumptions.doc

☐ Data sources, hydraulic models, computations, record plans, etc. ____

Routing Method(s):

Channel/Floodplain Storage: Modified Puls

Detention Routing: Yes.

Review Comments:

1. Detention pond calculations appear reasonable. No action necessary.
2. RCOW1 and RCOW4 need to have a q lower than 500 since the 10 year q is lower than 500 (notice the output hydrograph for both). Also, they should all have the 0,0 just to ensure this isn't happening anywhere else (it's not extrapolating, it's messing up but it's not crashing like the old versions). RCOW12 is an example of trib messing up (below 100 cfs). RCOW12, 8, 9 etc. – I think I'd add a 50 cfs to curve since Q's so low. .
3. I don't like to spend time getting rid of xing profiles, but in the main stem, I think you have too many crossing that are affecting the volumes. Check profile. I would only county by the 1000's once you get above 5000. Also, keep in mind that in the upper reach you don't have to let your curve go so high and in the lower reach you don't have to use the lower part of the curve. Then, I delete a profile here and there if I must. Take your final RAS model and update the volumes (I'd wait until you address all the RAS comments.) Cowcut also has some crossing profiles affecting volumes – but, you don't need a rating that high, so just delete those from the rating. Check xing for CowEast too.
4. You should probably add sections on RCOW8 that go all the way up to detention pond.
5. How do we feel about the Cow West routing (the culvert)?
6. Routing steps look good except are based on 2 minute time step instead of 1 minute. Since we are changing q's due to 0,0 on routing anyway, could we change time step to 2 (you only have one tc that is causing it to be 1 minute, I bet you could double check that calculation).

Response to Comments:

1. OK
2. Some lower values were added to the routing flows. A 0,0 was added at the beginning of each routing table in HEC-HMS.
3. Crossing profiles in the routing models have been prevented as much as possible.
4. An additional section was added at the upstream of the reach, just downstream of detention pond.
5. Cow West routing was recalculated. Stormcad was used to calculate HGLs for a series of flows. The resulting HGL elevations were added as rating curves in the HEC-RAS model for 4 different XS that each have a blocked obstruction that is used to represent the width of the actual culvert. Routing volumes seem more reasonable.
6. The 6 minute Tc was based on an estimated channel velocity that may have been too high. With a lower velocity, the lag time is now 7 minutes, which allowed me to change the time step to 2 minutes, matching the routing steps.

IV. FINAL MODEL:

Reviewer's Initials: chm Date: 3-3-8

Modeler's Initials: bp Date: 2-4-8

Data files received:

- ☐ Calibration
- ☒ Frequency Analysis
- ☒ Table of Discharges
- ☒ Comparison of Discharges

Calibration Procedures/Results:

I'd like to take a look at this after you update your table.

Frequency Analysis Procedures/Results:

———

Discharge differences greater than 10% of current FIS:

———

Review Comments:

1.

Response to Comments:

1.

QA/QC APPROVAL:

Hydrologic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____Date: _____

Task Leader:_____Date: _____

Project Manager: _____Date: _____

Principal in Charge: _____Date: _____

Hydrology QA/QC Checklist

Watershed Name: Howard Creek

Modeler's Name: Pamela Salvador

Model Name: _____

Reviewer's Name: Cindy Mosier/Ben Pylant

WATERSHED DELINEATION:

Reviewer's Initials: chm/bbp Date: January 5, 2011

Modeler's Initials: PLS Date: October 26, 2010

DATA FILES RECEIVED:

- ☒ ArcMap project file (watershed boundaries (name and area), study stream centerlines, topographic data, images, and etc.
  N:\27000s\27093\Geohms\Howard\Howard_Watershed_Working.mxd
- ☐ Description of modeler's assumptions, notes, and special issues.
  _____

TECHNICAL REVIEW:

- ☒ DA breaks at headwater limits of detailed hydraulic study.
- ☒ DA breaks at pertinent locations such as confluences, detention facilities, major highways, gages, etc.
- ☒ DA breaks at location common to current effective if applicable and feasible.
- ☒ Compare DA to previous studies. *Comprehensive Drainage Report, Hennigson, Durham, and Richardson. July 1976*
- ☒ Is DA size reasonable for type of study?
- ☒ Do DA boundaries agree with available contours and images?

REVIEW COMMENTS:

Modeler's comments:
1. Bookmark1: Reshaped subbassin delineation. One basin edge matches the Howard stream centerline.
2. Bookmark2: Assumed there was a culvert, but could not find one in the aerial - There is a culvert outlet (or it seems).
3. Bookmark3: Assume a culvert - need to field verify - If you zoom out, the whole area is for field visit, so culvert locations can be determined.
4. Bookmark4 & 5: No sure how the water exits the subbasin on the right
5. Bookmark6: Flat area, not sure how water will go.
6. Bookmark7: it seems that the water will pond up before flowing down...Will this be correct for the longuest flowpath?
7. Bookmark 8 & 9: Where does this drain to? Confirm with field visit
8. Bookmark 10: The original DA shows that the water drains though here, but since then, a baseball field has been constructed. I think the DA will change.

Reviewer's comments: CHM
1. CINDY: I'm wondering if we should add break at those ds railroads?
2. QC1 - Add a break at Findley. Merge How9, How10, and FID88.
3. QC2 - Make part of How5 merge with How 3 like current effective (ce). Merge rest of How5 with How6. The How3 part could go either way, but How5 and How6 don't make sense as is and I think that is the best way to resolve.
4. QC3 - at a minimum, combine How1 and How2, but I also recommend moving the break downstream to US Hwy67 rather than Old Redwater to match ce and to have breaks at the major roads. I added a Field Visit to confirm water doesn't cross over Hwy67 on east side of creek.
5. QC4 - Unless theres a culvert in that pond, I think FID 52 and 53 should be joined if they both drain to the culvert I did find. Then, we need to figure out where the culvert I found outlets to the creek and add a DA break for the main stem at the confluence (looks like FID 49 outlet could just be moved ds to the confluence).
6. QC5 - We need to decide about FID 47 and 48 after field visit. Merge? break at 59, cheat like you show? Quite a bit different than ce.

RESPONSE TO COMMENTS:

Response to Modeler's comments: - CHM

1. OK.
2. Per your Response BKM2 below, resolved.
3. It's ok to go to this one because of area I added to west of there. I want to find high point. I think it's clear this area is Howard side of high point, doesn't really matter exactly how gets to southeast corner, but since we'll be close,we can look.
4. Per your response BMK 4 and 5 below, resolved.
5. It definetely looks like it heads towards Howard so doesn't really matter exactly how (plus, looks like under construction).
6. Yes, just use a low velocity through the pond.
7. BKM 8 - confirm with fv. Per your Response BKM 8 below, resolved. BKM 9 - no need for field visit.
8. BKM 10 - You're in between high point contours. If you want to tweak it a little you can, otherwise, it's fine like you have it.

Response to Reviewer's comments: - PLS

1. Break at DS Railraod - Please explain ITS' NOT NECESSARY. EFFECTIVE DOESN'T HAVE A BREAK AND TO USE THE Q DS OF THERE WILL NOT BE TOO CONSERVATIVE.
2. QC 1 - Done
3. QC 2 - Done
4. QC 3 - Done
5. QC 4 - Ater field visit, 3 culverts outlet into corral creek. The basin drawn were correct, but we decided to merge them all, so we would not have a tiny bassin. (We are not studying Corral Creek anyway). - Basin COC6
6. QC 5 - Reshaped basin COC2 based on field visit - Since both COC1 and COC2 have a culvert, we could not merge both basins. We did not break at HWY 59 (Lake) because we would have a basin too small compared to the rest.
7. Resp 1 - BKM 1 - Ok
8. Resp 2 - BMK 2 - After field visit, redrew basin HOW13, since the water there moves away from our basin - cut watershed shapefile North of Baroid Road.
9. Resp 3 - BKM 3 - I did not see any changes in the watershed chm- **SEE QC6 - SHOULDN'T THAT BE MORE LIKE EFFECTIVE TOO. - Addressed (PLS - 1/21/11)**
10. Resp BKM 4, 5, & 6 - OK
11. Resp 7 - BMK 8 - After field visit, determined that basins HOW1, 2 & 3 were drawn properly.
12. Resp 8 - BMK 9 - Deleted Field Visit FID 20 & 21 - Water goes into storm drain.
13. Resp9 - BMK10 - Will leave as is.

Other than last look at QC6 above, basins approved chm 1-20-11.

ADDITIONAL REVIEW COMMENTS:

1. Reviewed basins/comments and I agree with the revisions bbp 4-13-11

II. "SKELETON" MODEL:

Reviewer's Initials: BP Date: 4/15/11

Modeler's Initials: PLS Date: _____

DATA FILES RECEIVED:

- ☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc. *N:\27000s\27093\GeoHMS\XXXXXX.mxd*
- ☐ Description of modeler's assumptions, data sources. ____
- ☒ HMS model paths *I:\27000s\27093\HEC_HMS_v4.0\XXXXX\XXXX.basin*
- ☒ Loss Rate computations *I:\27000s\27093\Admin\Documents\Excel*
- ☒ Time of Concentration / Lag Time computations *I:\27000s\27093\Admin\Documents\Excel*

TECHNICAL REVIEW:

Total Drainage Area: 7.7128
Total No. of Subbasins: 19
Min DA sq. mi.: .1501
Max DA sq. mi.: 1.0883

Basin Models: Unit Hydrograph Method: SCS UH

Computation Interval: 4 min
Peaking Factor: N/A
Min Tc / Lag: 26/15
Max Tc / Lag: 84/50

Loss Rate Method: SCS Curve Number- Raw soil CN used with percent impervious per Landuse
Min CN: 71
Max CN: 75
Min Initial Loss: default equation
Max Initial Loss: default equation
Min Uniform Loss: N/A
Max Uniform Loss: N/A

Rainfall Source: Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas, USGS Scientific Investigation Report 2004-5041, Asquith 2004

Rainfall Distribution: Triangular.

REVIEW COMMENTS:

1. Pamela Comments:
2. Assumed an Overland Wood n-value of 0.24 max. - OK
3. Assumed rainfall of 3.84 in. - OK
4. Longuest Flowpath in HOW7 along was calculated over undeveloped area (26 min) rather than a longuer route over developed street drains (17 min). - OK

BBP Comments:
1. I recommend moving the How5 longest flowpath to the south at the upstream end instead of putting it on that hill.
2. I know that we talked about using an average velocity for the channels in the USGS where the topo was not good enough to cut a channel section but the velocities seem low to me. I would recommend making some assumptions as to the channel size based on the aerial, assume a depth and recalculate the velocity. If you cannot see the channel on the ortho, I would use a velocity of 3.5 fps to at least be a little more conservative with the Tc.
3. NO ACTION NECESSARY - How13 flowpath appeared to not be the longest but I checked and I agree in general with your selected flowpath.
4. BP-1 Change How3 longest flowpath. It leaves gutter and flows into grass lined channel (concrete lined upstream of Pioneer) at this point. Recalculate channel velocity.
5. Some longest flowplath channel sections do not match the final stream CL (How 8, 9, 10, 11). This will not significantly affect your times but please make these match and update the lengths. Some clients have been asking for these files recently.
6. BP-2 In general, I would try not to start your longest flowpath at the top of a local hill like the upstream of How10. By definition, we are probably overestimating the slope of the actual longest flowpath (by flow time). NO ACTION NEEDED. In this case it may still be the longest flowpath because there is pavement all around the hill.
7. Your lengths for the main channel (3188 ft actually) and open channel (2898) are backward in the spreadsheet. Recheck and make sure the velocity is with the correct length.
8. BP-3 Make sure not to overwrite an existing landuse with a lower pct impervious landuse in the future landuse like this small area in How2. I would adjust the landuse file but it is so small that you shouldn't need to recalculate % impervious.
9. NEVERMIND - I saw now that you included your roads in a different future landuse file (not in MXD) which is what you were suppose to do. IGNORE Comments. Why is How6 Basin 73.1% Impervious in the future conditions when the entire futue landuse for the basin is Industrial. How13 future landuse is almost entirely Industrial with a few slivers of small high density so I do not know why the Impervious percentage is above 72.
10. NO ACTION NECESSARY - You total basin area is 4936.18 ac. Your soils and future landuse match almost exactly. Your existing landuse file adds up to 4936.06 which means there are probably a few small holes in the shapefile but insignificant to the calculation.
11. NO ACTION - n the future, please number elements incrementally in HMS so that there is a J_HOW1 and a R_HOW2.
12. For HOW1 and HOW2 I think you should assume a 1% shallow concentrated slope since the USGS topo is not very detailed in these small areas.
13. I cannot open your flowmaster model that you used for your velocity calcs but some velocities seem low. Make sure that your n values are not more than 0.045 for these roadside ditches and maintained grass channels (i.e. HOW10, 12, 13; COC4).
14. Why didn't you assume 1% slope for overland and shallow concentrated on COC4?
15.***Discharges compared to CE are low by up to 40%. Investigation revealed that the new Mod Puls routing upstream of Jarvis created significant attenuation that was not included in CE Muskingum Routing. The result is that the new peak misses Corral peak more and the discharges are lower, but appear to be correct. Muskingum was input for this reach in our model and the Q's were approx. 10% higher than CE in most places, which is consistent with other basins.
16. Please use min 1% slope for shallow concentrated flow TC on HOW5 like you did on the other USGS calculated slopes.
18. Make changes in Ult. TC spreadsheet shallow conc. slopes for HOW1, 2, 5, and COC4 to be consistent with Ex. TC
19. HOW6, COC3, COC5, and COC6 Ult LU is Industrial/Commercial for Overland flow. Ult TC should be 50' and .011 n value
20. HOW12 Ult LU is Residential for Overland flow. Ult TC should be 100' and 0.15 n value.
21. Please add a separate junction at the downstream of Corral Creek in your HMS model so that the total flow from Corral can be separated from Howard.

RESPONSE TO COMMENTS:

Pamela's Responses to BP Comments (BBP RESPONSE IN CAPS):
1. Fixed. - OK
2. Per our discussion, I used flowmaster to calculate velocity based on ditch width, assumed depth, assumed n-value of 0.4, and slope. - HOPEFULLY YOU ACTUALLY USED 0.04 AS WE DISCUSSED. - Yes, I did use 0.04.
3. No action taken. - OK
4. Fixed. - WHEN IT LEAVES THE GUTTER AND GOES INTO THE CHANNEL/STORM DRAIN THE FLOW NEEDS TO BE CHANGED TO CHANNEL FLOW - OK.
5. Fixed - OK
6.No action taken. - OK
7. For HOW10 - Fixed - OK
8. Fixed. - OK
9. N/A - The difference in percent impervious is due to Roads - OK
10. No action taken. - OK
11. Fixed.
12. Fixed. - ALSO NEED TO FIX IN ULT TC - OK
13. Check HOW 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, and CCO4. - Fixed when needed. - OK
14. I tried to use the topography, but I don't like those slopes (not very accurate) - will assume 1% slope. - YOU TYPED 1 IN THE VELOCITY INSTEAD OF THE SLOPE COLUMN. PLEASE REVISE. - Fixed.
15. No action taken.
16. Per discussion with Ben, used 1% slope for shallow concentrated on HOW 3 & 5.
18. Fixed.
19. Per discusion with Ben, fixed all except COC6.
20. Fixed.
21. Updated.

III. FLOOD ROUTING:

Reviewer's Initials: BP Date: 4/15/11

Modeler's Initials: PLS Date: _____

Data files received:

☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc.
N:\27000s\27093\GeoHMS\XXXXX.mxd
☐ Description of modeler's assumptions, notes, and special issues. ____
☐ Data sources, hydraulic models, computations, record plans, etc. ____

Routing Method(s):
Channel/Floodplain Storage: Modified Puls
Detention Routing:Modified Puls

Review Comments:

1. I would have liked to use a Q of 800, 4500, and 5500 but these Q but these profiles were jumping because they reached critical WSEL at some XS.
2. Created a Howard routing Model & a separate HEC-RAS 4.0 Corral Creek Routing Model.

1. Please rerun routing with final HEC-RAS model after you address all hydraulic comments
2. Move Routing XS 30395 to 30268 so that the first routing reach will start downstream of the fourth bridge section.
3. Move routing XS 19862 to be 19955 so that it is upstream of the 1st bridge section.
4. Move routing XS 17498 to XS 17442.
5. Move routing XS 14699 to 14776.
6. Move routing XS 12328 to 12394
7. Move routing XS 3662 to 3801
8. Please add Corral Creek cross sections and routing reach cross sections to model. Make sure that you did not choose any internal structure sections.
9. Update routing steps calculation based on new routing sections that were selected. Currently R_HOW1 length is incorrect in subreach calculation.
10.****Go back and rerun Howard HMS model after the Corral routing has been updated for the new Corral hydraulic model.

Response to Comments:

1. Updated Routing model with new geometry.

2 - 8. Ok

9. Updated Routing Names, lengths. Updated HEC-HMS when needed.

IV. FINAL MODEL:

Reviewer's Initials: _____ Date:

Modeler's Initials: Date:

Data files received:

- ☐ Calibration
- ☒ Frequency Analysis
- ☒ Table of Discharges
- ☒ Comparison of Discharges

Calibration Procedures/Results:

_____

Frequency Analysis Procedures/Results:

_____

Discharge differences greater than 10% of current FIS:

_____

Review Comments:

1.

Response to Comments:

1.

QA/QC APPROVAL:

Hydrologic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____ Date: _____

Task Leader:_____ Date: _____

Project Manager: _____ Date: _____

Principal in Charge: _____ Date: _____

Hydrology QA/QC Checklist

Watershed Name: South Wagner Creek

Modeler's Name: Will Wiegand

Model Name: S Wagner

Reviewer's Name: Cindy Mosier/Angela Wright

WATERSHED DELINEATION:

Reviewer's Initials: chm Date: November 19, 2010

Modeler's Initials: WAW Date: October 22, 2010

DATA FILES RECEIVED:

- ☒ ArcMap project file (watershed boundaries (name and area), study stream centerlines, topographic data, images, and etc.
  N:\27000s\27093\Geohms\Wagner\South_Wagner_Watershed_Working.mxd
- ☐ Description of modeler's assumptions, notes, and special issues.

TECHNICAL REVIEW:

- ☒ DA breaks at headwater limits of detailed hydraulic study.
- ☒ DA breaks at pertinent locations such as confluences, detention facilities, major highways, gages, etc.
- ☒ DA breaks at location common to current effective if applicable and feasible.
- ☒ Compare DA to previous studies. *Comprehensive Drainage Report, Hennigson, Durham, and Richardson. July 1976*
- ☒ Is DA size reasonable for type of study?
- ☒ Do DA boundaries agree with available contours and images?

REVIEW COMMENTS:

Modeler's Comments:
1.
2. Note: In general I tried to keep the basins between 0.1 and 0.5 sqmi. to keep the smallest to largest basin ratio around 5:1.

Reviewer's comments:
1. QC-1 CINDY: Could that basin be moved a bit further downstream to headwaters/most upstream xse/downstream face highway? NO, IT'S FINE LIKE IT IS.
2. QC-2 CINDY: fis didn't think water crossed back up across road. Is there a culvert? NOT NEC. A CULVERT, BUT THE ROAD IS LOW AND WATER GETS TO A CREEK ON US. SIDE OF ROAD. FINE LIKE IS.
3.

****JAN 4, 2010

RESPONSE TO COMMENTS:

Response to Modeler's comments:
1. Good.

Response to Reviewer's comments:
1. Fine like is (chm).
2. Fine like is (chm).

approved chm 11-22-10

ADDITIONAL REVIEW COMMENTS:

1.

II. "SKELETON" MODEL:

Reviewer's Initials: alw Date: March 28, 2011

Modeler's Initials: waw Date: _____

DATA FILES RECEIVED:

- ☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc. *N:\27000s\27093\Geohms\South_Wagner\South_Wagner_Watershed_Working.mxd*
- ☐ Description of modeler's assumptions, data sources. ____
- ☒ HMS model paths *I:\27000s\27093\HEC_HMS_v3.5\SWAGNER*
- ☒ Loss Rate computations *I:\27000s\27093\Admin\Documents\Excel*
- ☒ Time of Concentration / Lag Time computations *I:\27000s\27093\Admin\Documents\Excel*

TECHNICAL REVIEW:

Total Drainage Area: 1.902
Total No. of Subbasins: 7
Min DA sq. mi.: 0.048
Max DA sq. mi.: 0.447

Basin Models: Unit Hydrograph Method: SCS UH

Computation Interval: 4 min
Peaking Factor: N/A
Min Tc / Lag: 15
Max Tc / Lag: 37

Loss Rate Method:	SCS Curve Number- Raw soil CN used with percent impervious per Landuse
Min CN:	69
Max CN:	73
Min Initial Loss:	default equation
Max Initial Loss:	default equation
Min Uniform Loss:	N/A
Max Uniform Loss:	N/A
Rainfall Source:	Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas, USGS Scientific Investigation Report 2004-5041, Asquith 2004
Rainfall Distribution:	Triangular.

REVIEW COMMENTS:

1. Round B_SWC 1 to a whole number.
2. Need to revise overland flow "n" value to be 0.24 in Sub basin SWC5
3. Change the second shallow concentrated flow for SW-1 to channel flow.
4. The channel velocity for B_SWC 6 seems low. Double check
5. Double check your time step for the model. It should be set at 1/3 of your shortest lag time. Revise your routing step calculations with the updated time step.
6. Check calculations for the storm drain velocities. The values seem slow
7. Initial abstraction values are low and are all the same. They should be calculated based on the CN for each basin
8. 2. Channel velocity for SW-2A seems slows. Double check with HEC-RAS model.
9. Move routing dss to hms folder. Repath the routing reaches.
10. CHM COMMENTS: Be sure to do symbology for exhibits for LU based on LUClass. "Name" was never cleaned and is not consistent with LU class or Percent Impervious.
11. Shouldn't SW-1 have been added in to J_SWC_2?
12. Hopefully you didn't have this at 2 minutes before Angela's QC, but you will need to change to 2 minutes (not 4 minutes) either way because we are combining this with Wagner. (Also, you even if not wanting to be consistent with Wagner, you need to base this off the ultimate lag not existing – 4 minutes is too high for the ultimate).
13. Existing LU - Why do you have the one Multi-Family as 45%? Shouldn't it be the typical 72%?
14. Is the "small-high density correct or should that polygon be broken up with some moderate density?
15. There are two "open"s assignd as 25% that don't appear correct.
16. Some of your small mods have 25% and some have 35%. If they are really 25%, they should be labeled small low, ortherwise, change to 35%.
17. See bookmark –is that really industrial at 72%?
18. Ultimate Land Use – didn't you coordinate with Ben and Scott for this – Assuming that "working city Texarkana future 105" is the shapefile I should be looking at (impossible to tell), you have a mixture of 90% for commercial and retail. I don't believe we have this category. Did you really think this was necessary?
19. Why did your multifamily change from 45% in existing to 40% in future?
20. My understanding is that all low and mod residential gets changed to high for future.
21. You didn't need to change those opens in the future to 80% since they were open in existing. Just when it was developed for existing unless you thought they planned on tearing out a development in future.
22. You're Q breaks need lots of help – let's talk.

