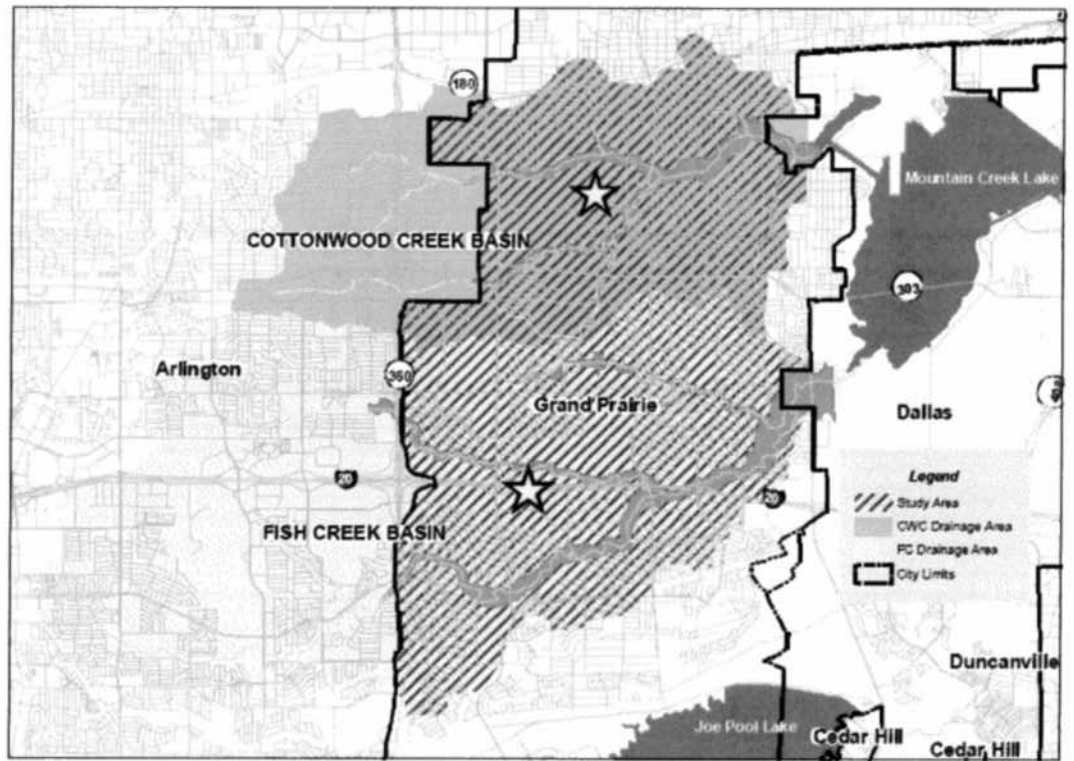


Final Report

COTTONWOOD AND FISH CREEKS Flood Protection Plan



Texas Water Development Board

City of Grand Prairie



January 11, 2011

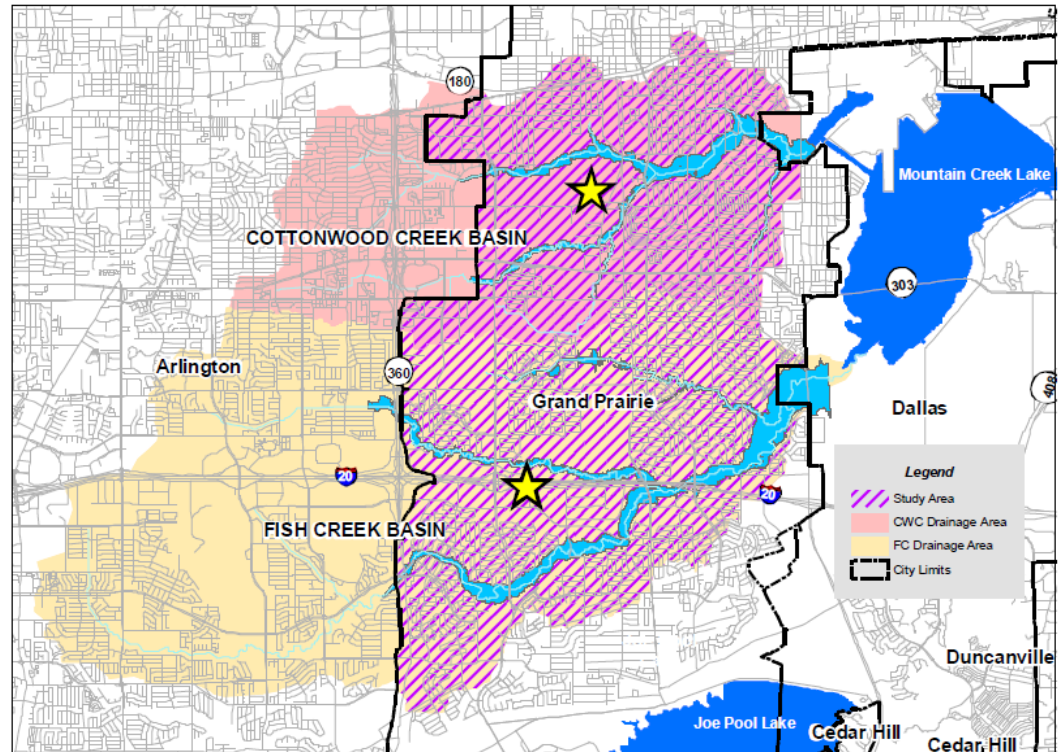
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COTTONWOOD AND FISH CREEKS Flood Protection Plan



Texas Water Development Board

City of Grand Prairie



January 11, 2011

Project No. 08073.00

**COTTONWOOD AND FISH CREEKS
FLOOD PROTECTION PLAN**

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January 11, 2011

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EXECUTIVE SUMMARY

The Cottonwood and Fish Creeks Flood Protection Plan is an engineering analysis of the flooding risks facing both Cottonwood and Fish Creek Basins, as well as a planning analysis of mitigation of these flooding risks. This project was funded by the Texas Water Development Board (TWDB) and the City of Grand Prairie. This project developed comprehensive hydrologic and hydraulic models for both watersheds within and upstream of the City of Grand Prairie to be utilized in developing flood protection alternatives (both structural and non-structural) within the City of Grand Prairie.

Separate detailed hydraulic analyses were performed, one for the Cottonwood Creek Basin and the second for the Fish Creek Basin. These hydraulic analyses computed the water surface elevations for the 50%, 20%, 10%, 4%, 2%, 1% and 0.2% annual chance (2-, 5-, 10-, 25-, 50-, 100- and 500-year, respectively) existing condition storm events and the ultimate conditions 1% annual chance event. Each of the hydraulic analyses included the delineation of the existing conditions 1% and 0.2% annual chance floodplains, and the ultimate conditions 1% annual chance floodplains:

- The Cottonwood Creek analysis began at Mountain Creek Lake and extended to the City of Grand Prairie's boundary with Arlington. This analysis encompassed 16.5 miles of stream and included South Cottonwood Creek, Warrior Creek, Plattner Creek, Indian Hills Branch and Daniel's Branch. During the course of the study, the City of Grand Prairie initiated the construction of its Central Park Facilities at the intersection of Arkansas Lane and S.H. 161, within the Cottonwood Creek Basin.
- The Fish Creek analysis also began at Mountain Creek Lake and extended to the City of Grand Prairie's boundary with Arlington. The analysis consisted of 28.2 stream miles of Fish Creek, Prairie Creek, Kirby Creek, South Kirby Creek, and Brian Branch. Construction of the Airport detention pond in the upper reaches of Kirby Creek as well as improvements to the Smith Investments and Pardue properties also in Kirby Creek were completed during this study. These improvements are detailed in a LOMR for Kirby Creek prepared by Half Associates dated January 2010. This information has been incorporated in the hydrologic (HEC-HMS) and hydraulic (HEC-RAS) models of this report.

The land uses for the majority of the existing 100-YR flood plains in the Cottonwood and Fish Creek basins consist of undeveloped land, parks and a golf course. In general, these uses are considered appropriate for areas subject to flooding. The parks and golf course are not usable during flooding, but are designed to minimize any damage. There are two primary areas where residences and businesses are located in the existing 100-YR flood plain and subject to flooding. The first is a group of apartments along Cottonwood Creek on both sides of Beltline Road. There are twelve buildings which are subject to flooding up to three and a half feet deep. The second area is located along Fish Creek between Bardin Road and Robinson Road. There are eight residences located in the 100-YR flood plain including the only repetitive loss structure in Grand Prairie. There are also two commercial buildings in the 100-YR flood plain along Robison Road. In addition to the residential and commercial buildings discussed above, there are 18 road crossings which are overtopped by a 100-YR storm.

A summary of the bridges showing the roads, the creek at each bridge, the highest storm each bridge will pass without being overtopped, the size and type of structure, roadway elevation and the existing 100-YR water surface elevation at each bridge is shown on the following table.

Roadway Crossings Overtopped by 100 YR-Storm

Cottonwood Creek Watershed Bridges					
City of Grand Prairie					
Roadway	Creek	Highest Storm the Bridge will Pass	Existing Structure	Existing Roadway Elevation	Existing 100-YR WSEL
SE 14th Street	Cottonwood	5 YR.	160' Bridge	461.88	465.63
Beltline Road	Cottonwood	5 YR.	340' Bridge	469.00	470.82
3rd Street	Cottonwood	2 YR.	130' Bridge	478.00	481.37
Carrier Parkway	Cottonwood	Overtopped by a 2 YR. storm	5-10'x5' MBC	481.00	485.49
Great Southwest Parkway	Cottonwood	2 YR.	5-10'x8' MBC	523.67	526.36
Carrier Parkway	South Cottonwood	2 YR.	4-9'x6' MBC	482.00	486.29
Marshall Drive	South Cottonwood	2 YR.	4-9'x6' MBC	493.57	496.45
Robinson Road	South Cottonwood	2 YR.	4-10'x6' MBC	494.67	497.17
Pioneer Parkway	South Cottonwood	25 YR.	3-8'x8' MBC	542.00	543.45
Great Southwest Parkway	South Cottonwood	25 YR.	3-10'x8' MBC	551.39	552.63
Beltline Road	Plattner	25 YR.	3-6'x6' MBC	494.33	495.42

Fish Creek Watershed Bridges					
City of Grand Prairie					
Roadway	Creek	Highest Storm the Bridge will Pass	Existing Structure	Existing Roadway Elevation	Existing 100-YR WSEL
Matthew Road	Fish	2 YR	120' Bridge	497.61	502.41
Great Southwest Parkway	Prairie	10 YR	4-10x9 MBC	533.53	537.20
Interstate Highway 20 Bridges					
Carrier Parkway	Fish	2 YR	120' bridge	481.00	486.66
I-20 W-Bound on-ramp	Fish	25 YR	228' bridge	485.35	488.92
I-20 E-Bound off-ramp	Fish	25 YR	177' bridge	489.00	489.31
I-20 Main Lanes	Fish	500 YR	245' bridge	494.00	488.90
Robinson Road	Fish	10 YR	180' Bridge	487.40	493.00
I-20 Main Lanes	Prairie	500 YR	280' bridge	499.97	491.35
Robinson Road	Prairie	25 YR	106' bridge	489.72	492.93

Three types of mitigation were considered in this study for the flooding discussed above; storage, buy-out and structural modification.

1. Storage normally consists of the construction of a large pond or series of small ponds designed to store a portion of the flood flow and release it slowly reducing the peak flow. This, in turn, lowers the flood levels. This approach provides benefits for the areas downstream of the storage, but can require the purchase of large areas of land.
2. The buy-outs option consists of purchasing structures located in the floodplain. The structures are removed and the property is converted to a use that is compatible with its location in the floodplain.

3. Structural modifications cover a wide variety of construction to increase conveyance, the most common being widening of the stream channels and enlarging bridges or culverts.

Each situation was examined to determine if one or more of these alternatives was applicable. The availability of sufficient open area for the construction of storage ponds is a significant factor in determining if storage can be considered because converting developed property to storage would be prohibitively expensive. Buy-out can only be considered as an option if there are residential or commercial buildings which are flooded. Several of the problem areas have bridges which are flooded but do not have any home or commercial building flooding associated with them. A summary of alternatives considered for those locations where multiple options exist follows for four of the most critical areas of flood impact for the City.

Beltline Road at Cottonwood Creek

This location has two types of flooding, apartments that are located in the floodplain and roadway overtopping. All three mitigation options were considered for this location. The buyout option has an estimated cost of \$4,500,000. The construction of detention storage facilities upstream of this location would have an estimated cost of \$4,719,000. Channel improvements have an annualized estimated cost of \$4,614,000. The estimated costs of these options are within five percent of each other and non-economic impacts should also be considered. The implementation of the storage option would not require the relocation of any residents, and all of the construction could be located within the city limits of Grand Prairie; therefore, EC recommends storage as the preferred mitigation option for this area.

Comparison of Mitigation Options at Beltline Road & Cottonwood Creek

		Fox Hollow & Cotton Creek Apartments	Beltline Road at Cottonwood Creek
Annualized Cost of Flood Damages		\$535,000	
BUYOUT	Principal	\$4,500,000	
	Annualized	\$362,639	
	Benefit Cost Ratio	1.5	
	Results	Apartments removed from floodplain	Street flooding not mitigated
STORAGE	Principal	\$4,719,000	
	Annualized	\$380,287	
	Benefit Cost Ratio	1.4	
	Results	Apartments removed from floodplain	Street flooding mitigated, flooding downstream is reduced
STRUCTURAL	Principal	\$4,614,000	
	Annualized	\$372,826	
	Benefit Cost Ratio	1.4	
	Results	Apartments removed from floodplain	Street flooding mitigated

Great Southwest Parkway at Cottonwood Creek

Two of the mitigation options were considered for this area. First, the construction of a storage area upstream of Great Southwest Parkway was examined. Second, structural improvements to the roadway, culvert, downstream channel and railroad bridge were reviewed. The storage option has an estimated cost of \$4,914,000, while the structural option has an estimated cost of \$4,713,000. The storage option is within five percent higher than the structural improvements cost. The proposed structural improvements will not reduce downstream peak flow magnitude, but the storage option will reduce the localized peak flow and the downstream peak flow.

Comparison of Mitigation Options at Great Southwest Parkway & Cottonwood Creek

		Cottonwood Creek at Great Southwest Parkway
Annualized Cost of Flood Damages		\$447,000
BUYOUT	Principal	N/A
	Annualized	N/A
	Benefit Cost Ratio	N/A
	Results	N/A
STORAGE	Principal	\$4,914,000
	Annualized	\$396,002
	Benefit Cost Ratio	1.1
	Results	Street flooding mitigated, flooding downstream is reduced
STRUCTURAL	Principal	\$4,713,000
	Annualized	\$379,804
	Benefit Cost Ratio	1.2
	Results	Street flooding mitigated

Marshall Drive & Robinson Road at South Cottonwood Creek

A structural and a storage option were considered for Marshall Drive & Robinson Road. The structural option, with an estimated cost of \$1,804,000, is much more economical than the storage option with an estimated cost of \$10,867,000. The storage option provides additional downstream benefits; however, even with this additional benefit, the structural option is significantly more economical and a much greater benefit-cost ratio. Therefore, the recommended option is the structural improvement.

Comparison of Mitigation Options at Marshall Drive & Robinson Road at South Cottonwood Creek

		Marshall Dr at South Cottonwood	Robinson Rd at South Cottonwood
Annualized Cost of Flood Damages		\$542,000	
BUYOUT	Principal	N/A	
	Annualized	N/A	
	Benefit Cost Ratio	N/A	
	Results	N/A	
STORAGE	Principal	\$10,867,000	
	Annualized	\$362,639	
	Benefit Cost Ratio	1.1	
	Results	Street flooding mitigated at both locations, flooding downstream is reduced	
STRUCTURAL	Principal	\$787,000	\$1,017,000
	Annualized	\$63,421	\$81,956
	Benefit Cost Ratio	3.7	
	Results	Street flooding mitigated at both locations	

Interstate Highway 20 at Fish Creek

The magnitude of the 100-YR flood flow, 30,000 cfs, compared to the capacity of the Carrier Parkway bridge, 7,100 cfs, provides an indication of the challenges involved in mitigating the flooding in this area. Buy-out, storage and structural mitigation projects were considered for this location. In all three of these options, the cost of the mitigation projects exceeded the benefits. The structural option of widening the Fish Creek channel downstream of Carrier Parkway approximately 3,000 feet and widening the bridge at Carrier to 170', replacing the existing concrete channel between Carrier and IH-20 with a 160' to 190' trapezoidal concrete channel and replacing the section under IH-20 with a 165' rectangular channel, has the lowest capital cost and therefore the best Benefit-Cost ratio. The total annualized cost of the damages is \$1,447,000, and the annualized cost of \$1,623,816 for the proposed improvements produces a BC ratio of only 0.89.

Comparison of Mitigation Options at Interstate 20 & Fish Creek

		Fish Creek between Bardin Rd. & Robinson Rd.	IH-20 at Fish Creek
Annualized Cost of Flood Damages		\$191,000	\$1,256,000
BUYOUT	Principal	\$3,400,000	\$0
	Annualized	\$273,994	\$0
	Benefit Cost Ratio	0.7	
	Results	Residential & Commercial structures removed from floodplain	Street flooding not mitigated

STORAGE	Principal	\$0	\$49,848,000
	Annualized	\$0	\$4,017,071
	Benefit Cost Ratio		0.3
	Results	Residential & Commercial structures removed from floodplain	Street flooding mitigated, flooding downstream is reduced
STRUCTURAL	Principal	\$0	\$20,150,000
	Annualized	\$0	\$1,623,816
	Benefit Cost Ratio		0.8
	Results	Residential & Commercial structures removed from floodplain	Street flooding mitigated.

S.E.14th Street at Cottonwood Creek

The water surface levels for the various storm events at this bridge are heavily influenced by the backwaters of Mountain Creek Lake. In fact, the normal lake level backs water into the creek channel under the bridge. The close proximity of Mountain Creek Lake reduces the viable structural options at this location to raising the bridge and roadway above the ultimate 100-YR flood level. However, this bridge is located within the city limits of Dallas, so a detailed cost estimate for this option was not performed. Improvements to this crossing would require negotiations between the Cities of Grand Prairie and Dallas.

3rd Street at Cottonwood Creek

The proposed improvements for this bridge include extending the 150-foot flat bottom channel from Beltline upstream to 3rd Street, raising the roadway approximately one foot and lengthening the bridge to 240 feet, which matches the proposed channel width. The estimated cost for this project is \$9,873,000.

Carrier Parkway at Cottonwood and South Cottonwood Creeks

Carrier Parkway crosses both Cottonwood and South Cottonwood Creeks in close proximity to their confluence. Structural modifications proposed include raising the roadway at both creeks to an elevation of 485.5, and constructing a 140-foot bridge across Cottonwood Creek and a 160-foot bridge across South Cottonwood. The estimated cost for improving both bridges is \$5,668,000.

Pioneer Parkway and Great Southwest Parkway at South Cottonwood Creek

Pioneer and Great Southwest Parkways are separated by a 2,000-foot reach of South Cottonwood Creek. The proposed improvement for Pioneer Parkway consists of adding a 10'x10' box culvert to the existing 3 barrel 8'x8' culvert. Limited space for construction requires that the existing box culvert at Great Southwest Parkway be removed and replaced with a four barrel 10' x 10' multiple box culvert. The improvements have an estimated cost of \$217,000 for Pioneer Parkway and \$326,000 for Great Southwest Parkway.

Beltline Road at Plattner Creek

The existing culvert is a three barrel 6' x 6' culvert. Constructing a fourth barrel for this culvert would allow it to pass the ultimate 100-YR event. The estimated cost for this project is \$139,000.

Matthew Road at Fish Creek

Matthew Road, north of Bardin Road and south of Butterfield Trail, is a four lane thoroughfare; however, the section between these locations is only a two lane road. The City of Grand Prairie’s Thoroughfare Master Plan shows that Matthew Road is to be re-routed and widened in the future. The existing bridge will be removed and design of the proposed bridge and roadway should be sized for the 100-YR flood event. Since the proposed re-route has not been designed a detailed cost estimate for this option was not performed.

Great Southwest Parkway at Prairie Creek

The existing four barrel 10’ x 9’ MBC will need to be augmented by the construction of an additional four barrel 10’ x 10’ MBC. This provides the capacity to pass the ultimate 100-YR storm with an estimated cost of \$570,000.

PRIORITIZATION

The City of Grand Prairie’s “City Wide Drainage Master Plan Road Map” has a procedure for ranking and prioritizing drainage improvement projects. Each project is ranked by a six-step system. Projects receiving an initial ranking of 3 or less in the first prioritization step are considered short term priorities, while projects receiving an initial ranking of 4 or higher are considered long term priorities. There are four projects with a ranking of 3, making them short term priorities and seven long term priority projects. The priorities for the Cottonwood and Fish Creek Basins are shown below.

Project Priorities	
Project	Rank
Beltline Road at Cottonwood Creek	1
IH-20 at Fish Creek	2
Beltline Road at Plattner Creek	3
Pioneer Pkwy. at South Cottonwood Creek	4
Marshall Dr. at South Cottonwood Creek	5
Great Southwest Pkwy. at South Cottonwood Creek	6
Great Southwest Pkwy. at Prairie Creek	7
Robinson Rd. at South Cottonwood Creek	8
Great Southwest Pkwy. at Cottonwood Creek	9
Carrier Pkwy. at Cotton and South Cottonwood Creeks	10
3rd Street at Cottonwood Creek	11

IMPLEMENTATION

Factors to be taken into consideration in the implementation of any specific project within the City of Grand Prairie include the following:

- Coordination of projects within a watershed
- Availability of funding
- City-wide prioritization

It is the City’s plan to incorporate the completed Cottonwood and Fish Creek Flood Protection Plan into its overall city-wide master plan for implementation of capital improvements. The City will continue to seek partnerships for funding these improvements and will periodically subject the overall ranking of all capital improvements to public review and comment and reprioritization. If the comparative ranking of the improvements proposed in the Cottonwood and Fish Creek Flood Protection Plan remains high after these improvements are merged with other ranked projects throughout the City, city management will then have a greater opportunity to implement these improvements sooner, provided funding can be identified.

ACKNOWLEDGEMENTS

Espey Consultants, Inc., has completed the Cottonwood Creek and Fish Creek Flood Protection Plan for establishing an understanding of these watersheds, the potential impacts during flood events, and the viability of improvements to reduce this impact. The resources required to address this effort included not just site specific information gathered during the study but additionally resource materials from prior studies of upstream areas that had material effects on the outcome of the plan. Additionally, the value of the final plan was significantly enhanced with the review of plan elements as they were developed by the City of Grand Prairie management and the Technical Advisory Committee established for review of significant milestones during the study. These added resources and the access to the individuals offering input through the Technical Advisory Committee have served to provide greater confidence in the reliability of the final Cottonwood and Fish Creek Flood Protection Plan findings. Thus, the following staff of Espey Consultants, Inc., associated with the project, appreciates the contributions from each of the resources and recognizes that there are many individuals who will go unnamed in recognizing the key contributors to the success of the project. However, Espey Consultants, Inc., gratefully acknowledges the key contributions made by the individuals listed below for their participative support with the Cottonwood and Fish Creek Flood Protection Plan project.

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Joe Sherwin, P.E., CFM, (Previous) Flood Plain Administrator
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1.0 INTRODUCTION

The Cottonwood and Fish Creeks Flood Protection Plan is an engineering analysis of the flooding risks facing both Cottonwood and Fish Creek Basins, as well as a planning analysis of mitigation of these flooding risks. This project was funded by the Texas Water Development Board (TWDB) and the City of Grand Prairie, with participation from the City of Arlington, the Texas Department of Transportation, Dallas County, Tarrant County, Trinity River Authority, and U.S. Army Corps of Engineers – Ft. Worth District. The general project location is found in **Figure 1**. The following sections of this report describe the methods, data, and assumptions used in the analyses, as well as the results and recommendations for improving flood protection within the portion of the City of Grand Prairie within the Cottonwood Creek and Fish Creek watersheds.

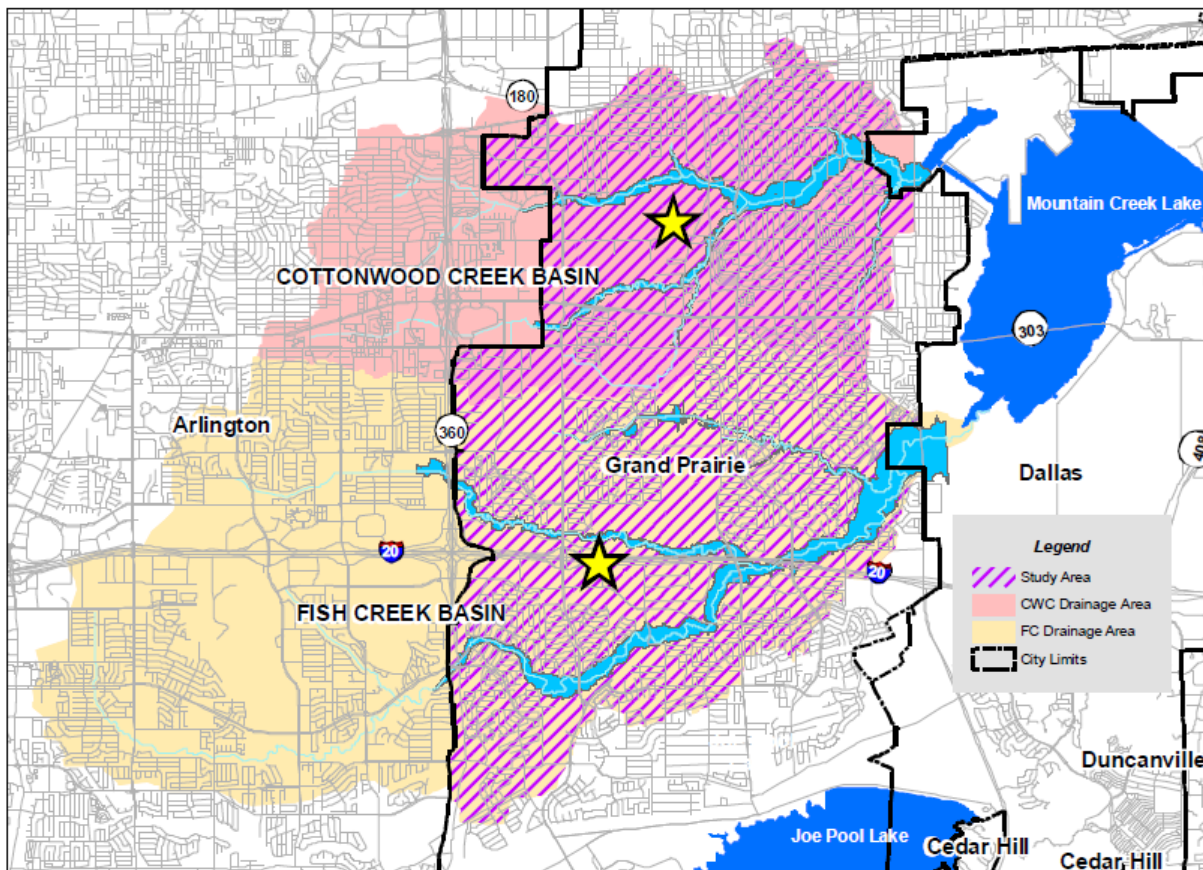


Figure 1: Location Map

1.1 SCOPE OF SERVICES

The fundamental objective of this proposed flood protection planning effort was to comprehensively integrate and update the various hydrologic models that have been developed historically for both Fish and Cottonwood Creek watersheds. This updating incorporated current watershed conditions inclusive of channel conditions, additional structures, new improvements, etc., and additional data reflected in approved and pending Letters of Map Revision (LOMRs). Future watershed conditions are also projected, particularly the fully developed watershed conditions and planned transportation improvements now being implemented. This study included the collection of baseline information, review of environmental constraints, and the identification of flood/drainage problem areas. Hydrologic and

hydraulic modeling was performed to refine the understanding of flood impacts from which alternatives were developed and analyzed to reduce these impacts.

The hydrologic analysis of Cottonwood Creek encompassed the fourteen square mile drainage area from its confluence with Mountain Creek Lake, extending upstream sixteen and a half miles, to the headwaters located in Arlington. The Cottonwood Creek Basin includes three major tributaries, South Cottonwood Creek, Warrior Creek, and Plattner Creek; as well as ten minor tributaries. The hydrologic analysis of Fish Creek encompasses the twenty seven square mile drainage area from its confluence with Mountain Creek Lake, extending upstream twenty eight miles, to the headwaters located in Arlington. The Fish Creek Basin includes four major tributaries, Kirby Creek, Prairie Creek, and two unnamed tributaries in Arlington.

Utilizing and expanding existing hydrologic model data from FEMA and the City of Grand Prairie, an updated hydrologic model of the watersheds was developed using a georeferenced HEC-HMS model. The model included both existing and ultimate land use assumptions, utilizing existing City of Grand Prairie and City of Arlington GIS data, and employing SSURGO soil information to generate runoff curve numbers using the NRCS (SCS) method. A modified Puls stream routing was developed for the studied watersheds using recent digital topographic data and HEC-RAS. Times of concentration (Tc) and the corresponding lag times were computed using the TR-55 method.

1.2 ADVISORY COMMITTEE

The Cottonwood and Fish Creeks Flood Protection Plan was implemented with the goal of disseminating information as the plan was developed and utilizing additional information gathered through both a technical advisory committee and public meetings. To this end, two committees were developed at the onset of the project, a Technical Advisory Committee and a Public Advisory Committee. The roles of each of these committees were as follows:

Technical Advisory Committee

The Technical Advisory Committee was established to provide peer review from agencies or entities knowledgeable or affected by the subject matter for the project. These organizations participated during the performance of the project through attending technical meetings at five key milestones during the study:

1. Kickoff meeting
2. Data review meeting
3. Hydrologic and hydraulic modeling results meeting
4. Alternative solutions meeting
5. Final recommended improvements plan meeting

Representative agencies selected for this committee involvement included the following:

Agency or Organization	Role on Technical Advisory Committee
City of Grand Prairie	Co-sponsor for study; Flood management responsibility throughout study area; operator of transportation, water, and wastewater infrastructure in study area
Espey Consultants	Facilitator for Advisory Committee Meetings; presented study progress
Texas Water Development Board	Co-sponsor for study; Flood management planning agency for State

Agency or Organization (cont.)	Role on Technical Advisory Committee (cont.)
USACE	Flood management federal regulatory agency
North Central Texas Council of Governments	Regional flood management planning organization
City of Arlington	Local city within the watershed
Texas Department of Transportation	State transportation infrastructure management with facilities in study area
Trinity River Authority	Regional operator of wastewater infrastructure with facilities in study area

Public Advisory Committee

The Public Advisory Committee was intended to facilitate public access and sharing of information regarding flood impacts in the study area and alternatives for reducing these impacts. Public Advisory Committee meetings were generally held immediately following Technical Advisory Committee meetings to allow the latter committee members to attend and participate during the public meetings. Each of these public meetings was advertised through one of two, or both means, direct advertisement in the Grand Prairie News, a local newspaper with readership throughout the study area, and through a posting on the City’s public access website. Copies of attendee sign-ins for these meetings and representative advertisements are included in **Appendix H**. Specific meetings were held on the following dates for the following purposes:

Technical and Public Advisory Committee Meetings	Meeting Date
Kickoff meeting	November 14, 2008
Data review meeting	January 16, 2009
Hydrologic and hydraulic modeling results meeting	November 12, 2009
Alternative solutions meeting	February 25, 2010
Final recommended improvements plan meeting	June 30, 2010

1.3 PUBLIC INVOLVEMENT

The City’s web site and local newspaper, of general circulation in the study area, were used to reach out to citizens and businesses in the study area in an attempt to solicit their comments and input. Attendance at these public meetings was minimal with five people attending the meeting where the flood mitigation alternatives were presented. The final public meeting was scheduled in the evening in order to broaden the opportunity for citizen and business attendance; one member of the general public attended the meeting.

1.4 BASELINE DATA ACQUISITION

Information was obtained from a variety of sources for performance of the project. The following table lists general types of data obtained during the course of the study.

Type of Data

Aerial Photgraphy data
1-ft LiDAR contour data
SSURGO (Soils) Data
Existing land use data
Existing land use data
Future land use data

Source of Data

City of Grand Prairie GIS
City of Grand Prairie GIS
USDA
City of Grand Prairie GIS
City of Arlington GIS
City of Grand Prairie GIS

Type of Data (continued)	Source of Data (continued)
Future land use data	City of Arlington GIS
Drainage area boundaries for Cottonwood & Fish Creeks	Cities of Grand Prairie and Arlington
Storm drain database (CoGP)	City of Grand Prairie GIS
Storm drain database (CoA)	City of Arlington GIS
Drainage Complaints database (CoGP)	City of Grand Prairie GIS
Hot Spot location database (CoGP)	City of Grand Prairie GIS
Drainage Complaints database (CoA)	City of Arlington GIS
Property value database (CoGP)	City of Grand Prairie GIS
Mountain Creek Spillway Operating Procedure	Exelon Energy
Hydrology & Hydraulics Summary Joe Pool Lake Drainage Master Plan	USACE
City of Grand Prairie Watershed Technical Report	City of Grand Prairie
City of Grand Prairie Hazard Mitigation Plan	City of Grand Prairie
City of Grand Prairie (County Wide) FIS and FIRMS	City of Grand Prairie
Half 2006 HMS models for Kirby & Prairie Creek	Half Associates
Half 2006 Capital Improvement Study along Kirby Creek & Fish Creek	Half Associates
Half 2006 HEC-RAS models for Kirby, Prairie & Fish Creeks	Half Associates
F&N 2004 HMS models for Cedar Creek, Cottonwood Creek, Fish Creek & Kirby Creek	Freese & Nichols
2008 Mountain Creek Flood Protection Plan	Espey Consultants

In addition to these sources of data, two data types were procured through purchased services by the City of Grand Prairie:

1. **Field Surveying.** The field survey of channel cross sections, bridges and culverts was performed between January 2009 and April 2009 by Marshall Lancaster & Associates, Inc. The field survey data obtained was horizontally referenced to the NAD83, Texas State Plan, North Central Texas coordinate system and vertically referenced to North American Vertical Datum (NAVD88).
2. **LiDAR and Topographic Mapping.** In early 2009, the City of Grand Prairie initiated city wide acquisition of updated LiDAR data collection. The data was horizontally referenced to the NAD 83, Texas State Plane, North Central Zone coordinate system and was vertically referenced to NAVD 88. The contour data formatted into a shapefile format are included in **Appendix I**. LiDAR is an acronym for **L**ight **D**etection and **R**anging; LiDAR is typically defined as the integration of three technologies into a single system capable of acquiring data to produce accurate digital terrain models (DTMs), using lasers, the Global Positioning System (GPS), and inertial navigation systems (INS). The DTMs are then used to produce the cross-sections used by HEC-RAS.

2.0 HYDROLOGIC ANALYSIS

The scope of this project included a hydrologic study of the Cottonwood Creek watershed and the Fish Creek watershed totaling approximately forty-one square miles contained within the Cities of Grand Prairie and Arlington. The Cottonwood Creek Basin has a drainage area of 14.4 square miles. Cottonwood Creek has three major tributaries, South Cottonwood Creek, Warrior Creek and Plattner Creek as well as nine minor tributaries, Avion Branch, Henry Branch, Indian Hills Branch, Gray's Branch, Daniels Branch, Raine's Branch, Jackson Branch, Bostick Branch and Williamson Branch.

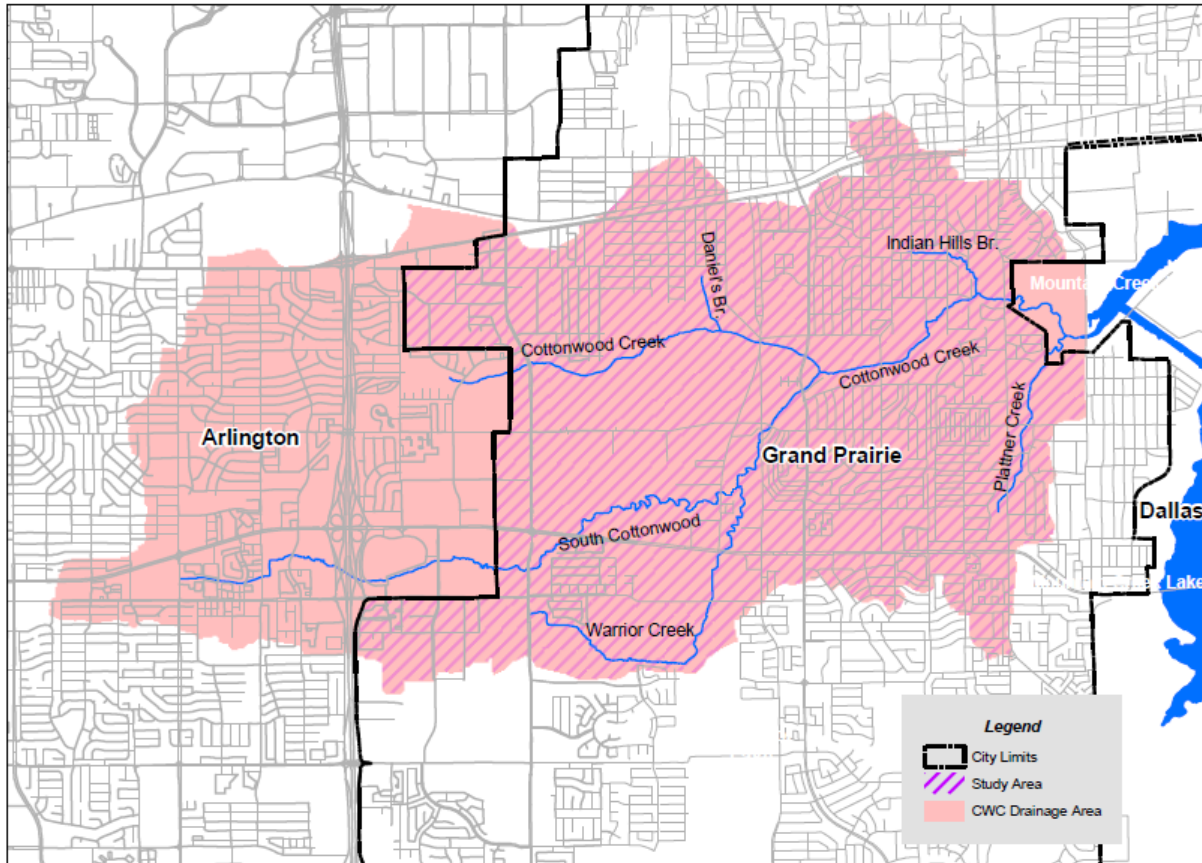


Figure 2: Cottonwood Creek and Tributaries

The Fish Creek Basin has a drainage area of 28.2 square miles. Fish Creek has two major tributaries: Prairie Creek and Kirby Creek, twelve minor tributaries: Lively Branch, Brian Branch, South Kirby Creek, Vernoy Branch, Dechman Branch, Rodger's Branch, Willis Branch, Martin Branch, Knox Branch, Garden Branch and two unnamed tributaries in Arlington. The hydrologic analysis included the evaluation of the existing conditions 50%, 20%, 10%, 4%, 2%, and 1% (2-, 5-, 10-, 25-, 50- and 100-year, respectively) annual chance storm events as well as the ultimate condition 1% annual chance storm event. Version 3.4 of the HEC-HMS computer program developed by the Hydrologic Engineering Center of the U. S. Army Corps of Engineers (USACE) was used in the hydrologic analysis to estimate peak flow rates and storm hydrographs for each reach. This section of the report describes the input parameters used in this analysis, the calibration efforts, the correlation with frequency analyses, and the computed peak flow rates used in the floodplain delineation.

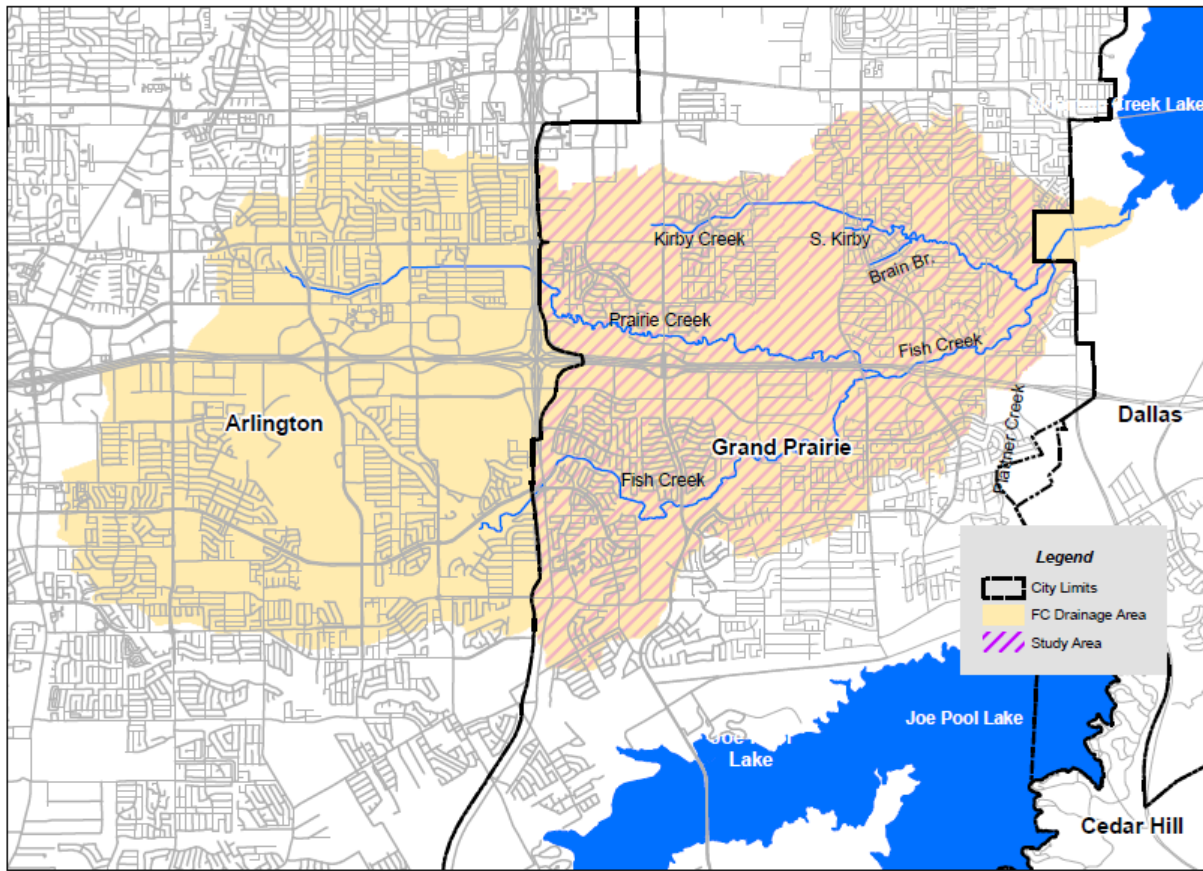


Figure 3: Fish Creek and Tributaries

2.1 DRAINAGE AREA DELINEATION

The watersheds were manually delineated using numerous sources including: United States Geological Survey (USGS) topographical survey data, NCTCOG LiDAR data, record drawings, storm drain GIS maps, and previous drainage studies. The watershed was further divided into sub-areas at points of critical interest (i.e., confluence of large tributaries, bridges, etc.).

A drainage area map showing the watershed delineation and sub-area names for both basins is included as Exhibit 1 of **Appendix A**.

2.2 PRECIPITATION

The precipitation values used in the hydrologic analysis were taken from the *City of Grand Prairie Drainage Design Manual (November, 2008)* and are shown in **Table 1**.

Table 1: City of Grand Prairie Depth–Duration Rainfall Data

Return Period (years)	TABLE 5.4C - Depth-Duration Data							
	Point Rainfall Depths (inches)							
	5-min	15-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
1	0.39	0.76	1.49	1.81	1.99	2.41	2.80	3.21
2	0.49	1.04	1.85	2.22	2.45	2.91	3.45	3.95
5	0.57	1.22	2.45	3.00	3.30	3.90	4.70	5.40
10	0.63	1.36	2.86	3.55	3.85	4.65	5.50	6.40
25	0.73	1.56	3.35	4.15	4.55	5.45	6.50	7.50
50	0.80	1.71	3.82	4.65	5.15	6.20	7.35	8.52
100	0.87	1.87	4.25	5.20	5.70	6.92	8.40	9.55
500	1.00	2.20	5.40	6.60	7.40	8.80	10.50	12.00

2.3 INFILTRATION LOSSES

The U.S. Department of Agriculture Natural Resource Conservation Service (NRCS), formerly the Soil Conservation Service (SCS), has developed a rainfall-runoff index called the runoff curve number (CN) which takes into account such factors as soil characteristics, land use/land condition, and antecedent soil moisture to derive a generalized rainfall-runoff relationship for a given area. A description of these components and the equations for calculating runoff depth from rainfall are provided below.

The NRCS classifies soils into four hydrologic soil groups: A, B, C, and D which indicate the runoff potential of a soil, ranging from a low runoff potential (group A) to a high runoff potential (group D). Digital soil data is available from the Texas Natural Resource Information System (TNRIS) post-processed from the US Department of Agriculture Soil Survey Geographic (SSURGO) database into the Texas statewide mapping system. Exhibit 2 in **Appendix A** shows the soils map for the study area.

The NRCS provides runoff curve numbers for three Antecedent Moisture Conditions (AMC): I, II and III. AMC I represents dry soil conditions and AMC III represents saturated soil conditions. AMC II is normally considered to be the average soil condition; however, studies have indicated that the average condition ranges from AMC I in West Texas to between AMC II and III for east Texas. Runoff curve numbers vary from 0 to 100, with the smaller values representing soils with lower runoff potential and the larger values representing soils with higher runoff potential. This study assumes an AMC II to represent average conditions.

Curve numbers were evaluated independently of impervious cover (i.e., these curve numbers reflect fair condition open spaces) for this analysis. A composite CN is computed based on area weighting of each hydrologic soil group within each sub-area. Impervious cover values are entered separately from CN values into the HEC-HMS model. The assumed CN values are shown in **Table 2**. A table describing the weighted CN values for each sub-area is included in Appendix B. HEC-HMS computes 100 percent runoff from impervious areas, while runoff from pervious areas is computed using the selected CN value and the following equations:

$$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S) \quad \text{Equation 1}$$

And

$$CN = 1000 / (10 + S) \quad \text{Equation 2}$$

Where:

- Q = depth of runoff (in),
P = depth of precipitation (in),
S = potential maximum retention after runoff begins (in), and
CN = runoff curve number.

Table 2: NRCS Curve Number Assumption

Group	AMC I	AMC II	AMC III
A	21	39	59
B	41	61	78
C	55	74	88
D	63	80	91

Key Assumption: Undeveloped grassland or range land.
Reference: National Engineering Handbook 4 (NEH-4)

The range of calculated existing conditions weighted CN values used in this analysis is 62.9 to 80.0. A summary of CN values for all sub-basins is included in **Appendix B**.

An existing conditions land use map (City of Grand Prairie GIS and City of Arlington GIS) was analyzed in conjunction with 2004 color-infrared imagery in GIS to estimate existing conditions impervious cover percentages. The hydrologic model for existing conditions utilized percent impervious cover values calculated for each watershed sub-basin. The Existing Land Use Map is included as Exhibit 3 in **Appendix A**. The details of this analysis are included in **Appendix C**. The range of calculated impervious cover percentages for this analysis is 1% to 72%.

The ultimate development conditions (fully-developed conditions) analysis included modifications to the impervious cover percentages to represent full development. For the purposes of this analysis, full development was assumed to be equivalent to the estimated level by the year 2030 for City of Grand Prairie, and 2025 for City of Arlington (as per their respective future land use studies). The Ultimate Land Use Map is included as Exhibit 4 in **Appendix A**

The impervious cover for each sub-area is modified to reflect the projected land use based on the datasets provided by the City of Grand Prairie and the City of Arlington. Land use impervious cover percentages were taken from *City of Grand Prairie Drainage Design Manual* (Nov. 2008). For land use types that are not mentioned in the manual, values are estimated based on previous studies and engineering judgment. The future land use maps provided by City of Grand Prairie and others have more land use types than those for existing conditions. **Table 3** on the following page shows future land use types designated in the future land use studies and the modifications employed to maintain consistency. The weighted impervious cover value for each sub-area is included in **Appendix C**.

Table 3: Future Land Use Impervious Cover Assumptions

Land Use Types in Future Land Use Map	Equivalent to Existing Land Use	IC % Equivalent to Existing Conditions
Airport Industrial	Airports	40%
Campus District	Institutional	40%
Community Activity Center	Institutional	40%
Connecting Corridors	Transportation	35%
Drainage	Flood Control	0%
Floodplain	Flood Control	0%
Heavy Industrial	Industrial	90%
High Density Residential	Multi-family	70%
Light Industrial	Industrial	90%
Low Density Residential	Single Family	25%
Medium Density Residential	Single Family	25%
Mixed Residential - 2	Multi-family	70%
Mixed Residential - 3	Multi-family	70%
Mixed Use	Retail	95%
Parks and Recreation	Parks	6%
Parks Outside Grand Prairie	Parks	6%
Regional Activity Center	Institutional	40%
Regional Industrial Center	Industrial	90%
Residential Neighborhood	Single Family	25%
Roadway	Transportation	35%
Urban Neighborhood	Multi-family	70%

2.4 UNIT HYDROGRAPH

2.4.1 Background

A rainfall-runoff transformation is required to convert excess rainfall (total rainfall minus infiltration losses) into runoff from a particular sub-basin. The NRCS unit hydrograph option in HEC-HMS was used in this analysis to generate runoff hydrographs for each defined sub-basin within the studied watersheds. The unit hydrograph method represents a hydrograph for one unit (one inch) of direct runoff, which is standard engineering practice.

The dimensionless unit hydrograph developed by the NRCS (see **Figure 4**) was developed by Victor Mockus and presented in *National Engineering Handbook, Chapter 16, Hydrology* (March 2007). The dimensionless unit hydrograph has its ordinate values expressed in a dimensionless ratio, of discharge relative to peak discharge, q/q_p , and its abscissa values as time relative to time to peak, t/T_p . This unit hydrograph has a point of inflection approximately 1.7 times the time to peak (T_p), and the time-to-peak 0.2 of the time-of-base (T_b).

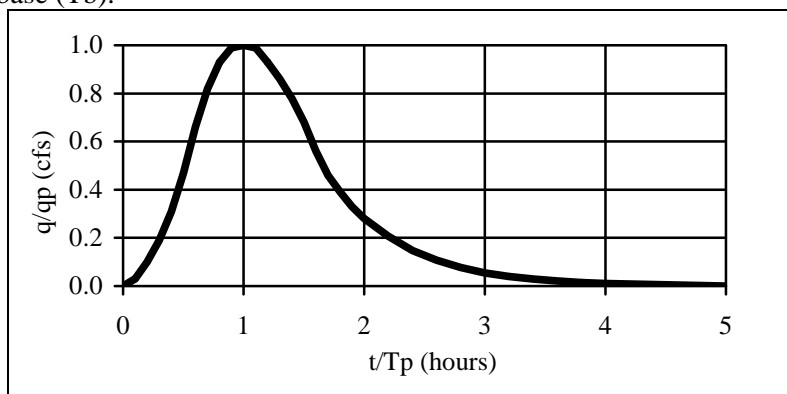


Figure 4: NRCS Unit Graph

In HEC-HMS, input data for this method consists of a single input parameter, T_{LAG} , which is equal to the time (hours) between the center of mass of excess rainfall and the peak of the unit hydrograph (NEH, Chapter 15, March 2009). In other words, there is a delay in time after a rain event begins before the runoff reaches its maximum peak. This delay is known as lag. The lag is determined based on the time of concentration, as discussed in **Section 2.4.2**.

The time to peak is computed using the following equation:

$$T_{PEAK} = \Delta t/2 + T_{LAG} \quad \text{Equation 3}$$

Where:

- T_{PEAK} = time to peak of the unit graph (hours),
- Δt = computation interval or duration of unit excess (hours), and
- T_{LAG} = watershed lag (hours).

The peak flow rate of the unit graph is computed using the following equation:

$$qp = 484A/T_{PEAK} \quad \text{Equation 4}$$

Where:

- qp = peak flow rate of the unit graph (cubic feet per second [cfs] / inch) and
- A = watershed area (square miles).
- 484 = peak rate factor (dimensionless)

Note: The peak rate factor of 484 has been known to vary from 600 in steep terrain to 300 in very flat, swampy terrain. The 484 value is standard engineering practice and is used in this analysis.

2.4.2 Time of Concentration

The NRCS method assumes that the lag time of a watershed is 60 percent of the watershed's time of concentration. The time of concentration (T_c) is the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed (NEH, Chapter 15, March 2009). The time of concentration may be estimated by calculating and summing the travel time for each sub-reach defined by the flow type: sheet flow, shallow concentrated flow, and channelized flow (including roadways, storm sewers, and channels). The methods prescribed in NRCS Technical Release 55 (TR-55) are used to determine the times of concentration for each flow segment in this analysis. Adjustments are made to the time of concentration calculations in the ultimate conditions analysis to reflect faster watershed response times, typically in the uplands of the watershed if development is proposed in these areas. Time of concentration calculations can be found in **Appendix D**, utilizing each typical flow segment presented below.

2.4.2.1 Sheet Flow (≤ 100 feet)

Sheet flow is flow over plane surfaces. With sheet flow, the friction value (Manning's n) is an effective roughness coefficient that includes the effect of raindrop impact, of drag over the plane surface and obstacles such as litter, crop ridges, and rocks, and of erosion and transportation of sediment. These n values are for very shallow flow depths of approximately 0.1 feet. Sheet flow normally becomes shallow concentrated flow after no more than approximately 100 feet depending on surface conditions. The *City of Grand Prairie Drainage Design Manual (November 2009)* allows for a maximum sheet flow length of 50 feet in residential areas. The T_c calculations were performed using these guidelines, high resolution aerial photography and engineering judgment. Travel time was computed using the following equation.

$$T_t = (0.007 \times (n \times L)^{0.8}) / (P_2^{0.5} \times s^{0.4}) \quad \text{Equation 5}$$

Where:

- Tt = travel time (hr),
- n = Manning's roughness coefficient,
- L = flow length (ft),
- P₂ = 2-year, 24-hour rainfall (in), and
- s = slope of hydraulic grade line (land slope, ft/ft).

2.4.2.2 Shallow Concentrated Flow

Sheet flow usually becomes shallow concentrated flow when the depth of flow exceeds 0.1 feet, or flows in a shallow swale or gutter. The average velocity for this flow can be determined from the following figure in which average velocity is a function of watercourse slope and type of channel (TR-55).

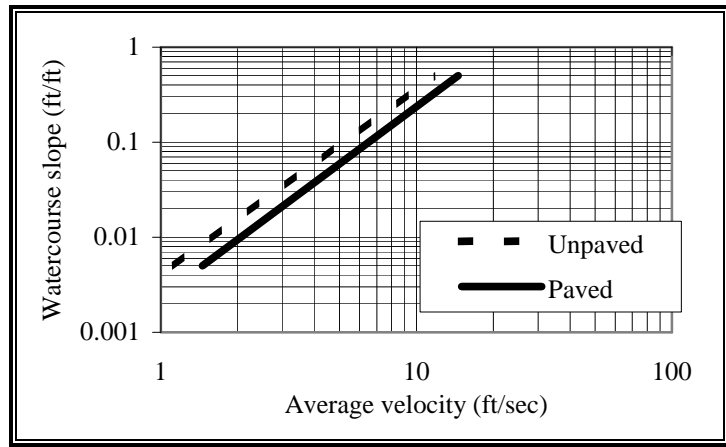


Figure 5: Average Velocities for Estimating Travel Time in Shallow Concentrated Flow Segments

After determining the average velocity, the following equation is used to compute travel time:

$$Tt = L / (3600 \times V) \quad \text{Equation 6}$$

Where:

- Tt = travel time (hr),
- L = flow length (ft),
- V = average velocity (ft/sec), and
- 3,600 = conversion factor from seconds to hours.

2.4.2.3 Channelized Flow

As the depth of concentrated flow increases, the shallow concentrated flow evolves into channelized flow. Open channels are assumed to begin where surveyed cross section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on United States Geological Survey (USGS) quadrangle maps. In the case of this analysis, channel flow either involves flow in man-made storm sewer infrastructure or flow in the natural channel. Manning's equation or water surface profile information (available from HEC-2 or HEC-RAS) can be used to estimate average flow velocity. Average flow velocity is usually determined for bank-full elevations. Both open channel and closed conduit systems can be included.

Manning's equation is:

$$V = 1.49 \times r^{2/3} \times s^{0.5} / n \quad \text{Equation 7}$$

Where:

- V = average velocity (ft/sec),
r = hydraulic radius (ft), equal to flow area divided by wetted perimeter,
s = slope of the hydraulic grade line (channel slope, ft/ft), and
n = Manning's roughness coefficient.

2.5 HYDROGRAPH ROUTING

Stream routing reaches were modeled using modified Puls data derived from HEC-RAS models developed as part of this study. Modified Puls routing is also called storage routing or level pool routing. It uses conservation of mass and a relationship between storage and discharge to route flow through the stream. The flow through a reach was attenuated by the storage and delayed release of water in the reach. In some of the upper drainage areas Modified Puls routing data was not available. Muskingum-Cunge routing was used for these locations.

2.6 DESIGN STORM ANALYSIS

The application of a design storm in the HEC-HMS model is used to generate runoff hydrographs and estimate peak flow rates along the watercourse for various storm frequencies. There are three major components to the design storm: depth, duration, and distribution. Precipitation depths selected for this impact study are included in **Section 2.2**. The following subsections describe the analysis and selection of storm duration and distribution.

2.6.1 Design Storm Duration

Design storm duration is a significant consideration for hydrologic modeling. A check must be performed to ensure that the peak flow of any given event has reached the mouth of the studied basin prior to the end of the rainfall duration. The time of concentration for all watersheds was less than 24 hours; therefore a 24-hour duration was selected.

2.6.2 Design Storm Distribution

A balanced and nested distribution is assumed for this analysis due to its flexibility with regard to storm duration. The distribution is balanced in that the precipitation is centered at half the storm duration. The distribution is nested in that the precipitation depths from the *City of Grand Prairie Drainage Design Manual (November 2009)* are applied in an alternating block format (i.e., the 15-minute depth is applied as the hyetograph peak, the 30-minute depth is applied such that the peak 15-minute block and the adjacent 15-minute block sum to be the 30-minute depth).

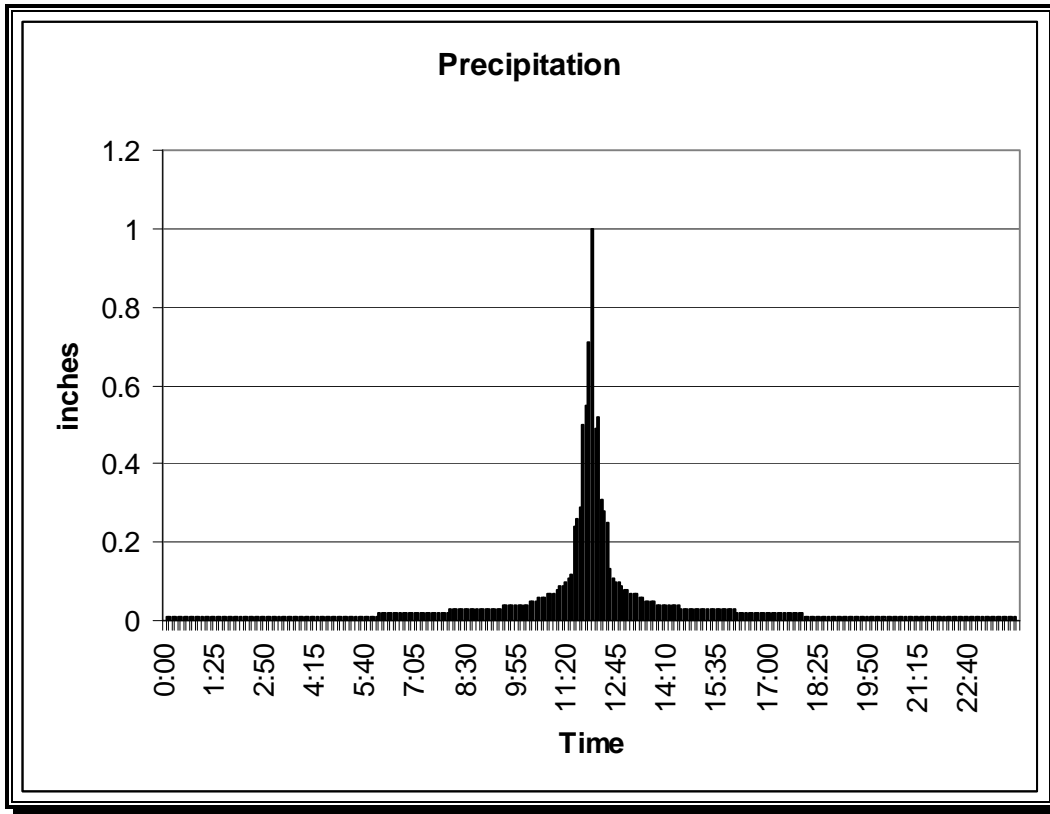


Figure 6: Precipitation Distribution

2.7 HYDROLOGIC ANALYSIS SUMMARY AND CONCLUSIONS

The hydrologic analysis was completed using prescribed methods by City of Grand Prairie and the NRCS. The design storm distribution used was the nested and balanced distribution, with rainfall depths derived from the *City of Grand Prairie Drainage Design Manual (November 2009)*. A 24-hour storm duration was assumed for all the watersheds. The ultimate conditions model was generated by revising the existing conditions hydrologic model to reflect future impervious cover projections. **Table 4** lists the computed peak flow rates for existing and ultimate conditions.

Table 4: Computed Peak Flow Rates Summary

COTTONWOOD CREEK									
Location	XS River Sta.	2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	500-YR (cfs)	Ultimate 100-YR
Great Southwest Parkway	10,550	2,721	4,311	5,277	6,484	7,839	8,761	11,327	8,888
Confluence with Daniels Branch	3,546	3,145	5,560	6,909	8,421	10,102	11,629	15,091	12,033
Upstream of South Cottonwood	701	3,003	5,550	7,050	8,621	10,264	11,858	15,495	12,276
Confluence with South Cottonwood	12,482	4,460	7,789	10,202	12,745	15,072	17,425	23,278	18,386
Confluence with Indian Creek	5,978	4,309	7,827	10,526	13,350	15,900	18,304	25,195	19,398
Confluence with Plattner Creek	1,288	4,254	7,783	10,218	13,613	16,349	19,320	27,159	20,690

Downstream of SE 14th Street	914	4,241	7,734	10,177	13,598	16,353	19,294	27,161	20,692
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SOUTH COTTONWOOD CREEK									
Location	XS River Sta.	2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	500-YR (cfs)	Ultimate 100-YR
Great Southwest Parkway	16,685	1,113	1,847	2,327	2,837	3,331	3,886	5,174	4,010
Pioneer Parkway	14,301	1,105	1,833	2,271	2,691	3,228	3,844	5,359	3,987
Confluence with Warrior Creek	5,157	1,526	2,719	3,456	4,228	4,906	5,647	8,124	6,111
Upstream of Cottonwood	761	1,555	2,747	3,521	4,341	5,052	5,810	8,275	6,290

WARRIOR CREEK									
Location	XS River Sta.	2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	500-YR (cfs)	Ultimate 100-YR
Arkansas Lane	4,903	360	499	549	605	663	740	992	761
Pioneer Parkway	3,510	726	1,094	1,308	1,543	1,751	1,966	2,516	2,104
Upstream of South Cotton wood	182	933	1,497	1,842	2,197	2,495	2,789	3,521	2,981

PLATTNER CREEK									
Location	XS River Sta.	2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	500-YR (cfs)	Ultimate 100-YR
Beltline Road	6,517	642	996	1,234	1,496	1,717	1,930	2,461	1,981
Marshall Road	4,062	1,039	1,688	2,066	2,505	2,862	3,173	4,063	3,236
Upstream of Cottonwood	364	1,113	1,887	2,261	2,821	3,243	3,632	4,767	3,758

FISH CREEK									
Location	XS River Sta.	2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	500-YR (cfs)	Ultimate 100-YR
Matthew Road	25,980	4,387	8,304	11,272	14,590	17,184	19,709	26,237	20,123
Bardin Road	21,523	4,432	8,376	11,329	14,796	17,462	19,871	26,539	20,273
Robinson Road	17,750	4,424	8,307	11,215	14,565	17,407	19,798	26,309	20,166
Prairie Creek	16,845	6,985	12,463	16,898	21,910	26,151	30,050	37,489	30,661
Carrier Parkway	14,725	7,025	12,525	16,935	22,123	26,347	30,228	37,759	30,940
D/S of Kirby Creek	4,059	7,402	13,553	18,256	23,350	27,578	31,698	40,572	32,492

PRAIRIE CREEK									
Location	XS River Sta.	2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	500-YR (cfs)	Ultimate 100-YR
S.H.360	25,164	2,894	4,706	5,828	6,988	8,004	8,962	11,238	9,150
Great Southwest Pkwy	13,805	2,890	5,012	6,238	7,468	8,751	10,210	13,768	10,589
S.H.161	5,252	2,943	5,206	6,553	7,972	9,347	10,981	15,234	11,469
Robinson Road	2,210	2,887	5,174	6,555	7,981	9,372	10,943	15,035	11,379

Upstream of Fish Creek	1,270	2,916	5,228	6,608	8,051	9,479	11,027	15,168	11,451
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KIRBY CREEK									
Location	XS River Sta.	2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	500-YR (cfs)	Ultimate 100-YR
Great Southwest Pkwy	23,654	275	383	455	531	596	661	1,396	661
Waterwood	19,333	499	795	1,059	1,328	1,559	1,779	2,307	1,840
S.H.161	17,311	703	1,162	1,506	1,896	2,217	2,521	3,173	2,622
Robinson Road	15,042	545	976	1,337	1,698	2,041	2,392	3,250	2,530
Confluence S. Kirby	13,143	438	738	971	1,300	1,567	1,846	2,839	1,984
Confluence Brian Branch	9,393	1,050	1,695	2,149	2,691	3,130	3,560	4,687	3,720
Corn Valley	7,431	1,358	2,241	2,851	3,508	4,079	4,651	6,130	4,813
Ridgewood	4,860	1,405	2,381	3,052	3,765	4,391	5,015	6,631	5,177
Upstream of Fish Creek	3,062	1,424	2,434	3,157	3,968	4,654	5,337	6,988	5,499

The results of this model were compared to previous studies of these drainage basins. The peak flows in the upper reaches of the drainage basins tended to be slightly less than previous studies with the lower reaches having higher peak flows. These higher peaks are to be expected as continued urbanization increases the impervious cover in the drainage basins.