RESPONSE TO COMMENTS:

1. Revised to be 73
2. Revised overland flow # to 0.24 in Sub basin SWC5
3. Revised shallow concentrated and added to total channel flow.
4. Checked – Revised based upon RAS table check of 2 yr event to be 3.04 ft/s and not 2.1 ft/s
5. Changed to be 4 minutes
6. Revised storm drain velocity to be 6 ft/s, this is now consistent with other adjacent basins
7. Deleted initial abstraction allowed HMS to calculate values
8. Need to make a revision to comparison of headwater discharges at Hwy 67
9. The storage-discharge data on Route 4 between Findley and Robison was entered manually into HMS; when the route was linked from the dss a dip in the profile appeared so the 2 "lower" discharge values were removed to produce a smooth plot of storage-discharge

********** 4/ 7 / 2011 ********** WAW

10. will change today 4/8
11. yes, revised now and added junction, this gives a better comparison of Halff areas to effective models

12) agreed, revised to be 2 minutes with 10 minute minimum time step
13) yes, revised to be 72 %
14) yes, I think the small high density is correct and did not change it
15) agreed revised the open areas to be 1% impervious
16) agreed revised the small mods low to be 25% and moderate - 35%
17) agreed on bookmark –is that really industrial at 72%? revised to be moderate density / small moderate density residential
18) agreed, revised to be all retail / commercial @ 85 %
19) agreed, was not supposed to, revised multi family in ultimate (future) to be 72 %
20) agreed revised the low and moderate to high density this changed the perc. imperv to 45 %
21) agreed, revised 2 open areas in future file that were previously open 80% to 1 %
22) revised Q breaks

Approved CHM 4-18-11

III. FLOOD ROUTING:

Reviewer's Initials: ALW Date: March 29, 2010

Modeler's Initials: waw Date: _____

Data files received:

☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc.
N:\27000s\27093\Geohms\South_Wagner\South_Wagner_Watershed_Working.mxd
☐ Description of modeler's assumptions, notes, and special issues. _____
☐ Data sources, hydraulic models, computations, record plans, etc. _____

Routing Method(s):
Channel/Floodplain Storage: Modified Puls
Detention Routing:Modified Puls

Review Comments:

1. Routing reach R_SWC 1 needs to be double checked. The higher flows have crossing profiles in the HEC-RAS routing model. The crossing profiles are causing the volume calculations to be odd.
2. Channel velocity for SW-2A seems slows. Double check with HEC-RAS model.
3. Recalculate your routing steps with the revised time step.
4. Don't worry about this because it's only minimal, but be sure to check for this next time – your longest flow paths are not identical total lengths for existing and future.
5. I'm ok with your manual entry for Route 5-6, although I'd prefer it be in DSS.

Response to Comments:

1-3 Done.
Approved chm 5-3-11

IV. FINAL MODEL:

Reviewer's Initials: chm Date:

Modeler's Initials: waw Date:

Data files received:

- ☐ Calibration
- ☒ Frequency Analysis
- ☒ Table of Discharges
- ☒ Comparison of Discharges

Calibration Procedures/Results:

Green Ampt was used for the FIS hydrology model

The areas are similar for the different sub basins except for the intersection of Hwy 59 and 67 at the upper limits

Frequency Analysis Procedures/Results:

———

Discharge differences greater than 10% of current FIS:

The HEC-1 model shows values of less than 25 % impervious 25 for the basins.
Based upon the 2008 aerial photo and the Texarkana land use shapefiles the percent impervious for existing conditions range from 23 - 49 % impervious.

I did a sensitivity test – when run single basins in HMS with single basin parameters from HEC-1 (change all but rainfall. The IA and moisture deficit was a little questionable on conversion from HEC-1 to HMS) it increased Q by about 25%. When change HMS % imp values to HEC-1 value, decreased Q by about 5-10%. When double tp (and % imp change) (although theirs is tc it's still about double) decreases ours by about 10%. Shows that numbers would be closer together with similar parameters/rainfall. We like our parameters/methodology.

Review Comments:

1.

Response to Comments:

1.

QA/QC APPROVAL:

Hydrologic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____Date: _____

Task Leader:_____Date: _____

Project Manager: _____Date: _____

Principal in Charge: _____Date: _____

Hydrology QA/QC Checklist

Watershed Name: Stream WC1

Modeler's Name: Scott Rushing

Model Name: _____

Reviewer's Name: Cindy Mosier

WATERSHED DELINEATION:

Reviewer's Initials: chm Date: _____

Modeler's Initials: SAR Date: May 26, 2011

DATA FILES RECEIVED:

- ☒ ArcMap project file (watershed boundaries (name and area), study stream centerlines, topographic data, images, and etc.
  N:\27000s\27093\Geohms\Stream_WC1\Stream_WC1_Watershed_Working.mxd
- ☐ Description of modeler's assumptions, notes, and special issues.

  _____

TECHNICAL REVIEW:

- ☒ DA breaks at headwater limits of detailed hydraulic study.
- ☒ DA breaks at pertinent locations such as confluences, detention facilities, major highways, gages, etc.
- ☒ DA breaks at location common to current effective if applicable and feasible.
- ☒ Compare DA to previous studies. *Comprehensive Drainage Report, Hennigson, Durham, and Richardson. July 1976*
- ☒ Is DA size reasonable for type of study?
- ☒ Do DA boundaries agree with available contours and images?

REVIEW COMMENTS:

1. CHM1: I think it would be better if you hadn't moved this line to the west (WagnerpreQC vs. new WC-1). It's ok to straighten it out, but I think Wagner was following the contours better.
2. (CHM2 and 3: I did Street View and agree with your change here.)
3. (CHM4: I agree with both of your changes here.)
4. CHM5: I think it was better the way it was before (and per Street View). See my markups - I think CHM5-2 is more correct (would assume inlets are taking water to one pipe and appears to dump in at upstream - not completely sure - past last inlet, water does seem to dump in last inlet and then to ds side), but CHM5-1 at least makes a slightly prettier picture. **Also, if you don't use either of my suggestions, this affects WC-10 area (or if you do use my suggestions and already changed WC-10 area, need to change it back.)**
5. CHM6: I'm ok with the change that you made from preQCWagner to WC-1, but are you sure you didn't change the orginal Wagner based on a field visit or something? **Also, if you are sure you want to change, did you change the Wagner model because this affects WC-16 area.**
6. (CHM7: Either could work, I'm fine with yours.)

RESPONSE TO COMMENTS:

1. Delineation moved east to better follow WagnerpreQC.
2. OK.
3. OK.
4. I like CHM5-2 the best as well. I agree it appears from the aerial the last inlet probably empties on the ds side. Delineation adjusted in this area to follow CHM5-2 suggestions. WC-10 area was not changed.
5. I am sure we did not look at this area on a field visit. I originally was unsure of the funny looking basin shape but I think it is correct now with the recent WC-1 changes. I will make sure to update the WC-16 area when I update the Wagner model with the WC-1 changes.
6. OK. No change made.

Approved chm 6-27-11 **BUT MAKE SURE WC-16 AREA GETS UPDATED PER CHANGES FOR WC-1.**

ADDITIONAL REVIEW COMMENTS:

1.

II. "SKELETON" MODEL:

Reviewer's Initials: chm Date: _____

Modeler's Initials: SAR Date: _____

DATA FILES RECEIVED:

- ☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc. *N:\27000s\27093\Geohms\Stream_WC1\Stream_WC1_Watershed_Working.mxd*
- ☐ Description of modeler's assumptions, data sources. _____
- ☒ HMS model paths *I:\27000s\27093\HEC_HMS_v3.5\Wagner\Wagner_HMS*
- ☒ Loss Rate computations *I:\27000s\27093\Admin\Documents\Excel*
- ☒ Time of Concentration / Lag Time computations *I:\27000s\27093\Admin\Documents\Excel*

TECHNICAL REVIEW:

Total Drainage Area: 0.91 sq. mil
- Total No. of Subbasins: 6
- Min DA sq. mi.: 0.041
- Max DA sq. mi.: 0.224

Basin Models: Unit Hydrograph Method: SCS UH
- Computation Interval: 2 min
- Peaking Factor: N/A
- Min Tc / Lag: min
- Max Tc / Lag: min

Loss Rate Method: SCS Curve Number- Raw soil CN used with percent impervious per Landuse
- Min CN: _____
- Max CN: _____
- Min Initial Loss: default equation
- Max Initial Loss: default equation
- Min Uniform Loss: N/A
- Max Uniform Loss: N/A

Rainfall Source: Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas, USGS Scientific Investigation Report 2004-5041, Asquith 2004

Rainfall Distribution: Triangular.

REVIEW COMMENTS:

1. The WC-1 model was added to Wagner, but WC-16 area was not updated.
2. Did you deliberately leave WC-7 at 100 feet for overland ultimate (smooth surface)?
3. These Qs are not reduced, correct?
4. Update routing with new geometry. Reach 3 in particular has changed quite a bit.

RESPONSE TO COMMENTS:

1. WC-16 area updated.
2. Not deliberate, my error. I changed the overland length to 50' for both existing and ultimate to be consistent with our methodology and I added 50' to shallow concentrated flow for both as well. The lag time did not change; however, so no change was made to HMS model.
3. Correct, the Qs were not reduced for WC-1.
4. Routing updated with new geometry. SAR 09/23/11

III. FLOOD ROUTING:

Reviewer's Initials: chm Date: ____

Modeler's Initials: SAR Date: ____

Data files received:

☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc.
N:\27000s\27093\Geohms\Stream_WC1\Stream_WC1_Watershed_Working.mxd
☐ Description of modeler's assumptions, notes, and special issues. ____
☐ Data sources, hydraulic models, computations, record plans, etc. ____

Routing Method(s):
Channel/Floodplain Storage: Modified Puls
Detention Routing: Modified Puls

Review Comments:

see previous section.

Response to Comments:

OK.

IV. FINAL MODEL:

Reviewer's Initials: ____ Date:

Modeler's Initials: Date:

Data files received:

☐ Calibration
☒ Frequency Analysis
☒ Table of Discharges
☒ Comparison of Discharges

Calibration Procedures/Results:

—

Frequency Analysis Procedures/Results:

—

Discharge differences greater than 10% of current FIS:

—

Review Comments:

1.

Response to Comments:

1.

QA/QC APPROVAL:

Hydrologic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____ Date: _____

Task Leader:_____ Date: _____

Project Manager: _____ Date: _____

Principal in Charge: _____ Date: _____

Hydrology QA/QC Checklist

Watershed Name: Stream WC2

Modeler's Name: Pamela Salvador

Model Name: _____

Reviewer's Name: Cindy Mosier/Angela Wright

WATERSHED DELINEATION:

Reviewer's Initials: chm Date: November 4, 2010

Modeler's Initials: PLS Date: 11-4-10

DATA FILES RECEIVED:

- ☒ ArcMap project file (watershed boundaries (name and area), study stream centerlines, topographic data, images, and etc.
  N:\27000s\27093\Geohms\Stream_WC2\Stream_WC2_Watershed_Working.mxd
- ☐ Description of modeler's assumptions, notes, and special issues.
  _____

TECHNICAL REVIEW:

- ☒ DA breaks at headwater limits of detailed hydraulic study.
- ☒ DA breaks at pertinent locations such as confluences, detention facilities, major highways, gages, etc.
- ☒ DA breaks at location common to current effective if applicable and feasible.
- ☒ Compare DA to previous studies. *Comprehensive Drainage Report, Hennigson, Durham, and Richardson. July 1976*
- ☒ Is DA size reasonable for type of study?
- ☒ Do DA boundaries agree with available contours and images?

REVIEW COMMENTS:

Modeler's Comments:

1. A. Basin Delineation:
2. Bookmark 1: Could not find outlet structure of the culvert (added to site visit shapefile) - Check Culvert shapefile in MXD, will show you, where I think the culvert might go.
3. Bookmark 2: The culvert crossing Pleasant Grove seems to be at a high point. I included the drainage ditch on the West side of the road , please check
4. Bookmark 3: After talking with Ben, we decided not to follow the FIS Q break located 50 feet dowstream of Independence, and break the bassin at the tributary and US of Lexington. That way, we don't have a very small basin.

B. Flow Path

5. Bookmark 4: New Construction - Not sure where are the culverts.

Reviewer's Comments:

1. QC1 - Please confirm that this drains to WC-2. I think GeoHMS made more sense here, it appears to drain away.
2. QC2 - next time, draw a break like this through the centerline of road.
3. QC3 - get Ben to look at this spot. I thought we decided a little more than this went to WC-2 when we were in the field (slightly).
4. QC-4 - I think GeoHMS made more sense here, but you may have been thinking of grading since the topo.
5. Wagner and WC-2 delineations overlap. Need to coordinate and pick one.

RESPONSE TO COMMENTS:

Response to Modeler's Comments:

1. no comment
2. BKM 1 - either way, the water is clearly in this basin. Regardless, confirmed with site visit.
3. BKM 2: confirmed in field.
4. OK.

Response to Reviewers Comments:

1. QC1 - Used GeoHMS delineation
2. QC2 - Drew line through roadway centerline
3. QC3 - Per Ben's guidance, I followed the ridge of the houses. I did not include the house in the south, because Ben remembered it did not seem to drain towards Stream WC-2.
4. QC4 - Used GeoHMS delineation
5. Deleted the overlapping area.
6. Bookmark 5: I changed the upstream shape of basin per drainage ditch line that can be seen in ortho. - It also match the GeoHMS basin break. OK.

Approved chm 11-19-11

ADDITIONAL REVIEW COMMENTS:

1.

II. "SKELETON" MODEL:

Reviewer's Initials: ALW Date: April 8, 2011

Modeler's Initials: PLS Date: March 4, 2011

DATA FILES RECEIVED:

- ☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc.
  N:\27000s\27093\GeoHMS\Stream_WC2\Stream_WC2_Watershed_Working.mxd
- ☐ Description of modeler's assumptions, data sources. ____
- ☒ HMS model paths *I:\27000s\27093\HEC_HMS_v3.5\WC2\Stream_WC2\Stream_WC2.hms*
- ☒ Loss Rate computations *IN:\27000s\27093\Geohms\Stream_WC2*
- ☒ Time of Concentration / Lag Time computations
  I:\27000s\27093\Admin\Documents\Excel\Texarkana_Tc_Existing.xls & Texarkana_Tc_Ultimate.xls

TECHNICAL REVIEW:

Total Drainage Area: 0.859 sq.mi.
- Total No. of Subbasins: 7
- Min DA sq. mi.: .055
- Max DA sq. mi.: 0.265

Basin Models: Unit Hydrograph Method: SCS UH

- Computation Interval: 3 min
- Peaking Factor: N/A
- Min Tc / Lag: 15/9
- Max Tc / Lag: 51/30

Loss Rate Method: SCS Curve Number- Raw soil CN used with percent impervious per Landuse
- Min CN: 68
- Max CN: 75
- Min Initial Loss: default equation - %impervious = 9% - 34%
- Max Initial Loss: default equation
- Min Uniform Loss: N/A
- Max Uniform Loss: N/A

Rainfall Source: Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas, USGS Scientific Investigation Report 2004-5041, Asquith 2004

Rainfall Distribution: Triangular.

REVIEW COMMENTS:

1. Cindy: Why does her WC2_2 have a longer tc in future? See her QC.xls.
2. Longest flow path segment lengths do not match GIS in existing TC. You are short by about 1800 ft for WC2_2 and 500 ft short for WC2_3. Update both existing and future.
3. Double check longest flow path for WC2_7. Why did you not use the entire length of the watershed? Change Overland to 100ft for the short grass.
4. Limit the overland flow length for the paved sections to 50 ft.
5. Double check n-value for overland flow for WC2_3. Slope for shallow concentrated flow is in ft/ft not percent (existing and future).
6. Calculate the velocity for the channel section of WC2_6 with flowmaster. The majority of the stream is not in the main channel.
7. Double check longest flow path for WC2_3. I seems that the flowpath would be longer if it went to the other side of the basin.
8. Update peak discharge comparison table.
9.

RESPONSE TO COMMENTS:

Modeler's Comments:
A. WC2_4 tc went from 12 min existing to 5 min in the future because it was in a 100' wood area into a 50' developed area. Does this make sense? - Assumed a wood n-value for the overland 0.24. - Fixed, after QC - PLS 04/14/11
B. Please check that ycu like how the Q's were asigned at XS 2793 & 2441 (BMK6).
C. Q's are decreasing for the low flows for the 2-, 5, and 5-year because the last two basins have either a very short distance to travel, or very small overland & shallow concentrated.
D. Did double check tc for WC2_6 and WC2_7 and tried other scenarios with a lower tc.

Response to Reviewer's Comments:
A. I think the ultimate Tc looks okay. ALW
B. Q-breaks were changed. See hydraulics QAQC. ALW
C. There is a note in the Preliminary FIS for the confluence that says " A flatter average stream slope and longer stream length cause the unit hydrograph time to peak (Tp) to lengthen. The result is a decrease in the downstream discharge." This may be happening in the 2,5 ,and 10-year. ALW
1. Updated WC2_2 was updated and now has a shorter tc in the future.
2. Fixed.
3. Updated.
4. Fixed.
5. Updated n-value and slope.
6. For basin WC2_4 & WC2_6, I assumed a ditch as the topo did not pick it up, and calculated the velocities with flowmaster.
7. Change longest flow path to be longer.
8. Updated.
D. For basin WC2_7& WC2_3, I assumed 100 feet overland and 500 feet shallow concentrated even though it is in a ditch.
Approved chm 4-27-11

III. FLOOD ROUTING:

Reviewer's Initials: chm Date: ____

Modeler's Initials: pls Date: ____

Data files received:

- ☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc.
  N:\27000s\27093\GeoHMS\XXXXX.mxd
- ☐ Description of modeler's assumptions, notes, and special issues. ____
- ☐ Data sources, hydraulic models, computations, record plans, etc. ____

Routing Method(s):

Channel/Floodplain Storage: Modified Puls
Detention Routing: Modified Puls

Review Comments:

1. The routing model is located under:
I:\27000s\27093\HEC_RAS_v4.1\StreamWC2
2. The routing model is the same as the existing except the inneffectives elevations. - Not updated with QC yet - PLS04/14/11
3. Change time step to 2 minutes to match the time step for Wagner. Recalculate and update routing steps in HEC-HMS existing and future.
4. Double check velocity for WC2_4 with updated Tc calculations.

Response to Comments:

3. Update Time step & subreaches in HEC-HMS for both Existing & Ultimate.
4. Updated.
Approved chm - (the routing was updated with final geometry), 5-4-11

IV. FINAL MODEL:

Reviewer's Initials: chm Date:

Modeler's Initials: pls Date:

Data files received:

- ☐ Calibration
- ☒ Frequency Analysis
- ☒ Table of Discharges
- ☒ Comparison of Discharges

Calibration Procedures/Results:

Frequency Analysis Procedures/Results:

Discharge differences greater than 10% of current FIS:

I did a sensitivity test - with their 0% impervious, their rainfall, then their tc for basin B_wc2_1 and combing the basins ds of their and us of junction J_wc2_4 and using their tc (and only one of the routing reaches), get practically identical answers to theirs! chm 4-27-11

Review Comments:

1.

Response to Comments:

1.

QA/QC APPROVAL:

Hydrologic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____ Date: _____

Task Leader:_____ Date: _____

Project Manager: _____ Date: _____

Principal in Charge: _____ Date: _____

Hydrology QA/QC Checklist

Watershed Name: Swampoodle

Modeler's Name: Scott Rushing

Model Name: Swampoodle Creek

Reviewer's Name: Cindy Mcsier

WATERSHED DELINEATION:

Reviewer's Initials: chm Date: 10-1-10

Modeler's Initials: Date:

DATA FILES RECEIVED:

- ☒ ArcMap project file (watershed boundaries (name and area), study stream centerlines, topographic data, images, and etc.
  N:\27000s\27093\Geohms\Swampoodle\Swampoodle_Watershed_Working.mxd
- ☐ Description of modeler's assumptions, notes, and special issues.

TECHNICAL REVIEW:

- ☒ DA breaks at headwater limits of detailed hydraulic study.
- ☒ DA breaks at pertinent locations such as confluences, detention facilities, major highways, gages, etc.
- ☒ DA breaks at location common to current effective if applicable and feasible.
- ☒ Compare DA to previous studies. *Comprehensive Drainage Report, Hennigson, Durham, and Richardson. July 1976*
- ☒ Is DA size reasonable for type of study?
- ☒ Do DA boundaries agree with available contours and images?

REVIEW COMMENTS:

1. QAQC1- do you want a break at that detention pond so you can route it? Also, I think there's probably a pipe going under road there. I think that water is going to the creek at the upper end. What made you create the upside down U? I'm thinking water doesn't turn across that road until further downstream. Centerline not inside contours. Does our survey help out in this area? Let's go ahead and extend cl and have headwater where the pipe comes across.
2. QAQC2 – you know you can tell GeoHMS where you want sub-basin outlets? I would have put this right at the end of floodplain or right at the road/culvert. I'm not seeing anything special about this sub-basin break location. Breaks at culverts will help the City size culverts later.
3. Did you burn in the Swampoodle west centerline before ran GeoHMS?
4. QAQC3 – I'd rather tell GeoHMS a point at upstream side of culvert so that we have the da going to the culvert.
5. QAQC4,5 – I'd break across centerline of road so not so much extra Q going through culvert in RAS model.
6. QAQC 6 – where's that water go?
7. QAQC 7 – I think water from road goes straight to main creek no trib. Can you draw a centerline for that trib. This may change based on where qaqc6 is going.
8. QAQC8 – need a DA break at confluence of trib.
9. QAQC 9 – I bet that drains to a sd and stays on other side of road. If not, the stuff just to the left of there probably drains across too.
10. QAQC10 – I think the water probably turns along the road. Draw break across centerline of road.
11. QAQC11 – this is just for aesthetics, but can you clean up the confluence here where the one basin merges to the other a the confluence of trib. I'm tempted to move the main stem basin (ID 161) to downstream of road at the confluence.
12. QAQC12 – I think this could be broke across centerline of New Boston.
13. QAQC13 – Is there really a culvert here or should the water upstream of the road turn to the culvert. Field verify.
14. QAQC14 – field verify or get sd plans to confirm geohms not correct here. I would think water does turn down side road into our basin here.
15. QAQC15 – I wonder if all of this is really going back up to the culvert at 8th.
16. Do you know which street used to be called Richmond? The FIS has a break between Swampoodle East and New Boston at Richomond. We need to make sure we have one there. BE SURE TO COMPARE ALL PARAMETERS AREAS ETC. TO FIS HEC-2 AND HEC-1. (WE NEED TO EVENUALLY COMPARE THE SQ. MI. – I DIDN'T DO THAT YET, JUST THE BREAKS)
17. Does Texarkana have any gages? If so, do we have breaks near them?

RESPONSE TO COMMENTS:

1. The plan was not to route this pond since it doesn't appear to be used for detention. I can break at the pond though just in case. There are two outlets that cross Texas Blvd. towards the ditch on the north side of the road upstream of the upside down U. The CL was adjusted in this area and extended upstream. This area hasn't been surveyed yet but I was able to use the routing Xsecs I cut to help verify the CL location.
2. Needed a break here for the trib/channel flowing into SPCET.
3. Yes, Swampoodle West was burned before running GeoHMS.
4. I tried using the basin break tool in GeoHMS at culvert crossings, however, hand edits were still needed.
5. Agreed, DA broken along centerline of road.
6. Not quite sure either. Potential overflow area from channel just north? This area is in the field visit shapefile.
7. DA adjusted. CL drawn for trib.
8. DA break added.
9. Agreed, survey photos show sd on downstream end of crossing. DA adjusted.
10. You're probably right but I put a field verify box around this areas in case water does turn south. No changes to DA at this time 10/21/10.
11. Confluence DA cleaned. Basin ID 161 on main stem left as is.
12. Agreed, survey photos show sd on downstream end of crossing. DA broken at centerline of New Boston.
13. There appears to be a stormdrain outlet in the concrete channel bank approximately 200 ft downstream of the road crossing. It appears to be angled back towards the intersection with the curb inlets. This does need to be field verified. No changes to DA at this time 10/21/10.
14. Field verify.
15. If not down 8th street then I'm not sure where else the water would go. There appears to be a sd pipe down the north and south split of 8th street I did adjust the DA in this area to send about 20 acres of water from basin ID 143 to basin ID 162. THAT'S WHAT I MEANT. I FELT LIKE THE AREA YOU CHANGED NEEDED TO DRAIN TO 8TH LIKE YOU CHANGED IT.
16. Richmond is also 24th Street/King Street/FM 559 (Can't they just choose one!) We do have a break at "Richmond".
17. Checked the USGS website and didn't see any gages in the study area.

Approved chm 11-18-10 (except double check #14 above 1 more time.

ADDITIONAL REVIEW COMMENTS:

1.

II. "SKELETON" MODEL:

Reviewer's Initials: Chm Date: 2-14-11

Modeler's Initials: Sar Date: 12-29-10

DATA FILES RECEIVED:

- ☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc. N:\27000s\27093\Geohms\Swampoodle\Swampoodle_Watershed_Working.mxd
- ☐ Description of modeler's assumptions, data sources. ____
- ☒ HMS model paths *I:\27000s\27093\HEC_HMS_v3.5\Swampoodle*
- ☒ Loss Rate computations N:\27000s\27093\Geohms\Swampoodle
- ☒ Time of Concentration / Lag Time computations I:\27000s\27093\Admin\Documents\Excel

TECHNICAL REVIEW:

Total Drainage Area: 4.426
- Total No. of Subbasins: 23
- Min DA sq. mi.: 0.018
- Max DA sq. mi.: 0.544

Basin Models: Unit Hydrograph Method: SCS UH

- Computation Interval: 2 min
- Peaking Factor: N/A
- Min Tc / Lag: 11/6
- Max Tc / Lag: 51/31

Loss Rate Method: SCS Curve Number- Raw soil CN used with percent impervious per Landuse
- Min CN: 63
- Max CN: 74
- Min Initial Loss: default equation %impervious = 20%-75%
- Max Initial Loss: default equation
- Min Uniform Loss: N/A
- Max Uniform Loss: N/A

Rainfall Source: Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas, USGS Scientific Investigation Report 2004-5041, Asquith 2004

Rainfall Distribution: Triangular.

REVIEW COMMENTS:

1. For Tc, I changed 2-hour, 24 hour rainfall to match our new weighted average value (from 3.75 to 3.84). This does not change the nearest minute tc value utilized. No action necessary. ACTUALLY, IT CHANGED SPC1 FROM 22 MIN. TO 21 MIN. I changed it in model. You were going to have to rerun Q's anyway because of rain. Only action is to rerun model.
2. The rainfall has changed since you did this model. Use the new rainfall and run the model.
3. Ultimate Land Use – see my markups. Did you deliberately get rid of all the pavement, water, residential, and multi-family for SPC3? (and if you did, is it the correct thing to do – Ultimate %imp is less than existing %imp.
4. SPC14 ultimate %imp doesn't match GIS.
5. Did you deliberately decrease the shallow concentrated flow path from existing to ultimate for SPC13.
6. SPC5 – overland actually had higher velocity than shallow concentrated and now future has higher tc than existing. We should either not move it for future so that they're both 6fps or I'm considering changing all these to match Joe Pool where you have 50' for pavement and 100' for grass regardless if existing or future. This comment probably goes away with your new tc.

RESPONSE TO COMMENTS:

1. OK, thanks.
2. Rainfall updated.
3. No, I did not deliberately get rid of the existing LU classes. The only time I would add to the future land use was when there was no zoning for part of the watershed that was outside the city limits or state boundary. However, I think when the Texarkana future land use shapefile is zoned as open we should include all existing LU classes that are not open or brush to avoid basins with ultimate %imp less than existing %imp. I included existing LU areas for SPC3 and parts of SPWC1 where the future land use was zoned as open.
4. SPC14 Ultimate %imp corrected.
5. No, this has been corrected.
6. New tc corrected this problem. SAR

Approved chm 3-25-11

III. FLOOD ROUTING:

Reviewer's Initials: chm Date: ____

Modeler's Initials: sar Date: ____

Data files received:

☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc.
N:\27000s\27093\GeoHMS\XXXXX.mxd
☐ Description of modeler's assumptions, notes, and special issues. ____
☐ Data sources, hydraulic models, computations, record plans, etc. ____

Routing Method(s):
Channel/Floodplain Storage: Modified Puls
Detention Routing:Modified Puls

Review Comments:

1. I checked xsec station in DSS path. All good. No action necessary.
2. You do need to double check that the final multiple profile geometry is used for routing and reexport the DSS file (for swamp east, bring in the geometry that is shared). (Keep the old routing geometry temporarily. See how with swamp main, 14000 upstream was actually a lot smoother before. Same with the shared part of east.)
3. You might need to truncate the West Swampoodle routing model at the basin break so that you don't account for the volume upstream of the basin break (DSS) This would affect routing step length too.
4. Detention Pond 1 – for the flows above weir, did you add in the culvert flow too? Did you use tailwater? I think I recommend adding a xsec at downstream and upstream of outlet in RAS so you can have a better rating. (that road just ds of there doesn't have a culvert and water just spills over road, correct?)
5. Detention Pond 2 – you could probably put this weir in the RAS routing model too to test your weir equations with backwater.
6. Q breaks look good for main stem. I would change the break at 4812 to 4717 so that the bridge has the same q at us and ds face (I actually like for all 4 bridge xsec to have same q, but doesn't really make sense in this case). **I might change the one at 14208 to 14117. Just leave it since it's the diversion, but keep this in mind if this bridge is giving you a lot of grief later.**
7. Qbreaks for Swamp East look good. If wsel are too high, we could use the ds discharge for fewer xsec. It's a bit conservative as is.
8. For Div. 1 – seems like Swamp West may have changed quite a bit since then. I'm not getting anywhere near those wsel's. (I REALIZE NOW PART OF IT IS BECAUSE HE USED THE RATING Q'S WHICH GIVES A DIFFERENT ANSWER THAN IF USE MULTIPLE PROFILE Q'S. I THINK IT'S FINE SINCE REALLY JUST DOING A NORMAL DEPTH.)
9. For Div. 1 – this may not be necessary, but the Initial q's have changed by about 30 cfs and not necessarily a consistent change between Main and West. May want to consider updating that part too.
10. Diversion 3 – I couldn't find RAS model with lateral wier.

Response to Comments:

1. Ok.
2. Routing updated with final multiple profile geometry.
3. SwampWest routing model truncated at basin break by using xsec 1003 as the upstream section used to calculate volumes. Routing step updated.
4. I updated the rating to include the culvert flows for flows over weir. I did not use tailwater. Ultimately decided on using RAS to rate Pond 1 and Pond 2 since RAS considers backwater. HMS model updated with RAS rating.
5. Pond 2 rated using RAS. HMS model updated with RAS rating.
6. Q-break at 4812 changed to 4717.
7. Ok.
8. WSEL updated for West and Main to establish updated DIV1 rating. DIV1 rating updated in HMS model.
9. Initial q's updated.
10. RAS model is located at:
I:\27000s\27093\HEC_RAS_v4.1\Swampoodle\Rating
Unsteady plan name: SPCWC_DIV3_Rating
Approved chm 3-31-11

IV. FINAL MODEL:

Reviewer's Initials: chm Date:

Modeler's Initials: sar Date:

Data files received:

- ☐ Calibration
- ☒ Frequency Analysis
- ☒ Table of Discharges
- ☒ Comparison of Discharges

Calibration Procedures/Results:

———

Frequency Analysis Procedures/Results:

———

Discharge differences greater than 10% of current FIS:

Different lccations, assumptions etc.

Review Comments:

1.

Response to Comments:

1.

QA/QC APPROVAL:

Hydrologic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____ Date: _____

Task Leader:_____ Date: _____

Project Manager: _____ Date: _____

Principal in Charge: _____ Date: _____

Hydrology QA/QC Checklist

Watershed Name: Wagner Creek

Modeler's Name: Scott Rushing

Model Name: _____

Reviewer's Name: Cindy Mosier

WATERSHED DELINEATION:

Reviewer's Initials: chm Date: December 21, 2010

Modeler's Initials: SAR Date: December 17, 2010

DATA FILES RECEIVED:

- ☒ ArcMap project file (watershed boundaries (name and area), study stream centerlines, topographic data, images, and etc.
  N:\27000s\27093\Geohms\Wagner\Wagner_Watershed_Working.mxd
- ☐ Description of modeler's assumptions, notes, and special issues.
  _____

TECHNICAL REVIEW:

- ☒ DA breaks at headwater limits of detailed hydraulic study.
- ☒ DA breaks at pertinent locations such as confluences, detention facilities, major highways, gages, etc.
- ☒ DA breaks at location common to current effective if applicable and feasible.
- ☒ Compare DA to previous studies *Comprehensive Drainage Report, Hennigson, Durham, and Richardson. July 1976*
- ☒ Is DA size reasonable for type of study?
- ☒ Do DA boundaries agree with available contours and images?

REVIEW COMMENTS:

Modeler's comments:

1. Note: In general I tried to keep the basins between 0.1 and 0.5 sqmi. to keep the smallest to largest basin ratio around 5:1.
2. Bookmark1: Not quite sure how basin ID 182 outlets to Wagner. It appears there could be a culvert under Robinson that outlets on the downstream end of US Hwy 67.
3. Bookmark2: The FIS has a break at South Wagner and at Lake Drive (State Hwy 93) however, due to what appears to be an overflow channel just to the west that would need a separate flow path, there would be a very small DA between South Wagner and Lake Drive that I highlighted in yellow. I think we keep the break at South Wagner and drop the break at Lake Drive since the increase in discharge would be minimal between the two. What do you think?
4. Bookmark3: Does this area drain to Cowhorn? See Field Visit shapefile ID #27.

Reviewer's comments:

1. Wagner and WC-2 delineations overlap. Coordinate and pick one.
2. QC-1 - should we get the plans/survey and model this detention pond? (BKMs in QAQC2 mxd). (Probably not, it's cutside city limits and not much DA to it.)
3. QC-2 - I bet this looks a lot more like effective. We should check during field visit. We should check for culvert here or somewhere across road.
4. QC-3 - I bet this culvert cuts across into basin OID148 more like effective shows. We should check during field vist for outlet.
5. QC-4 - in same area, does this part go across road? Look for culvert
6. QC-5 - looks like water goes under underpass and joins basin to left like effective basin shows.
7. Next time, please draw the culverts in the structures shapefile at the questionable roads etc. so that I'll know immediately that you checked it out. I added several culverts so we won't check those areas again.
8. QC6 - I would think since that one little area crosses under railroad through culvert that the area to east does too. Possible field visit to see where culvert outlets.
9. QC7 - You and I may have talked about this one. I know I usually like the break at the ds road if 2 roads too close together, but in this case, I'd rather have the break at the RR since it's probably backing up more water and is across the whole basin where the other road does not appear to be a major road.
10. QC-8 if do or don't do QC7, this needs cleaned up either way.

RESPONSE TO COMMENTS:

Response to Modeler's comments:
1. Let's merge several of those to be closer to current effective. Keep around .5 to 1 sm for most part.
2. I'm guessing this got resolved when merged. If not, let me know if you still have question.
3. I like it like you have it.
4. I agree with how you fixed it.

Response to Reviewer's comments:
1. Delineations now match.
2. I agree it should not be modeled based on your comments above. The pond also appears to be another recreational/stock pond that does not function as detention.
3. From field inspection, there was no culvert across US Hwy 82 in this location. Basin delineation was not adjusted.
4. From field inspection, there is a culvert that cuts across US Hwy 82 carrying water to basin WC18. Basins in this area were delineated more like the effective basins.
5. From field inspection, there is a culvert that carries water across road. Basin delineation not adjusted.
6. I agree. Basin adjusted to reflect effective delineation.
7. Will do, thanks.
8. No culvert was found at this location during field visit. Curb inlets appear to take water north along State Hwy 93 before draining west.
9. I agree. Basin adjusted to have break at RR.
10. Basin adjusted.

ADDITIONAL REVIEW COMMENTS:

1. Bookmark Basin Edit1: I edited the basin boundary along Volga. There are two roadside ditches along either side of Volga in this area that appear to remain separate; one drains north one drains south. I also added a divide at Thames using the TXK terrain and added some additional DA to Basin WC6. - OK CHM.
2. Bookmark Basin Edit2: Regarding Basins WC22 & WC23, the current effective HEC2 basin delineation indicates water draining south of Westlawn through development. However, Kyle Dooley explained over the phone with Ben P. that water enters the stormdrain system on Westlawn and heads west along Weslawn to the intersection with Piney before draining south. 01/24/2011 Basin divide was delineated along Westlawn to divide WC22 & WC23. - agree CHM
3. Bookmark Basin Edit3: Two culverts were identified in the field to drain water north under RR in this area. OK CHM.
4. Bookmark Basin Edit4: Field Visit confirmed culvert drains water north under US Hwy 82. Basin divide between WC24 & WC25 adjusted. OK. CHM.
5. Bookmark Basin Edit5: Basin divide between WC14 & WC16 at I30 used Drainage Area Maps provided by TxDOT (I30_DA_pg4 & I30_DA_pg5 in the QAQC2 mxd). I DON'T THINK YOU CAN BREAK THIS ONE LIKE THIS. EITHER NEED TO MERGE WC16 AND 17 OR ADD ANOTHER BASIN or just move break to downstream of confluece at Walton. DONE. OK. CHM.

Basins approved chm 1-31-11

II. "SKELETON" MODEL:

Reviewer's Initials: alw Date: 4/1/1

Modeler's Initials: SAR Date: 2/28/11

DATA FILES RECEIVED:

- ☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc. *N:\27000s\27093\Geohms\Wagner\Wagner_Watershed_Working.mxd*
- ☐ Description of modeler's assumptions, data sources. ____
- ☒ HMS model paths *I:\27000s\27093\HEC_HMS_v3.5\Wagner\Wagner_HMS*
- ☒ Loss Rate computations *I:\27000s\27093\Admin\Documents\Excel*
- ☒ Time of Concentration / Lag Time computations *I:\27000s\27093\Admin\Documents\Excel*

TECHNICAL REVIEW:

Total Drainage Area: 20.57 sq. mil
Total No. of Subbasins: 56
Min DA sq. mi.: 0.03
Max DA sq. mi.: 1.15

Basin Models: Unit Hydrograph Method: SCS UH

Computation Interval: 2 min

Peaking Factor:	N/A
Min Tc / Lag:	6.6 min
Max Tc / Lag:	70 min
Loss Rate Method:	SCS Curve Number- Raw soil CN used with percent impervious per Landuse
Min CN:	62
Max CN:	76
Min Initial Loss:	default equation
Max Initial Loss:	default equation
Min Uniform Loss:	N/A
Max Uniform Loss:	N/A
Rainfall Source:	Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas, USGS Scientific Investigation Report 2004-5041, Asquith 2004
Rainfall Distribution:	Triangular.

REVIEW COMMENTS:

1. Modeler Comment 1: The Q from Stream WC-1 was combined with Wagner upstream of I-30 frontage and then modeled as a multiple opening analysis in RAS.
2. Modeler Comment 2: Cowhorn Q and WC26 Q were combined at XS 10041 since this is the only section between Cowhorn and WC26 outlet. The additional Q from WC26 is minimal in comparison since it is a smaller basin.

Review Comments
1. Check the channel velocity for B_WC10 in the time of concentration calculations. The velocity seems to be slow. Check with you new geometry in the HEC-RAS model.
2. Check the channel velocities for B_WC11. They are also slow.
3. Check the channel velocity for B_WC6. The velocity seems slow for street flow.
4. The CNs are different for several basins between the ultimate and existing conditions. Double check the Ultimate CNs.

RESPONSE TO COMMENTS:

1. Channel velocity increased to 2.95 fps to match average 2yr channel velocities in this reach.
2. Channel velocity increased to 2.16 fps to match channel velocity for downstream basin WC12.
3. Channel velocity increased to 6 fps for street flow.
4. All differences were for the Cowhorn basins. Different CN were assigned to open areas based on ground cover density for Cowhorn study.

III. FLOOD ROUTING:

Reviewer's Initials: 4/1/1 Date: ____

Modeler's Initials: SAR Date: February 28, 2011

Data files received:

☒ ArcMap project file with Land Use, Soils, Drainage Paths, etc.
N:\27000s\27093\Geohms\Wagner\Wagner_Watershed_Working.mxd
☐ Description of modeler's assumptions, notes, and special issues. ____
☐ Data sources, hydraulic models, computations, record plans, etc. ____

Routing Method(s):
Channel/Floodplain Storage: Modified Puls
Detention Routing:Modified Puls

Review Comments:

Moceler Comment 1: We seem to be losing quite a bit of discharge due to storage in some areas. This might actually be what is happening but worth looking into.

Rev ewer Comments:

1. S:orage areas look okay.

2. All WC routing reaches need routing steps computed and put in the existing and ultimate models

Response to Comments:

____

IV. FINAL MODEL:

Reviewer's Initials: chm Date:

Modeler's Initials: sar Date:

Data files received:

- ☐ Calibration
- ☒ Frequency Analysis
- ☒ Table of Discharges
- ☒ Comparison of Discharges

Calibration Procedures/Results:

—

Frequency Analysis Procedures/Results:

—

Discharge differences greater than 10% of current FIS:

—

Review Comments:

1.

Response to Comments:

1.

QA/QC APPROVAL:

Hydrologic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____ Date: _____

Task Leader:_____ Date: _____

Project Manager: _____ Date: _____

Principal in Charge: _____ Date: _____

Hydraulics QA/QC Checklist

Hydraulics QA/QC Checklist

Stream Name: Clear Creek

Modeler's Name: Scott Rushing/Will Wiegand

Model Name: Clear Creek

Reviewer's Name: Cindy Mosier

I. CROSS SECTION LAYOUT:

Reviewer's Initials: chm Date: January 19, 2011

Modeler's Initials: waw Date: January 10, 2011

SUBMITTED ITEMS:

ArcMap project file name: Clear Creek GeoRAS.mxd

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Q3 or Current Floodplains
- ☒ Watershed Location
- ☒ Any previous study workmaps _____
- ☒ Road network for names

TECHNICAL REVIEW:

- ☒ Cross Sections Extend to Assumed Limits of Floodplains
- ☒ Reasonably perpendicular to flow
- ☒ Reasonable location of the 4 bridge cross section
- ☒ Reasonable spacing
- ☒ Reasonable transitions, constrictions and expansion on floodplain

REVIEW COMMENTS:

1. CINDY: I think we could import the HEC-2 ds of our first xsec or start with known wsel of 305 (move our first xsec to where theirs is). Let's import for now since going to try extending hydrology.
2) Will - still looking for stillwater elevation +/- 305, not in FIS, drew mapping XS across Bringle Lake,
also extended XS to limits of pond upstream of Skyline to re-map elevation based on City topo
3. I moved xs 531 to 25' us of BFE 305 and 725' ds of CC-6. That is really close to where HEC-2 effective xsec 15100 is.
4. I made several changes. Compare preqc to final.

**********March 7, 2011, WAW**********
Current effective XS 4400 - XS 8300 are the downstream geometry - reach lengths from XS 8300 to 1st Halff XS 15412 are measured along GEORAS flowpaths

RESPONSE TO COMMENTS:

1. Yes, let's import.
2. The 305 on the FIRM, in the model, and on the profile. OK, to Bringle Lake xsec, but we will import from HEC2.
3. OK.
4. OK.

approved chm 1-19-11

II. RAS GEOMETRY:

Reviewer's Initials: chm Date: April 12, 2011

Modeler's Initials: waw Date: April 10, 2011

SUBMITTED ITEMS:

ArcMap project file name: _____

- ☒ ArcMap project has all files listed in Milestone I
- ☒ Stream Centerline Texarkana_Streams.shp
- ☒ Flowpaths
- ☒ Field Surveys sketches, photos, and points file
- ☒ Bridge Record Plans _____
- ☒ Stationing assumptions and calculations for field surveys _____
- ☒ Manning's n-values assumptions

TECHNICAL REVIEW:

- ☒ Top of bank at reasonable locations
- ☒ Bridge Geometry Corresponds to Surveys or Record Plans
- ☒ Bridge Geometry assumptions documented
- ☒ Contraction and expansion coefficients
- ☒ Proper use of Ineffective flow areas
- ☒ Reasonable Manning's n-values
- ☐ No Crossing profiles

REVIEW COMMENTS:

1. Don't forget to raise your n value where that pipe at BR-01 is since you decided not to model it.
2. Add a description to HEC-RAS with (name, date, location,avo, general comments/notes)
3. Round XS stations to a whole number.
4. I could not find your Q breaks table that shows which hydrologic element was assigned to which cross-section. Please add to the discharge spreadsheet.
5. Double check boundary conditions. It looks like there is just one starting water surface elevation and everything else is normal depth.
6. Add descriptions to cross sections where survey data was added to the cross sections
7. Bank station elevations on XS 24567 downstream to 26381 need to be adjusted. (see profile view). Bank stations change 5 ft in a pond. Set bank station in the pond near the top of the wier controlling the lake (329.2 ft)
8. Flow is not contained in XS 22921.43, 22918.92
9. Adjust bank stations or n values on XS 22849, 21252.07, 16532.07, 15761.54. Looks like bank station was moved and the n-value was not.
10. Did you use the n-value shapefile? It does not seem to match the RAS.
11. Double check reach lengths fro XS 15761.54, 16532.07, 19506.87
12. Do you need contraction and expansion coefficients on culvert at 24505.56?
13. Make sure bank station width is consistent. See hydraulics QAQC spreadsheet. There are some large jumps in bank station widths.
14. Culvert at XS 22867 - double check culvert spacing. The spacing is not consistent.
15. Culvert at XS 24505 - Check culvert spacing on the DS section.
16. HEC-2 dam does not make sense in the model. I talked to Cindy and she thinks that we should remove the HEC-2 sections and used a starting WSEL at your first cross-section.
17. Inline structure - Why is the weir jagged. When I look at the survey I only see 2 shots.
18. I don't understand your ineffective areas. Add a note to the cross sections about ineffective areas being houses. Add ineffective areas to the pond flowing into the wier. Ineffectives in pond do not seem to be consistent.
19.