There are some notable reductions in the peak flows as a result of recent detention pond construction. In the Kirby Creek Basin, an 85.5 ac-ft detention pond has been constructed at the Grand Prairie Airport which reduced the peak flow rate at Great Southwest Parkway by 58 percent; additional storage constructed on the Smith Investment property also reduced peak flows along Kirby Creek. The flow reductions are most noticeable upstream of the confluence with South Kirby Creek. A detailed analysis of these changes can be found in the LOMR request prepared by Half Associates, dated January 2010. This construction has been incorporated into the HEC-HMS and HEC-RAS models for the Fish Creek Basin. The City of Grand Prairie has constructed a series of five ponds along Warrior Creek as a part of its Central Park Facilities. These improvements have reduced peak flows along Warrior Creek by an average of 36 percent with a 60 percent reduction immediately downstream of the facility. These improvements along Warrior Creek were modeled by Half Associates, using Unsteady RAS (*Central Park Drainage Design Analysis Warrior Creek*, Nov. 2008). The Central Park improvements have been incorporated into the HEC-HMS model for the Cottonwood Creek Basin; however, the Steady HEC-RAS model for this basin ends on the downstream side of Arkansas Lane. Detailed analysis of Warrior Creek upstream of this point should utilize the Unsteady model.

3.0 HYDRAULIC ANALYSIS

Separate detailed hydraulic analyses were performed, for the Cottonwood Creek Basin and for the Fish Creek Basin. These hydraulic analyses computed the water surface elevations for the 50%, 20%, 10%, 4%, 2%, 1% and 0.2% annual chance (2-, 5-, 10-, 25-, 50-, 100- and 500-year, respectively) existing condition storm events and the ultimate conditions 1% annual chance event. Each of the hydraulic analyses includes the delineation of the existing conditions 1% and 0.2% annual chance floodplains, and the ultimate conditions 1% annual chance floodplains.

The Cottonwood Creek analysis began at Mountain Creek Lake and extended to the City of Grand Prairie's boundary with Arlington. This analysis encompassed 16.5 miles of stream and included South Cottonwood Creek, Warrior Creek, Plattner Creek, Indian Hills Branch and Daniel's Branch. During the course of the study, the City of Grand Prairie initiated the construction of its Central Park Facilities at the intersection of Arkansas Lane and S.H. 161, within the Cottonwood Creek Basin. This facility includes several ponds and some rerouting of Warrior Creek, upstream of Arkansas Lane. The effects of this construction were taken into consideration in this study's HMS model; however, any water surface profile analysis of Warrior Creek, upstream of Arkansas Lane, should utilize the unsteady model of this area created by Half Associates, Inc.

The Fish Creek analysis also began at Mountain Creek Lake and extended to the City of Grand Prairie's boundary with Arlington. The analysis consisted of 28.2 stream miles of Fish Creek, Prairie Creek, Kirby Creek, South Kirby Creek, and Brian Branch. Construction of the Airport detention pond in the upper reaches of Kirby Creek as well as improvements to the Smith Investments and Pardue properties also in Kirby Creek were completed during this study. These improvements are detailed in a LOMR for Kirby Creek, prepared by Half Associates, dated January 2010. This information has been incorporated in the HEC-HMS and HEC-RAS models of this report.

Overall maps showing the extents of the studied reaches are included in Exhibit 5 and 5A of **Appendix A**. The USACE HEC-RAS software version 4.1.0 was used for the hydraulic analyses. All modeling is one dimensional. Steady state analyses were performed for both the Cottonwood Creek and Fish Creek Basins. The sections that follow describe the development of the hydraulic models in both basins.

3.1 HYDRAULIC ANALYSIS

3.1.1 Processing

The detailed study methodology incorporated use of HEC-GeoRAS software as a preprocessor to HEC-RAS. HEC-GeoRAS utilizes geographically referenced data sets as well as a three-dimensional terrain model to create the input data files for HEC-RAS. The terrain model was developed from City of Grand Prairie 2009 LiDAR one-foot topography data, acquired by the City of Grand Prairie during the study to improve the accuracy of the study results. HEC-RAS was then executed to determine the flood elevation at each cross section of the modeled stream. The resulting elevations are then post-processed by HEC-GeoRAS for creation of the floodplain boundaries.

3.1.2 Cross Sections

Model cross sections were placed along the study streams using the available contour data (Grand Prairie 2009 LiDAR). Where roads or other structures are encountered, additional cross sections were acquired through additional surveying to meet HEC-RAS data input needs. An extensive field survey of hydraulic structures was conducted to help enhance the accuracy of the hydraulic model. These detailed cross sections were then used to enhance the channel portions of the cross sections derived from the terrain model. The HEC-RAS model generated from HEC-GeoRAS then received an extensive quality check / quality assurance to ensure that LiDAR and field survey data were merged correctly.

3.1.3 Parameter Estimation

Tables 5 and 6 document the hydraulic parameters used in the analysis of Cottonwood and Fish Creeks.

Table 5: Manning's n Values

Type	Value
Channel	
Natural channel, irregular cross section, meandering, brush	0.055
Overbank	
Natural channel, irregular cross section, meandering, heavier brush with medium trees	0.08
Tree/Brush coverage	0.1
Developed/Residential areas	0.1

Table 6: Miscellaneous Hydraulic Coefficients

Coefficient Type	Value or Range
Bridge pier drag coefficient for momentum equation applications, Cd	2
Pressure and weir flow coefficient (submerged inlet and outlet), Cd	0.8
Expansion coefficients for bridges / culverts / in-line structures	0.3 to 0.5
Expansion coefficients for channels	0.3
Contraction coefficients for bridges / culverts / in-line structures	0.1 to 0.3
Contraction coefficients for channels	0.1
Weir coefficients (road deck)	2.6 to 3.0
Culvert entrance loss coefficient	0.4
Culvert exit loss coefficient	1

3.1.4 Modeling Considerations

Various considerations were taken into account when evaluating each hydraulic reach. These considerations include, but are not limited to, starting water surface elevations, structure crossings, islands and flow splits, ineffective flow areas, supercritical versus subcritical flow regimes, hydraulic calibration, etc. The sections below describe the various considerations taken into account for this study.

Ineffective flow areas are added to portions of various cross sections to accurately model any given section's ability to convey flow. Ineffective flow areas are typically modeled by:

- 1) applying an ineffective flow area boundary in HEC-RAS with a test elevation that, if exceeded, would offer some level of conveyance;
- 2) applying a permanent ineffective flow area boundary in HEC-RAS, which will permanently prevent that portion of the cross section from conveying flow;
- 3) applying a blocked obstruction boundary in HEC-RAS, which will permanently prevent that portion of the cross section from conveying flow and remove storage capacity of the stream.

Examples of temporary ineffective flow areas include: 1) minor swales parallel to the reach that eventually outfall into the reach; or 2) cross sections immediately upstream or downstream of an in-line structure. Examples of permanent ineffective flow areas include: 1) minor swales parallel to the reach, which do not outfall into the reach; or 2) off-line water quality / detention ponds.

The effective FEMA model assumed a known water surface elevation as its downstream boundary condition. Careful consideration was given to the downstream boundary condition for this study. A normal depth assumption was selected as the most appropriate methodology. The exception to this method is the fifty percent chance event for Cottonwood Creek, the normal depth method produced a

water surface lower than the normal pool level of Mountain Creek Lake, therefore the lake level was used as a known boundary condition.

3.2 DETAILED DESCRIPTION OF HYDRAULIC MODEL GENERATION

The Cottonwood and Fish Creek Basins have a combined drainage area of 46.6 square miles crossing Grand Prairie and including portions of Arlington. A total of 44.7 miles of stream within the City Limits of Grand Prairie were modeled. This study required the production of four models an HMS and RAS model for the Cottonwood Creek Basin and an HMS and RAS model for the Fish Creek Basin. Peak flow data from the HMS models was transferred into each respective RAS model and both creeks were modeled assuming a subcritical flow regime, which is consistent with FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners*.

3.2.1 Cottonwood Creek Steady Analysis

The hydraulic model for the Cottonwood Creek Basin contains six named creeks, Cottonwood Creek, South Cottonwood Creek, Warrior Creek, Plattner Creek, Indian Hills Branch and Daniels Branch. Cottonwood Creek is divided into two river segments Cottonwood Creek (CWC) Main Stem with three reaches, and North Fork Cottonwood Creek (NF CWC) with two reaches. South Cottonwood is divided into two reaches and the remaining streams all have one reach each. The flows for the various storms and the corresponding cross-section where these flows were applied to the Cottonwood Creek HEC-RAS model are shown in **Table 7**.

Table 7: Cottonwood Creek Stream Flows

RAS Cross Sections			Flows								
River	Reach	River Station	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR	Ultimate 100YR	
CWC MAIN STEM	SECTION_01	12689	4,460	7,789	10,202	12,745	15,072	17,425	23,278	18,386	
CWC MAIN STEM	SECTION_01	10760	4,410	7,771	10,291	12,894	15,260	17,675	23,650	18,630	
CWC MAIN STEM	SECTION_01	10345	4,402	7,778	10,312	12,925	15,296	17,709	23,700	18,679	
CWC MAIN STEM	SECTION_01	9744	4,516	8,059	10,727	13,484	15,991	18,530	24,832	19,518	
CWC MAIN STEM	SECTION_02	5978	4,309	7,827	10,526	13,350	15,900	18,304	25,195	19,398	
CWC MAIN STEM	SECTION_02	4663	4,204	7,600	10,184	12,986	15,355	17,660	24,778	18,835	
CWC MAIN STEM	SECTION_02	3081	4,198	7,575	10,156	12,984	15,368	17,688	24,829	18,863	
CWC MAIN STEM	SECTION_03	1288	4,254	7,783	10,218	13,613	16,349	19,320	27,159	20,690	
CWC MAIN STEM	SECTION_03	1075	4,241	7,734	10,177	13,598	16,353	19,294	27,161	20,692	
DANIELS BR	DANIELS BR	1718	657	1,010	1,250	1,522	1,738	1,954	2,447	1,954	
DANIELS BR	DANIELS BR	1159	699	1,100	1,369	1,672	1,916	2,158	2,720	2,195	
INDIAN HILLS BR	INDIAN HILLS BR	3183	420	648	802	971	1,111	1,248	1,579	1,248	
INDIAN HILLS BR	INDIAN HILLS BR	2328	491	771	959	1,164	1,333	1,497	1,896	1,500	
INDIAN HILLS BR	INDIAN HILLS BR	1086	474	790	980	1,186	1,345	1,483	1,881	1,486	
NF CWC	SECTION_02	12725	2,570	4,023	4,870	6,050	7,145	8,009	10,425	8,099	
NF CWC	SECTION_02	12079	2,705	4,245	5,131	6,351	7,588	8,499	11,081	8,617	
NF CWC	SECTION_02	10550	2,721	4,311	5,277	6,484	7,839	8,761	11,327	8,888	
NF CWC	SECTION_02	10386	3,238	5,097	6,215	7,654	9,234	10,336	13,295	10,527	
NF CWC	SECTION_02	8394	3,220	5,155	6,316	7,741	9,291	10,474	13,313	10,681	
NF CWC	SECTION_02	5702	3,372	5,510	6,739	8,221	9,879	11,261	14,462	11,640	
NF CWC	SECTION_03	3546	3,145	5,560	6,909	8,421	10,102	11,629	15,091	12,033	

RAS Cross Sections			Flows							
River	Reach	River Station	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR	Ultimate 100YR
NF CWC	SECTION_03	1291	3,003	5,550	7,050	8,621	10,264	11,858	15,495	12,276
PLATTNER CRK	PLATTNER CRK	7131	642	996	1,234	1,496	1,717	1,930	2,461	1,981
PLATTNER CRK	PLATTNER CRK	5235	749	1,185	1,461	1,776	2,007	2,212	2,847	2,261
PLATTNER CRK	PLATTNER CRK	4284	1,039	1,688	2,066	2,505	2,862	3,173	4,063	3,236
PLATTNER CRK	PLATTNER CRK	1654	1,114	1,867	2,320	2,828	3,238	3,600	4,670	3,712
PLATTNER CRK	PLATTNER CRK	642	1,113	1,887	2,261	2,821	3,243	3,632	4,767	3,758
SF CWC	SECTION_01	18296	1,079	1,718	2,116	2,609	3,005	3,516	4,553	3,616
SF CWC	SECTION_01	16685	1,113	1,847	2,327	2,837	3,331	3,886	5,174	4,010
SF CWC	SECTION_01	14582	1,097	1,813	2,258	2,692	3,199	3,786	5,180	3,913
SF CWC	SECTION_01	14301	1,105	1,833	2,271	2,691	3,228	3,844	5,359	3,987
SF CWC	SECTION_01	13479	1,092	1,841	2,286	2,707	3,242	3,854	5,426	4,008
SF CWC	SECTION_01	12822	1,154	1,957	2,408	2,826	3,411	4,102	5,930	4,282
SF CWC	SECTION_01	9021	1,225	2,177	2,709	3,194	3,745	4,529	6,744	4,798
SF CWC	SECTION_01	5765	1,201	2,146	2,695	3,182	3,712	4,457	6,599	4,725
SF CWC	SECTION_02	5157	1,526	2,719	3,456	4,228	4,906	5,647	8,124	6,111
SF CWC	SECTION_02	2852	1,535	2,729	3,485	4,280	4,971	5,720	8,183	6,197
SF CWC	SECTION_02	2723	1,550	2,744	3,513	4,325	5,032	5,793	8,262	6,277
SF CWC	SECTION_02	905	1,555	2,747	3,521	4,341	5,052	5,810	8,275	6,290
WARRIOR CRK	WARRIOR CRK	4887	360	499	549	605	663	740	992	761
WARRIOR CRK	WARRIOR CRK	3967	652	973	1,149	1,343	1,513	1,693	2,190	1,785
WARRIOR CRK	WARRIOR CRK	3079	726	1,094	1,308	1,543	1,751	1,966	2,516	2,104
WARRIOR CRK	WARRIOR CRK	689	933	1,497	1,842	2,197	2,495	2,789	3,521	2,981

3.2.2 Fish Creek Steady Analysis

The hydraulic model for the Fish Creek Basin contains five named creeks, Fish Creek, Prairie Creek, Kirby Creek, South Kirby Creek and Brian Branch. Fish Creek and Kirby Creek have three reaches each and the remaining streams all have one reach each. The flows for the various storms and the corresponding cross-section where these flows were applied to the Fish Creek Basin HEC-RAS model are shown in Table 8.

Table 8: Fish Creek Stream Flows

RAS Cross Sections			Existing Condition Flows							Ultimate 100-YR
River	Reach	RS	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR	Ultimate 100-YR
BRIAN BRANCH	Main	2540	144	224	278	337	386	434	549	434
FISH CREEK	MAINSTEM MID2	43484	3,222	6,252	8,259	10,208	11,796	13,493	18,056	13,786
FISH CREEK	MAINSTEM MID2	42574	3,219	6,282	8,307	10,312	11,898	13,551	18,189	13,820
FISH CREEK	MAINSTEM MID2	41093	3,352	6,601	8,763	10,890	12,580	14,286	19,241	14,553
FISH CREEK	MAINSTEM MID2	40008	3,543	6,969	9,302	11,589	13,393	15,166	20,485	15,430
FISH CREEK	MAINSTEM MID2	36983	3,643	7,009	9,395	11,754	13,603	15,497	20,812	15,756
FISH CREEK	MAINSTEM MID2	34603	4,076	7,617	10,047	12,817	15,123	17,365	23,273	17,691
FISH CREEK	MAINSTEM MID2	31772	4,241	7,961	10,542	13,433	15,859	18,149	24,263	18,500
FISH CREEK	MAINSTEM MID2	31603	4,265	8,016	10,623	13,529	15,969	18,269	24,390	18,618
FISH CREEK	MAINSTEM MID2	26695	4,240	7,993	10,722	13,771	16,251	18,669	24,931	19,037
FISH CREEK	MAINSTEM MID2	25980	4,387	8,304	11,272	14,590	17,184	19,709	26,237	20,123

RAS Cross Sections			Existing Condition Flows							
River	Reach	RS	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR	Ultimate 100-YR
FISH CREEK	MAINSTEM MID2	21523	4,432	8,376	11,329	14,796	17,462	19,871	26,539	20,273
FISH CREEK	MAINSTEM MID2	17750	4,424	8,307	11,215	14,565	17,407	19,798	26,309	20,166
FISH CREEK	MAINSTEM MID1	17314	6,985	12,463	16,898	21,910	26,151	30,050	37,489	30,661
FISH CREEK	MAINSTEM MID1	16845	6,985	12,463	16,898	21,910	26,151	30,050	37,489	30,661
FISH CREEK	MAINSTEM MID1	16060	7,000	12,488	16,913	21,969	26,370	30,078	37,609	30,730
FISH CREEK	MAINSTEM MID1	15727	7,011	12,505	16,915	22,014	26,323	30,039	37,663	30,756
FISH CREEK	MAINSTEM MID1	14725	7,025	12,525	16,935	22,123	26,347	30,228	37,759	30,940
FISH CREEK	MAINSTEM MID1	12580	7,018	12,520	16,918	21,991	26,350	30,103	37,803	30,824
FISH CREEK	MAINSTEM MID1	12085	7,053	12,585	16,993	22,080	26,449	30,264	38,016	30,973
FISH CREEK	MAINSTEM MID1	10541	7,047	12,587	17,001	22,082	26,461	30,273	38,038	30,969
FISH CREEK	MAINSTEM MID1	9945	7,062	12,617	17,032	22,104	26,471	30,207	38,091	30,887
FISH CREEK	MAINSTEM MID1	7473	7,045	12,631	17,027	21,966	26,191	29,903	37,882	30,525
FISH CREEK	MAINSTEM D/S	5968	7,541	13,593	18,331	23,576	27,896	32,145	40,853	32,889
FISH CREEK	MAINSTEM D/S	4059	7,402	13,553	18,256	23,350	27,578	31,698	40,572	32,492
FISH CREEK	MAINSTEM D/S	3288	7,300	13,519	18,206	23,208	27,394	31,475	40,383	32,284
FISH CREEK	MAINSTEM D/S	2802	7,310	13,563	18,253	23,261	27,471	31,553	40,490	32,359
KC SOUTH FORK	SOUTH FORK	1368	166	284	363	450	523	594	768	654
KIRBY CREEK	MAINSTEM U/S	23654	275	383	455	531	596	661	1,396	661
KIRBY CREEK	MAINSTEM U/S	21707	610	917	1,118	1,336	1,511	1,681	2,213	1,735
KIRBY CREEK	MAINSTEM U/S	19464	499	795	1,059	1,328	1,559	1,779	2,307	1,840
KIRBY CREEK	MAINSTEM U/S	17526	703	1,162	1,506	1,896	2,217	2,521	3,173	2,622
KIRBY CREEK	MAINSTEM U/S	15225	545	976	1,337	1,698	2,041	2,392	3,250	2,530
KIRBY CREEK	MAINSTEM MID	13143	438	738	971	1,300	1,567	1,846	2,839	1,984
KIRBY CREEK	MAINSTEM D/S	9393	1,050	1,695	2,149	2,691	3,130	3,560	4,687	3,720
KIRBY CREEK	MAINSTEM D/S	7486	1,358	2,241	2,851	3,508	4,079	4,651	6,130	4,813
KIRBY CREEK	MAINSTEM D/S	6009	1,405	2,381	3,052	3,765	4,391	5,015	6,631	5,177
KIRBY CREEK	MAINSTEM D/S	3062	1,424	2,434	3,157	3,968	4,654	5,337	6,988	5,499
PRAIRIE CREEK	MAINSTEM	28248	2,379	3,815	4,802	5,862	6,683	7,536	9,604	7,724
PRAIRIE CREEK	MAINSTEM	25164	2,894	4,706	5,828	6,988	8,004	8,962	11,238	9,150
PRAIRIE CREEK	MAINSTEM	24089	3,334	5,436	6,679	7,760	8,917	10,403	13,249	10,662
PRAIRIE CREEK	MAINSTEM	17616	2,895	5,142	6,588	7,853	9,044	10,396	13,512	10,708
PRAIRIE CREEK	MAINSTEM	13805	2,890	5,012	6,238	7,468	8,751	10,210	13,768	10,589
PRAIRIE CREEK	MAINSTEM	10240	2,824	4,935	6,199	7,521	8,802	10,308	14,065	10,685
PRAIRIE CREEK	MAINSTEM	6270	2,875	5,041	6,354	7,725	9,038	10,585	14,582	11,001
PRAIRIE CREEK	MAINSTEM	5252	2,943	5,206	6,553	7,972	9,347	10,981	15,234	11,469
PRAIRIE CREEK	MAINSTEM	4462	2,937	5,191	6,552	7,969	9,341	10,968	15,198	11,461
PRAIRIE CREEK	MAINSTEM	2210	2,887	5,174	6,555	7,981	9,372	10,943	15,035	11,379
PRAIRIE CREEK	MAINSTEM	1270	2,916	5,228	6,608	8,051	9,479	11,027	15,168	11,451

3.3 HYDRAULIC ANALYSIS SUMMARY AND CONCLUSIONS

The ultimate conditions steady-state calculated water surface elevations are very similar to existing conditions. The flow rates for the ultimate conditions 1% event are an average of 4% greater than existing, but this does not translate to a significant increase in depth. The calculated water surface elevations are an average of 0.19 ft higher in the ultimate conditions, with the largest increase being 0.52 ft. The existing conditions floodplains are shown on Exhibits 6 and 6A in **Appendix A**. The areal extent

of the ultimate floodplain is very similar to the existing floodplain. **Table 9** shows the water surface elevations for the various events at selected locations.

Table 9: Steady Flow Data

COTTONWOOD CREEK									
Location	XS River Sta.	2-YR (ft)	5-YR (ft)	10-YR (ft)	25-YR (ft)	50-YR (ft)	100-YR (ft)	500-YR (ft)	Ultimate 100-YR
Great Southwest Parkway	10,550	520.24	523.58	524.41	525.12	525.82	526.22	528.38	526.3
Confluence with Daniels Branch	3,546	487.72	489.67	490.39	491.07	491.73	492.29	493.48	492.44
Upstream of South Cottonwood	701	481.14	482.37	482.95	483.51	483.99	484.45	485.43	484.61
Confluence with South Cottonwood	12,482	479.86	481.03	481.75	482.36	482.85	483.3	484.28	483.47
Confluence with Indian Creek	5,978	466.94	468.77	469.88	470.88	471.56	471.97	473.77	472.29
Confluence with Plattner Creek	1,288	459.99	462.71	463.53	464.36	465.16	465.80	467.30	466.07
Downstream of SE 14th Street	914	457.89	458.81	459.93	461.39	462.73	463.88	466.63	464.40

SOUTH COTTONWOOD CREEK									
Location	XS River Sta.	2-YR (ft)	5-YR (ft)	10-YR (ft)	25-YR (ft)	50-YR (ft)	100-YR (ft)	500-YR (ft)	Ultimate 100-YR
Great Southwest Parkway	16,685	545.75	548.29	549.70	551.24	552.18	552.63	553.31	552.72
Pioneer Parkway	14,301	533.56	534.57	534.99	535.37	535.80	536.22	537.11	536.31
Confluence with Warrior Creek	5,157	499.10	500.52	501.12	501.64	502.06	502.48	503.73	502.72
Upstream of Cottonwood	761	481.40	482.57	483.24	483.78	484.23	484.67	485.69	484.85

WARRIOR CREEK									
Location	XS River Sta.	2-YR (ft)	5-YR (ft)	10-YR (ft)	25-YR (ft)	50-YR (ft)	100-YR (ft)	500-YR (ft)	Ultimate 100-YR
Arkansas Lane	4,887	525.12	525.75	525.96	526.20	526.42	526.68	527.49	526.77
Pioneer Parkway	3,510	518.33	519.79	520.52	521.28	521.93	522.59	524.88	522.92
Upstream of South Cotton wood	182	500.05	501.27	501.85	502.35	502.75	503.15	504.32	503.38

PLATTNER CREEK									
Location	XS River Sta.	2-YR (ft)	5-YR (ft)	10-YR (ft)	25-YR (ft)	50-YR (ft)	100-YR (ft)	500-YR (ft)	Ultimate 100-YR
Beltline Road	6,517	485.71	487.7	489.56	492.21	494.64	495.42	496.23	495.42
Marshall Road	4,062	470.34	472.19	473.19	474.41	475.61	476.75	479.17	476.99
Upstream of Cottonwood	364	460.23	462.8	463.63	464.47	465.27	465.93	467.46	466.2

FISH CREEK									
Location	XS River Sta.	2-YR (ft)	5-YR (ft)	10-YR (ft)	25-YR (ft)	50-YR (ft)	100-YR (ft)	500-YR (ft)	Ultimate 100-YR
Matthew Road	25,980	496.55	499.08	499.95	500.93	501.68	502.35	503.9	502.46
Bardin Road	21,523	489.22	491.62	492.98	494.33	495.33	496.08	498.19	496.21
Robinson Road	17,750	483.23	485.92	487.85	489.68	491.1	491.9	494.06	492.08
Prairie Creek	16,845	481.86	484.21	485.56	486.95	488.07	488.97	490.99	489.24
Carrier Parkway	14,725	479.52	481.1	482.11	483.46	484.4	485.19	486.63	485.33
D/S of Kirby Creek	4,059	464.54	466.47	467.66	468.51	469.59	470.67	473.12	470.89

PRAIRIE CREEK									
Location	XS River Sta.	2-YR (ft)	5-YR (ft)	10-YR (ft)	25-YR (ft)	50-YR (ft)	100-YR (ft)	500-YR (ft)	Ultimate 100-YR
S.H.360	25,164	562.75	565.75	569.31	572.02	572.92	573.42	574.16	573.49
Great Southwest Pkwy	13,805	522.23	528.31	532.5	535.35	536.61	537.6	539.31	537.81
S.H.161	5,252	497.15	499.2	500.07	500.85	501.51	502.21	503.59	502.39
Robinson Road	2,210	482.66	484.74	486.32	487.7	489.05	491.74	493.63	491.82
Upstream of Fish Creek	1,270	482.68	484.67	486.26	487.94	489.17	490.02	492.07	490.2

KIRBY CREEK									
Location	XS River Sta.	2-YR (ft)	5-YR (ft)	10-YR (ft)	25-YR (ft)	50-YR (ft)	100-YR (ft)	500-YR (ft)	Ultimate 100-YR
Great Southwest Pkwy	23,654	555.98	556.47	556.77	557.08	557.33	557.56	559.8	557.56
Waterwood	19,333	537.59	538.76	539.67	540.51	541.21	542.11	544.11	542.35
S.H.161	17,238	532.35	533.59	534.45	534.92	535.1	535.25	535.56	535.3
Robinson Road	15,055	517.53	519.1	520.15	521.13	522.04	523.26	525.77	523.75
Confluence S. Kirby	13,143	508.01	509.79	510.77	511.89	512.67	513.4	515.52	513.73
Confluence Brian Branch	9,393	488.64	490.75	491.83	492.8	493.56	494.28	496.04	494.5
Corn Valley	7,431	485.29	487.6	488.9	490.13	491.08	491.94	493.88	492.16
Ridgewood	4,860	474.24	476.38	477.24	477.99	478.59	480.65	481.29	480.7
Upstream of Fish Creek	3,062	467.01	468.6	469.23	469.94	470.72	471.58	473.74	471.76

4.0 FLOODING AND MITIGATION ALTERNATIVES

The land uses for the majority of the existing 100-YR flood plains in the Cottonwood and Fish Creek basins consist of undeveloped land, parks and a golf course; in general these uses are considered appropriate for areas subject to flooding. The parks and golf course are not usable during flooding, but are designed to minimize any damage. There are two primary areas where residences and businesses are located in the existing 100-YR flood plain. The first is a group of apartments along Cottonwood Creek on both sides of Beltline Road. There are twelve buildings which are subject to flooding up to three and a half feet deep. The second area is located along Fish Creek between Bardin Road and Robinson Road. There are eight residences located in the 100-YR flood plain including the only repetitive loss structure in Grand Prairie. There are also two commercial buildings in the 100-YR flood plain along Robison Road. In addition to the residential and commercial buildings discussed above, there are 18 road crossings which are overtopped by a 100-YR storm.

4.1 FLOODING OF RESIDENTIAL AND COMMERCIAL BUILDINGS

4.1.1 Fox Hollow and Cotton Creek Apartments

These apartment complexes are located on opposite sides of Beltline Road on the north side of Cottonwood Creek. Five buildings in the Fox Hollow complex and seven buildings in the Cotton Creek complex are located in the 100-YR floodplain. None of these structures appear on the City's list of repetitive loss structures. These structures are shown on **Figure 7**.

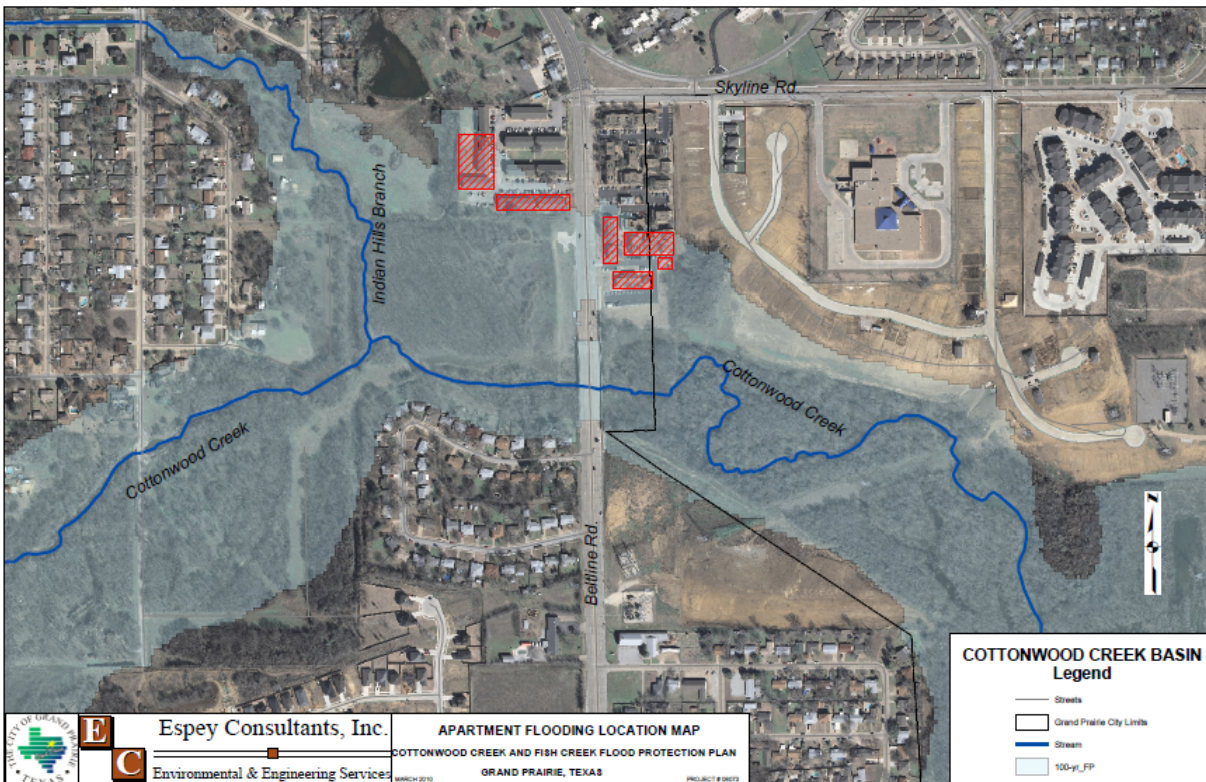


Figure 7: 100-YR Flood Plain at Fox Hollow and Cotton Creek Apartments

4.1.2 Fish Creek between Bardin Road and Robinson Road

There are eight residences located in the 100-YR floodplain along this section of Fish Creek. All of these residences are on large lots which back up to the creek. Two of these homes are located on Our Lane, five are located on Vineyard Road, and one is adjacent to Interstate-20. The home at 802 Our Lane is a

repetitive loss structure. In addition to the residential structures, there are two commercial buildings on Robinson Road which are in the floodplain.

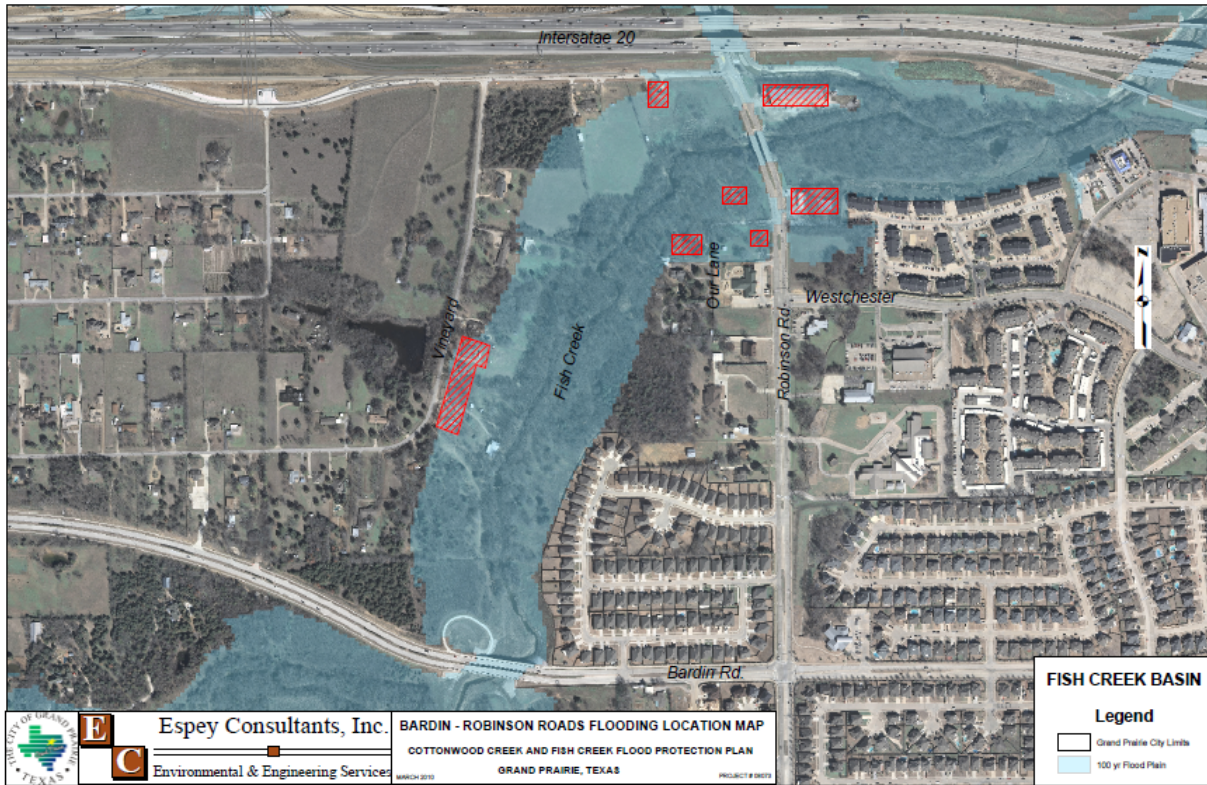


Figure 8: 100-YR Flood Plain between Bardin Road and Robinson Road

4.2 FLOODING OF STREET AND HIGHWAY CROSSINGS

There are 18 road crossings which are overtopped by a 100-YR storm. The locations of the eleven of the bridges in the Cottonwood Creek Basin and are shown on **Figure 9**. The remaining seven overtopped roads are in the Fish Creek Basin and their locations are shown on **Figure 10**. A summary of the bridges showing the roads, the creek each bridge crosses, the highest storm each bridge will pass without being overtopped, the size and type of structure, roadway elevation and the existing 100-YR water surface elevation at each bridge is shown on **Table 10**. The following sections discuss each bridge in more detail.

Table 10: Roadway Crossings Overtopped by 100-YR Storm

Cottonwood Creek Watershed Bridges					
City of Grand Prairie					
Roadway	Creek	Highest Storm the Bridge will Pass	Existing Structure	Existing Roadway Elevation	Existing 100-YR WSEL
SE 14th Street	Cottonwood	5-YR.	160' Bridge	461.88	465.63
Beltline Road	Cottonwood	5-YR.	340' Bridge	469.00	470.82
3rd Street	Cottonwood	2-YR.	130' Bridge	478.00	481.37
Carrier Parkway	Cottonwood	Overtopped by a 2-YR. storm	5-10'x5' MBC	481.00	485.49
Great Southwest Parkway	Cottonwood	2-YR.	5-10'x8' MBC	523.67	526.36
Carrier Parkway	South Cottonwood	2-YR.	4-9'x6' MBC	482.00	486.29
Marshall Drive	South Cottonwood	2-YR.	4-9'x6' MBC	493.57	496.45
Robinson Road	South Cottonwood	2-YR.	4-10'x6' MBC	494.67	497.17
Pioneer Parkway	South Cottonwood	25-YR.	3-8'x8' MBC	542.00	543.45
Great Southwest Parkway	South Cottonwood	25-YR.	3-10'x8' MBC	551.39	552.63
Beltline Road	Plattner	25-YR.	3-6'x6' MBC	494.33	495.42

Fish Creek Watershed Bridges					
City of Grand Prairie					
Roadway	Creek	Highest Storm the Bridge will Pass	Existing Structure	Existing Roadway Elevation	Existing 100-YR WSEL
Matthew Road	Fish	2-YR	120' Bridge	497.61	502.41
Great Southwest Parkway	Prairie	10-YR	4-10x9 MBC	533.53	537.20
Interstate Highway 20 Bridges					
Carrier Parkway	Fish	2-YR	120' Bridge	481.00	486.66
I-20 W-Bound on-ramp	Fish	25-YR	228' Bridge	485.35	488.92
I-20 E-Bound off-ramp	Fish	25-YR	177' Bridge	489.00	489.31
I-20 Main Lanes	Fish	500-YR	245' Bridge	494.00	488.90
Robinson Road	Fish	10-YR	180' Bridge	487.40	493.00
I-20 Main Lanes	Prairie	500-YR	280' Bridge	499.97	491.35
Robinson Road	Prairie	25-YR	106' Bridge	489.72	492.93

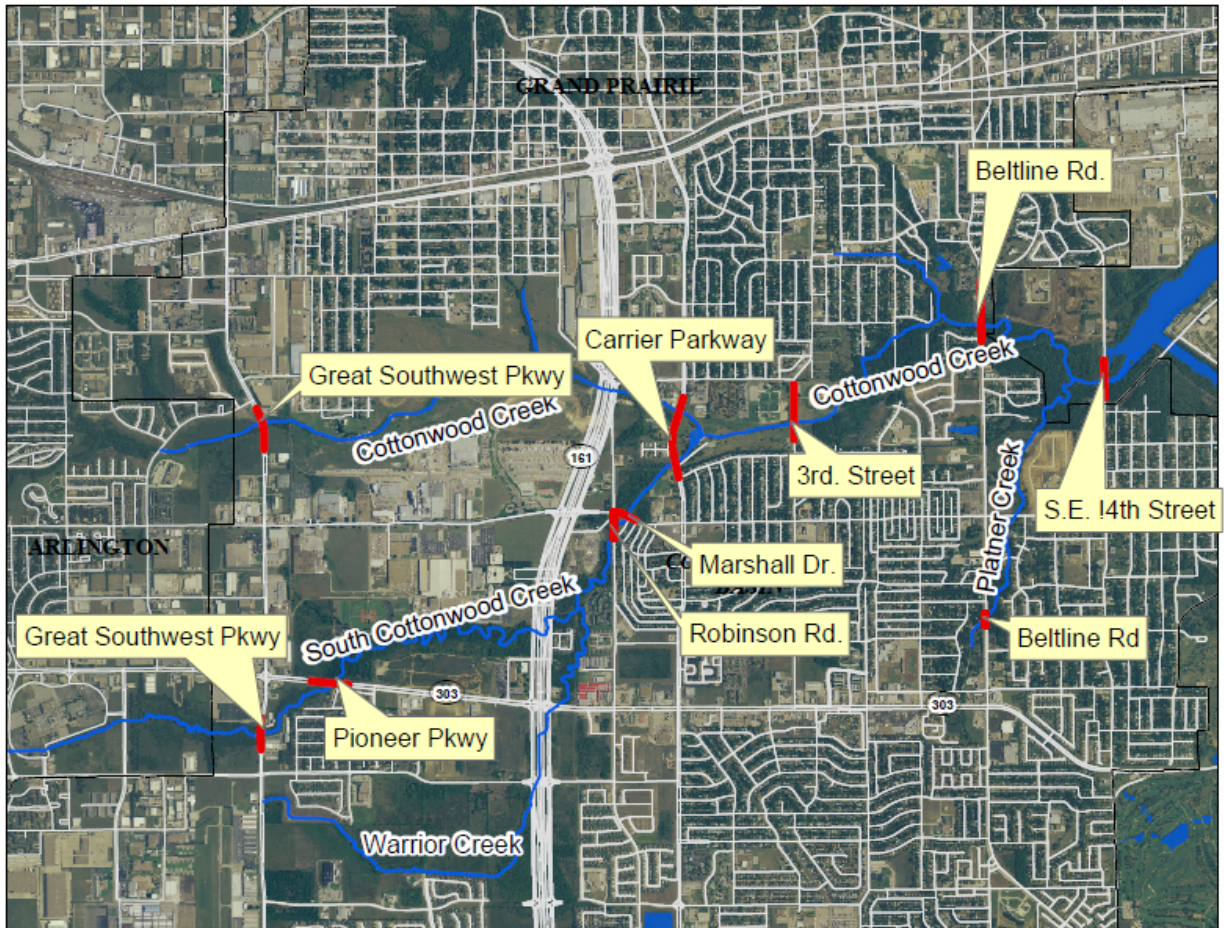


Figure 9: Cottonwood Creek Basin Bridges Overtopped by a 100-YR Storm

4.2.1 S.E. 14th Street at Cottonwood Creek

S.E. 14th Street is a major north-south collector for the City of Grand Prairie even though the portion of the road crossing the Cottonwood Creek Floodplain is located within the City Limits of Dallas. The roadway is classified as M4U, with four lanes and a traffic volume of 10,500 vehicles a day. The crossing consists of 1,100 feet of roadway constructed on a fill section and a five span bridge with 160' of opening. The roadway north of the bridge has a low spot with an elevation of 461.88 while the bridge has an elevation of 463.04. The bridge will pass a 5-YR storm. The ultimate development 100-YR flood level is 466.08, which overtops the roadway by over four feet and the bridge itself by three feet.

4.2.2 Beltline Road at Cottonwood Creek

Beltline is a P7U Major Principal Artery with a traffic volume of 30,000 vehicles per day, six lanes with a center left turn lane. The bridge across Cottonwood Creek is 340' long with 11 spans and will pass a 10-YR storm. The lowest elevation is located on the roadway north of the bridge and has an elevation of 469.0 and the bridge deck elevation is 472.0. The ultimate development 100-YR flood level is 471.11, which overtops the roadway by over two feet; however, the bridge deck remains above the flood. The apartment complexes on the north side of Cottonwood Creek, which flood during the 100-YR event discussed in 4.1.1 above, are located adjacent to this bridge.

4.2.3 3rd Street at Cottonwood Creek

3rd Street is a two lane collector, C2U, with an average traffic count of 10,000 vehicles per day and provides access to the Little League Baseball Complex in McFalls Park. The bridge at Cottonwood Creek

is a four span structure 130' long, with approximately 1,000 feet of the roadway below the 100-YR flood level. The bridge will pass a 2-YR storm; however, this same storm floods the park. The roadway north of the bridge has a low elevation of 478.0, and the bridge elevation is 478.5. The ultimate development 100-YR flood level is 481.62, which overtops the roadway by three and a half feet and the bridge itself by three feet.

4.2.4 Carrier Parkway at Cottonwood and South Cottonwood Creeks

Carrier Parkway crosses both Cottonwood and South Cottonwood Creeks 700 feet upstream of the confluence of the two creeks. This divided, four-lane street is a P4D Minor Principal Artery with an average traffic count of 23,000 vehicles per day. The 4 barrel 9' x 6' multiple box culvert at South Cottonwood Creek will pass a 2-YR storm while the same storm overtops the 5 barrel 10' x 5' multiple box culvert at Cottonwood Creek. An apartment complex and two church buildings located on a peninsula shaped area are cut-off from street access by a 5-YR or greater storm. The ultimate development 100-YR storm overtops Carrier at Cottonwood Creek by four and a half feet and at South Cottonwood Creek by four feet.

4.2.5 Great Southwest Parkway at Cottonwood Creek

Great Southwest Parkway is a divided, four-lane P4D Minor Principal Artery with an average traffic count of 23,000 vehicles per day. The existing five barrel, 10' x 8', multiple box culvert will pass a 2-YR storm. The roadway immediately south of the culvert has a low elevation of 522.9. The ultimate development 100-YR flood level is 526.48, which overtops the roadway by over three and a half feet.

4.2.6 Marshall Drive and Robinson Road at South Cottonwood Creek

Marshall Drive is a four lane east-west major collector, M4U with an average traffic count of 6,000 vehicles per day; while Robinson Road is a north-south collector with only two lanes at this location and has an average daily traffic count of 6,500. Marshall Drive crosses South Cottonwood Creek approximately 365 feet downstream from Robinson Road and backwater from the Marshall Drive four barrel 9' x 6' box culvert has a significant impact on the Robinson Road four barrel 10' x 6' culvert. The Marshall Drive culvert will pass a 5-YR storm while the Robinson Road culvert will only pass a 2-YR storm. The lowest elevation on Marshall Drive is 493.57, while the Ultimate Development 100-YR flood level is 496.45, overtopping the street by almost three feet. Robinson Road has a low point of 494.67, and the Ultimate 100-YR flood level at this location is 497.17. The flood level is two and a half feet above the street.

4.2.6.1

There do not appear to be any structures that are flooded near this location; however, there are 10 residences which will have some yard and driveway flooding. These residences have their fronts on Wellington Street and back-up to South Cottonwood Creek and Robinson Road. One commercial complex has a driveway which is flooded, but a second driveway provides access to S.H. 161 north-bound frontage road. There is an apartment complex approximately 0.4 miles south of the intersection of Marshall and Robinson that appears to experience some flooding in a park area and parking lot during the Ultimate Development 100-YR storm. None of the occupied structures appear to be directly affected by flooding.

4.2.7 Pioneer Parkway and Great Southwest Parkway at South Cottonwood Creek

Pioneer Parkway (S.H. 303) is a six lane, east-west P6D Major Principal Artery with an average traffic count of 26,000 vehicles per day. The three barrel 8' x 8' box culvert will pass a 25-YR storm. Great Southwest Parkway is a north-south P4D Minor Principal Artery with an average daily traffic count of 20,000 vehicles per day, and its three barrel 10' x 8' box culvert will also pass a 25-YR storm. The lowest elevation on Pioneer is 541.88, and the Ultimate 100-YR flood level is 543.56, which overtops the road by one and a half feet. The ultimate 100-YR flood level at Great Southwest is 552.71, and overtops the roadway's lowest elevation of 551.39 by over a foot

4.2.8 Beltline Road at Plattner Creek

Beltline Road (FM 1382) is a P7U Major Principal Artery with an average traffic count of 34,000 vehicles per day. The three barrel 6' x 6' box culvert will pass a 25-YR storm. The Ultimate 100-YR flood level of 495.41 overtops the roadway low point elevation of 494.33 by over a foot.



Figure 10: Fish Creek Basin Bridges Overtopped by a 100-YR Storm

4.2.9 Matthew Road at Fish Creek

Matthew Road in the vicinity of Fish Creek is a two lane road with a 120 foot long three span bridge. This bridge will pass a 2-YR storm. The bridge has an elevation of 497.66 and the ultimate 100-YR flood level is 502.41, which overtops the bridge by four and three quarter feet. There is a private road which appears to provide access to two residences which is also flooded by the Ultimate 100-YR event.

4.2.10 Great Southwest Parkway at Prairie Creek

Great Southwest Parkway is a major divided four lane north-south thoroughfare with an average traffic count of 30,000 vehicles per day. It crosses Prairie Creek with a four barrel 10' x 9' box culvert, which can pass a 10-YR storm. The roadway has a low point elevation of 533.53, and the ultimate 100-YR flood level is 537.78, which overtops the road by four and a quarter feet.

4.2.11 Interstate - 20 at Fish and Prairie Creeks

There are seven bridges in this area, beginning at the most downstream location Carrier Parkway crosses Fish Creek with a 120' three span bridge, continuing upstream the west bound on-ramp for IH-20 is a 228' three span bridge, IH-20 main lanes are carried by a 245' three span bridge and the east bound off-ramp has a 177' three span bridge. Prairie Creek joins Fish Creek approximately 1,300' upstream of IH-

20. Robinson Road crosses Fish Creek with a 106' five span bridge approximately seven hundred and fifty feet upstream of the confluence with Prairie Creek. Proceeding upstream from its confluence with Fish Creek, Prairie Creek runs parallel with IH-20 for a short distance and then turns north crossing under IH-20 running adjacent to Robinson Road. Prairie Creek then makes a sharp turn west and crosses under Robinson Road a short distance north of IH-20. The IH-20 Bridge which crosses over both Prairie Creek and Robinson Road is a 280' four span structure. The Robinson Road Bridge is only 700' north of IH-20; it is a 106' long three span structure.

These bridges are being discussed as a group because the short distances between structures and the common roadway connections result in flooding at one bridge impacting adjacent roads and backwater from each bridge affecting the next bridge upstream. The Carrier Parkway Bridge will pass a 2-YR storm. Flooding here closes Carrier Parkway at the bridge, under the IH-20 overpass as well as the IH-20 ramps on both the north and south sides of IH-20. The backwater from Carrier negatively affects the hydraulic capacity of the upstream bridges. Both of the IH-20 ramp bridges will pass a 50-YR storm, however flooding at Carrier effectively closes these roads. The IH-20 main lane bridge will pass a 500-YR storm. The bridge at Robinson Road and Fish Creek will pass a 10-YR storm; the bridge itself is not overtopped however the roadway north of the bridge is flooded as well as the ramp on the south side of IH-20. The IH-20 main lane bridge crosses over both Robinson Road and Prairie Creek. This bridge will pass a 500-YR Storm; however, a 10-YR storm will flood Robinson Road and both intersecting ramps at this location. The bridge at Robinson Road and Prairie Creek will pass a 25-YR storm. Again the bridge is not overtopped but the roadway to the south of the bridge floods. **Table 11** shows the bridge deck elevations, approach roadway elevations and the ultimate 100-YR flood level for each bridge.

Table 11: Interstate Highway 20 Bridge & Roadway Flood Elevations

Location	Ultimate 100-YR Flood Level	Bridge Deck Elevation	Bridge Overtop Depth	Roadway Elevation	Roadway Overtop Depth
Carrier at Fish Creek	485.61	481.0	4.6	481.0	4.6
IH-20 W Bound On-Ramp at Fish Creek	485.85	490.0	N/A	484.73	1.1
IH-20 Main Lanes at Fish Creek	485.93	498.9	N/A	493.0	N/A
IH-20 E Bound Off-Ramp at Fish Creek	487.6	489.0	N/A	484.36	3.2
Robinson Road at Fish Creek	490.89	495.0	N/A	487.42	3.5
Robinson Road at Prairie Creek	492.02	494.5	N/A	489.72	2.3

In summary each bridge in this group is affected by the backwater of the structure immediately downstream which compounds the magnitude of the flooding. This results in the flooding of Carrier Parkway and the ramps that connect Carrier to IH-20 during a 5-YR storm and flooding of Robinson Road and its associated IH-20 ramps with a 10-YR storm.

4.3 MITIGATION ALTERNATIVES

We will discuss three types of mitigation considered in this study for the flooding discussed above; storage, buy-out and structural modification. Storage normally consists of the construction of a large pond or series of small ponds designed to store a portion of the flood flow and release it slowly reducing the peak flow, which in turn lowers the flood levels. This approach provides benefits for the areas

downstream of the storage, but can require the purchase of large areas of land. Buy-out consists of purchasing structures located in the floodplain. The structures are removed and the property is converted to a use that is compatible with its location in the floodplain. Structural modification covers a wide variety of construction, the most common being widening of the stream channels and enlarging bridges or culverts. Each situation was examined to determine if each of these alternatives was applicable. The availability of sufficient open area for the construction of storage ponds is a significant factor in determining if storage can be considered; converting developed property to storage would be prohibitively expensive. Buy-out can only be considered if there are residential or commercial buildings which are flooded; several of the bridges which are flooded do not have any home or commercial building flooding associated with them and a buy-out would not apply in these situations. The cost of each mitigation project must be considered against the benefits produced. A detailed discussion of the Benefit Cost analysis of the mitigation alternatives is contained in **Section 4.4** of this report. The effects of the ultimate condition 100-YR flooding were used as the basis for each of the alternatives examined.

4.3.1 Storage

Storage was considered for three locations in the Cottonwood Creek Basin: upstream of Great Southwest Parkway on Cottonwood Creek, upstream of Robinson Road on South Cottonwood and upstream of Beltline Road on Cottonwood. The storage consideration for Fish Creek consists of a series of ponds or benching along both Prairie and Fish Creeks above IH-20 and Robinson Road. The availability of undeveloped land for pond construction allows for the consideration of storage for these locations. The estimated cost for the storage projects are discussed in the followings sections. Comparisons of the benefits against the project cost are discussed in **Section 4.4** of this report. Details of these costs are included in **Appendix G**.

4.3.1.1 Great Southwest Parkway at Cottonwood Creek Storage

In order to reduce flow to a point that the existing culvert at Great Southwest Parkway will be able to pass a 100-YR storm, approximately 350 ac-ft of storage will be required. The estimated cost of this storage pond is expected to be \$ 4,914,000. This 350 ac-ft of storage would also reduce the size of the structural improvements needed to allow Carrier Parkway to pass a 100-YR flood. A storage capacity of 850 ac-ft would be needed in order for Carrier Parkway to pass the 100-YR storm. There is not enough undeveloped land in the immediate area to construct a pond of this size. Purchasing developed property for the construction of a pond will most likely prove to be prohibitively expensive.

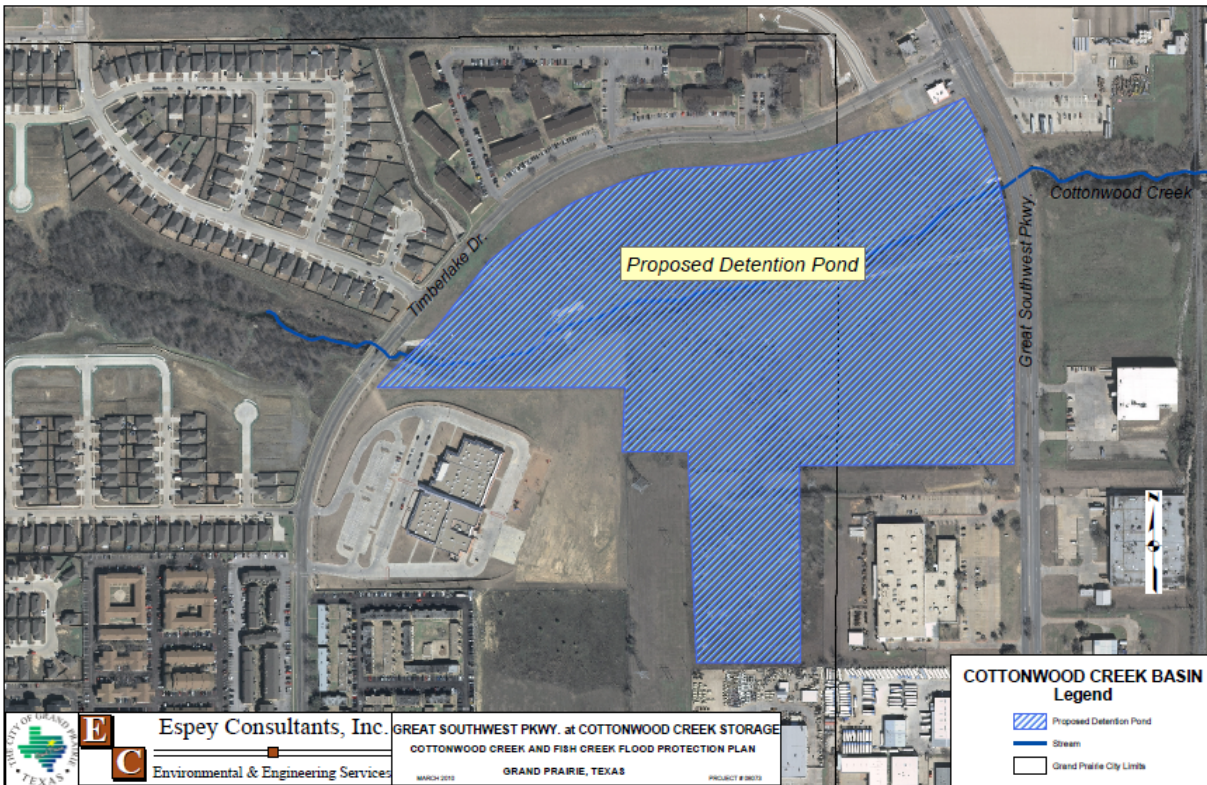


Figure 11: Great Southwest Parkway at Cottonwood Creek Storage

4.3.1.2 South Cottonwood Creek Upstream of Robinson Road

This proposed storage would benefit the bridges for Robinson Road and Marshall Drive, allowing them to pass a 100-YR flood, without any additional improvements. It will also reduce the structural improvements necessary for Carrier to pass the 100-YR storm. This pond would be required to contain 800 ac-ft. with an estimated cost of \$ 10,867,000.

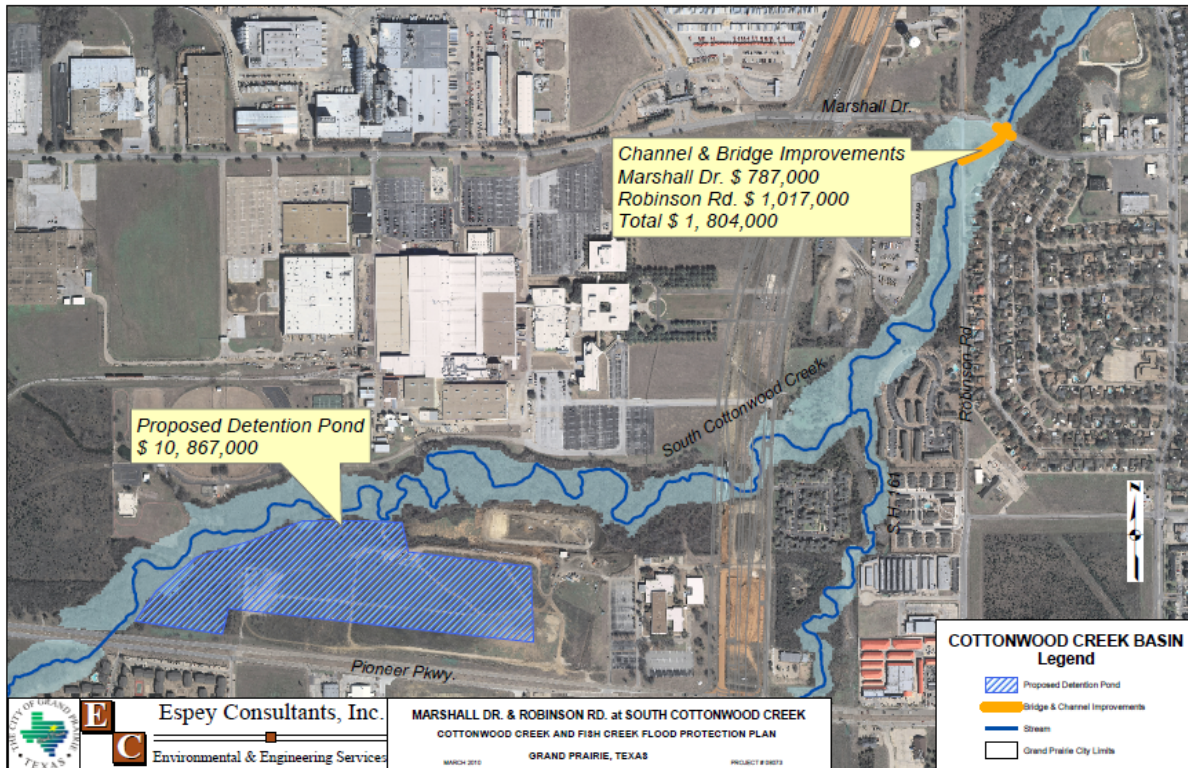


Figure 12: Storage for South Cottonwood Creek Upstream of Robinson Road

4.3.1.3 Beltline Road at Cottonwood Creek Storage

The benefits of this proposed 375 ac-ft detention pond would be the elimination of flooding in the Fox Hollow and Cotton Creek apartment complexes as well as allowing the Beltline Road Bridge to pass the 100-YR event. This would actually be a series of ponds along the creek running upstream from Beltline Road to McFalls Park. The estimated cost for these ponds is \$ 4,719,000.

4.3.1.4 Fish and Prairie Creeks Storage

The benefits of this project would be the elimination of flooding of the residential and commercial structures along Fish Creek between Bardin Road and Robinson Road, as well as allowing the group of bridges at Fish Creek and Interstate-20 to pass a 100-YR storm. This is a variation of a concept proposed by Halff Associates in a report titled, “Capital Improvements Study along Kirby, Prairie & Fish Creek Drainage Basins,” dated April 2006. The original concept proposed benching Fish Creek from Robinson Road up stream to Great Southwest Parkway a distance of approximately 10,000 feet. EC’s variation would be to reduce the benching along Fish Creek by benching a portion of Prairie Creek. This would benefit the Robinson Road Bridge at Prairie Creek in addition to those along Fish Creek. The storage volume required will be approximately 2,700 ac-ft on Fish Creek and 1,000 ac-ft along Prairie Creek for a total of 3,700 ac-ft of storage. The estimated cost for the ponds along Fish Creek is \$36,122,000, and the cost for the ponds along Prairie Creek is \$ 13,726,000, for a total project cost of \$ 49,848,000.

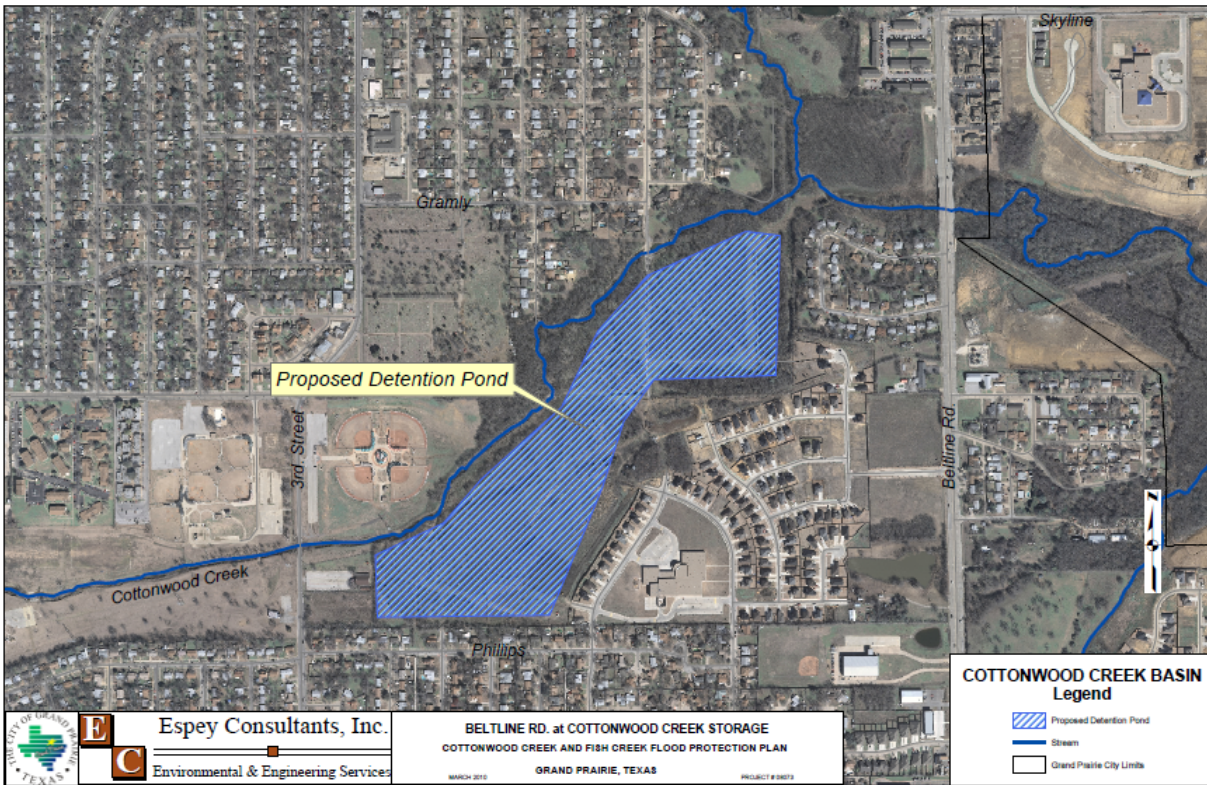


Figure 13: Beltline Road at Cottonwood Creek Storage

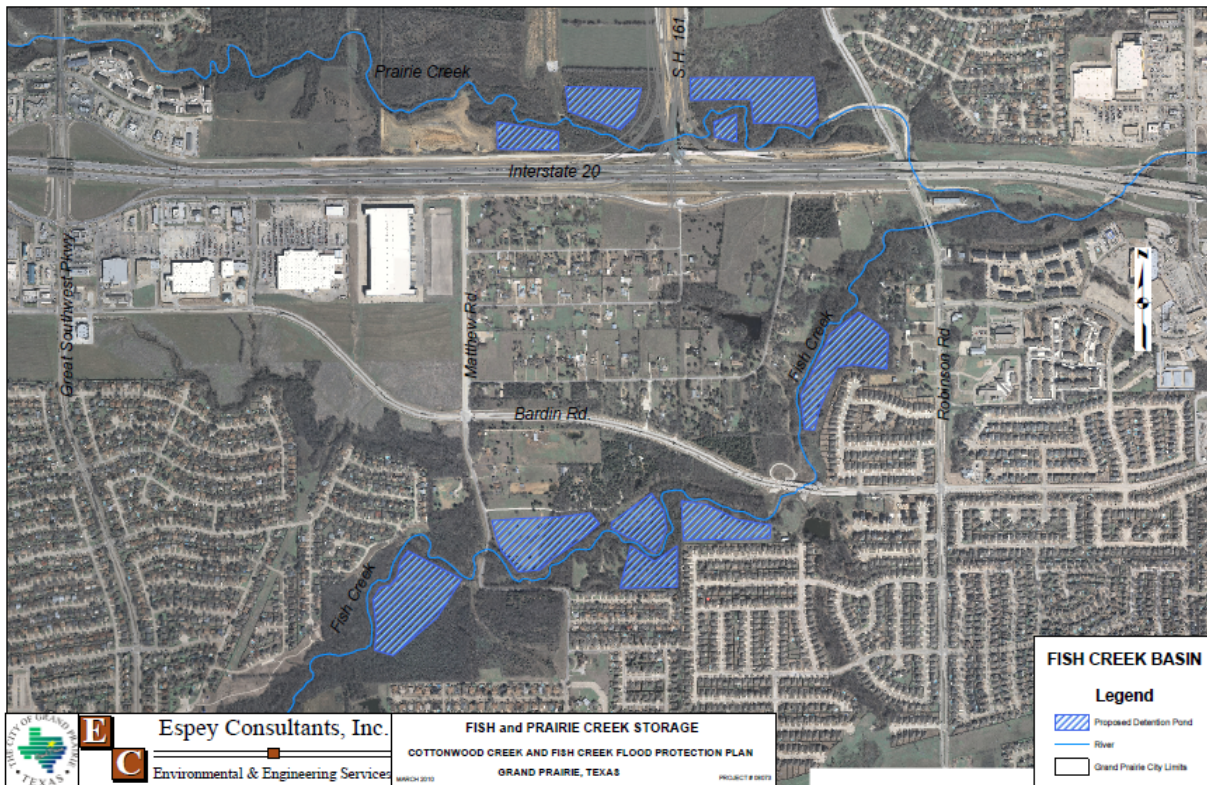


Figure 14: Fish and Prairie Creek Storage

4.3.2 Buy-out

There are two areas where buy-outs were considered, the apartments at Beltline & Cottonwood Creek as well as the residential and commercial structures along Fish Creek between Bardin Road and Robinson Road.