RESPONSE TO COMMENTS:

1. revised - .065 "n" in channel on XS upstream of pipe obstruction on aerial accounts for blockage
2) done
3) done - XS numbers rounded
4) Q breaks showing HMS element and XS in RAS is in discharge comparison tab
5) there was no starting wsel for other frequencies, we had 100 yr wsel from HEC-2 model
7) agreed - done
10) did not used "n" value shapefile
12) yes - done 0.3 and 0.5 added
13) channel bank widths vary from cross sections
14) done - revised culvert spacing
15) done - revised culvert spacing
16) ok removed HEC-2 XS
17) survey points varied by 0.1', revised to be 327.2 across weir
18) need to import GEORAS ineffectives, some notes were there

III. HEC-RAS MODEL REVIEW:

Reviewer's Initials: chm Date: April 12, 2011

Modeler's Initials: waw Date: April 10, 2011

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☐ Discharge Points Locations
- ☒ N-values shape file
- ☒ Any previous study workmaps Several CE XS files
- ☒ Road network for names

Descript on of modeler's assumptions, notes, or special situations.

- ☐ Check RAS output
- ☒ N-value table
- ☒ Any record plans needed
- ☒ Descriptions of assumptions
- ☐ Any special situation

TECHNICAL REVIEW:

- ☒ Discharge Locations and Values
- ☒ Starting boundary conditions
- ☒ Cross Section Geometry-needs to extend to limits of floodplain
- ☒ Manning's n values
- ☒ Contraction and expansion Coefficients
- ☒ Bridge/Culverts
- ☒ Ineffective flow-Top widths
- ☒ Special Features (weirs, overflow, split)
- ☒ Profiles
- ☒ Errors, Warning and Special Notes
- ☐ Check-RAS

REVIEW COMMENTS:

1.

RESPONSE TO COMMENTS:

1.

IV. FLOODWAY MODEL:

Reviewer's Initials: chm Date: April 12, 2011

Modeler's Initials: waw Date: April 10, 2011

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☐ N-values shape file
- ☒ Any previous study workmaps
- ☒ Road network for names
- ☒ Floodway Points
- ☒ Floodway Lines

TECHNICAL REVIEW:

- ☒ Discharge consistent with multiple profile plan
- ☒ Surcharges between 0 and max allowed
- ☒ Check starting boundary conditions with friction slope
- ☒ Negative surcharges

REVIEW COMMENTS:

1. Encroachment at 22725 is inside bank. Bank may be too high.
2. I'm curious why ya'll didn't add floodway to upstream face of Skyline. Would at least one more section have made a little more sense? (All of that bridge was AE on old FIRM.) Also, I know you told me about Ben's decision, but would it make more sense to continue the floodway and just have it be at edge of floodplain? (we did add floodway to the previous Zone A Corral Creek.)
3 The 500-year needs cleaned up for that trib up of 22133. If that is AE, then the 500 year needs exteneded. If A, the 500-year needs cut at LDS. Ultimate probably needs cleaned too.
4. Needs LDS at most us xsec with Zone A.
5. CC-1 to CC-6 need tied for LOMR submittal (AE with bfe). (Our centerline probably needs fixed too - see cc-6 [or clean their fp].) You will have to clean those 305 bfes in lake.
6. Add 312 bfe at 18947 to duplicate profile. 311 probably not necessary. 313 probably not necessary. Add 324 at 22725. Can delete 323. Add a 331 at 24418 (the 332 is stil necessary). Add a 336 just upstream of bridge but below LDS.

RESPONSE TO COMMENTS:

1. Bank lowered for 22725.
2. Floodway extended to downstream bridge xsec for Skyline. Scope for Clear Creek only to Skyline.
3. Trib mapped as Zone A. 500-year cut at LDS. 100-year ult. cut at LDS.
4. LDS/Zone A added at upstream Xsec.
5. Will complete for LOMR submittal.
6. BFEs adjusted per comments.

Approved chm 1-17-11 except #5 to be cleaned during LOMR.

QA/QC APPROVAL:

Hydraulic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____Date: _____

Task Leader:_____Date: _____

Project Manager: _____Date: _____

Principal in Charge: _____Date: _____

Hydraulics QA/QC Checklist

Stream Name: Corral Creek

Modeler's Name: Scott Rushing

Model Name: Corral Creek

Reviewer's Name: Cindy Mosier

I. CROSS SECTION LAYOUT:

Reviewer's Initials: chm Date: August 30, 2011

Modeler's Initials: sar Date: August 15, 2011

SUBMITTED ITEMS:

ArcMap project file name: N:\27000s\27093\GeoRAS\Corral_Creek\Corral_Creek_G

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Q3 or Current Floodplains
- ☒ Watershed Location
- ☒ Any previous study workmaps _____
- ☒ Road network for names

TECHNICAL REVIEW:

- ☒ Cross Sections Extend to Assumed Limits of Floodplains
- ☒ Reasonably perpendicular to flow
- ☒ Reasonable location of the 4 bridge cross section
- ☒ Reasonable spacing
- ☒ Reasonable transitions, constrictions and expansion on floodplain

REVIEW COMMENTS:

1. Approved chm

RESPONSE TO COMMENTS:

1.

II. RAS GEOMETRY:

Reviewer's Initials: chm Date: August 30, 2011

Modeler's Initials: sar Date: August 15, 2011

SUBMITTED ITEMS:

ArcMap project file name: N:\27000s\27093\GeoRAS\Corral_Creek\Corral_Creek_G

- ☒ ArcMap project has all files listed in Milestone I
- ☒ Stream Centerline Texarkana_Streams.shp
- ☒ Flowpaths
- ☒ Field Surveys sketches, photos, and points file
- ☒ Bridge Record Plans _____
- ☒ Stationing assumptions and calculations for field surveys _____
- ☒ Manning's n-values assumptions

TECHNICAL REVIEW:

- ☒ Top of bank at reasonable locations
- ☒ Bridge Geometry Corresponds to Surveys or Record Plans
- ☒ Bridge Geometry assumptions documented
- ☒ Contraction and expansion coefficients
- ☒ Proper use of Ineffective flow areas
- ☒ Reasonable Manning's n-values
- ☒ No Crossing profiles

REVIEW COMMENTS:

1. When you are incorporating survey from a channel that was taken a decent distance from the section (or even when you are choosing to ignore too survey outside channel area), I would blend better. I changed the blending for xsec 1422, 5817, 6933, 7459, . No actio required.
2. Note, 8812 uses the survey from ds bridge and xs07 in overbanks since we believe there is a topo bust from 8812 to 8934. No action required (OTHER THAN CLEANING MAPPING BY HAND IN THIS AREA).
3. Please explain the drop in channel banks from 280 at xsec 4632 to 275 at xsec 4753. Adjust if a mistake. Maybe the xsec needs more of a channel input. (THERE IS ALSO A TOPO BUST FROM 4391-4753 WHERE THE MAPPING NEEDS CLEANED BY HAND)
4. Consider adding stat/elev points for 6450 so that you can have channel banks more reasonable with us and ds sections.
5. Why doesn't culvert 2 have contraction/exansion coefficients of 0.3/0.5?
6. I think .005 for normal depth slope would be more appropriate.
7. The ineffectives limits don't appear consistent per frequency at bridges.
8. Please update routing one last time.

RESPONSE TO COMMENTS:

1. OK
2. OK
3. Xsec needed more of a channel input. Channel adjusted per COR XS-03 channel survey.
4. Stat/elev points added to make channel banks more reasonable for Xsec 6450.
5. I had to recut some of the sections in this area since they were no longer containing the 100yr discharge and I forgot to change the contraction/expansion coefficients back to 0.3/0.5. Coeffients now revised to 0.3/0.5.
6. Normal depth slope changed to 0.005 for all flow files.
7. Ineffectives revised to be consistent per frequency at bridges.
8. Routing updated one last time.

Approved chm. (BUT SEE AREAS FOR HAND EDITING OF MAPPING)

III. HEC-RAS MODEL REVIEW:

Reviewer's Initials: chm Date: August 30, 2011

Modeler's Initials: sar Date: August 15, 2011

SUBMITTED ITEMS:

Name of RAS Project: Corral Creek

Name of RAS Plan: Corral Creek Existing

ArcMap project file name: N:\27000s\27093\GeoRAS\Corral_Creek\Corral_Creek_G

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☐ Discharge Points Locations
- ☒ N-values shape file
- ☒ Any previous study workmaps Several CE XS files
- ☒ Road network for names

Description of modeler's assumptions, notes, or special situations.

- ☐ Check RAS output
- ☒ N-value table
- ☒ Any record plans needed
- ☒ Descriptions of assumptions
- ☐ Any special situation

TECHNICAL REVIEW:

- ☒ Discharge Locations and Values
- ☒ Starting boundary conditions
- ☒ Cross Section Geometry-needs to extend to limits of floodplain
- ☒ Manning's n values
- ☒ Contraction and expansion Coefficients
- ☒ Bridge/Culverts
- ☒ Ineffective flow-Top widths
- ☒ Special Features (weirs, overflow, split)
- ☒ Profiles
- ☒ Errors, Warning and Special Notes
- ☐ Check-RAS

REVIEW COMMENTS:

1. Modeler Comment1: Corral peaks before Howard at the confluence enough to use normal depth. See Known WSEL calcs for Corral at:I:\27000s\27093\Admin\Documents\Excel\Boundary_Conditions.xls

RESPONSE TO COMMENTS:

1. Good.
2. approved chm.

IV. FLOODWAY MODEL:

Reviewer's Initials: chm Date: August 30, 2011

Modeler's Initials: sar Date: August 15, 2011

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☐ N-values shape file
- ☒ Any previous study workmaps
- ☒ Road network for names
- ☒ Floodway Points
- ☒ Floodway Lines

TECHNICAL REVIEW:

- ☒ Discharge consistent with multiple profile plan
- ☒ Surcharges between 0 and max allowed
- ☒ Check starting boundary conditions with friction slope
- ☒ Negative surcharges

REVIEW COMMENTS:

1. The MP run was slope. You started the 100-year natural with only 2 decimals so some of the wsel weren't matching from MP to FW run. I changed FW natureal to slope.
2. Floodplains need cut at upstream sections with Zone A.
3. I pulled 8112 left encroachment in to bank to be consistent top width with surrounding xsec. I also pulled in both encroachments for 9795 and 9909 to be consistent topwidth. Unless you had a reason, Fix Mapping.
4. When you cut mapping at contained culverts I would cut them at the actual face of the culvert and just cut a straight line.
5. What is the mapping plan right bank where 9795 spills? Adding a Limit of Study to map? (Also, we were aware the existing floodplain was so much bigger in this area, correct?)
6. Adjust floodplain to avoid house left at 7784.
7. Check out the terrain, I bet you could avoid some of those houses near 6933.
8. Add a 271 bfe just upstream of 1152. The bfe just upstream of long culvert should be 284 not 283 (the second 284 is still correct).
9. Make sure we label the centerline that's not within the floodplain across long culvert properly so know it's the baseline and the floodplain is overflow. I am ok with the decision to truncate the floodway and sort of treat it like a contained culvert separate from the wier flow mapping. But, for the bridge at 7888, it looks like there is definely flooding to left of centerline for 500-year and probably some for 100-year. i would consider connecting floodway through on this one to represent floodway model better and extending 500-year mapping.

RESPONSE TO COMMENTS:

1. OK, thanks.
2. Floodplains cut at upstream section.
3. Agree, mapping adjusted.
4. OK, adjusted mapping at upstream Loop 151.
5. The plan was to add a Limit to Study to map as you mentioned. We were aware the existing floodplain was much bigger in this area but always believed the existing mapping was very inaccurate based on our contours.
6. Floodplain adjusted to avoid house in LOB for 7784.
7. Based on terrain I was able to avoid a couple of the houses near 6933.
8. BFEs adjusted per comments.
9. OK. Mapping adjusted for bridge upstream of 7888 to flood left of centerline and floodway connected through bridge.

APPROVED chm 1-19-12.

QA/QC APPROVAL:

Hydraulic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____Date: _____

Task Leader:_____Date: _____

Project Manager: _____Date: _____

Principal in Charge: _____Date: _____

Hydraulics QA/QC Checklist

Stream Name: Cowhorn Creek, Cowhorn Creek East, Cowhorn West

Modeler's Name: Ben Pylant

Model Name: Cowhorn.prj

Reviewer's Name: Cindy Mosier

I. CROSS SECTION LAYOUT:

Reviewer's Initials: cm Date: 12-15-8

Modeler's Initials: bp Date: December 5, 2008

SUBMITTED ITEMS

ArcMap project file name: Cowhorn_GeoRas.mxd

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Q3 or Current Floodplains
- ☒ Watershed Location
- ☒ Any previous study workmaps Cowhorn_CE_XS, CowhornWest_CE_XS
- ☒ Road network for names

TECHNICAL REVIEW:

- ☒ Cross Sections Extend to Assumed Limits of Floodplains
- ☒ Reasonably perpendicular to flow
- ☒ Reasonable location of the 4 bridge cross section
- ☒ Reasonable spacing
- ☒ Reasonable transitions, constrictions and expansion on floodplain

REVIEW COMMENTS:

1. The surveyors reported there was no sign of ever being a bridge at survey location Cow-BR5. bp
2. Ben – Field visit may be needed to understand the hydraulic interaction of the 2 most downstream bridges on Cowhorn Creek. bp
3. BKM 1 - I guess ya'll think 244-275 on East is a road. Is it surveyed or did we have the bridge data already? I'm not crazy about these sections.
4. BKM 2 – what is all this? Is this correct? Particulary the DS xsec of Br 3 and expansion xsec for Br 2.
5. BKM 3 – I'm not sure what's going on here, but I added a xsec. Maybe it can't have one.
6. BKM 4 – is this a road? Do we know why current effective wanted 3 xsec here?
7. See the file chm_Suggestions_xslayout for additional comments.

RESPONSE TO COMMENTS:

1. The new ortho shows a road up to the creek, but not across the creek.
2. Ok
3. New Ortho shows a road at this location. Surveyors took shots. XS adjusted slightly.
4. Adjustments made
5. Looks good. We may just have to add some ineffectives in the model for this area.
6. No reason was found for the high number of CE XS. I left ours as is.
7. Suggestions incorporated.

II. RAS GEOMETRY:

Reviewer's Initials: chm Date: March 3, 2009

Modeler's Initials: bp Date: February 6 2009

SUBMITTED ITEMS:

ArcMap project file name: Cowhorn_GeoRas_v4.mxd

- ☒ ArcMap project has all files listed in Milestone I
- ☒ Stream Centerline CL_Cowhorn_GeoRas
- ☒ Flowpaths
- ☒ Field Surveys sketches, photos, and points file
- ☒ Bridge Record Plans N/A . We did receive plans for the Cowhorn West Tributary Culvert
- ☒ Stationing assumptions and calculations for field surveys _____
- ☒ Manning's n-values assumptions

TECHNICAL REVIEW:

- ☒ Top of bank at reasonable locations
- ☒ Bridge Geometry Corresponds to Surveys or Record Plans
- ☒ Bridge Geometry assumptions documented
- ☒ Contraction and expansion coefficients
- ☒ Proper use of Ineffective flow areas
- ☒ Reasonable Manning's n-values
- ☐ No Crossing profiles

REVIEW COMMENTS:

1. Why didn't we model all the xsec for Cow East?
2. Do we want the culvert as a rating or as a known wsel inside flow editor?
3. Do we want to do the combined model backwater version? Do they hit about same time?
4. Shouldn't xsec 3187 match your combined xsec from XS-2 and the sections around there have a flowline interpolated?
5. Interpolate a channel/flowline for all non-surveyed sections based on surveyed sections and Lidar. (For Cow, CowWest and CowEast. It looks like you already did this for ds of CowWest.)
6. We need to be careful that mapping matches model top width for surveyed sections - not terrain when floodplain is inside surveyed part.
7. Please explain the 1.8 weir coefficent on bridge 1235.
8. You don't have to put in exact bottom and top of wier. Put in extreme values and RAS will calculate.
9. The upstream face of 2245 RR shouldn't have a tr much past about 200' past second opening. GR is TR - xsec left rr.
10. Is Bridge 13 TR from Lidar? Consider smoothing.
11. TR for 18322 left side - get more points till ties to ground.
12. Are the abutments correct for Bridge 8?
13. Did you intend for 16514,17959, to have 0.3/0.5 contractio/expansion coefficients?
14. I don't necessarily think those downstream xsec need ineffective.
15. 4803 right side should be ineffective.
16. I don't think 18931 and upstream needs to be ineffective if you use the combined Q instead. See floodplain. You will still transition from upper section with some ineffective.
17. Let's check out 6465 after revision - get rid of drawdown - check for all. 109000 to 111000 drawdown.
18. I think 6655 smoothes out with pressure/weir.
19. Bridge 2650 CowWest - looks like TR came from Lidar. Please use survey points provided and consider smoothing Lidar points.
20. CowWest-label 2415 as DS face of bridge and consider 0.3/0.5 expansion/contraction coefficients.
21. CowWest - please check all reach lengths for section 1243.
22. Uhoh - if you used those Cowhorn at East Peak and Cowhorn at West Peak, I think this concept got confused. Let's talk!
23. CWest- can you label 1279 and 2392 as DS and US face of culvert?
24. Why does your CowWest floodplain go beyond last xsec?
25. The floodplain should be conneted thru 30 for the 500 year on CowWest (unless wsel changes with new Q's).
26. Could you extend 2853,3001,3039 CW if 500 still spills with new wsel.
27. CW - I'm not seeing the wsel that was hardwired to RAS for 2392 in the StormCad results provided (it will need rerun anyway with the new Q's.)
28. CE - can you check to make sure if the surveys need interpolated into Lidar sections for any of these.
29. 2263 TR needs extended on left. 23530TR extended on right. 467 left.
30. CE- should 2063 and 2427 have 0.3/0.5 contr. expansion.

RESPONSE TO COMMENTS:

1. XSec no longer contained the floodplain upstream of a certain point. It made modeling very difficult. The DA area was not very large for the upstream part of the channel.
2. I don't know of a way to add the known wsel in flow editor for specific xs besides the downstream boundary condition? I left it as a rating curve since it seems to be working fine.
3. It may be an option but the separate models seem to be working fine for now.
4. Xsec 3187 now match combined xsec from XS-2.
5. Flowlines interpolated for non-surveyed sections.
6. *******Check after running.
7. Not sure what happened. The coefficient was changed to 2.6
8. Ok
9. TR now ends approximately 200' past the second opening.
10. Bridge 13 TR smoothed using survey data.
11. TR now ties to ground.
12. Yes, it looks a little funny because a channel runs parallel to the bridge and our DS face XS is DS of this channel, which caused the opening to be larger than it actually is at the bridge. Abutments were used to reduce the area to the actually opening size.
13. Yes, the flow is still expanding in these locations.
14. It was decided to leave the DS XS as ineffective because of the road fill and other obstructions that were not modeled in XS because XS do not run parallel to the road for their entire length.
15. Addressed
16. Agreed. Combined Q was used and ineffectives were removed from that point on.
17. *******Check after running
18. It did not seem to make much difference when I tried it.
19. TR smoothed using survey data.
20. 2415 labled as DS face of bridge. 0.3/0.5 expansion/contraction coefficients used.
21. All reach lengths corrected.
22. Coincident flow will still be used, but Cowhorn mainstem elevations will be interpolated from profiles instead or rerunning the model with desired Q.
23. OK
24. Has not been hand edited yet.
25. ******Check after running. Make hand edits to 500yr fp if necessary.
26. ******Check after running.
27. Will recheck.
28. ******Check Cow East and decide if we need to interpolate FL Elevs.
29. ******Check Cow East later
30. ******Check Cow East later
31. Cow Main - BR 6 (Tucker) - I used a weir coefficienct of 2 with the Pressure modeling approach to prevent crossing profiles. Appears that energy would be more applicable, but profiles kept crossing.

III. HEC-RAS MODEL REVIEW:

Reviewer's Initials: chm Date: _____

Modeler's Initials: bbp Date: February 6, 2009

SUBMITTED ITEMS:

Name of RAS Project: Cowhorn Creek

Name of RAS Plan: Cowhorn Revised Effective

ArcMap project file name: Cowhorn GeoRas_v4

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☐ Discharge Points Locations
- ☒ N-values shape file
- ☒ Any previous study workmaps Several CE XS files
- ☒ Road network for names

Description of modeler's assumptions, notes, or special situations.

- ☐ Check RAS output
- ☒ N-value table
- ☒ Any record plans needed
- ☒ Descriptions of assumptions
- ☐ Any special situation

TECHNICAL REVIEW:

- ☒ Discharge Locations and Values
- ☒ Starting boundary conditions
- ☒ Cross Section Geometry-needs to extend to limits of floodplain
- ☒ Manning's n values
- ☒ Contraction and expansion Coefficients
- ☒ Bridge/Culverts
- ☒ Ineffective flow-Top widths
- ☒ Special Features (weirs, overflow, split)
- ☒ Profiles
- ☒ Errors, Warning and Special Notes
- ☐ Check-RAS

REVIEW COMMENTS:

1. Interesting. I started model with normal depth .007 and got practically identical starting wsel to the known from Wagner. No action necessary.
2. Did you start Cowhorn West the way you meant to - assumptions says with normal depth (which if go back to that, let's talk about chosen slope), but model has Known WSEL.
3. 5-20-9 - proposed xing at Morris. This model is very senstive. I ran some tests in the one called chmkeepfornow. Bottom line is smaller or bigger culverts hurt or no help so his sizes are correct. BUT, putting in letter that this concept sizing needs confirmed with final proposed grading and survey for design.
4. 9-1-9 - Alt Improvements
5. Reach 1 - buy out - OK, I guess you decided extensive improvements for too few houses cuz does seem like room for impovements.
6. Reach 2 - Let's do shelves above CHM rather than widening from flowline (especially since not grading, well I guess you did grade a little but still do the shelf). Can you try to do a shelf upstream of bridge to 5369 to get bfe at/below 290?

RESPONSE TO COMMENTS:

1. Ok

IV. FLOODWAY MODEL:

Reviewer's Initials: chm Date: _____

Modeler's Initials: bbp Date: _____

SUBMITTED ITEMS:

Name of RAS Project: Cowhorn Creek

Name of RAS Plan: Cowhorn RevEff Floodway, CowhornEast RevEff Floodway, CowhornWest RevEff Floodway

ArcMap project file name: Cowhorn GeoRas v4

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☐ N-values shape file
- ☒ Any previous study workmaps
- ☒ Road network for names
- ☒ Floodway Points
- ☒ Floodway Lines

TECHNICAL REVIEW:

- ☒ Discharge consistent with multiple profile plan
- ☒ Surcharges between 0 and max allowed
- ☒ Check starting boundary conditions with friction slope
- ☒ Negative surcharges

REVIEW COMMENTS:

_____

RESPONSE TO COMMENTS:

QA/QC APPROVAL:

Hydraulic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____Date: _____

Task Leader:_____Date: _____

Project Manager: _____Date: _____

Principal in Charge: _____Date: _____

Hydraulics QA/QC Checklist

Stream Name: Howard Creek

Modeler's Name: Scott R./Pam S.

Model Name: Howard_Creek

Reviewer's Name: Cindy Mosier/Ben Pylant

I. CROSS SECTION LAYOUT:

Reviewer's Initials: chm Date: January 6, 2011

Modeler's Initials: sar Date: January 6, 2011

SUBMITTED ITEMS:

ArcMap project file name: Howard_Creek_GeoRAS.mxd

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Q3 or Current Floodplains
- ☒ Watershed Location
- ☒ Any previous study workmaps _____
- ☒ Road network for names

TECHNICAL REVIEW:

- ☒ Cross Sections Extend to Assumed Limits of Floodplains
- ☒ Reasonably perpendicular to flow
- ☒ Reasonable location of the 4 bridge cross section
- ☒ Reasonable spacing
- ☒ Reasonable transitions, constrictions and expansion on floodplain

REVIEW COMMENTS:

1. When looking at hydrology, I noticed you have xsec well above study limits. I suppose those are just for routing? Make sure you stop your model at the study limits. (Also, could we have used ce for routing instead of cutting new sections? check for all streams - NO for this one. It's Zone A effective above there.)
2. BKM 1 - Since we are fairly confident that water is being pushed under the RR and that the banks of these xsec will be ineffective, I just truncated them rather than extending back across the railroad.
3. BKM 2 - SCOTT - I deleted xsec 18600. Was it needed for anything?
4. I made a few other changes to xsec. See preQC vs. final cutlines.

RESPONSE TO COMMENTS:

1. Yes the additional Xsecs are for routing. Will stop model at study limits. SAR
2. Makes sense. Thanks. SAR
3. OK. That section had no specific purpose. SAR
4. OK. SAR

approved chm 1-6-11 (CINDY: don't forget to check that other creeks used CE for routing if/when possible.)

II. RAS GEOMETRY:

Reviewer's Initials: BBP Date: April 17, 2011

Modeler's Initials: PLS Date: 3/8/11

SUBMITTED ITEMS:

ArcMap project file name: _____

- ☒ ArcMap project has all files listed in Milestone I
- ☒ Stream Centerline Texarkana_Streams.shp
- ☒ Flowpaths
- ☒ Field Surveys sketches photos, and points file
- ☐ Bridge Record Plans _____
- ☒ Stationing assumptions and calculations for field surveys _____
- ☒ Manning's n-values assumptions

TECHNICAL REVIEW:

- ☒ Top of bank at reasonable locations
- ☐ Bridge Geometry Corresponds to Surveys or Record Plans
- ☐ Bridge Geometry assumptions documented
- ☒ Contraction and expansion coefficients
- ☒ Proper use of Ineffective flow areas
- ☐ Reasonable Manning's n-values
- ☐ No Crossing profiles

REVIEW COMMENTS:

1. Howard Bridge 5 RR - Made up the 1st and Last point of the TOR. Since the WSEL will probably be below the TOR, I don't think we need to go back & survey the missing TOR.
2. BR02 - Flower Acres - Culvert 1 Flowlines are wrong on the US (5' higher than other FL) & DS(2' lower than other FL). I ended up doing an average of the other flowlines. - Surveycrs fixed - problem with data collector
3. Updated Survey with newer or fixed problems.
4. Flow not contained at XS 17497, 17515, 17571, 17663, 18084, and 19862. OK, see BMK1 comments.
5. Should we include a skewness factor at BR01?
6. 500-Yr Profile jumps from RR to Jarvis, at RR3, and at RR4... The last 2 br are outside the detailed study. - I used the highest of the momemtum, Yarnell, and energy with the ccrrect coeffiecients, and the problem was fixed. - Angela helped.
7. BKM 2 - Adjust flowpath to be outside of new centerline.
8. In general, we need to lower most channel banks. I will make adjustments. Please review to make sure you agree. - BBP
9. Use XS 15329 channel survey for XS 15094 also. Adjust Channel Bank to match survey.
10. Use XS 16350 channel survey for XS 15595 also. Adjust Channel Bank to match survey.
11. ****5/26/11 Comments start here - ineffective flow from BR 2613 were not carried upstream. Please revise this area.
12. Add ineffective at XS 7742 Sta. 180 to help transition top width.
13. Raise ineffective on right side of XS 12329 above the 2 year.
14. Place ineffective on XS 14699 at Sta 1275 to transition top width.
15. NO ACTION NEEDED - I changed Flower Acres, Lake Drive, and Findley to Energy. I changed Jarvis to pressure. Impacts were minimal.
16. NO ACTION NEEDED - I checked the Boundary Cond. Even though CE model uses known WSEL, our normal depth cond. is more conservative.
17. IGNORE THIS COMMENT - Please update your Node Descriptions to be consistent with the format that was used for Wagner.

RESPONSE TO COMMENTS:

1. Pamela's Responses
5. After talking with Ben, and looking at the floodplains, we determined that it was not necessary.
7. Fixed.
8. Updated model with lower banks & updated n-values locations to be within the channel.
9. Updated.
10. Updated.

11. ****Response to 5/26/11 Comments
12 -16 - OK
17. After discussing with Ben, Hold until a final decision has been made.

III. HEC-RAS MODEL REVIEW:

Reviewer's Initials: BBP Date: April 17, 2011

Modeler's Initials: PLS Date: April 18, 2011

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☐ Discharge Points Locations
- ☒ N-values shape file
- ☒ Any previous study workmaps Several CE XS files
- ☒ Road network for names

Descript on of modeler's assumptions, notes, or special situations.

- ☐ Check RAS output
- ☒ N-value table
- ☒ Any record plans needed
- ☒ Descriptions of assumptions
- ☐ Any special situation

TECHNICAL REVIEW:

- ☒ Discharge Locations and Values
- ☒ Starting boundary conditions
- ☒ Cross Section Geometry-needs to extend to limits of floodplain
- ☒ Manning's n values
- ☒ Contraction and expansion Coefficients
- ☒ Bridge/Culverts
- ☒ Ineffective flow-Top widths
- ☒ Special Features (weirs, overflow, split)
- ☒ Profiles
- ☒ Errors, Warning and Special Notes
- ☐ Check-RAS

REVIEW COMMENTS:

1. BKM3 - Lower n value in the left overbank for XS 11754, 11204, 10653 from 0.1 to 0.065 based on ortho.
2.
3.
4. Keep the channel n value at 0.075 between XS 14776 to 10653. This area appears pretty rough in the photos and this is more consistent with CE.
5. Was there a reason you lowered the channel n value to 0.055 between the RR and Flower Acres? I was thinking that it should be 0.06 or even 0.065 based on the survey photos. Let's discuss.
6. Copy HOW-XS07 channel survey to XS 10653.
7. Copy Flow Acres channel survey to XS 12158.
8. Copy HOW-XS08 channel survey to XS 13822
9. Where did 14538 channel geometry come from? Let's discuss but I may want you to use it for XS 14445.
10. Copy HOW-XS09 channel survey to XS 15094.
11. Copy HOW-XS10 channel survey to XS 15595.
12. Copy Findley Railroad channel survey to XS 17663.
13. Copy HOW-XS11 channel survey to XS 18608
14. Where did 19141 channel geometry come from? Let's discuss but I may want you to use it for XS 19015.
15. Copy Jarvis channel survey to XS 19954.
16. Move Q Break from 15329 to 15595
17.

18. Comments for later:
19. Double check ineffective areas. If a profile is ineffective on the upstream side then it needs to be ineffective on the downstream and vice versa. I will go back and make specific comments after you update with new Q's and make channel geometry and bank station changes.
20. BR 2856 - Where did you get the top of road from outside of the channel? This seems unrealistic for a RR. I would extend at 268.3 until you meet ground.
21. Where did you get the right side top of road for BR 2253? It seems too high. I would extend at the same slope that you use around the channel.
22. Move stream CL to FL at XS 17360, banks are outside stream CL.
23. BR03 Culvert n values should be 0.015 instead of 0.15. Change all 3 culverts. Why is Culvert #1 distance to Upstream XS shorter?
24. It will not affect the calculation but you should set the scale # to "wingwalls flared 0 deg" for the culverts that have straight wingwalls.
25. Copy HOW-XS04 channe survey to XS 7742.
26. Copy HOW XS07 channel survey to XS 11754.
27. Copy HOW BR02 channe survey to XS 12393
28. XS 14445 - I think you should shift channel survey to the right as much as possible. It would probably look better with topo.
29. Copy BR04 channel survey to XS 16964 and 17361.
30. Move 6710 Channel Banks down closer to the 264 elevation.
31. FYI - In the future, it is not necessary to set both sides of the channel bank at the exact same elevation. In reality, channel bends typically have slightly different bank elevations.
32. XS 9597 - Bring in right channel bank slightly to Sta 451.66
33. XS 17361 - Adjust CL to be within Channel banks.
34. Rename Junction J_COC6 to J_HOW11 in Discharge spreadsheet.
35.

RESPONSE TO COMMENTS:

1. Pamela's responses:
1. Fixed.
2.
3.
4. & 5. were contradicting each other. Used channel n-valued from RR to flower acres of .065. Used n-value of 0.075 dowsntream of Flower Acres to XS10653.
6 to 15. Updated.
16. Fixed.

19. Updated Inneffective Areas after all other hydraulic commenst were updated.
20 & 21. I got the TOR from the HEC-2 ground, which I assumed to be TOR. - Ben OK - left as is.
22 &33. After discussing with Ben, we agreed to shift the channel instead.
23. Fixed.
24. Fixed for BR02 & BR04
25. After discussing with Ben, left as is.
26 & 27. Fixed.
28. As per discussion with Ben, moved right bank futher.
29. Fixed
30. As per discussion with Ben, moved banks closer to 265.
31 OK.
32. Fixed.
33. See response 22.
34. Fixed.
FYI: I used the average survey flowline elevation for each culverts. I also deleted unecessary inneffectives.

IV. FLOODWAY MODEL:

Reviewer's Initials: _____ Date: _____

Modeler's Initials: _____ Date: _____

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs

- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☐ N-values shape file
- ☒ Any previous study workmaps
- ☒ Road network for names
- ☒ Floodway Points
- ☒ Floodway Lines

TECHNICAL REVIEW:

- ☒ Discharge consistent with multiple profile plan
- ☒ Surcharges between 0 and max allowed
- ☒ Check starting boundary conditions with friction slope
- ☒ Negative surcharges

REVIEW COMMENTS:

1. I moved left encroachment at 3461 from 961 to 800 to make internal bridge surcharge round to 1.0. FIX MAPPING.
2. I moved left at 3662 from 700 to 625 to make internal bridge surcharge round to 1.0. FIX MAPPING.
3. I moved 5380 left from 597 to 410 and right from 1210 to 1420 to match current effective. DID YOU HAVE A REASON FOR NOT MATCHING? FIX MAPPING.
4. I moved 4481 left from 717 to 910 to match current effective. UNLESS YOU HAD A REASON, FIX MAPPING. I changed 5987-11204 for same reason. Fix mapping.
5. I changed 19050 for same reason. fix mapping.
6. I moved right 14445 to inside of hill. CHECK OUT POSSIBLY PUTTING IN AN ISLAND FOR THAT HOUSE RIGHT THERE.
7. The floodplain upstream of Jarvis should be truncated further upstream at the face of culvert.
8. I never saw those blocked obstructions on 14538 before. That seems very odd. Let's discuss editing that.
9. I merged the floodplains at the 17572 RR since it's a bridge.
10. Why doesn't your floodplain mapping continue downstream? Your elevations are higher than Days. Were we thinking not to remap below city limits??? Doesn't make sense since we added xsec below city limits. The modeling and mapping need to match.
11. Add a 287 and 288 bfe ds and us of Lake Drive to duplicate profile. The 288 already included should be further upstream at 15596 to duplicate profile. Add the 289 bfe at 16351 to duplicate profile better. The 290 is not necessary. Add 294 immediately upstream of 17572 RR to duplicate profile. Move the 295 to immediately downstream of Jarvis to duplicate profile. Remember, we don't just put the bfes at the point that the program gives - that is just the starting point - then you have to make sure the bfes duplicate profile.
12. The ultimate floodplain needs cleaned up right bank near 17475.
13. Ben said Howard had lettered sections, but I'm not seeing them in folder specified or MXD so I haven't looked at them.

RESPONSE TO COMMENTS:

1. Fixed Mapping.
2. Fixed Mapping.
3. I agree, this is a weird area, and we should match the current effective. Fixed Mapping.
4. Fixed Mapping.
5. Fixed Mapping.
6. Fixed Mapping. I made an island for the house on the hill. I did not include the porches as they seem to be sloping off by over one foot..
7. Fixed Mapping for FWY, 100-Year, 500-Year, and 100-Year Ult.
8. Those block obstruction was to take out some isolated islands that were not going to be mapped.
9. OK (Merged for 100-Year Existing, 100-Ultimate, FWY, and 500-Year)
10. I continued the mapping DS for 100-Year, 500-Year, and 100-Year Ultimate. I also fixed the tie-in with Days Creek (for some reason, it looks as if the Days Creek floodplain was shifted north). The copied Day's Creek floodplain is located under: N:\27000s\27093\GIS\Mapping\FP_Mapping\Final_Mapping\Final_Report\S_FLD_HAZ_AR_Revised.shp
11. OK with all BFE except BFE 294 (Please check, I really don't like the ROB) [AGREE, TOO WEIRD OF A PLACE IN FLOODPLAIN. IN THIS CASE, WE WILL BREAK THE DUPLICATE PROFILE RULE. I ADDED A 295 BFE US TO HELP DUPLICATE THE PROFILE WITHOUT THE CONFUSING 294 BFE]
12. Fixed.
13. Here are the letter XS1: N:\27000s\27093\GIS\Mapping\FP_Mapping\Final_Mapping\Draft_Report\Howard\HOWARD_LETTER_XS.shp
APPROVED CHM 1-18-11

QA/QC APPROVAL:

Hydraulic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____ Date: _____

Task Leader:_____ Date: _____

Project Manager: _____ Date: _____

Principal in Charge: _____ Date: _____

Hydraulics QA/QC Checklist

Stream Name: South Wagner Creek

Modeler's Name: Will Wiegand

Model Name: South Wagner Creek

Reviewer's Name: BP, chm, ALW

I. CROSS SECTION LAYOUT:

Reviewer's Initials: BP Date: October 1, 2010

Modeler's Initials: WAW Date: December 13, 2010

SUBMITTED ITEMS:

ArcMap project file name: South Wagner GeoRas.mxd

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Q3 or Current Floodplains
- ☒ Watershed Location
- ☒ Any previous study workmaps _____
- ☒ Road network for names

TECHNICAL REVIEW:

- ☒ Cross Sections Extend to Assumed Limits of Floodplains
- ☒ Reasonably perpendicular to flow
- ☒ Reasonable location of the 4 bridge cross section
- ☒ Reasonable spacing
- ☒ Reasonable transitions, constrictions and expansion on floodplain

REVIEW COMMENTS:

1. Extend XS 5339 past the local high point on the right side (Bookmark 1). bp comment. Fixed by chm since no one else bothered.
2. I made several changes to the xsec. See preQC vs. xscutlines.

March 2, 2011
Effective Starting wsel from Wagner Creek HEC-2 Model, Need to obtain coincident elevation from Wagner Creek

RESPONSE TO COMMENTS:

1. XS 5339 extended.
2. OK.
approved chm 12-15-10

II. RAS GEOMETRY:

Reviewer's Initials: ALW Date: March 29, 2011

Modeler's Initials: WAW Date: _____

SUBMITTED ITEMS:

ArcMap project file name: N:\27000s\27093\GeoRAS\South_Wagner\South_Wagner_GeoRAS.mxd

- ☒ ArcMap project has all files listed in Milestone I
- ☒ Stream Centerline Texarkana_Streams.shp
- ☒ Flowpaths
- ☒ Field Surveys sketches, photos, and points file
- ☒ Bridge Record Plans _____
- ☒ Stationing assumptions and calculations for field surveys _____
- ☒ Manning's n-values assumptions

TECHNICAL REVIEW:

- ☒ Top of bank at reasonable locations
- ☒ Bridge Geometry Corresponds to Surveys or Record Plans
- ☒ Bridge Geometry assumptions documented
- ☒ Contraction and expansion coefficients
- ☒ Proper use of Ineffective flow areas
- ☒ Reasonable Manning's n-values
- ☒ No Crossing profiles

REVIEW COMMENTS:

1. Double check mann ng's n channel value for xs 10305. It looks like the channel banks may have been moved and the n-value was not updated.
2. Check your stream centerline with your HEC-RAS crosss-sections Bank stations are not containing the centerline in several places
3. Check your bank stations with the ortho and topo. Some banks stations look like they are pretty far off from the channel centerline. exported your bank stations from HEC-RAS to a shapefile. I saved it at N:\27000s\27093\GeoRAS\South_Wagner\Bank_Station_QAQC.shp.
4. Bank station widths are not consistent There are some places where the bank station width changes by 70' to 100' between cross sections. Bank stations also change elevation drastically between cross-section (profile view in RAS)
5. Add a label to all bridges and surveyed cross sections that matches the survey name.
6. Culvert SWC-02 West. Check the downstream culvert inverts. The DS inverts are all at different elevations but the upstream inverts are all the same.
7. Why are the n-values 0.02 for structures SWC-BR01, SWC-BR02, SWC-BR06?
8. SWC-BR04 looks more like a bridge than a culvert. May need to adjust cross-section 4415 channel geometry. Ineffective area may be needed on right side of structure (look at it in the X-Y-Z perspective)
9. Double check the channel geometry for XS 4482. There is a 5' rise on the bank station from the upstream xs.
10. SWC-BR07 upstream culvert inverts need to be adjusted. The tops of the culverts should line up. Also double check the channel geometry for the US and DS cross sections.
11. Check culvert centerlines on SWC-BR08. The culverts are overlapping.
12. Bridge opening and pier locations on SWC-BR09 need to be checked. The don't seem to be in the correct location.
13. SWC-BR10 roadway width seems too wide.
14. SWC-BR11 check culvert inverts.
15. SWC-BR12 check culvert centerlines. Upstream culverts are seperated by 1 foot and downstream have a 4 foot gap.
16. Consider adding ineffective areas for low flows and areas where split flows are being calcu ated.
17. XS 12625 - move ineffective outside of bank station or more bank station inside of ineffective
18. Bank stations for XS 3977 is too high and for XS 3643 & 4346 seems too low.

RESPONSE TO COMMENTS:

1.) agreed - Revised channel "n" on XS 10535
2)agreed - revised several channel banks
3) also agreed per # 2 revised channel banks at XS 462, 10535, 10899,10086, 13078, 11681
4) discussed channel geometry is very flat in some locations, ex: XS 3643, revised some CB at structures to have a consistent increase in elevation
5) XS survey and structure labels added to node names
6) revised culvert FL elevations with blocked depth option
7) revised culvert "n" values to be 0.015 from 0.02
8 - agreed - revised structure to be a bridge
9) lowered channel bank stations at XS 4543 and added "n" value of 0.065 inside the channel
10) revised culvert FL's with depth blocked option
11) agreed - revised distance between culverts to be 1'
12) made minor change to distance between piers see surveys
13) agreed - revised roadway deck width from 52' to 42' to match ortho
14) culvert upstream and downstream FL reviewed, these match the surveys
15) agreed, revised culvert CL
16) agreed added ineffective flow on several overbanks where no conveyance exists
17 Revised channel banks, moved to closer to centerline, ineffective maintained from building on LOB.
18) agreed and made some minor revisions to the CB's
Approved chm 5-3-11

III. HEC-RAS MODEL REVIEW:

Reviewer's Initials: chm Date: _____

Modeler's Initials: WAW Date: _____

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☒ N-values shape file
- ☒ Any previous study workmaps Several CE XS files

☒ Road network for names

Description of modeler's assumptions, notes, or special situations.

☐ Check RAS output
☒ N-value table
☒ Any record plans needed
☒ Descriptions of assumptions
☐ Any special situation

TECHNICAL REVIEW:

☒ Discharge Locations and Values
☒ Starting boundary conditions
☒ Cross Section Geometry-needs to extend to limits of floodplain
☒ Manning's n values
☒ Contraction and expansion Coefficients
☒ Bridge/Culverts
☒ Ineffective flow-Top widths
☐ Special Features (weirs, overflow, split)
☒ Profiles
☐ Errors, Warning and Special Notes
☐ Check-RAS

REVIEW COMMENTS:

1. • Consider adding survey channel to xs 9490. 10271 too maybe,
2. • Don't be afraid to add sta/elev for the channel banks- you can do this easily in graphic editor. Your banks still seem high to me particularly at bridges, but it does look like you tried to follow survey. OK as is.
3. • Did you change your n values after you did shapefile because they are not matching shapefile. It's fine if you did, I just want to make sure it was on purpose – see 1479, 2073, 6491, 11897 for examples
4. • Angela, did you not ask Will to check Pressure/weir for the high flows? I think he needs to do that.
5. • I noticed all the entrance loss coefficients appear to be the same. Is that just how it is or do they need checked with pictures?
6. • Angela/Will – please recheck reach lengths since he moved centerline – isn't 625 wrong now – only one I spot checked.

RESPONSE TO COMMENTS:

1. added channel survey to XS 9490 and 10271
2. no action needed
3. did change most "n" values from shapefile
4. checked pressure weir for high flows
5. revised some entrance loss coeficients because of wingwalls confirmed most entrance loss values are 0.5 with pictures
6. agreed revised some reach lengths
7. Approved chm 5-3-11 (except need to fix known wsel when wagner finalized.)