The buy-out cost includes not only the cost of purchasing the property, but the cost of relocating the residents, demolishing and removing the structures as well. The estimated buy-out cost for the apartments at Cottonwood at Beltline is \$ 4,500,000. The estimated buy-out cost for the area along Fish Creek between Bardin Road and Robinson Road is \$ 3,400,000. Estimates of property values are based on information obtained from the Dallas County Appraisal District. Comparisons of the benefits against the project cost are discussed in **Section 4.4** of this report.

4.3.3 Structural Modifications

Structural modifications will consist of widening creek channels, enlarging existing culverts and bridges as well as raising roadways above the ultimate 100-YR floodplain. The modifications are designed to provide for creek crossings with the capacity to pass an ultimate 100-YR storm. These types of construction projects improve the flow capacities of the culverts, bridges and creeks reducing the flood water surface elevations. These reduced water levels can benefit areas upstream of the construction. The reductions in water levels will also reduce the creek's valley storage. This loss of valley storage has the potential to increase peak flows downstream of the structural modification raising the ultimate 100-YR WSEL and possibly requiring addition mitigation downstream. All excavation and backfill operations within the creek channels will require a 404 Permit from the U. S. Army Corps of Engineers. Total Estimated Project Costs are identified in each of the following sections. Comparisons of the benefits against the project cost are discussed in **Section 4.4** of this report. Detailed descriptions of the makeup of each of these costs are included in **Appendix G**.

4.3.3.1 S.E.14th Street at Cottonwood Creek

The water surface levels for the various storm events are heavily influenced by the backwaters of Mountain Creek Lake. In fact, the normal lake level backs water into the creek channel under the bridge. The close proximity of Mountain Creek Lake reduces the viable structural options at this location to raising the bridge and roadway above the ultimate 100-YR flood level. However, this bridge is located within the city limits of Dallas, so a detailed cost estimate for this option was not performed. Improvements to this crossing would require negotiations between the Cities of Grand Prairie and Dallas.

4.3.3.2 Beltline Road at Cottonwood Creek

Widening the creek channel from the bridge at Beltline downstream to Cottonwood Creek's confluence with Plattner Creek, the proposed channel would have a trapezoidal section with a 150-foot flat bottom and 4:1 side slopes which would reduce the ultimate 100-YR WSE by five feet to 469.27. The reduced backwater levels will allow the existing bridge to pass the ultimate 100-YR storm and would also remove seven of the twelve apartment buildings from the flood plain. The excavation in the creek channel will require a 404 permit. The estimated cost for this project is \$4,614,000.

4.3.3.3 3rd Street at Cottonwood Creek

The proposed improvements for this bridge include extending the 150-foot flat bottom channel from Beltline upstream to 3rd Street, raising the roadway approximately one foot and lengthening the bridge to 240 feet, to match the proposed channel width. The estimated cost for this project is \$9,873,000.

4.3.3.4 Carrier Parkway at Cottonwood and South Cottonwood Creeks

Carrier Parkway crosses both Cottonwood and South Cottonwood Creeks in close proximity to their confluence. Structural modifications proposed include raising the roadway at both creeks to an elevation of 485.5, and constructing a 140-foot bridge across Cottonwood Creek and a 160-foot bridge across South Cottonwood. The estimated cost for improving both bridges is \$5,668,000.

4.3.3.5 Great Southwest Parkway at Cottonwood Creek

The 100-YR WSE at Great Southwest Parkway is heavily influenced by the backwater effects of the railroad bridge located approximately 600' downstream of this crossing. The railroad bridge embankment narrows the flow, producing extremely high velocities and approximately 4.8-feet of headloss at this crossing during the 100-YR event. The high velocities lead to high rates of erosion. Widening the railroad bridge will reduce erosion at the railroad and reduce the magnitude of the structural modifications needed at Great Southwest. The improvements proposed for this location consist of widening the railroad bridge to 200-feet, raising the roadway at Great Southwest 3-feet and replacing the existing culvert with a seven barrel 10'x9' multiple box culvert, with an estimated project cost of \$4,713,000.

4.3.3.6 Marshall Drive and Robison Road at South Cottonwood

South Cottonwood Creek crosses Robison Road 400 feet upstream of Marshall Drive; backwater from Marshall significantly increases the WSE at Robison. Construction of the proposed improvements should begin at Marshall Drive and proceed upstream. Marshall Drive will need to be raised three quarters of a foot and the existing culvert needs to be replaced with a 10 barrel 10' x 10' multiple box culvert. The channel between Marshall and Robison needs to be widened to 100 feet wide trapezoidal configuration and the culvert at Robison also needs to be replaced with a 10 barrel 10' x 10' multiple box culvert. The estimated cost for these improvements is \$787,000 for Marshall, \$1,017,000 for Robison, totaling \$1,804,000 for both.

4.3.3.7 Pioneer Parkway and Great Southwest Parkway at South Cottonwood Creek

Pioneer and Great Southwest Parkways are separated by a 2,000-foot reach of South Cottonwood Creek. The proposed improvement for Pioneer Parkway consists of adding a 10'x10' box culvert to the existing 3 barrel 8'x8' culvert. Limited space for construction requires that the existing box culvert at Great Southwest Parkway be removed and replaced with a four barrel 10' x 10' multiple box culvert. The improvements have an estimated cost of \$217,000 for Pioneer Parkway and \$326,000 for Great Southwest Parkway.

4.3.3.8 Beltline Road at Plattner Creek

The existing culvert is a three barrel 6' x 6' culvert. Constructing a fourth barrel for this culvert would allow it to pass the ultimate 100-YR event. The estimated cost for this project is \$139,000.

4.3.3.9 Mathew Road at Fish Creek

Matthew Road, north of Bardin Road and south of Butterfield Trail, is a four lane thoroughfare, the section between these locations is only a two lane road. The City of Grand Prairie's Thoroughfare Master Plan shows that Matthew Road is to be re-routed and widened in the future. The existing bridge will be removed and design of the proposed bridge and roadway should be sized for the 100-YR flood event. Since the proposed re-route has not been designed a detailed cost estimate for this option was not performed.

4.3.3.10 Great Southwest Parkway at Prairie Creek

The existing four barrel 10' x 9' MBC will need to be augmented by the construction of an additional four barrel 10' x 10' MBC. This provides the capacity to pass the ultimate 100-YR storm with an estimated cost of \$570,000.

4.3.3.11 Interstate-20 at Fish and Prairie Creeks

There are six bridges in close proximity and the capacity of this group of bridges is determined by the smallest structure in the group.

This complex intersection of interstate highway, major local thoroughfares, and major drainage features does not lend itself to a simple solution. The original design criteria of the interstate highway did not

require that the secondary roads be able to pass a 100-YR flood, additionally growth in both Grand Prairie and Arlington has converted large areas of the drainage basin from agricultural to residential which produces more runoff than was anticipated at the time of the original design. The weak link in this group of bridges is the Carrier Parkway Bridge as it will only pass a 2-YR storm and backwater from this structure has a negative impact on the remaining bridges. Two reconfigurations of the streets and highway were considered but discarded as impractical:

- Raising Carrier Parkway – Raising Carrier would improve the capacity of the bridge. The distance between the bridge and IH-20 does not allow Carrier to be lowered before passing under IH-20. This would require that the main lanes of the interstate be raised in order to maintain the required vertical clearances. The cost associated with the modification of IH-20 removes this option from consideration.
- Constructing a new grade separation taking Carrier Parkway over IH-20 – This configuration would be the construction of an over-pass which would take Carrier Parkway over IH-20. Connecting the proposed grade separation with Westchase Drive proved problematic, the grade required to make this connection was unreasonably steep. This option would also require the redesign and construction of the access ramps on both sides of IH-20.

Three hydraulic options were considered:

- Storage upstream of Robinson Road – This option was discussed in **Section 4.3.1.4** and consists of a series of ponds along both Fish and Prairie Creeks with a combined capacity 3,700 ac-ft. The estimated construction cost of this option is \$ 49,848,000.
- Channel Improvements – Halff Associates in a report titled, “Capital Improvements Study Along Kirby, Prairie & Fish Creek Drainage Basins,” dated April 2006, proposed widening the Fish Creek channel downstream of Carrier Parkway approximately 3,000 feet. Widening the bridge at Carrier to 170’, replacing the existing concrete channel between Carrier and IH-20 with a 160’ to 190’ trapezoidal concrete channel and the section under IH-20 would be replaced with a 165’ rectangular channel. The natural channel section upstream of IH-20 would also receive improvements to the east bank as required to prevent overflows to the south side of IH-20. In 2006 the estimated cost of this project was \$20,150,000. A key component in this proposed project is the widening of the Fish Creek channel downstream of Carrier Parkway. This section of Fish Creek traverses an urban forest preserve which presents a significant challenge to obtaining permission for this type of construction. Typically mitigation for construction through this type of environment requires setting aside a mitigation area on a three to one basis. That is the City of Grand Prairie would have to set aside three acres of land as mitigation for every acre of disturbed area. The cost of the urban forest mitigation was not included in the 2006 estimate. Updating the 2006 cost and adding the cost of the urban forest mitigation results in an estimated construction cost of \$ 22,000,000.
- Diversion – Divert flows in excess of the 7,000 cfs capacity of the Carrier Parkway Bridge. This option proposes the construction of 9,000 feet of 24-foot diameter tunnel from Fish Creek immediately upstream of IH-20 to Mountain Creek. The proposed tunnel would run east along IH-20 to the point where it crosses Mountain Creek, between Mountain Creek Lake and Joe Pool Lake. This project proved to be prohibitively expensive with an estimated cost of \$ 132,000,000.

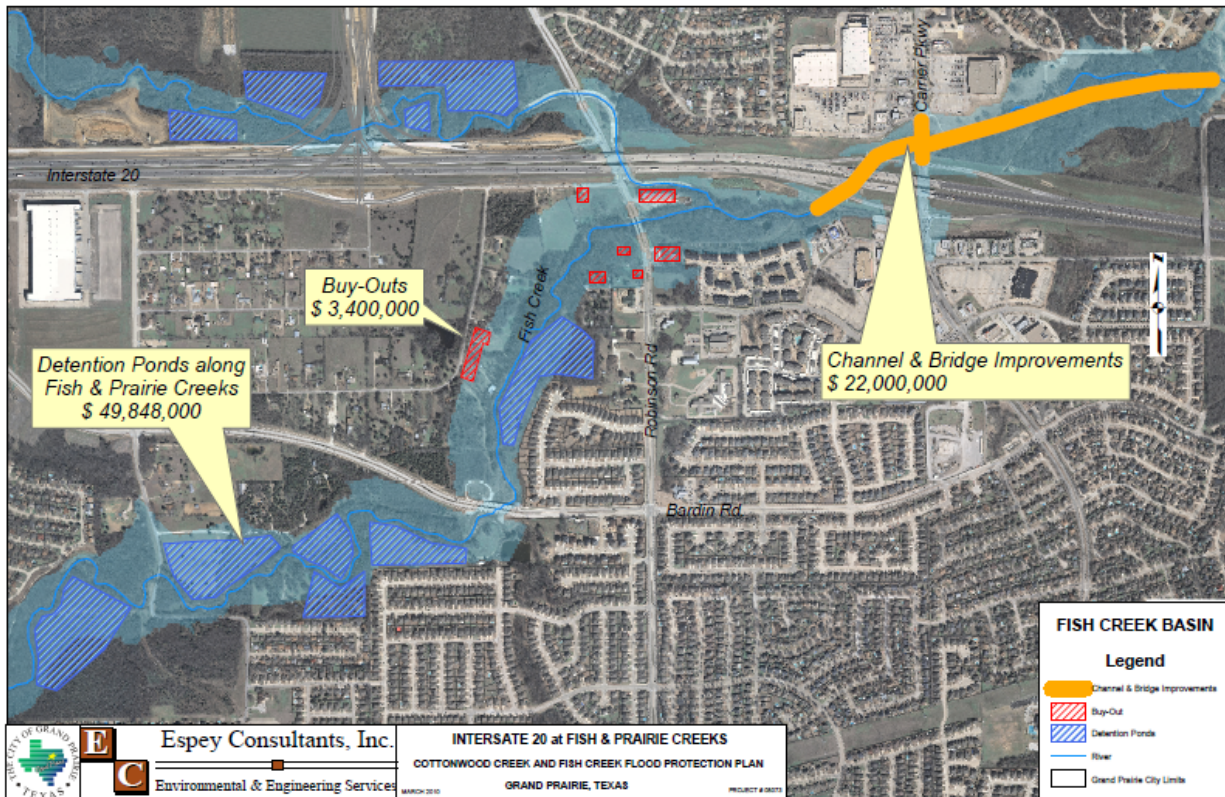


Figure 15: Fish at Interstate 20 Storage, Buy-Out, and Structural Options

4.3.4 High Water Warning Systems

A high water warning system would alert the traveling public to the fact that flood water is over the roadway and that it is unsafe to attempt crossing. These systems can be as simple as staff gauges which provide visual information on the water depth to a system with flashing warning lights similar to a railroad crossing. The purpose of a warning system would be to reduce the potential for involving emergency personnel in dangerous high water rescues and drowning fatalities as a result of attempting to drive through high water. Warning systems are appropriate at locations where the costs of storage or structural modifications exceed the benefits or where budgetary constraints significantly restrict construction of other alternatives. **Table 12** below shows the roadways subject to flooding during a 100-YR storm and the type of high water warning system at each location.

Table 12: High Water Warning Systems

Roadway	Creek	High Water Warning System
SE 14th Street	Cottonwood	None
Beltline Road	Cottonwood	Staff gauge for the south bound lane only
3rd Street	Cottonwood	Staff gages
Carrier Parkway	Cottonwood	Automatic flashing light warning system
Great Southwest Parkway	Cottonwood	Staff gages
Carrier Parkway	South Cottonwood	Has automatic flashing light warning system
Marshall Drive	South Cottonwood	Staff gages
Robinson Road	South Cottonwood	Staff gages

Pioneer Parkway	South Cottonwood	None
Great Southwest Parkway	South Cottonwood	Staff gages
Coral Way	Plattner	None
Beltline Road	Plattner	None
Carrier Parkway	Fish	None
Robinson Road	Fish	None
Robinson Road	Prairie	None
Matthew Road	Fish	Staff gages
Great Southwest Parkway	Prairie	Staff gages

4.4 BENEFIT COST ANALYSIS

A benefit-cost analysis was performed for the various options affecting four of the areas discussed above. The viability of the various options was measured through a comparison of the relative cost of each mitigation project versus the benefits derived from these projects. The benefits must exceed the cost in order for a project to be considered viable. There are numerous methods for comparing cost and benefits, a Net Present Value Analysis (NPV) was chosen for this study. Over the life of a project the benefits and costs are unequally distributed, a means of accounting for the time value of money is necessary to provide useful decision making, i.e. the concept of present value (PV). To calculate PV, both the series of benefits accrued and the costs incurred each year are discounted using a compound interest procedure. This discount rate is typically between 3.5% and 7%. FEMA requires the use of a 7% discount rate in analysis and application for its Federally-funded cost-sharing programs, as such, 7% was used for this analysis. The NPV analysis begins with an estimate of cost for the selected improvement, and considers the estimated benefit stream associated with the improvement in-place. This method calculates the annual cost equivalent of the damages resulting not only from the 100-year storm but also from the 10-YR, 50-YR and 500-YR events.

4.4.1 Cost Analysis

The estimated cost for each alternative includes materials and construction cost, which are based on recent bid tabulations for similar construction in this region, as well as soft cost for administration, engineering, surveying, geotechnical reports and legal. The allowance for soft cost was 22% of the construction cost. The construction cost were estimated using bid data from the Texas Department of Transportation, Dallas District. A summary of the costs for each of the alternatives is provided in **Appendix G**.

4.4.2 Benefit Analysis

The benefit of the alternative is the relative monetary savings of a given improvement being in-place, compared to it “not being in-place”. This value is determined from the difference between estimated damages for existing condition and estimated damage with alternative in-place. To estimate the risk associated with a given magnitude flood event, HAZUS-MH software was employed. This software, developed by FEMA Hazard Mitigation Division under a contract with the National Institute of Building Sciences, integrates with ArcGIS 9.3 (the platform utilized for spatial data management and analysis in the overall study). HAZUS is a widely-accepted methodology for flood damage estimation. HAZUS provides an estimate of damages by taking spatial information about the depth of flooding, and correlating that information in an “overlay” analysis to data about the built environment and regional assumptions about the relationship between depth of inundation and damages. In addition to this information, HAZUS provides other useful emergency management data such as estimates of displaced households, disrupted critical facilities, and business use loss.

For the City’s purposes, HAZUS was used to generate estimates of the relative benefit of the flood protection measures proposed. The results of the hydraulic analysis from HEC-RAS (see **Section 3.0**) are processed in HEC-GeoRAS into inundation depth grids for each event (“depth grid”). For each alternative, the resulting depth grid is evaluated in HAZUS to produce an estimate of damages. These damages “with the selected improvement in place” are then compared to an estimate of damages in the existing condition, for the same storm event. The difference in damages is then the relative benefit for that particular flood control measure.

4.4.3 Benefit Cost Results

Benefit Cost Analysis was performed for four project locations with multiple alternative solutions:

- Beltline Road at Cottonwood Creek including the Fox Hollow & Cotton Creek Apartments
- Great Southwest Parkway at Cottonwood Creek
- Marshall Drive & Robinson Road at South Cottonwood
- Interstate Highway 20 at Fish Creek as well as the area along Fish Creek between Robinson Road & Bardin Road

4.4.3.1 Beltline Road at Cottonwood Creek

Three mitigation options were considered for this location, buyout with an annualized estimated cost of \$362,639, the construction of storage facilities upstream of this location with an annualized estimated cost of \$ 380,287, and channel improvements with an annualized estimated cost of \$ 371,826. The estimated costs of these options are within five percent of each other so non-economic impacts were considered:

- a. The buy-out has the least cost but does not provide any relief for flooding of Beltline Rd. It also requires the relocation of the residents of the affected apartments and will result in the removal of these assets from the City’s tax base which would be a net increase in the cost of the project to the City.
- b. The structural channel improvements will improve conveyance through this section of Cottonwood Creek at the expense of valley storage which will increase the flow and flooding at the bridge on S.E. 14th Street. This project will also require that a significant portion of the improvements be constructed within the city limits of Dallas. While the construction will benefit the City of Grand Prairie, the expenditure of Grand Prairie funds in Dallas could produce negative political impacts.
- c. Storage, while costing slightly more than the other two options will reduce flooding in the target area but will also reduce the flood levels downstream. The implementation of the storage option would not require the relocation of any residents, and all of the construction will be located within the city limits of Grand Prairie.

Therefore, EC recommends storage as the preferred mitigation option for this area.

Table 13: Comparison of Mitigation Options at Beltline Road & Cottonwood Creek

		Fox Hollow & Cotton Creek Apartments	Beltline Road at Cottonwood Creek
Annualized Cost of Flood Damages		\$535,000	
BUYOUT	Principal	\$4,500,000	
	Annualized	\$362,639	
	Benefit Cost Ratio	1.5	
	Results	Apartments removed from floodplain	Street flooding not mitigated

STORAGE	Principal	\$4,719,000	
	Annualized	\$380,287	
	Benefit Cost Ratio	1.4	
	Results	Apartments removed from floodplain	Street flooding mitigated, flooding downstream is reduced
STRUCTURAL	Principal	\$4,614,000	
	Annualized	\$372,826	
	Benefit Cost Ratio	1.4	
	Results	Apartments removed from floodplain	Street flooding mitigated

4.4.3.2 Great Southwest Parkway at Cottonwood Creek

The two mitigation options considered for this area were the construction of a storage area upstream of Great Southwest and structural improvements to the roadway, culvert, downstream channel and railroad bridge. The storage option has an annualized estimated cost of \$ 396,002, while the structural option has an annualized estimated cost of \$ 379,804. The storage option is between four and five percent higher than the structural improvements. Noneconomic considerations include the following:

- a. Storage will reduce the peak flow through the culvert at Carrier as well as other structures downstream of Great Southwest, providing additional benefits by reducing the cost of improvements to them.
- b. The proposed structural improvements will tend to increase peak flows which will have the opposite effect downstream.

Therefore, the storage option is recommended for Great Southwest Parkway at Cottonwood Creek.

Table 14: Comparison of Mitigation Options at Great Southwest Pkwy. & Cottonwood Creek

		Cottonwood Creek at Great Southwest Parkway
Annualized Cost of Flood Damages		\$447,000
BUYOUT	Principal	N/A
	Annualized	N/A
	Benefit Cost Ratio	N/A
	Results	N/A
STORAGE	Principal	\$4,914,000
	Annualized	\$396,002
	Benefit Cost Ratio	1.1
	Results	Street flooding mitigated, flooding downstream is reduced

STRUCTURAL	Principal	\$4,713,000
	Annualized	\$379,804
	Benefit Cost Ratio	1.2
	Results	Street flooding mitigated

4.4.3.3 Marshall Dr. & Robinson Rd. at South Cottonwood Creek

A structural and storage option were considered for Marshall Drive & Robinson Road. The structural option with an annualized cost of \$145,377 is much more economical than the storage option with an annualized cost of \$362,639. The storage option provides additional downstream benefits; however, even with this additional consideration, the structural option is the most economical and therefore the recommended option.

Table 15: Comparison of Mitigation Options at Marshall Dr & Robinson Rd. at South Cottonwood Ck.

		Marshall Dr at South Cottonwood	Robinson Rd at South Cottonwood
Annualized Cost of Flood Damages		\$542,000	
BUYOUT	Principal	N/A	
	Annualized	N/A	
	Benefit Cost Ratio	N/A	
	Results	N/A	
STORAGE	Principal	\$10,867,000	
	Annualized	\$362,639	
	Benefit Cost Ratio	1.1	
	Results	Street flooding mitigated at both locations, flooding downstream is reduced	
STRUCTURAL	Principal	\$787,000	\$1,017,000
	Annualized	\$63,421	\$81,956
	Benefit Cost Ratio	3.7	
	Results	Street flooding mitigated at both locations	

4.4.3.4 Interstate Highway 20 at Fish Creek

The magnitude of the 100-YR flood flow, 30,000 cfs, compared to the capacity of the Carrier Parkway bridge, 7,100 cfs, provides an indication of the challenges involved in mitigating the flooding in this area. Buy-out, storage and structural mitigation projects were considered for this location. In all three of these options, the cost of the mitigation projects exceeded the benefits. The structural option of widening the Fish Creek channel downstream of Carrier Parkway approximately 3,000 feet and widening the bridge at Carrier to 170', replacing the existing concrete channel between Carrier and IH-20 with a 160' to 190' trapezoidal concrete channel and replacing the section under IH-20 with a 165' rectangular channel, has the lowest capital cost and therefore the most favorable Benefit-Cost ratio. The total annualized cost of

the damages is \$1,447,000, and the annualized cost of \$1,623,816 for the proposed improvements produces a BC ratio of only 0.89.

Table 16: Comparison of Mitigation Options at Interstate 20 & Fish Ck.

		Fish Creek between Bardin Rd. & Robinson Rd.	IH-20 at Fish Creek
Annualized Cost of Flood Damages		\$191,000	\$1,256,000
BUYOUT	Principal	\$3,400,000	\$0
	Annualized	\$273,994	\$0
	Benefit Cost Ratio	0.7	
	Results	Residential & Commercial structures removed from floodplain	Street flooding not mitigated
STORAGE	Principal	\$0	\$49,848,000
	Annualized	\$0	\$4,017,071
	Benefit Cost Ratio		0.3
	Results	Residential & Commercial structures removed from floodplain	Street flooding mitigated, flooding downstream is reduced
STRUCTURAL	Principal	\$0	\$20,150,000
	Annualized	\$0	\$1,623,816
	Benefit Cost Ratio		0.8
	Results	Residential & Commercial structures removed from floodplain	Street flooding mitigated.

5.0 PHASING AND IMPLEMENTATION

5.1 PRIORITIZATION OF ALTERNATIVES

The City of Grand Prairie’s *City-Wide Drainage Master Plan Road Map* has a procedure for ranking and prioritizing drainage improvement projects. The ranking matrix is shown in **Table 17**.

- **Step 1** of the Prioritization Plan would develop the Initial Ranking Factor based on the estimate of probable cost versus the number of properties/structures benefitted:

Table 17: Ranking Matrix

Ranking Matrix				
		Number of Properties Benefitted		
		High > 10	Medium 5 to 10	Small < 5
Estimate of Probable Cost (\$)	Small < \$500k	1	2	3
	Medium \$500 k to \$1.5 mil	2	3	4
	Large > \$1.5 mil	3	4	5
	X-Large (>\$5M)	6	7	8
	Super-Size (>\$10M)	9	10	11

- **Step 2** of the Prioritization Plan would be to develop a second factor for ranking based on the number of citizens impacted, by potential for roadway shutdowns if no improvements were made on existing roadways, and by a cost to benefit ratio of proposed improvements per roadway citizens impacted.

Sub-Step 1 – Determine Existing Roadway Type

Table 18 : Roadway Classifications

Roadway Classification
HWY
P7U
P6D
P4D
P3U
M5U
M4U
M3U
C2U

Sub-Step 2 – Determine Existing Conditions Roadway Flood Event Protection and Percentage of Roadway Citizens Protected

Table 19: Citizens Protected

Roadway Flood Event Protection	Percentage of Citizens Protected ¹
1-Year	0%
2-Year	15%
5-Year	35%
10-Year	50%
25-Year	70%
50-Year	85%
100-Year	100%
¹ Based on approximation, using logarithmic chart, with 1-Year Event coverage protecting 0% and with 100-Year Event protecting 100%	

Sub-Step 3 – Determine Percentage of Roadway Citizens Impacted
100% minus percentage of citizens protected in Sub-Step 2

Sub-Step 4 – Determine Number of Roadway Citizens Impacted

Table 20: Citizens Impacted

Roadway Type Benefitted	Percentage of Citizens Protected ¹
HWY	20800
P7U	12740
P6D	11700
P4D	7800
P3U	5460
M5U	8450
M4U	6760
M3U	5070
C2U	2730
¹ Based on percentage of citizens impacted multiplied by [No. Lanes * 4 hours impacted * hourly volume per lane * Level of Service C Traffic Volume (see following Table)]	

Table 21: Roadway Benefit

Grand Prairie Classification	NCTCOG Classification	Lanes	Hourly Service Vol./lane	NCTCOG LOS*			Current UDC "LOS C" Traffic Volume
				Roadway Capacity LOS E	LOS D	LOS C	
P7U	Principal Arterial-Undiv.	7	700	49,000	39,200	31,850	42,000
P6D	Principal Arterial-Divided	6	750	45,000	36,000	29,250	42,000
P4D	Principal Arterial-Divided	4	750	30,000	24,000	19,500	28,000
P3U	Principal Arterial-Undiv.	3	700	21,000	16,800	13,650	18,000
M5U	Minor Arterial	5	650	32,500	26,000	21,125	28,000
M4U	Minor Arterial	4	650	26,000	20,800	16,900	22,000
M3U	Minor Arterial	3	650	19,500	15,600	12,675	18,000
C2U	Collector	2	525	10,500	8,400	6,825	10,000
L2U	Local Street	2	525	10,500	8,400	6,825	8,000
LU	Local Street	1	525	5,250	4,200	3,413	8,000
R2U	Rural Street	2	525	10,500	8,400	6,825	8,000

* = from the Dallas-Fort Worth Regional Travel Model Manual, Exhibits 23 and 24
 NCTCOG capacity: LOS E = (# lanes) * 10 * (NCTCOG Hourly Service Volume per Lane)
 NCTCOG capacity: LOS D = (LOS E) * .8
 NCTCOG capacity: LOS C = (LOS E) * .65

Sub-Step 5 – Determine Cost to Benefit of Roadway Number of Citizens Impacted

Divide the estimate of probable cost by the results from Sub-Step 4 to determine the cost to benefit ratio (in dollars).

Sub-Step 6 – Develop Second Ranking Factor with highest rank being the lowest cost to benefit ratio.

- **Step 3** of the Prioritization Plan would be to determine the total tax value of all the properties with structures that are benefitted by the project from Step 1. Develop Third Ranking Factor based on the table below.

Table 22: Value of Benefitted Structures

Total Tax Value of Properties with Structures Benefitted	Third Ranking Factor
\$2,000,000+	1
≥ \$1,900,000	2
≥ \$1,800,000	3
≥ \$1,700,000	4
≥ \$1,600,000	5
≥ \$1,500,000	6
≥ \$1,400,000	7
≥ \$1,300,000	8
≥ \$1,200,000	9
≥ \$1,100,000	10
≥ \$1,000,000	11
≥ \$ 900,000	12
≥ \$ 800,000	13
≥ \$ 700,000	14

≥ \$ 600,000	15
≥ \$ 500,000	16
≥ \$ 400,000	17
≥ \$ 300,000	18
≥ \$ 200,000	19
\$0 to \$ 199,000	20

- **Step 4** – Provide sum of first, second, and third ranking factors. Next, provide the initial ranking, with the top-ranked (#1) project having the lowest total ranking factor. Continue this method until all projects are ranked.
- **Step 5** – If two or more projects are ranked the same in Step 4, then these projects need to be sorted further. The higher ranked of these projects would be the one that has the greatest ultimate 100-year discharge at the project location.
- **Step 6** – Provide the Final Ranking, with the top-ranked (#1) project having the lowest total ranking factor and include the sorted project rankings from Step 5.
- **Additional Notes on Ranking**
 - Phased projects shall be ranked in order of phasing. *For example, Phase 1 of a project shall be ranked higher than Phase 2 of a project.* Note, that if this occurs, the Phased projects can only move down in the overall rankings, not up.
 - Also, if a project is dependent on another downstream project, then the consultant shall take this into account and consider this as phasing of an overall project.
 - If two projects in different watersheds have the same rank in Step 4 and need to be sorted in Step 5, but have similar ultimate 100-year discharges (within 500 cfs), then the projects should be ranked in order of the lowest estimate of probable cost.
 - Rankings will be adjusted as each individual watershed master plan is completed. Each project will be ranked as follows:
 - Ranked among other projects in same watershed
 - Ranked among other projects in City of Grand Prairie
 - Ranked among various size projects in City of Grand Prairie (Small, Medium, Large, and Extra Large/Super Size)

Table 23 : Roadway Level of Service Classifications

Level of Service Classifications and Capacities		
Classification	Lanes	Max. Daily Traffic Volume (vehicles per day)
HWY-Highway	-	-
P7U-Major Principal Arterial	7 undivided	33,000
P6D-Major Principal Arterial	6 undivided	35,500
P4D-Minor Principal Arterial	4 undivided	24,000
M5U-Minor Arterial	5 undivided	21,000
M4U-Major Collector	4 undivided	17,000
C2U-Collector	2 undivided	8,500
*note: 5U and 7U roadways contain center turn lanes		

The project priorities are shown in **Table 24**. Project receiving a ranking of 3 or less in Step 1 of the ranking process are considered short term priorities, while projects receiving ranking of 4 or higher are considered long term priorities. There are four projects with a ranking of 2, making them short term priority, and seven long term priority projects.

Table 24 : Project Priorities

City Wide Drainage Master Plan																			
Cottonwood & Fish Creeks Drainage Basins Only																			
Capital Improvement Project Alternative	Project Size & Short-Term/Long-Term	Step 1 - Initial Ranking Factor - Estimate of Probable Cost vs. # Structures Benefited ¹			Step 2 - Second Ranking Factor - Cost to Benefit of Roadway Number of Citizens Impacted ²							Step 3 - Tax Value of Benefited Property Structures ⁷		Sum of 1st, 2nd, and 3rd Factors - Step 4	Initial Rank - Step 4	100-Year Ultimate Discharge at CIP Location - Step 5		Final Rank - Step 6	
		# Structures	Cost	1st Factor ¹	Type	Roadway Flood Event Protection	Roadway % Citizens Protected ³	Roadway % Citizens Impacted ⁴	Roadway # Citizens Impacted ⁵	Cost to Benefit Roadway # Citizens Impacted ⁶	2nd Factor	Tax Value of Property Structures Benefited	3rd Factor	Total	Rank ⁸	Ultimate Q ₁₀₀	Sorting ⁹	Rank ¹⁰	
1	Belt Line Road at Cottonwood Creek	X-Large/Long-Term	12	\$4,719,000	3	P6D	5	35%	65%	7605	\$620.51	7	\$2,250,000	1	11	1	19,398	1	
4	Pioneer Parkway at SF Cottonwood	Small/Short-Term	0	\$217,000	3	P6D	25	70%	30%	3510	\$61.82	2	\$0	20	25	4	3,987	4	
3	Belt Line Road at Plattner Creek	Small/Short-Term	0	\$139,000	3	P6D	25	70%	30%	3510	\$39.60	1	\$0	20	24	2	1,981	3	
5	GSW Pkwy at SF Cottonwood	Small/Short-Term	0	\$326,000	3	P4D	25	70%	30%	2340	\$139.32	4	\$0	20	27	5	4,010	6	
9	GSW Pkwy at Cottonwood	X-Large/Long-Term	0	\$4,914,000	8	P4D	2	15%	85%	6630	\$741.18	8	\$0	20	36	9	8,888	9	
7	GSW Pkwy at Prairie Creek	Medium/Long-Term	0	\$570,000	4	P4D	10	50%	50%	3900	\$146.15	5	\$0	20	29	7	10,589	7	
6	Marshall Drive at SF Cottonwood	Medium/Long-Term	0	\$787,000	4	M4U	2	15%	85%	5746	\$136.96	3	\$0	20	27	5	6,277	5	
8	Robinson Road at SF Cottonwood	Medium/Long-Term	0	\$1,017,000	4	M4U	2	15%	85%	5746	\$176.99	6	\$0	20	30	8	6,197	8	
2	IH-20/Carrier at Fish Creek	Super-Size/Long-Term	10	\$20,150,000	10	P6D	2	15%	85%	9945	\$2,026.14	10	\$1,700,000	4	24	2	26,347	2	
10	Carrier at SF Cottonwood/Cottonwood	X-Large/Long-Term	0	\$5,688,000	8	M5U	2	15%	85%	7182.5	\$791.92	9	\$0	20	37	10	18,386	10	
11	3rd Street at Cottonwood	X-Large/Long-Term	0	\$9,873,000	8	C2U	2	15%	85%	2320.5	\$4,254.69	11	\$0	20	39	11	18,630	11	

1 Refer to City-Wide Drainage Master Plan Road Map, Section II.G - Implementation Plan - Step 1
2 Refer to City-Wide Drainage Master Plan Road Map, Section II.G - Implementation Plan - Step 2
3 Based on approximation, using logarithmic chart, with 1-Year Event coverage protecting 0% of traffic volume and 100-Year Event coverage protecting 100% of traffic volume
4 Percent Impacted = 100% minus % of Roadway Citizens Protected (approximate)
5 Number Impacted = % Impacted multiplied by [No. Lanes * 4 Hours Impacted * Hourly Volume Per Lane * Level of Service "C" Traffic Volume]
6 Cost of CIP divided by Roadway # Citizens Impacted
7 Refer to City-Wide Drainage Master Plan Road Map, Section II.G - Implementation Plan - Step 3
8 Refer to City-Wide Drainage Master Plan Road Map, Section II.G - Implementation Plan - Step 4
9 Refer to City-Wide Drainage Master Plan Road Map, Section II.G - Implementation Plan - Step 5
10 Refer to City-Wide Drainage Master Plan Road Map, Section II.G - Implementation Plan - Step 6

Additional Notes:
a. Phased projects shall be ranked in order of Phasing (i.e. Phase 1 shall be ranked higher than Phase 2, etc.)
b. In Step 5, when comparing projects between two different watersheds: If two projects have same rank in Step 4 and need to be sorted, but have similar 100-Year Ultimate Discharges, then projects should be ranked in order of lowest cost estimate

5.2 POTENTIAL FUNDING SOURCES

An important aspect of implementing any of the recommended alternatives is the funding mechanism. The summary below provides a description of the potential available funding sources for the City to construct a project.

5.2.1 Municipal Funding Sources

Capital Improvements Plan (CIP) – a long-range plan, usually four to six years, which identifies capital projects and equipment purchases, provides a planning schedule and identifies options for financing the plan.

Drainage Utility Fees – Municipal Stormwater projects are funded by the assessment of a drainage utility fee for all developed projects based on amount of impervious cover, number of living units, or site area.

Regional Storm Water Program Impact Fee – An impact fee could be established to pass the cost of alternative implementation to upstream developers who would benefit from reduced detention requirements. Since the reduction of detention requirements would require the modification of local drainage and development policies, further investigation is required to quantify this potential funding source.

General Fund – The primary operating fund of a governmental entity.

General Obligation Bond (GO) – A municipal bond that is backed by the credit and "taxing power" of the issuing jurisdiction, rather than the revenue from a given project. General obligation bonds are issued with the belief that a municipality will be able to repay its debt obligation through taxation or revenue from projects. No assets are used as collateral. These bonds are typically considered the most secure type of municipal bond, and therefore carry the lowest interest rate.

Revenue Bond – A municipal bond supported by a specified stream of future income, such as income generated by a water utility from payments by customers. This differs from general-obligation bonds, which can be repaid through a variety of tax sources. Revenue bonds are only payable from specified revenues. A main reason for using revenue bonds is that they allow the municipality to avoid reaching legislated debt limits.

Special Assessment Bond – A special type of municipal bond used to fund a development project based on property tax assessments of properties located within the issuer's boundaries.

Tax Increment Bond – A bond (also known as a "tax allocation bond") payable from the incremental increase in tax revenues realized from any increase in property value resulting from capital improvements benefiting the properties that are financed with bond proceeds. Tax increment bonds often are used to finance the redevelopment of blighted areas.

5.2.2 State Assistance

TRA (Trinity River Authority) - The river authority for the watershed. Many State and Federal agencies stipulate that river authorities must be the arbiters for the pass-through of funds.

TWDB (Texas Water Development Board) – Clean Water State Revolving Fund - Provides perpetual funds to provide low interest loan assistance for the planning, design, and construction of stormwater pollution control projects.

- Research and Planning Fund Grants – The purpose is to provide financial assistance for research and feasibility studies into practical solutions to water-related problems.

- State Participation and Storage Acquisition Program – The purpose is to help finance regional water projects including water storage facilities and flood retention basins; and to allow for “right sizing” of projects in consideration of future growth.
- Texas Water Development Fund – The purpose is to provide loans for the planning, design, and construction of water supply, wastewater, and flood control projects.

TCEQ (Texas Commission on Environmental Quality) – Texas Clean Rivers Program (CRP) – The purpose of these funds are to maintain and improve the quality of surface water resources within each river basin in Texas.

5.2.3 Federal Assistance

FEMA (Federal Emergency Management Agency)

- Flood Hazard Mapping Program – Department of Homeland Security (DHS) funds are administered through FEMA to identify, publish, and update information on all flood-prone areas of the U.S. in order to inform the public on flooding risks, support sound floodplain management, and set flood insurance premium rates.
- Flood Mitigation Assistance Grants (FMA) – The purpose is to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured through the National Flood Insurance Program (NFIP).
- Hazard Mitigation Grant Program (HMGP) – The purpose is to provide states and local governments financial assistance to permanently reduce or eliminate future damages and losses from natural hazards through safer building practices and improving existing structures and supporting infrastructure.
- Pre-Disaster Mitigation Grant Program (PDM) – The purpose is to provide funding for states and communities for cost-effective hazard mitigation activities that complement a comprehensive hazard mitigation program and reduce injuries, loss of life, and damage and destruction of property.

HUD (U.S. Department of Housing and Urban Development)

- Disaster Relief/Urgent Needs Fund of Texas – To rebuild viable communities impacted by a natural disaster or urgent, unanticipated needs posing serious threats to health and safety by providing decent housing, suitable living environments and economic opportunities.
- Texas Community Development Program – The purpose is to build viable communities that meet “basic human needs” such as safe and sanitary sewer systems, clean drinking water, disaster relief and urgent needs, housing, drainage and flood control, passable streets, and economic development.

NRCS (Natural Resources Conservation Service)

- Watershed Protection and Flood Prevention Program – To protect, develop, and utilize the land and water resources in small watersheds of 250,000 acres or less. The program is Federally assisted and locally led.
- Watershed Surveys and Planning – Provides planning assistance to Federal, State, and local agencies for the development of coordinated water and related land resources programs in watersheds and river basins. Emphasis on flood damage reduction, erosion control, water conservation, preservation of wetlands, and water quality improvements.
- Wetlands Reserve Program – To protect and restore wetlands by enabling landowners to sell easements which take wetlands out of production.
- Emergency Watershed Protection Program – The purpose is to provide relief from imminent hazards and reduce the threat to life and property by severe natural events. Hazards include floods

and the results of erosion created by floods, fire, windstorms, earthquakes, drought, or other natural disasters.

USACE (United States Army Corps of Engineers)

- Emergency Advance Measures for Flood Prevention – The purpose is to protect against the loss of life or damages to property given an immediate threat of unusual flooding.
- Emergency Rehabilitation of Flood Control Works – The purpose of this program is to assist in the repair or restoration of flood control works damaged by flood.
- Emergency Streambank and Shoreline Protection – The purpose is to prevent erosion damages to public facilities by the emergency construction or repair of streambank and shoreline protection works.
- Floodplain Management Services – The purpose is to promote appropriate recognition of flood hazards in land and water use planning and development through the provision of flood and floodplain related data, technical services, and guidance.
- Nonstructural Alternatives to Structural Rehabilitation of Damaged Flood Control Works – This program provides a nonstructural alternative to the structural rehabilitation of flood control works damaged in floods or coastal storms.
- Planning Assistance to States – The purpose is to assist states, local governments and other non-Federal entities in the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources.
- Small Flood Control Projects – The purpose is to reduce flood damages through small flood control projects not specifically authorized by Congress.

5.3 REGULATORY COMPLIANCE

Prior to commencement of construction, it will be necessary to submit the project and appropriate permit applications to regulatory agencies. A detailed review and acquisition of the necessary permits for the construction of these projects exceeds the scope of this contract; however, a partial list and brief discussion of permits is included in the following subsections. This following list of agencies and corresponding permit activities is intended to be general in nature and is not intended to represent a definitive list of required permit acquisitions and agency coordination.

5.3.1 Federal Emergency Management Agency (FEMA)

The National Flood Insurance Act of 1968 was enacted by Title XIII of the Housing and Urban Development Act of 1968 (Public Law 90-448, August 1, 1968) to provide previously unavailable flood insurance protection to property owners in flood prone areas. FEMA administers the National Flood Insurance Program (NFIP); however, if a local community elects to participate in the NFIP, the local government is primarily responsible for enforcement. Participating communities are typically covered by a Flood Insurance Study which defines water surface profiles and floodplain boundaries through their communities.

The recommended drainage improvement projects are intended to reduce floodplain limits. If changes to the current effective FEMA floodplain map are desired as a result of improvements, a request for a Letter of Map Revision (LOMR) from FEMA will be required.

5.3.2 U. S. Army Corps of Engineers (USACE)

Pursuant to Section 404 of the Clean Water Act and the Rules and Regulations promulgated there under by the United States Environmental Protection Agency (USEPA) and the United States Army Corps of Engineers (USACE), the filling or excavation of waters of the United States, including wetlands, with dredged or fill material, requires the issuance of a permit from the USACE (33 CFR Parts 320-330). For purposes of administering the Section 404 permit program, the USACE defines wetlands as follows:

Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. (33 CFR 328.3)

The *Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1)*, issued by the USACE in 1987 states that wetlands must possess three essential characteristics. These characteristics include, under normal circumstances: 1) the presence of hydrophytic vegetation, 2) hydric soils, and 3) wetland hydrology. If all three of these criteria are present on a particular property in areas larger than one-third acre in size, then a permit (general permit or nationwide permit) must be issued by the USACE in order to fill all or a portion of those areas. Exhibit 19 in Appendix A shows the known wetland areas within the 100-Year floodplain.

Section 404 (b)(1) guidelines (40 CFR Part 230), established by the USEPA, constitute the substantive environmental criteria used in the evaluating activities regulated under Section 404 of the Clean Water Act. The purpose of these guidelines is to restore and maintain the chemical physical and biological integrity of waters of the United States through the control of discharge of dredged or fill material.

All property owners within the United States and its territories must adhere to the provisions of the Clean Water Act. If any contemplated activity might impact waters of the United States, including adjacent or isolated wetlands a permit application must be made. If jurisdictional waters and/or wetlands are found to exist, then any activity which would involve filling, excavating, or dredging these wetlands would require the issuance of a permit. The final authority to determine whether or not jurisdictional waters exist lies with USACE.

There is a strong likelihood that Waters of the U.S. jurisdictional areas exist along the main stem and secondary channels of Cottonwood and Fish Creeks. It is recommended that the City engage the USACE early in its design process for any structural improvements on channels.

5.3.3 U.S. Fish and Wildlife Service (USFWS)

The U.S. Fish and Wildlife Service (USFWS), in the Department of the Interior, and the National Marine Fisheries Service (NMFS), in the Department of Commerce, share responsibility for administration of the Endangered Species Act (ESA). Generally, the USFWS is responsible for terrestrial and freshwater species and migratory birds, while the NMFS deals with those species occurring in marine environments and anadromous fish.

Section 9 of the ESA prohibits take of federally listed endangered or threatened species without appropriate authorization. Take is defined in the ESA, in part as “killing, harming, or harassment” of a federally listed species, while incidental take is take that is “incidental to, and not the purpose of, otherwise lawful activities”.

Section 10 of the ESA provides a means for non-Federal projects resulting in take of listed species to be permitted subject to carefully prescribed conditions. Application for an incidental take permit is subject to a number of requirements, including preparation of a Habitat Conservation Plan by the applicant. In processing an incidental take permit application, the USFWS must comply with appropriate environmental laws, including the National Environmental Policy Act. Review of the application under Section 7 of the ESA is also required to ensure that permit issuance is not likely to jeopardize listed species. Section 10 issuance criteria require the USFWS to issue an incidental take permit if, after opportunity for public comment, it finds that:

1. the taking will be incidental;

2. the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking;
3. the applicant will ensure that adequate funding and means to deal with unforeseen circumstances will be provided;
4. the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and
5. the applicant will ensure that other measures that the USFWS may require as being necessary or appropriate will be provided.

The U.S. Fish and Wildlife Service should be contacted to determine the potential occurrence of and consequent impacts to any federal threatened and endangered species. In addition, the Corps of Engineers will require USFWS review of the project to ensure the project is in compliance with the Endangered Species Act prior to the issuance of a Section 404 permit.

5.3.4 Texas Commission on Environmental Quality (TCEQ)

The Texas Commission on Environmental Quality (TCEQ) has regulatory authority over: dam safety, water rights, Texas Pollutant Discharge Elimination System and Section 404(b)(1) guidelines for specification of disposal sites for dredged or fill material. The following sections briefly describe these regulations.

- Texas Pollutant Discharge Elimination System (TPDES)

On September 14, 1998, the USEPA authorized Texas to implement its Texas Pollutant Discharge Elimination System (TPDES) program. TPDES is the state program to carry out the National Pollutant Discharge Elimination System (NPDES), a federal regulatory program to control discharges of pollutants to surface waters of the United States. The TCEQ administers the program, and a permit is required for any construction activity that disturbs one acre or more.

- Section 401 Water Quality Certification

Any activity requiring authorization under Section 404 of the Clean Water Act will also require a Section 401 water quality certification from the TCEQ. In Texas, these regulations are administered by the TCEQ.

- Texas Water Code Section 11.121 Water Right Permit

Use of surface water, including the diversion or storage of water, in the State of Texas requires a water right permit through the State of Texas pursuant to Texas Water Code Section 11.121. TCEQ requires the submission of the Water Rights Permit Package Application, TCEQ-10214 form. This application must be notarized and submitted with the water use permit application fees. Supplemental information may be required with the application.

5.3.5 Texas Historical Commission

The Division of Antiquities Protection of the Texas Historical Commission coordinates the program by identifying and protecting important archeological and historic sites that may be threatened by public construction projects. This department coordinates the nomination of numerous sites as State Archeological Landmarks or for listing in the *National Register of Historic Places*. Designation is often sought by interested parties as the most effective way to protect archeological sites threatened by new development or vandalism. Applicable rules are found in the Texas Administrative Code, Title 13-Cultural Resources, Part II-Texas Historical Commission, Chapters 24-28.

The Corps of Engineers will require that the State Historical Preservation Officer (SHPO) review the project to ensure the project is in compliance with the National Historic Act prior to issuance of a Section 404 permit.

5.4 ENVIRONMENTAL CONSTRAINTS

5.4.1 Rare, Threatened and Endangered Species

In addition, plant and animal habitats must be carefully considered. The following is a list of the species considered to be rare, threatened, or endangered in Dallas County.

Table 25: Rare, Threatened, and Endangered Species of Dallas County

Taxon	Common Name	Scientific Name	Federal Status	State Status
Birds	Henslow's Sparrow	<i>Ammodramus henslowii</i>		
Birds	Western Burrowing Owl	<i>Athene cunicularia hypugaea</i>		
Birds	Piping Plover	<i>Charadrius melodus</i>	LT	T
Birds	Golden-cheeked Warbler	<i>Dendroica chrysoparia</i>	LE	E
Birds	Peregrine Falcon	<i>Falco peregrinus</i>	DL	E T
Birds	American Peregrine Falcon	<i>Falco peregrinus anatum</i>	DL	E
Birds	Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	DL	T
Birds	Whooping Crane	<i>Grus americana</i>	LE	E
Birds	Bald Eagle	<i>Haliaeetus leucocephalus</i>	LT-PDL	T
Birds	Wood Stork	<i>Mycteria americana</i>		T
Birds	White-faced Ibis	<i>Plegadis chihi</i>		T
Birds	Interior Least Tern	<i>Sterna antillarum athalassos</i>	LE	E
Birds	Black-capped Vireo	<i>Vireo atricapilla</i>	LE	E
Insects	Black Lordithon rove beetle	<i>Lordithon niger</i>		
Mammals	Cave myotis bat	<i>Myotis velifer</i>		
Mammals	Plains spotted skunk	<i>Spilogale putorius interrupta</i>		
Mollusks	Rock pocketbook	<i>Arcidens confragosus</i>		
Mollusks	Wabash pigtoe	<i>Fusconaia flava</i>		
Mollusks	Sandbank pocketbook	<i>Lampsilis satura</i>		
Mollusks	Louisiana pigtoe	<i>Pleurobema riddellii</i>		
Mollusks	Texas heelsplitter	<i>Potamilus amphichaenus</i>		
Mollusks	Pistolgrip	<i>Tritogonia verrucosa</i>		
Mollusks	Fawnsfoot	<i>Truncilla donaciformis</i>		
Mollusks	Little spectaclecase	<i>Villosa lienosa</i>		
Plants	Warnock's coral-root	<i>Hexalectris warnockii</i>		
Plants	Glen Rose yucca	<i>Yucca necopina</i>		
Reptiles	Timber/Canebrake rattlesnake	<i>Crotalus horridus</i>		T
Reptiles	Alligator snapping turtle	<i>Macrochelys temminckii</i>		T
Reptiles	Texas horned lizard	<i>Phrynosoma cornutum</i>		T
Reptiles	Texas garter snake	<i>Thamnophis sirtalis annectens</i>		

Source: Texas Parks and Wildlife

5.5 IMPLEMENTATION

A number of factors must be taken into consideration in the implementation of any specific project. These include:

- Coordination of projects within a watershed
 - Availability of funding
 - City-wide prioritization
- a. **Coordination of projects within a watershed.** A flood mitigation project can affect peak flows and flood levels both upstream and downstream of the project. The magnitude of these effects can vary considerably and are very project specific. The details of a specific project and its relationship with other projects within a watershed should be carefully considered. Construction of multiple projects or phasing of a large project should be planned so as to minimize these effects. In general projects which improve the conveyance or capacity of a stream, such as a channel improvement or enlarging a culvert tend to reduce flood level along the project as well as upstream of the project, while tending to increase peak flow rates downstream of the project, therefore the normal practice for these types of projects is to begin downstream and work upstream. Detention or storage projects tend to reduce peak flows downstream and should be constructed before any channel improvements which may be located downstream of the storage project.
- b. **Availability of funding.** The availability of funding will also be an important factor in the determination of which projects are constructed and the timing of the construction. Projects which will benefit other governmental entities as well as the City of Grand Prairie may qualify for joint funding; an obvious example would be an improvement to a roadway owned and operated by the Texas Department of Transportation could possibly be funded in part by TxDOT. The City may also be eligible for funds from FEMA's Flood Mitigation Assistance Program.
- c. **City-wide prioritization.** The methodologies for project rankings and priorities, discussed in **Section 5.1**, have been applied to the projects within the Cottonwood and Fish Creek watersheds. The City of Grand Prairie has developed a City-Wide Drainage Master Plan Road Map which provides a strategy for implementing drainage projects across the entire City. The projects in the Cottonwood and Fish Creek watersheds will be included in this Master Plan. All of the projects from the various watersheds will be ranked using the same criteria and a City-wide priority list will be created. In this City-Wide approach the projects which provide the most benefits for the least cost will tend to be highest on the priority list. Final implementation will be based on these priorities.

Following completion of the Cottonwood and Fish Creeks Flood Protection Plan, the City has focused on issuing elevation certificates to all homes within (or very near) the 100-YR floodplain in both the Cottonwood Creek and Fish Creek drainage basins. In an effort to inform residents of those areas of the risks of flooding, the City has also distributed information about the National Flood Insurance Program and how to obtain coverage. The data collected and modeling performed as part of the Cottonwood and Fish Creeks Flood Protection Plan has also provided the City the basis for updating FEMA's Flood Insurance Rate Map.

6.0 REFERENCES

- The City of Grand Prairie
Drainage Design Manual
November 2008
- The City of Grand Prairie
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November 2009
- The City of Grand Prairie
City-Wide Drainage Master Plan Road Map
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Watershed Technical Report
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- Graham Associates, Inc.
Letter of Map Revision Report for FEMA
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April 2006
- Halff Associates
Central Park Drainage Design Analysis
Warrior Creek, Grand Prairie, Texas
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- Halff Associates
Letter of Map Revision, Bardin Road at Fish Creek
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- Halff Associates
Letter of Map Revision on Kirby Creek
HEC-HMS & HEC-RAS Models
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Huitt – Zollars, Inc.

Cottonwood Creek Drainage Master Plan
City of Grand Prairie
April 1995

North Central Texas Council of Governments

Airborne LiDAR topographic data
Aerial Photography

Texas Department of Transportation

Construction Drawings and As-Built Plans
Various Years

Texas Natural Resource Information System (TNRIS)

<http://www.tnris.state.tx.us/>

US Army Corps of Engineers, Hydrologic Engineering Center

Hydrologic Modeling System (HEC-HMS) version 3.2
User Manual and Technical Reference Manual
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Technical Report 55 (TR-55)
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May 2010

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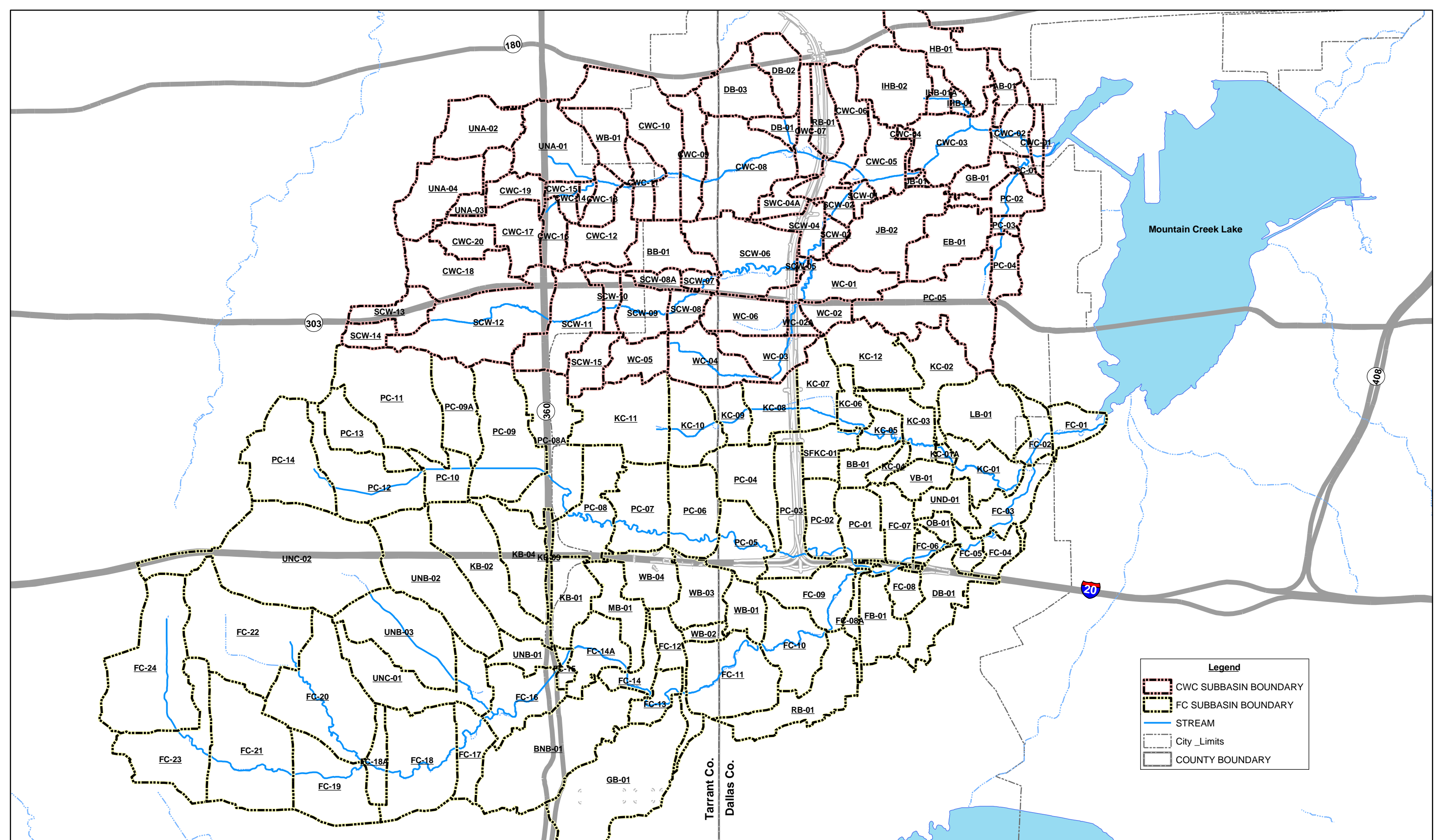
Part 630 Hydrology, *National Engineering Handbook*, Chapter 16 – Hydrographs
March 2007

US Department of Commerce, National Oceanic and Atmospheric Administration

Technical Memorandum HYDRO-35
June 1977

Appendix **A**
Exhibits

- Exhibit 1 – Drainage Area Map
- Exhibit 2 – Soils Map
- Exhibit 3 – Existing Land Use Map
- Exhibit 4 – Ultimate Land Use Map
- Exhibit 5 – Cottonwood Creek HEC-RAS Cross-Section Location Map
- Exhibit 5A – Fish Creek HEC-RAS Cross-Section Location Map
- Exhibit 6 – Cottonwood Creek Flood Plain Map
- Exhibit 6A – Fish Creek Flood Plain Map



Legend

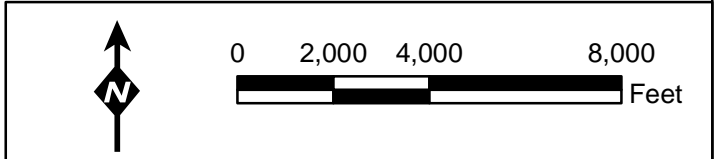
- CWC SUBBASIN BOUNDARY
- FC SUBBASIN BOUNDARY
- STREAM
- City Limits
- COUNTY BOUNDARY



E Espey Consultants, Inc.
C Environmental & Engineering Services

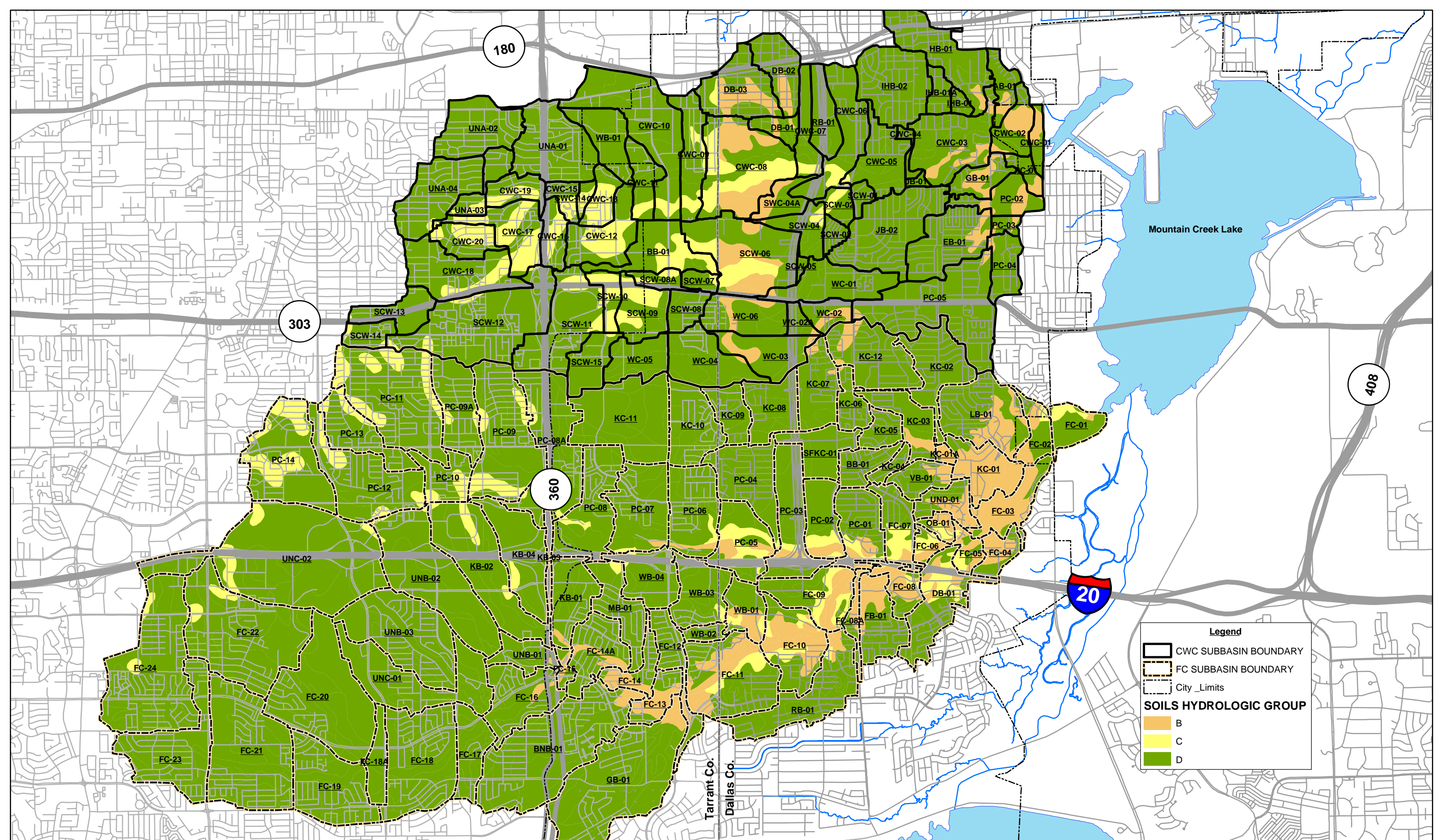
EXHIBIT # 1
DRAINAGE AREA MAP
COTTONWOOD CREEK AND FISH CREEK FLOOD PROTECTION PLAN
GRAND PRAIRIE, TEXAS

FEBRUARY 2010 PROJECT # 08073



Joe Pool Lake

Tarrant Co.
 Dallas Co.