IV. FLOODWAY MODEL:

Reviewer's Initials: chm Date: _____

Modeler's Initials: WAW Date: _____

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☐ N-values shape file
- ☒ Any previous study workmaps
- ☒ Road network for names
- ☒ Floodway Points
- ☒ Floodway Lines

TECHNICAL REVIEW:

- ☐ Discharge consistent with multiple profile plan
- ☐ Surcharges between 0 and max allowed
- ☐ Check starting boundary conditions with friction slope
- ☐ Negative surcharges

REVIEW COMMENTS:

1. Mapping needs cut at most us xsec with Zone A if that's the plan. Talk to Ben first.
2. Check out 4396 right bank. Xsec shows floodplain in channel. If so, correct mapping and move fw to bank. FW station probably needs adjusted regardless.
3. What's up with 4462 (4479 downstream face) ineffective (and fw encorachment) being inside bridge opening?
4. 4524 encroachments need scooted in to water.
5. 5308 - I don't like letting the encroachment be within an island that shows on xsec even if we do flood it during mapping. Move left encroachment to inside water edge per xsec (won't affect answer).
6. 6693 - don't forget, if water inside banks, put encroachments at banks. (these banks might be high - I'd consider moving banks rather than encroachments..)
7. 9607 - right encroachment inside bank.
8. 12537 - left encroachment inside bank. banks appear too high.
9. 12622 - move right encroachment to inside water based on xsec.
10 12673 - you think that xsec is cut right? The channel banks are very wide compared to other sections around there. Right encroachment is inside bank.
11. 5785 - far left should be blocked obstruction to match mapping.
12. 9607 right bank should be blocked obstruction to match mapping.
13. Add a 277 bfe ds of Garber. Add a 279 ds of Findley. You can delete the 281. The 283 by 4524 should be 282. Need a 283 around 5785. The 285 at 6126 should be another 283. Move the 300 at 10271 to just ds of Kilgore. Add a 309 just ds of LDS.
14. I couldn't find lettered xsec.

RESPONSE TO COMMENTS:

1. Mapping at most upstream Xsec adjusted to be consistent with our methodology for all other streams at upstream limit.
2. Mapping adjusted and FW encroachment moved to right bank.
3. Ineffective should be correct from Findley bridge opening. FW encroachment moved to outside of RR bridge opening. Will FEMA accept this as the adopted floodway?
4. Encroachments moved to water station limits for 4524.
5. Encroachment moved to left water station limit for 5308.
6. Lowered the banks and set encroachments at water station limits for 6693.
7. 9607 right encroachment moved to bank,
8. Bank stations lowered 12537.
9. Right encroachment moved to water station at 12622.
10. Yes it is cut correctly. The channel is wider because the cross section cuts through the confluence area of a stormdrain channel. Right encroachment moved to bank.
11. Blocked obstruction added to far left overbank for 5785.
12. Block obstruction added to right overbank for 9607.
13. BFEs adjusted per comments.
14. N:\27000s\27093\GIS\Mapping\FP Mapping\Final Mapping\Final Report\Texarkana Letter XS Final.shp
Approved chm 1-17-11 (except he made ar additional change to geometry. results are all fine as long as I understand and agree with the change. I UNDERSTAND AND AGREE WITH CHANGE. MAPPING UPDATED AND APPROVED. ALL APPROVED.)

QA/QC APPROVAL:

Hydraulic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____Date: _____

Task Leader:_____Date: _____

Project Manager: _____Date: _____

Principal in Charge: _____Date: _____

Hydraulics QA/QC Checklist

Stream Name: Stream WC1

Modeler's Name: Scott Rushing

Model Name: Stream_WC1

Reviewer's Name: Cindy Mosier

I. CROSS SECTION LAYOUT:

Reviewer's Initials: CHM Date: November 19, 2011

Modeler's Initials: SAR Date: June 9, 2011

SUBMITTED ITEMS:

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Q3 or Current Floodplains
- ☒ Watershed Location
- ☒ Any previous study workmaps _____
- ☒ Road network for names

TECHNICAL REVIEW:

- ☒ Cross Sections Extend to Assumed Limits of Floodplains
- ☒ Reasonably perpendicular to flow
- ☒ Reasonable location of the 4 bridge cross section
- ☒ Reasonable spacing
- ☒ Reasonable transitions, constrictions and expansion on floodplain

REVIEW COMMENTS:

1. That's a ds face of unmodeled culvert at 9208 right? If so, let's add the expansion cross section.

RESPONSE TO COMMENTS:

1.

II. RAS GEOMETRY:

Reviewer's Initials: chm Date: _____

Modeler's Initials: SAR Date: June 9, 2011

SUBMITTED ITEMS:

ArcMap project file name: _____

- ☒ ArcMap project has all files listed in Milestone I
- ☒ Stream Centerline Texarkana_Streams.shp
- ☒ Flowpaths
- ☒ Field Surveys sketches, photos, and points file
- ☒ Bridge Record Plans _____
- ☒ Stationing assumptions and calculations for field surveys _____
- ☒ Manning's n-values assumptions

TECHNICAL REVIEW:

- ☒ Top of bank at reasonable locations
- ☒ Bridge Geometry Corresponds to Surveys or Record Plans
- ☒ Bridge Geometry assumptions documented
- ☒ Contraction and expansion coefficients
- ☒ Proper use of Ineffective flow areas
- ☒ Reasonable Manning's n-values
- ☒ No Crossing profiles

REVIEW COMMENTS:

1. Modeler Comment 1: Survey WC1-XS04 confirmed the lidar in this area that the channel is not well defined through this reach. The unedited lidar geometry was used for Xsecs 5956 & 6355.
2. Modeler Comment 2: The contours are outdated in the upper reach (above Xsec 7559) with the recent development. Additional surveys will probably be needed in this area. Survey WC1-XS05 was used for both BR05 downstream Xsecs, and the BR05 upstream survey was used for both BR05 upstream Xsecs.

Reviewer's comments:

1. What's going on at Bridge 1 that the channel flowline is so much lower than culverts? Doesn't appear to match survey or photos.
2. It appears the flowline for xsec 5641 was lowered too much. Please double check.
3. I moved the left bank of 1953 one sta to the right so the channel wouldn't include the flat part.
4. Please run a preliminary floodplain so I can check ineffectives.
5. Consider increasing the n value upstream since that development is probably more built out since ortho taken. What do photos/field visit show? May get them to take extra photos when go back out to survey.
6. Is the downstream area really 0.05 still?
7. You decided not to have the Q break at 1608 that your spreadsheet has?
8. Update routing with new geometry. Reach 3 in particular has changed quite a bit.

RESPONSE TO COMMENTS:

Response to Modeler's comments:

1. OK.
2. I thought we sent the surveyor's back out there already?? If not, let's take another quick look at other streams for additional needs and then send them back out ASAP.

I put in a survey request for topo in this area for mapping. SAR 09/23/11

Response to Reviewer's comments:

1. It appears from the aerial photo there is a concrete apron extending approximately 15 from both the US & DS faces of Bridge 1. The upstream bridge survey was outside of the apron based on the aerial photo, which is why the flowline is much lower on the upstream end. The DS invert shot appears to have been taken on the DS apron from the aerial photo, which is why it is close to the culvert flowlines on the downstream end. However I used the channel/flowline profile from the upstream XSec at DS section 1953 and adjusted the flowline to show what I believed to be a more representative ds flowline.
2. The upstream bridge survey section lowered the flowline just over 1' against the lidar. The DS invert shot also lowered the flowline just over 1' against the lidar. Xsec 5641 flowline was also lowered just over 1' which I think is justified since 5641 is in close proximity to these surveyed points. No change was made. [THERE WAS A TYPO SUGGESTING THE 1' DROP AT US. XSEC. I DISCUSSED WITH SCOTT AND CHANGED FL. chm]
3. OK.
4. Preliminary RASMapper floodplains generated and can be viewed at: N:\27000s\27093\GeoRAS\Stream_WC1\Stream_WC1_GeoRAS.mxd
5. This area appears to be maintained fairly well based on field visit. They were mowing when Ben and I were out there for the field visit. N-values seem reasonable as they are based on field visit and photos. [ACTUALLY, I SEE THAT YOU DID BUMP SOME UP SINCE QC FOR THE NEW BUILDINGS SO GOOD chm]
6. Based on our field visit and photos taken while out there 0.05 seems reasonable. I asked Ben his opinion and he agreed 0.05 was correct. No changes made. [FYI NEW ORTHOS ALSO CONFIRMS STILL .05 chm]
7. Only a small portion of basin WC1_7 contributes at 1608; small enough to be overly conservative to add Q break I believe. Decided not to add the break here. [AGREE, BUT DELETE FROM SPREADSHEET SO WE DON'T PRESENT WRONG IN REPORT]
8. Routing updated with new geometry. SAR 09/23/11

III. HEC-RAS MODEL REVIEW:

Reviewer's Initials: chm Date: _____

Modeler's Initials: SAR Date: June 9, 2011

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☐ Discharge Points Locations
- ☒ N-values shape file
- ☒ Any previous study workmaps Several CE XS files
- ☒ Road network for names

Description of modeler's assumptions, notes, or special situations.

- ☐ Check RAS output
- ☒ N-value table
- ☒ Any record plans needed
- ☒ Descriptions of assumptions
- ☐ Any special situation

TECHNICAL REVIEW:

- ☒ Discharge Locations and Values
- ☒ Starting boundary conditions
- ☒ Cross Section Geometry-needs to extend to limits of floodplain
- ☒ Manning's n values
- ☒ Contraction and expansion Coefficients
- ☒ Bridge/Culverts
- ☒ Ineffective flow-Top widths
- ☐ Special Features (weirs, overflow, split)
- ☒ Profiles
- ☒ Errors, Warning and Special Notes
- ☐ Check-RAS

REVIEW COMMENTS:

1. Approved chm 10-7-11

RESPONSE TO COMMENTS:

1.

IV. FLOODWAY MODEL:

Reviewer's Initials: _____ Date: _____

Modeler's Initials: _____ Date: _____

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☐ N-values shape file
- ☒ Any previous study workmaps
- ☒ Road network for names
- ☒ Floodway Points
- ☒ Floodway Lines

TECHNICAL REVIEW:

- ☒ Discharge consistent with multiple profile plan
- ☒ Surcharges between 0 and max allowed
- ☒ Check starting boundary conditions with friction slope
- ☒ Negative surcharges

REVIEW COMMENTS:

1. I pulled the right encroacment in on the 1st two cross sections since it works and to smooth out the top widths. FIX MAPPING. (I tested it with the slope method too (let's discuss!).
2. I moved 3216 left from 765 to 770. Probably doesn't show on mapping.
3. What was decided about FP at LDS. Apply to this creek too.
4. Please adc a 318 bfe immediately upstream of second bridge. A 329 immediately upstream of 3rd bridge. A 330 bfe to duplicate profile. A 333 and 335 immediately ds and us of 4th bridge. The 332 doesn't appear necessary to duplicate profile. A 340 immediately upstream of 5th bridge. I might add the 342 instead of 341 now to space the bfes.
5. Looks like you need to designate lettered sections.

RESPONSE TO COMMENTS:

1. Mapping adjusted to match revised encroachment stations.
2. Mapping adjusted at 3216.
3. Same as WC-2: Floodway, 100yr AE, and 500yr truncated at upstream xsec 9225 with designated Zone A upstream of 9225.
4. All suggested BFE comments were performed.
5. N:\27000s\27093\GIS\Mapping\FP Mapping\Final Mapping\Final Report\Texarkana Letter XS Final.shp
Approved chm 1-17-11 (except the fw disappeared between 3216 and 8264 copy back in from draft FIXED AND APPROVED).

QA/QC APPROVAL:

Hydraulic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____ Date: _____

Task Leader:_____ Date: _____

Project Manager: _____ Date: _____

Principal in Charge: _____ Date: _____

Hydraulics QA/QC Checklist

Stream Name: Stream WC-2

Modeler's Name: Pamela Salvador

Model Name: Stream WC2

Reviewer's Name: Cindy Mosier

I. CROSS SECTION LAYOUT:

Reviewer's Initials: chm Date: November 3, 2010

Modeler's Initials: PLS Date: November 2, 2010

SUBMITTED ITEMS:

ArcMap project file name: Stream_WC2 GeoRas.mxd

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Q3 or Current Floodplains
- ☒ Watershed Location
- ☒ Any previous study workmaps _____
- ☒ Road network for names

TECHNICAL REVIEW:

- ☒ Cross Sections Extend to Assumed Limits of Floodplains
- ☒ Reasonably perpendicular to flow
- ☒ Reasonable location of the 4 bridge cross section
- ☒ Reasonable spacing
- ☒ Reasonable transitions, constrictions and expansion on floodplain

REVIEW COMMENTS:

Modeler's Comments:
1. Bookmark1 & 2: I am not sure where the stream CL goes. CENTERLINES LOOK FINE TO ME.
2. Bookmark 3: Check XS Layout & inneffectives because the space is very constricted. I tried to add at least 3 XS in between the bridge, because, from experience, the WSEL may become unstable (goest to critical) with only one XS. SEE MY COMMENT 1 BELOW. I THINK YOU STARTED OUT REMEMBERING ABOUT THE 4 XSEC AT BRIDGES. BASED ON XSEC AND THIS CCMMENT, I THINK YOU FORGOT AS YOU MOVED UPSTREAM. I FIXED YOUR BKM3 IN YOUR FILE. YOU NEED TO DELETE 3D. I'LL CHECK INEFFECTIVES LATER.
Reviewer's Comments:
1. XS 4489 is too far from bridge for a contraction xs. (I FIXED 4489 PER 2. ABOVE. YOU NEED TO FIX THE NEXT 2) XS 3215, 3687 a little far for expansion xs. - PLS: Moved 3215 & 3687
2. Looks like you missed a constriction with 5962. Move downstream slightly. - PLS: It seems that there is a topo bust right at the stream centerline - This XS may be a good one to use for Survey. - Moved DS.
3. Are 3092 and 2392 both needed. Maybe put one in the middle of those if both not needed. Or, maybe it's ok to keep both but move 3092 further us after move 3215 further upstream. - PLS: could not find a 2392, but found a 2932 - Moved both XS 2932 & 3092 Upstream.
RESPONSE TO YOUR CORRECTIONS: You copied 3687 instead of moving it. I deleted the old 3687 and realigned the new 3687 slightly. I did not want you to move 2932 upstream. I moved it back where it was. Actually, I decided that was too many xsec since you didn't have a reason for them and changed this area slightly.
Cross Sections approved - chm 11-4-10

RESPONSE TO COMMENTS:

1.

II. RAS GEOMETRY:

Reviewer's Initials: alw Date: April 8, 2010

Modeler's Initials: PLS Date: _____

SUBMITTED ITEMS

ArcMap project file name: _____

- ☒ ArcMap project has all files listed in Milestone I
- ☒ Stream Centerline Texarkana_Streams.shp
- ☒ Flowpaths
- ☒ Field Surveys sketches, photos, and points file
- ☒ Bridge Record Plans _____
- ☒ Stationing assumptions and calculations for field surveys _____
- ☒ Manning's n-values assumptions

TECHNICAL REVIEW:

- ☒ Top of bank at reasonable locations
- ☒ Bridge Geometry Corresponds to Surveys or Record Plans
- ☒ Bridge Geometry assumptions documented
- ☒ Contraction and expansion coefficients
- ☒ Proper use of Ineffective flow areas
- ☒ Reasonable Manning's n-values
- ☐ No Crossing profiles

REVIEW COMMENTS:

1. CINDY: see Swampoodlegeorasqc.mxd. and redbook page 96 and email 12-13-10. double check that new fp is accurate at 4005 concord place.
2. Delete all working files and only leave final geometry, plans and flows.
3. Geometry file name does not make sense in the ultimate conditions. Please remove existing from the geometry file name.
4. XS 1145 survey points seem to have the centerline in another area. How did you get it to line up with your cross section? Bank stations does not contain the centerline. Adjust centerline or cross section.
5. Should you move some cross-sections so that they align with the surveyed cross sections instead of just projecting the survey to the closest XS?
6. Mannging's N values - Lots of cross sections have multiple n values in the channel. Double check n-value locations and bank stations. Lots of cross sections have channel n values and overbank values that overlap the bankstations.
7. Bank Stations - XS 944 has really wide bank station when compared to upstream and downstream cross sections. Double check XS 4236 bank station with orthos. Same with XS 4340. XS 5219, 5569, 5776 have really wide bank stations and are really high (profile view)
8. Add survey names (ex. BR01) to Bridge Descriptions
9. BR01, BR02, BR03, BR04 - 1.Culvert inverts should be the same for the both DS culverts and for both US culverts.
10. Remove unneccesary ineffective areas from cross-sections.
11. Double check areas of where split flow is occuring. Add ineffectives if necessary.
12. Double check starting conditions. The normal depth slope seems odd.
13. Update Q-Break spreadsheet to match the HEC-RAS model. I like the second Q-Break better at 5776 like the spreadsheet. Update RAS. Move Q break from 4446 to 4696 to get the Q break off of the contraction cross section for the bridge.
14. Double check 0.01 n values. These seem really low.
15. XS 6593 - 3 n-values in bank station. Move the channel banks or change the n-values
16.

RESPONSE TO COMMENTS:

1.
2. OK.
3. Renamed geometry to "Stream WC2 Geometry."
4. Already Fixed.
5. No, Cindy wanted the XS to be evenly spaced.
6. Updated the Manning's N-Value.
7. Updated banks when possible, please look at DS of BR01 - 2002 - Problem with inneffective & bank.
8. Fixed
9. Fixed (Using Average).
10. Fixed.
11. there was not much split flow. When I tried to fix at BR03 - I was getting jump. Left as it was. Same with BR04
12. Found the same answer (area does not have many contours).
13. Updated Q-break.
14. 0.01 n-value was a typo. Changed to 0.10

Approved chm 5-4-11 (except need to update KWSEL when Wagner complete.)

III. HEC-RAS MODEL REVIEW:

Reviewer's Initials: chm Date: _____

Modeler's Initials: PLS Date: _____

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☐ Discharge Points Locations
- ☒ N-values shape file
- ☒ Any previous study workmaps Several CE XS files - NONE For this Stream!
- ☒ Road network for names

Description of modeler's assumptions, notes, or special situations.

- ☐ Check RAS output
- ☒ N-value table
- ☒ Any record plans needed
- ☒ Descriptions of assumptions
- ☐ Any special situation

TECHNICAL REVIEW:

- ☒ Discharge Locations and Values
- ☒ Starting boundary conditions
- ☒ Cross Section Geometry-needs to extend to limits of floodplain
- ☒ Manning's n values
- ☒ Contraction and expansion Coefficients
- ☒ Bridge/Culverts
- ☒ Ineffective flow-Top widths
- ☒ Special Features (weirs, overflow, split)
- ☒ Profiles
- ☒ Errors, Warning and Special Notes
- ☐ Check-RAS

REVIEW COMMENTS:

1.

RESPONSE TO COMMENTS:

1.

IV. FLOODWAY MODEL:

Reviewer's Initials: PLS Date: July 25, 2011

Modeler's Initials: chm Date: _____

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: StreamWC2_Existing_FWY

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☐ N-values shape file
- ☒ Any previous study workmaps
- ☒ Road network for names
- ☒ Floodway Points
- ☒ Floodway Lines

TECHNICAL REVIEW:

- ☒ Discharge consistent with multiple profile plan
- ☒ Surcharges between 0 and max allowed
- ☒ Check starting boundary conditions with friction slope
- ☒ Negative surcharges

REVIEW COMMENTS:

1. Concord floodway Top width is has a differenct of approximately 130 feet between upstream and dowsntream. If I encroach the upstream Floodway, the surcharge is greater than 1.0 foot. This also causes a house to be in the floodway. please advise. (XS 4276 & 4340)
2. After talking with Cindy, I moved the LOB Encroachment of 4340 (into the inneffective), because the FWY elevation will be effective at that location.
3. At XS 4446, the WSEL is inside the banks. Therefore I still placed my encroachment at the barks.
4. If you are interested in my Floodway_QC.xlsx, it is located under: I:\27000s\27093\HEC_RAS_v4.1\StreamWC2\excel.

CHM comments;

1. We need to be careful about the BUG in RAS. Sometimes, the 100-year natural wsel is different when its prcfile 1 vs. profile 3. this is the case with this model. We really need to compare the floodway to the true wsel at profile 3. This caused a couple of your surcharges to be greater than 1.00. I moved 2097 left encroachment from 361.27 to 355. And I moved 2160 left from 421 to 390 - but some of this was to smooth out the mapping in this location too. FIX the mapping according to my new encroachments. When you do FWDT etc, make sure you use the true natural 100 year wsel from MP not the one from FW model.
2. Just downstream of 4238, tweek the left bank FW to where the house is not being clipped.
3. I feel like I could be forgetting what the typical approach is, but shouldn't the floodway truncate at the most upstream cross section and the 100-year be Zone A upstream of last cross section? If so, I suppose the 500-year would truncate at the most upstream xsec too. And, if so, the 343 bfe will need moved to downstream side of xsec/LDS. If ya'll aren't sure, we should look this up. I kind of feel like the rule changed at some point.
4. According to model, that same island at 4238 exists for the 500-year too and not just the 100-year. Did we deliberately and cosistently decide not to show 500-year islands or should we show that?
5. XSEC 4446 - I think we should show this 100-year island too. That will of course make there be an island in fw - DON'T FORGET TO ACCOUNT FOR THAT WHEN DO TOPWIDTHS IN FWDT. 500-year decision from #4 will apply. Technically, I think we should then put in a blocked obstruction in our fw run since we're allowing conveyance in this island during fw encroachment. What if someone legally fills this island before someone tries to fill the fringe? At least test what it does to the surcharge in a temporary model.
6. consider tweaking fp to take the house at 3542 right bank out of floodplain. the pool will still be in fp. House on left bank too. House right bank at 3971. House right bank just downstream 4238.
7. It looks like a 341 bfe would help to duplicate the profile better. The 340 and or 342 wouldn't have to be included necessarily to duplicate profile.

RESPONSE TO COMMENTS:

1. FW mapping revised to match new encroachment limits for 2097 and 2160.
2. FW revised to not clip house just downstream of 4238.
3. Not totally sure if the approach has changed for this situation. I tried to look it up on the FEMA website but didn't find anything. The procedure you described sounds like what we typically do and is what I did for this stream. Need to check all other streams to make sure we are consistent. Floodway, 100yr AE, and 500yr truncated at upstream xsec 6593 with designated Zone A upstream of 6593. 343 BFE moved just downstream of 6593.
4. No there was not a deliberate or consistent effort to flood 500-yr islands. 500-yr island added to 4238.
5. 100yr/FW island added at 4446 and the house here was clipped out of floodplain. 500yr island very small therefore is was flooded. I put in a blocked obstruction in a test geometry for the floodway run and the surcharge only increased by 0.01'. Blocked obstruction was not included in model since there was minimal impact to the surcharge.
6. Floodplain tweeked for all structures referenced.
7. Agree. 341 BFE added and 340 and 342 BFEs deleted.

Approved chm 1-15-11

QA/QC APPROVAL:

Hydraulic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____ Date: _____

Task Leader:_____ Date: _____

Project Manager: _____ Date: _____

Principal in Charge: _____ Date: _____

Hydraulics QA/QC Checklist

Stream Name: Swampoodle Creek East Tributary

Modeler's Name: Scott Rushing

Model Name: Swampoodle Creek East Tributary

Reviewer's Name: Cindy Mosier

I. CROSS SECTION LAYOUT:

Reviewer's Initials: chm Date: November 17, 2010

Modeler's Initials: sr Date: October 27, 2010

SUBMITTED ITEMS:

ArcMap project file name: Swampoodle_Creek_GeoRAS.mxd

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Q3 or Current Floodplains
- ☒ Watershed Location
- ☒ Any previous study workmaps _____
- ☒ Road network for names

TECHNICAL REVIEW:

- ☒ Cross Sections Extend to Assumed Limits of Floodplains
- ☒ Reasonably perpendicular to flow
- ☒ Reasonable location of the 4 bridge cross section
- ☒ Reasonable spacing
- ☒ Reasonable transitions, constrictions and expansion on floodplain

REVIEW COMMENTS:

1. I adjusted 1567 and added a xsec ds for the contraction xsec. If you have 2 bridges fairly close together, always try to have the 4 xsec for each bridge plus 1 in between if possible. It is easily possible here.
2. Is that a bridge at 2196 that needs modeled?
3. You need the contraction xsec to be close upstream of 1959.
4. You need a contraction xsec closer upstrem of 2341.

RESPONSE TO COMMENTS:

1. Ok, thanks.
2. There is a pedestrian bridge at 2196 that completely spans the channel opening. If flow is contained in the channel then it does not need to be modeled, however, it probably should be modeled if flow is over channel banks. See photo 144 from the field visit: I:\27000s\27093\Photos\2010-10-29
3. Contraction Xsec added.
4. Contraction Xsec added.

Approved. chm 11-18-10.

II. RAS GEOMETRY:

Reviewer's Initials: sar Date: _____

Modeler's Initials: chm Date: February 21, 2011

SUBMITTED ITEMS:

ArcMap project file name: _____

- ☒ ArcMap project has all files listed in Milestone I
- ☒ Stream Centerline Texarkana_Streams.shp
- ☒ Flowpaths
- ☒ Field Surveys sketches, photos, and points file
- ☒ Bridge Record Plans _____
- ☒ Stationing assumptions and calculations for field surveys _____
- ☒ Manning's n-values assumptions

TECHNICAL REVIEW:

- ☒ Top of bank at reasonable locations
- ☒ Bridge Geometry Corresponds to Surveys or Record Plans
- ☒ Bridge Geometry assumptions documented
- ☒ Contraction and expansion coefficients
- ☒ Proper use of Ineffective flow areas
- ☒ Reasonable Manning's n-values
- ☐ No Crossing profiles

REVIEW COMMENTS:

1. Modeler Note 1: Pedestrian bridge at 2196 was added to model since flow is out of channel.
2. Didn't something go wrong with n values? See 837 and 1708 right bank not matching shapefile and check all.
3. You forgot your contraction/expansion coefficients. We may need to change all these to something less if run supercritical (or even if don't if flow always within a constant U. see Table 3-3 in Hydraulic Reference Manual)
4. I'm thinking your flowpaths need to go all the way to the confluence - particularly the center one - just so that it will make more sense.

RESPONSE TO COMMENTS:

1. OK
2. I'm not sure why the n-values occasionally don't match the shapefile. I don't think it has to do with GeoRAS. I'm thinking when I splice in surveys from excel I re-input the wrong n-value, or they could get changed when I set channel n-values. I checked all against the n-value shapefile and all sections now match.
3.
4. Flowpaths adjusted to confluence.

APPROVED CHM 4-12-11

III. HEC-RAS MODEL REVIEW:

Reviewer's Initials: chm Date: _____

Modeler's Initials: sar Date: _____

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☒ N-values shape file
- ☒ Any previous study workmaps Several CE XS files
- ☒ Road network for names

Description of modeler's assumptions, notes, or special situations.

- ☐ Check RAS output
- ☒ N-value table
- ☒ Any record plans needed
- ☒ Descriptions of assumptions
- ☐ Any special situation

TECHNICAL REVIEW:

- ☒ Discharge Locations and Values
- ☒ Starting boundary conditions
- ☒ Cross Section Geometry-needs to extend to limits of floodplain
- ☒ Manning's n values
- ☒ Contraction and expansion Coefficients
- ☒ Bridge/Culverts
- ☒ Ineffective flow-Top widths
- ☒ Special Features (weirs, overflow, split)
- ☒ Profiles
- ☒ Errors, Warning and Special Notes
- ☐ Check-RAS

REVIEW COMMENTS:

1. Modeler Note1: Storm Drain Outfall design methodology from City of Texarkana Drainage Manual used to determine known WSEL boundary condition for SwampEast. Highly developed watershed, "skinny" hydrograph, timing very sensitive. Assume peak on peak. At 1:1 area ratio, coincidental occurance frequencies are equal for main stem and tributary, per City DCM.
2. I'm not going to worry about dip in 5-year for xsec 1567 since it's impossible to get rid of and it's not a FEMA frequency. Ditto 25-year at xsec 2570.
3. Even thought this steep concrete channel has some criticals, we decided to keep as subcritical because the supercritical and mixed just don't look good/make sense.
4. We used .6/.8 at upstream culvert and raised upstream n value at last 3 xsec from .02 to .025 to get rid of bad dip in 10-year.
5. Approved CHM 4-13-11

RESPONSE TO COMMENTS:

1.

IV. FLOODWAY MODEL:

Reviewer's Initials: _____ Date: _____

Modeler's Initials: _____ Date: _____

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☐ N-values shape file
- ☒ Any previous study workmaps
- ☒ Road network for names
- ☒ Floodway Points
- ☒ Floodway Lines

TECHNICAL REVIEW:

- ☒ Discharge consistent with multiple profile plan
- ☒ Surcharges between 0 and max allowed
- ☒ Check starting boundary conditions with friction slope
- ☒ Negative surcharges

REVIEW COMMENTS:

1. See markup to smooth up some of the mapping (I can't edit right now).
2. Clean centerline or mapping at upstream end of Zone A.
3. Check terrain, but I would probably unclip the house left bank 2010, 2402 right bank and 2570 left bank.
4. Per Ben and Cindy, let's delete xsec 2570 from the models so that 2402 can be the LDS and limit of floodway. truncate floodway us of 2402 so that we are closer to the Lds and LoF in current effective.
5. Add a 314 immediately us of first bridge. A 315 at 1527 would make more sense. The 316 can be deleted. Add 317s immediately ds and us of 2nd bridge. Scoot the 318 to us of 2117. Add a 319 just ds of Pine. Add another 319 just downstream 2402/new LDS. Delete 320 bfe.

RESPONSE TO COMMENTS:

1. Mapping smoothed per markups.
2. Mapping cleaned at upstream end of Zone A.
3. Unclipped the house left bank 2010 and 2402 right bank based on terrain but 2570 left bank was not clipped based on terrain.
4. Xsec 2570 removed from models. Mapping truncated at 2402.
5. BFEs adjusted per comments.

APPROVED cnm 1-19-11

QA/QC APPROVAL:

Hydraulic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____Date: _____

Task Leader:_____Date: _____

Project Manager: _____Date: _____

Principal in Charge: _____Date: _____

Hydraulics QA/QC Checklist

Stream Name: Swampoodle Creek

Modeler's Name: Scott Rushing

Model Name: Swampoodle_Creek

Reviewer's Name: Cindy Mosier

I. CROSS SECTION LAYOUT:

Reviewer's Initials: chm Date: October 26, 2010

Modeler's Initials: sar Date: 10-26-10

SUBMITTED ITEMS:

ArcMap project file name: Swampoodle_Creek_GeoRAS.mxd

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Q3 or Current Floodplains
- ☒ Watershed Location
- ☒ Any previous study workmaps _____
- ☒ Road network for names

TECHNICAL REVIEW:

- ☒ Cross Sections Extend to Assumed Limits of Floodplains
- ☒ Reasonably perpendicular to flow
- ☒ Reasonable location of the 4 bridge cross section
- ☒ Reasonable spacing
- ☒ Reasonable transitions, constrictions and expansion on floodplain

REVIEW COMMENTS:

1. BKM 1 - Consider extending right bank of 4281-5100 to the outside 526 to be consistent with xsec upstream and downstream and to be on the safe side.
2. BKM 2 - Please extend xsec 17057 - 17729, right bank so that we can map the backwater. For 100-year, this will likely be ineffective in model.
3. BKM 3 - I know I typically say being close enough to perpendicular to contours is good enough when trying to avoid bendy xsec. But, in this area, the xsec are bendy anyway, and I think the skew of these bridges is pretty significant (not close enough to perpendicular). I would consider making these xsec perpendicular to channel and adding a skew factor to the bridges. We could skew the sections, but we'd have to manually do it at the channel only. See QAQC xsec file.
4. Consider adding an additional xsec around 700 or so to help define floodway. FYI: current effective has one at 350 and 1195.
5. 8038,11358, - I'd say a max of 150' for distance of expansion/contraction xsec or FEMA will comment during LOMR phase. Check all. (They'll probably comment greater than 50' or so, but we can justify up to 100'-150' on this big floodplain.)
6. US 14367 to 16806- floodplain very narrow through here. Consider at least doubeling the number of xsec.
7. Is xsec 10765 needed?

RESPONSE TO COMMENTS:

1. Xsecs 4281-5100 Extended
2. Xsecs 17057-17729 Extended
3. I incorporated your xsec changes in this area. I did notice the US survey section shots for BR06 and BR07 are a little skewed, especially BR07. There is not much vegetation in this location so the lidar should be fairly accurate. I'm thinking we can just use the flowline for these sections? I'D JUST SEE HOW IT LOOKS AND DECIDE. THE SKEW IS PROBABLY MORE OF A VISUAL COMMENT THAT ACTUALLY MESSING UP THE SECTION, BUT YOU CAN CHECK IT OUT.
4. I did add a section around 700, however I did have to cut across the embankment for Texas Viaduct. Is that going to be an issue? IF IT GIVES US PROBLEMS WE CAN DELETE IT LATER.
5. Xsecs 8038, 11358 adjusted. I checked all of the other exp/con. sections and adjusted a few slightly to decrease the distance.
6. I added Xsecs through this area.
7. Yes, there is a transition here from concrete lined channel to natural.

APPROVED CHM 11-2-10

II. RAS GEOMETRY:

Reviewer's Initials: chm Date: February 18, 2011

Modeler's Initials: sar Date: December 30, 2010

SUBMITTED ITEMS:

ArcMap project file name: _____

- ☒ ArcMap project has all files listed in Milestone I
- ☒ Stream Centerline Texarkana_Streams.shp
- ☒ Flowpaths
- ☒ Field Surveys sketches, photos, and points file
- ☒ Bridge Record Plans _____
- ☒ Stationing assumptions and calculations for field surveys _____
- ☒ Manning's n-values assumptions

TECHNICAL REVIEW:

- ☒ Top of bank at reasonable locations
- ☒ Bridge Geometry Corresponds to Surveys or Record Plans
- ☒ Bridge Geometry assumptions documented
- ☒ Contraction and expansion coefficients
- ☒ Proper use of Ineffective flow areas
- ☒ Reasonable Manning's n-values
- ☐ No Crossing profiles

REVIEW COMMENTS:

1. Modeler Note 1: There is a separate ground adjustment and structure adjustment in excel file for SPC-BR16 due to skew.
2. Modeler Note 2: SPC-BR17 & 18 - Culvert and Deck adjusted to align with channel.
3. Bridge 2264, on the right bank when the xsec leaves the road, the top of road should end or be equal to the ground, not filled in like shown. The road should also drop down on the left bank when it leaves the road. Check this for all bridges where the xsec is leaving road.
4. For Bridge 3035, the piers need skewed. Check all.
5. Are we sure the survey got processed correctly for 17749? The channel is not where you have the stream centerline. If it is correct, fix your centerline.
6. Looks like 14208, 14117, and 13977 should have a lower n value in channel.
7. When they just went back out, did you get them to survey bridge 9? Because it's not in your model. OK, I guess they are tearing that road/bridge down?
8. This will change again since you're moving centerline, but 17749 has wrong reach lengths.
9. You don't have contraction/expansion coeffic ents at the bridges.
10. Bridge 1 should be modeled as pressure/weir unless you changed it back for stability. Check all that are not majorly submerged. Program will default back to energy if it shouldn't be pressure/wier.
11. Double check your starting slope. I'm wondering if .001 might be more appropriate. (I uess we're eventually going to change to Known wsel, but still check this in case we decide to stick with slope.)
12. Flow paths need extended at downstream sections.
13.

RESPONSE TO COMMENTS:

1. OK
2. OK
3. All bridges adjusted where the xsec is leaving the road.
4. Piers in this area did not need to be skewed since they were inline with the direction of flow. The piers from the flyover bridge between BR05 and BR06 were incorporated into BR05 and BR06 in the model using one large pier for BR05 and including 6 piers and deck for BR06 (see geometry). I had to use an abutment to finish off the BR06 roadway deck in the ROB.
5. The survey appears correct and there were no issues with processing. I'm going to change the centerline for now and we can get the survey crew to verify next time they are out there.
6. N-value lowered from 0.03 to 0.015
7. Yeah bridge 9 has been torn down.
8. Reach lengths updated.
9. C/E coefficients added.
10. Bridge 1 and the majority of other bridges were switched to pressure/weir.
11. Starting slope changed from 0.003 to 0.001.
12. Flowpaths extended.

APPROVED chm 3-31-11

III. HEC-RAS MODEL REVIEW:

Reviewer's Initials: chm Date: _____

Modeler's Initials: sar Date: _____

SUBMITTED ITEMS:

Name of RAS Project: Swampoodle_Creek.prj

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☐ Discharge Points Locations
- ☒ N-values shape file
- ☒ Any previous study workmaps Several CE XS files
- ☒ Road network for names

Description of modeler's assumptions, notes, or special situations.

- ☐ Check RAS output
- ☒ N-value table
- ☒ Any record plans needed
- ☒ Descriptions of assumptions
- ☐ Any special situation

TECHNICAL REVIEW:

- ☒ Discharge Locations and Values
- ☒ Starting boundary conditions
- ☒ Cross Section Geometry-needs to extend to limits of floodplain
- ☒ Manning's n values
- ☒ Contraction and expansion Coefficients
- ☒ Bridge/Culverts
- ☒ Ineffective flow-Top widths
- ☒ Special Features (weirs, overflow, split)
- ☒ Profiles
- ☒ Errors, Warning and Special Notes
- ☐ Check-RAS

REVIEW COMMENTS:

1. Modeler Note 1: I did not attempt to work out any crossing profiles yet. Thought I would wait until after your first review to avoid doing this process twice. There are only a few on SwampWest and SwampMain, but SwampEast is a little messy.
2. Modeler Note 2: Swampoodle West: SPCWC-BR01 is currently modeled using the multiple opening analysis and the combined downstream discharge is applied upstream of SwampEast, eventhough the 54" culvert outlets downstream of SwampEast. The diversion rating for this area currently uses both culvert groups (the 2 box culverts and the 54" culvert) in the bridge opening analysis and the curved railroad to the south as the lateral weir. I guess the 6x4 & 6X6 culverts could be modeled as a separate diversion, but I wanted you to review the current solution before trying anything new. I like the way you have the diversion. But, I couldn't find this diversion model you are talking about (but it does seem reasonable approach). I think it's fine to be a little conservative with Q on xsec 12567 and 12894 (otherwise would have to be unconservative or add in per multiple opening results or another diversion) unless you want to look at this some more.
3. Modeler Note 3: Swampoodle Main: At 40th street, the effective model applied the upstream DA discharge from both the east and the west side of the railroad upstream of 40th street. I made the same assumption instead of creating another diversion rating in this location, which is a conservative approach. I applied the Q from B_SPC2 at 17307 and B_SPC3 at 17057. **CAN YOU CHANGE AND NOTE THIS IN THE DISCHARGE SPREADSHEET THEN. IT STILL SAYS BREAK IS AT 16568.**
4. See preQC for types of ineffectives I changed. Paticularly 1606, 1970,
5. Your top of road wasn't cosistent with ds face and upstream face of bridge 2.
6. Starting slope coincident based on current effective.
7. APPROVED CHM 4-12-11

RESPONSE TO COMMENTS:

1.

IV. FLOODWAY MODEL:

Reviewer's Initials: _____ Date: _____

Modeler's Initials: _____ Date: _____

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☐ N-values shape file
- ☒ Any previous study workmaps
- ☒ Road network for names
- ☒ Floodway Points
- ☒ Floodway Lines

TECHNICAL REVIEW:

- ☒ Discharge consistent with multiple profile plan
- ☒ Surcharges between 0 and max allowed
- ☒ Check starting boundary conditions with friction slope
- ☒ Negative surcharges

REVIEW COMMENTS:

1. Why is there some effective flow on 1828? Seems like this should be ineffective and then the floodway wouldn't have to get so wide. Check ineffectives upstream too. (Looks like this will make a big difference in floodplain for quite awhile, so really think this through.)
2. You should not pull the floodway in to bridge opening at bridges. See 1970. Hold the FW at the face according to DS and US sections (notice wier flow in xsec view).
3. Looks like the left ineffective at 2117 is too wide also. Even if you decide it's ok, the floodway could still be pulled in 90 feet or so without messing up surcharge and creating a smoother floodway.
4. Please smooth out the left bank floodplain/floodway between 2376 and 2477.
5. I would not edge match the floodplain just downstream of 4443. Sort of round that small part off to where theres a small 100-year triangle outside floodway.
6. I'd probably smooth floodway just above 4812 too rather than edgematching.
7. Please smooth out the jags above 5656 in floodplain/floodway. I know the floodplain needs to go around those contours, but it could be less jaggedy.
8. Follow existing floodway upstream of 6252, but then smoothly transition to narrower floodway rather than having that bulge that is edge matching floodplain. And smooth those other jags upstream of there.
9. The floodplain/floodway should be connected through above 7303 since it's a bridge.
10. Please smooth the left bank upstream of 7747.
11. Looks like you could have held the FIRM right bank a little better between 10292 and 10601.
12. The three jogs upstream and downstream of 12567 should not be there.

new comments:

13. The tie to Days/Nix will need cleaned for LOMR submittal (you will probably need to adjust your 275 bfe).
14. The 285 us of rr should be 286. The 286 us of next rr should be 287. Add a 296 at 8897 (you probably don't need the 298 if it's crowded).
15. 1370 is a bridge so it should be connected through not broken (right? not sure why this one broken and the other non-overtopped not).

(16. and my floodway changes reflected in mapping?)

RESPONSE TO COMMENTS:

1. Not sure why we had effective flow on 1828 but I agree that the right overbank should be ineffective based on deck elevation forcing flow through the bridge opening only for BR01. There does not appear to be a relief opening for BR01 based on ortho and contours. WSELs increased almost 3' for high flow events with crossing profiles when 1828 made ineffective; however, when I switched the bridge modeling approach to pressure/weir for high flows for BR02 the model stablized and WSELs lowered to only show around a 1' increase for 100YR compared to when we previously allowed effective flow for 1828.
2. Floodway adjusted through bridge upstream of 1970.
3. I agree, the ineffective at 2117 was pulled in along with the floodway.
4. Floodplain/Floodway smoothed between 2376 and 2477.
5. Floodway adjusted just downstream of 4443.
6. Floodway smoothed just upstream of 4812.
7. Floodplain/Floodway smoothed upstream of 5656.
8. Floodplain/Floodway adjusted upstrem of 6252 as suggested.
9. Floodplain/Floodway connected through bridge upsteam of 7003.
10. Leftbank smoothed upstream of 7747.
11. Floodway adjusted to match right bank FIRM between 10292 and 10601.
12. The jog downstream of 12567 was kept since this is the relief channel from SwampWest which is modeled as floodway. Jog upstream adjusted.
13. Will do for LOMR submittal.
14. BFEs adjusted per comments. I did keep the 298 BFE.
15. Should be connected through, not sure what happened here. I connected the floodplain and floodway through.
16. Floodway updated using revised encroachments.

APPROVED chm 1-20-11 (except tie in Days during LOMR)

QA/QC APPROVAL:

Hydraulic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____ Date: _____

Task Leader:_____ Date: _____

Project Manager: _____ Date: _____

Principal in Charge: _____ Date: _____

Hydraulics QA/QC Checklist

Stream Name: Swampoodle Creek West Channel

Modeler's Name: Scott Rushing

Model Name: Swampoodle Creek West Channel

Reviewer's Name: Cindy Mosier

I. CROSS SECTION LAYOUT:

Reviewer's Initials: chm Date: November 17, 2010

Modeler's Initials: sr Date: October 27, 2010

SUBMITTED ITEMS:

ArcMap project file name: Swampoodle_Creek_GeoRAS.mxd

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Q3 or Current Floodplains
- ☒ Watershed Location
- ☒ Any previous study workmaps _____
- ☒ Road network for names

TECHNICAL REVIEW:

- ☒ Cross Sections Extend to Assumed Limits of Floodplains
- ☒ Reasonably perpendicular to flow
- ☒ Reasonable location of the 4 bridge cross section
- ☒ Reasonable spacing
- ☒ Reasonable transitions, constrictions and expansion on floodplain

REVIEW COMMENTS:

1. Consider adding 2 xsec between 452 and 935.
2. Do these xsec still work with what we learned in field visit (i.e. the dam that blocked the stream)?

RESPONSE TO COMMENTS:

1. I only added 1 xsec to be consistent with xsec spacing on Swamp main.
2. Xsec work.

II. RAS GEOMETRY:

Reviewer's Initials: chm Date: February 22, 2011

Modeler's Initials: sar Date: _____

SUBMITTED ITEMS:

ArcMap project file name: _____

- ☒ ArcMap project has all files listed in Milestone I
- ☒ Stream Centerline Texarkana_Streams.shp
- ☒ Flowpaths
- ☒ Field Surveys sketches, photos, and points file
- ☒ Bridge Record Plans _____
- ☒ Stationing assumptions and calculations for field surveys _____
- ☒ Manning's n-values assumptions

TECHNICAL REVIEW:

- ☒ Top of bank at reasonable locations
- ☒ Bridge Geometry Corresponds to Surveys or Record Plans
- ☒ Bridge Geometry assumptions documented
- ☒ Contraction and expansion coefficients
- ☒ Proper use of Ineffective flow areas
- ☒ Reasonable Manning's n-values
- ☒ No Crossing profiles

REVIEW COMMENTS:

1. I guess I never did a cross check of your xsec. The xsec do not work with what we learned in field. Your inline weir needs to have 4 xsec just like a bridge or culvert. See page 8-3 of Hydraulics Reference Manual if need help. (It will also need expansion/contraction coefficients.)
2. Seems like n values didn't work out right here either. why is this? See xsec 49 - there should be some .075 on left bank.
3. Needs to add your contraction/expansion coefficients.
4. Bridge 1 - your description is not matching your entrance loss coefficients. check to see which is correct. Check all.

RESPONSE TO COMMENTS:

1. Ok, the inline weir now has the 4 required sections.
2. I'm not sure why this happened in some places, but I've checked all Xsecs for all 3 Swampoodle streams and I updated any sections that didn't match the N-value shapefile.
3. C/E coefficients added.
4. Description was incorrect. Entrance loss coefficient updated. All other bridge culverts were checked also.