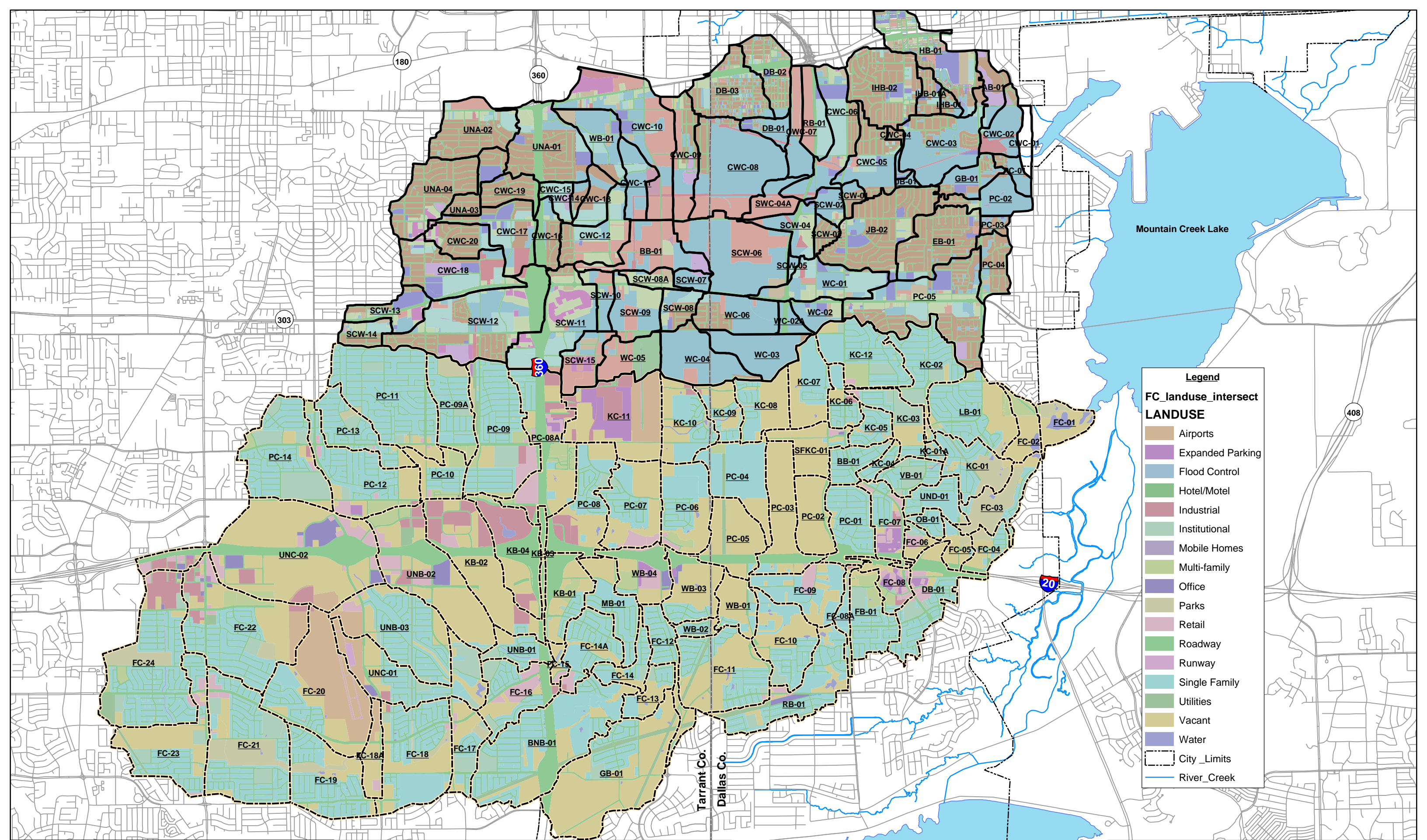


Legend

- CWC SUBBASIN BOUNDARY
- FC SUBBASIN BOUNDARY
- City Limits

SOILS HYDROLOGIC GROUP

- B
- C
- D



Legend

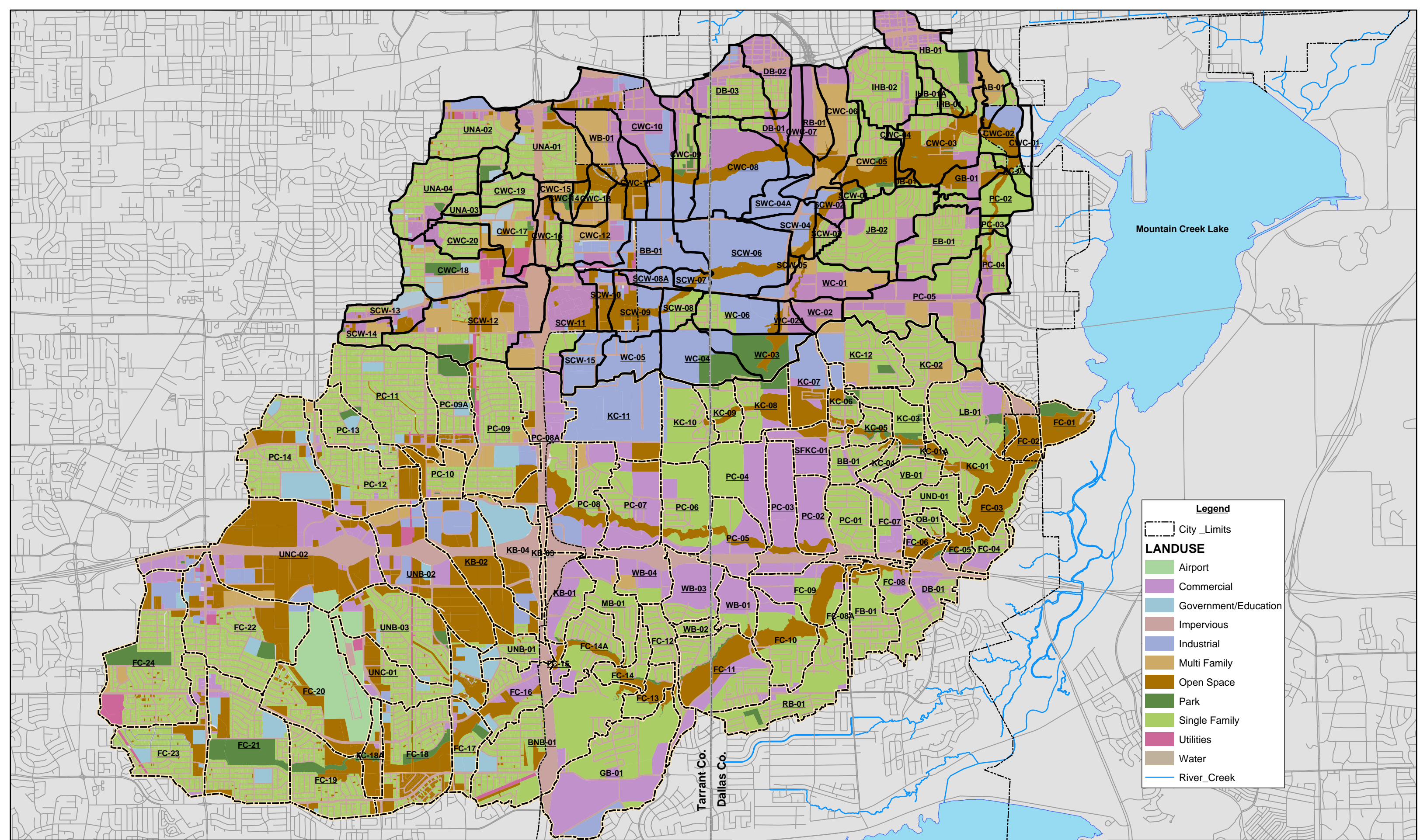
FC_landuse_intersect

LANDUSE

- Airports
- Expanded Parking
- Flood Control
- Hotel/Motel
- Industrial
- Institutional
- Mobile Homes
- Multi-family
- Office
- Parks
- Retail
- Roadway
- Runway
- Single Family
- Utilities
- Vacant
- Water

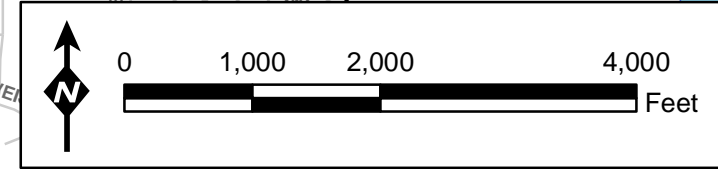
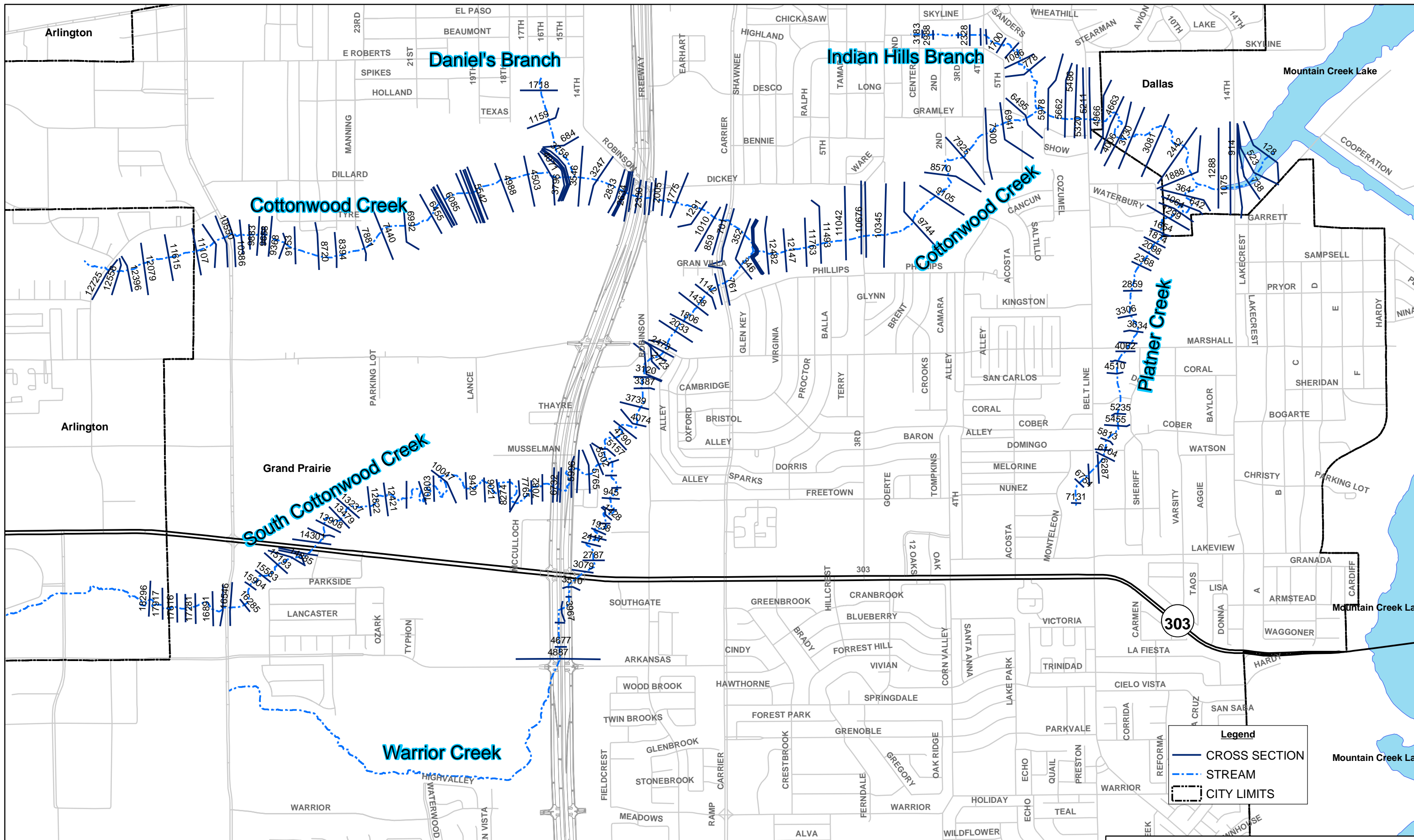
City Limits

River/Creek



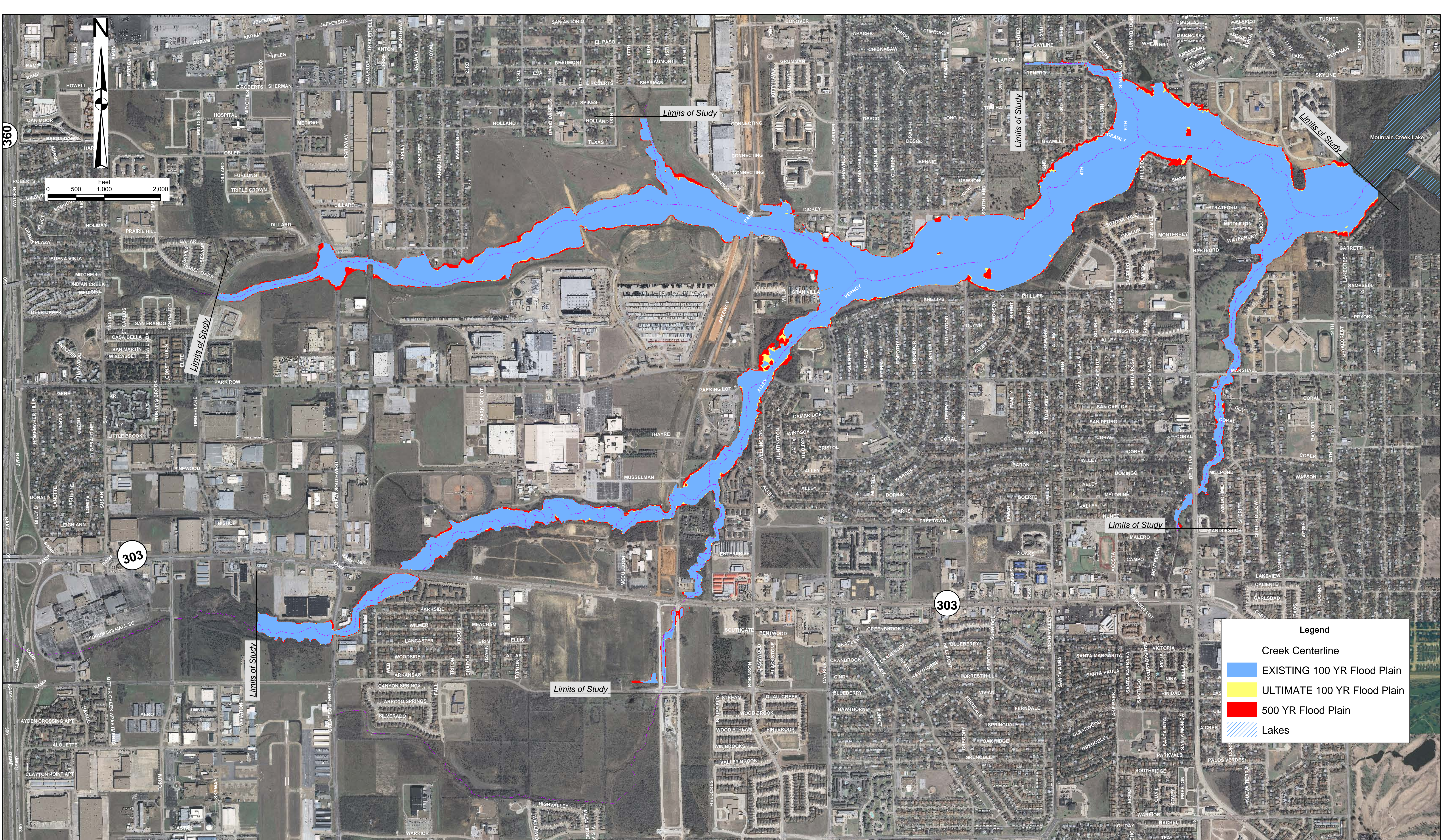
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- City Limits
- LANDUSE**
- Airport
- Commercial
- Government/Education
- Impervious
- Industrial
- Multi Family
- Open Space
- Park
- Single Family
- Utilities
- Water
- River_Creek



Legend

- CROSS SECTION
- - - STREAM
- CITY LIMITS

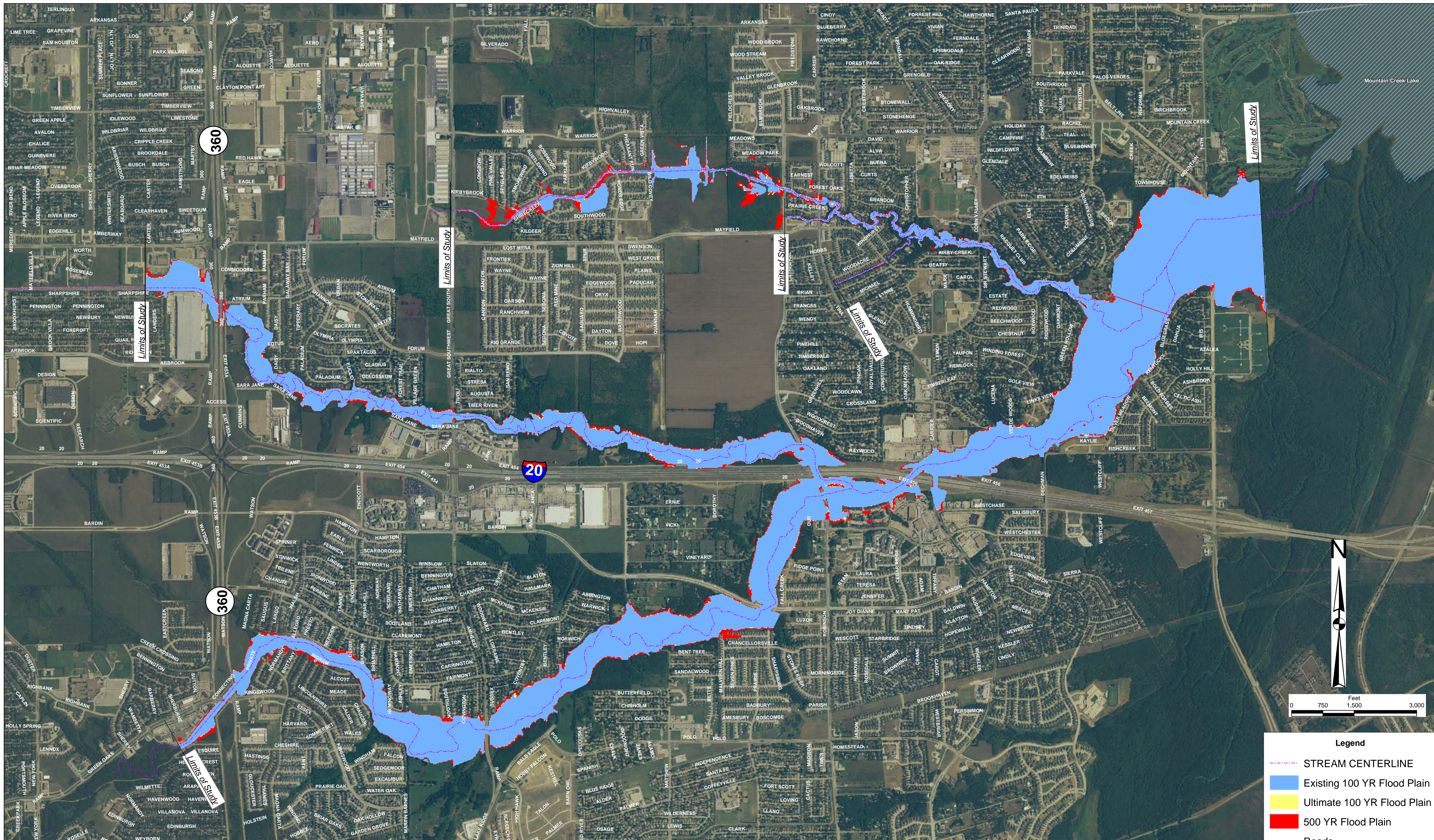


E Espey Consultants, Inc.
C Environmental & Engineering Services

EXHIBIT # 6
COTTONWOOD CREEK FLOOD PLAN MAP
COTTONWOOD CREEK AND FISH CREEK FLOOD PROTECTION PLAN
GRAND PRAIRIE, TEXAS

MARCH 2010

PROJECT # 08073



Legend

- STREAM CENTERLINE
- Existing 100 YR Flood Plain
- Ultimate 100 YR Flood Plain
- 500 YR Flood Plain
- Roads
- Tarrant_County_Roads
- Lakes_MCL_JPL

Espey Consultants, Inc.
 Environmental & Engineering Services

EXHIBIT # 6A
FISH CREEK FLOOD PLAIN MAP
COTTONWOOD CREEK AND FISH CREEK FLOOD PROTECTION PLAN
GRAND PRAIRIE, TEXAS

MARCH 2010 PROJECT # 08073

Appendix **B**
Weighted Curve Number Table

Subbasin	Area of NRCS Group (SF)				Total Area (sq.mi)	Percent of Soil Type				Weighted Curve Number AMC II
	A	B	C	D		% A	% B	% C	% D	
AB-01		550,917		2,505,670	0.11	0%	18%	0%	82%	76.6
BB-01		126	2,571,595	5,392,941	0.29	0%	0%	32%	68%	78.1
CWC-01		720,633		1,019,312	0.06	0%	41%	0%	59%	72.1
CWC-02		1,762,021		2,559,352	0.16	0%	41%	0%	59%	72.3
CWC-03		1,605,733		9,492,925	0.40	0%	14%	0%	86%	77.3
CWC-04				903,648	0.03	0%	0%	0%	100%	80.0
CWC-05			145,746	6,873,493	0.25	0%	0%	2%	98%	79.9
CWC-06			870,818	8,223,695	0.33	0%	0%	10%	90%	79.4
CWC-07			538,242	3,406,562	0.14	0%	0%	14%	86%	79.2
CWC-08		5,250,232	5,461,101	5,093,071	0.57	0%	33%	35%	32%	71.6
CWC-09			1,221,730	5,281,609	0.23	0%	0%	19%	81%	78.9
CWC-10			675,311	15,146,170	0.57	0%	0%	4%	96%	79.7
CWC-11			539,898	3,598,654	0.15	0%	0%	13%	87%	79.2
CWC-12			2,935,554	4,577,370	0.27	0%	0%	39%	61%	77.7
CWC-13			2,149,823	1,174,610	0.12	0%	0%	65%	35%	76.1
CWC-14			579,941	410,594	0.04	0%	0%	59%	41%	76.5
CWC-15			779,694	1,316,539	0.08	0%	0%	37%	63%	77.8
CWC-16			1,642,235	1,870,783	0.13	0%	0%	47%	53%	77.2
CWC-17			4,552,709	2,943,919	0.27	0%	0%	61%	39%	76.4
CWC-18			2,053,096	8,551,851	0.38	0%	0%	19%	81%	78.8
CWC-19			1,274,008	2,298,455	0.13	0%	0%	36%	64%	77.9
CWC-20			2,189,708	2,036,245	0.15	0%	0%	52%	48%	76.9
DB-01		428,863		1,817,728	0.08	0%	19%	0%	81%	76.4
DB-02		1,027,048		4,787,705	0.21	0%	18%	0%	82%	76.6
DB-03		2,492,278	339,240	5,971,434	0.32	0%	28%	4%	68%	74.4
EB-01		1,014,088		8,655,024	0.35	0%	10%	0%	90%	78.0
GB-01		1,413,375		2,351,555	0.14	0%	38%	0%	62%	72.9
HB-01		419,745		10,088,788	0.38	0%	4%	0%	96%	79.2
IHB-01				3,090,595	0.11	0%	0%	0%	100%	80.0
IHB-02				10,869,307	0.39	0%	0%	0%	100%	80.0
JB-01		6,543		498,160	0.02	0%	1%	0%	99%	79.8
JB-02				13,573,613	0.49	0%	0%	0%	100%	80.0
PC-01		520,593		1,230,183	0.06	0%	30%	0%	70%	74.4
PC-02		1,234,634		3,409,691	0.17	0%	27%	0%	73%	74.9
PC-03		259,406		890,205	0.04	0%	23%	0%	77%	75.7
PC-04		214,070		3,916,891	0.15	0%	5%	0%	95%	79.0
PC-05		441,329		18,030,542	0.66	0%	2%	0%	98%	79.5
RB-01				4,578,820	0.16	0%	0%	0%	100%	80.0
SCW-01				1,257,591	0.05	0%	0%	0%	100%	80.0
SCW-02			566,733	1,578,233	0.08	0%	0%	26%	74%	78.4
SCW-03			10,620	1,446,866	0.05	0%	0%	1%	99%	80.0
SCW-04		125,777	452,088	3,429,462	0.14	0%	3%	11%	86%	78.7
SCW-05				459,943	0.02	0%	0%	0%	100%	80.0
SCW-06		4,200,200	3,083,708	7,683,920	0.54	0%	28%	21%	51%	73.4
SCW-07			187,895	1,339,236	0.05	0%	0%	12%	88%	79.3
SCW-08			747,137	4,319,906	0.18	0%	0%	15%	85%	79.1
SCW-09			2,395,020	3,614,165	0.22	0%	0%	40%	60%	77.6
SCW-10			1,977,572	634,377	0.09	0%	0%	76%	24%	75.5
SCW-11			1,455,307	10,384,637	0.42	0%	0%	12%	88%	79.3
SCW-12			970,959	18,344,359	0.69	0%	0%	5%	95%	79.7
SCW-13			72,221	4,682,752	0.17	0%	0%	2%	98%	79.9
SCW-14			302,940	2,345,563	0.10	0%	0%	11%	89%	79.3
SCW-15			93,767	4,661,749	0.17	0%	0%	2%	98%	79.9
SWC-04A		1,226,651	18,582	1,971,543	0.12	0%	38%	1%	61%	72.7
UNA-01			35,080	11,659,130	0.42	0%	0%	0%	100%	80.0
UNA-02				8,969,445	0.32	0%	0%	0%	100%	80.0
UNA-03			654,043	2,919,337	0.13	0%	0%	18%	82%	78.9
UNA-04			153,132	9,697,663	0.35	0%	0%	2%	98%	79.9
WB-01				5,891,340	0.21	0%	0%	0%	100%	80.0
WC-01		297,365		7,672,687	0.29	0%	4%	0%	96%	79.3
WC-02		1,163,555		4,385,009	0.20	0%	21%	0%	79%	76.0
WC-03		1,211,224		5,478,975	0.24	0%	18%	0%	82%	76.6
WC-04		131,462		8,213,877	0.30	0%	2%	0%	98%	79.7
WC-05				5,229,501	0.19	0%	0%	0%	100%	80.0
WC-06		973,360		4,600,669	0.20	0%	17%	0%	83%	76.7

Subbasin	Area of NRCS Group (SF)				Total Area (sq.mi)	Percent of Soil Type				Weighted Curve Number AMC II
	A	B	C	D		%A	%B	%C	%D	
BB-01				3,724,313	0.13	0%	0%	0%	100%	80.0
BNB-01		878,233		23,490,167	0.87	0%	4%	0%	96%	79.3
DB-01		1,454,121	2,028,436	6,100,719	0.34	0%	15%	21%	64%	75.8
FB-01		2,320,110		4,849,382	0.26	0%	32%	0%	68%	73.9
FC-01		121,637	717,936	3,341,098	0.15	0%	3%	17%	80%	78.4
FC-02		1,360,246	276,249	2,109,351	0.13	0%	36%	7%	56%	72.7
FC-03		5,056,084		1,453,186	0.23	0%	78%	0%	22%	65.2
FC-04		1,752,093		1,490,588	0.12	0%	54%	0%	46%	69.7
FC-05		1,246,051	600,599	590,850	0.09	0%	51%	25%	24%	68.8
FC-06		679,433	705,394	400,529	0.06	0%	38%	40%	22%	70.4
FC-07		553,403	1,530,182	3,624,490	0.20	0%	10%	27%	63%	76.5
FC-08		2,112,184	611,161	1,117,217	0.14	0%	55%	16%	29%	68.6
FC-08A		999,160		1,010,550	0.07	0%	50%	0%	50%	70.6
FC-09		2,291,853	1,856,959	4,095,860	0.30	0%	28%	23%	50%	73.4
FC-10		4,411,501	1,354,132	3,883,108	0.35	0%	46%	14%	40%	70.5
FC-11		4,536,751	1,374,523	8,694,558	0.52	0%	31%	9%	60%	73.5
FC-12		561,459		4,739,000	0.19	0%	11%	0%	89%	78.0
FC-13		1,974,575		1,770,335	0.13	0%	53%	0%	47%	70.0
FC-14		1,533,596		2,217,143	0.13	0%	41%	0%	59%	72.2
FC-14A		1,012,425		6,346,287	0.26	0%	14%	0%	86%	77.4
FC-15		450,354		783,335	0.04	0%	37%	0%	63%	73.1
FC-16		470,397		8,507,601	0.32	0%	5%	0%	95%	79.0
FC-17				5,820,430	0.21	0%	0%	0%	100%	80.0
FC-18				16,145,834	0.58	0%	0%	0%	100%	80.0
FC-18A				3,549,662	0.13	0%	0%	0%	100%	80.0
FC-19				12,460,019	0.45	0%	0%	0%	100%	80.0
FC-20				20,850,099	0.75	0%	0%	0%	100%	80.0
FC-21				20,505,569	0.74	0%	0%	0%	100%	80.0
FC-22			1,003,054	21,280,532	0.80	0%	0%	5%	95%	79.7
FC-23				13,680,285	0.49	0%	0%	0%	100%	80.0
FC-24			836,975	21,802,090	0.81	0%	0%	4%	96%	79.8
GB-01		1,138,494		22,318,356	0.84	0%	5%	0%	95%	79.1
KB-01		295,526		6,884,176	0.26	0%	4%	0%	96%	79.2
KB-02			1,255,883	13,921,617	0.54	0%	0%	8%	92%	79.5
KB-03				1,391,853	0.05	0%	0%	0%	100%	80.0
KB-04			497,156	9,750,027	0.37	0%	0%	5%	95%	79.7
KC-01		6,253,306		702,588	0.25	0%	90%	0%	10%	62.9
KC-01A		653,203		105,610	0.03	0%	86%	0%	14%	63.6
KC-02		37,925		8,787,028	0.32	0%	0%	0%	100%	79.9
KC-03		715,397		4,957,698	0.20	0%	13%	0%	87%	77.6
KC-04		4,466		1,545,110	0.06	0%	0%	0%	100%	79.9
KC-05				2,986,305	0.11	0%	0%	0%	100%	80.0
KC-06		73,980		3,326,663	0.12	0%	2%	0%	98%	79.6
KC-07		399,228		6,548,233	0.25	0%	6%	0%	94%	78.9
KC-08				6,623,531	0.24	0%	0%	0%	100%	80.0
KC-09				4,248,773	0.15	0%	0%	0%	100%	80.0
KC-10				8,189,246	0.29	0%	0%	0%	100%	80.0
KC-11				14,408,050	0.52	0%	0%	0%	100%	80.0
KC-12		1,053,139		9,171,077	0.37	0%	10%	0%	90%	78.0
LB-01		3,789,970		7,987,229	0.42	0%	32%	0%	68%	73.9
MB-01		7,298	307,306	6,427,141	0.24	0%	0%	5%	95%	79.7
OB-01		704,866	581,674	354,051	0.06	0%	43%	35%	22%	69.7
PC-01		1,346,265	959,229	5,200,649	0.27	0%	18%	13%	69%	75.8
PC-02		804,732	1,146,607	4,001,991	0.21	0%	14%	19%	67%	76.3
PC-03		632,717	1,253,186	7,822,512	0.35	0%	7%	13%	81%	78.0
PC-04		31,017	92,344	9,242,553	0.34	0%	0%	1%	99%	79.9
PC-05		1,104,003	2,458,619	4,621,533	0.29	0%	13%	30%	56%	75.6
PC-06		455,542	364,470	8,917,028	0.35	0%	5%	4%	92%	78.9
PC-07		230,687	191,867	10,238,548	0.38	0%	2%	2%	96%	79.5
PC-08			378,461	10,806,819	0.40	0%	0%	3%	97%	79.8
PC-08A			559,406	15,358,423	0.57	0%	0%	4%	96%	79.8
PC-09			2,799,038	13,746,731	0.59	0%	0%	17%	83%	79.0
PC-09A			680,449	7,485,680	0.29	0%	0%	8%	92%	79.5
PC-10			1,263,525	3,661,271	0.18	0%	0%	26%	74%	78.5
PC-11			5,016,846	14,570,702	0.70	0%	0%	26%	74%	78.5
PC-12			2,083,992	11,446,128	0.49	0%	0%	15%	85%	79.1
PC-13			1,284,351	5,937,202	0.26	0%	0%	18%	82%	78.9

Subbasin	Area of NRCS Group (SF)				Total Area (sq.mi)	Percent of Soil Type				Weighted Curve Number AMC II
	A	B	C	D		%A	%B	%C	%D	
PC-14			4,965,285	10,195,303	0.54	0%	0%	33%	67%	78.0
RB-01		748,341	168,911	10,934,300	0.43	0%	6%	1%	92%	78.7
SFKC-01				5,771,473	0.21	0%	0%	0%	100%	80.0
UNB-01		172,512		3,747,735	0.14	0%	4%	0%	96%	79.2
UNB-02			307,547	17,984,597	0.66	0%	0%	2%	98%	79.9
UNB-03				16,086,154	0.58	0%	0%	0%	100%	80.0
UNC-01				13,873,102	0.50	0%	0%	0%	100%	80.0
UNC-02			2,049,032	33,029,538	1.26	0%	0%	6%	94%	79.6
UND-01		1,978,169		2,139,805	0.15	0%	48%	0%	52%	70.9
VB-01		827,897		3,052,542	0.14	0%	21%	0%	79%	75.9
WB-01		1,452,693	564,323	2,566,185	0.16	0%	32%	12%	56%	73.2
WB-02			31,035	1,517,020	0.06	0%	0%	2%	98%	79.9
WB-03		4,514	292,335	7,163,649	0.27	0%	0%	4%	96%	79.8
WB-04		7,811	525,958	6,240,061	0.24	0%	0%	8%	92%	79.5

Appendix **C**
Weighted Land Use Table

CWC Drainage Basin Composite IC (Existing Condition)			
Sub-Basin	Impervious Area (sq.ft)	Drainage Area (sq.ft)	Percentage IC
AB-01	702,870	3,066,624	22.9%
BB-01	4,591,322	8,084,736	56.8%
CWC-01	427,209	1,672,704	25.5%
CWC-02	827,877	4,460,544	18.6%
CWC-03	1,731,806	11,151,360	15.5%
CWC-04	220,546	836,352	26.4%
CWC-05	2,107,607	6,969,600	30.2%
CWC-06	4,278,860	9,199,872	46.5%
CWC-07	1,480,008	3,902,976	37.9%
CWC-08	3,351,346	15,890,688	21.1%
CWC-09	3,086,752	6,412,032	48.1%
CWC-10	9,249,969	15,890,688	58.2%
CWC-11	744,353	4,181,760	17.8%
CWC-12	4,870,078	7,527,168	64.7%
CWC-13	1,479,005	3,345,408	44.2%
CWC-14	294,842	1,115,136	26.4%
CWC-15	1,101,977	2,230,272	49.4%
CWC-16	1,171,701	3,624,192	32.3%
CWC-17	3,414,323	7,527,168	45.4%
CWC-18	4,889,035	10,593,792	46.2%
CWC-19	1,358,347	3,624,192	37.5%
CWC-20	1,918,173	4,181,760	45.9%
DB-01	258,712	2,230,272	11.6%
DB-02	2,403,843	5,854,464	41.1%
DB-03	3,446,216	8,921,088	38.6%
EB-01	3,827,844	9,757,440	39.2%
GB-01	831,334	3,902,976	21.3%
HB-01	5,326,559	10,593,792	50.3%
IHB-01	326,874	975,744	33.5%
IHB-02	741,565	2,118,758	35.0%
IHB-03	4,452,320	10,872,576	41.0%
JB-01	63,842	557,568	11.5%
JB-02	5,449,140	13,660,416	39.9%
PC-01	157,401	1,672,704	9.4%
PC-02	634,596	4,739,328	13.4%
PC-03	334,875	1,115,136	30.0%
PC-04	1,469,889	4,181,760	35.2%
PC-05	8,366,364	18,399,744	45.5%
RB-01	3,154,943	4,460,544	70.7%
SCW-01	352,522	1,393,920	25.3%
SCW-02	427,766	2,230,272	19.2%
SCW-03	517,423	1,393,920	37.1%
SCW-04	1,714,968	3,902,976	43.9%
SCW-04A	2,043,375	3,345,408	61.1%
SCW-05	164,315	557,568	29.5%
SCW-06	5,053,741	15,054,336	33.6%
SCW-07	15,333	1,393,920	1.1%
SCW-08	1,640,644	3,066,624	53.5%
SCW-08A	1,174,238	2,007,245	58.5%

Sub-Basin	Impervious Area (sq.ft)	Drainage Area (sq.ft)	Percentage IC
SCW-09	2,747,695	6,133,248	44.8%
SCW-10	845,803	2,509,056	33.7%
SCW-11	7,383,650	11,708,928	63.1%
SCW-12	8,327,306	19,236,096	43.3%
SCW-13	2,347,389	4,739,328	49.5%
SCW-14	1,568,718	2,787,840	56.3%
SCW-15	3,401,890	4,739,328	71.8%
UNA-01	4,635,565	11,708,928	39.6%
UNA-2	4,454,299	8,921,088	49.9%
UNA-3	1,367,770	3,624,192	37.7%
UNA-4	4,227,899	9,757,440	43.3%
WB-01	1,841,229	5,854,464	31.5%
WC-01	3,934,033	8,084,736	48.7%
WC-02	533,035	2,787,840	19.1%
WC-02A	288,820	1,561,190	18.5%
WC-03	801,504	3,206,016	25.0%
WC-03A	43,490	111,514	39.0%
WC-04	2,376,912	4,098,125	58.0%
WC-05	355,728	1,226,650	29.0%
WC-05B	191,803	446,054	43.0%
WC-05C	80,290	167,270	48.0%
WC-05D	200,724	669,082	30.0%
WC-05E	193,197	585,446	33.0%
WC-06	36,799	919,987	4.0%
WC-06A	85,308	473,933	18.0%
WC-07	0	306,662	0.0%
WC-08	278,784	1,393,920	20.0%
WC-09	289,935	3,624,192	8.0%
WC-10	3,178,138	5,296,896	60.0%
WC-5A-POND1	397,546	641,203	62.0%
WC-5A-POND2	287,705	669,082	43.0%
WC-5A-POND3	275,439	724,838	38.0%
WC-5A-POND4	187,343	669,082	28.0%
WC-5A-POND5	71,369	446,054	16.0%
WC-5A-POND6	1,024,531	2,090,880	49.0%

FC Drainage Basin Composite IC (Existing Condition)			
Sub-Basin	Impervious Area (sq.ft)	Drainage Area (sq.ft)	Percentage IC
AP-1	101,087	1,444,101	7.0%
AP-2	809,923	1,499,858	54.0%
AP-3	211,736	683,021	31.0%
AP-4	797,880	886,533	90.0%
BB-01	1,370,257	3,735,706	36.7%
BNB-01	7,831,143	24,365,722	32.1%
DA-1	1,681,068	1,867,853	90.0%
DA-2	376,358	418,176	90.0%
DA-3	250,237	2,085,304	12.0%
DB-01	3,759,346	9,590,170	39.2%
FB-01	2,932,532	7,164,749	40.9%
FC-01	1,058,822	4,181,760	25.3%
FC-02	1,017,606	3,735,706	27.2%
FC-03	1,092,571	6,495,667	16.8%
FC-04	683,969	3,233,894	21.2%
FC-05	319,913	2,425,421	13.2%
FC-06	684,783	1,784,218	38.4%
FC-07	3,069,565	5,715,072	53.7%
FC-08	2,259,857	3,847,219	58.7%
FC-08A	764,359	2,007,245	38.1%
FC-09	2,809,808	8,252,006	34.1%
FC-10	2,372,898	9,645,926	24.6%
FC-11	3,174,380	14,608,282	21.7%
FC-12	1,662,166	5,296,896	31.4%
FC-13	828,206	3,735,706	22.2%
FC-14	1,170,098	3,763,584	31.1%
FC-14A	2,737,882	7,359,898	37.2%
FC-15	344,198	1,226,650	28.1%
FC-16	3,888,769	8,976,845	43.3%
FC-17	1,479,370	5,826,586	25.4%
FC-18	4,413,112	16,141,594	27.3%
FC-18A	630,927	3,540,557	17.8%
FC-19	3,539,107	12,461,645	28.4%
FC-20	6,602,073	20,853,043	31.7%
FC-21	6,323,407	20,490,624	30.9%
FC-22	8,259,511	22,274,842	37.1%
FC-23	3,675,307	13,688,294	26.9%
FC-24	9,312,969	22,637,261	41.1%
GB-01	3,284,747	23,445,734	14.0%
KB-01	1,912,520	7,192,627	26.6%
KB-02	4,997,147	15,165,850	33.0%
KB-03	487,872	1,393,920	35.0%
KB-04	5,163,481	10,259,251	50.3%
KC-01	1,777,248	6,969,600	25.5%
KC-01A	216,782	752,717	28.8%
KC-02	3,218,600	8,837,453	36.4%
KC-03	1,826,827	5,659,315	32.3%
KC-04	548,134	1,561,190	35.1%
KC-05	994,528	2,982,989	33.3%

Sub-Basin	Impervious Area (sq.ft)	Drainage Area (sq.ft)	Percentage IC
KC-06	1,189,727	3,401,165	35.0%
KC-07	1,478,587	6,941,722	21.3%
KC-08	1,043,695	6,635,059	15.7%
KC-09	897,930	4,237,517	21.2%
KC-10	2,059,718	8,196,250	25.1%
KC-12	4,114,035	10,231,373	40.2%
LB-01	3,430,582	11,764,685	29.2%
MB-01	1,951,784	6,746,573	28.9%
OB-01	589,834	1,644,826	35.9%
PC-01	2,719,242	7,499,290	36.3%
PC-02	215,968	5,965,978	3.6%
PC-03	790,687	9,701,683	8.2%
PC-04	3,074,296	9,367,142	32.8%
PC-05	810,609	8,196,250	9.9%
PC-06	2,892,599	9,729,562	29.7%
PC-07	2,771,013	10,649,549	26.0%
PC-08	3,588,536	11,179,238	32.1%
PC-08A	6,867,270	15,918,566	43.1%
PC-09	7,181,454	16,531,891	43.4%
PC-09A	2,880,985	8,168,371	35.3%
PC-10	1,667,853	4,934,477	33.8%
PC-11	6,937,791	19,570,637	35.5%
PC-12	5,235,340	13,521,024	38.7%
PC-13	2,435,477	7,220,506	33.7%
PC-14	5,608,331	15,165,850	37.0%
RB-01	4,409,945	11,848,320	37.2%
SFKC-01	541,304	5,770,829	9.4%
TV-1	2,542,510	2,676,326	95.0%
TV-2	1,250,067	1,315,860	95.0%
TV-3	900,472	947,866	95.0%
TV-4	1,218,286	1,282,406	95.0%
UNK-B	1,299,147	3,930,854	33.1%
UNK-BA	6,271,034	18,288,230	34.3%
UNK-C	5,316,369	16,085,837	33.1%
UNK-D	4,818,943	13,883,443	34.7%
UNK-E	10,286,332	35,071,027	29.3%
UNK-F	1,497,327	4,126,003	36.3%
VB-01	1,499,275	3,875,098	38.7%
WB-01	528,073	4,572,058	11.6%
WB-02	510,509	1,561,190	32.7%
WB-03	1,284,336	7,471,411	17.2%
WB-04	3,236,155	6,774,451	47.8%

CWC Drainage Basin Composite IC (Ultimate Condition)				
Sub-Basin	Impervious Area (sq.ft)	Drainage Area (sq.ft)	Calculated Percentage IC	Adjusted Percentage IC
AB-01	702,870	3,066,624	22.9%	38.0%
BB-01	4,591,322	8,084,736	56.8%	84.7%
CWC-01	427,209	1,672,704	25.5%	52.3%
CWC-02	827,877	4,460,544	18.6%	25.9%
CWC-03	1,731,806	11,151,360	15.5%	26.5%
CWC-04	220,546	836,352	26.4%	26.4%
CWC-05	2,107,607	6,969,600	30.2%	32.3%
CWC-06	4,278,860	9,199,872	46.5%	62.4%
CWC-07	1,480,008	3,902,976	37.9%	75.0%
CWC-08	3,351,346	15,890,688	21.1%	75.0%
CWC-09	3,086,752	6,412,032	48.1%	65.5%
CWC-10	9,249,969	15,890,688	58.2%	84.9%
CWC-11	744,353	4,181,760	17.8%	48.0%
CWC-12	4,870,078	7,527,168	64.7%	67.3%
CWC-13	1,479,005	3,345,408	44.2%	44.2%
CWC-14	294,842	1,115,136	26.4%	26.4%
CWC-15	1,101,977	2,230,272	49.4%	56.8%
CWC-16	1,171,701	3,624,192	32.3%	63.9%
CWC-17	3,414,323	7,527,168	45.4%	56.2%
CWC-18	4,889,035	10,593,792	46.2%	57.7%
CWC-19	1,358,347	3,624,192	37.5%	38.0%
CWC-20	1,918,173	4,181,760	45.9%	55.7%
DB-01	258,712	2,230,272	11.6%	75.4%
DB-02	2,403,843	5,854,464	41.1%	41.1%
DB-03	3,446,216	8,921,088	38.6%	38.6%
EB-01	3,827,844	9,757,440	39.2%	46.7%
GB-01	831,334	3,902,976	21.3%	38.0%
HB-01	5,326,559	10,593,792	50.3%	60.2%
IHB-01	326,874	975,744	33.5%	35.1%
IHB-02	741,565	2,118,758	35.0%	43.9%
IHB-03	4,452,320	10,872,576	41.0%	41.0%
JB-01	63,842	557,568	11.5%	14.7%
JB-02	5,449,140	13,660,416	39.9%	46.9%
PC-01	157,401	1,672,704	9.4%	35.9%
PC-02	634,596	4,739,328	13.4%	56.9%
PC-03	334,875	1,115,136	30.0%	56.0%
PC-04	1,469,889	4,181,760	35.2%	53.7%
PC-05	8,366,364	18,399,744	45.5%	60.9%
RB-01	3,154,943	4,460,544	70.7%	83.7%
SCW-01	352,522	1,393,920	25.3%	25.3%
SCW-02	427,766	2,230,272	19.2%	31.2%
SCW-03	517,423	1,393,920	37.1%	42.0%
SCW-04	1,714,968	3,902,976	43.9%	87.1%
SCW-04A	2,043,375	3,345,408	61.1%	61.1%
SCW-05	164,315	557,568	29.5%	71.0%
SCW-06	5,053,741	15,054,336	33.6%	90.0%
SCW-07	15,333	1,393,920	1.1%	90.0%
SCW-08	1,640,644	3,066,624	53.5%	64.7%
SCW-08A	1,174,238	2,007,245	58.5%	90.5%
SCW-09	2,747,695	6,133,248	44.8%	49.9%
SCW-10	845,803	2,509,056	33.7%	46.6%
SCW-11	7,383,650	11,708,928	63.1%	75.1%
SCW-12	8,327,306	19,236,096	43.3%	61.2%
SCW-13	2,347,389	4,739,328	49.5%	64.1%
SCW-14	1,568,718	2,787,840	56.3%	65.2%
SCW-15	3,401,890	4,739,328	71.8%	88.9%

Sub-Basin	Impervious Area (sq.ft)	Drainage Area (sq.ft)	Calculated Percentage IC	Adjusted Percentage IC
UNA-01	4,635,565	11,708,928	39.6%	39.6%
UNA-2	4,454,299	8,921,088	49.9%	49.9%
UNA-3	1,367,770	3,624,192	37.7%	37.7%
UNA-4	4,227,899	9,757,440	43.3%	43.3%
WB-01	1,841,229	5,854,464	31.5%	75.3%
WC-01	3,934,033	8,084,736	48.7%	83.9%
WC-02	533,035	2,787,840	19.1%	87.9%
WC-02A	288,820	1,561,190	18.5%	94.7%
WC-03	801,504	3,206,016	25.0%	74.0%
WC-03A	43,490	111,514	39.0%	39.0%
WC-04	2,376,912	4,098,125	58.0%	74.0%
WC-05	355,728	1,226,650	29.0%	50.0%
WC-05B	191,803	446,054	43.0%	43.0%
WC-05C	80,290	167,270	48.0%	48.0%
WC-05D	200,724	669,082	30.0%	30.0%
WC-05E	193,197	585,446	33.0%	33.0%
WC-06	36,799	919,987	4.0%	50.0%
WC-06A	85,308	473,933	18.0%	50.0%
WC-07	0	306,662	0.0%	50.0%
WC-08	278,784	1,393,920	20.0%	63.0%
WC-09	289,935	3,624,192	8.0%	63.0%
WC-10	3,178,138	5,296,896	60.0%	80.0%
WC-5A-POND1	397,546	641,203	62.0%	62.0%
WC-5A-POND2	287,705	669,082	43.0%	43.0%
WC-5A-POND3	275,439	724,838	38.0%	38.0%
WC-5A-POND4	187,343	669,082	28.0%	28.0%
WC-5A-POND5	71,369	446,054	16.0%	16.0%
WC-5A-POND6	1,024,531	2,090,880	49.0%	49.0%

FC Drainage Basin Composite IC (Ultimate Condition)

Sub-Basin	Impervious Area (sq.ft)	Drainage Area (sq.ft)	Percentage IC	Adjusted Percentage IC
AP-1	101,087	1,444,101	7.0%	7.0%
AP-2	809,923	1,499,858	54.0%	54.0%
AP-3	211,736	683,021	31.0%	31.0%
AP-4	797,880	886,533	90.0%	90.0%
BB-01	1,370,257	3,735,706	36.7%	36.7%
BNB-01	7,831,143	24,365,722	32.1%	51.6%
DA-1	1,681,068	1,867,853	90.0%	90.0%
DA-2	376,358	418,176	90.0%	90.0%
DA-3	250,237	2,085,304	12.0%	12.0%
DB-01	3,759,346	9,590,170	39.2%	39.2%
FB-01	2,932,532	7,164,749	40.9%	40.9%
FC-01	1,058,822	4,181,760	25.3%	25.3%
FC-02	1,017,606	3,735,706	27.2%	27.2%
FC-03	1,092,571	6,495,667	16.8%	16.8%
FC-04	683,969	3,233,894	21.2%	43.4%
FC-05	319,913	2,425,421	13.2%	45.5%
FC-06	684,783	1,784,218	38.4%	41.1%
FC-07	3,069,565	5,715,072	53.7%	71.4%
FC-08	2,259,857	3,847,219	58.7%	58.7%
FC-08A	764,359	2,007,245	38.1%	47.7%
FC-09	2,809,808	8,252,006	34.1%	54.9%
FC-10	2,372,898	9,645,926	24.6%	37.9%
FC-11	3,174,380	14,608,282	21.7%	25.0%
FC-12	1,662,166	5,296,896	31.4%	36.0%
FC-13	828,206	3,735,706	22.2%	28.2%
FC-14	1,170,098	3,763,584	31.1%	31.1%
FC-14A	2,737,882	7,359,898	37.2%	37.2%
FC-15	344,198	1,226,650	28.1%	56.4%
FC-16	3,888,769	8,976,845	43.3%	43.3%
FC-17	1,479,370	5,826,586	25.4%	39.5%
FC-18	4,413,112	16,141,594	27.3%	39.0%
FC-18A	630,927	3,540,557	17.8%	28.2%
FC-19	3,539,107	12,461,645	28.4%	41.3%
FC-20	6,602,073	20,853,043	31.7%	37.3%
FC-21	6,323,407	20,490,624	30.9%	42.1%
FC-22	8,259,511	22,274,842	37.1%	47.5%
FC-23	3,675,307	13,688,294	26.9%	48.7%
FC-24	9,312,969	22,637,261	41.1%	52.8%
GB-01	3,284,747	23,445,734	14.0%	50.3%
KB-01	1,912,520	7,192,627	26.6%	74.6%
KB-02	4,997,147	15,165,850	33.0%	44.7%
KB-03	487,872	1,393,920	35.0%	35.0%
KB-04	5,163,481	10,259,251	50.3%	58.7%
KC-01	1,777,248	6,969,600	25.5%	25.5%
KC-01A	216,782	752,717	28.8%	28.8%
KC-02	3,218,600	8,837,453	36.4%	42.4%
KC-03	1,826,827	5,659,315	32.3%	32.3%
KC-04	548,134	1,561,190	35.1%	35.1%
KC-05	994,528	2,982,989	33.3%	33.3%

Sub-Basin	Impervious Area (sq.ft)	Drainage Area (sq.ft)	Percentage IC	Adjusted Percentage IC
KC-06	1,189,727	3,401,165	35.0%	45.5%
KC-07	1,478,587	6,941,722	21.3%	50.8%
KC-08	1,043,695	6,635,059	15.7%	55.7%
KC-09	897,930	4,237,517	21.2%	35.5%
KC-10	2,059,718	8,196,250	25.1%	55.7%
KC-12	4,114,035	10,231,373	40.2%	47.4%
LB-01	3,430,582	11,764,685	29.2%	46.1%
MB-01	1,951,784	6,746,573	28.9%	53.3%
OB-01	589,834	1,644,826	35.9%	36.3%
PC-01	2,719,242	7,499,290	36.3%	40.5%
PC-02	215,968	5,965,978	3.6%	80.9%
PC-03	790,687	9,701,683	8.2%	84.4%
PC-04	3,074,296	9,367,142	32.8%	47.7%
PC-05	810,609	8,196,250	9.9%	51.0%
PC-06	2,892,599	9,729,562	29.7%	47.0%
PC-07	2,771,013	10,649,549	26.0%	59.3%
PC-08	3,588,536	11,179,238	32.1%	60.4%
PC-08A	6,867,270	15,918,566	43.1%	66.9%
PC-09	7,181,454	16,531,891	43.4%	54.5%
PC-09A	2,880,985	8,168,371	35.3%	45.4%
PC-10	1,667,853	4,934,477	33.8%	51.0%
PC-11	6,937,791	19,570,637	35.5%	50.6%
PC-12	5,235,340	13,521,024	38.7%	52.1%
PC-13	2,435,477	7,220,506	33.7%	48.0%
PC-14	5,608,331	15,165,850	37.0%	48.5%
RB-01	4,409,945	11,848,320	37.2%	39.7%
SFKC-01	541,304	5,770,829	9.4%	68.0%
TV-1	2,542,510	2,676,326	95.0%	95.0%
TV-2	1,250,067	1,315,860	95.0%	95.0%
TV-3	900,472	947,866	95.0%	95.0%
TV-4	1,218,286	1,282,406	95.0%	95.0%
UNK-B	1,299,147	3,930,854	33.1%	33.1%
UNK-BA	6,271,034	18,288,230	34.3%	34.3%
UNK-C	5,316,369	16,085,837	33.1%	33.1%
UNK-D	4,818,943	13,883,443	34.7%	34.7%
UNK-E	10,286,332	35,071,027	29.3%	29.3%
UNK-F	1,497,327	4,126,003	36.3%	36.3%
VB-01	1,499,275	3,875,098	38.7%	40.1%
WB-01	528,073	4,572,058	11.6%	76.7%
WB-02	510,509	1,561,190	32.7%	38.0%
WB-03	1,284,336	7,471,411	17.2%	79.1%
WB-04	3,236,155	6,774,451	47.8%	47.8%

Appendix **D**
Time of Concentration Spreadsheets

EXISTING CONDITIONS

TR-55 Method of Computing the Time of Concentration

			AB_01	BB_01	CWC_01	CWC_02	CWC_03	CWC_04	CWC_04A	CWC_05
Sheet Flow										
variable	units									
Manning's roughness coef.	n	n/a	0.240	0.013	0.013	0.240	0.240	0.240	0.240	0.240
Flow Length	L	feet	50	20	60	60	60	60	20	50
2-year, 24-hour rainfall	P2	inches	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Slope	s	ft/ft	0.0020	0.0050	0.0050	0.0382	0.0189	0.0100	0.0129	0.0100
Travel time	Tt	hours	0.333	0.011	0.026	0.118	0.157	0.202	0.076	0.175
		min.	20.0	0.6	1.6	7.1	9.4	12.1	4.5	10.5
Shallow Concentrated Flow										
Flow Length	L	feet	665	1,820	1,450	140	390	1,105	145	670
Slope	s	ft/ft	0.007	0.010	0.018	0.027	0.074	0.005	0.012	0.005
Surface (1=paved or 2=unpaved)		n/a	2	1	2	2	2	1	1	1
Velocity	V	ft/sec	1.36	2.06	2.16	2.69	4.41	1.42	2.23	1.46
Travel time	Tt	hours	0.136	0.246	0.186	0.014	0.025	0.216	0.018	0.128
		min.	8.2	14.7	11.2	0.9	1.5	13.0	1.1	7.7
Manning's Equation										
1 Flow Length	L	feet	2,520	2,230	830	1,250	4,560	1,375	1,495	1,848
Slope	S	ft/ft	0.0135	0.0110	0.0156	0.0232	0.0029	0.0240	0.0123	0.0029
roughness	n	n/a	0.04	0.04	0.05	0.013	0.06	0.04	0.013	0.04
Open Channel										
Bottom Width	BW	feet	20	10	3	0	25	3	0	2
Side Slopes (H:1)	H	feet	20	15	5	0	15	5	0	3
Depth	d	feet	1.5	3	2	0	4.5	1.5	0	1.5
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	0.00	0.00	2.00	0.00	0.00	2.50	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	75.00	165.00	26.00	3.14	416.25	15.75	4.91	9.75
Flow Rate	Q	cfs	310.78	898.22	103.67	34.51	1059.16	82.24	45.66	17.57
Velocity	V	ft/sec	4.14	5.44	3.99	10.99	2.54	5.22	9.30	1.80
Travel time	Tt	hours	0.169	0.114	0.058	0.032	0.498	0.073	0.045	0.285
2 Flow Length	L	feet	753	1,420	640	2,854	-	801	587	1,579
Slope	S	ft/ft	0.0125	0.0094	0.0064	0.0011	0.0000	0.0041	0.0088	0.0177
roughness	n	n/a	0.05	0.013	0.06	0.06	0	0.05	0.013	0.013
Open Channel										
Bottom Width	BW	feet	25	0	100	100	0	25	0	0
Side Slopes (H:1)	H	feet	12	0	25	25	0	15	0	0
Depth	d	feet	2	0	2	2.5	0	1.5	0	0
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	3.50	0.00	0.00	0.00	0.00	5.00	4.50
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	98.00	9.62	300.00	406.25	0.00	71.25	19.63	15.90
Flow Rate	Q	cfs	395.97	98.02	782.49	503.24	0.00	136.71	245.41	238.56
Velocity	V	ft/sec	4.04	10.19	2.61	1.24	0.00	1.92	12.50	15.00
Travel time	Tt	hours	0.052	0.039	0.068	0.640	-	0.116	0.013	0.029
3 Flow Length	L	feet	-	1,953	-	-	-	-	464	866
Slope	S	ft/ft	0.0000	0.0131	0.0000	0.0000	0.0000	0.0000	0.0176	0.0126
roughness	n	n/a	0	0.05	0	0	0	0	0.013	0.06
Open Channel										
Bottom Width	BW	feet	0	25	0	0	0	0	0	20
Side Slopes (H:1)	H	feet	0	5	0	0	0	0	0	15
Depth	d	feet	0	3.5	0	0	0	0	0	4
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	0.00	0.00	0.00	0.00	0.00	6.33	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	0.00	148.75	0.00	0.00	0.00	0.00	31.50	320.00
Flow Rate	Q	cfs	0.00	923.14	0.00	0.00	0.00	0.00	472.55	1545.64
Velocity	V	ft/sec	0.00	6.21	0.00	0.00	0.00	0.00	15.00	4.83
Travel time	Tt	hours	-	0.087	-	-	-	-	0.009	0.050
Total Travel Time										
TC	hours		0.690	0.496	0.338	0.804	0.679	0.608	0.160	0.667
TC	min.		41.4	29.8	20.3	48.3	40.8	36.5	9.6	40.0
Lag Time										
TL	hours		0.4139	0.2978	0.2029	0.4827	0.4076	0.3646	0.0961	0.4000
TL	min.		24.8	17.9	12.2	29.0	24.5	21.9	5.8	24.0

EXISTING CONDITIONS

TR-55 Method of Computing the Time of Concentration

			CWC_06	CWC_07	CWC_08	CWC_09	CWC_10	CWC_11	CWC_12	CWC_13
Sheet Flow										
Manning's roughness coef.	n	n/a	0.013	0.240	0.013	0.240	0.240	0.240	0.240	0.240
Flow Length	L	feet	20	60	50	20	20	60	50	60
2-year, 24-hour rainfall	P2	inches	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Slope	s	ft/ft	0.0050	0.0412	0.0050	0.0103	0.0090	0.0054	0.0100	0.0100
Travel time	Tt	hours	0.011	0.115	0.022	0.083	0.088	0.258	0.175	0.202
Shallow Concentrated Flow										
Flow Length	L	feet	620	600	320	1,557	390	1,676	1,110	1,100
Slope	s	ft/ft	0.016	0.048	0.016	0.015	0.006	0.030	0.006	0.025
Surface (1=paved or 2=unpaved)		n/a	1	2	1	1	2	2	1	2
Velocity	V	ft/sec	2.59	3.56	2.63	2.53	1.21	2.79	1.61	2.58
Travel time	Tt	hours	0.066	0.047	0.034	0.171	0.090	0.167	0.192	0.118
Manning's Equation										
1 Flow Length	L	feet	1,583	740	2,590	2,890	3,955	1,537	4,880	1,350
Slope	S	ft/ft	0.0061	0.0392	0.0232	0.0201	0.0047	0.0054	0.0137	0.0242
roughness	n	n/a	0.013	0.06	0.04	0.013	0.04	0.05	0.04	0.04
Open Channel										
Bottom Width	BW	feet	0	6	3	0	3	35	3	3
Side Slopes (H:1)	H	feet	0	5	5	0	5	10	5	5
Depth	d	feet	0	3	3	0	1.5	2.5	3	2
...or Closed Conduit										
Rise / Diameter	R / D	feet	3.00	0.00	0.00	2.75	0.00	0.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	7.07	63.00	54.00	5.94	15.75	150.00	54.00	26.00
Flow Rate	Q	cfs	52.05	445.02	420.38	75.12	36.23	480.94	322.50	161.59
Velocity	V	ft/sec	7.36	7.06	7.78	12.65	2.30	3.21	5.97	6.22
Travel time	Tt	hours	0.060	0.029	0.092	0.063	0.478	0.133	0.227	0.060
2 Flow Length	L	feet	894	1,100	4,528	555	1,995	-	643	466
Slope	S	ft/ft	0.0023	0.0209	0.0042	0.0039	0.0113	0.0000	0.0238	0.0165
roughness	n	n/a	0.013	0.06	0.06	0.05	0.013	0	0.05	0.04
Open Channel										
Bottom Width	BW	feet	0	6	35	25	0	0	35	5
Side Slopes (H:1)	H	feet	0	5	15	10	0	0	10	5
Depth	d	feet	0	4	4.5	4.25	0	0	2.5	2
...or Closed Conduit										
Rise / Diameter	R / D	feet	4.00	0.00	0.00	0.00	3.50	0.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	12.57	104.00	461.25	286.88	9.62	0.00	150.00	30.00
Flow Rate	Q	cfs	69.09	636.54	1438.77	1007.49	107.41	0.00	1005.45	160.64
Velocity	V	ft/sec	5.50	6.12	3.12	3.51	11.16	0.00	6.70	5.35
Travel time	Tt	hours	0.045	0.050	0.403	0.044	0.050	-	0.027	0.024
3 Flow Length	L	feet	3,169	1,007	-	-	2,889	-	-	235
Slope	S	ft/ft	0.0110	0.0157	0.0000	0.0000	0.0181	0.0000	0.0000	0.0190
roughness	n	n/a	0.013	0.06	0	0	0.013	0	0	0.05
Open Channel										
Bottom Width	BW	feet	0	6	0	0	0	0	0	35
Side Slopes (H:1)	H	feet	0	6	0	0	0	0	0	15
Depth	d	feet	0	4	0	0	0	0	0	2
...or Closed Conduit										
Rise / Diameter	R / D	feet	7.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	38.48	120.00	0.00	0.00	19.63	0.00	0.00	130.00
Flow Rate	Q	cfs	577.27	630.55	0.00	0.00	294.52	0.00	0.00	656.95
Velocity	V	ft/sec	15.00	5.25	0.00	0.00	15.00	0.00	0.00	5.05
Travel time	Tt	hours	0.059	0.053	-	-	0.053	-	-	0.013
Total Travel Time										
	TC	hours	0.241	0.294	0.552	0.361	0.758	0.558	0.621	0.418
	TC	min.	14.4	17.6	33.1	21.7	45.5	33.5	37.2	25.1
Lag Time										
	TL	hours	0.1444	0.1763	0.3311	0.2166	0.4548	0.3348	0.3723	0.2509
	TL	min.	8.7	10.6	19.9	13.0	27.3	20.1	22.3	15.1

EXISTING CONDITIONS

TR-55 Method of Computing the Time of Concentration

			CWC_14	CWC_15	CWC_16	CWC_17	CWC_18	CWC_19	CWC_20	DB_01
Sheet Flow										
Manning's roughness coef.	n	n/a	0.240	0.013	0.240	0.240	0.240	0.240	0.240	0.240
Flow Length	L	feet	20	20	20	20	50	50	20	60
2-year, 24-hour rainfall	P2	inches	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Slope	s	ft/ft	0.0181	0.0050	0.0210	0.0150	0.0100	0.0231	0.0038	0.0035
Travel time	Tt	hours	0.066	0.011	0.062	0.071	0.175	0.125	0.123	0.308
Shallow Concentrated Flow										
Flow Length	L	feet	1,061	1,168	1,098	1,480	1,430	161	780	1,427
Slope	s	ft/ft	0.039	0.028	0.018	0.015	0.005	0.023	0.011	0.028
Surface (1=paved or 2=unpaved)		n/a	1	2	2	2	1	1	1	2
Velocity	V	ft/sec	4.07	2.71	2.15	2.01	1.46	3.13	2.21	2.72
Travel time	Tt	hours	0.072	0.120	0.142	0.205	0.273	0.014	0.098	0.146
Manning's Equation										
1 Flow Length	L	feet	1,160	1,066	2,070	2,184	3,300	2,500	2,138	1,695
Slope	S	ft/ft	0.0179	0.0184	0.0206	0.0096	0.0102	0.0120	0.0190	0.0106
roughness	n	n/a	0.06	0.05	0.04	0.05	0.04	0.04	0.04	0.05
Open Channel										
Bottom Width	BW	feet	30	30	2	10	10	2	2	30
Side Slopes (H:1)	H	feet	10	10	3	15	15	5	3	15
Depth	d	feet	1.5	1.5	1.5	3.75	3	3	1.5	2
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	67.50	67.50	9.75	248.44	165.00	51.00	9.75	120.00
Flow Rate	Q	cfs	242.17	294.80	46.69	1161.27	865.41	280.29	44.93	444.98
Velocity	V	ft/sec	3.59	4.37	4.79	4.67	5.24	5.50	4.61	3.71
Travel time	Tt	hours	0.090	0.068	0.120	0.130	0.175	0.126	0.129	0.127
2 Flow Length	L	feet	-	-	607	-	1,869	761	926	-
Slope	S	ft/ft	0.0000	0.0000	0.0060	0.0000	0.0108	0.0121	0.0130	0.0000
roughness	n	n/a	0	0	0.05	0	0.05	0.013	0.05	0
Open Channel										
Bottom Width	BW	feet	0	0	30	0	25	0	15	0
Side Slopes (H:1)	H	feet	0	0	5	0	10	0	15	0
Depth	d	feet	0	0	2.75	0	3.5	0	2.5	0
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	0.00	0.00	120.31	0.00	210.00	7.07	131.25	0.00
Flow Rate	Q	cfs	0.00	0.00	450.85	0.00	1102.32	73.62	572.10	0.00
Velocity	V	ft/sec	0.00	0.00	3.75	0.00	5.25	10.42	4.36	0.00
Travel time	Tt	hours	-	-	0.045	-	0.099	0.020	0.059	-
3 Flow Length	L	feet	-	-	-	-	-	-	-	-
Slope	S	ft/ft	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
roughness	n	n/a	0	0	0	0	0	0	0	0
Open Channel										
Bottom Width	BW	feet	0	0	0	0	0	0	0	0
Side Slopes (H:1)	H	feet	0	0	0	0	0	0	0	0
Depth	d	feet	0	0	0	0	0	0	0	0
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flow Rate	Q	cfs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Velocity	V	ft/sec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Travel time	Tt	hours	-	-	-	-	-	-	-	-
Total Travel Time										
TC	hours		0.228	0.198	0.369	0.406	0.721	0.286	0.409	0.580
TC	min.		13.7	11.9	22.2	24.4	43.3	17.2	24.6	34.8
Lag Time										
TL	hours		0.1371	0.1189	0.2216	0.2436	0.4327	0.1716	0.2457	0.3480
TL	min.		8.2	7.1	13.3	14.6	26.0	10.3	14.7	20.9

EXISTING CONDITIONS

TR-55 Method of Computing the Time of Concentration

			DB_02	DB_03	EB_01	GB_01	HB_01	IHB_01	IHB_02	JB_01
Sheet Flow										
variable	units									
Manning's roughness coef.	n	n/a	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240
Flow Length	L	feet	50	50	60	50	60	50	60	50
2-year, 24-hour rainfall	P2	inches	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Slope	s	ft/ft	0.0112	0.0060	0.0040	0.0068	0.0013	0.0211	0.0017	0.0080
Travel time	Tt	hours	0.167	0.215	0.292	0.204	0.453	0.130	0.412	0.191
		min.	10.0	12.9	17.5	12.3	27.2	7.8	24.7	11.5
Shallow Concentrated Flow										
Flow Length	L	feet	691	400	1,440	1,861	110	1,050	303	450
Slope	s	ft/ft	0.009	0.015	0.004	0.006	0.001	0.032	0.009	0.003
Surface (1=paved or 2=unpaved)		n/a	1	1	2	2	1	2	2	2
Velocity	V	ft/sec	1.92	2.51	1.04	1.24	0.65	2.92	1.56	0.89
Travel time	Tt	hours	0.100	0.044	0.386	0.418	0.047	0.100	0.054	0.141
		min.	6.0	2.7	23.1	25.1	2.8	6.0	3.2	8.5
Manning's Equation										
1 Flow Length	L	feet	2,068	1,882	3,402	851	3,436	682	1,507	732
Slope	S	ft/ft	0.0118	0.0165	0.0041	0.0277	0.0084	0.0079	0.0062	0.0075
roughness	n	n/a	0.013	0.013	0.013	0.04	0.013	0.04	0.013	0.05
Open Channel										
Bottom Width	BW	feet	0	0	0	130	0	20	0	30
Side Slopes (H:1)	H	feet	0	0	0	50	0	10	0	20
Depth	d	feet	0	0	0	1.5	0	5	0	1.5
...or Closed Conduit										
Rise / Diameter	R / D	feet	3.00	3.00	5.50	0.00	4.50	0.00	2.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	7.07	7.07	23.76	307.50	15.90	350.00	3.14	90.00
Flow Rate	Q	cfs	72.65	86.02	214.69	2029.92	180.33	2360.04	17.93	231.96
Velocity	V	ft/sec	10.28	12.17	9.04	6.60	11.34	6.74	5.71	2.58
Travel time	Tt	hours	0.056	0.043	0.105	0.036	0.084	0.028	0.073	0.079
2 Flow Length	L	feet	1,587	2,059	1,174	441	4,600	-	1,334	-
Slope	S	ft/ft	0.0130	0.0117	0.0102	0.0127	0.0109	0.0000	0.0084	0.0000
roughness	n	n/a	0.013	0.013	0.013	0.013	0.05	0.05	0.013	0
Open Channel										
Bottom Width	BW	feet	0	0	0	0	35	0	0	0
Side Slopes (H:1)	H	feet	0	0	0	0	10	0	0	0
Depth	d	feet	0	0	0	0	3	0	0	0
...or Closed Conduit										
Rise / Diameter	R / D	feet	5.00	5.00	6.50	2.00	0.00	0.00	4.50	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	19.63	19.63	33.18	3.14	195.00	0.00	15.90	0.00
Flow Rate	Q	cfs	294.52	281.91	497.75	25.58	979.21	0.00	180.20	0.00
Velocity	V	ft/sec	15.00	14.36	15.00	8.14	5.02	0.00	11.33	0.00
Travel time	Tt	hours	0.029	0.040	0.022	0.015	0.254	-	0.033	-
3 Flow Length	L	feet	483	349	-	546	-	-	1,404	-
Slope	S	ft/ft	0.0147	0.0156	0.0000	0.0054	0.0000	0.0000	0.0103	0.0000
roughness	n	n/a	0.04	0.05	0	0.05	0	0	0.013	0
Open Channel										
Bottom Width	BW	feet	20	20	0	35	0	0	0	0
Side Slopes (H:1)	H	feet	15	20	0	20	0	0	0	0
Depth	d	feet	2.5	3	0	2	0	0	0	0
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	0.00	0.00	0.00	0.00	0.00	5.50	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	143.75	240.00	0.00	150.00	0.00	0.00	23.76	0.00
Flow Rate	Q	cfs	856.12	1280.21	0.00	393.10	0.00	0.00	342.01	0.00
Velocity	V	ft/sec	5.96	5.33	0.00	2.62	0.00	0.00	14.40	0.00
Travel time	Tt	hours	0.023	0.018	-	0.058	-	-	0.027	-
Total Travel Time										
TC	hours		0.375	0.360	0.804	0.731	0.839	0.258	0.599	0.411
TC	min.		22.5	21.6	48.2	43.9	50.3	15.5	35.9	24.7
Lag Time										
TL	hours		0.2250	0.2159	0.4823	0.4387	0.5033	0.1547	0.3592	0.2466
TL	min.		13.5	13.0	28.9	26.3	30.2	9.3	21.6	14.8

EXISTING CONDITIONS

TR-55 Method of Computing the Time of Concentration

			JB_02	PC_01	PC_02	PC_03	PC_04	PC_05	RB_01	SCW_01
Sheet Flow										
	variable	units								
Manning's roughness coef.	n	n/a	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240
Flow Length	L	feet	50	100	50	50	50	50	20	20
2-year, 24-hour rainfall	P2	inches	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Slope	s	ft/ft	0.0017	0.0007	0.0004	0.0029	0.0020	0.0026	0.0214	0.0091
Travel time	Tt	hours	0.354	0.882	0.612	0.286	0.333	0.300	0.062	0.087
		min.	21.2	52.9	36.7	17.1	20.0	18.0	3.7	5.2
Shallow Concentrated Flow										
Flow Length	L	feet	1,363	257	1,210	396	376	822	300	1,222
Slope	s	ft/ft	0.009	0.008	0.001	0.009	0.002	0.014	0.016	0.050
Surface (1=paved or 2=unpaved)		n/a	1	2	1	1	2	1	2	1
Velocity	V	ft/sec	1.94	1.46	0.61	1.93	0.72	2.44	2.02	4.58
Travel time	Tt	hours	0.195	0.049	0.552	0.057	0.144	0.094	0.041	0.074
		min.	11.7	2.9	33.1	3.4	8.6	5.6	2.5	4.4
Manning's Equation										
1 Flow Length	L	feet	2,613	1,300	1,367	550	2,357	3,769	4,466	873
Slope	S	ft/ft	0.0034	0.0278	0.0149	0.0522	0.0102	0.0021	0.0136	0.0054
roughness	n	n/a	0.04	0.013	0.013	0.05	0.013	0.013	0.04	0.05
Open Channel										
Bottom Width	BW	feet	3	0	0	10	0	0	5	20
Side Slopes (H:1)	H	feet	5	0	0	10	0	0	8	25
Depth	d	feet	1.5	0	0	1.5	0	0	3.5	1.5
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	3.50	2.25	0.00	3.00	3.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	15.75	9.62	3.98	37.50	7.07	7.07	115.50	86.25
Flow Rate	Q	cfs	30.92	144.32	37.91	244.00	67.44	30.45	763.98	176.47
Velocity	V	ft/sec	1.96	15.00	9.53	6.51	9.54	4.31	6.61	2.05
Travel time	Tt	hours	0.370	0.024	0.040	0.023	0.069	0.243	0.188	0.119
2 Flow Length	L	feet	2,312	420	2,468	531	717	2,087	-	-
Slope	S	ft/ft	0.0074	0.0142	0.0097	0.0125	0.0076	0.0032	0.0000	0.0000
roughness	n	n/a	0.013	0.04	0.05	0.05	0.05	0.013	0	0
Open Channel										
Bottom Width	BW	feet	0	10	20	15	10	0	0	0
Side Slopes (H:1)	H	feet	0	12	25	7	7	0	0	0
Depth	d	feet	0	2	2.5	2	3.5	0	0	0
...or Closed Conduit										
Rise / Diameter	R / D	feet	4.50	0.00	0.00	0.00	0.00	8.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	5	0	0
Cross-Sectional Area	X-A	feet^2	15.90	68.00	206.25	58.00	120.75	40.00	0.00	0.00
Flow Rate	Q	cfs	169.80	335.26	766.59	235.32	504.33	344.19	0.00	0.00
Velocity	V	ft/sec	10.68	4.93	3.72	4.06	4.18	8.60	0.00	0.00
Travel time	Tt	hours	0.060	0.024	0.184	0.036	0.048	0.067	-	-
3 Flow Length	L	feet	1,443	1,084	-	-	648	2,035	-	-
Slope	S	ft/ft	0.0130	0.0021	0.0000	0.0000	0.0060	0.0118	0.0000	0.0000
roughness	n	n/a	0.013	0.05	0	0	0.06	0.013	0	0
Open Channel										
Bottom Width	BW	feet	3	20	0	0	6	0	0	0
Side Slopes (H:1)	H	feet	5	30	0	0	6	0	0	0
Depth	d	feet	3	2	0	0	4	0	0	0
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	0.00	0.00	0.00	0.00	8.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	54.00	160.00	0.00	0.00	120.00	50.27	0.00	0.00
Flow Rate	Q	cfs	810.00	240.84	0.00	0.00	391.41	753.98	0.00	0.00
Velocity	V	ft/sec	15.00	1.51	0.00	0.00	3.26	15.00	0.00	0.00
Travel time	Tt	hours	0.027	0.200	-	-	0.055	0.038	-	-
Total Travel Time										
	TC	hours	1.005	1.179	1.389	0.402	0.649	0.741	0.291	0.280
	TC	min.	60.3	70.7	83.3	24.1	38.9	44.5	17.4	16.8
Lag Time										
	TL	hours	0.6032	0.7074	0.8333	0.2415	0.3891	0.4447	0.1744	0.1680
	TL	min.	36.2	42.4	50.0	14.5	23.3	26.7	10.5	10.1

EXISTING CONDITIONS

TR-55 Method of Computing the Time of Concentration

			SCW_02	SCW_03	SCW_04	SCW_05	SCW_06	SCW_07	SCW_08	SCW_09
Sheet Flow										
	variable	units								
Manning's roughness coef.	n	n/a	0.240	0.240	0.011	0.240	0.240	0.240	0.240	0.240
Flow Length	L	feet	60	50	20	60	20	300	60	60
2-year, 24-hour rainfall	P2	inches	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Slope	s	ft/ft	0.0045	0.0164	0.0117	0.0398	0.0070	0.0316	0.0050	0.0027
Travel time	Tt	hours	0.278	0.144	0.007	0.116	0.097	0.463	0.267	0.342
Shallow Concentrated Flow										
		min.	16.7	8.6	0.4	7.0	5.8	27.8	16.0	20.5
Flow Length	L	feet	874	990	650	650	1,344	100	590	460
Slope	s	ft/ft	0.035	0.036	0.012	0.035	0.007	0.034	0.005	0.007
Surface (1=paved or 2=unpaved)		n/a	2	1	1	2	2	2	2	1
Velocity	V	ft/sec	3.03	3.89	2.28	3.03	1.32	2.98	1.19	1.70
Travel time	Tt	hours	0.080	0.071	0.079	0.060	0.282	0.009	0.138	0.075
Manning's Equation										
		min.	4.8	4.2	4.8	3.6	16.9	0.6	8.3	4.5
1 Flow Length	L	feet	1,410	710	3,160	696	2,325	750	1,084	1,650
Slope	S	ft/ft	0.0083	0.0183	0.0145	0.0042	0.0167	0.0093	0.0301	0.0227
roughness	n	n/a	0.05	0.013	0.04	0.05	0.04	0.05	0.013	0.04
Open Channel										
Bottom Width	BW	feet	15	0	2	20	3	15	0	3
Side Slopes (H:1)	H	feet	5	0	3	15	5	20	0	5
Depth	d	feet	2.75	0	1.5	1.5	2	2	0	2
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	3.00	0.00	0.00	0.00	0.00	2.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	79.06	7.07	9.75	63.75	26.00	110.00	3.14	26.00
Flow Rate	Q	cfs	321.14	90.48	39.16	121.71	134.39	348.39	39.36	156.56
Velocity	V	ft/sec	4.06	12.80	4.02	1.91	5.17	3.17	12.53	6.02
Travel time	Tt	hours	0.096	0.015	0.219	0.101	0.125	0.066	0.024	0.076
2 Flow Length	L	feet	-	255	2,632	-	5,925	1,386	1,791	2,462
Slope	S	ft/ft	0.0000	0.0080	0.0061	0.0000	0.0038	0.0059	0.0045	0.0032
roughness	n	n/a	0	0.05	0.05	0	0.05	0.05	0.05	0.06
Open Channel										
Bottom Width	BW	feet	0	15	25	0	20	30	20	30
Side Slopes (H:1)	H	feet	0	5	11	0	15	15	15	30
Depth	d	feet	0	2.5	3	0	4	2	4	3
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	0.00	68.75	174.00	0.00	320.00	120.00	320.00	360.00
Flow Rate	Q	cfs	0.00	260.79	623.16	0.00	1023.42	332.91	1106.56	723.07
Velocity	V	ft/sec	0.00	3.79	3.58	0.00	3.20	2.77	3.46	2.01
Travel time	Tt	hours	-	0.019	0.204	-	0.515	0.139	0.144	0.340
3 Flow Length	L	feet	-	-	-	-	-	-	-	-
Slope	S	ft/ft	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
roughness	n	n/a	0	0	0	0	0	0	0	0
Open Channel										
Bottom Width	BW	feet	0	0	0	0	0	0	0	0
Side Slopes (H:1)	H	feet	0	0	0	0	0	0	0	0
Depth	d	feet	0	0	0	0	0	0	0	0
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flow Rate	Q	cfs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Velocity	V	ft/sec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Travel time	Tt	hours	-	-	-	-	-	-	-	-
Total Travel Time										
	TC	hours	0.454	0.248	0.509	0.277	1.019	0.677	0.573	0.833
	TC	min.	27.2	14.9	30.5	16.6	61.1	40.6	34.4	50.0
Lag Time										
	TL	hours	0.2725	0.1490	0.3051	0.1664	0.6112	0.4060	0.3439	0.5000
	TL	min.	16.3	8.9	18.3	10.0	36.7	24.4	20.6	30.0

EXISTING CONDITIONS

TR-55 Method of Computing the Time of Concentration

			SCW_10	SCW_11	SCW_12	SCW_13	SCW_14	SCW_15	UNA_01	UNA_02
Sheet Flow										
variable	units									
Manning's roughness coef.	n	n/a	0.240	0.011	0.240	0.240	0.240	0.240	0.240	0.240
Flow Length	L	feet	20	20	50	50	50	20	20	20
2-year, 24-hour rainfall	P2	inches	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Slope	s	ft/ft	0.0060	0.0010	0.0043	0.0100	0.0040	0.0045	0.0090	0.0100
Travel time	Tt	hours	0.103	0.018	0.244	0.175	0.251	0.115	0.088	0.084
Shallow Concentrated Flow										
Flow Length	L	feet	564	911	982	700	1,378	136	1,853	480
Slope	s	ft/ft	0.018	0.008	0.013	0.015	0.010	0.014	0.009	0.006
Surface (1=paved or 2=unpaved)		n/a	1	1	1	2	1	2	1	1
Velocity	V	ft/sec	2.76	1.90	2.35	1.97	2.03	1.89	1.98	1.56
Travel time	Tt	hours	0.057	0.133	0.116	0.099	0.188	0.020	0.260	0.085
Manning's Equation										
		min.	3.4	8.0	7.0	5.9	11.3	1.2	15.6	5.1
1 Flow Length	L	feet	1,020	1,440	2,853	2,794	1,373	2,412	2,450	1,775
Slope	S	ft/ft	0.0111	0.0247	0.0100	0.0090	0.0077	0.0030	0.0151	0.0114
roughness	n	n/a	0.013	0.013	0.04	0.013	0.013	0.013	0.013	0.04
Open Channel										
Bottom Width	BW	feet	0	0	3	0	0	0	0	3
Side Slopes (H:1)	H	feet	0	0	5	0	0	0	0	5
Depth	d	feet	0	0	1.5	0	0	0	0	1.5
...or Closed Conduit										
Rise / Diameter	R / D	feet	3.00	4.50	0.00	2.50	3.50	3.00	3.50	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	7.07	15.90	15.75	4.91	9.62	7.07	9.62	15.75
Flow Rate	Q	cfs	70.35	238.56	53.18	39.02	88.46	36.76	123.82	56.76
Velocity	V	ft/sec	9.95	15.00	3.38	7.95	9.19	5.20	12.87	3.60
Travel time	Tt	hours	0.028	0.027	0.235	0.098	0.041	0.129	0.053	0.137
2 Flow Length	L	feet	522	1,407	2,695	654	-	1,466	2,730	613
Slope	S	ft/ft	0.0295	0.0077	0.0067	0.0058	0.0000	0.0081	0.0093	0.0176
roughness	n	n/a	0.04	0.04	0.05	0.013	0	0.013	0.05	0.013
Open Channel										
Bottom Width	BW	feet	2	10	15	0	0	0	10	0
Side Slopes (H:1)	H	feet	3	5	8	0	0	0	5	0
Depth	d	feet	1.5	3	3	0	0	0	5	0
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	0.00	0.00	3.50	0.00	6.50	0.00	4.00
Span (0 if circular)	S	feet	0	0	0	0	0	4	0	0
Cross-Sectional Area	X-A	feet^2	9.75	75.00	117.00	9.62	0.00	26.00	175.00	12.57
Flow Rate	Q	cfs	55.94	369.10	430.02	76.72	0.00	308.84	1013.94	188.50
Velocity	V	ft/sec	5.74	4.92	3.68	7.97	0.00	11.88	5.79	15.00
Travel time	Tt	hours	0.025	0.079	0.204	0.023	-	0.034	0.131	0.011
3 Flow Length	L	feet	366	2,463	3,059	-	-	1,008	-	1,752
Slope	S	ft/ft	0.0070	0.0055	0.0062	0.0000	0.0000	0.0045	0.0000	0.0201
roughness	n	n/a	0.05	0.05	0.05	0	0	0.013	0	0.05
Open Channel										
Bottom Width	BW	feet	20	15	20	0	0	5	0	15
Side Slopes (H:1)	H	feet	10	15	10	0	0	5	0	10
Depth	d	feet	2.75	4.5	4.75	0	0	3.5	0	3.5
...or Closed Conduit										
Rise / Diameter	R / D	feet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Span (0 if circular)	S	feet	0	0	0	0	0	0	0	0
Cross-Sectional Area	X-A	feet^2	130.63	371.25	320.63	0.00	0.00	78.75	0.00	175.00
Flow Rate	Q	cfs	469.70	1494.89	1487.71	0.00	0.00	940.06	0.00	1194.37
Velocity	V	ft/sec	3.60	4.03	4.64	0.00	0.00	11.94	0.00	6.82
Travel time	Tt	hours	0.028	0.170	0.183	-	-	0.023	-	0.071
Total Travel Time										
TC	hours		0.242	0.427	0.982	0.394	0.481	0.322	0.531	0.389
TC	min.		14.5	25.6	58.9	23.6	28.8	19.3	31.9	23.3
Lag Time										
TL	hours		0.1451	0.2564	0.5890	0.2362	0.2884	0.1932	0.3189	0.2334
TL	min.		8.7	15.4	35.3	14.2	17.3	11.6	19.1	14.0

	A	B	C	D	E	F	G	H	I	J	K
1	EXISTING CONDITIONS										
2	TR-55 Method of Computing the Time of Concentration										
3					FC_01	FC_02	FC_03	FC_04	FC_05	FC_06	FC_07
4	Sheet Flow	variable	units								
5	Manning's roughness coef.	n	n/a		0.240	0.011	0.240	0.013	0.013	0.240	0.240
6	Flow Length	L	feet		60.00	20.00	50.00	20.00	20.00	50.00	50.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.010	0.023	0.018	0.005	0.005	0.010	0.010
9	Travel time	Tt	hours		0.202	0.005	0.139	0.011	0.011	0.175	0.175
10	Shallow Concentrated Flow		min.		12.1	0.3	8.4	0.6	0.6	10.5	10.5
11	Flow Length	L	feet		300.00	100.00	810.00	260.00	250.00	455.00	140.00
12	Slope	s	ft/ft		0.003	0.021	0.024	0.001	0.003	0.019	0.004
13	Surface (1=paved or 2=unpaved)		n/a		2.000	1.000	1.000	1.000	1.000	1.000	1.000
14	Velocity	V	ft/sec		0.887	3.010	3.198	0.651	1.128	2.840	1.303
15	Travel time	Tt	hours		0.094	0.009	0.070	0.111	0.062	0.045	0.030
16	Manning's Equation		min.		5.6	0.6	4.2	6.7	3.7	2.7	1.8
17	## Flow Length	L	feet		4333.00	1705.00	400.00	1050.00	950.00	890.00	1400.00
18	Slope	S	ft/ft		0.001	0.011	0.028	0.025	0.025	0.023	0.004
19	roughness	n	n/a		0.060	0.013	0.013	0.013	0.040	0.013	0.013
20	Open Channel										
21	Bottom Width	BW	feet		50	0	0	0	45	0	0
22	Side Slopes (H:1)	H	feet		20	0	0	0	10	0	0
23	Depth	d	feet		2.50	0.00	0.00	0.00	1.25	0.00	0.00
24	...or Closed Conduit										
25	Rise / Diameter	R / D	feet		0.00	2.00	1.50	2.13	0.00	3.00	3.00
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	Cross-Sectional Area	X-A	feet^2		250.00	3.14	1.77	3.55	71.88	7.07	7.07
28	Flow Rate	Q	cfs		265.04	23.82	17.54	41.98	432.01	101.42	39.97
29	Velocity	V	ft/sec		1.1	7.6	9.9	11.8	6.0	14.3	5.7
30	Travel time	Tt	hours		1.135	0.062	0.011	0.025	0.044	0.017	0.069
31	2 Flow Length	L	feet		0.00	1400.00	4890.00	850.00	897.69	1625.00	600.00
32	Slope	S	ft/ft		0.000	0.008	0.003	0.027	0.006	0.007	0.003
33	roughness	n	n/a		0.000	0.050	0.060	0.013	0.050	0.050	0.013
34	Open Channel										
35	Bottom Width	BW	feet		0	20	50	0	50	70	0
36	Side Slopes (H:1)	H	feet		0	10	20	0	20	30	0
37	Depth	d	feet		0.00	2.00	2.50	0.00	2.00	1.25	0.00
38	...or Closed Conduit										
39	Rise / Diameter	R / D	feet		0.00	0.00	0.00	5.00	0.00	0.00	3.50
40	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
41	Cross-Sectional Area	X-A	feet^2		0.00	80.00	250.00	19.63	180.00	134.38	9.62
42	Flow Rate	Q	cfs		0.00	263.43	486.41	294.52	508.70	318.40	51.11
43	Velocity	V	ft/sec		0.0	3.3	1.9	15.0	2.8	2.4	5.3
44	Travel time	Tt	hours		0.000	0.118	0.698	0.016	0.088	0.191	0.031
45	3 Flow Length	L	feet		0.00	796.69	0.00	519.52	0.00	0.00	2604.40
46	Slope	S	ft/ft		0.000	0.003	0.000	0.004	0.000	0.000	0.019
47	roughness	n	n/a		0.000	0.060	0.000	0.050	0.000	0.000	0.013
48	Open Channel										
49	Bottom Width	BW	feet		0	50	0	50	0	0	0
50	Side Slopes (H:1)	H	feet		0	20	0	20	0	0	0
51	Depth	d	feet		0.00	2.75	0.00	2.00	0.00	0.00	0.00
52	...or Closed Conduit										
53	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	0.00	4.50
54	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		0.00	288.75	0.00	180.00	0.00	0.00	15.90
56	Flow Rate	Q	cfs		0.00	558.10	0.00	431.22	0.00	0.00	238.56
57	Velocity	V	ft/sec		0.0	1.9	0.0	2.4	0.0	0.0	15.0
58	Travel time	Tt	hours		0.000	0.114	0.000	0.060	0.000	0.000	0.048
59	Total Travel Time	TC	hours		1.43	0.31	0.92	0.22	0.20	0.43	0.35
60		TC	min.		85.89	18.57	55.14	13.33	12.27	25.63	21.19
61	Lag Time	TL	hours		0.9	0.2	0.6	0.1	0.1	0.3	0.2
62		TL	min.		51.5	11.1	33.1	8.0	7.4	15.4	12.7

	A	B	C	D	L	M	N	O	P	Q	R
1	EXISTING CONDITIONS										
2	TR-55 Method of Computing the Time of Concentration										
3					FC_08	FC_08A	FC_09	FC_10	FC_11	FC_12	FC_13
4	Sheet Flow	variable	units								
5	Manning's roughness coef.	n	n/a		0.240	0.240	0.240	0.240	0.240	0.240	0.240
6	Flow Length	L	feet		50.00	50.00	50.00	20.00	50.00	50.00	50.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.010	0.010	0.010	0.010	0.010	0.010	0.010
9	Travel time	Tt	hours		0.175	0.175	0.175	0.083	0.175	0.175	0.175
10	Shallow Concentrated Flow		min.		10.5	10.5	10.5	5.0	10.5	10.5	10.5
11	Flow Length	L	feet		310.00	350.00	350.00	850.00	420.00	1150.00	630.00
12	Slope	s	ft/ft		0.008	0.008	0.011	0.060	0.016	0.009	0.010
13	Surface (1=paved or 2=unpaved)		n/a		1.000	1.000	1.000	1.000	1.000	1.000	1.000
14	Velocity	V	ft/sec		1.843	1.843	2.157	5.060	2.631	2.005	2.009
15	Travel time	Tt	hours		0.047	0.053	0.045	0.047	0.044	0.159	0.087
16	Manning's Equation		min.		2.8	3.2	2.7	2.8	2.7	9.6	5.2
17	## Flow Length	L	feet		1539.00	2820.00	2450.00	2100.00	650.00	730.00	950.00
18	Slope	S	ft/ft		0.020	0.007	0.011	0.003	0.051	0.005	0.043
19	roughness	n	n/a		0.013	0.013	0.040	0.050	0.013	0.013	0.013
20	Open Channel										
21	Bottom Width	BW	feet		0	0	3	35	0	0	0
22	Side Slopes (H:1)	H	feet		0	0	5	7	0	0	0
23	Depth	d	feet		0.00	0.00	3.00	3.00	0.00	0.00	0.00
24	...or Closed Conduit										
25	Rise / Diameter	R / D	feet		3.00	3.00	0.00	0.00	2.75	2.00	2.75
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	Cross-Sectional Area	X-A	feet^2		7.07	7.07	54.00	168.00	5.94	3.14	5.94
28	Flow Rate	Q	cfs		94.52	55.03	294.00	427.10	119.38	16.16	89.09
29	Velocity	V	ft/sec		13.4	7.8	5.4	2.5	20.1	5.1	15.0
30	Travel time	Tt	hours		0.032	0.101	0.125	0.229	0.009	0.039	0.018
31	2 Flow Length	L	feet		1007.00	1930.00	1500.00	1843.00	600.00	1950.00	2578.00
32	Slope	S	ft/ft		0.027	0.022	0.025	0.002	0.044	0.007	0.003
33	roughness	n	n/a		0.013	0.013	0.040	0.060	0.040	0.013	0.050
34	Open Channel										
35	Bottom Width	BW	feet		0	0	110	35	15	0	30
36	Side Slopes (H:1)	H	feet		0	0	15	7	12	0	20
37	Depth	d	feet		0.00	0.00	1.50	5.00	2.00	0.00	2.50
38	...or Closed Conduit										
39	Rise / Diameter	R / D	feet		6.00	5.50	0.00	0.00	0.00	4.50	0.00
40	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
41	Cross-Sectional Area	X-A	feet^2		28.27	23.76	198.75	350.00	78.00	15.90	200.00
42	Flow Rate	Q	cfs		424.12	356.37	1393.22	915.00	701.73	159.86	427.69
43	Velocity	V	ft/sec		15.0	15.0	7.0	2.6	9.0	10.1	2.1
44	Travel time	Tt	hours		0.019	0.036	0.059	0.196	0.019	0.054	0.335
45	3 Flow Length	L	feet		714.91	750.00	1704.23	0.00	4628.54	1238.45	0.00
46	Slope	S	ft/ft		0.006	0.002	0.002	0.000	0.001	0.031	0.000
47	roughness	n	n/a		0.050	0.050	0.050	0.000	0.060	0.013	0.000
48	Open Channel										
49	Bottom Width	BW	feet		20	20	30	0	40	0	0
50	Side Slopes (H:1)	H	feet		8	8	5	0	10	0	0
51	Depth	d	feet		3.00	3.00	5.25	0.00	5.75	0.00	0.00
52	...or Closed Conduit										
53	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	6.00	0.00
54	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		132.00	132.00	295.31	0.00	560.63	28.27	0.00
56	Flow Rate	Q	cfs		485.75	258.31	815.18	0.00	1224.96	424.12	0.00
57	Velocity	V	ft/sec		3.7	2.0	2.8	0.0	2.2	15.0	0.0
58	Travel time	Tt	hours		0.054	0.106	0.171	0.000	0.588	0.023	0.000
59	Total Travel Time	TC	hours		0.33	0.47	0.58	0.55	0.84	0.45	0.61
60		TC	min.		19.57	28.23	34.55	33.28	50.11	27.03	36.87
61	Lag Time	TL	hours		0.2	0.3	0.3	0.3	0.5	0.3	0.4
62		TL	min.		11.7	16.9	20.7	20.0	30.1	16.2	22.1

	A	B	C	D	S	T	U	V	W	X	Y
1	EXISTING CONDITIONS										
2	TR-55 Method of Computing the Time of Concentration										
3					FC_14	FC_14A	FC_15	FC_16	FC_17	FC_18	FC_18A
4	Sheet Flow	variable	units								
5	Manning's roughness coef.	n	n/a		0.240	0.240	0.240	0.240	0.240	0.240	0.240
6	Flow Length	L	feet		50.00	50.00	20.00	60.00	50.00	50.00	60.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.010	0.011	0.028	0.031	0.010	0.012	0.010
9	Travel time	Tt	hours		0.175	0.168	0.056	0.129	0.175	0.163	0.202
10	Shallow Concentrated Flow		min.		10.5	10.1	3.3	7.7	10.5	9.8	12.1
11	Flow Length	L	feet		1166.00	630.00	1400.00	760.00	510.00	375.00	421.00
12	Slope	s	ft/ft		0.012	0.017	0.027	0.018	0.005	0.021	0.005
13	Surface (1=paved or 2=unpaved)		n/a		1.000	1.000	1.000	2.000	1.000	1.000	1.000
14	Velocity	V	ft/sec		2.289	2.655	2.000	2.158	1.435	2.952	1.400
15	Travel time	Tt	hours		0.141	0.066	0.194	0.098	0.099	0.035	0.084
16	Manning's Equation		min.		8.5	4.0	11.7	5.9	5.9	2.1	5.0
17	## Flow Length	L	feet		2305.00	1185.00	823.00	2300.00	890.00	2500.00	1006.00
18	Slope	S	ft/ft		0.011	0.025	0.001	0.010	0.021	0.010	0.020
19	roughness	n	n/a		0.013	0.013	0.050	0.013	0.013	0.013	0.040
20	Open Channel										
21	Bottom Width	BW	feet		0	0	30	0	0	0	2
22	Side Slopes (H:1)	H	feet		0	0	10	0	0	0	3
23	Depth	d	feet		0.00	0.00	2.25	0.00	0.00	0.00	1.50
24	...or Closed Conduit										
25	Rise / Diameter	R / D	feet		3.00	2.50	0.00	3.00	3.50	4.00	4.00
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	Cross-Sectional Area	X-A	feet^2		7.07	4.91	118.13	7.07	9.62	12.57	9.75
28	Flow Rate	Q	cfs		71.33	65.49	164.16	67.38	144.32	142.41	46.16
29	Velocity	V	ft/sec		10.1	13.3	1.4	9.5	15.0	11.3	4.7
30	Travel time	Tt	hours		0.063	0.025	0.165	0.067	0.016	0.061	0.059
31	2 Flow Length	L	feet		303.00	2329.00	0.00	1970.00	1470.00	3420.00	2055.25
32	Slope	S	ft/ft		0.042	0.007	0.000	0.005	0.020	0.006	0.013
33	roughness	n	n/a		0.050	0.050	0.000	0.050	0.050	0.060	0.013
34	Open Channel										
35	Bottom Width	BW	feet		15	35	0	40	55	110	0
36	Side Slopes (H:1)	H	feet		20	10	0	15	10	30	0
37	Depth	d	feet		2.00	4.00	0.00	3.00	2.00	3.00	0.00
38	...or Closed Conduit										
39	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	0.00	5.50
40	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
41	Cross-Sectional Area	X-A	feet^2		110.00	300.00	0.00	255.00	150.00	600.00	23.76
42	Flow Rate	Q	cfs		744.22	1382.65	0.00	812.20	855.16	1838.87	356.37
43	Velocity	V	ft/sec		6.8	4.6	0.0	3.2	5.7	3.1	15.0
44	Travel time	Tt	hours		0.012	0.140	0.000	0.172	0.072	0.310	0.038
45	3 Flow Length	L	feet		632.17	0.00	0.00	2403.96	2471.60	0.00	0.00
46	Slope	S	ft/ft		0.004	0.000	0.000	0.001	0.003	0.000	0.000
47	roughness	n	n/a		0.050	0.000	0.000	0.050	0.060	0.000	0.000
48	Open Channel										
49	Bottom Width	BW	feet		35	0	0	50	110	0	0
50	Side Slopes (H:1)	H	feet		10	0	0	10	25	0	0
51	Depth	d	feet		2.50	0.00	0.00	4.00	2.00	0.00	0.00
52	...or Closed Conduit										
53	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		150.00	0.00	0.00	360.00	320.00	0.00	0.00
56	Flow Rate	Q	cfs		422.39	0.00	0.00	728.79	537.04	0.00	0.00
57	Velocity	V	ft/sec		2.8	0.0	0.0	2.0	1.7	0.0	0.0
58	Travel time	Tt	hours		0.062	0.000	0.000	0.330	0.409	0.000	0.000
59	Total Travel Time	TC	hours		0.45	0.40	0.41	0.80	0.77	0.57	0.38
60		TC	min.		27.28	23.96	24.88	47.71	46.25	34.20	22.98
61	Lag Time	TL	hours		0.3	0.2	0.2	0.5	0.5	0.3	0.2
62		TL	min.		16.4	14.4	14.9	28.6	27.7	20.5	13.8

	A	B	C	D	Z	AA	AB	AC	AD	AE	AF
1	EXISTING CONDITIONS										
2	TR-55 Method of Computing the Time of Concentration										
3					FC_19	FC_20	FC_21	FC_22	FC_23	FC_24	BB_01
4	Sheet Flow	variable	units								
5	Manning's roughness coef.	n	n/a		0.240	0.240	0.240	0.240	0.240	0.240	0.240
6	Flow Length	L	feet		60.00	60.00	50.00	50.00	50.00	20.00	50.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.010	0.010	0.010	0.010	0.010	0.010	0.010
9	Travel time	Tt	hours		0.202	0.202	0.175	0.175	0.175	0.084	0.175
10	Shallow Concentrated Flow		min.		12.1	12.1	10.5	10.5	10.5	5.0	10.5
11	Flow Length	L	feet		1110.00	1775.00	1290.00	935.00	1339.00	540.00	1140.00
12	Slope	s	ft/ft		0.012	0.009	0.010	0.010	0.015	0.020	0.005
13	Surface (1=paved or 2=unpaved)		n/a		1.000	2.000	2.000	1.000	2.000	2.000	1.000
14	Velocity	V	ft/sec		2.257	1.537	1.620	2.060	1.984	2.291	1.445
15	Travel time	Tt	hours		0.137	0.321	0.221	0.126	0.187	0.065	0.219
16	Manning's Equation		min.		8.2	19.2	13.3	7.6	11.2	3.9	13.1
17	## Flow Length	L	feet		1482.00	6462.00	1865.00	2400.00	2100.00	1958.00	1091.00
18	Slope	S	ft/ft		0.008	0.008	0.008	0.011	0.014	0.006	0.001
19	roughness	n	n/a		0.040	0.060	0.013	0.013	0.013	0.013	0.013
20	Open Channel										
21	Bottom Width	BW	feet		3	100	0	0	0	0	0
22	Side Slopes (H:1)	H	feet		3	10	0	0	0	0	0
23	Depth	d	feet		1.50	3.00	0.00	0.00	0.00	0.00	0.00
24	...or Closed Conduit										
25	Rise / Diameter	R / D	feet		0.00	0.00	3.50	5.00	5.00	4.00	3.50
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	Cross-Sectional Area	X-A	feet^2		11.25	390.00	9.62	19.63	19.63	12.57	9.62
28	Flow Rate	Q	cfs		34.18	1541.12	90.23	271.81	294.52	112.76	28.64
29	Velocity	V	ft/sec		3.0	4.0	9.4	13.8	15.0	9.0	3.0
30	Travel time	Tt	hours		0.136	0.454	0.055	0.048	0.039	0.061	0.102
31	2 Flow Length	L	feet		4279.00	0.00	1172.00	5460.00	3275.00	4900.00	1809.00
32	Slope	S	ft/ft		0.007	0.000	0.007	0.008	0.006	0.011	0.013
33	roughness	n	n/a		0.060	0.000	0.013	0.013	0.050	0.013	0.013
34	Open Channel										
35	Bottom Width	BW	feet		35	0	0	10	10	10	10
36	Side Slopes (H:1)	H	feet		15	0	0	5	7	5	5
37	Depth	d	feet		3.50	0.00	0.00	4.00	5.00	6.00	2.00
38	...or Closed Conduit										
39	Rise / Diameter	R / D	feet		0.00	0.00	5.00	0.00	0.00	0.00	0.00
40	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
41	Cross-Sectional Area	X-A	feet^2		306.25	0.00	19.63	120.00	225.00	240.00	40.00
42	Flow Rate	Q	cfs		1035.57	0.00	218.49	1200.00	1028.78	2880.00	600.00
43	Velocity	V	ft/sec		3.4	0.0	11.1	10.0	4.6	12.0	15.0
44	Travel time	Tt	hours		0.352	0.000	0.029	0.152	0.199	0.113	0.034
45	3 Flow Length	L	feet		0.00	0.00	3705.00	0.00	0.00	0.00	727.94
46	Slope	S	ft/ft		0.000	0.000	0.007	0.000	0.000	0.000	0.020
47	roughness	n	n/a		0.000	0.000	0.050	0.000	0.000	0.000	0.060
48	Open Channel										
49	Bottom Width	BW	feet		0	0	10	0	0	0	25
50	Side Slopes (H:1)	H	feet		0	0	7	0	0	0	4
51	Depth	d	feet		0.00	0.00	6.25	0.00	0.00	0.00	2.50
52	...or Closed Conduit										
53	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		0.00	0.00	335.94	0.00	0.00	0.00	87.50
56	Flow Rate	Q	cfs		0.00	0.00	1830.17	0.00	0.00	0.00	474.58
57	Velocity	V	ft/sec		0.0	0.0	5.4	0.0	0.0	0.0	5.4
58	Travel time	Tt	hours		0.000	0.000	0.189	0.000	0.000	0.000	0.037
59	Total Travel Time	TC	hours		0.83	0.98	0.67	0.50	0.60	0.32	0.57
60		TC	min.		49.56	58.64	40.17	30.05	36.01	19.41	33.99
61	Lag Time	TL	hours		0.5	0.6	0.4	0.3	0.4	0.2	0.3
62		TL	min.		29.7	35.2	24.1	18.0	21.6	11.6	20.4

	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM
1	EXISTING CONDITIONS										
2	TR-55 Method of Computing the Time of Concentration										
3					BNB_01	DB_01	FB_01	GB_01	KB_01	KB_02	KB_03
4	Sheet Flow	variable	units								
5	Manning's roughness coef.	n	n/a		0.240	0.240	0.240	0.011	0.240	0.240	0.240
6	Flow Length	L	feet		50.00	50.00	50.00	20.00	60.00	20.00	20.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.010	0.010	0.010	0.005	0.010	0.013	0.010
9	Travel time	Tt	hours		0.175	0.175	0.175	0.009	0.202	0.077	0.084
10	Shallow Concentrated Flow		min.		10.5	10.5	10.5	0.6	12.1	4.6	5.0
11	Flow Length	L	feet		1610.00	860.00	340.00	160.00	560.00	1230.00	60.00
12	Slope	s	ft/ft		0.005	0.005	0.006	0.005	0.008	0.017	0.149
13	Surface (1=paved or 2=unpaved)		n/a		1.000	1.000	1.000	1.000	2.000	2.000	2.000
14	Velocity	V	ft/sec		1.506	1.500	1.596	1.440	1.481	2.113	2.000
15	Travel time	Tt	hours		0.297	0.159	0.059	0.031	0.105	0.162	0.008
16	Manning's Equation		min.		17.8	9.6	3.6	1.9	6.3	9.7	0.5
17	## Flow Length	L	feet		1580.00	1965.00	2500.00	2064.00	4100.00	1000.00	930.00
18	Slope	S	ft/ft		0.007	0.004	0.005	0.003	0.009	0.008	0.008
19	roughness	n	n/a		0.013	0.013	0.013	0.013	0.040	0.013	0.013
20	Open Channel										
21	Bottom Width	BW	feet		0	0	0	0	20	3	0
22	Side Slopes (H:1)	H	feet		0	0	0	0	15	5	0
23	Depth	d	feet		0.00	0.00	0.00	0.00	2.50	2.00	0.00
24	...or Closed Conduit										
25	Rise / Diameter	R / D	feet		4.50	4.25	4.50	3.50	0.00	0.00	2.50
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	Cross-Sectional Area	X-A	feet^2		15.90	14.19	15.90	9.62	143.75	26.00	4.91
28	Flow Rate	Q	cfs		169.58	102.67	136.63	53.21	684.95	291.71	36.95
29	Velocity	V	ft/sec		10.7	7.2	8.6	5.5	4.8	11.2	7.5
30	Travel time	Tt	hours		0.041	0.075	0.081	0.104	0.239	0.025	0.034
31	2 Flow Length	L	feet		2500.00	1500.00	800.00	1950.00	1416.00	6200.00	4450.00
32	Slope	S	ft/ft		0.010	0.008	0.016	0.006	0.012	0.008	0.005
33	roughness	n	n/a		0.040	0.013	0.013	0.013	0.050	0.050	0.013
34	Open Channel										
35	Bottom Width	BW	feet		25	0	10	0	30	25	0
36	Side Slopes (H:1)	H	feet		20	0	3	0	15	12	0
37	Depth	d	feet		3.00	0.00	2.00	0.00	2.25	4.00	0.00
38	...or Closed Conduit										
39	Rise / Diameter	R / D	feet		0.00	10.00	0.00	6.00	0.00	0.00	5.00
40	Span (0 if circular)	S	feet		0.000	0.000	0.000	4.000	0.000	0.000	0.000
41	Cross-Sectional Area	X-A	feet^2		255.00	78.54	32.00	24.00	143.44	292.00	19.63
42	Flow Rate	Q	cfs		1358.34	1178.10	480.00	249.64	610.69	1361.40	188.31
43	Velocity	V	ft/sec		5.3	15.0	15.0	10.4	4.3	4.7	9.6
44	Travel time	Tt	hours		0.130	0.028	0.015	0.052	0.092	0.369	0.129
45	3 Flow Length	L	feet		6558.37	3859.10	3020.87	7152.53	0.00	1747.87	0.00
46	Slope	S	ft/ft		0.007	0.011	0.011	0.007	0.000	0.005	0.000
47	roughness	n	n/a		0.050	0.050	0.050	0.050	0.000	0.013	0.000
48	Open Channel										
49	Bottom Width	BW	feet		45	65	50	55	0	10	0
50	Side Slopes (H:1)	H	feet		10	20	15	10	0	10	0
51	Depth	d	feet		4.00	2.00	2.50	4.50	0.00	3.00	0.00
52	...or Closed Conduit										
53	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		340.00	210.00	218.75	450.00	0.00	120.00	0.00
56	Flow Rate	Q	cfs		1609.88	823.77	982.12	2434.93	0.00	1421.30	0.00
57	Velocity	V	ft/sec		4.7	3.9	4.5	5.4	0.0	11.8	0.0
58	Travel time	Tt	hours		0.385	0.273	0.187	0.367	0.000	0.041	0.000
59	Total Travel Time	TC	hours		1.03	0.71	0.52	0.56	0.64	0.67	0.26
60		TC	min.		61.69	42.63	31.00	33.80	38.32	40.41	15.33
61	Lag Time	TL	hours		0.6	0.4	0.3	0.3	0.4	0.4	0.2
62		TL	min.		37.0	25.6	18.6	20.3	23.0	24.2	9.2

	A	B	C	D	AN	AO	AP	AQ	AR	AS	AT
1	EXISTING CONDITIONS										
2	TR-55 Method of Computing the Time of Concentration										
3					KB_04	KC_01	KC_01A	KC_02	KC_03	KC_04	KC_05
4	Sheet Flow	variable	units								
5	Manning's roughness coef.	n	n/a		0.240	0.240	0.240	0.240	0.240	0.240	0.240
6	Flow Length	L	feet		20.00	50.00	20.00	50.00	50.00	50.00	50.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.010	0.010	0.020	0.010	0.010	0.010	0.010
9	Travel time	Tt	hours		0.084	0.175	0.063	0.175	0.175	0.175	0.175
10	Shallow Concentrated Flow		min.		5.0	10.5	3.8	10.5	10.5	10.5	10.5
11	Flow Length	L	feet		660.00	1577.00	435.00	650.00	1920.00	1650.00	350.00
12	Slope	s	ft/ft		0.011	0.012	0.082	0.002	0.004	0.002	0.003
13	Surface (1=paved or 2=unpaved)		n/a		1.000	1.000	1.000	1.000	2.000	1.000	1.000
14	Velocity	V	ft/sec		2.166	2.247	2.000	1.003	1.025	0.988	1.124
15	Travel time	Tt	hours		0.085	0.195	0.060	0.180	0.521	0.464	0.087
16	Manning's Equation		min.		5.1	11.7	3.6	10.8	31.2	27.8	5.2
17	## Flow Length	L	feet		900.00	315.00	1429.80	1950.00	1400.00	675.00	660.00
18	Slope	S	ft/ft		0.013	0.082	0.001	0.001	0.002	0.014	0.012
19	roughness	n	n/a		0.013	0.013	0.050	0.013	0.013	0.013	0.013
20	Open Channel										
21	Bottom Width	BW	feet		0	0	35	0	0	0	0
22	Side Slopes (H:1)	H	feet		0	0	10	0	0	0	0
23	Depth	d	feet		0.00	0.00	1.50	0.00	0.00	0.00	0.00
24	...or Closed Conduit										
25	Rise / Diameter	R / D	feet		3.00	1.50	0.00	3.00	3.00	2.70	2.25
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	Cross-Sectional Area	X-A	feet^2		7.07	1.77	75.00	7.07	7.07	5.73	3.98
28	Flow Rate	Q	cfs		77.25	26.51	90.35	15.61	29.91	58.94	34.63
29	Velocity	V	ft/sec		10.9	15.0	1.2	2.2	4.2	10.3	8.7
30	Travel time	Tt	hours		0.023	0.006	0.330	0.245	0.092	0.018	0.021
31	2 Flow Length	L	feet		2088.00	1870.00	0.00	3729.00	1300.00	576.00	2749.00
32	Slope	S	ft/ft		0.013	0.004	0.000	0.004	0.022	0.048	0.008
33	roughness	n	n/a		0.040	0.050	0.000	0.013	0.013	0.040	0.050
34	Open Channel										
35	Bottom Width	BW	feet		100	60	0	0	0	30	30
36	Side Slopes (H:1)	H	feet		40	10	0	0	0	5	10
37	Depth	d	feet		2.00	2.50	0.00	0.00	0.00	1.00	2.00
38	...or Closed Conduit										
39	Rise / Diameter	R / D	feet		0.00	0.00	0.00	5.00	8.00	0.00	0.00
40	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
41	Cross-Sectional Area	X-A	feet^2		360.00	212.50	0.00	19.63	50.27	35.00	100.00
42	Flow Rate	Q	cfs		1892.57	619.68	0.00	169.38	753.98	261.48	330.77
43	Velocity	V	ft/sec		5.3	2.9	0.0	8.6	15.0	7.5	3.3
44	Travel time	Tt	hours		0.110	0.178	0.000	0.120	0.024	0.021	0.231
45	3 Flow Length	L	feet		4324.07	2781.87	0.00	0.00	2800.00	0.00	0.00
46	Slope	S	ft/ft		0.008	0.002	0.000	0.000	0.006	0.000	0.000
47	roughness	n	n/a		0.040	0.050	0.000	0.000	0.050	0.000	0.000
48	Open Channel										
49	Bottom Width	BW	feet		30	80	0	0	35	0	0
50	Side Slopes (H:1)	H	feet		5	20	0	0	10	0	0
51	Depth	d	feet		3.75	2.50	0.00	0.00	2.25	0.00	0.00
52	...or Closed Conduit										
53	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		182.81	325.00	0.00	0.00	129.38	0.00	0.00
56	Flow Rate	Q	cfs		1139.21	573.01	0.00	0.00	410.69	0.00	0.00
57	Velocity	V	ft/sec		6.2	1.8	0.0	0.0	3.2	0.0	0.0
58	Travel time	Tt	hours		0.193	0.438	0.000	0.000	0.245	0.000	0.000
59	Total Travel Time	TC	hours		0.49	0.99	0.45	0.72	1.06	0.68	0.51
60		TC	min.		29.68	59.52	27.21	43.22	63.38	40.71	30.80
61	Lag Time	TL	hours		0.3	0.6	0.3	0.4	0.6	0.4	0.3
62		TL	min.		17.8	35.7	16.3	25.9	38.0	24.4	18.5

	A	B	C	D	AU	AV	AW	AX	AY	AZ	BA
1	EXISTING CONDITIONS										
2	TR-55 Method of Computing the Time of Concentration										
3					KC_06	KC_07	KC_08	KC_09	KC_10	KC_11	KC_12
4	Sheet Flow	variable	units								
5	Manning's roughness coef.	n	n/a		0.240	0.011	0.240	0.240	0.240	0.240	0.240
6	Flow Length	L	feet		50.00	20.00	50.00	50.00	20.00	20.00	50.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.010	0.005	0.016	0.010	0.010	0.010	0.010
9	Travel time	Tt	hours		0.175	0.009	0.145	0.175	0.084	0.084	0.175
10	Shallow Concentrated Flow		min.		10.5	0.6	8.7	10.5	5.0	5.0	10.5
11	Flow Length	L	feet		440.00	419.00	750.00	641.00	1200.00	1950.00	1200.00
12	Slope	s	ft/ft		0.011	0.005	0.009	0.007	0.009	0.011	0.011
13	Surface (1=paved or 2=unpaved)		n/a		1.000	2.000	1.000	1.000	1.000	1.000	1.000
14	Velocity	V	ft/sec		2.203	1.146	1.949	1.679	1.907	2.131	2.111
15	Travel time	Tt	hours		0.055	0.102	0.107	0.106	0.175	0.254	0.158
16	Manning's Equation		min.		3.3	6.1	6.4	6.4	10.5	15.3	9.5
17	## Flow Length	L	feet		960.00	1395.00	1155.00	950.00	550.00	1500.00	1020.00
18	Slope	S	ft/ft		0.001	0.008	0.003	0.015	0.008	0.009	0.008
19	roughness	n	n/a		0.013	0.013	0.013	0.013	0.013	0.013	0.013
20	Open Channel										
21	Bottom Width	BW	feet		0	0	0	0	0	0	0
22	Side Slopes (H:1)	H	feet		0	0	0	0	0	0	0
23	Depth	d	feet		0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	...or Closed Conduit										
25	Rise / Diameter	R / D	feet		3.00	3.00	2.00	2.00	2.00	6.00	3.00
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	4.000	0.000
27	Cross-Sectional Area	X-A	feet^2		7.07	7.07	3.14	3.14	3.14	24.00	7.07
28	Flow Rate	Q	cfs		16.16	61.02	11.78	27.89	20.65	298.39	59.41
29	Velocity	V	ft/sec		2.3	8.6	3.7	8.9	6.6	12.4	8.4
30	Travel time	Tt	hours		0.117	0.045	0.086	0.030	0.023	0.034	0.034
31	2 Flow Length	L	feet		2070.00	575.00	360.00	860.00	2100.00	840.00	2400.00
32	Slope	S	ft/ft		0.008	0.002	0.017	0.009	0.008	0.008	0.003
33	roughness	n	n/a		0.013	0.013	0.013	0.013	0.013	0.040	0.013
34	Open Channel										
35	Bottom Width	BW	feet		0	0	5	0	0	5	0
36	Side Slopes (H:1)	H	feet		0	0	8	0	0	8	0
37	Depth	d	feet		0.00	0.00	2.00	0.00	0.00	3.00	0.00
38	...or Closed Conduit										
39	Rise / Diameter	R / D	feet		6.00	6.00	0.00	3.50	4.00	0.00	5.50
40	Span (0 if circular)	S	feet		0.000	4.000	0.000	0.000	0.000	0.000	0.000
41	Cross-Sectional Area	X-A	feet^2		28.27	24.00	42.00	9.62	12.57	87.00	23.76
42	Flow Rate	Q	cfs		385.24	146.76	420.00	95.90	132.50	394.64	183.93
43	Velocity	V	ft/sec		13.6	6.1	10.0	10.0	10.5	4.5	7.7
44	Travel time	Tt	hours		0.042	0.026	0.010	0.024	0.055	0.051	0.086
45	3 Flow Length	L	feet		581.73	2686.49	1495.12	612.72	823.77	646.79	1435.18
46	Slope	S	ft/ft		0.006	0.004	0.005	0.008	0.005	0.011	0.003
47	roughness	n	n/a		0.040	0.013	0.040	0.013	0.013	0.050	0.013
48	Open Channel										
49	Bottom Width	BW	feet		30	0	10	5	5	30	0
50	Side Slopes (H:1)	H	feet		10	0	10	8	8	8	0
51	Depth	d	feet		2.25	0.00	4.00	2.25	3.00	4.25	0.00
52	...or Closed Conduit										
53	Rise / Diameter	R / D	feet		0.00	8.00	0.00	0.00	0.00	0.00	8.00
54	Span (0 if circular)	S	feet		0.000	6.000	0.000	0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		118.13	48.00	200.00	51.75	87.00	272.00	50.27
56	Flow Rate	Q	cfs		459.00	518.86	849.58	628.60	1010.69	1665.81	500.92
57	Velocity	V	ft/sec		3.9	10.8	4.2	12.1	11.6	6.1	10.0
58	Travel time	Tt	hours		0.042	0.069	0.098	0.014	0.020	0.029	0.040
59	Total Travel Time	TC	hours		0.43	0.25	0.44	0.35	0.36	0.45	0.49
60		TC	min.		25.85	15.07	26.69	20.92	21.43	27.15	29.55
61	Lag Time	TL	hours		0.3	0.2	0.3	0.2	0.2	0.3	0.3
62		TL	min.		15.5	9.0	16.0	12.5	12.9	16.3	17.7

	A	B	C	D	BB	BC	BD	BE	BF	BG	BH
1	EXISTING CONDITIONS										
2	TR-55 Method of Computing the Time of Concentration										
3					LB_01	MB_01	OB_01	PC_01	PC_02	PC_03	PC_04
4	Sheet Flow	variable	units								
5	Manning's roughness coef.	n	n/a		0.240	0.240	0.240	0.240	0.240	0.240	0.240
6	Flow Length	L	feet		40.00	20.00	50.00	50.00	20.00	60.00	50.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.010	0.010	0.010	0.010	0.010	0.010	0.010
9	Travel time	Tt	hours		0.146	0.084	0.175	0.175	0.084	0.202	0.175
10	Shallow Concentrated Flow		min.		8.8	5.0	10.5	10.5	5.0	12.1	10.5
11	Flow Length	L	feet		620.00	1925.00	1100.00	1150.00	1500.00	600.00	715.00
12	Slope	s	ft/ft		0.004	0.008	0.024	0.004	0.002	0.003	0.006
13	Surface (1=paved or 2=unpaved)		n/a		1.000	2.000	1.000	1.000	1.000	2.000	1.000
14	Velocity	V	ft/sec		1.269	1.452	3.219	1.352	1.015	0.852	1.641
15	Travel time	Tt	hours		0.136	0.368	0.095	0.236	0.411	0.196	0.121
16	Manning's Equation		min.		8.1	22.1	5.7	14.2	24.6	11.7	7.3
17	## Flow Length	L	feet		1100.00	900.00	1242.00	2315.00	800.00	740.00	2800.00
18	Slope	S	ft/ft		0.001	0.008	0.016	0.007	0.002	0.002	0.010
19	roughness	n	n/a		0.013	0.013	0.050	0.013	0.013	0.060	0.013
20	Open Channel										
21	Bottom Width	BW	feet		0	0	30	0	0	6	0
22	Side Slopes (H:1)	H	feet		0	0	10	0	0	5	0
23	Depth	d	feet		0.00	0.00	2.00	0.00	0.00	3.00	0.00
24	...or Closed Conduit										
25	Rise / Diameter	R / D	feet		3.50	5.00	0.00	5.00	4.00	0.00	4.00
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	Cross-Sectional Area	X-A	feet^2		9.62	19.63	100.00	19.63	12.57	63.00	12.57
28	Flow Rate	Q	cfs		36.64	230.25	476.90	225.35	64.41	106.30	145.41
29	Velocity	V	ft/sec		3.8	11.7	4.8	11.5	5.1	1.7	11.6
30	Travel time	Tt	hours		0.080	0.021	0.072	0.056	0.043	0.122	0.067
31	2 Flow Length	L	feet		2950.00	3000.00	0.00	2261.00	2313.00	2051.00	1990.00
32	Slope	S	ft/ft		0.010	0.012	0.000	0.016	0.022	0.001	0.003
33	roughness	n	n/a		0.013	0.013	0.060	0.013	0.013	0.060	0.013
34	Open Channel										
35	Bottom Width	BW	feet		0	0	0	10	0	6	0
36	Side Slopes (H:1)	H	feet		0	0	0	5	0	5	0
37	Depth	d	feet		0.00	0.00	0.00	2.00	0.00	4.00	0.00
38	...or Closed Conduit										
39	Rise / Diameter	R / D	feet		4.50	7.00	0.00	0.00	5.00	0.00	9.00
40	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	5.000
41	Cross-Sectional Area	X-A	feet^2		15.90	38.48	0.00	40.00	19.63	104.00	45.00
42	Flow Rate	Q	cfs		194.98	577.27	0.00	400.00	294.52	161.12	363.20
43	Velocity	V	ft/sec		12.3	15.0	0.0	10.0	15.0	1.5	8.1
44	Travel time	Tt	hours		0.067	0.056	0.000	0.063	0.043	0.368	0.068
45	3 Flow Length	L	feet		2305.95	1113.09	0.00	0.00	0.00	1181.86	2444.59
46	Slope	S	ft/ft		0.010	0.015	0.000	0.000	0.000	0.040	0.019
47	roughness	n	n/a		0.050	0.050	0.060	0.000	0.000	0.060	0.040
48	Open Channel										
49	Bottom Width	BW	feet		75	15	0	0	0	6	10
50	Side Slopes (H:1)	H	feet		15	5	0	0	0	6	10
51	Depth	d	feet		2.50	3.50	0.00	0.00	0.00	4.00	3.00
52	...or Closed Conduit										
53	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		281.25	113.75	0.00	0.00	0.00	120.00	120.00
56	Flow Rate	Q	cfs		1293.39	715.88	0.00	0.00	0.00	1002.29	884.81
57	Velocity	V	ft/sec		4.6	6.3	0.0	0.0	0.0	8.4	7.4
58	Travel time	Tt	hours		0.139	0.049	0.000	0.000	0.000	0.039	0.092
59	Total Travel Time	TC	hours		0.57	0.58	0.34	0.53	0.58	0.93	0.52
60		TC	min.		34.10	34.70	20.53	31.80	34.85	55.61	31.42
61	Lag Time	TL	hours		0.3	0.3	0.2	0.3	0.3	0.6	0.3
62		TL	min.		20.5	20.8	12.3	19.1	20.9	33.4	18.9