APPROVED CHM 4-12-11 - EXCEPT MAKE SURE STARTING WSEL STILL CURRENT AFTER ADDRESS SWAMP COMMENTSand we're actually chaning the starting a bit!!!. - **now approved 4-12-11.**

III. HEC-RAS MODEL REVIEW:

Reviewer's Initials: chm Date: _____

Modeler s Initials: sar Date: _____

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☒ N-values shape file
- ☒ Any previous study workmaps Several CE XS files
- ☒ Road network for names

Description of modeler's assumptions, notes, or special situations.

- ☐ Check RAS output
- ☒ N-value table
- ☒ Any record plans needed
- ☒ Descriptions of assumptions
- ☐ Any special situation

TECHNICAL REVIEW:

- ☒ Discharge Locations and Values
- ☒ Starting boundary conditions
- ☒ Cross Section Geometry-needs to extend to limits of floodplain
- ☒ Manning's n values
- ☒ Contraction and expansion Coefficients
- ☒ Bridge/Culverts
- ☒ Ineffective flow-Top widths
- ☒ Special Features (weirs, overflow, split)
- ☒ Profiles
- ☒ Errors, Warning and Special Notes
- ☒ Check-RAS

REVIEW COMMENTS:

1. Approved chm 4-12-11 - .

RESPONSE TO COMMENTS:

1.

IV. FLOODWAY MODEL:

Reviewer's Initials: _____ Date: _____

Modeler's Initials: _____ Date: _____

SUBMITTED ITEMS

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☐ N-values shape file
- ☒ Any previous study work maps
- ☒ Road network for names
- ☒ Floodway Points
- ☒ Floodway Lines

TECHNICAL REVIEW:

- ☒ Discharge consistent with multiple profile plan
- ☒ Surcharges between 0 and max allowed
- ☒ Check starting boundary conditions with friction slope
- ☒ Negative surcharges

REVIEW COMMENTS:

1. I added blocked obstruction at 452 so model and mapping would match. No action necessary. (Did not affect results.)
2. I think you could fit a 314 bfe parallel and just upstream of the road.
3. Please add another 315 bfe just downstream of LDs.
4. Don't truncate the ultimate at lds (you can get from draft).

RESPONSE TO COMMENTS:

1. OK.
2. 314 BFE added just upstream of RR.
3. 315 BFE added just downstream of LDS.
4. 100yr Ult. extended.

Approved chm 1-18-11

QA/QC APPROVAL:

Hydraulic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____ Date: _____

Task Leader:_____ Date: _____

Project Manager: _____ Date: _____

Principal in Charge: _____ Date: _____

Hydraulics QA/QC Checklist

Stream Name: Wagner Creek

Modeler's Name: Scott Rushing

Model Name: South Wagner Creek

Reviewer's Name: CHM/BP

I. CROSS SECTION LAYOUT:

Reviewer's Initials: BP Date: October 11, 2010

Modeler's Initials: SR Date: _____

SUBMITTED ITEMS:

ArcMap project file name: Wagner Creek GeoRas.mxd

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Q3 or Current Floodplains
- ☒ Watershed Location
- ☒ Any previous study workmaps _____
- ☒ Road network for names

TECHNICAL REVIEW:

- ☒ Cross Sections Extend to Assumed Limits of Floodplains
- ☒ Reasonably perpendicular to flow
- ☒ Reasonable location of the 4 bridge cross section
- ☒ Reasonable spacing
- ☒ Reasonable transitions, constrictions and expansion on floodplain

REVIEW COMMENTS:

In general, I would zoom in and make sure that all bridge cross sections are as close to face of structure as possible without being located in the roadside ditch or on fill. Most look fine but I saw several that could be closer. Also, make sure that the expansion cross-section is a reasonable distance from the downstream of structure XS.

1. Remember these aerial crossing south of State Hwy 93 when you start the HECRAS model. We need to increase the N Value. - Bookmark 1
2. Keep XS parallel to RR (south of Hwy 93) for a little farther west. Make sure that second opening is included in Survey Request. - Bookmark 2.
3. Need to extend the 4 most downstream Xsecs farther west. A couple of them are in a pond.
4. Add another XS downstream of Garber. - Bockmark 3
5. Add another XS downstream of Findley. - Bookmark 4
6. Probably should try to extend XS 14179, 14110, and 14302 straight north instead of crossing road. Crossing road should be a last resort. - Bookmark 5.
7. Extend Xsecs 18167, 18276, and 18654 farther east. Make sure that two relief bridges are included in survey request. Add XS downstream of XS 18167. - Bookmark 6.
8. I think 21898 and 22079 should stay on the upstream side of the ramp and redwater. - Bookmark 7.
9. Add XS downstream of XS 28965. Bookmark 8.
10. Add XS downstream of XS 33453. Bookmark 9.
11. Add XS upstream of XS 33903. Bend XS 33903 upstream on the east side to parallel the future frontage road. We may need to survey the opening on Stream WC-1. - Bookmark 10.
12. Add XS farther upstream so that floodplain can extend completely past the City boundary. - Bookmark 11.

chm comments:

1. I suppose we need to add those two DS RR to model since current effective has them. Hopefully, we can use the effective model rather than survey. Actually, I guess that is outside study extents, but we definitely need to include the model ds of there.
2. I moved your most ds expansion xsec way closer to bridge.
3. I added an expansion xsec for Bridge 2 (you can see your old version in preQAQC shapfile).
4. I moved and added several expansion/contraction xsec. See preQC for comparison. Please apply comments from previous QC before you give me new ones. These are the same types of comments from Swampoodle. Ben also mentioned above that they were too far apart.
5. QC1 - I cleaned up this area a bit.
6. QC2 - I added a xsec here. Spacing was starting to get a bit extreme.
7. QC3 - Looks like current effective has a bridge here. I think I see it on orthos. I'm also curious why they have the 3 xsec ds of there. Check current effective profile and model.

RESPONSE TO COMMENTS:

1. OK. -SAR
2. XS parallel RR farther west to include second opening. - SAR
3. Trimmed Xsecs short of pond. - SAR
4. XS added. - SAR
5. XS added. - SAR
6. XS extended north to parallel road. - SAR
7. I think you meant extend farther west instead of east to include the additional relief structure? Xsecs mentioned were extended west and a XS was added downstream of 18167. - SAR
8. US Xsecs adjusted to stay on the upstream side of the ramp and redwater. - SAR
9. XS added. - SAR
10. XS added. - SAR
11. XS added. - SAR
12. XS added - SAR

approved chm 12-23-10 (except start model with current effective)
CHM Comment 7: Current effective model does have a bridge here. Bridge Xsecs were added at this location. I checked the effective profile and model and I think the 2 just ds are the bridge sections and the third is used as the section just upstream of Cowhorn. SAR [OK chm.]

II. RAS GEOMETRY:

Reviewer's Initials: ALW Date: April 4, 2011

Modeler's Initials: SAR Date: February 28, 2011

SUBMITTED ITEMS:

ArcMap project file name: _____

- ☒ ArcMap project has all files listed in Milestone I
- ☒ Stream Centerline Texarkana_Streams.shp
- ☒ Flowpaths
- ☒ Field Surveys sketches, photos, and points file
- ☒ Bridge Record Plans _____
- ☒ Stationing assumptions and calculations for field surveys _____
- ☒ Manning's n-values assumptions

TECHNICAL REVIEW:

- ☒ Top of bank at reasonable locations
- ☒ Bridge Geometry Corresponds to Surveys or Record Plans
- ☒ Bridge Geometry assumptions documented
- ☒ Contraction and expansion coefficients
- ☒ Proper use of Ineffective flow areas
- ☒ Reasonable Manning's n-values
- ☐ No Crossing profiles

REVIEW COMMENTS:

1. Modeler Comment 1: XS 31276 hits a local low point at approx. sta. 675 that has no conveyance and was manually removed instead of modeling as a blocked obstruction.
2. Modeler Comment 2: There is a description for each cross section noting how the surveys were used and sections with interpolated flowlines. Occasionaly the upstream bridge survey from one bridge was used for the channel on the downstream end of the bridge just upstream of it. Ex. At Loop 151, BR13 upstream survey used for downstream channel of BR14.
3. Modeler Comment 3: For the top of road for I-30 and I-30 frontage road, I used the survey elevations where we had survey and used the TxDOT I-30 plans we received to interpolate the deck extensions.
4. Review Comments: Add a description to the RAS model with name, date, location, avo, general comment/notes.
5. You might change the name of the geometry. The Existing looks odd in the ultimate flow plan.
6. Check the reach lengths for XS 39298, 38740, 37629, 35638, 34623.
7. Check banks stations on XS 34203. Centerline is not contained.
8. Banks stations are much wider than ortho for XS 20846, 26793, 33218. Banks stations could be wided based on orthos for XS 20103-21607, 33750-33771. I exported the bank stations from RAS and created a shapefile called Wagner_Bank_Station_QAQC. I saved it in the Wagner GeoRAS folder. Also double check banks stations in the RAS profile view. There are several big jumps between cross sections.
9. Bridge at XS 750 Texas Pacific RR- Extend top of road along the entire xs. Add Yarnell to Bridge Modeling approach. Pier shape K = 1.05 (from HEC-2 model)
10. Bridge at XS 1545 - Extend top of road to along entire XS. I could not find this bridge in the HEC-2 .dat file.
11. BR01 - Extend the top of road to the end of the XS.
12. BR02- Extend the top of road to the end of the XS. Change bridge width to 73' to match the note on the survey field notes. Double check top of road. There are two 1' spikes above the bridge opening that don't seem to match the survey.
13. BR03 - Bridge width measures 45 feet along the stream centerline. Are you modeling the rails? If so they need to be added to the top of road.Add wider pier width (guessing 2 ft like BR04) to the top of the pier. Add ineffectives for the contraction and expansion.
14. BR04-Double check ineffective areas. Gaurdrails need to be added to the top of road. Add wider pier width to the top of the pier.
15. BR06- Should the road block out more than just the area over the bridge? Pull elevation from contours for top of road for area outside of survey. Ineffectives need to be checked. Double check bridge width (I measure 49').
16. BR07 - change bridge width to 10' to match the survey field notes. Double check ineffective areas
17. BR-Access-RR - Add wider pier width at top of pier.
18. BR08 - Add wider area of the pier. No ineffectives on the bridge. The picture of the bridge looks like you need sloping abutments. or maybe concrete shown in the n-values for the overbanks under the bridge.
19. BR09- Same as BR08 with the abutments or concrete in the n-values for the area under the bridge. Double check your pier location. It seems to be on opposite sides of the flowline between the US and DS.
20. BR10-Add a note in the description with the survey name of each bridge WC10, WC10A and WC10B. Bridge WC10A seems to be missing a pier. Double check pier widths with survey for WC10B and WC10A.
21. BR11 - Change bridge width to 50' to match survey field notes.
22. BR14 - Double check bridge width along channel. I calculate 133'. Abutments look odd due to the location of the bounding cross-section. Maybe you should take out all but the upstream left abutment. The channel geometry seems to take care of the others. Double check ineffectives.
23. BR15-Add guardrail to top of road.
24. BR16 - Add note to description for the survey name for each opening. Double check culvert centerline stations. The are different for US and DS. Centerline needs to be adjusted between xs 33750 and 33444 to show flow through culvert. This will change reach lengths between the cross sections.
25. BR17 - Add note to description for the survey name of each opening. Double check top of road, especially the left side (340'). BR17A - Ineffective is inside of the culvert on ds side.
26. See Wagner Q-Break email for c break comments
27. Double check channel inverts to make sure that the sections pulled from the TIN make sense with the survey. There are some big jumps in channel inverts.Also double check banks stations to make sure that they have smooth and consistent transistions
28. Crossing profile on 33444. May go away with previous comments.
29. Consider ineffectives where RAS is computing split flow to make sure all the areas are effective or if ineffectives are needed.

RESPONSE TO COMMENTS:

1.
2.
3.
Review Comments
4. RAS model description addded.
5. Geometry name changed to Wagner Creek Geometry.
6. Reach lengths are correct, no changes made.
7. Bank stations adjusted for XS 34203.
8. Bank stations moved in for XS 20846, 26793, and 33218. Channel manually shifted for XS 33218 to contain centerline. XS 21030-21607 bank stations seem appropriate based on surveys, therefore were not widened. XS 33750 channel copied to 33762 and bank stations adjusted. Channel manually shifted for XS 33762 to contain centerline.
9. Bridge not extended. Permanent ineffectives used in overbanks where bridge deck was cutoff. Yarnell and Pier shape K added to model from HEC2.
10. Bridge not extended. Permanent ineffectives used in overbanks where bridge deck was cutoff.
11. Bridge not extended. Permanent ineffectives used in overbanks where bridge deck was cutoff.
12. Bridge deck width changed to 73' to match survey notes. Top of road smoothed using only TR survey shots and not the interpolation top of road points for LC and End/Begin shots from survey processor tool. Manual interpolation was used for top of road elevations for LC and End/Begin shots based on their station.
13. Bridge width changed to 45 ft. The rails were not modeled for this bridge or any other bridge where the rails were open. Rails were modeled only when they were solid. Pier width added to top of pier (2ft like BR04). Ineffectives were not added since this bridge is overtopped by the 2yr event.
14. Ineffectives were not added since this bridge is overtopped by the 2yr event. Ineffectives in this area are from the expansion of BR05. Guardrails not added since they are open. 2ft pier width added to top of pier.
15. Roadway adjusted in overbanks to follow tin. Bridge width adjusted to 49'. Ineffectives were not added since this bridge is overtopped by the 2yr event.
16. Bridge deck width changed to 10' to match survey notes. Ineffectives were not added since this bridge is overtopped by the 2yr event.
17. Wider pier width added to top of pier.
18. The beam above the pier appears to be the same width as the pier itself from the photos so I did not add a wider pier section. Ineffectives removed from bridge. Channel geometry takes care of the abutments.
19. Abutments are in there but the channel geometry takes care of the majority of the abutments. Pier location adjusted to be on the same side of the centerline and in the location seen in the photos.
20. Description added to ID bridge survey openings. LC extents did not contain all 7 piers for WC-BR10A. All 7 piers manually shifted 6 feet east. Pier widths checked in survey text file description and adjusted accordingly.
21. Bridge width adjusted to 50.
22. Bridge width adjusted to 130'. Right abutment removed, left abutment still in model geometry.
23. Guardrail added.
24. Description added with survey ID. Culvert centerline stations good. Centerline adjusted and reach lengths updated.
25. Description added with survey ID. Ineffective adjusted on DS side. Top of road taken from TxDOT plan set for entrance ramp in LOB.
26. Q-break at XS 16554 moved to 15547.
27. XS 7926 Channel and flowline adjusted using the US channel survey for WCBR-07. The channel geometry between BR07 US survey and WC-XS05 survey are very similar and it seemed appropriate to splice in the WCBR-07 US channel survey for XS 7926. A few bank stations were slightly adjusted to smooth transitions.

III. HEC-RAS MODEL REVIEW:

Reviewer's Initials: chm Date: _____

Modeler's Initials: SAR Date: February 28, 2011

SUBMITTED ITEMS:

Name of RAS Project: Wagner_Creek.prj

Name of RAS Plan: Wagner_Creek_Multi-Profile

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☐ Discharge Points Locations
- ☒ N-values shape file
- ☒ Any previous study workmaps Several CE XS files
- ☒ Road network for names

Description of modeler's assumptions, notes, or special situations.

- ☐ Check RAS output
- ☒ N-value table
- ☒ Any record plans needed
- ☒ Descriptions of assumptions
- ☐ Any special situation

TECHNICAL REVIEW:

- ☒ Discharge Locations and Values
- ☒ Starting boundary conditions
- ☒ Cross Section Geometry-needs to extend to limits of floodplain
- ☒ Manning's n values
- ☒ Contraction and expansion Coefficients
- ☒ Bridge/Culverts
- ☒ Ineffective flow-Top widths
- ☒ Special Features (weirs, overflow, split)
- ☒ Profiles
- ☒ Errors, Warning and Special Notes
- ☐ Check-RAS

REVIEW COMMENTS:

1. Modeler Comment 1: Known WSEL used for boundary condition from Days Creek HEC-2 model. 2yr, 5yr, 25yr, and 250yr known WSEL interpolated based on Wagner Q at outlet since we don't have these profiles for Days.
2. Modeler Comment 2: Bridges with multiple openings were modeled using the multiple opening analysis.
3. Modeler Comment 3: For WC-BR01, the ROB was set as ineffective because I could not find an additional culvert crossing south along the RR. It appears the water is forced to come back north through the relief bridge.
4. Modeler Comment 4: Ineffectives associated with BR05 RR Bridge were set above the 500yr for model stability.

RESPONSE TO COMMENTS:

1.

IV. FLOODWAY MODEL:

Reviewer's Initials: _____ Date: _____

Modeler's Initials: _____ Date: _____

SUBMITTED ITEMS:

Name of RAS Project: _____

Name of RAS Plan: _____

ArcMap project file name: _____

- ☒ GeoRAS Geodatabase
- ☒ Study Stream Centerlines-for Scoping Categories
- ☒ Topographic Maps
- ☒ Images
- ☒ Preliminary floodplain runs
- ☒ Watershed Location
- ☒ Discharge Points Locations
- ☐ N-values shape file
- ☒ Any previous study workmaps
- ☒ Road network for names
- ☒ Floodway Points
- ☒ Floodway Lines

TECHNICAL REVIEW:

- ☒ Discharge consistent with multiple profile plan

☒ Surcharges between 0 and max allowed
☒ Check starting boundary conditions with friction slope
☒ Negative surcharges

REVIEW COMMENTS:

1. We aren't adding floodway downstream of city limits. I removed your enroachments downstream of city. Ideally, we would start the model at xsec 1455 with a 1.0' surcharge. The model will not work with/without encroachments with this surcharge. The maximum starting surcharge with/without enroachments is 0.45'. If the county ever establishes a floodway, they will realize this is the case when they try to etablish it (unless of course things change and at the time they are able to create a higher surcharge).
2. I moved 1729, 2758 left to ineffective. I moved 7125-7926 to better match effective. I moved 14179 left to make negative round to 0.0. FIX MAPPING.
3. I added blocked obstruction to 41599,41036,2899 left since isolated pond not shown on mapping. I added 8838 left ineffective per mapping.
4. Add the island back in near 8838 since current effective showed it. I would fill it in near the upstream side where it enters the floodway just to keep a smooth floodway.
5. The 265 and 268 bfe need deleted to tie with Days Creek. Try to add 269 ds of RR. add 270 and 271 ds and us of next RR.
6. Do you have lettered xsecs?

RESPONSE TO COMMENTS:

1. OK. FW Mapping revised.
2. FW Mapping revised.
3. OK.
4. Island added back near 8838.
5. BFEs adjusted per comments.
6. Letter XS were created and can be found in the location below: N:\27000s\27093\GIS\Mapping\FP_Mapping\Final_Mapping\Final_Report\Texarkana_Letter_XS_Final.shp

Approved chm 1-17-12 (except fix 269 bfe and or Days floodplain to tie)

QA/QC APPROVAL:

Hydraulic QC review is in compliance with the contract requirements and all task "check points" are complete. Task checklists have been appropriately documented and signed by the reviewer, approved by the QA Manager and then forwarded to the production team along with all check prints/drafts and text. A meeting was conducted with the QC Team and Production Team to formally review the QC comments and resolve any problems/conflicts. Task production leaders have signed the QC document to confirm that all comments are received, addressed and documented appropriately.

QA Manager:_____Date: _____

Task Leader:_____Date: _____

Project Manager: _____Date: _____

Principal in Charge: _____Date: _____

Appendix G
TWDB Review Comments

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www twdb.state.tx.us
Phone (512) 463-7847, Fax (512) 475-2053

December 19, 2011

Kyle Dooley, P.E.
City of Texarkana
West 3rd and Texas Boulevard
Texarkana, Texas 75501

Re: Flood Protection Planning Grant between the Texas Water Development Board (TWDB) and the City of Texarkana (City); TWDB Contract No. 1004831090, Draft Report Comments

Dear Mr. Dooley:

Staff members of the TWDB have completed a review of the draft report prepared under the above referenced contract. ATTACHMENT I provides the comments resulting from this review. As stated in the TWDB contract, the City will consider incorporating draft report comments from the EXECUTIVE ADMINISTRATOR as well as other reviewers into the final report. In addition, the City will include a copy of the EXECUTIVE ADMINISTRATOR'S draft report comments in the Final Report.

The TWDB looks forward to receiving one (1) electronic copy of the entire Final Report in Portable Document Format (PDF) and six (6) bound double-sided copies. The City shall also submit one (1) electronic copy of any computer programs or models, and, if applicable, an operations manual developed under the terms of this Contract.

If you have any questions concerning the contract, please contact Ivan Ortiz, the TWDB's designated Contract Manager for this project at (512) 463-8184.

Sincerely,

Carolyn L. Brittin
Deputy Executive Administrator
Water Resources Planning and Information

Enclosures

c: Ivan Ortiz, TWDB

Our Mission

To provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water for Texas

Board Members

Edward G. Vaughan, Chairman
Joe M. Crutcher, Vice Chairman
Thomas Weir Labatt III, Member
Lewis H. McMahan, Member
Billy R. Bradford Jr., Member
Monte Cluck, Member

Melanie Callahan, Executive Administrator

Attachment 1

Draft Report Review for Contract No. 1004831090
City-Wide Flood Protection Planning Study for the City of Texarkana, Texas

1. Please conduct a final edit for typos, grammar, inconsistent usage of acronyms, and abbreviations. Final report edited/reviewed.

2. Please indicate the location of the Reference list in the Table of Contents. References listed in Table of Contents.

3. Section 2.1; is provided as a community and watershed description while no watersheds or creeks are listed in this section. Please include a description of the major watersheds found in the study area, similar to what is found in Section 3.1. Major watersheds were listed with reference to the total drainage area for this study.

4. Section 2.1, last paragraph; seems to include a description that is solely associated with the Wagner Creek Watershed. Please amend to include a description of the entire study area. Description revised to reference entire study area.

5. Section 2.3, second paragraph, third sentence; notes that flooding conditions exist near the Howard Creek confluence but does not name the stream with which Howard Creek is confluent relative to the statement. Please amend to include the second stream. Howard Creek confluence stream name included.

6. Section 3.3.5, second sentence discussing the Muskingum-Cunge Routing Method appears to include a typo. Please review and correct this sentence. Sentence corrected.

7. Section 3.3.7; does not include citing and reference of "TP-40" for rainfall adjustment. Please include citing and reference for this in the Reference section. Citing and reference included for TP-40.

8. In general, the study follows standard methodologies and practice. Mitigation alternatives identified by the study are eligible for funding under the Board's financial assistance programs. Application requirements and eligibility criteria is identified by Board rules specified in Section 363 of the Texas Administrative Code. The report would be appropriate for use in support of an application to the Board for financing the proposed improvements. All additional information required by Board rules, 31 TAC 363.401-404, as well as necessary information to make legal findings as required by Texas Water Code Chapter 17.771-776, would be required at the time of loan application.

Appendix H
Digital Data