	A	B	C	D	BI	BJ	BK	BL	BM	BN	BO
1	EXISTING CONDITIONS										
2	TR-55 Method of Computing the Time of Concentration										
3					PC_05	PC_06	PC_07	PC_08	PC_08A	PC_09	PC_09A
4	Sheet Flow	variable	units								
5	Manning's roughness coef.	n	n/a		0.240	0.240	0.240	0.240	0.240	0.240	0.240
6	Flow Length	L	feet		20.00	20.00	50.00	50.00	50.00	50.00	50.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.010	0.013	0.010	0.010	0.012	0.010	0.011
9	Travel time	Tt	hours		0.084	0.076	0.175	0.175	0.162	0.175	0.166
10	Shallow Concentrated Flow		min.		5.0	4.5	10.5	10.5	9.7	10.5	10.0
11	Flow Length	L	feet		1240.00	2080.00	1100.00	1066.00	1577.00	574.00	1665.00
12	Slope	s	ft/ft		0.017	0.009	0.009	0.017	0.010	0.021	0.012
13	Surface (1=paved or 2=unpaved)		n/a		1.000	2.000	1.000	1.000	1.000	1.000	1.000
14	Velocity	V	ft/sec		2.650	1.551	1.960	2.671	2.073	2.987	2.298
15	Travel time	Tt	hours		0.130	0.373	0.156	0.111	0.211	0.053	0.201
16	Manning's Equation		min.		7.8	22.4	9.4	6.7	12.7	3.2	12.1
17	## Flow Length	L	feet		626.00	2379.00	2575.00	1529.00	3075.00	4113.00	3500.00
18	Slope	S	ft/ft		0.064	0.013	0.017	0.008	0.009	0.010	0.012
19	roughness	n	n/a		0.050	0.013	0.013	0.013	0.040	0.013	0.013
20	Open Channel										
21	Bottom Width	BW	feet		10	0	0	0	15	0	0
22	Side Slopes (H:1)	H	feet		5	0	0	0	7	0	0
23	Depth	d	feet		1.50	0.00	0.00	0.00	3.00	0.00	0.00
24	...or Closed Conduit										
25	Rise / Diameter	R / D	feet		0.00	4.50	3.50	3.50	0.00	3.50	4.33
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	Cross-Sectional Area	X-A	feet^2		26.25	15.90	9.62	9.62	108.00	9.62	14.75
28	Flow Rate	Q	cfs		202.71	224.27	131.06	92.84	589.49	103.12	192.30
29	Velocity	V	ft/sec		7.7	14.1	13.6	9.6	5.5	10.7	13.0
30	Travel time	Tt	hours		0.023	0.047	0.053	0.044	0.156	0.107	0.075
31	2 Flow Length	L	feet		2947.00	1914.00	2364.00	998.00	2030.00	985.00	985.00
32	Slope	S	ft/ft		0.003	0.009	0.007	0.028	0.011	0.012	0.007
33	roughness	n	n/a		0.050	0.050	0.050	0.013	0.013	0.050	0.013
34	Open Channel										
35	Bottom Width	BW	feet		25	30	20	0	0	20	5
36	Side Slopes (H:1)	H	feet		7	5	20	0	0	15	5
37	Depth	d	feet		4.25	3.75	3.50	0.00	0.00	3.00	3.25
38	...or Closed Conduit										
39	Rise / Diameter	R / D	feet		0.00	0.00	0.00	6.00	10.00	0.00	0.00
40	Span (0 if circular)	S	feet		0.000	0.000	0.000	6.000	6.000	0.000	0.000
41	Cross-Sectional Area	X-A	feet^2		232.69	182.81	315.00	36.00	60.00	195.00	69.06
42	Flow Rate	Q	cfs		693.86	1005.11	1231.87	540.00	900.00	932.15	690.63
43	Velocity	V	ft/sec		3.0	5.5	3.9	15.0	15.0	4.8	10.0
44	Travel time	Tt	hours		0.275	0.097	0.168	0.018	0.038	0.057	0.027
45	3 Flow Length	L	feet		0.00	0.00	0.00	1939.07	2337.57	2231.35	0.00
46	Slope	S	ft/ft		0.000	0.000	0.000	0.003	0.006	0.005	0.160
47	roughness	n	n/a		0.000	0.000	0.000	0.060	0.060	0.013	0.000
48	Open Channel										
49	Bottom Width	BW	feet		0	0	0	35	35	10	0
50	Side Slopes (H:1)	H	feet		0	0	0	10	10	5	0
51	Depth	d	feet		0.00	0.00	0.00	5.00	4.50	4.25	0.00
52	...or Closed Conduit										
53	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		0.00	0.00	0.00	425.00	360.00	132.81	0.00
56	Flow Rate	Q	cfs		0.00	0.00	0.00	1161.23	1398.54	1328.13	0.00
57	Velocity	V	ft/sec		0.0	0.0	0.0	2.7	3.9	10.0	0.0
58	Travel time	Tt	hours		0.000	0.000	0.000	0.197	0.167	0.062	0.000
59	Total Travel Time	TC	hours		0.51	0.59	0.55	0.55	0.73	0.45	
60		TC	min.		30.66	35.51	33.07	32.72	44.06	27.24	
61	Lag Time	TL	hours		0.3	0.4	0.3	0.3	0.4	0.3	
62		TL	min.		18.4	21.3	19.8	19.6	26.4	16.3	

	A	B	C	D	BP	BQ	BR	BS	BT	BU	BV
1	EXISTING CONDITIONS										
2	TR-55 Method of Computing the Time of Concentration										
3					PC_10	PC_11	PC_12	PC_13	PC_14	RB_01	SFKC_01
4	Sheet Flow	variable	units								
5	Manning's roughness coef.	n	n/a		0.240	0.240	0.240	0.240	0.240	0.240	0.240
6	Flow Length	L	feet		60.00	50.00	20.00	50.00	20.00	50.00	20.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.010	0.010	0.010	0.012	0.010	0.010	0.010
9	Travel time	Tt	hours		0.200	0.175	0.084	0.164	0.084	0.175	0.084
10	Shallow Concentrated Flow		min.		12.0	10.5	5.0	9.8	5.0	10.5	5.0
11	Flow Length	L	feet		1190.00	2130.00	740.00	580.00	656.00	2000.00	1523.00
12	Slope	s	ft/ft		0.013	0.010	0.012	0.016	0.013	0.010	0.003
13	Surface (1=paved or 2=unpaved)		n/a		2.000	1.000	1.000	1.000	1.000	1.000	1.000
14	Velocity	V	ft/sec		1.849	2.020	2.257	2.638	2.349	2.073	1.068
15	Travel time	Tt	hours		0.179	0.293	0.091	0.061	0.078	0.268	0.396
16	Manning's Equation		min.		10.7	17.6	5.5	3.7	4.7	16.1	23.8
17	## Flow Length	L	feet		2185.00	1932.00	3630.00	1995.00	2500.00	4355.00	1211.00
18	Slope	S	ft/ft		0.008	0.011	0.008	0.012	0.014	0.003	0.001
19	roughness	n	n/a		0.013	0.013	0.013	0.013	0.013	0.013	0.013
20	Open Channel										
21	Bottom Width	BW	feet		5	0	0	0	0	0	0
22	Side Slopes (H:1)	H	feet		5	0	0	0	0	0	0
23	Depth	d	feet		2.50	0.00	0.00	0.00	0.00	0.00	0.00
24	...or Closed Conduit										
25	Rise / Diameter	R / D	feet		0.00	4.00	5.00	3.00	4.33	7.00	4.50
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	4.000	0.000
27	Cross-Sectional Area	X-A	feet^2		43.75	12.57	19.63	7.07	14.75	28.00	15.90
28	Flow Rate	Q	cfs		570.22	150.36	237.41	73.38	210.97	210.20	68.45
29	Velocity	V	ft/sec		13.0	12.0	12.1	10.4	14.3	7.5	4.3
30	Travel time	Tt	hours		0.047	0.045	0.083	0.053	0.049	0.161	0.078
31	2 Flow Length	L	feet		0.00	3058.00	4480.00	3000.00	3800.00	3505.00	1100.00
32	Slope	S	ft/ft		0.000	0.007	0.007	0.009	0.005	0.013	0.001
33	roughness	n	n/a		0.000	0.013	0.013	0.013	0.050	0.050	0.013
34	Open Channel										
35	Bottom Width	BW	feet		0	5	10	5	20	35	0
36	Side Slopes (H:1)	H	feet		0	5	5	5	15	5	0
37	Depth	d	feet		0.00	3.00	5.00	2.75	4.75	3.25	0.00
38	...or Closed Conduit										
39	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	0.00	10.00
40	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	8.000
41	Cross-Sectional Area	X-A	feet^2		0.00	60.00	175.00	51.56	433.44	166.56	80.00
42	Flow Rate	Q	cfs		0.00	819.18	1750.00	515.63	1799.97	1021.13	492.51
43	Velocity	V	ft/sec		0.0	13.7	10.0	10.0	4.2	6.1	6.2
44	Travel time	Tt	hours		0.000	0.062	0.124	0.083	0.254	0.159	0.050
45	3 Flow Length	L	feet		0.00	1822.89	0.00	784.06	0.00	0.00	1319.99
46	Slope	S	ft/ft		0.000	0.007	0.000	0.006	0.000	0.000	0.013
47	roughness	n	n/a		0.000	0.040	0.000	0.050	0.000	0.000	0.050
48	Open Channel										
49	Bottom Width	BW	feet		0	10	0	20	0	0	25
50	Side Slopes (H:1)	H	feet		0	10	0	15	0	0	5
51	Depth	d	feet		0.00	4.75	0.00	3.50	0.00	0.00	2.50
52	...or Closed Conduit										
53	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		0.00	273.13	0.00	253.75	0.00	0.00	93.75
56	Flow Rate	Q	cfs		0.00	1652.42	0.00	902.25	0.00	0.00	487.18
57	Velocity	V	ft/sec		0.0	6.1	0.0	3.6	0.0	0.0	5.2
58	Travel time	Tt	hours		0.000	0.084	0.000	0.061	0.000	0.000	0.071
59	Total Travel Time	TC	hours		0.43	0.66	0.38	0.42	0.46	0.76	0.68
60		TC	min.		25.50	39.51	22.98	25.37	27.86	45.77	40.71
61	Lag Time	TL	hours		0.3	0.4	0.2	0.3	0.3	0.5	0.4
62		TL	min.		15.3	23.7	13.8	15.2	16.7	27.5	24.4

	A	B	C	D	BW	BX	BY	BZ	CA	CB	CC
1	EXISTING CONDITIONS										
2	TR-55 Method of Computing the Time of Concentration										
3					UKN_B	UKN_BA	UKN_C	UKN_D	UKN_E	UKN_F	VB_01
4	Sheet Flow	variable	units								
5	Manning's roughness coef.	n	n/a		0.240	0.240	0.240	0.240	0.240	0.240	0.240
6	Flow Length	L	feet		60.00	20.00	20.00	20.00	20.00	50.00	50.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.011	0.010	0.010	0.028	0.010	0.013	0.010
9	Travel time	Tt	hours		0.193	0.084	0.084	0.056	0.084	0.158	0.175
10	Shallow Concentrated Flow		min.		11.6	5.0	5.0	3.3	5.0	9.5	10.5
11	Flow Length	L	feet		160.00	650.00	1980.00	1100.00	2500.00	1150.00	1150.00
12	Slope	s	ft/ft		0.045	0.013	0.023	0.006	0.010	0.004	0.002
13	Surface (1=paved or 2=unpaved)		n/a		2.000	1.000	2.000	1.000	1.000	1.000	1.000
14	Velocity	V	ft/sec		3.437	2.361	2.479	1.590	2.060	1.339	0.977
15	Travel time	Tt	hours		0.013	0.076	0.222	0.192	0.337	0.239	0.327
16	Manning's Equation		min.		0.8	4.6	13.3	11.5	20.2	14.3	19.6
17	## Flow Length	L	feet		1029.00	1011.00	5273.98	1065.00	7900.00	1250.00	1050.00
18	Slope	S	ft/ft		0.025	0.012	0.005	0.010	0.015	0.018	0.004
19	roughness	n	n/a		0.013	0.013	0.035	0.013	0.040	0.013	0.013
20	Open Channel										
21	Bottom Width	BW	feet		0	0	10	0	2	0	0
22	Side Slopes (H:1)	H	feet		0	0	5	0	3	0	0
23	Depth	d	feet		0.00	0.00	6.00	0.00	2.00	0.00	0.00
24	...or Closed Conduit										
25	Rise / Diameter	R / D	feet		2.25	3.00	0.00	2.00	0.00	3.50	3.00
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	Cross-Sectional Area	X-A	feet^2		3.98	7.07	240.00	3.14	16.00	9.62	7.07
28	Flow Rate	Q	cfs		48.78	72.50	1688.66	22.47	77.42	133.68	41.94
29	Velocity	V	ft/sec		12.3	10.3	7.0	7.2	4.8	13.9	5.9
30	Travel time	Tt	hours		0.023	0.027	0.208	0.041	0.454	0.025	0.049
31	2 Flow Length	L	feet		2742.00	4519.00	0.00	5960.00	1825.00	1824.00	1300.00
32	Slope	S	ft/ft		0.008	0.005	0.000	0.006	0.014	0.011	0.017
33	roughness	n	n/a		0.050	0.040	0.000	0.050	0.013	0.013	0.013
34	Open Channel										
35	Bottom Width	BW	feet		15	10	0	20	10	0	0
36	Side Slopes (H:1)	H	feet		6	15	0	5	5	0	0
37	Depth	d	feet		3.25	3.00	0.00	4.00	6.00	0.00	0.00
38	...or Closed Conduit										
39	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	7.00	3.75
40	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	4.000	0.000
41	Cross-Sectional Area	X-A	feet^2		112.13	165.00	0.00	160.00	240.00	28.00	11.04
42	Flow Rate	Q	cfs		486.13	631.27	0.00	704.06	2400.00	402.25	156.63
43	Velocity	V	ft/sec		4.3	3.8	0.0	4.4	10.0	14.4	14.2
44	Travel time	Tt	hours		0.176	0.328	0.000	0.376	0.051	0.035	0.025
45	3 Flow Length	L	feet		0.00	3986.29	0.00	2800.00	0.00	0.00	802.08
46	Slope	S	ft/ft		0.000	0.007	0.000	0.004	0.000	0.000	0.014
47	roughness	n	n/a		0.000	0.050	0.000	0.050	0.000	0.000	0.040
48	Open Channel										
49	Bottom Width	BW	feet		0	30	0	30	0	0	40
50	Side Slopes (H:1)	H	feet		0	15	0	10	0	0	10
51	Depth	d	feet		0.00	3.75	0.00	4.25	0.00	0.00	1.50
52	...or Closed Conduit										
53	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		0.00	323.44	0.00	308.13	0.00	0.00	82.50
56	Flow Rate	Q	cfs		0.00	1385.65	0.00	1117.57	0.00	0.00	401.80
57	Velocity	V	ft/sec		0.0	4.3	0.0	3.6	0.0	0.0	4.9
58	Travel time	Tt	hours		0.000	0.258	0.000	0.214	0.000	0.000	0.046
59	Total Travel Time	TC	hours		0.40	0.77	0.51	0.88	0.93	0.46	0.62
60		TC	min.		24.30	46.47	30.84	52.79	55.52	27.42	37.34
61	Lag Time	TL	hours		0.2	0.5	0.3	0.5	0.6	0.3	0.4
62		TL	min.		14.6	27.9	18.5	31.7	33.3	16.5	22.4

	A	B	C	D	CD	CE	CF	CG
1	EXISTING CONDITIONS							
2	TR-55 Method of Computing the Time of Concentration							
3					WB_01	WB_02	WB_03	WB_04
4	Sheet Flow	variable	units					
5	Manning's roughness coef.	n	n/a		0.240	0.240	0.240	0.240
6	Flow Length	L	feet		20.00	50.00	60.00	60.00
7	2-year, 24-hour rainfall	P2	inches		3.400	3.400	3.400	3.400
8	Slope	s	ft/ft		0.010	0.010	0.010	0.010
9	Travel time	Tt	hours		0.084	0.175	0.202	0.202
10	Shallow Concentrated Flow		min.		5.0	10.5	12.1	12.1
11	Flow Length	L	feet		70.00	1809.00	1560.00	1790.00
12	Slope	s	ft/ft		0.006	0.006	0.006	0.005
13	Surface (1=paved or 2=unpaved)		n/a		1.000	1.000	1.000	2.000
14	Velocity	V	ft/sec		1.596	1.549	1.549	1.150
15	Travel time	Tt	hours		0.012	0.324	0.280	0.432
16	Manning's Equation		min.		0.7	19.5	16.8	25.9
17	## Flow Length	L	feet		1130.00	200.00	2500.00	1730.00
18	Slope	S	ft/ft		0.009	0.006	0.007	0.009
19	roughness	n	n/a		0.013	0.013	0.013	0.013
20	Open Channel							
21	Bottom Width	BW	feet		0	0	0	0
22	Side Slopes (H:1)	H	feet		0	0	0	0
23	Depth	d	feet		0.00	0.00	0.00	0.00
24	...or Closed Conduit							
25	Rise / Diameter	R / D	feet		2.00	3.00	3.50	4.50
26	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000
27	Cross-Sectional Area	X-A	feet^2		3.14	7.07	9.62	15.90
28	Flow Rate	Q	cfs		21.01	51.80	86.99	182.82
29	Velocity	V	ft/sec		6.7	7.3	9.0	11.5
30	Travel time	Tt	hours		0.047	0.008	0.077	0.042
31	2 Flow Length	L	feet		950.00	467.00	3282.00	1647.00
32	Slope	S	ft/ft		0.030	0.044	0.008	0.011
33	roughness	n	n/a		0.013	0.050	0.050	0.013
34	Open Channel							
35	Bottom Width	BW	feet		0	10	30	0
36	Side Slopes (H:1)	H	feet		0	5	15	0
37	Depth	d	feet		0.00	2.00	2.50	0.00
38	...or Closed Conduit							
39	Rise / Diameter	R / D	feet		3.50	0.00	0.00	5.50
40	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000
41	Cross-Sectional Area	X-A	feet^2		9.62	40.00	168.75	23.76
42	Flow Rate	Q	cfs		144.32	299.35	612.25	345.26
43	Velocity	V	ft/sec		15.0	7.5	3.6	14.5
44	Travel time	Tt	hours		0.018	0.017	0.251	0.031
45	3 Flow Length	L	feet		2331.26	0.00	0.00	0.00
46	Slope	S	ft/ft		0.010	0.000	0.000	0.000
47	roughness	n	n/a		0.050	0.000	0.000	0.000
48	Open Channel							
49	Bottom Width	BW	feet		30	0	0	0
50	Side Slopes (H:1)	H	feet		6	0	0	0
51	Depth	d	feet		3.00	0.00	0.00	0.00
52	...or Closed Conduit							
53	Rise / Diameter	R / D	feet		0.00	0.00	0.00	0.00
54	Span (0 if circular)	S	feet		0.000	0.000	0.000	0.000
55	Cross-Sectional Area	X-A	feet^2		144.00	0.00	0.00	0.00
56	Flow Rate	Q	cfs		728.52	0.00	0.00	0.00
57	Velocity	V	ft/sec		5.1	0.0	0.0	0.0
58	Travel time	Tt	hours		0.128	0.000	0.000	0.000
59	Total Travel Time	TC	hours		0.29	0.52	0.81	0.71
60		TC	min.		17.32	31.45	48.61	42.47
61	Lag Time	TL	hours		0.2	0.3	0.5	0.4
62		TL	min.		10.4	18.9	29.2	25.5

Appendix **E**
HEC-HMS Output Report

HEC-HMS 3.4 [P:\08073.00_Cottonwood_Fish_Creek_FPP\HEC-HMS\Cottonwood\Current Model\Final\Cottonwood_Creek_2010\Cottonwood_Creek_2010.hms]

File Edit View Components Parameters Compute Results Tools Help

Cottonwood_Creek_2010

- Basin Models
 - Cottonwood Existing 2009
 - Ultimate Development
- Meteorologic Models
- Control Specifications
- Paired Data

Basin Model [Cottonwood Existing 2009]

Components Compute Results

Basin Model

Name: Cottonwood Exis

Description: Cottonwood Creek

Grid Cell File:

Local Flow: No

Flow Ratios: No

Replace Missing: No

Unit System: U.S. Customary

Sediment: No

Water Quality: No

NOTE 10008: Finished opening project "Cottonwood_Creek_2010" in directory "P:\08073.00_Cottonwood_Fish_Creek_FPP\HEC-HMS\Cottonwood\Current Model\Final\Cottonwood_Creek_2010" at time 23Apr2010, 07:29:41.

NOTE 10179: Opened basin model "Cottonwood Existing 2009" at time 23Apr2010, 07:29:48.

COTTONWOOD CREEK PEAK RUN-OFF

HMS-Node	Peak Flows (cfs)							
	Existing 2 yr	Existing 5 yr	Existing 10 yr	Existing 25 yr	Existing 50 yr	Existing 100 yr	Existing 500 yr	Ultimate 100yr
CWC J-05	4,460	7,789	10,202	12,745	15,072	17,425	23,278	18,386
CWC J-04	4,410	7,771	10,291	12,894	15,260	17,675	23,650	18,630
CWC J-03A	4,402	7,778	10,312	12,925	15,296	17,709	23,700	18,679
CWC J-03	4,516	8,059	10,727	13,484	15,991	18,530	24,832	19,518
CWC J-02A	4,309	7,827	10,526	13,350	15,900	18,304	25,195	19,398
CWC J-02	4,204	7,600	10,184	12,986	15,355	17,660	24,778	18,835
CWC J-01A	4,198	7,575	10,156	12,984	15,368	17,688	24,829	18,863
CWC J-01	4,254	7,783	10,218	13,613	16,349	19,320	27,159	20,690
Mountain Creek Lake	4,241	7,734	10,177	13,598	16,353	19,294	27,161	20,692
DB J-2	657	1,010	1,250	1,522	1,738	1,954	2,447	1,954
DB J-1	699	1,100	1,369	1,672	1,916	2,158	2,720	2,195
IHB-03	420	648	802	971	1,111	1,248	1,579	1,248
IHB J-2	491	771	959	1,164	1,333	1,497	1,896	1,500
IHB J-1	474	790	980	1,186	1,345	1,483	1,881	1,486
CWC J-16	1,055	1,640	2,037	2,478	2,839	3,197	4,067	3,280
CWC J-15A	1,146	1,785	2,217	2,696	3,090	3,477	4,412	3,564
CWC J-15	1,105	1,708	2,122	2,668	3,119	3,543	4,540	3,631
CWC J-14	2,408	3,765	4,600	5,696	6,565	7,384	9,463	7,472
CWC J-13	2,332	3,670	4,473	5,527	6,474	7,292	9,478	7,381
CWC J-12A	2,570	4,023	4,870	6,050	7,145	8,009	10,425	8,099
CWC J-12	2,705	4,245	5,131	6,351	7,588	8,499	11,081	8,617
CWC J-11	2,721	4,311	5,277	6,484	7,839	8,761	11,327	8,888
CWC J-10	3,238	5,097	6,215	7,654	9,234	10,336	13,295	10,527
CWC J-09	3,220	5,155	6,316	7,741	9,291	10,474	13,313	10,681
CWC J-08A	3,372	5,510	6,739	8,221	9,879	11,261	14,462	11,640
CWC J-08	3,145	5,560	6,909	8,421	10,102	11,629	15,091	12,033
CWC J-07	3,041	5,566	6,985	8,520	10,178	11,734	15,291	12,153
CWC J-06	3,003	5,550	7,050	8,621	10,264	11,858	15,495	12,276
PC-05	642	996	1,234	1,496	1,717	1,930	2,461	1,981
PC J-3	749	1,185	1,461	1,776	2,007	2,212	2,847	2,261
PC J-2	1,039	1,688	2,066	2,505	2,862	3,173	4,063	3,236
PC J-1	1,114	1,867	2,320	2,828	3,238	3,600	4,670	3,712
PC J-1A	1,113	1,887	2,261	2,821	3,243	3,632	4,767	3,758
SCW J-11	258	385	472	568	644	722	905	739
SCW J-10	727	1,205	1,524	1,857	2,128	2,381	2,973	2,447
SCW J-09	847	1,491	1,931	2,358	2,715	3,042	4,084	3,127
SCW J-08A	857	1,503	1,948	2,380	2,729	3,124	4,077	3,202
SCW J-08	1,079	1,718	2,116	2,609	3,005	3,516	4,553	3,616
SCW J-07	1,113	1,847	2,327	2,837	3,331	3,886	5,174	4,010
SCW J-06A	1,097	1,813	2,258	2,692	3,199	3,786	5,180	3,913
SCW J-06	1,105	1,833	2,271	2,691	3,228	3,844	5,359	3,987
SCW J-05A	1,092	1,841	2,286	2,707	3,242	3,854	5,426	4,008
SCW J-05	1,154	1,957	2,408	2,826	3,411	4,102	5,930	4,282
SCW J-04	1,225	2,177	2,709	3,194	3,745	4,529	6,744	4,798
SCW J-03A	1,201	2,146	2,695	3,182	3,712	4,457	6,599	4,725
SCW J-03	1,526	2,719	3,456	4,228	4,906	5,647	8,124	6,111
SCW J-02A	1,535	2,729	3,485	4,280	4,971	5,720	8,183	6,197
SCW J-02	1,550	2,744	3,513	4,325	5,032	5,793	8,262	6,277
SCW J-01	1,555	2,747	3,521	4,341	5,052	5,810	8,275	6,290
UNA J-01	1,510	2,275	2,791	3,368	3,835	4,294	5,378	4,294
WC-10	316	448	536	637	715	794	968	819
WC J-08	379	572	691	832	947	1,059	1,326	1,117
WC J-07	263	429	524	611	690	761	897	780
WC J-06	291	382	413	466	534	595	752	621
WC J-05	298	385	432	483	543	604	769	631
WC J-04	314	427	502	569	613	655	794	670
WC J-03	332	445	483	531	584	642	849	665
WC J-02	360	499	549	605	663	740	992	761
WC J-01A	652	973	1,149	1,343	1,513	1,693	2,190	1,785
WC J-01	726	1,094	1,308	1,543	1,751	1,966	2,516	2,104
WC J-00	933	1,497	1,842	2,197	2,495	2,789	3,521	2,981

HEC-HMS 3.4 [P:\08073.00_Cottownwood_Fish_Creek_FPP\HEC-HMS\Fish\Current Model\Fish Creek 2010\Fish_Creek_2010.hms]

File Edit View Components Parameters Compute Results Tools Help

Basin Model [Existing 2010]

NOTE 10008: Finished opening project "Fish Creek 2010" in directory "P:\08073.00_Cottownwood_Fish_Creek_FPP\HEC-HMS\Fish\Current Model\Fish Creek 2010" at time 23Apr2010, 07:37:50.
 NOTE 10179: Opened basin model "Existing 2010" at time 23Apr2010, 07:37:56.

- Fish Creek 2010
 - Basin Models
 - Existing 2010
 - Ultimate Land Use
 - Meteorologic Models
 - Control Specifications
 - Paired Data

Components Compute Results

Basin Model

Name: Existing 2010

Description: Existing Conditions

Grid Cell File:

Local Flow: No

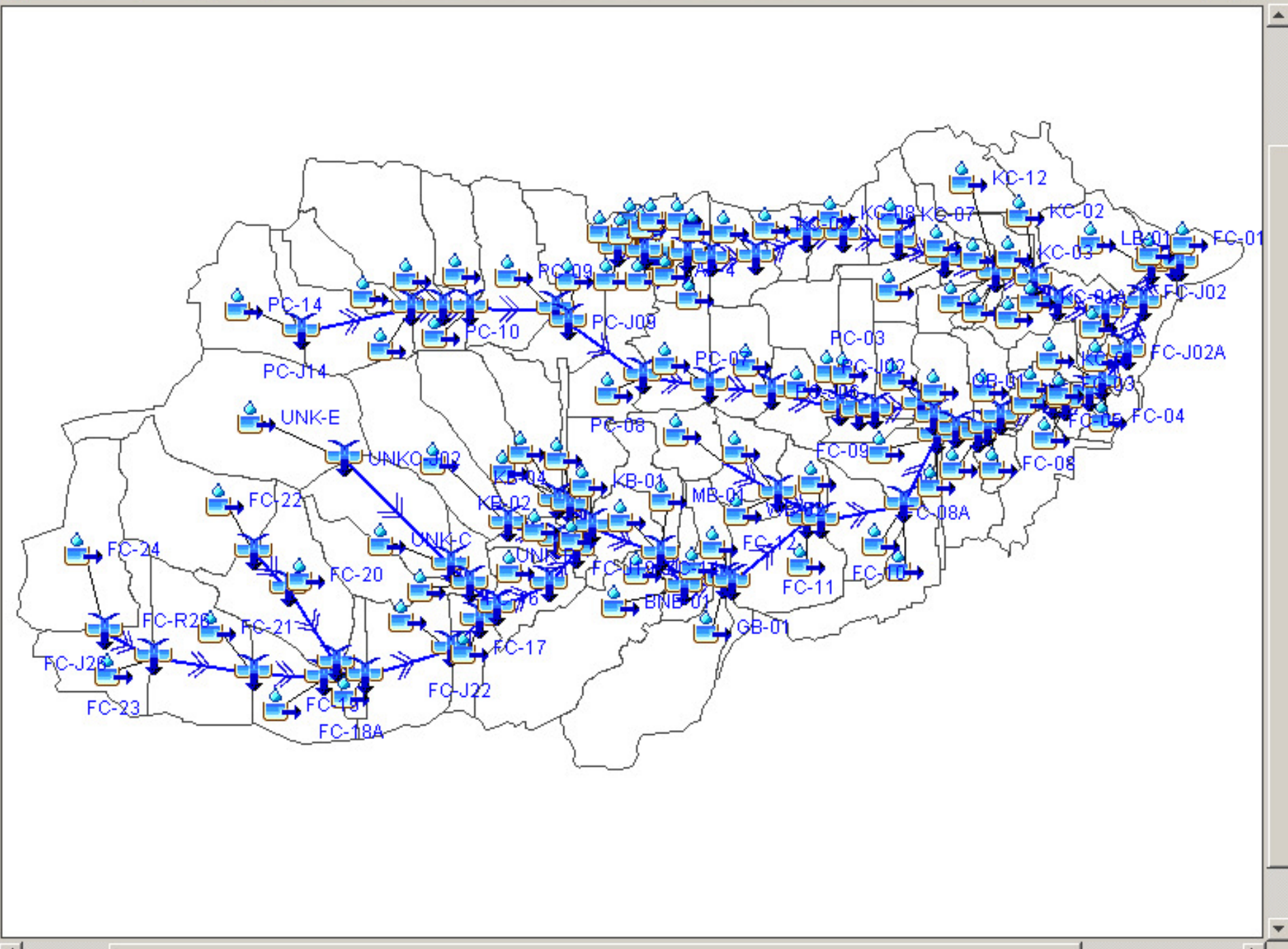
Flow Ratios: No

Replace Missing: No

Unit System: U.S. Customary

Sediment: No

Water Quality: No



FISH CREEK PEAK RUN-OFF

HMS-Node	Peak Flows (cfs)							
	Existing 2 yr	Existing 5 yr	Existing 10 yr	Existing 25 yr	Existing 50 yr	Existing 100 yr	Existing 500 yr	Ultimate 100 yr
BB-01	144	224	278	337	386	434	549	434
UNKC-J02	905	1,492	1,891	2,322	2,693	3,050	3,956	3,050
UNKC-J01A	1,061	1,921	2,489	3,082	3,593	4,083	5,318	4,083
UNKC-J01	1,440	2,544	3,288	4,064	4,729	5,367	6,979	5,367
FC-J27A	908	1,402	1,734	2,102	2,403	2,699	3,402	2,745
FC-J27	1,341	2,181	2,736	3,336	3,843	4,336	5,552	4,399
FC-J26	1,150	1,712	2,086	2,511	2,843	3,175	3,927	3,233
FC-J25	1,409	2,252	2,807	3,408	3,902	4,398	5,548	4,506
FC-J24	1,441	2,677	3,520	4,364	5,045	5,694	7,380	5,829
FC-J23A	1,516	2,950	3,871	4,885	5,664	6,507	8,719	6,670
FC-J23	2,662	4,900	6,342	7,932	9,175	10,448	13,747	10,678
FC-J22A	2,676	4,913	6,354	7,919	9,149	10,363	13,645	10,577
FC-J22	2,599	4,849	6,324	7,859	9,037	10,315	13,583	10,564
FC-J21A	2,584	4,840	6,319	7,855	9,039	10,340	13,699	10,585
FC-J21	3,222	6,252	8,259	10,208	11,796	13,493	18,056	13,786
FC-J20	3,219	6,282	8,307	10,312	11,898	13,551	18,189	13,820
FC-J19	3,352	6,601	8,763	10,890	12,580	14,286	19,241	14,553
FC-J18	3,543	6,969	9,302	11,589	13,393	15,166	20,485	15,430
FC-J17	3,643	7,009	9,395	11,754	13,603	15,497	20,812	15,756
FC-J16	4,076	7,617	10,047	12,817	15,123	17,365	23,273	17,691
FC-J15	4,241	7,961	10,542	13,433	15,859	18,149	24,263	18,500
FC-J14	4,265	8,016	10,623	13,529	15,969	18,269	24,390	18,618
FC-J13A	4,240	7,993	10,722	13,771	16,251	18,669	24,931	19,037
FC-J13	4,387	8,304	11,272	14,590	17,184	19,709	26,237	20,123
FC-J12	4,432	8,376	11,329	14,796	17,462	19,871	26,539	20,273
FC-J11	4,424	8,307	11,215	14,565	17,407	19,798	26,309	20,166
FC-J10	6,985	12,463	16,898	21,910	26,151	30,050	37,489	30,661
FC-J10	6,985	12,463	16,898	21,910	26,151	30,050	37,489	30,661
FC-J09	7,000	12,488	16,913	21,969	26,370	30,078	37,609	30,730
FC-J08	7,011	12,505	16,915	22,014	26,323	30,039	37,663	30,756
FC-J07	7,025	12,525	16,935	22,123	26,347	30,228	37,759	30,940
FC-J06	7,018	12,520	16,918	21,991	26,350	30,103	37,803	30,824
FC-J05	7,053	12,585	16,993	22,080	26,449	30,264	38,016	30,973
FC-J04	7,047	12,587	17,001	22,082	26,461	30,273	38,038	30,969
FC-J03	7,062	12,617	17,032	22,104	26,471	30,207	38,091	30,887
FC-J02A	7,045	12,631	17,027	21,966	26,191	29,903	37,882	30,525
FC-J02	7,541	13,593	18,331	23,576	27,896	32,145	40,853	32,889
FC-J01	7,402	13,553	18,256	23,350	27,578	31,698	40,572	32,492
FC-J0	7,300	13,519	18,206	23,208	27,394	31,475	40,383	32,284
Mountain Creek Lake	7,310	13,563	18,253	23,261	27,471	31,553	40,490	32,359
SFKC-01	166	284	363	450	523	594	768	654
Great Southwest	275	383	455	531	596	661	1,396	661
KC-J08	610	917	1,118	1,336	1,511	1,681	2,213	1,735
KC-J07	499	795	1,059	1,328	1,559	1,779	2,307	1,840
KC-J06	703	1,162	1,506	1,896	2,217	2,521	3,173	2,622
KC-J05	545	976	1,337	1,698	2,041	2,392	3,250	2,530
KC-J04	438	738	971	1,300	1,567	1,846	2,839	1,984
KC-J03	1,050	1,695	2,149	2,691	3,130	3,560	4,687	3,720
KC-J02	1,358	2,241	2,851	3,508	4,079	4,651	6,130	4,813
KC-J01A	1,405	2,381	3,052	3,765	4,391	5,015	6,631	5,177
KC-J01	1,424	2,434	3,157	3,968	4,654	5,337	6,988	5,499
PC-J14	609	947	1,175	1,429	1,637	1,841	2,326	1,883
PC-J13	1,255	2,023	2,575	3,150	3,631	4,125	5,216	4,231
PC-J12	1,881	3,038	3,840	4,695	5,417	6,140	7,792	6,297
PC-J11	2,379	3,815	4,802	5,862	6,683	7,536	9,604	7,724
PC-J10	2,894	4,706	5,828	6,988	8,004	8,962	11,238	9,150
PC-J09	3,334	5,436	6,679	7,760	8,917	10,403	13,249	10,662
PC-J08	2,895	5,142	6,588	7,853	9,044	10,396	13,512	10,708
PC-J07	2,890	5,012	6,238	7,468	8,751	10,210	13,768	10,589
PC-J06	2,824	4,935	6,199	7,521	8,802	10,308	14,065	10,685
PC-J05	2,875	5,041	6,354	7,725	9,038	10,585	14,582	11,001
PC-J04	2,943	5,206	6,553	7,972	9,347	10,981	15,234	11,469
PC-J03	2,937	5,191	6,552	7,969	9,341	10,968	15,198	11,461
PC-J02	2,887	5,174	6,555	7,981	9,372	10,943	15,035	11,379
PC-J01	2916	5228	6608	8051	9479	11027	15168	11451

Appendix **F**
HEC-RAS Output Report

River	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
CWC MAIN STEM	SECTION_01	12699	2 yr	4460.00	475.00	480.31	478.48	480.56	0.000767	7.96	1636.14	714.55	0.63
CWC MAIN STEM	SECTION_01	12699	5 yr	7789.00	475.00	481.55	479.46	481.83	0.000796	9.40	2767.30	890.93	0.66
CWC MAIN STEM	SECTION_01	12699	10 yr	10202.00	475.00	482.11	479.94	482.44	0.000860	10.35	3282.81	951.46	0.70
CWC MAIN STEM	SECTION_01	12699	25 yr	12745.00	475.00	482.70	480.72	483.04	0.000836	10.79	3857.15	984.72	0.70
CWC MAIN STEM	SECTION_01	12699	50 yr	15072.00	475.00	483.20	481.34	483.56	0.000816	11.14	4353.16	1007.95	0.70
CWC MAIN STEM	SECTION_01	12699	100 yr	17425.00	475.00	483.66	481.34	484.03	0.000802	11.47	4824.37	1027.63	0.70
CWC MAIN STEM	SECTION_01	12699	500 yr	23278.00	475.00	484.66	482.34	485.08	0.000799	12.34	5868.40	1071.05	0.71
CWC MAIN STEM	SECTION_01	12699	Ultimate 100 yr	18386.00	475.00	483.83	481.70	484.22	0.000801	11.61	5004.41	1034.92	0.70
CWC MAIN STEM	SECTION_01	12679	2 yr	4460.00	475.92	480.06	479.29	480.52	0.001783	9.91	1191.41	646.23	0.91
CWC MAIN STEM	SECTION_01	12679	5 yr	7789.00	475.92	481.38	480.29	481.81	0.001385	10.72	2284.84	863.36	0.85
CWC MAIN STEM	SECTION_01	12679	10 yr	10202.00	475.92	481.96	480.83	482.41	0.001329	11.30	2801.01	911.16	0.85
CWC MAIN STEM	SECTION_01	12679	25 yr	12745.00	475.92	482.56	481.43	483.02	0.001219	11.60	3364.19	951.78	0.82
CWC MAIN STEM	SECTION_01	12679	50 yr	15072.00	475.92	483.07	481.71	483.53	0.001152	11.88	3851.05	983.82	0.81
CWC MAIN STEM	SECTION_01	12679	100 yr	17425.00	475.92	483.54	481.98	484.01	0.001090	12.09	4319.86	1003.76	0.80
CWC MAIN STEM	SECTION_01	12679	500 yr	23278.00	475.92	484.54	482.54	485.06	0.001028	12.82	5345.49	1047.12	0.79
CWC MAIN STEM	SECTION_01	12679	Ultimate 100 yr	18386.00	475.92	483.71	482.10	484.20	0.001076	12.21	4497.07	1011.36	0.80
CWC MAIN STEM	SECTION_01	12662	2 yr	4460.00	474.77	479.80	479.39	480.48	0.001433	9.48	1125.89	612.34	0.83
CWC MAIN STEM	SECTION_01	12662	5 yr	7789.00	474.77	480.69	480.16	481.73	0.001857	12.33	1813.38	799.37	0.98
CWC MAIN STEM	SECTION_01	12662	10 yr	10202.00	474.77	481.59	481.20	482.36	0.001277	11.43	2563.85	870.41	0.83
CWC MAIN STEM	SECTION_01	12662	25 yr	12745.00	474.77	482.24	481.58	482.98	0.001138	11.58	3144.18	911.63	0.80
CWC MAIN STEM	SECTION_01	12662	50 yr	15072.00	474.77	482.75	481.89	483.49	0.001079	11.86	3618.17	943.10	0.79
CWC MAIN STEM	SECTION_01	12662	100 yr	17425.00	474.77	483.21	482.21	483.97	0.001058	12.25	4057.95	979.88	0.79
CWC MAIN STEM	SECTION_01	12662	500 yr	23278.00	474.77	484.21	482.77	485.02	0.000999	12.95	5069.54	1026.06	0.79
CWC MAIN STEM	SECTION_01	12662	Ultimate 100 yr	18386.00	474.77	483.38	482.32	484.15	0.001045	12.37	4232.17	989.09	0.79
CWC MAIN STEM	SECTION_01	12645	2 yr	4460.00	471.00	480.11	476.80	480.33	0.000276	6.53	2320.32	719.10	0.40
CWC MAIN STEM	SECTION_01	12645	5 yr	7789.00	471.00	481.17	478.00	481.50	0.000407	8.61	3139.27	828.92	0.50
CWC MAIN STEM	SECTION_01	12645	10 yr	10202.00	471.00	481.86	478.59	482.23	0.000444	9.44	3731.32	881.05	0.53
CWC MAIN STEM	SECTION_01	12645	25 yr	12745.00	471.00	482.46	478.51	482.87	0.000483	10.24	4272.78	923.87	0.56
CWC MAIN STEM	SECTION_01	12645	50 yr	15072.00	471.00	482.95	478.51	483.39	0.000521	10.95	4733.16	971.94	0.58
CWC MAIN STEM	SECTION_01	12645	100 yr	17425.00	471.00	483.40	481.25	483.87	0.000544	11.50	5178.06	999.50	0.60
CWC MAIN STEM	SECTION_01	12645	500 yr	23278.00	471.00	484.39	482.02	484.92	0.000579	12.54	6190.93	1034.82	0.63
CWC MAIN STEM	SECTION_01	12645	Ultimate 100 yr	18386.00	471.00	483.57	481.37	484.06	0.000552	11.70	5352.39	1007.85	0.61
CWC MAIN STEM	SECTION_01	12482	2 yr	4460.00	470.00	479.86	477.87	480.22	0.001739	5.84	1242.83	622.98	0.37
CWC MAIN STEM	SECTION_01	12482	5 yr	7789.00	470.00	481.03	480.04	481.37	0.001635	6.22	2018.11	708.49	0.37
CWC MAIN STEM	SECTION_01	12482	10 yr	10202.00	470.00	481.75	480.43	482.08	0.001509	6.29	2545.13	754.72	0.36
CWC MAIN STEM	SECTION_01	12482	25 yr	12745.00	470.00	482.36	480.80	482.71	0.001465	6.46	3016.24	783.91	0.36
CWC MAIN STEM	SECTION_01	12482	50 yr	15072.00	470.00	482.85	481.12	483.22	0.001439	6.60	3406.55	799.63	0.35
CWC MAIN STEM	SECTION_01	12482	100 yr	17425.00	470.00	483.30	481.37	483.69	0.001438	6.78	3770.58	820.11	0.36
CWC MAIN STEM	SECTION_01	12482	500 yr	23278.00	470.00	484.28	481.96	484.73	0.001444	7.19	4601.55	863.63	0.36
CWC MAIN STEM	SECTION_01	12482	Ultimate 100 yr	18386.00	470.00	483.47	481.47	483.87	0.001441	6.86	3912.41	829.39	0.36
CWC MAIN STEM	SECTION_01	12147	2 yr	4460.00	467.00	479.45	476.30	479.73	0.001093	5.29	1385.19	578.39	0.30
CWC MAIN STEM	SECTION_01	12147	5 yr	7789.00	467.00	480.55	479.25	480.88	0.001291	6.17	2051.90	632.04	0.33
CWC MAIN STEM	SECTION_01	12147	10 yr	10202.00	467.00	481.27	479.72	481.62	0.001299	6.46	2520.36	667.42	0.33
CWC MAIN STEM	SECTION_01	12147	25 yr	12745.00	467.00	481.86	480.10	482.24	0.001349	6.81	2922.20	687.31	0.34
CWC MAIN STEM	SECTION_01	12147	50 yr	15072.00	467.00	482.34	480.42	482.75	0.001385	7.08	3252.32	697.84	0.35
CWC MAIN STEM	SECTION_01	12147	100 yr	17425.00	467.00	482.77	480.77	483.22	0.001424	7.34	3555.77	706.32	0.36
CWC MAIN STEM	SECTION_01	12147	500 yr	23278.00	467.00	483.71	481.41	484.24	0.001508	7.91	4221.94	714.87	0.37
CWC MAIN STEM	SECTION_01	12147	Ultimate 100 yr	18386.00	467.00	482.93	480.84	483.39	0.001439	7.44	3672.40	707.82	0.36
CWC MAIN STEM	SECTION_01	11763	2 yr	4460.00	467.00	478.05	475.88	479.04	0.002965	8.85	795.88	466.86	0.50
CWC MAIN STEM	SECTION_01	11763	5 yr	7789.00	467.00	479.31	479.07	480.16	0.002843	9.38	1423.69	524.24	0.50
CWC MAIN STEM	SECTION_01	11763	10 yr	10202.00	467.00	480.26	479.55	480.95	0.002354	9.02	1954.27	599.17	0.46
CWC MAIN STEM	SECTION_01	11763	25 yr	12745.00	467.00	480.84	479.97	481.55	0.002397	9.39	2313.36	629.52	0.46
CWC MAIN STEM	SECTION_01	11763	50 yr	15072.00	467.00	481.30	480.40	482.04	0.002465	9.75	2607.05	654.61	0.47
CWC MAIN STEM	SECTION_01	11763	100 yr	17425.00	467.00	481.71	480.70	482.49	0.002533	10.09	2878.93	674.47	0.48
CWC MAIN STEM	SECTION_01	11763	500 yr	23278.00	467.00	482.58	481.41	483.47	0.002724	10.91	3486.41	721.96	0.51
CWC MAIN STEM	SECTION_01	11763	Ultimate 100 yr	18386.00	467.00	481.86	480.84	482.66	0.002563	10.22	2983.91	681.71	0.49
CWC MAIN STEM	SECTION_01	11493	2 yr	4460.00	467.73	478.14	476.38	478.25	0.000608	3.59	1907.63	762.04	0.22
CWC MAIN STEM	SECTION_01	11493	5 yr	7789.00	467.73	479.28	477.18	479.42	0.000669	4.10	2950.15	876.85	0.23
CWC MAIN STEM	SECTION_01	11493	10 yr	10202.00	467.73	480.21	477.54	480.34	0.000569	4.02	3787.54	927.11	0.22
CWC MAIN STEM	SECTION_01	11493	25 yr	12745.00	467.73	480.78	477.87	480.93	0.000607	4.30	4323.80	954.78	0.23
CWC MAIN STEM	SECTION_01	11493	50 yr	15072.00	467.73	481.23	478.16	481.40	0.000644	4.55	4757.90	976.62	0.24
CWC MAIN STEM	SECTION_01	11493	100 yr	17425.00	467.73	481.63	478.42	481.83	0.000683	4.80	5156.47	996.54	0.25
CWC MAIN STEM	SECTION_01	11493	500 yr	23278.00	467.73	482.50	478.89	482.75	0.000770	5.34	6038.18	1036.88	0.26
CWC MAIN STEM	SECTION_01	11493	Ultimate 100 yr	18386.00	467.73	481.78	478.47	481.99	0.000699	4.89	5309.90	1004.12	0.25
CWC MAIN STEM	SECTION_01	11042	2 yr	4460.00	467.00	477.99	475.97	478.03	0.000263	2.52	3158.34	1171.36	0.15
CWC MAIN STEM	SECTION_01	11042	5 yr	7789.00	467.00	479.12	476.77	479.18	0.000273	2.77	4503.91	1203.84	0.15
CWC MAIN STEM	SECTION_01	11042	10 yr	10202.00	467.00	480.08	477.02	480.13	0.000228	2.69	5665.27	1224.17	0.14
CWC MAIN STEM	SECTION_01	11042	25 yr	12745.00	467.00	480.64	477.26	480.71	0.000247	2.89	6357.84	1234.00	0.15
CWC MAIN STEM	SECTION_01	11042	50 yr	15072.00	467.00	481.09	477.44	481.16	0.000266	3.07	6906.28	1241.42	0.15
CWC MAIN STEM	SECTION_01	11042	100 yr	17425.00	467.00	481.48	477.62	481.57	0.000285	3.25	7400.65	1247.37	0.16
CWC MAIN STEM	SECTION_01	11042	500 yr	23278.00	467.00	482.33	478.02	482.45	0.000330	3.65	8468.03	1257.79	0.17
CWC MAIN STEM	SECTION_01	11042	Ultimate 100 yr	18386.00	467.00	481.63	477.69	481.73	0.000293	3.32	7588.68	1249.66	0.16
CWC MAIN STEM	SECTION_01	10760	2 yr	4410.00	465.37	477.71	471.89	477.92	0.000556	3.69	1223.46	932.09	0.22
CWC MAIN STEM	SECTION_01	10760	5 yr	7771.00	465.37	478.47	473.75	479.00	0.001278	5.92	1346.78	999.85	0.34
CWC MAIN STEM	SECTION_01	10760	10 yr	10291.00	465.37	479.96	474.74	480.06	0.000301	3.16	1823.65	1088.91	0.17
CWC MAIN STEM	SECTION_01	10760	25 yr	12894.00	465.37	480.52	475.68	480.63	0.000335	3.44	2425.06	1094.01	0.18
CWC MAIN STEM	SECTION_01	10760	50 yr	15260.00	465.37	480.95	476.44	481.07	0.000365	3.68	2899.99	1109.31	0.19
CWC MAIN STEM	SECTION_01	10760	100 yr	17675.00	465.37	481.33	477.25	481.47	0.000404	3.96	3330.31	1142.02	0.20
CWC MAIN STEM	SECTION_01	10760	500 yr	23650.00	465.37	482.15	479.21	482.34	0.000489	4.54	7283.68	1177.30	0.22
CWC MAIN STEM	SECTION_01	10760	Ultimate 100 yr	18630.00	465.37	481.48	477.55	481.62	0.000416	4.05			

River	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
CWC MAIN STEM	SECTION_01	10676	2 yr	4410.00	465.31	476.08	474.10	477.28	0.004581	8.99	526.37	650.94	0.59
CWC MAIN STEM	SECTION_01	10676	5 yr	7771.00	465.31	477.28	477.28	478.35	0.004360	9.64	1230.44	861.78	0.59
CWC MAIN STEM	SECTION_01	10676	10 yr	10291.00	465.31	477.69	477.30	478.22	0.002702	7.83	2217.40	894.15	0.47
CWC MAIN STEM	SECTION_01	10676	25 yr	12894.00	465.31	478.27	477.58	478.75	0.002396	7.70	2742.67	927.38	0.45
CWC MAIN STEM	SECTION_01	10676	50 yr	15260.00	465.31	478.76	477.83	479.23	0.002210	7.66	3209.05	975.23	0.43
CWC MAIN STEM	SECTION_01	10676	100 yr	17675.00	465.31	479.24	478.04	479.69	0.002000	7.53	3686.80	1002.24	0.42
CWC MAIN STEM	SECTION_01	10676	500 yr	23650.00	465.31	480.44	478.56	480.86	0.001572	7.19	4969.93	1150.53	0.38
CWC MAIN STEM	SECTION_01	10676	Ultimate 100 yr	18630.00	465.31	479.44	478.12	479.88	0.001902	7.44	3890.44	1012.74	0.41
CWC MAIN STEM	SECTION_01	10345	2 yr	4402.00	468.57	475.47	474.85	475.66	0.002064	4.79	1432.87	775.43	0.38
CWC MAIN STEM	SECTION_01	10345	5 yr	7778.00	468.57	476.41	475.32	476.63	0.001851	5.10	2195.60	845.38	0.37
CWC MAIN STEM	SECTION_01	10345	10 yr	10312.00	468.57	477.09	475.62	477.32	0.001690	5.25	2797.07	930.48	0.36
CWC MAIN STEM	SECTION_01	10345	25 yr	12925.00	468.57	477.74	475.90	477.98	0.001418	5.12	3404.56	938.08	0.34
CWC MAIN STEM	SECTION_01	10345	50 yr	15296.00	468.57	478.27	476.14	478.52	0.001280	5.11	3903.63	944.44	0.33
CWC MAIN STEM	SECTION_01	10345	100 yr	17709.00	468.57	478.80	476.37	479.05	0.001168	5.10	4398.65	950.58	0.31
CWC MAIN STEM	SECTION_01	10345	500 yr	23700.00	468.57	480.11	476.91	480.36	0.000880	4.88	6229.34	1351.27	0.28
CWC MAIN STEM	SECTION_01	10345	Ultimate 100 yr	18679.00	468.57	479.02	476.46	479.28	0.001121	5.08	4608.42	955.66	0.31
CWC MAIN STEM	SECTION_01	9744	2 yr	4516.00	466.49	474.68	473.92	474.78	0.001456	3.67	2329.59	1144.42	0.26
CWC MAIN STEM	SECTION_01	9744	5 yr	8059.00	466.49	475.80	474.21	475.91	0.001141	3.63	3634.62	1186.79	0.24
CWC MAIN STEM	SECTION_01	9744	10 yr	10727.00	466.49	476.56	474.46	476.68	0.000985	3.61	4547.83	1210.59	0.22
CWC MAIN STEM	SECTION_01	9744	25 yr	13484.00	466.49	477.30	474.70	477.44	0.000869	3.59	5452.82	1231.38	0.21
CWC MAIN STEM	SECTION_01	9744	50 yr	15991.00	466.49	477.88	474.89	478.02	0.000825	3.65	6162.38	1245.60	0.21
CWC MAIN STEM	SECTION_01	9744	100 yr	18530.00	466.49	478.43	475.07	478.59	0.000784	3.70	6861.00	1258.44	0.21
CWC MAIN STEM	SECTION_01	9744	500 yr	24832.00	466.49	479.81	475.51	479.99	0.000678	3.75	8610.11	1284.14	0.20
CWC MAIN STEM	SECTION_01	9744	Ultimate 100 yr	19518.00	466.49	478.67	475.15	478.83	0.000759	3.70	7160.34	1263.70	0.20
CWC MAIN STEM	SECTION_01	9105	2 yr	4516.00	463.14	473.21	472.02	473.46	0.003441	5.93	1784.32	732.80	0.36
CWC MAIN STEM	SECTION_01	9105	5 yr	8059.00	463.14	474.61	473.12	474.84	0.003094	6.24	2836.32	768.56	0.36
CWC MAIN STEM	SECTION_01	9105	10 yr	10727.00	463.14	475.51	473.53	475.74	0.002912	6.43	3542.17	795.72	0.35
CWC MAIN STEM	SECTION_01	9105	25 yr	13484.00	463.14	476.35	473.90	476.59	0.002773	6.60	4221.47	820.90	0.35
CWC MAIN STEM	SECTION_01	9105	50 yr	15991.00	463.14	476.95	474.20	477.21	0.002798	6.87	4716.75	832.07	0.35
CWC MAIN STEM	SECTION_01	9105	100 yr	18530.00	463.14	477.54	474.47	477.81	0.002786	7.07	5207.85	842.17	0.35
CWC MAIN STEM	SECTION_01	9105	500 yr	24832.00	463.14	479.00	475.07	479.30	0.002598	7.36	6462.70	866.65	0.35
CWC MAIN STEM	SECTION_01	9105	Ultimate 100 yr	19518.00	463.14	477.80	474.58	478.07	0.002724	7.09	5429.85	846.58	0.35
CWC MAIN STEM	SECTION_01	8570	2 yr	4516.00	461.00	471.84	470.28	471.99	0.002348	4.69	1995.87	631.36	0.30
CWC MAIN STEM	SECTION_01	8570	5 yr	8059.00	461.00	473.27	471.01	473.45	0.002492	5.43	2925.75	672.07	0.32
CWC MAIN STEM	SECTION_01	8570	10 yr	10727.00	461.00	474.21	471.48	474.41	0.002520	5.84	3572.43	707.64	0.33
CWC MAIN STEM	SECTION_01	8570	25 yr	13484.00	461.00	475.11	471.89	475.33	0.002393	6.03	4216.36	716.12	0.32
CWC MAIN STEM	SECTION_01	8570	50 yr	15991.00	461.00	475.66	472.20	475.91	0.002553	6.44	4611.05	721.31	0.34
CWC MAIN STEM	SECTION_01	8570	100 yr	18530.00	461.00	476.22	472.52	476.49	0.002660	6.79	5015.85	731.37	0.35
CWC MAIN STEM	SECTION_01	8570	500 yr	24832.00	461.00	477.69	473.18	478.01	0.002737	7.45	6129.28	795.15	0.36
CWC MAIN STEM	SECTION_01	8570	Ultimate 100 yr	19518.00	461.00	476.50	472.63	476.78	0.002624	6.85	5224.67	740.42	0.35
CWC MAIN STEM	SECTION_01	7925	2 yr	4516.00	460.00	470.08	469.27	470.42	0.004311	6.32	1453.37	560.55	0.41
CWC MAIN STEM	SECTION_01	7925	5 yr	8059.00	460.00	471.63	470.10	471.96	0.003861	6.80	2329.51	708.47	0.40
CWC MAIN STEM	SECTION_01	7925	10 yr	10727.00	460.00	472.61	470.59	472.96	0.003669	7.12	2919.91	773.98	0.40
CWC MAIN STEM	SECTION_01	7925	25 yr	13484.00	460.00	473.56	471.04	473.93	0.003636	7.54	3530.69	856.27	0.41
CWC MAIN STEM	SECTION_01	7925	50 yr	15991.00	460.00	474.22	471.39	474.55	0.003285	7.45	4495.30	878.67	0.39
CWC MAIN STEM	SECTION_01	7925	100 yr	18530.00	460.00	474.78	471.68	475.12	0.003249	7.65	4992.54	891.32	0.39
CWC MAIN STEM	SECTION_01	7925	500 yr	24832.00	460.00	476.38	472.51	476.72	0.002913	7.88	6551.21	1022.28	0.38
CWC MAIN STEM	SECTION_01	7925	Ultimate 100 yr	19518.00	460.00	475.07	471.82	475.42	0.003298	7.84	5256.53	950.70	0.39
CWC MAIN STEM	SECTION_01	7300	2 yr	4516.00	459.00	468.66	465.85	468.78	0.001259	3.94	2566.93	867.67	0.23
CWC MAIN STEM	SECTION_01	7300	5 yr	8059.00	459.00	470.43	467.81	470.53	0.001096	4.15	4143.23	926.43	0.23
CWC MAIN STEM	SECTION_01	7300	10 yr	10727.00	459.00	471.49	468.24	471.61	0.001069	4.37	5168.76	1000.43	0.23
CWC MAIN STEM	SECTION_01	7300	25 yr	13484.00	459.00	472.47	468.63	472.59	0.001026	4.52	6187.11	1041.56	0.22
CWC MAIN STEM	SECTION_01	7300	50 yr	15991.00	459.00	473.19	468.91	473.32	0.001036	4.71	6931.05	1073.43	0.23
CWC MAIN STEM	SECTION_01	7300	100 yr	18530.00	459.00	473.75	469.18	473.89	0.001095	4.98	7536.06	1095.24	0.24
CWC MAIN STEM	SECTION_01	7300	500 yr	24832.00	459.00	475.46	469.79	475.61	0.001034	5.23	9485.21	1186.16	0.23
CWC MAIN STEM	SECTION_01	7300	Ultimate 100 yr	19518.00	459.00	474.04	469.29	474.18	0.001083	5.02	7857.34	1111.12	0.23
CWC MAIN STEM	SECTION_01	6941	2 yr	4516.00	459.00	468.38	465.95	468.42	0.000714	2.74	3414.11	894.51	0.17
CWC MAIN STEM	SECTION_01	6941	5 yr	8059.00	459.00	470.15	466.40	470.21	0.000698	3.09	5043.14	938.43	0.17
CWC MAIN STEM	SECTION_01	6941	10 yr	10727.00	459.00	471.22	464.99	471.28	0.000707	3.34	6056.94	962.77	0.18
CWC MAIN STEM	SECTION_01	6941	25 yr	13484.00	459.00	472.20	467.12	472.27	0.000741	3.61	7028.58	1028.08	0.18
CWC MAIN STEM	SECTION_01	6941	50 yr	15991.00	459.00	472.91	467.37	472.99	0.000770	3.83	7770.49	1047.65	0.19
CWC MAIN STEM	SECTION_01	6941	100 yr	18530.00	459.00	473.45	467.61	473.54	0.000836	4.10	8337.33	1061.33	0.20
CWC MAIN STEM	SECTION_01	6941	500 yr	24832.00	459.00	475.17	468.15	475.28	0.000826	4.43	10199.64	1113.15	0.20
CWC MAIN STEM	SECTION_01	6941	Ultimate 100 yr	19518.00	459.00	473.74	467.70	473.84	0.000828	4.15	8651.06	1067.21	0.20
CWC MAIN STEM	SECTION_01	6495	2 yr	4516.00	458.51	467.69	465.85	467.88	0.002659	5.24	1758.64	529.35	0.33
CWC MAIN STEM	SECTION_01	6495	5 yr	8059.00	458.51	469.48	466.68	469.69	0.002506	5.84	2858.13	671.74	0.33
CWC MAIN STEM	SECTION_01	6495	10 yr	10727.00	458.51	470.55	467.21	470.77	0.002361	6.08	3610.61	723.19	0.33
CWC MAIN STEM	SECTION_01	6495	25 yr	13484.00	458.51	471.52	467.56	471.74	0.002232	6.26	4323.37	753.17	0.32
CWC MAIN STEM	SECTION_01	6495	50 yr	15991.00	458.51	472.21	468.41	472.45	0.002236	6.51	4850.10	765.15	0.33
CWC MAIN STEM	SECTION_01	6495	100 yr	18530.00	458.51	472.68	468.76	472.95	0.002428	6.96	5212.70	774.67	0.34
CWC MAIN STEM	SECTION_01	6495	500 yr	24832.00	458.51	474.42	469.54	474.71	0.002216	7.23	6610.49	828.43	0.33
CWC MAIN STEM	SECTION_01	6495	Ultimate 100 yr	19518.00	458.51	472.99	468.91	473.26	0.002366	6.98	5450.70	782.84	0.34
CWC MAIN STEM	SECTION_02	5978	2 yr	4309.00	457.91	466.94	463.92	466.98	0.000628	2.62	3377.83	898.66	0.17
CWC MAIN STEM	SECTION_02	5978	5 yr	7827.00	457.91	468.77	464.62	468.82	0.000655	3.09	5111.85	1019.51	0.18
CWC MAIN STEM	SECTION_02	5978	10 yr	10526.00	457.91	469.88	465.02	469.94	0.000657	3.32	6284.31	1073.87	0.18
CWC MAIN STEM	SECTION_02	5978	25 yr	13350.00	457.91	470.88	465.42	470.94	0.000658	3.53	7372.00	1107.36	0.18
CWC MAIN STEM	SECTION_02	5978	50 yr	15900.00	457.91	471.56	465.73	471.63	0.000726	3.85	8145.19	1171.05	0.19
CWC MAIN STEM	SECTION_02	5978	100 yr	18304.00	457.91	471.97	466.00	472.06	0.000809	4.16	8635.53	1184.52	0.20
CWC MAIN STEM	SECTION_02	5978	500 yr	25195.00	457.91	473.77	466.73	473.87	0.000814	4.55	10905.84	1318.16	0.21
CWC MAIN STEM	SECTION_02	5978	Ultimate 100 yr	19398.00	457.91	472.29	466.12	472.39	0.000803	4.21	9019.80	1210.77	0.20
CWC MAIN STEM	SECTION_02	5662	2 yr	4309.00									

River	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
CWC MAIN STEM	SECTION_02	5662	10 yr	10526.00	457.00	469.61	464.78	469.69	0.000985	4.14	5475.34	1017.07	0.22
CWC MAIN STEM	SECTION_02	5662	25 yr	13350.00	457.00	470.61	465.31	470.70	0.000936	4.27	6510.05	1038.67	0.21
CWC MAIN STEM	SECTION_02	5662	50 yr	15900.00	457.00	471.27	465.72	471.37	0.001014	4.60	7202.38	1086.93	0.23
CWC MAIN STEM	SECTION_02	5662	100 yr	18304.00	457.00	471.65	466.02	471.77	0.001151	5.00	7618.88	1111.08	0.24
CWC MAIN STEM	SECTION_02	5662	500 yr	25195.00	457.00	473.45	467.69	473.58	0.001087	5.29	9703.17	1191.42	0.24
CWC MAIN STEM	SECTION_02	5662	Ultimate 100 yr	19398.00	457.00	471.97	466.20	472.09	0.001135	5.05	7983.95	1129.75	0.24
CWC MAIN STEM	SECTION_02	5486	2 yr	4309.00	457.63	466.06	464.67	466.41	0.004233	6.71	1477.77	654.07	0.42
CWC MAIN STEM	SECTION_02	5486	5 yr	7827.00	457.63	468.03	465.88	468.26	0.002682	6.20	2893.69	822.78	0.35
CWC MAIN STEM	SECTION_02	5486	10 yr	10526.00	457.63	469.23	466.70	469.42	0.002183	6.04	3833.70	902.66	0.32
CWC MAIN STEM	SECTION_02	5486	25 yr	13350.00	457.63	470.26	467.16	470.45	0.002045	6.21	4957.42	1014.95	0.32
CWC MAIN STEM	SECTION_02	5486	50 yr	15900.00	457.63	470.90	467.51	471.10	0.002029	6.40	5622.45	1042.32	0.32
CWC MAIN STEM	SECTION_02	5486	100 yr	18304.00	457.63	471.24	467.81	471.47	0.002252	6.86	5973.39	1051.18	0.34
CWC MAIN STEM	SECTION_02	5486	500 yr	25195.00	457.63	473.08	468.56	473.30	0.002031	7.11	8002.80	1222.55	0.33
CWC MAIN STEM	SECTION_02	5486	Ultimate 100 yr	19398.00	457.63	471.58	467.94	471.80	0.002122	6.78	6335.73	1058.09	0.33
CWC MAIN STEM	SECTION_02	5320	2 yr	4309.00	455.58	465.69	462.32	465.88	0.001583	4.24	1616.74	398.84	0.26
CWC MAIN STEM	SECTION_02	5320	5 yr	7827.00	455.58	467.61	463.91	467.88	0.001887	5.34	2313.32	680.19	0.30
CWC MAIN STEM	SECTION_02	5320	10 yr	10526.00	455.58	468.72	464.61	469.06	0.002081	6.02	2726.34	828.50	0.32
CWC MAIN STEM	SECTION_02	5320	25 yr	13350.00	455.58	469.86	465.55	470.13	0.001761	5.91	4512.46	893.59	0.30
CWC MAIN STEM	SECTION_02	5320	50 yr	15900.00	455.58	470.49	466.06	470.78	0.001839	6.24	5062.67	926.74	0.31
CWC MAIN STEM	SECTION_02	5320	100 yr	18304.00	455.58	470.75	466.47	471.09	0.002163	6.86	5294.22	944.69	0.33
CWC MAIN STEM	SECTION_02	5320	500 yr	25195.00	455.58	472.61	467.62	472.96	0.002047	7.29	7260.99	1097.60	0.33
CWC MAIN STEM	SECTION_02	5320	Ultimate 100 yr	19398.00	455.58	471.11	466.66	471.44	0.002066	6.83	5622.79	972.81	0.33
CWC MAIN STEM	SECTION_02	5269		Bridge									
CWC MAIN STEM	SECTION_02	5211	2 yr	4309.00	455.30	465.13	463.50	465.45	0.003512	5.85	1247.02	326.34	0.38
CWC MAIN STEM	SECTION_02	5211	5 yr	7827.00	455.30	466.89	464.65	467.33	0.003963	7.18	1831.39	368.25	0.42
CWC MAIN STEM	SECTION_02	5211	10 yr	10526.00	455.30	467.89	465.32	468.42	0.004243	7.96	2178.36	617.45	0.44
CWC MAIN STEM	SECTION_02	5211	25 yr	13350.00	455.30	468.82	465.91	469.44	0.004461	8.66	2500.14	832.10	0.46
CWC MAIN STEM	SECTION_02	5211	50 yr	15900.00	455.30	469.59	466.45	470.20	0.004569	9.17	3659.10	989.54	0.47
CWC MAIN STEM	SECTION_02	5211	100 yr	18304.00	455.30	470.24	466.80	470.83	0.004322	9.24	4244.32	1010.83	0.46
CWC MAIN STEM	SECTION_02	5211	500 yr	25195.00	455.30	471.93	468.13	472.44	0.003462	9.00	5804.27	1064.68	0.42
CWC MAIN STEM	SECTION_02	5211	Ultimate 100 yr	19398.00	455.30	470.54	467.21	471.11	0.004115	9.16	4516.70	1021.23	0.45
CWC MAIN STEM	SECTION_02	4966	2 yr	4309.00	455.10	464.61	462.32	464.71	0.001776	4.30	2142.18	634.55	0.27
CWC MAIN STEM	SECTION_02	4966	5 yr	7827.00	455.10	466.35	463.13	466.47	0.001898	5.10	3477.29	863.25	0.29
CWC MAIN STEM	SECTION_02	4966	10 yr	10526.00	455.10	467.38	463.54	467.51	0.001733	5.22	4382.32	889.88	0.28
CWC MAIN STEM	SECTION_02	4966	25 yr	13350.00	455.10	468.33	464.13	468.47	0.001662	5.42	5245.25	931.47	0.28
CWC MAIN STEM	SECTION_02	4966	50 yr	15900.00	455.10	469.09	464.50	469.23	0.001628	5.60	5955.08	959.37	0.28
CWC MAIN STEM	SECTION_02	4966	100 yr	18304.00	455.10	469.75	464.77	469.91	0.001592	5.74	6604.31	982.30	0.28
CWC MAIN STEM	SECTION_02	4966	500 yr	25195.00	455.10	471.51	465.66	471.68	0.001482	6.03	8373.86	1029.28	0.28
CWC MAIN STEM	SECTION_02	4966	Ultimate 100 yr	19398.00	455.10	470.07	464.88	470.22	0.001561	5.78	6914.72	992.07	0.28
CWC MAIN STEM	SECTION_02	4663	2 yr	4204.00	454.90	464.20	462.27	464.31	0.001788	4.20	2063.78	633.81	0.27
CWC MAIN STEM	SECTION_02	4663	5 yr	7600.00	454.90	465.96	463.09	466.09	0.001646	4.65	3236.73	695.83	0.27
CWC MAIN STEM	SECTION_02	4663	10 yr	10184.00	454.90	466.99	463.57	467.14	0.001676	5.05	3981.50	748.97	0.28
CWC MAIN STEM	SECTION_02	4663	25 yr	12986.00	454.90	467.94	464.00	468.11	0.001681	5.37	4707.95	776.97	0.28
CWC MAIN STEM	SECTION_02	4663	50 yr	15355.00	454.90	468.69	464.35	468.87	0.001663	5.58	5299.87	796.01	0.29
CWC MAIN STEM	SECTION_02	4663	100 yr	17660.00	454.90	469.36	464.65	469.55	0.001659	5.78	5836.77	812.74	0.29
CWC MAIN STEM	SECTION_02	4663	500 yr	24778.00	454.90	471.10	465.47	471.33	0.001695	6.38	7288.72	851.88	0.30
CWC MAIN STEM	SECTION_02	4663	Ultimate 100 yr	18835.00	454.90	469.67	464.79	469.87	0.001664	5.89	6091.85	820.41	0.29
CWC MAIN STEM	SECTION_02	4006	2 yr	4204.00	454.40	463.47	461.14	463.56	0.001480	3.57	2156.91	569.27	0.25
CWC MAIN STEM	SECTION_02	4006	5 yr	7600.00	454.40	465.27	461.84	465.39	0.001542	4.28	3288.71	691.69	0.26
CWC MAIN STEM	SECTION_02	4006	10 yr	10184.00	454.40	466.29	462.31	466.43	0.001612	4.73	4010.04	752.09	0.27
CWC MAIN STEM	SECTION_02	4006	25 yr	12986.00	454.40	467.25	462.70	467.40	0.001593	5.02	4744.18	774.19	0.28
CWC MAIN STEM	SECTION_02	4006	50 yr	15355.00	454.40	468.02	462.99	468.19	0.001553	5.20	5349.24	795.93	0.28
CWC MAIN STEM	SECTION_02	4006	100 yr	17660.00	454.40	468.70	463.31	468.88	0.001535	5.38	5892.97	813.07	0.28
CWC MAIN STEM	SECTION_02	4006	500 yr	24778.00	454.40	470.43	464.13	470.65	0.001571	5.97	7347.96	861.97	0.29
CWC MAIN STEM	SECTION_02	4006	Ultimate 100 yr	18835.00	454.40	469.01	463.48	469.19	0.001540	5.49	6147.58	821.88	0.28
CWC MAIN STEM	SECTION_02	3730	2 yr	4204.00	454.20	463.09	460.87	463.18	0.002066	3.62	2031.46	614.48	0.28
CWC MAIN STEM	SECTION_02	3730	5 yr	7600.00	454.20	464.92	461.61	465.03	0.001715	4.03	3207.29	668.72	0.27
CWC MAIN STEM	SECTION_02	3730	10 yr	10184.00	454.20	465.93	462.09	466.06	0.001767	4.47	3899.47	713.75	0.28
CWC MAIN STEM	SECTION_02	3730	25 yr	12986.00	454.20	466.89	462.50	467.04	0.001741	4.79	4600.37	734.69	0.28
CWC MAIN STEM	SECTION_02	3730	50 yr	15355.00	454.20	467.67	462.84	467.84	0.001685	4.98	5178.00	744.39	0.28
CWC MAIN STEM	SECTION_02	3730	100 yr	17660.00	454.20	468.35	463.16	468.53	0.001673	5.19	5687.18	755.36	0.28
CWC MAIN STEM	SECTION_02	3730	500 yr	24778.00	454.20	470.07	463.95	470.30	0.001722	5.82	7001.66	786.89	0.29
CWC MAIN STEM	SECTION_02	3730	Ultimate 100 yr	18835.00	454.20	468.66	463.30	468.85	0.001676	5.29	5921.83	758.36	0.28
CWC MAIN STEM	SECTION_02	3081	2 yr	4198.00	453.70	462.21	460.00	462.26	0.001271	2.89	2456.79	656.93	0.22
CWC MAIN STEM	SECTION_02	3081	5 yr	7575.00	453.70	464.20	460.18	464.27	0.001057	3.25	3853.69	729.16	0.21
CWC MAIN STEM	SECTION_02	3081	10 yr	10156.00	453.70	465.18	460.57	465.27	0.001122	3.63	4578.14	752.62	0.22
CWC MAIN STEM	SECTION_02	3081	25 yr	12984.00	453.70	466.14	460.94	466.25	0.001187	4.01	5316.23	788.08	0.23
CWC MAIN STEM	SECTION_02	3081	50 yr	15368.00	453.70	466.94	461.23	467.05	0.001188	4.24	5952.99	811.68	0.23
CWC MAIN STEM	SECTION_02	3081	100 yr	17688.00	453.70	467.62	461.50	467.75	0.001204	4.46	6510.60	829.01	0.24
CWC MAIN STEM	SECTION_02	3081	500 yr	24829.00	453.70	469.30	462.24	469.47	0.001307	5.12	7943.44	869.53	0.25
CWC MAIN STEM	SECTION_02	3081	Ultimate 100 yr	18863.00	453.70	467.92	461.63	468.06	0.001222	4.58	6765.00	836.98	0.24
CWC MAIN STEM	SECTION_02	2442	2 yr	4198.00	453.30	461.58	458.81	461.64	0.001312	2.66	2339.51	609.65	0.22
CWC MAIN STEM	SECTION_02	2442	5 yr	7575.00	453.30	463.68	459.44	463.76	0.001086	3.11	3709.76	715.38	0.21
CWC MAIN STEM	SECTION_02	2442	10 yr	10156.00	453.30	464.62	459.86	464.72	0.001196	3.55	4397.49	757.54	0.23
CWC MAIN STEM	SECTION_02	2442	25 yr	12984.00	453.30	465.53	460.28	465.66	0.001287	3.98	5113.00	803.29	0.24
CWC MAIN STEM	SECTION_02	2442	50 yr	15368.00	453.30	466.33	460.59	466.46	0.001283	4.21	5788.38	844.80	0.24
CWC MAIN STEM	SECTION_02	2442	100 yr	17688.00	453.30	467.00	460.87	467.15	0.001293	4.43	6350.78	883.59	0.25
CWC MAIN STEM	SECTION_02	2442	500 yr	24829.00	453.30	468.65	461.67	468.84	0.001368	5.04	7855.22	949.04	0.26
CWC MAIN STEM	SECTION_02	2442	Ultimate 100 yr	18863.00	453.30	467.30	461.02	467.46	0.001304	4.53	6616.23	894.99	0.25
CWC MAIN STEM	SECTION_02	1888	2 yr	4198.00	452.90	460.84	458.65	460.94	0.001941	3.83	2076.72	643.32	0.28
CWC MAIN STEM	SECTION_02	1888	5 yr	7575.00	452.90	463.16	459.44	463.25	0.001199	3.76	3638.40	705.93	0.23

River	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
CWC MAIN STEM	SECTION_02	1888	10 yr	10156.00	452.90	464.04	459.89	464.15	0.001344	4.26	4267.34	730.41	0.25
CWC MAIN STEM	SECTION_02	1888	25 yr	12984.00	452.90	464.91	460.31	465.05	0.001442	4.69	4916.06	753.60	0.26
CWC MAIN STEM	SECTION_02	1888	50 yr	15368.00	452.90	465.71	460.55	465.86	0.001432	4.92	5527.80	777.11	0.26
CWC MAIN STEM	SECTION_02	1888	100 yr	17688.00	452.90	466.38	460.55	466.54	0.001453	5.16	6050.51	794.52	0.27
CWC MAIN STEM	SECTION_02	1888	500 yr	24829.00	452.90	467.95	461.81	468.17	0.001645	5.98	7339.91	848.80	0.29
CWC MAIN STEM	SECTION_02	1888	Ultimate 100 yr	18863.00	452.90	466.67	461.18	466.84	0.001481	5.30	6280.17	802.62	0.27
CWC MAIN STEM	SECTION_03	1288	2 yr	4254.00	452.40	459.99	457.93	460.03	0.000995	2.60	3130.46	1011.68	0.20
CWC MAIN STEM	SECTION_03	1288	5 yr	7783.00	452.40	462.71	458.45	462.74	0.000449	2.29	5965.63	1075.49	0.14
CWC MAIN STEM	SECTION_03	1288	10 yr	10218.00	452.40	463.53	458.73	463.57	0.000498	2.58	6860.67	1089.25	0.15
CWC MAIN STEM	SECTION_03	1288	25 yr	13613.00	452.40	464.36	459.08	464.41	0.000596	2.99	7760.96	1098.37	0.17
CWC MAIN STEM	SECTION_03	1288	50 yr	16349.00	452.40	465.16	459.33	465.22	0.000613	3.19	8644.96	1112.64	0.17
CWC MAIN STEM	SECTION_03	1288	100 yr	19320.00	452.40	465.80	459.58	465.88	0.000671	3.48	9368.93	1137.13	0.18
CWC MAIN STEM	SECTION_03	1288	500 yr	27159.00	452.40	467.30	460.18	467.41	0.000781	4.08	11099.52	1164.61	0.20
CWC MAIN STEM	SECTION_03	1288	Ultimate 100 yr	20690.00	452.40	466.07	459.69	466.16	0.000696	3.60	9681.40	1144.12	0.19
CWC MAIN STEM	SECTION_03	1075	2 yr	4241.00	452.27	459.21	457.52	459.61	0.005026	5.32	900.83	958.43	0.44
CWC MAIN STEM	SECTION_03	1075	5 yr	7734.00	452.27	462.10	458.80	462.52	0.002839	5.52	1600.91	1116.43	0.35
CWC MAIN STEM	SECTION_03	1075	10 yr	10177.00	452.27	463.38	459.51	463.44	0.000556	2.71	6060.75	1142.66	0.16
CWC MAIN STEM	SECTION_03	1075	25 yr	13598.00	452.27	464.19	460.38	464.27	0.000606	3.00	7485.83	1153.72	0.17
CWC MAIN STEM	SECTION_03	1075	50 yr	16353.00	452.27	464.99	461.02	465.07	0.000613	3.19	8411.86	1169.10	0.17
CWC MAIN STEM	SECTION_03	1075	100 yr	19294.00	452.27	465.62	461.66	465.72	0.000663	3.45	9153.55	1190.87	0.18
CWC MAIN STEM	SECTION_03	1075	500 yr	27161.00	452.27	467.09	462.50	467.22	0.000766	4.03	10935.10	1225.01	0.20
CWC MAIN STEM	SECTION_03	1075	Ultimate 100 yr	20692.00	452.27	465.88	461.96	465.99	0.000689	3.57	9472.23	1200.30	0.19
CWC MAIN STEM	SECTION_03	1005		Bridge									
CWC MAIN STEM	SECTION_03	914	2 yr	4241.00	449.00	457.89	452.81	458.15	0.001448	4.11	1100.29	854.92	0.25
CWC MAIN STEM	SECTION_03	914	5 yr	7734.00	449.00	458.81	454.60	459.47	0.003283	6.65	1263.20	877.57	0.39
CWC MAIN STEM	SECTION_03	914	10 yr	10177.00	449.00	459.93	455.67	460.81	0.003759	7.68	1474.67	953.23	0.42
CWC MAIN STEM	SECTION_03	914	25 yr	13598.00	449.00	461.39	457.18	462.49	0.004044	8.71	1791.27	1051.05	0.45
CWC MAIN STEM	SECTION_03	914	50 yr	16353.00	449.00	462.73	458.14	462.91	0.000982	6.61	6409.05	1087.22	0.23
CWC MAIN STEM	SECTION_03	914	100 yr	19294.00	449.00	463.88	459.05	464.05	0.000861	4.57	7520.85	1159.27	0.21
CWC MAIN STEM	SECTION_03	914	500 yr	27161.00	449.00	466.63	461.41	466.78	0.000662	4.51	11361.12	1340.67	0.19
CWC MAIN STEM	SECTION_03	914	Ultimate 100 yr	20692.00	449.00	464.40	459.45	464.56	0.000782	4.46	8565.53	1174.37	0.20
CWC MAIN STEM	SECTION_03	738	2 yr	4241.00	449.00	457.72	454.07	457.84	0.001313	3.69	2327.95	924.25	0.24
CWC MAIN STEM	SECTION_03	738	5 yr	7734.00	449.00	458.57	456.97	458.78	0.002094	5.01	3137.40	958.21	0.30
CWC MAIN STEM	SECTION_03	738	10 yr	10177.00	449.00	459.84	457.42	460.00	0.001482	4.62	4375.06	998.23	0.26
CWC MAIN STEM	SECTION_03	738	25 yr	13598.00	449.00	461.43	457.91	461.56	0.001075	4.35	6002.69	1040.86	0.23
CWC MAIN STEM	SECTION_03	738	50 yr	16353.00	449.00	462.60	458.21	462.72	0.000902	4.26	7236.14	1072.73	0.21
CWC MAIN STEM	SECTION_03	738	100 yr	19294.00	449.00	463.77	458.56	463.88	0.000780	4.20	8506.71	1101.70	0.20
CWC MAIN STEM	SECTION_03	738	500 yr	27161.00	449.00	466.54	459.27	466.65	0.000633	4.28	11680.05	1206.76	0.19
CWC MAIN STEM	SECTION_03	738	Ultimate 100 yr	20692.00	449.00	464.29	458.70	464.41	0.000736	4.19	9089.59	1111.47	0.20
CWC MAIN STEM	SECTION_03	523	2 yr	4241.00	449.00	457.57	451.72	457.65	0.000489	2.39	2521.49	796.79	0.15
CWC MAIN STEM	SECTION_03	523	5 yr	7734.00	449.00	458.28	453.04	458.46	0.001061	3.73	3101.09	824.91	0.22
CWC MAIN STEM	SECTION_03	523	10 yr	10177.00	449.00	459.60	453.83	459.76	0.000904	3.77	4215.15	865.43	0.21
CWC MAIN STEM	SECTION_03	523	25 yr	13598.00	449.00	461.23	454.84	461.38	0.000760	3.82	5652.75	897.58	0.20
CWC MAIN STEM	SECTION_03	523	50 yr	16353.00	449.00	462.42	455.58	462.57	0.000686	3.87	6730.04	919.29	0.19
CWC MAIN STEM	SECTION_03	523	100 yr	19294.00	449.00	463.60	456.31	463.75	0.000630	3.93	7827.15	941.25	0.18
CWC MAIN STEM	SECTION_03	523	500 yr	27161.00	449.00	466.37	458.46	466.54	0.000562	4.18	10554.21	1040.86	0.18
CWC MAIN STEM	SECTION_03	523	Ultimate 100 yr	20692.00	449.00	464.13	456.66	464.28	0.000609	3.96	8329.60	951.43	0.18
CWC MAIN STEM	SECTION_03	128	2 yr	4241.00	449.00	457.50	450.42	457.51	0.000102	0.98	4342.15	649.77	0.07
CWC MAIN STEM	SECTION_03	128	5 yr	7734.00	449.00	458.13	451.12	458.17	0.000253	1.64	4756.47	673.01	0.11
CWC MAIN STEM	SECTION_03	128	10 yr	10177.00	449.00	459.46	451.54	459.51	0.000253	1.83	5672.47	702.01	0.11
CWC MAIN STEM	SECTION_03	128	25 yr	13598.00	449.00	461.10	452.07	461.17	0.000253	2.04	6854.15	737.42	0.11
CWC MAIN STEM	SECTION_03	128	50 yr	16353.00	449.00	462.30	452.47	462.37	0.000254	2.20	7752.56	769.53	0.11
CWC MAIN STEM	SECTION_03	128	100 yr	19294.00	449.00	463.48	452.88	463.56	0.000253	2.34	8683.65	804.46	0.11
CWC MAIN STEM	SECTION_03	128	500 yr	27161.00	449.00	466.26	453.83	466.37	0.000253	2.67	11086.78	917.30	0.12
CWC MAIN STEM	SECTION_03	128	Ultimate 100 yr	20692.00	449.00	464.10	453.06	464.10	0.000253	2.40	9116.37	822.61	0.12
NF CWC	SECTION_02	12725	2 yr	2570.00	523.08	529.35	527.62	530.04	0.003121	6.64	387.06	89.29	0.54
NF CWC	SECTION_02	12725	5 yr	4023.00	523.08	530.48	528.81	531.57	0.003818	8.38	479.96	94.26	0.61
NF CWC	SECTION_02	12725	10 yr	4870.00	523.08	531.05	529.42	532.38	0.004073	9.23	527.83	96.82	0.64
NF CWC	SECTION_02	12725	25 yr	6050.00	523.08	531.85	530.18	533.26	0.004147	9.54	634.48	100.46	0.65
NF CWC	SECTION_02	12725	50 yr	7145.00	523.08	532.45	530.83	534.11	0.004402	10.33	691.88	103.41	0.68
NF CWC	SECTION_02	12725	100 yr	8009.00	523.08	532.87	531.32	534.73	0.004642	10.95	731.54	105.67	0.70
NF CWC	SECTION_02	12725	500 yr	10425.00	523.08	533.88	532.38	536.33	0.005288	12.56	829.98	111.13	0.76
NF CWC	SECTION_02	12725	Ultimate 100 yr	8099.00	523.08	532.91	531.35	534.79	0.004667	11.01	735.47	105.89	0.70
NF CWC	SECTION_02	12556	2 yr	2570.00	523.00	528.52	527.59	529.33	0.005461	7.21	356.35	101.35	0.68
NF CWC	SECTION_02	12556	5 yr	4023.00	523.00	529.72	528.68	530.79	0.005516	8.30	484.81	112.40	0.70
NF CWC	SECTION_02	12556	10 yr	4870.00	523.00	530.32	529.20	531.52	0.005548	8.80	553.32	117.88	0.72
NF CWC	SECTION_02	12556	25 yr	6050.00	523.00	531.07	529.89	532.44	0.005569	9.39	644.16	124.75	0.73
NF CWC	SECTION_02	12556	50 yr	7145.00	523.00	531.69	530.47	533.21	0.005589	9.87	723.80	130.42	0.74
NF CWC	SECTION_02	12556	100 yr	8009.00	523.00	532.13	530.91	533.76	0.005458	10.25	782.16	134.34	0.74
NF CWC	SECTION_02	12556	500 yr	10425.00	523.00	533.24	531.96	535.19	0.005236	11.24	936.12	146.11	0.74
NF CWC	SECTION_02	12556	Ultimate 100 yr	8099.00	523.00	532.18	530.96	533.82	0.005447	10.29	788.03	134.73	0.74
NF CWC	SECTION_02	12396	2 yr	2570.00	522.00	526.66	526.56	528.09	0.011523	9.57	268.58	87.54	0.96
NF CWC	SECTION_02	12396	5 yr	4023.00	522.00	527.93	527.70	529.60	0.009989	10.36	388.39	100.86	0.93
NF CWC	SECTION_02	12396	10 yr	4870.00	522.00	528.58	528.27	530.35	0.009355	10.70	455.21	107.13	0.91
NF CWC	SECTION_02	12396	25 yr	6050.00	522.00	529.36	528.98	531.30	0.008759	11.16	542.22	113.93	0.90
NF CWC	SECTION_02	12396	50 yr	7145.00	522.00	530.10	529.56	532.11	0.007985	11.37	628.66	119.76	0.87
NF CWC	SECTION_02	12396	100 yr	8009.00	522.00	530.62	530.00	532.70	0.007693	11.58	691.56	124.49	0.87
NF CWC	SECTION_02	12396	500 yr	10425.00	522.00	532.01	531.14	534.22	0.006815	11.92	874.63	137.55	0.83
NF CWC	SECTION_02	12396	Ultimate 100 yr	8099.00	522.00	530.69	530.05	532.76	0.007602	11.57	700.25	125.17	0.86
NF CWC	SECTION_02	12079	2 yr	2705.00	519.00	525.18	523.00	525.63	0.002118	5.38	502.50	108.07	0.44
NF CWC	SECTION_02	12079	5 yr	4245.00	519.00	526.75	524.06	527.36	0.002132	6.25	679.13	116.90	0.46

River	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
NF CWC	SECTION_02	12079	10 yr	5131.00	519.00	527.51	524.60	528.20	0.002160	6.67	769.29	121.15	0.47
NF CWC	SECTION_02	12079	25 yr	6351.00	519.00	528.41	525.27	529.22	0.002234	7.21	880.38	126.24	0.48
NF CWC	SECTION_02	12079	50 yr	7588.00	519.00	529.23	525.92	530.15	0.002297	7.69	986.28	130.93	0.49
NF CWC	SECTION_02	12079	100 yr	8499.00	519.00	529.78	526.36	530.78	0.002349	8.02	1059.21	134.14	0.50
NF CWC	SECTION_02	12079	500 yr	11081.00	519.00	531.29	527.54	532.48	0.002241	8.76	1276.49	158.57	0.51
NF CWC	SECTION_02	12079	Ultimate 100 yr	8617.00	519.00	529.86	526.41	530.86	0.002352	8.06	1069.07	134.59	0.50
NF CWC	SECTION_02	11615	2 yr	2705.00	517.45	523.70	522.21	524.37	0.003649	6.54	413.54	100.00	0.57
NF CWC	SECTION_02	11615	5 yr	4245.00	517.45	525.32	523.34	526.14	0.003283	7.28	583.14	110.63	0.56
NF CWC	SECTION_02	11615	10 yr	5131.00	517.45	526.05	523.92	526.97	0.003259	7.70	666.36	115.44	0.56
NF CWC	SECTION_02	11615	25 yr	6351.00	517.45	526.86	524.64	527.94	0.003401	8.34	761.49	120.70	0.59
NF CWC	SECTION_02	11615	50 yr	7588.00	517.45	527.61	525.31	528.83	0.003504	8.89	853.65	125.63	0.60
NF CWC	SECTION_02	11615	100 yr	8499.00	517.45	528.09	525.77	529.43	0.003610	9.29	914.97	128.82	0.61
NF CWC	SECTION_02	11615	500 yr	11081.00	517.45	529.73	526.95	531.21	0.003303	9.76	1136.88	149.05	0.60
NF CWC	SECTION_02	11615	Ultimate 100 yr	8617.00	517.45	528.16	525.82	529.51	0.003605	9.32	924.29	129.29	0.61
NF CWC	SECTION_02	11107	2 yr	2705.00	516.00	522.13	520.26	522.69	0.002838	6.01	450.22	102.40	0.50
NF CWC	SECTION_02	11107	5 yr	4245.00	516.00	524.01	521.40	524.66	0.002335	6.50	653.34	113.70	0.48
NF CWC	SECTION_02	11107	10 yr	5131.00	516.00	524.74	521.98	525.49	0.002392	6.95	737.87	117.93	0.49
NF CWC	SECTION_02	11107	25 yr	6351.00	516.00	525.40	522.68	526.34	0.002716	7.76	817.94	121.73	0.53
NF CWC	SECTION_02	11107	50 yr	7588.00	516.00	526.04	523.37	527.15	0.002982	8.47	896.37	125.57	0.56
NF CWC	SECTION_02	11107	100 yr	8499.00	516.00	526.40	523.82	527.66	0.003243	9.02	942.32	127.76	0.59
NF CWC	SECTION_02	11107	500 yr	11081.00	516.00	528.28	524.98	529.62	0.002793	9.30	1191.94	137.61	0.56
NF CWC	SECTION_02	11107	Ultimate 100 yr	8617.00	516.00	526.48	523.87	527.75	0.003238	9.05	951.86	128.20	0.59
NF CWC	SECTION_02	10741	2 yr	2705.00	516.00	520.56	519.93	521.24	0.006654	6.63	407.76	153.09	0.72
NF CWC	SECTION_02	10741	5 yr	4245.00	516.00	523.60	520.82	523.90	0.001322	4.39	972.51	213.07	0.35
NF CWC	SECTION_02	10741	10 yr	5131.00	516.00	524.40	521.24	524.72	0.001152	4.54	1148.79	229.37	0.34
NF CWC	SECTION_02	10741	25 yr	6351.00	516.00	525.09	521.76	525.47	0.001193	4.99	1308.46	247.39	0.35
NF CWC	SECTION_02	10741	50 yr	7588.00	516.00	525.76	522.24	526.20	0.001204	5.36	1474.90	266.55	0.36
NF CWC	SECTION_02	10741	100 yr	8499.00	516.00	526.13	522.55	526.62	0.001259	5.67	1573.26	281.39	0.37
NF CWC	SECTION_02	10741	500 yr	11081.00	516.00	528.26	523.36	528.70	0.000833	5.47	2308.03	358.71	0.31
NF CWC	SECTION_02	10741	Ultimate 100 yr	8617.00	516.00	526.22	522.58	526.71	0.001244	5.68	1596.24	286.94	0.37
NF CWC	SECTION_02	10550	2 yr	2721.00	510.20	520.24	514.20	520.41	0.000454	3.36	811.02	215.50	0.22
NF CWC	SECTION_02	10550	5 yr	4311.00	510.20	523.58	515.56	523.69	0.000238	2.84	1779.55	470.66	0.16
NF CWC	SECTION_02	10550	10 yr	5277.00	510.20	524.41	516.48	524.53	0.000229	2.95	2401.51	555.99	0.16
NF CWC	SECTION_02	10550	25 yr	6484.00	510.20	525.12	517.29	525.26	0.000251	3.23	2831.19	659.11	0.17
NF CWC	SECTION_02	10550	50 yr	7839.00	510.20	525.82	518.09	525.97	0.000266	3.47	3301.41	693.06	0.18
NF CWC	SECTION_02	10550	100 yr	8761.00	510.20	526.22	518.57	526.38	0.000279	3.63	3580.38	710.79	0.19
NF CWC	SECTION_02	10550	500 yr	11327.00	510.20	528.38	519.78	528.51	0.000197	3.41	5308.64	856.73	0.16
NF CWC	SECTION_02	10550	Ultimate 100 yr	8888.00	510.20	526.30	518.63	526.46	0.000276	3.63	3642.41	714.52	0.18
NF CWC	SECTION_02	10464		Culvert									
NF CWC	SECTION_02	10386	2 yr	3238.00	508.30	519.17	512.86	519.41	0.000427	3.93	824.73	113.35	0.22
NF CWC	SECTION_02	10386	5 yr	5097.00	508.30	520.91	514.21	521.34	0.000611	5.24	972.30	124.51	0.27
NF CWC	SECTION_02	10386	10 yr	6215.00	508.30	521.82	514.92	522.36	0.000704	5.92	1049.68	153.61	0.30
NF CWC	SECTION_02	10386	25 yr	7654.00	508.30	523.00	515.79	523.69	0.000787	6.66	1150.06	201.01	0.32
NF CWC	SECTION_02	10386	50 yr	9234.00	508.30	524.60	516.64	525.10	0.000580	5.97	1946.58	381.94	0.28
NF CWC	SECTION_02	10386	100 yr	10336.00	508.30	525.55	517.19	526.02	0.000519	5.90	2323.99	406.98	0.26
NF CWC	SECTION_02	10386	500 yr	13295.00	508.30	528.09	518.60	528.44	0.000368	5.49	3511.42	511.11	0.23
NF CWC	SECTION_02	10386	Ultimate 100 yr	10527.00	508.30	525.72	517.29	526.18	0.000508	5.88	2390.77	411.36	0.26
NF CWC	SECTION_02	10207	2 yr	3238.00	509.42	516.71	516.64	518.73	0.007733	12.15	309.63	78.65	0.87
NF CWC	SECTION_02	10207	5 yr	5097.00	509.42	519.12	518.50	520.78	0.004467	11.53	555.22	118.73	0.70
NF CWC	SECTION_02	10207	10 yr	6215.00	509.42	520.46	519.23	521.89	0.003334	10.97	718.30	125.40	0.62
NF CWC	SECTION_02	10207	25 yr	7654.00	509.42	521.97	520.01	523.29	0.002619	10.69	915.80	136.13	0.56
NF CWC	SECTION_02	10207	50 yr	9234.00	509.42	523.45	520.69	524.72	0.002204	10.64	1128.17	151.63	0.52
NF CWC	SECTION_02	10207	100 yr	10336.00	509.42	524.40	521.24	525.65	0.002011	10.66	1277.32	163.90	0.51
NF CWC	SECTION_02	10207	500 yr	13295.00	509.42	526.66	522.37	528.03	0.001884	11.41	1734.16	295.12	0.50
NF CWC	SECTION_02	10207	Ultimate 100 yr	10527.00	509.42	524.56	521.32	525.80	0.001982	10.66	1303.77	166.39	0.50
NF CWC	SECTION_02	10053	2 yr	3238.00	509.00	517.09	513.89	517.57	0.001388	5.92	619.44	149.21	0.39
NF CWC	SECTION_02	10053	5 yr	5097.00	509.00	519.51	515.21	520.01	0.001092	6.36	1017.32	181.90	0.36
NF CWC	SECTION_02	10053	10 yr	6215.00	509.00	520.81	515.92	521.28	0.000915	6.33	1260.56	192.22	0.34
NF CWC	SECTION_02	10053	25 yr	7654.00	509.00	522.32	516.69	522.77	0.000775	6.34	1557.91	203.88	0.32
NF CWC	SECTION_02	10053	50 yr	9234.00	509.00	523.80	517.91	524.25	0.000683	6.41	1869.86	217.70	0.30
NF CWC	SECTION_02	10053	100 yr	10336.00	509.00	524.75	518.60	525.21	0.000641	6.49	2081.83	228.64	0.30
NF CWC	SECTION_02	10053	500 yr	13295.00	509.00	527.11	519.97	527.58	0.000557	6.67	2655.77	259.33	0.28
NF CWC	SECTION_02	10053	Ultimate 100 yr	10527.00	509.00	524.91	518.69	525.37	0.000635	6.50	2118.63	230.61	0.29
NF CWC	SECTION_02	9883	2 yr	3238.00	505.96	516.98	512.16	517.35	0.000862	5.15	740.24	164.03	0.30
NF CWC	SECTION_02	9883	5 yr	5097.00	505.96	519.45	513.99	519.82	0.000690	5.41	1191.25	199.09	0.28
NF CWC	SECTION_02	9883	10 yr	6215.00	505.96	520.77	514.81	521.12	0.000601	5.42	1458.48	206.59	0.27
NF CWC	SECTION_02	9883	25 yr	7654.00	505.96	522.28	516.32	522.63	0.000527	5.47	1777.10	213.40	0.25
NF CWC	SECTION_02	9883	50 yr	9234.00	505.96	523.77	517.40	524.13	0.000481	5.58	2099.87	222.60	0.25
NF CWC	SECTION_02	9883	100 yr	10336.00	505.96	524.72	517.81	525.09	0.000474	5.76	2319.33	241.39	0.25
NF CWC	SECTION_02	9883	500 yr	13295.00	505.96	527.09	519.18	527.47	0.000419	5.91	2913.76	260.41	0.24
NF CWC	SECTION_02	9883	Ultimate 100 yr	10527.00	505.96	524.88	517.91	525.25	0.000470	5.77	2358.40	242.61	0.25
NF CWC	SECTION_02	9817	2 yr	3238.00	508.24	516.30	514.03	517.21	0.002653	8.22	437.82	71.58	0.53
NF CWC	SECTION_02	9817	5 yr	5097.00	508.24	518.43	515.63	519.66	0.002613	9.66	595.45	76.51	0.55
NF CWC	SECTION_02	9817	10 yr	6215.00	508.24	519.55	516.45	520.95	0.002593	10.37	682.57	79.33	0.56
NF CWC	SECTION_02	9817	25 yr	7654.00	508.24	520.83	517.47	522.45	0.002592	11.18	786.79	82.64	0.57
NF CWC	SECTION_02	9817	50 yr	9234.00	508.24	522.08	518.47	523.93	0.002618	12.01	892.00	85.87	0.58
NF CWC	SECTION_02	9817	100 yr	10336.00	508.24	522.88	519.12	524.88	0.002639	12.54	961.23	87.78	0.59
NF CWC	SECTION_02	9817	500 yr	13295.00	508.24	524.84	520.80	527.22	0.002704	13.85	1137.70	93.37	0.61
NF CWC	SECTION_02	9817	Ultimate 100 yr	10527.00	508.24	523.01	519.24	525.04	0.002642	12.63	973.01	88.09	0.59
NF CWC	SECTION_02	9797		Bridge									

River	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
NF CWC	SECTION_02	9769	2 yr	3238.00	507.00	512.86	512.86	515.02	0.009696	12.41	284.78	66.80	0.96
NF CWC	SECTION_02	9769	5 yr	5097.00	507.00	514.46	514.46	517.26	0.008901	14.25	396.62	72.37	0.97
NF CWC	SECTION_02	9769	10 yr	6215.00	507.00	515.29	515.29	518.43	0.008681	15.20	457.35	75.31	0.97
NF CWC	SECTION_02	9769	25 yr	7654.00	507.00	516.29	516.29	519.81	0.008316	16.17	535.09	79.12	0.97
NF CWC	SECTION_02	9769	50 yr	9234.00	507.00	517.31	517.31	521.20	0.008015	17.10	618.42	84.42	0.97
NF CWC	SECTION_02	9769	100 yr	10336.00	507.00	518.06	518.06	522.09	0.007610	17.52	682.84	88.43	0.96
NF CWC	SECTION_02	9769	500 yr	13295.00	507.00	519.72	519.72	524.23	0.007147	18.75	835.47	95.11	0.95
NF CWC	SECTION_02	9769	Ultimate 100 yr	10527.00	507.00	518.19	518.19	522.24	0.007521	17.57	694.72	88.99	0.96
NF CWC	SECTION_02	9658	2 yr	3238.00	505.02	512.71	510.36	513.27	0.002365	6.02	538.20	105.48	0.47
NF CWC	SECTION_02	9658	5 yr	5097.00	505.02	513.76	511.65	514.71	0.003351	7.81	652.98	114.82	0.57
NF CWC	SECTION_02	9658	10 yr	6215.00	505.02	514.20	512.32	515.42	0.003929	8.84	705.33	123.91	0.62
NF CWC	SECTION_02	9658	25 yr	7654.00	505.02	514.65	513.11	516.24	0.004766	10.15	764.01	151.21	0.69
NF CWC	SECTION_02	9658	50 yr	9234.00	505.02	515.03	513.87	517.08	0.005724	11.51	828.50	179.08	0.77
NF CWC	SECTION_02	9658	100 yr	10336.00	505.02	515.29	514.44	517.64	0.006335	12.38	877.39	205.88	0.81
NF CWC	SECTION_02	9658	500 yr	13295.00	505.02	516.49	516.49	518.96	0.005720	12.96	1178.95	287.18	0.79
NF CWC	SECTION_02	9658	Ultimate 100 yr	10527.00	505.02	515.33	514.53	517.73	0.006435	12.52	886.27	210.38	0.82
NF CWC	SECTION_02	9368	2 yr	3238.00	504.00	512.40	508.73	512.72	0.000963	4.59	744.15	149.43	0.32
NF CWC	SECTION_02	9368	5 yr	5097.00	504.00	513.34	510.03	513.90	0.001451	6.15	930.82	244.16	0.40
NF CWC	SECTION_02	9368	10 yr	6215.00	504.00	513.75	510.70	514.45	0.001724	6.95	1035.15	262.56	0.44
NF CWC	SECTION_02	9368	25 yr	7654.00	504.00	514.15	511.50	515.04	0.002101	7.93	1142.94	272.72	0.48
NF CWC	SECTION_02	9368	50 yr	9234.00	504.00	514.49	512.23	515.61	0.002539	8.96	1237.63	276.14	0.54
NF CWC	SECTION_02	9368	100 yr	10336.00	504.00	514.74	513.22	516.00	0.002799	9.58	1305.57	278.84	0.57
NF CWC	SECTION_02	9368	500 yr	13295.00	504.00	515.34	514.50	516.98	0.003435	11.08	1475.62	288.47	0.63
NF CWC	SECTION_02	9368	Ultimate 100 yr	10527.00	504.00	514.78	513.33	516.07	0.002842	9.68	1317.09	279.51	0.57
NF CWC	SECTION_02	9153	2 yr	3238.00	505.00	511.72	509.98	512.36	0.003237	6.50	533.72	224.80	0.54
NF CWC	SECTION_02	9153	5 yr	5097.00	505.00	512.35	511.53	513.38	0.004554	8.42	726.81	342.78	0.66
NF CWC	SECTION_02	9153	10 yr	6215.00	505.00	512.79	512.54	513.87	0.004564	8.90	881.13	373.15	0.67
NF CWC	SECTION_02	9153	25 yr	7654.00	505.00	513.31	513.06	514.42	0.004345	9.23	1086.93	403.41	0.66
NF CWC	SECTION_02	9153	50 yr	9234.00	505.00	513.77	513.48	514.93	0.004329	9.67	1276.29	425.50	0.67
NF CWC	SECTION_02	9153	100 yr	10336.00	505.00	514.09	513.76	515.25	0.004227	9.86	1412.23	438.58	0.67
NF CWC	SECTION_02	9153	500 yr	13295.00	505.00	514.84	514.36	516.06	0.004063	10.36	1755.26	477.26	0.66
NF CWC	SECTION_02	9153	Ultimate 100 yr	10527.00	505.00	514.13	513.80	515.31	0.004227	9.91	1433.24	440.71	0.67
NF CWC	SECTION_02	8720	2 yr	3238.00	505.00	510.25	510.25	511.36	0.001189	9.10	593.17	445.93	0.76
NF CWC	SECTION_02	8720	5 yr	5097.00	505.00	511.01	511.01	512.14	0.001175	10.06	1070.35	487.02	0.78
NF CWC	SECTION_02	8720	10 yr	6215.00	505.00	511.37	511.37	512.62	0.001246	10.83	1248.99	506.05	0.81
NF CWC	SECTION_02	8720	25 yr	7654.00	505.00	511.74	511.74	513.17	0.001365	11.84	1442.11	527.46	0.86
NF CWC	SECTION_02	8720	50 yr	9234.00	505.00	512.27	512.27	513.70	0.001299	12.23	1730.72	556.63	0.85
NF CWC	SECTION_02	8720	100 yr	10336.00	505.00	512.51	512.51	514.04	0.001350	12.78	1866.88	564.32	0.87
NF CWC	SECTION_02	8720	500 yr	13295.00	505.00	513.10	513.10	514.84	0.001461	14.07	2203.04	578.18	0.92
NF CWC	SECTION_02	8720	Ultimate 100 yr	10527.00	505.00	512.56	512.56	514.09	0.001346	12.83	1896.57	565.87	0.87
NF CWC	SECTION_02	8394	2 yr	3220.00	501.44	505.75	505.75	507.61	0.002178	10.93	294.52	117.28	1.00
NF CWC	SECTION_02	8394	5 yr	5155.00	501.44	507.28	507.28	509.37	0.001763	11.83	513.55	150.29	0.94
NF CWC	SECTION_02	8394	10 yr	6316.00	501.44	508.08	508.08	510.24	0.001613	12.17	654.89	200.27	0.91
NF CWC	SECTION_02	8394	25 yr	7741.00	501.44	508.86	508.86	511.15	0.001528	12.67	825.33	237.63	0.90
NF CWC	SECTION_02	8394	50 yr	9291.00	501.44	509.59	509.59	512.01	0.001436	13.22	1014.31	282.05	0.89
NF CWC	SECTION_02	8394	100 yr	10474.00	501.44	510.25	510.25	512.61	0.001267	13.21	1226.68	353.73	0.85
NF CWC	SECTION_02	8394	500 yr	13313.00	501.44	511.25	511.25	513.79	0.001215	14.05	1594.95	387.51	0.85
NF CWC	SECTION_02	8394	Ultimate 100 yr	10681.00	501.44	510.33	510.33	512.70	0.001262	13.27	1254.80	356.30	0.85
NF CWC	SECTION_02	7881	2 yr	3220.00	497.00	503.64	502.09	504.25	0.003112	6.31	518.75	133.30	0.53
NF CWC	SECTION_02	7881	5 yr	5155.00	497.00	504.98	503.24	505.85	0.003148	7.58	710.15	153.93	0.56
NF CWC	SECTION_02	7881	10 yr	6316.00	497.00	505.66	503.86	506.67	0.003162	8.19	820.38	170.21	0.57
NF CWC	SECTION_02	7881	25 yr	7741.00	497.00	506.23	504.50	507.48	0.003510	9.14	923.38	199.66	0.61
NF CWC	SECTION_02	7881	50 yr	9291.00	497.00	506.75	505.22	508.25	0.003883	10.08	1040.48	252.06	0.65
NF CWC	SECTION_02	7881	100 yr	10474.00	497.00	507.11	505.70	508.80	0.004151	10.76	1145.21	339.91	0.68
NF CWC	SECTION_02	7881	500 yr	13313.00	497.00	507.88	506.56	509.79	0.004368	11.74	1445.85	439.49	0.71
NF CWC	SECTION_02	7881	Ultimate 100 yr	10681.00	497.00	507.18	505.77	508.89	0.004178	10.85	1166.68	354.34	0.68
NF CWC	SECTION_02	7440	2 yr	3220.00	496.66	502.28	500.81	502.90	0.003037	6.43	534.45	158.31	0.53
NF CWC	SECTION_02	7440	5 yr	5155.00	496.66	503.84	502.01	504.57	0.002536	7.15	819.82	204.86	0.51
NF CWC	SECTION_02	7440	10 yr	6316.00	496.66	504.58	502.67	505.38	0.002471	7.61	1048.78	420.67	0.51
NF CWC	SECTION_02	7440	25 yr	7741.00	496.66	505.40	503.40	506.11	0.002031	7.44	1432.05	494.83	0.47
NF CWC	SECTION_02	7440	50 yr	9291.00	496.66	506.13	503.87	506.77	0.001761	7.36	1810.39	545.34	0.45
NF CWC	SECTION_02	7440	100 yr	10474.00	496.66	506.63	503.89	507.23	0.001607	7.31	2089.42	574.72	0.43
NF CWC	SECTION_02	7440	500 yr	13313.00	496.66	507.56	505.81	508.14	0.001438	7.39	2642.99	605.65	0.41
NF CWC	SECTION_02	7440	Ultimate 100 yr	10681.00	496.66	506.71	503.92	507.31	0.001586	7.30	2136.26	579.51	0.43
NF CWC	SECTION_02	6992	2 yr	3220.00	494.00	500.99	498.96	501.62	0.002662	6.40	510.68	115.85	0.50
NF CWC	SECTION_02	6992	5 yr	5155.00	494.00	502.42	500.34	503.35	0.002854	7.82	702.81	175.62	0.54
NF CWC	SECTION_02	6992	10 yr	6316.00	494.00	503.11	501.01	504.16	0.002894	8.43	844.03	227.16	0.55
NF CWC	SECTION_02	6992	25 yr	7741.00	494.00	503.84	501.85	505.00	0.002912	9.02	1029.95	286.36	0.57
NF CWC	SECTION_02	6992	50 yr	9291.00	494.00	504.50	502.95	505.74	0.002912	9.51	1237.88	344.25	0.57
NF CWC	SECTION_02	6992	100 yr	10474.00	494.00	505.02	503.69	506.27	0.002810	9.72	1429.44	402.39	0.57
NF CWC	SECTION_02	6992	500 yr	13313.00	494.00	506.17	504.87	507.30	0.002370	9.67	1943.14	475.90	0.53
NF CWC	SECTION_02	6992	Ultimate 100 yr	10681.00	494.00	505.14	503.81	506.37	0.002721	9.65	1481.27	412.63	0.56
NF CWC	SECTION_02	6455	2 yr	3220.00	493.00	499.39	497.94	500.10	0.003019	7.34	525.59	149.54	0.55
NF CWC	SECTION_02	6455	5 yr	5155.00	493.00	500.85	499.13	501.76	0.003074	8.64	797.25	237.03	0.57
NF CWC	SECTION_02	6455	10 yr	6316.00	493.00	501.83	499.95	502.66	0.002512	8.52	1068.53	327.91	0.53
NF CWC	SECTION_02	6455	25 yr	7741.00	493.00	502.98	500.90	503.60	0.001747	7.76	1556.02	472.07	0.45
NF CWC	SECTION_02	6455	50 yr	9291.00	493.00	503.87	501.55	504.38	0.001382	7.34	1988.48	501.19	0.41
NF CWC	SECTION_02	6455	100 yr	10474.00	493.00	504.50	502.56	504.96	0.001197	7.12	2313.73	523.88	0.38
NF CWC	SECTION_02	6455	500 yr	13313.00	493.00	505.78	503.24	506.19	0.000974	6.93	3016.70	573.49	0.35
NF CWC	SECTION_02	6455	Ultimate 100 yr	10681.00	493.00	504.66	502.63	505.10	0.001135	7.00	2398.10	529.40	0.37
NF CWC	SECTION_02	6201	2 yr	3220.00	491.91	498.87	497.12	499.40	0.002193	6.19	618.10	201.44</	

River	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
NF CWC	SECTION_02	6201	10 yr	6316.00	491.91	501.69	499.00	502.08	0.001155	5.91	1593.18	485.70	0.36
NF CWC	SECTION_02	6201	25 yr	7741.00	491.91	502.92	500.00	503.19	0.000763	5.27	2227.74	547.59	0.30
NF CWC	SECTION_02	6201	50 yr	9291.00	491.91	503.81	500.50	504.06	0.000646	5.14	2731.91	583.95	0.28
NF CWC	SECTION_02	6201	100 yr	10474.00	491.91	504.45	500.81	504.69	0.000578	5.06	3113.52	607.42	0.27
NF CWC	SECTION_02	6201	500 yr	13313.00	491.91	505.74	501.82	505.97	0.000499	5.06	3929.45	660.68	0.25
NF CWC	SECTION_02	6201	Ultimate 100 yr	10681.00	491.91	504.61	501.29	504.84	0.000552	4.99	3212.79	612.84	0.26
NF CWC	SECTION_02	6158	2 yr	3220.00	494.30	498.07	498.07	499.19	0.012034	8.73	396.25	196.04	0.96
NF CWC	SECTION_02	6158	5 yr	5155.00	494.30	500.50	499.00	500.95	0.002297	5.95	1118.60	447.15	0.47
NF CWC	SECTION_02	6158	10 yr	6316.00	494.30	501.72	499.58	502.00	0.001177	4.92	1701.82	508.07	0.35
NF CWC	SECTION_02	6158	25 yr	7741.00	494.30	502.93	499.99	503.14	0.000732	4.37	2349.31	553.68	0.28
NF CWC	SECTION_02	6158	50 yr	9291.00	494.30	503.82	500.64	504.02	0.000612	4.31	2853.03	584.17	0.26
NF CWC	SECTION_02	6158	100 yr	10474.00	494.30	504.45	500.92	504.65	0.000547	4.28	3231.39	605.21	0.25
NF CWC	SECTION_02	6158	500 yr	13313.00	494.30	505.74	501.45	505.94	0.000470	4.34	4036.29	647.08	0.24
NF CWC	SECTION_02	6158	Ultimate 100 yr	10681.00	494.30	504.62	500.96	504.81	0.000523	4.23	3329.77	610.48	0.25
NF CWC	SECTION_02	6144	2 yr	3220.00	494.52	497.89	497.79	498.85	0.010198	8.09	423.48	199.11	0.88
NF CWC	SECTION_02	6144	5 yr	5155.00	494.52	500.53	498.66	500.90	0.001764	5.37	1197.94	421.27	0.41
NF CWC	SECTION_02	6144	10 yr	6316.00	494.52	501.71	499.13	501.97	0.001017	4.67	1766.75	513.11	0.33
NF CWC	SECTION_02	6144	25 yr	7741.00	494.52	502.93	499.70	503.13	0.000654	4.21	2418.87	555.70	0.27
NF CWC	SECTION_02	6144	50 yr	9291.00	494.52	503.82	500.01	504.01	0.000557	4.18	2924.35	586.08	0.25
NF CWC	SECTION_02	6144	100 yr	10474.00	494.52	504.45	500.44	504.64	0.000503	4.16	3303.87	606.84	0.24
NF CWC	SECTION_02	6144	500 yr	13313.00	494.52	505.74	501.28	505.93	0.000438	4.24	4110.91	647.40	0.23
NF CWC	SECTION_02	6144	Ultimate 100 yr	10681.00	494.52	504.61	500.52	504.80	0.000481	4.12	3402.57	612.04	0.24
NF CWC	SECTION_02	6085	2 yr	3220.00	488.57	498.18	492.45	498.29	0.000270	2.82	1280.17	250.20	0.17
NF CWC	SECTION_02	6085	5 yr	5155.00	488.57	500.64	493.62	500.77	0.000226	3.08	2175.80	478.08	0.17
NF CWC	SECTION_02	6085	10 yr	6316.00	488.57	501.78	494.18	501.90	0.000201	3.10	2744.49	520.72	0.16
NF CWC	SECTION_02	6085	25 yr	7741.00	488.57	502.96	494.83	503.08	0.000182	3.15	3387.88	563.63	0.15
NF CWC	SECTION_02	6085	50 yr	9291.00	488.57	503.84	495.54	503.97	0.000185	3.31	3894.40	590.64	0.16
NF CWC	SECTION_02	6085	100 yr	10474.00	488.57	504.47	496.06	504.60	0.000186	3.43	4274.05	613.04	0.16
NF CWC	SECTION_02	6085	500 yr	13313.00	488.57	505.75	497.12	505.90	0.000193	3.69	5088.63	657.74	0.16
NF CWC	SECTION_02	6085	Ultimate 100 yr	10681.00	488.57	504.63	496.15	504.76	0.000183	3.42	4372.90	619.05	0.16
NF CWC	SECTION_02	5702	2 yr	3372.00	490.00	498.18	491.94	498.20	0.000063	1.33	2710.54	501.45	0.08
NF CWC	SECTION_02	5702	5 yr	5510.00	490.00	500.65	492.55	500.68	0.000057	1.52	4261.89	659.92	0.08
NF CWC	SECTION_02	5702	10 yr	6739.00	490.00	501.79	492.86	501.82	0.000055	1.60	5025.79	685.01	0.08
NF CWC	SECTION_02	5702	25 yr	8221.00	490.00	502.98	493.21	503.01	0.000053	1.68	5853.29	709.59	0.08
NF CWC	SECTION_02	5702	50 yr	9879.00	490.00	503.85	493.58	503.90	0.000058	1.84	6484.65	729.99	0.09
NF CWC	SECTION_02	5702	100 yr	11261.00	490.00	504.48	493.86	504.53	0.000062	1.96	6949.33	744.22	0.09
NF CWC	SECTION_02	5702	500 yr	14462.00	490.00	505.76	494.48	505.82	0.000071	2.22	7919.55	772.64	0.10
NF CWC	SECTION_02	5702	Ultimate 100 yr	11640.00	490.00	504.64	493.93	504.69	0.000063	1.99	7067.97	747.77	0.09
NF CWC	SECTION_02	5621	2 yr	3372.00	490.00	498.11	492.69	498.19	0.000045	2.47	1714.29	334.09	0.16
NF CWC	SECTION_02	5621	5 yr	5510.00	490.00	500.56	493.70	500.67	0.000042	2.88	2616.60	520.08	0.16
NF CWC	SECTION_02	5621	10 yr	6739.00	490.00	501.69	494.20	501.81	0.000040	3.04	3376.95	581.61	0.16
NF CWC	SECTION_02	5621	25 yr	8221.00	490.00	502.86	494.75	503.00	0.000039	3.23	4097.18	640.49	0.16
NF CWC	SECTION_02	5621	50 yr	9879.00	490.00	503.73	495.32	503.88	0.000042	3.52	4655.03	656.18	0.17
NF CWC	SECTION_02	5621	100 yr	11261.00	490.00	504.34	495.77	504.51	0.000045	3.75	5062.85	668.81	0.18
NF CWC	SECTION_02	5621	500 yr	14462.00	490.00	505.58	496.78	505.80	0.000052	4.28	5917.18	714.32	0.20
NF CWC	SECTION_02	5621	Ultimate 100 yr	11640.00	490.00	504.50	495.88	504.67	0.000046	3.82	5166.62	671.99	0.18
NF CWC	SECTION_02	5570	2 yr	3372.00	489.00	495.74	495.74	497.97	0.002113	11.98	281.47	64.08	1.01
NF CWC	SECTION_02	5570	5 yr	5510.00	489.00	497.66	497.66	500.40	0.001973	13.30	414.35	76.33	1.01
NF CWC	SECTION_02	5570	10 yr	6739.00	489.00	498.63	498.63	501.53	0.001940	13.66	493.40	86.30	1.01
NF CWC	SECTION_02	5570	25 yr	8221.00	489.00	499.62	499.62	502.70	0.001913	14.09	583.43	96.46	1.01
NF CWC	SECTION_02	5570	50 yr	9879.00	489.00	501.30	501.30	503.66	0.002029	12.32	802.12	173.81	1.00
NF CWC	SECTION_02	5570	100 yr	11261.00	489.00	501.88	501.88	504.29	0.001981	12.45	907.89	197.38	1.00
NF CWC	SECTION_02	5570	500 yr	14462.00	489.00	502.82	502.82	505.55	0.001853	13.26	1113.00	233.98	0.99
NF CWC	SECTION_02	5570	Ultimate 100 yr	11640.00	489.00	502.01	502.01	504.44	0.002043	12.53	933.85	207.16	1.01
NF CWC	SECTION_02	5542	2 yr	3372.00	488.66	495.37	495.37	497.59	0.002115	11.96	282.01	64.42	1.01
NF CWC	SECTION_02	5542	5 yr	5510.00	488.66	497.26	497.26	500.00	0.001967	13.28	414.85	76.46	1.00
NF CWC	SECTION_02	5542	10 yr	6739.00	488.66	498.21	498.21	501.14	0.001911	13.74	490.38	83.99	1.00
NF CWC	SECTION_02	5542	25 yr	8221.00	488.66	499.27	499.27	502.32	0.001910	14.00	587.05	97.95	1.01
NF CWC	SECTION_02	5542	50 yr	9879.00	488.66	500.81	500.81	503.37	0.001962	12.84	769.32	150.55	1.00
NF CWC	SECTION_02	5542	100 yr	11261.00	488.66	501.55	501.55	504.03	0.002014	12.63	891.57	182.99	1.01
NF CWC	SECTION_02	5542	500 yr	14462.00	488.66	502.51	502.51	505.32	0.001881	13.47	1088.18	232.62	1.00
NF CWC	SECTION_02	5542	Ultimate 100 yr	11640.00	488.66	501.72	501.72	504.19	0.001973	12.62	922.34	186.72	1.00
NF CWC	SECTION_02	5480	2 yr	3372.00	487.40	493.61	491.15	493.94	0.000254	4.71	826.06	202.45	0.37
NF CWC	SECTION_02	5480	5 yr	5510.00	487.40	494.77	492.18	495.32	0.000334	6.18	1074.18	225.61	0.43
NF CWC	SECTION_02	5480	10 yr	6739.00	487.40	495.27	492.73	495.97	0.000380	6.95	1191.13	235.46	0.47
NF CWC	SECTION_02	5480	25 yr	8221.00	487.40	495.80	493.31	496.67	0.000436	7.81	1317.27	247.17	0.51
NF CWC	SECTION_02	5480	50 yr	9879.00	487.40	496.29	493.94	497.38	0.000500	8.73	1441.19	258.68	0.55
NF CWC	SECTION_02	5480	100 yr	11261.00	487.40	496.63	494.43	497.91	0.000556	9.49	1532.72	269.21	0.58
NF CWC	SECTION_02	5480	500 yr	14462.00	487.40	497.29	495.42	499.09	0.000706	11.25	1730.08	341.19	0.67
NF CWC	SECTION_02	5480	Ultimate 100 yr	11640.00	487.40	496.72	494.56	498.06	0.000572	9.69	1557.08	272.28	0.59
NF CWC	SECTION_02	4988	2 yr	3372.00	487.00	493.68	489.25	493.74	0.000200	2.01	1758.89	341.66	0.14
NF CWC	SECTION_02	4988	5 yr	5510.00	487.00	494.93	489.93	495.04	0.000277	2.68	2237.29	432.51	0.17
NF CWC	SECTION_02	4988	10 yr	6739.00	487.00	495.50	490.28	495.63	0.000312	2.99	2491.52	461.88	0.19
NF CWC	SECTION_02	4988	25 yr	8221.00	487.00	496.11	490.67	496.26	0.000350	3.33	2780.34	491.50	0.20
NF CWC	SECTION_02	4988	50 yr	9879.00	487.00	496.70	491.08	496.89	0.000387	3.66	3077.46	514.15	0.21
NF CWC	SECTION_02	4988	100 yr	11261.00	487.00	497.14	491.40	497.35	0.000416	3.91	3309.28	529.34	0.22
NF CWC	SECTION_02	4988	500 yr	14462.00	487.00	498.08	492.09	498.34	0.000468	4.42	3818.52	558.47	0.24
NF CWC	SECTION_02	4988	Ultimate 100 yr	11640.00	487.00	497.26	491.50	497.48	0.000423	3.98	3370.67	532.99	0.22
NF CWC	SECTION_02	4503	2 yr	3372.00	488.00	493.29	490.90	493.56	0.001210	4.20	848.60	216.34	0.34
NF CWC	SECTION_02	4503	5 yr	5510.00	488.00	494.32	491.84	494.77	0.001636	5.56	1120.88	382.57	0.41
NF CWC	SECTION_02	4503	10 yr	6739.00	488.00	494.82	492.30	495.34	0.001727	6.03	1327.85	443.23	

River	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
NF CWC	SECTION_02	4503	50 yr	9879.00	488.00	495.95	493.32	496.54	0.001727	6.73	1894.12	540.06	0.43
NF CWC	SECTION_02	4503	100 yr	11261.00	488.00	496.40	493.79	497.00	0.001674	6.89	2139.56	557.05	0.43
NF CWC	SECTION_02	4503	500 yr	14462.00	488.00	497.36	495.37	497.96	0.001536	7.12	2691.35	586.22	0.42
NF CWC	SECTION_02	4503	Ultimate 100 yr	11640.00	488.00	496.52	493.90	497.11	0.001660	6.93	2204.90	560.95	0.43
NF CWC	SECTION_02	4071	2 yr	3372.00	487.00	493.17	489.20	493.20	0.000135	1.48	2346.27	535.90	0.11
NF CWC	SECTION_02	4071	5 yr	5510.00	487.00	494.21	489.70	494.26	0.000189	1.98	2968.13	644.25	0.14
NF CWC	SECTION_02	4071	10 yr	6739.00	487.00	494.72	489.94	494.79	0.000212	2.20	3306.83	681.95	0.15
NF CWC	SECTION_02	4071	25 yr	8221.00	487.00	495.29	490.23	495.37	0.000231	2.43	3706.07	710.64	0.16
NF CWC	SECTION_02	4071	50 yr	9879.00	487.00	495.87	490.51	495.97	0.000247	2.65	4126.98	725.34	0.17
NF CWC	SECTION_02	4071	100 yr	11261.00	487.00	496.33	490.75	496.44	0.000258	2.81	4458.32	733.02	0.17
NF CWC	SECTION_02	4071	500 yr	14462.00	487.00	497.31	491.25	497.44	0.000275	3.12	5181.91	746.26	0.18
NF CWC	SECTION_02	4071	Ultimate 100 yr	11640.00	487.00	496.45	490.82	496.56	0.000261	2.85	4545.39	734.65	0.17
NF CWC	SECTION_02	3856	2 yr	3372.00	488.00	492.78	490.90	493.13	0.000334	4.82	848.91	407.25	0.41
NF CWC	SECTION_02	3856	5 yr	5510.00	488.00	493.59	491.94	494.16	0.000457	6.31	1282.85	590.20	0.49
NF CWC	SECTION_02	3856	10 yr	6739.00	488.00	494.03	492.48	494.67	0.000483	6.85	1547.56	622.41	0.51
NF CWC	SECTION_02	3856	25 yr	8221.00	488.00	494.56	493.04	495.25	0.000482	7.27	1882.23	642.60	0.52
NF CWC	SECTION_02	3856	50 yr	9879.00	488.00	495.12	493.81	495.84	0.000472	7.63	2247.42	660.92	0.52
NF CWC	SECTION_02	3856	100 yr	11261.00	488.00	495.55	494.20	496.31	0.000464	7.89	2538.32	674.64	0.52
NF CWC	SECTION_02	3856	500 yr	14462.00	488.00	496.50	494.89	497.31	0.000443	8.38	3195.23	709.21	0.52
NF CWC	SECTION_02	3856	Ultimate 100 yr	11640.00	488.00	495.66	494.29	496.43	0.000463	7.96	2614.09	679.17	0.52
NF CWC	SECTION_02	3818	2 yr	3372.00	489.20	492.15	492.15	493.05	0.002677	7.62	453.86	275.05	1.00
NF CWC	SECTION_02	3818	5 yr	5510.00	489.20	492.86	492.86	494.06	0.002336	8.87	661.00	309.98	0.98
NF CWC	SECTION_02	3818	10 yr	6739.00	489.20	493.23	493.23	494.57	0.002175	9.38	779.95	325.92	0.97
NF CWC	SECTION_02	3818	25 yr	8221.00	489.20	493.61	493.61	495.14	0.002113	10.04	906.54	340.00	0.98
NF CWC	SECTION_02	3818	50 yr	9879.00	489.20	494.04	494.04	495.72	0.002003	10.60	1053.55	356.02	0.97
NF CWC	SECTION_02	3818	100 yr	11261.00	489.20	494.35	494.35	496.17	0.001954	11.05	1167.33	364.91	0.97
NF CWC	SECTION_02	3818	500 yr	14462.00	489.20	494.98	494.98	497.14	0.001940	12.13	1400.56	382.26	0.99
NF CWC	SECTION_02	3818	Ultimate 100 yr	11640.00	489.20	494.45	494.45	496.29	0.001916	11.13	1203.71	367.73	0.97
NF CWC	SECTION_02	3796	2 yr	3372.00	488.43	491.89	491.89	492.80	0.002893	7.93	487.34	288.71	1.04
NF CWC	SECTION_02	3796	5 yr	5510.00	488.43	492.64	492.64	493.84	0.002442	9.16	719.41	337.63	1.01
NF CWC	SECTION_02	3796	10 yr	6739.00	488.43	493.01	493.01	494.35	0.002283	9.70	849.38	353.97	1.00
NF CWC	SECTION_02	3796	25 yr	8221.00	488.43	493.41	493.41	494.91	0.002192	10.33	991.82	368.20	1.00
NF CWC	SECTION_02	3796	50 yr	9879.00	488.43	493.83	493.83	495.49	0.002080	10.90	1149.73	378.85	0.99
NF CWC	SECTION_02	3796	100 yr	11261.00	488.43	494.13	494.13	495.94	0.002055	11.41	1266.02	386.56	1.00
NF CWC	SECTION_02	3796	500 yr	14462.00	488.43	494.81	494.81	496.90	0.001973	12.39	1532.95	405.31	1.00
NF CWC	SECTION_02	3796	Ultimate 100 yr	11640.00	488.43	494.20	494.20	496.06	0.002077	11.59	1291.04	388.37	1.01
NF CWC	SECTION_02	3758	2 yr	3372.00	481.00	487.68	483.72	487.78	0.000065	2.63	1470.02	299.46	0.19
NF CWC	SECTION_02	3758	5 yr	5510.00	481.00	489.61	484.48	489.76	0.000066	3.18	2087.53	339.66	0.20
NF CWC	SECTION_02	3758	10 yr	6739.00	481.00	490.31	484.88	490.49	0.000073	3.55	2329.14	354.98	0.21
NF CWC	SECTION_02	3758	25 yr	8221.00	481.00	490.97	485.33	491.20	0.000085	4.04	2578.40	419.21	0.23
NF CWC	SECTION_02	3758	50 yr	9879.00	481.00	491.60	485.80	491.89	0.000098	4.51	2856.41	470.96	0.25
NF CWC	SECTION_02	3758	100 yr	11261.00	481.00	492.14	486.17	492.48	0.000105	4.85	3130.89	531.30	0.26
NF CWC	SECTION_02	3758	500 yr	14462.00	481.00	493.28	486.97	493.71	0.000118	5.51	3790.07	645.33	0.29
NF CWC	SECTION_02	3758	Ultimate 100 yr	11640.00	481.00	492.28	486.26	492.63	0.000107	4.93	3206.77	539.34	0.27
NF CWC	SECTION_03	3546	2 yr	3145.00	481.67	487.72	483.29	487.74	0.000090	1.28	2596.33	531.14	0.09
NF CWC	SECTION_03	3546	5 yr	5560.00	481.67	489.67	483.85	489.71	0.000098	1.62	3677.62	594.83	0.10
NF CWC	SECTION_03	3546	10 yr	6909.00	481.67	490.39	484.12	490.43	0.000110	1.82	4116.94	638.12	0.11
NF CWC	SECTION_03	3546	25 yr	8421.00	481.67	491.07	484.40	491.13	0.000122	2.03	4566.05	679.48	0.12
NF CWC	SECTION_03	3546	50 yr	10102.00	481.67	491.73	484.70	491.80	0.000135	2.24	5025.43	714.65	0.13
NF CWC	SECTION_03	3546	100 yr	11629.00	481.67	492.29	484.95	492.38	0.000145	2.40	5441.46	754.64	0.13
NF CWC	SECTION_03	3546	500 yr	15091.00	481.67	493.48	485.49	493.58	0.000159	2.71	6374.55	814.56	0.14
NF CWC	SECTION_03	3546	Ultimate 100 yr	12033.00	481.67	492.44	485.02	492.52	0.000147	2.44	5553.08	763.21	0.13
NF CWC	SECTION_03	3247	2 yr	3145.00	481.00	487.70	482.44	487.72	0.000048	1.01	3242.02	563.76	0.07
NF CWC	SECTION_03	3247	5 yr	5560.00	481.00	489.66	482.96	489.68	0.000059	1.34	4380.96	602.77	0.08
NF CWC	SECTION_03	3247	10 yr	6909.00	481.00	490.37	483.21	490.40	0.000068	1.52	4815.12	618.51	0.09
NF CWC	SECTION_03	3247	25 yr	8421.00	481.00	491.05	483.48	491.09	0.000078	1.71	5240.15	632.48	0.10
NF CWC	SECTION_03	3247	50 yr	10102.00	481.00	491.71	483.75	491.76	0.000089	1.91	5659.95	645.83	0.10
NF CWC	SECTION_03	3247	100 yr	11629.00	481.00	492.27	483.99	492.33	0.000098	2.07	6028.04	657.90	0.11
NF CWC	SECTION_03	3247	500 yr	15091.00	481.00	493.45	484.49	493.53	0.000114	2.39	6818.57	678.04	0.12
NF CWC	SECTION_03	3247	Ultimate 100 yr	12033.00	481.00	492.42	484.05	492.48	0.000100	2.11	6124.60	660.76	0.11
NF CWC	SECTION_03	2833	2 yr	3145.00	481.00	487.62	483.48	487.68	0.000235	2.19	1698.38	439.42	0.16
NF CWC	SECTION_03	2833	5 yr	5560.00	481.00	489.56	484.38	489.64	0.000226	2.57	2607.19	491.50	0.16
NF CWC	SECTION_03	2833	10 yr	6909.00	481.00	490.25	484.84	490.35	0.000243	2.82	2953.35	501.70	0.17
NF CWC	SECTION_03	2833	25 yr	8421.00	481.00	490.92	485.27	491.03	0.000263	3.08	3288.91	510.07	0.18
NF CWC	SECTION_03	2833	50 yr	10102.00	481.00	491.56	485.87	491.69	0.000286	3.35	3617.42	518.46	0.19
NF CWC	SECTION_03	2833	100 yr	11629.00	481.00	492.11	486.31	492.26	0.000303	3.57	3904.53	525.66	0.19
NF CWC	SECTION_03	2833	500 yr	15091.00	481.00	493.26	487.25	493.45	0.000330	4.00	4519.55	540.80	0.21
NF CWC	SECTION_03	2833	Ultimate 100 yr	12033.00	481.00	492.25	486.42	492.41	0.000306	3.63	3979.79	527.53	0.19
NF CWC	SECTION_03	2723	2 yr	3145.00	481.00	487.49	484.44	487.65	0.000123	3.58	1404.53	427.86	0.26
NF CWC	SECTION_03	2723	5 yr	5560.00	481.00	489.40	485.68	489.61	0.000121	4.29	2307.02	513.32	0.27
NF CWC	SECTION_03	2723	10 yr	6909.00	481.00	490.06	486.21	490.32	0.000133	4.74	2658.58	536.58	0.29
NF CWC	SECTION_03	2723	25 yr	8421.00	481.00	490.70	486.74	490.99	0.000146	5.20	3002.44	547.10	0.30
NF CWC	SECTION_03	2723	50 yr	10102.00	481.00	491.30	487.34	491.65	0.000160	5.69	3336.59	557.65	0.32
NF CWC	SECTION_03	2723	100 yr	11629.00	481.00	491.83	487.75	492.21	0.000170	6.08	3630.40	565.95	0.33
NF CWC	SECTION_03	2723	500 yr	15091.00	481.00	492.93	488.61	493.40	0.000187	6.82	4262.36	581.94	0.36
NF CWC	SECTION_03	2723	Ultimate 100 yr	12033.00	481.00	491.96	487.84	492.36	0.000172	6.17	3707.74	568.13	0.34
NF CWC	SECTION_03	2713	2 yr	3145.00	481.94	487.40	485.40	487.64	0.000259	4.57	1177.50	372.40	0.36
NF CWC	SECTION_03	2713	5 yr	5560.00	481.94	489.31	486.45	489.60	0.000218	5.23	2012.35	492.77	0.35
NF CWC	SECTION_03	2713	10 yr	6909.00	481.94	489.98	486.96	490.31	0.000229	5.70	2348.63	519.68	0.37
NF CWC	SECTION_03	2713	25 yr	8421.00	481.94	490.61	487.45	490.98	0.000242	6.20	2680.59	537.12	0.38
NF CWC	SECTION_03	2713	50 yr	10102.00	481.94	491.20	487.73	491.64	0.000258	6.71	300		

River	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
NF CWC	SECTION_03	2713	500 yr	15091.00	481.94	492.82	489.03	493.39	0.000283	7.87	3931.48	586.75	0.43
NF CWC	SECTION_03	2713	Ultimate 100 yr	12033.00	481.94	491.86	488.51	492.35	0.000271	7.22	3373.51	569.19	0.42
NF CWC	SECTION_03	2700	2 yr	3145.00	483.57	487.35	485.91	487.63	0.000486	5.01	993.04	355.45	0.47
NF CWC	SECTION_03	2700	5 yr	5560.00	483.57	489.28	486.79	489.59	0.000311	5.38	1752.57	442.83	0.41
NF CWC	SECTION_03	2700	10 yr	6909.00	483.57	489.94	487.22	490.30	0.000313	5.83	2053.67	482.40	0.42
NF CWC	SECTION_03	2700	25 yr	8421.00	483.57	490.56	487.69	490.98	0.000327	6.35	2362.75	514.86	0.43
NF CWC	SECTION_03	2700	50 yr	10102.00	483.57	491.15	488.19	491.63	0.000339	6.85	2674.81	533.48	0.45
NF CWC	SECTION_03	2700	100 yr	11629.00	483.57	491.67	488.56	492.19	0.000345	7.23	2954.01	547.01	0.46
NF CWC	SECTION_03	2700	500 yr	15091.00	483.57	492.76	489.07	493.38	0.000350	7.95	3565.70	580.34	0.47
NF CWC	SECTION_03	2700	Ultimate 100 yr	12033.00	483.57	491.81	488.61	492.34	0.000345	7.32	3028.40	550.11	0.46
NF CWC	SECTION_03	2688	2 yr	3145.00	482.46	487.24	486.32	487.62	0.001129	8.81	965.96	355.51	0.75
NF CWC	SECTION_03	2688	5 yr	5560.00	482.46	489.27	487.17	489.59	0.000650	8.63	1779.16	448.27	0.60
NF CWC	SECTION_03	2688	10 yr	6909.00	482.46	489.94	487.58	490.30	0.000654	9.26	2099.99	496.18	0.62
NF CWC	SECTION_03	2688	25 yr	8421.00	482.46	490.58	488.14	490.96	0.000643	9.73	2420.64	508.78	0.62
NF CWC	SECTION_03	2688	50 yr	10102.00	482.46	491.19	488.48	491.61	0.000663	10.39	2735.14	535.09	0.64
NF CWC	SECTION_03	2688	100 yr	11629.00	482.46	491.71	488.84	492.17	0.000673	10.91	3023.66	562.08	0.65
NF CWC	SECTION_03	2688	500 yr	15091.00	482.46	492.84	489.67	493.34	0.000653	11.64	3673.94	592.36	0.65
NF CWC	SECTION_03	2688	Ultimate 100 yr	12033.00	482.46	491.85	488.92	492.31	0.000671	11.01	3102.21	566.62	0.65
NF CWC	SECTION_03	2634	2 yr	3041.00	481.00	487.33	485.66	487.49	0.001244	4.08	1041.26	423.18	0.30
NF CWC	SECTION_03	2634	5 yr	5566.00	481.00	489.36	486.64	489.49	0.000678	3.70	2000.44	523.75	0.24
NF CWC	SECTION_03	2634	10 yr	6985.00	481.00	490.05	487.05	490.19	0.000657	3.86	2369.05	549.71	0.24
NF CWC	SECTION_03	2634	25 yr	8520.00	481.00	490.69	487.38	490.86	0.000652	4.04	2731.36	572.61	0.24
NF CWC	SECTION_03	2634	50 yr	10178.00	481.00	491.32	487.70	491.50	0.000651	4.23	3095.55	597.00	0.24
NF CWC	SECTION_03	2634	100 yr	11734.00	481.00	491.86	487.97	492.05	0.000655	4.40	3423.90	622.38	0.24
NF CWC	SECTION_03	2634	500 yr	15291.00	481.00	492.99	488.57	493.21	0.000630	4.63	4151.35	654.55	0.24
NF CWC	SECTION_03	2634	Ultimate 100 yr	12153.00	481.00	492.00	488.02	492.19	0.000655	4.44	3511.89	629.01	0.24
NF CWC	SECTION_03	2587	2 yr	3041.00	479.80	487.28	485.60	487.43	0.001016	3.86	1076.83	386.44	0.28
NF CWC	SECTION_03	2587	5 yr	5566.00	479.80	489.32	486.44	489.46	0.000637	3.72	1902.18	423.42	0.23
NF CWC	SECTION_03	2587	10 yr	6985.00	479.80	490.00	486.82	490.16	0.000652	3.97	2191.87	433.83	0.24
NF CWC	SECTION_03	2587	25 yr	8520.00	479.80	490.63	487.22	490.82	0.000675	4.23	2469.26	442.55	0.24
NF CWC	SECTION_03	2587	50 yr	10178.00	479.80	491.24	487.56	491.46	0.000703	4.50	2741.95	452.70	0.25
NF CWC	SECTION_03	2587	100 yr	11734.00	479.80	491.76	487.80	492.01	0.000730	4.75	2982.41	463.55	0.26
NF CWC	SECTION_03	2587	500 yr	15291.00	479.80	492.87	488.40	493.17	0.000821	5.38	3515.04	518.44	0.28
NF CWC	SECTION_03	2587	Ultimate 100 yr	12153.00	479.80	491.90	487.88	492.16	0.000736	4.81	3046.15	466.60	0.26
NF CWC	SECTION_03	2543		Bridge									
NF CWC	SECTION_03	2464	2 yr	3041.00	479.09	487.26	483.19	487.31	0.000229	2.15	1739.32	385.48	0.14
NF CWC	SECTION_03	2464	5 yr	5566.00	479.09	489.29	484.56	489.37	0.000240	2.58	2546.27	410.41	0.15
NF CWC	SECTION_03	2464	10 yr	6985.00	479.09	489.96	484.99	490.06	0.000280	2.91	2827.15	425.11	0.16
NF CWC	SECTION_03	2464	25 yr	8520.00	479.09	490.59	485.28	490.71	0.000328	3.28	3100.01	452.48	0.17
NF CWC	SECTION_03	2464	50 yr	10178.00	479.09	491.20	485.65	491.34	0.000368	3.60	3381.40	468.78	0.19
NF CWC	SECTION_03	2464	100 yr	11734.00	479.09	491.72	485.92	491.89	0.000394	3.83	3627.31	473.19	0.19
NF CWC	SECTION_03	2464	500 yr	15291.00	479.09	492.82	486.59	493.03	0.000440	4.29	4152.24	482.39	0.21
NF CWC	SECTION_03	2464	Ultimate 100 yr	12153.00	479.09	491.86	485.99	492.03	0.000400	3.89	3691.87	474.33	0.20
NF CWC	SECTION_03	2330	2 yr	3041.00	480.00	486.50	484.80	487.09	0.003472	6.43	529.19	181.82	0.50
NF CWC	SECTION_03	2330	5 yr	5566.00	480.00	488.73	486.87	489.20	0.001975	6.19	1136.70	310.04	0.40
NF CWC	SECTION_03	2330	10 yr	6985.00	480.00	489.35	487.65	489.87	0.002044	6.64	1332.23	322.20	0.42
NF CWC	SECTION_03	2330	25 yr	8520.00	480.00	489.92	488.15	490.50	0.002137	7.11	1517.67	333.81	0.43
NF CWC	SECTION_03	2330	50 yr	10178.00	480.00	490.46	488.59	491.11	0.002209	7.53	1702.38	342.45	0.44
NF CWC	SECTION_03	2330	100 yr	11734.00	480.00	490.93	488.96	491.64	0.002262	7.88	1864.99	349.15	0.45
NF CWC	SECTION_03	2330	500 yr	15291.00	480.00	491.93	489.70	492.76	0.002316	8.53	2222.46	363.56	0.46
NF CWC	SECTION_03	2330	Ultimate 100 yr	12153.00	480.00	491.06	489.05	491.78	0.002272	7.97	1908.24	350.96	0.45
NF CWC	SECTION_03	2239	2 yr	3041.00	477.30	486.68	482.60	486.77	0.000315	2.75	1378.27	280.17	0.16
NF CWC	SECTION_03	2239	5 yr	5566.00	477.30	488.86	484.22	488.99	0.000339	3.32	2003.40	292.72	0.18
NF CWC	SECTION_03	2239	10 yr	6985.00	477.30	489.49	484.69	489.65	0.000408	3.77	2186.88	296.25	0.20
NF CWC	SECTION_03	2239	25 yr	8520.00	477.30	490.06	485.11	490.27	0.000483	4.24	2356.86	299.52	0.21
NF CWC	SECTION_03	2239	50 yr	10178.00	477.30	490.60	485.52	490.87	0.000560	4.70	2521.87	302.65	0.23
NF CWC	SECTION_03	2239	100 yr	11734.00	477.30	491.08	485.85	491.39	0.000628	5.10	2665.01	305.34	0.25
NF CWC	SECTION_03	2239	500 yr	15291.00	477.30	492.07	486.61	492.49	0.000764	5.91	2972.00	311.13	0.28
NF CWC	SECTION_03	2239	Ultimate 100 yr	12153.00	477.30	491.20	485.93	491.52	0.000646	5.20	2702.71	306.04	0.25
NF CWC	SECTION_03	2204		Bridge									
NF CWC	SECTION_03	2170	2 yr	3041.00	474.45	486.65	479.86	486.73	0.000229	2.72	1494.76	279.98	0.14
NF CWC	SECTION_03	2170	5 yr	5566.00	474.45	488.81	483.48	488.93	0.000278	3.35	2114.73	292.44	0.16
NF CWC	SECTION_03	2170	10 yr	6985.00	474.45	489.42	484.27	489.58	0.000343	3.83	2293.72	295.89	0.18
NF CWC	SECTION_03	2170	25 yr	8520.00	474.45	489.98	484.80	490.18	0.000415	4.31	2458.41	299.06	0.19
NF CWC	SECTION_03	2170	50 yr	10178.00	474.45	490.51	485.25	490.76	0.000490	4.79	2617.49	302.09	0.21
NF CWC	SECTION_03	2170	100 yr	11734.00	474.45	490.96	485.63	491.26	0.000558	5.21	2754.78	304.67	0.23
NF CWC	SECTION_03	2170	500 yr	15291.00	474.45	491.91	486.34	492.32	0.000698	6.06	3048.03	310.20	0.26
NF CWC	SECTION_03	2170	Ultimate 100 yr	12153.00	474.45	491.08	485.72	491.39	0.000576	5.32	2790.88	305.34	0.23
NF CWC	SECTION_03	2005	2 yr	3041.00	478.77	485.42	484.10	486.39	0.005045	8.07	408.46	143.57	0.61
NF CWC	SECTION_03	2005	5 yr	5566.00	478.77	486.66	486.46	488.37	0.007242	11.07	578.60	201.50	0.75
NF CWC	SECTION_03	2005	10 yr	6985.00	478.77	487.70	487.70	489.10	0.005367	10.49	872.33	401.61	0.66
NF CWC	SECTION_03	2005	25 yr	8520.00	478.77	488.19	488.19	489.67	0.005486	11.05	1034.86	422.23	0.68
NF CWC	SECTION_03	2005	50 yr	10178.00	478.77	488.63	488.63	490.21	0.005704	11.66	1180.97	442.72	0.70
NF CWC	SECTION_03	2005	100 yr	11734.00	478.77	488.99	488.99	490.67	0.005921	12.20	1302.59	462.61	0.71
NF CWC	SECTION_03	2005	500 yr	15291.00	478.77	489.61	489.61	491.63	0.006705	13.58	1519.88	481.99	0.77
NF CWC	SECTION_03	2005	Ultimate 100 yr	12153.00	478.77	489.07	489.07	490.79	0.006005	12.37	1331.23	465.55	0.72
NF CWC	SECTION_03	1775	2 yr	3041.00	477.00	484.65	482.63	485.34	0.003386	6.95	518.65	232.29	0.50
NF CWC	SECTION_03	1775	5 yr	5566.00	477.00	485.91	485.27	486.83	0.004083	8.66	881.39	397.79	0.57
NF CWC	SECTION_03	1775	10 yr	6985.00	477.00	486.51	485.91	487.38	0.003774	8.78	1142.59	438.87	0.55
NF CWC	SECTION_03	1775	25 yr	8520.00	477.00	487.02	486.60	487.88	0.003619	8.97	1364.63	459.49	0.55

River	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
NF CWC	SECTION_03	1775	50 yr	10178.00	477.00	487.53	486.95	488.39	0.003481	9.15	1587.63	546.37	0.54
NF CWC	SECTION_03	1775	100 yr	11734.00	477.00	487.92	487.22	488.81	0.003468	9.40	1768.48	591.75	0.54
NF CWC	SECTION_03	1775	500 yr	15291.00	477.00	488.78	487.80	489.64	0.003249	9.65	2374.71	629.49	0.53
NF CWC	SECTION_03	1775	Ultimate 100 yr	12153.00	477.00	488.04	487.30	488.95	0.003582	9.63	1922.63	605.61	0.55
NF CWC	SECTION_03	1291	2 yr	3003.00	477.00	483.56	482.87	483.88	0.002394	5.69	759.91	360.99	0.42
NF CWC	SECTION_03	1291	5 yr	5550.00	477.00	484.83	483.66	485.20	0.002269	6.32	1282.20	433.99	0.42
NF CWC	SECTION_03	1291	10 yr	7050.00	477.00	485.45	484.01	485.86	0.002257	6.67	1567.77	488.38	0.42
NF CWC	SECTION_03	1291	25 yr	8621.00	477.00	485.98	484.39	486.42	0.002211	6.90	1824.91	505.46	0.42
NF CWC	SECTION_03	1291	50 yr	10264.00	477.00	486.48	484.74	486.95	0.002277	7.29	2105.60	542.47	0.44
NF CWC	SECTION_03	1291	100 yr	11858.00	477.00	486.90	484.98	487.40	0.002219	7.42	2332.41	543.82	0.43
NF CWC	SECTION_03	1291	500 yr	15495.00	477.00	487.72	485.75	488.29	0.002283	7.97	2785.46	568.33	0.45
NF CWC	SECTION_03	1291	Ultimate 100 yr	12276.00	477.00	487.00	484.98	487.50	0.002216	7.47	2386.10	544.15	0.43
NF CWC	SECTION_03	1010	2 yr	3003.00	476.54	482.88	481.73	483.16	0.002520	5.13	739.90	277.82	0.42
NF CWC	SECTION_03	1010	5 yr	5550.00	476.54	483.99	482.63	484.45	0.003024	6.48	1088.82	352.49	0.48
NF CWC	SECTION_03	1010	10 yr	7050.00	476.54	484.50	483.02	485.05	0.003448	7.32	1281.06	400.95	0.52
NF CWC	SECTION_03	1010	25 yr	8621.00	476.54	484.94	483.53	485.59	0.003832	8.08	1468.23	444.74	0.55
NF CWC	SECTION_03	1010	50 yr	10264.00	476.54	485.35	483.93	486.08	0.004113	8.71	1661.55	505.87	0.58
NF CWC	SECTION_03	1010	100 yr	11858.00	476.54	485.71	484.28	486.52	0.004331	9.24	1855.81	553.34	0.60
NF CWC	SECTION_03	1010	500 yr	15495.00	476.54	486.39	485.22	487.35	0.005073	10.59	2273.44	672.91	0.65
NF CWC	SECTION_03	1010	Ultimate 100 yr	12276.00	476.54	485.80	484.41	486.62	0.004371	9.35	1906.04	564.65	0.60
NF CWC	SECTION_03	859	2 yr	3003.00	473.60	482.74	478.06	482.84	0.000502	2.98	1383.14	466.15	0.19
NF CWC	SECTION_03	859	5 yr	5550.00	473.60	483.86	481.64	484.02	0.000705	3.89	1934.11	505.83	0.24
NF CWC	SECTION_03	859	10 yr	7050.00	473.60	484.36	482.03	484.56	0.000810	4.33	2192.41	530.84	0.25
NF CWC	SECTION_03	859	25 yr	8621.00	473.60	484.79	482.35	485.03	0.000929	4.78	2424.04	548.51	0.27
NF CWC	SECTION_03	859	50 yr	10264.00	473.60	485.19	482.65	485.47	0.001065	5.26	2647.65	579.67	0.30
NF CWC	SECTION_03	859	100 yr	11858.00	473.60	485.51	482.92	485.86	0.001352	6.06	2857.46	701.09	0.34
NF CWC	SECTION_03	859	500 yr	15495.00	473.60	486.15	483.50	486.57	0.001540	6.74	3391.35	884.52	0.36
NF CWC	SECTION_03	859	Ultimate 100 yr	12276.00	473.60	485.59	483.01	485.95	0.001389	6.18	2917.85	716.62	0.34
NF CWC	SECTION_03	776		Culvert									
NF CWC	SECTION_03	701	2 yr	3003.00	473.50	481.14	477.90	481.67	0.002292	5.88	586.92	613.62	0.41
NF CWC	SECTION_03	701	5 yr	5550.00	473.50	482.37	481.83	482.83	0.002148	6.40	1331.58	915.83	0.41
NF CWC	SECTION_03	701	10 yr	7050.00	473.50	482.95	482.20	483.31	0.001765	6.10	1946.94	961.99	0.38
NF CWC	SECTION_03	701	25 yr	8621.00	473.50	483.51	482.64	483.80	0.001414	5.71	2498.48	996.10	0.34
NF CWC	SECTION_03	701	50 yr	10264.00	473.50	483.99	482.76	484.26	0.001241	5.54	2984.98	1020.46	0.32
NF CWC	SECTION_03	701	100 yr	11858.00	473.50	484.45	483.10	484.69	0.001100	5.39	3456.00	1042.25	0.31
NF CWC	SECTION_03	701	500 yr	15495.00	473.50	485.43	483.47	485.66	0.000874	5.12	4498.35	1077.87	0.28
NF CWC	SECTION_03	701	Ultimate 100 yr	12276.00	473.50	484.61	483.15	484.85	0.001027	5.27	3626.99	1048.60	0.30
NF CWC	SECTION_03	352	2 yr	3003.00	476.00	480.82	479.00	480.90	0.000893	2.86	1346.12	604.95	0.25
NF CWC	SECTION_03	352	5 yr	5550.00	476.00	482.05	479.98	482.17	0.000782	3.19	2144.41	675.08	0.24
NF CWC	SECTION_03	352	10 yr	7050.00	476.00	482.65	480.29	482.78	0.000745	3.34	2552.92	695.08	0.24
NF CWC	SECTION_03	352	25 yr	8621.00	476.00	483.23	480.54	483.37	0.000709	3.46	2965.26	715.71	0.24
NF CWC	SECTION_03	352	50 yr	10264.00	476.00	483.73	480.80	483.88	0.000712	3.64	3320.35	729.29	0.24
NF CWC	SECTION_03	352	100 yr	11858.00	476.00	484.19	481.00	484.36	0.000718	3.81	3663.97	753.18	0.24
NF CWC	SECTION_03	352	500 yr	15495.00	476.00	485.20	481.50	485.39	0.000667	3.99	4424.52	759.16	0.24
NF CWC	SECTION_03	352	Ultimate 100 yr	12276.00	476.00	484.37	481.10	484.53	0.000686	3.79	3796.64	754.27	0.24
SF CWC	SECTION_01	182956	2 yr	1079.00	546.00	551.22	550.21	551.35	0.004132	4.07	483.97	269.17	0.34
SF CWC	SECTION_01	182956	5 yr	1718.00	546.00	551.88	550.67	552.03	0.004358	4.58	664.22	282.60	0.36
SF CWC	SECTION_01	182956	10 yr	2116.00	546.00	552.29	550.92	552.44	0.004144	4.70	782.26	291.40	0.35
SF CWC	SECTION_01	182956	25 yr	2609.00	546.00	552.97	551.22	553.11	0.003223	4.48	983.89	304.33	0.32
SF CWC	SECTION_01	182956	50 yr	3005.00	546.00	553.52	551.39	553.64	0.002673	4.31	1153.54	314.66	0.29
SF CWC	SECTION_01	182956	100 yr	3516.00	546.00	553.98	551.57	554.12	0.002537	4.39	1301.75	321.01	0.29
SF CWC	SECTION_01	182956	500 yr	4553.00	546.00	554.79	551.90	554.94	0.002432	4.61	1567.77	334.02	0.29
SF CWC	SECTION_01	182956	Ultimate 100 yr	3616.00	546.00	554.07	551.61	554.21	0.002508	4.40	1331.24	322.46	0.29
SF CWC	SECTION_01	17917	2 yr	1079.00	545.36	550.21	549.00	550.28	0.003711	3.77	584.48	310.75	0.33
SF CWC	SECTION_01	17917	5 yr	1718.00	545.36	550.84	549.51	550.94	0.003879	4.23	785.23	324.71	0.34
SF CWC	SECTION_01	17917	10 yr	2116.00	545.36	551.39	549.67	551.48	0.003134	4.09	967.70	336.34	0.31
SF CWC	SECTION_01	17917	25 yr	2609.00	545.36	552.36	549.86	552.43	0.001940	3.59	1300.73	353.67	0.25
SF CWC	SECTION_01	17917	50 yr	3005.00	545.36	553.03	550.04	553.10	0.001531	3.41	1541.47	364.04	0.23
SF CWC	SECTION_01	17917	100 yr	3516.00	545.36	553.52	550.20	553.59	0.001488	3.52	1722.06	369.81	0.23
SF CWC	SECTION_01	17917	500 yr	4553.00	545.36	554.35	550.51	554.44	0.001492	3.78	2032.96	379.01	0.23
SF CWC	SECTION_01	17917	Ultimate 100 yr	3616.00	545.36	553.62	550.24	553.69	0.001475	3.54	1758.11	370.87	0.23
SF CWC	SECTION_01	17616	2 yr	1079.00	545.03	548.65	548.22	548.85	0.008278	4.72	404.21	283.76	0.48
SF CWC	SECTION_01	17616	5 yr	1718.00	545.03	549.69	548.58	549.82	0.004227	4.10	701.38	290.34	0.36
SF CWC	SECTION_01	17616	10 yr	2116.00	545.03	550.64	548.75	550.74	0.002301	3.47	982.19	298.42	0.27
SF CWC	SECTION_01	17616	25 yr	2609.00	545.03	551.92	548.95	551.99	0.001256	2.98	1371.56	310.39	0.21
SF CWC	SECTION_01	17616	50 yr	3005.00	545.03	552.68	549.10	552.75	0.001020	2.90	1609.59	317.70	0.19
SF CWC	SECTION_01	17616	100 yr	3516.00	545.03	553.17	549.28	553.25	0.001051	3.08	1767.00	322.86	0.20
SF CWC	SECTION_01	17616	500 yr	4553.00	545.03	553.98	549.61	554.07	0.001158	3.46	2032.54	332.46	0.21
SF CWC	SECTION_01	17616	Ultimate 100 yr	3616.00	545.03	553.27	549.31	553.35	0.001054	3.11	1798.75	324.07	0.20
SF CWC	SECTION_01	17466	2 yr	1079.00	544.00	547.87	546.85	547.94	0.003177	3.01	554.45	258.06	0.30
SF CWC	SECTION_01	17466	5 yr	1718.00	544.00	549.29	547.04	549.36	0.001613	2.74	931.54	270.52	0.22
SF CWC	SECTION_01	17466	10 yr	2116.00	544.00	550.42	547.21	550.47	0.001001	2.49	1241.70	279.67	0.18
SF CWC	SECTION_01	17466	25 yr	2609.00	544.00	551.79	547.40	551.84	0.000648	2.31	1632.87	289.02	0.15
SF CWC	SECTION_01	17466	50 yr	3005.00	544.00	552.57	547.56	552.62	0.000572	2.33	1859.66	293.56	0.15
SF CWC	SECTION_01	17466	100 yr	3516.00	544.00	553.06	547.75	553.11	0.000622	2.53	2002.91	296.39	0.15
SF CWC	SECTION_01	17466	500 yr	4553.00	544.00	553.85	548.11	553.92	0.000739	2.93	2240.27	302.10	0.17
SF CWC	SECTION_01	17466	Ultimate 100 yr	3616.00	544.00	553.16	547.78	553.21	0.000629	2.56	2031.81	296.94	0.15
SF CWC	SECTION_01	17281	2 yr	1079.00	541.13	547.25	545.81	547.37	0.002833	3.88	484.82	180.25	0.30
SF CWC	SECTION_01	17281	5 yr	1718.00	541.13	548.95	546.34	549.05	0.001636	3.55	810.09	203.38	0.24
SF CWC	SECTION_01	17281	10 yr	2116.00	541.13	550.19	546.60	550.27	0.001108	3.26	1073.77	223.70	0.20
SF CWC	SECTION_01	17281	25 yr	2609.00	541.13	551.63	546.88	551.70	0.000787	3.06	1425.57	262.97	0.17

River	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
SF CWC	SECTION_01	17281	50 yr	3005.00	541.13	552.43	547.09	552.50	0.000725	3.10	1643.25	285.19	0.17
SF CWC	SECTION_01	17281	100 yr	3516.00	541.13	552.90	547.33	552.98	0.000804	3.36	1780.20	297.76	0.18
SF CWC	SECTION_01	17281	500 yr	4553.00	541.13	553.66	547.80	553.76	0.000980	3.88	2013.97	317.17	0.20
SF CWC	SECTION_01	17281	Ultimate 100 yr	3616.00	541.13	552.99	547.38	553.07	0.000817	3.41	1808.63	300.67	0.18
SF CWC	SECTION_01	16891	2 yr	1079.00	541.40	546.14	544.79	546.25	0.003795	3.83	466.83	185.28	0.33
SF CWC	SECTION_01	16891	5 yr	1718.00	541.40	548.49	545.21	548.55	0.001232	2.96	970.09	239.57	0.21
SF CWC	SECTION_01	16891	10 yr	2116.00	541.40	549.89	545.43	549.94	0.000813	2.74	1331.78	281.83	0.17
SF CWC	SECTION_01	16891	25 yr	2609.00	541.40	551.43	545.70	551.47	0.000559	2.56	1802.07	327.96	0.15
SF CWC	SECTION_01	16891	50 yr	3005.00	541.40	552.24	545.90	552.28	0.000499	2.56	2077.49	345.80	0.14
SF CWC	SECTION_01	16891	100 yr	3516.00	541.40	552.69	546.07	552.74	0.000549	2.76	2234.90	350.78	0.15
SF CWC	SECTION_01	16891	500 yr	4553.00	541.40	553.40	546.58	553.46	0.000706	3.27	2495.62	377.43	0.17
SF CWC	SECTION_01	16891	Ultimate 100 yr	3616.00	541.40	552.78	546.13	552.83	0.000561	2.81	2267.09	353.92	0.15
SF CWC	SECTION_01	16685	2 yr	1113.00	538.68	545.75	540.81	545.81	0.000507	1.98	562.62	190.54	0.13
SF CWC	SECTION_01	16685	5 yr	1847.00	538.68	548.29	541.52	548.38	0.000478	2.38	776.02	238.95	0.14
SF CWC	SECTION_01	16685	10 yr	2327.00	538.68	549.70	541.92	549.80	0.000472	2.60	894.53	270.36	0.14
SF CWC	SECTION_01	16685	25 yr	2837.00	538.68	551.24	542.34	551.36	0.000447	2.77	1023.99	341.42	0.14
SF CWC	SECTION_01	16685	50 yr	3331.00	538.68	552.18	542.70	552.21	0.000169	1.34	2576.78	380.28	0.08
SF CWC	SECTION_01	16685	100 yr	3886.00	538.68	552.63	543.10	552.66	0.000193	1.48	2750.13	400.31	0.09
SF CWC	SECTION_01	16685	500 yr	5174.00	538.68	553.31	543.94	553.36	0.000263	1.82	3037.89	440.55	0.10
SF CWC	SECTION_01	16685	Ultimate 100 yr	4010.00	538.68	552.72	543.19	552.75	0.000198	1.51	2786.20	404.98	0.09
SF CWC	SECTION_01	16615			Culvert								
SF CWC	SECTION_01	16546	2 yr	1113.00	539.03	543.77	542.12	544.19	0.005778	5.24	212.24	58.38	0.48
SF CWC	SECTION_01	16546	5 yr	1847.00	539.03	544.80	543.21	545.50	0.007443	6.70	275.68	64.23	0.57
SF CWC	SECTION_01	16546	10 yr	2327.00	539.03	545.32	543.81	546.20	0.008218	7.54	308.73	67.14	0.60
SF CWC	SECTION_01	16546	25 yr	2837.00	539.03	545.88	544.39	546.93	0.008464	8.23	344.65	70.30	0.63
SF CWC	SECTION_01	16546	50 yr	3331.00	539.03	546.44	544.87	547.63	0.008422	8.76	380.06	73.42	0.63
SF CWC	SECTION_01	16546	100 yr	3886.00	539.03	547.13	545.36	548.34	0.009063	8.82	440.80	77.35	0.65
SF CWC	SECTION_01	16546	500 yr	5174.00	539.03	548.29	546.38	549.75	0.009218	9.69	536.20	90.46	0.67
SF CWC	SECTION_01	16546	Ultimate 100 yr	4010.00	539.03	547.26	545.46	548.49	0.009098	8.91	450.29	78.04	0.65
SF CWC	SECTION_01	16285	2 yr	1113.00	537.34	541.72	541.31	542.12	0.011538	8.04	301.22	149.73	0.70
SF CWC	SECTION_01	16285	5 yr	1847.00	537.34	542.84	541.86	543.21	0.008470	8.10	477.54	164.85	0.63
SF CWC	SECTION_01	16285	10 yr	2327.00	537.34	543.53	542.20	543.88	0.007112	8.07	592.50	171.38	0.59
SF CWC	SECTION_01	16285	25 yr	2837.00	537.34	544.37	542.50	544.69	0.005449	7.73	740.78	178.85	0.53
SF CWC	SECTION_01	16285	50 yr	3331.00	537.34	545.14	542.75	545.44	0.004499	7.55	880.73	185.48	0.49
SF CWC	SECTION_01	16285	100 yr	3886.00	537.34	545.81	543.09	546.12	0.004109	7.64	1006.15	190.19	0.47
SF CWC	SECTION_01	16285	500 yr	5174.00	537.34	547.10	543.67	547.44	0.003724	8.02	1258.18	198.62	0.46
SF CWC	SECTION_01	16285	Ultimate 100 yr	4010.00	537.34	545.94	543.16	546.25	0.004054	7.67	1032.02	191.09	0.47
SF CWC	SECTION_01	15904	2 yr	1113.00	531.00	538.84	536.45	539.27	0.003484	5.56	252.11	79.82	0.40
SF CWC	SECTION_01	15904	5 yr	1847.00	531.00	540.24	537.79	540.85	0.003941	6.82	378.65	98.18	0.45
SF CWC	SECTION_01	15904	10 yr	2327.00	531.00	541.18	538.60	541.82	0.003690	7.16	474.89	105.67	0.44
SF CWC	SECTION_01	15904	25 yr	2837.00	531.00	542.60	539.47	543.15	0.002696	6.81	628.46	110.08	0.39
SF CWC	SECTION_01	15904	50 yr	3331.00	531.00	543.58	540.08	544.12	0.002447	6.92	737.75	114.30	0.37
SF CWC	SECTION_01	15904	100 yr	3886.00	531.00	544.22	540.63	544.83	0.002598	7.41	812.38	118.17	0.39
SF CWC	SECTION_01	15904	500 yr	5174.00	531.00	545.30	541.73	546.11	0.003146	8.67	944.22	126.12	0.44
SF CWC	SECTION_01	15904	Ultimate 100 yr	4010.00	531.00	544.34	540.75	544.97	0.002650	7.54	826.42	119.09	0.39
SF CWC	SECTION_01	15583	2 yr	1113.00	531.00	537.79	535.79	538.15	0.003599	5.97	348.16	137.09	0.42
SF CWC	SECTION_01	15583	5 yr	1847.00	531.00	539.37	537.33	539.70	0.002974	6.30	582.01	158.58	0.40
SF CWC	SECTION_01	15583	10 yr	2327.00	531.00	540.51	537.99	540.80	0.002291	6.05	772.03	172.16	0.35
SF CWC	SECTION_01	15583	25 yr	2837.00	531.00	542.22	538.41	542.42	0.001410	5.33	1080.90	192.81	0.29
SF CWC	SECTION_01	15583	50 yr	3331.00	531.00	543.25	538.81	543.45	0.001294	5.43	1297.39	222.95	0.28
SF CWC	SECTION_01	15583	100 yr	3886.00	531.00	543.90	539.19	544.11	0.001356	5.76	1446.19	237.26	0.29
SF CWC	SECTION_01	15583	500 yr	5174.00	531.00	544.96	539.96	545.23	0.001610	6.62	1712.14	263.82	0.32
SF CWC	SECTION_01	15583	Ultimate 100 yr	4010.00	531.00	544.01	539.30	544.24	0.001380	5.84	1473.97	240.05	0.29
SF CWC	SECTION_01	15193	2 yr	1113.00	528.15	535.97	534.01	536.55	0.004899	6.37	225.79	85.35	0.47
SF CWC	SECTION_01	15193	5 yr	1847.00	528.15	537.90	535.65	538.45	0.003676	6.70	448.18	147.16	0.43
SF CWC	SECTION_01	15193	10 yr	2327.00	528.15	539.64	536.58	539.99	0.002061	5.75	742.13	195.03	0.33
SF CWC	SECTION_01	15193	25 yr	2837.00	528.15	541.78	537.23	541.97	0.001017	4.63	1229.21	259.42	0.24
SF CWC	SECTION_01	15193	50 yr	3331.00	528.15	542.89	537.91	543.05	0.000838	4.47	1549.83	303.01	0.22
SF CWC	SECTION_01	15193	100 yr	3886.00	528.15	543.53	538.43	543.70	0.000847	4.64	1748.41	313.77	0.22
SF CWC	SECTION_01	15193	500 yr	5174.00	528.15	544.54	539.26	544.74	0.000980	5.24	2073.47	332.02	0.24
SF CWC	SECTION_01	15193	Ultimate 100 yr	4010.00	528.15	543.64	538.55	543.82	0.000858	4.70	1783.65	315.64	0.23
SF CWC	SECTION_01	14885	2 yr	1113.00	528.10	535.29	532.54	535.45	0.001501	3.70	532.18	217.28	0.27
SF CWC	SECTION_01	14885	5 yr	1847.00	528.10	537.55	534.15	537.64	0.000775	3.28	1091.16	287.02	0.20
SF CWC	SECTION_01	14885	10 yr	2327.00	528.10	539.47	534.57	539.53	0.000409	2.74	1710.24	351.62	0.15
SF CWC	SECTION_01	14885	25 yr	2837.00	528.10	541.71	535.08	541.74	0.000215	2.27	2567.36	414.75	0.11
SF CWC	SECTION_01	14885	50 yr	3331.00	528.10	542.83	535.42	542.86	0.000191	2.26	3050.42	449.01	0.11
SF CWC	SECTION_01	14885	100 yr	3886.00	528.10	543.47	535.70	543.51	0.000207	2.43	3346.39	474.93	0.11
SF CWC	SECTION_01	14885	500 yr	5174.00	528.10	544.46	536.33	544.51	0.000260	2.85	3837.50	510.86	0.13
SF CWC	SECTION_01	14885	Ultimate 100 yr	4010.00	528.10	543.58	535.77	543.62	0.000212	2.47	3399.29	478.99	0.12
SF CWC	SECTION_01	14701	2 yr	1113.00	528.31	534.61	532.84	535.03	0.005003	5.39	252.00	113.09	0.46
SF CWC	SECTION_01	14701	5 yr	1847.00	528.31	537.41	534.37	537.51	0.000943	3.27	1020.61	336.20	0.22
SF CWC	SECTION_01	14701	10 yr	2327.00	528.31	539.42	534.63	539.47	0.000363	2.40	1755.74	394.64	0.14
SF CWC	SECTION_01	14701	25 yr	2837.00	528.31	541.69	535.75	541.71	0.000162	1.86	2715.10	451.26	0.10
SF CWC	SECTION_01	14701	50 yr	3331.00	528.31	542.81	536.03	542.84	0.000136	1.81	3238.02	478.53	0.09
SF CWC	SECTION_01	14701	100 yr	3886.00	528.31	543.45	536.31	543.48	0.000143	1.92	3549.24	493.21	0.09
SF CWC	SECTION_01	14701	500 yr	5174.00	528.31	544.44	536.92	544.48	0.000175	2.23	4051.03	518.76	0.10
SF CWC	SECTION_01	14701	Ultimate 100 yr	4010.00	528.31	543.56	536.38	543.59	0.000146	1.95	3603.94	495.91	0.09
SF CWC	SECTION_01	14582	2 yr	1097.00	523.97	534.57	527.70	534.61	0.000239	1.69	670.62	252.22	0.11
SF CWC	SECTION_01	14582	5 yr	1813.00	523.97	537.38	528.76	537.44	0.000227	1.98	952.62	344.74	0.11
SF CWC	SECTION_01	14582	10 yr	2258.00	523.97	539.38	529.29	539.44	0.000194	2.02	1162.39	387.67	0.11
SF CWC	SECTION_01	14582	25 yr	2692.00	523.97	541.63	529.78	541.69	0.000150	1.99	1422.08	441.77	0.10

River	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
SF CWC	SECTION_01	14582	50 yr	3199.00	523.97	542.81	530.29	542.82	0.000057	1.30	3993.14	475.48	0.06
SF CWC	SECTION_01	14582	100 yr	3786.00	523.97	543.45	530.84	543.47	0.000067	1.45	4295.01	498.61	0.07
SF CWC	SECTION_01	14582	500 yr	5180.00	523.97	544.44	531.95	544.47	0.000096	1.81	4780.30	535.99	0.08
SF CWC	SECTION_01	14582	Ultimate 100 yr	3913.00	523.97	543.56	530.95	543.58	0.000070	1.48	4348.07	502.16	0.07
SF CWC	SECTION_01	14444											
			Culvert										
SF CWC	SECTION_01	14301	2 yr	1105.00	524.70	533.56	527.31	533.63	0.000511	2.07	533.59	432.05	0.13
SF CWC	SECTION_01	14301	5 yr	1833.00	524.70	534.57	528.32	534.71	0.000925	3.03	605.01	443.14	0.18
SF CWC	SECTION_01	14301	10 yr	2271.00	524.70	534.99	528.88	535.19	0.001207	3.58	635.09	447.85	0.21
SF CWC	SECTION_01	14301	25 yr	2691.00	524.70	535.37	529.39	535.63	0.001477	4.07	661.91	451.13	0.23
SF CWC	SECTION_01	14301	50 yr	3228.00	524.70	535.80	529.94	536.13	0.001830	4.66	692.26	461.83	0.26
SF CWC	SECTION_01	14301	100 yr	3844.00	524.70	536.22	530.49	536.26	0.000398	2.24	2727.75	479.51	0.12
SF CWC	SECTION_01	14301	500 yr	5359.00	524.70	537.11	531.66	537.18	0.000524	2.72	3160.96	496.30	0.14
SF CWC	SECTION_01	14301	Ultimate 100 yr	3987.00	524.70	536.31	530.61	536.35	0.000410	2.28	2770.33	484.21	0.13
SF CWC	SECTION_01	14120	2 yr	1105.00	527.00	533.31	531.38	533.45	0.002689	3.84	514.25	227.24	0.29
SF CWC	SECTION_01	14120	5 yr	1833.00	527.00	534.26	532.31	534.43	0.003084	4.58	761.43	294.79	0.32
SF CWC	SECTION_01	14120	10 yr	2271.00	527.00	534.66	532.69	534.85	0.003190	4.86	882.69	303.13	0.33
SF CWC	SECTION_01	14120	25 yr	2691.00	527.00	535.01	533.01	535.21	0.003290	5.10	988.39	309.92	0.34
SF CWC	SECTION_01	14120	50 yr	3228.00	527.00	535.40	533.40	535.62	0.003419	5.39	1111.45	317.32	0.35
SF CWC	SECTION_01	14120	100 yr	3844.00	527.00	535.83	533.66	536.06	0.003499	5.66	1248.67	325.37	0.36
SF CWC	SECTION_01	14120	500 yr	5359.00	527.00	536.62	534.53	536.92	0.004126	6.56	1518.78	361.31	0.39
SF CWC	SECTION_01	14120	Ultimate 100 yr	3987.00	527.00	535.91	533.76	536.15	0.003555	5.75	1274.82	327.22	0.36
SF CWC	SECTION_01	13908	2 yr	1105.00	529.00	532.64	531.04	532.78	0.004495	3.60	417.95	182.48	0.35
SF CWC	SECTION_01	13908	5 yr	1833.00	529.00	533.45	531.70	533.66	0.005359	4.56	590.70	248.42	0.40
SF CWC	SECTION_01	13908	10 yr	2271.00	529.00	533.80	532.04	534.04	0.005776	5.01	679.71	266.43	0.42
SF CWC	SECTION_01	13908	25 yr	2691.00	529.00	534.09	532.32	534.37	0.006146	5.40	758.10	311.59	0.44
SF CWC	SECTION_01	13908	50 yr	3228.00	529.00	534.41	532.61	534.73	0.006638	5.87	849.27	339.41	0.46
SF CWC	SECTION_01	13908	100 yr	3844.00	529.00	534.77	532.96	535.14	0.007173	6.39	1001.75	391.54	0.49
SF CWC	SECTION_01	13908	500 yr	5359.00	529.00	535.48	533.83	535.89	0.007451	7.08	1284.24	409.40	0.51
SF CWC	SECTION_01	13908	Ultimate 100 yr	3987.00	529.00	534.84	533.00	535.21	0.007209	6.46	1029.60	393.12	0.49
SF CWC	SECTION_01	13479	2 yr	1092.00	527.00	529.60	529.26	529.83	0.016035	5.22	294.61	237.07	0.63
SF CWC	SECTION_01	13479	5 yr	1841.00	527.00	530.23	529.65	530.51	0.012672	5.51	453.51	263.42	0.58
SF CWC	SECTION_01	13479	10 yr	2286.00	527.00	530.58	529.86	530.87	0.011265	5.61	546.98	277.61	0.56
SF CWC	SECTION_01	13479	25 yr	2707.00	527.00	530.90	530.02	531.19	0.010143	5.68	636.72	290.59	0.54
SF CWC	SECTION_01	13479	50 yr	3242.00	527.00	531.28	530.24	531.58	0.008967	5.73	750.03	303.80	0.52
SF CWC	SECTION_01	13479	100 yr	3854.00	527.00	531.67	530.45	531.99	0.008107	5.81	872.88	316.99	0.50
SF CWC	SECTION_01	13479	500 yr	5426.00	527.00	532.51	530.97	532.87	0.007316	6.23	1153.35	352.19	0.49
SF CWC	SECTION_01	13479	Ultimate 100 yr	4008.00	527.00	531.76	530.51	532.08	0.007994	5.85	900.86	319.95	0.50
SF CWC	SECTION_01	13237	2 yr	1092.00	521.00	526.49	525.65	526.84	0.008979	5.76	282.44	127.11	0.51
SF CWC	SECTION_01	13237	5 yr	1841.00	521.00	527.48	526.42	527.92	0.009008	6.69	421.17	152.41	0.53
SF CWC	SECTION_01	13237	10 yr	2286.00	521.00	527.96	526.78	528.43	0.009071	7.13	495.66	164.15	0.54
SF CWC	SECTION_01	13237	25 yr	2707.00	521.00	528.36	527.12	528.88	0.009181	7.52	565.07	181.36	0.55
SF CWC	SECTION_01	13237	50 yr	3242.00	521.00	528.85	527.50	529.41	0.009144	7.92	662.24	213.32	0.55
SF CWC	SECTION_01	13237	100 yr	3854.00	521.00	529.37	527.84	529.95	0.008950	8.26	781.91	246.86	0.56
SF CWC	SECTION_01	13237	500 yr	5426.00	521.00	530.45	528.68	531.03	0.008068	8.64	1075.92	298.11	0.54
SF CWC	SECTION_01	13237	Ultimate 100 yr	4008.00	521.00	529.49	527.91	530.06	0.008860	8.31	810.79	252.40	0.55
SF CWC	SECTION_01	12822	2 yr	1154.00	518.00	524.55	521.92	524.63	0.001554	2.78	654.32	297.33	0.22
SF CWC	SECTION_01	12822	5 yr	1957.00	518.00	525.57	523.55	525.67	0.001622	3.22	963.38	309.12	0.23
SF CWC	SECTION_01	12822	10 yr	2408.00	518.00	526.05	523.85	526.16	0.001643	3.41	1112.29	313.65	0.24
SF CWC	SECTION_01	12822	25 yr	2826.00	518.00	526.45	524.07	526.57	0.001662	3.57	1239.07	316.60	0.24
SF CWC	SECTION_01	12822	50 yr	3411.00	518.00	526.96	524.36	527.10	0.001685	3.78	1403.39	319.84	0.25
SF CWC	SECTION_01	12822	100 yr	4102.00	518.00	527.51	524.60	527.66	0.001720	4.00	1579.15	323.19	0.25
SF CWC	SECTION_01	12822	500 yr	5930.00	518.00	528.71	525.22	528.90	0.001851	4.56	1970.76	330.25	0.27
SF CWC	SECTION_01	12822	Ultimate 100 yr	4282.00	518.00	527.64	524.67	527.79	0.001731	4.06	1621.93	323.96	0.25
SF CWC	SECTION_01	12421	2 yr	1154.00	518.00	523.71	522.34	523.82	0.003548	3.53	489.74	188.73	0.32
SF CWC	SECTION_01	12421	5 yr	1957.00	518.00	524.65	522.83	524.81	0.003873	4.27	672.36	202.22	0.34
SF CWC	SECTION_01	12421	10 yr	2408.00	518.00	525.10	523.07	525.28	0.003991	4.60	765.07	211.78	0.35
SF CWC	SECTION_01	12421	25 yr	2826.00	518.00	525.47	523.28	525.68	0.004091	4.87	846.08	227.62	0.36
SF CWC	SECTION_01	12421	50 yr	3411.00	518.00	525.96	523.56	526.20	0.004212	5.22	954.50	276.82	0.37
SF CWC	SECTION_01	12421	100 yr	4102.00	518.00	526.47	523.86	526.74	0.004306	5.57	1117.29	298.45	0.38
SF CWC	SECTION_01	12421	500 yr	5930.00	518.00	527.60	524.57	527.93	0.004443	6.28	1466.97	321.81	0.40
SF CWC	SECTION_01	12421	Ultimate 100 yr	4282.00	518.00	526.60	523.92	526.87	0.004320	5.65	1154.95	301.65	0.38
SF CWC	SECTION_01	11967	2 yr	1154.00	519.00	521.81	520.62	521.94	0.006379	3.57	430.13	209.83	0.40
SF CWC	SECTION_01	11967	5 yr	1957.00	519.00	522.72	521.13	522.89	0.005970	4.27	630.43	234.65	0.41
SF CWC	SECTION_01	11967	10 yr	2408.00	519.00	523.16	521.37	523.36	0.005762	4.56	738.26	248.40	0.41
SF CWC	SECTION_01	11967	25 yr	2826.00	519.00	523.54	521.59	523.76	0.005596	4.79	834.63	259.72	0.41
SF CWC	SECTION_01	11967	50 yr	3411.00	519.00	524.04	521.88	524.27	0.005358	5.05	967.55	273.74	0.41
SF CWC	SECTION_01	11967	100 yr	4102.00	519.00	524.57	522.17	524.83	0.005152	5.32	1117.49	288.86	0.41
SF CWC	SECTION_01	11967	500 yr	5930.00	519.00	525.73	522.87	526.04	0.004905	5.94	1467.00	314.55	0.42
SF CWC	SECTION_01	11967	Ultimate 100 yr	4282.00	519.00	524.70	522.21	524.96	0.005121	5.40	1155.04	292.80	0.41
SF CWC	SECTION_01	11238	2 yr	1154.00	511.46	518.79	517.74	518.98	0.004135	4.64	440.55	184.26	0.35
SF CWC	SECTION_01	11238	5 yr	1957.00	511.46	519.82	518.36	520.04	0.004390	5.37	637.54	201.59	0.37
SF CWC	SECTION_01	11238	10 yr	2408.00	511.46	520.31	518.64	520.56	0.004489	5.70	739.70	213.16	0.38
SF CWC	SECTION_01	11238	25 yr	2826.00	511.46	520.73	518.88	521.00	0.004554	5.97	832.34	224.61	0.39
SF CWC	SECTION_01	11238	50 yr	3411.00	511.46	521.32	519.17	521.61	0.004521	6.27	970.36	247.80	0.39
SF CWC	SECTION_01	11238	100 yr	4102.00	511.46	521.93	519.50	522.23	0.004524	6.58	1124.46	276.75	0.40
SF CWC	SECTION_01	11238	500 yr	5930.00	511.46	523.18	520.22	523.53	0.004570	7.25	1474.65	314.51	0.41
SF CWC	SECTION_01	11238	Ultimate 100 yr	4282.00	511.46	522.06	519.58	522.37	0.004550	6.67	1160.17	281.72	0.40
SF CWC	SECTION_01	10803	2 yr	1154.00	514.00	517.11	515.76	517.26	0.006326	3.87	398.73	164.71	0.41
SF CWC	SECTION_01	10803	5 yr	1957.00	514.00	518.09	516.32	518.30	0.006257	4.71	564.84	175.88	0.43
SF CWC	SECTION_01	10803	10 yr	2408.00	514.00	518.57	516.59	518.81	0.006218	5.09	650.34	182.28	0.44
SF CWC	SECTION_01	10803	25 yr	2826.00	514.00	518.98	516.83	519.24	0.006174	5.39	726.02	187.5	

River	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
SF CWC	SECTION_01	10803	50 yr	3411.00	514.00	519.58	517.15	519.88	0.006064	5.80	845.07	204.97	0.45
SF CWC	SECTION_01	10803	100 yr	4102.00	514.00	520.19	517.49	520.52	0.005989	6.21	974.69	220.47	0.45
SF CWC	SECTION_01	10803	500 yr	5930.00	514.00	521.36	518.28	521.78	0.006285	7.18	1244.81	241.91	0.48
SF CWC	SECTION_01	10803	Ultimate 100 yr	4282.00	514.00	520.30	517.57	520.64	0.006074	6.33	1000.16	222.83	0.46
SF CWC	SECTION_01	10047	2 yr	1154.00	506.00	513.73	512.75	513.93	0.005190	4.66	401.05	170.06	0.38
SF CWC	SECTION_01	10047	5 yr	1957.00	506.00	514.71	513.34	514.97	0.005536	5.46	576.28	186.22	0.40
SF CWC	SECTION_01	10047	10 yr	2408.00	506.00	515.20	513.62	515.49	0.005633	5.82	669.96	198.48	0.41
SF CWC	SECTION_01	10047	25 yr	2826.00	506.00	515.63	513.85	515.94	0.005706	6.12	758.45	213.82	0.42
SF CWC	SECTION_01	10047	50 yr	3411.00	506.00	516.18	514.13	516.53	0.005971	6.61	883.67	245.51	0.44
SF CWC	SECTION_01	10047	100 yr	4102.00	506.00	516.81	514.50	517.18	0.006061	7.04	1054.55	294.72	0.44
SF CWC	SECTION_01	10047	500 yr	5930.00	506.00	518.12	515.22	518.51	0.005707	7.58	1531.09	406.83	0.44
SF CWC	SECTION_01	10047	Ultimate 100 yr	4282.00	506.00	516.96	514.58	517.33	0.005933	7.05	1099.03	299.76	0.44
SF CWC	SECTION_01	9420	2 yr	1154.00	506.00	511.85	510.55	511.94	0.002174	3.28	680.44	335.10	0.26
SF CWC	SECTION_01	9420	5 yr	1957.00	506.00	512.94	511.22	513.02	0.001812	3.42	1052.54	350.91	0.24
SF CWC	SECTION_01	9420	10 yr	2408.00	506.00	513.47	511.42	513.55	0.001679	3.48	1240.96	355.80	0.24
SF CWC	SECTION_01	9420	25 yr	2826.00	506.00	513.93	511.59	514.02	0.001587	3.54	1405.59	359.79	0.24
SF CWC	SECTION_01	9420	50 yr	3411.00	506.00	514.44	511.79	514.53	0.001588	3.71	1590.39	364.08	0.24
SF CWC	SECTION_01	9420	100 yr	4102.00	506.00	515.10	512.02	515.19	0.001491	3.80	1830.63	369.25	0.23
SF CWC	SECTION_01	9420	500 yr	5930.00	506.00	516.53	512.54	516.65	0.001408	4.11	2368.75	380.41	0.23
SF CWC	SECTION_01	9420	Ultimate 100 yr	4282.00	506.00	515.28	512.07	515.38	0.001453	3.80	1898.44	370.56	0.23
SF CWC	SECTION_01	9021	2 yr	1225.00	504.00	510.55	509.45	510.78	0.005242	5.27	406.79	157.18	0.40
SF CWC	SECTION_01	9021	5 yr	2177.00	504.00	511.68	510.25	511.99	0.005787	6.29	591.52	169.49	0.43
SF CWC	SECTION_01	9021	10 yr	2709.00	504.00	512.22	510.58	512.57	0.006023	6.76	684.43	178.59	0.45
SF CWC	SECTION_01	9021	25 yr	3194.00	504.00	512.68	510.86	513.06	0.006268	7.19	768.88	191.20	0.46
SF CWC	SECTION_01	9021	50 yr	3745.00	504.00	513.15	511.15	513.57	0.006469	7.61	862.92	204.38	0.48
SF CWC	SECTION_01	9021	100 yr	4529.00	504.00	513.79	511.53	514.26	0.006874	8.26	1001.67	234.36	0.50
SF CWC	SECTION_01	9021	500 yr	6744.00	504.00	515.21	512.38	515.76	0.006883	9.16	1368.08	278.04	0.51
SF CWC	SECTION_01	9021	Ultimate 100 yr	4798.00	504.00	513.98	511.65	514.46	0.006883	8.39	1047.16	239.65	0.50
SF CWC	SECTION_01	8667	2 yr	1225.00	503.00	508.79	507.78	509.01	0.005651	4.87	429.71	205.94	0.41
SF CWC	SECTION_01	8667	5 yr	2177.00	503.00	510.18	508.50	510.38	0.004050	4.95	730.25	226.61	0.36
SF CWC	SECTION_01	8667	10 yr	2709.00	503.00	510.69	508.91	510.91	0.004104	5.26	848.40	235.88	0.37
SF CWC	SECTION_01	8667	25 yr	3194.00	503.00	511.13	509.15	511.37	0.004080	5.49	954.61	243.73	0.37
SF CWC	SECTION_01	8667	50 yr	3745.00	503.00	511.59	509.38	511.85	0.004080	5.73	1068.34	252.74	0.37
SF CWC	SECTION_01	8667	100 yr	4529.00	503.00	512.18	509.70	512.47	0.004114	6.06	1220.06	264.01	0.38
SF CWC	SECTION_01	8667	500 yr	6744.00	503.00	513.63	510.50	513.97	0.004089	6.76	1622.31	289.37	0.39
SF CWC	SECTION_01	8667	Ultimate 100 yr	4798.00	503.00	512.37	509.80	512.67	0.004126	6.17	1271.18	268.18	0.38
SF CWC	SECTION_01	8274	2 yr	1225.00	502.00	507.88	506.07	507.91	0.000816	1.82	1051.61	359.07	0.15
SF CWC	SECTION_01	8274	5 yr	2177.00	502.00	509.57	506.14	509.60	0.000597	1.94	1664.56	368.71	0.14
SF CWC	SECTION_01	8274	10 yr	2709.00	502.00	510.08	506.27	510.11	0.000657	2.15	1852.10	371.17	0.15
SF CWC	SECTION_01	8274	25 yr	3194.00	502.00	510.53	506.54	510.57	0.000692	2.30	2020.17	373.36	0.15
SF CWC	SECTION_01	8274	50 yr	3745.00	502.00	510.99	506.70	511.04	0.000731	2.47	2193.64	375.65	0.16
SF CWC	SECTION_01	8274	100 yr	4529.00	502.00	511.58	506.92	511.64	0.000789	2.70	2415.78	379.84	0.17
SF CWC	SECTION_01	8274	500 yr	6744.00	502.00	513.04	507.43	513.13	0.000915	3.25	2981.16	394.31	0.19
SF CWC	SECTION_01	8274	Ultimate 100 yr	4798.00	502.00	511.77	506.98	511.83	0.000807	2.77	2488.98	381.21	0.17
SF CWC	SECTION_01	7765	2 yr	1225.00	501.00	506.55	505.52	507.24	0.010261	7.22	229.17	89.70	0.57
SF CWC	SECTION_01	7765	5 yr	2177.00	501.00	508.13	507.10	509.07	0.010681	8.84	419.20	206.55	0.61
SF CWC	SECTION_01	7765	10 yr	2709.00	501.00	508.71	507.60	509.56	0.009678	8.90	539.75	213.97	0.59
SF CWC	SECTION_01	7765	25 yr	3194.00	501.00	509.18	507.60	510.00	0.009134	9.02	645.43	230.78	0.58
SF CWC	SECTION_01	7765	50 yr	3745.00	501.00	509.67	507.60	510.46	0.008649	9.15	761.43	246.87	0.57
SF CWC	SECTION_01	7765	100 yr	4529.00	501.00	510.26	509.41	511.03	0.008193	9.33	911.86	268.98	0.56
SF CWC	SECTION_01	7765	500 yr	6744.00	501.00	511.69	510.35	512.46	0.007604	9.95	1355.67	341.37	0.55
SF CWC	SECTION_01	7765	Ultimate 100 yr	4798.00	501.00	510.45	509.84	511.22	0.008095	9.41	964.19	282.72	0.56
SF CWC	SECTION_01	7344	2 yr	1225.00	497.00	504.36	501.06	504.54	0.002141	3.61	444.96	157.95	0.27
SF CWC	SECTION_01	7344	5 yr	2177.00	497.00	506.09	502.69	506.30	0.001990	4.15	742.11	184.16	0.27
SF CWC	SECTION_01	7344	10 yr	2709.00	497.00	506.82	503.30	507.04	0.002011	4.43	880.24	196.89	0.27
SF CWC	SECTION_01	7344	25 yr	3194.00	497.00	507.38	504.04	507.62	0.002059	4.69	993.03	205.32	0.28
SF CWC	SECTION_01	7344	50 yr	3745.00	497.00	507.91	504.50	508.18	0.002156	4.99	1104.35	213.31	0.29
SF CWC	SECTION_01	7344	100 yr	4529.00	497.00	508.52	504.94	508.83	0.002365	5.45	1237.77	226.82	0.30
SF CWC	SECTION_01	7344	500 yr	6744.00	497.00	509.88	506.07	510.33	0.002946	6.63	1569.16	260.60	0.35
SF CWC	SECTION_01	7344	Ultimate 100 yr	4798.00	497.00	508.70	505.14	509.04	0.002436	5.60	1280.33	230.61	0.31
SF CWC	SECTION_01	7082	2 yr	1225.00	496.64	503.93	500.34	504.06	0.001493	3.05	470.13	114.72	0.22
SF CWC	SECTION_01	7082	5 yr	2177.00	496.64	505.58	501.60	505.80	0.001895	4.06	684.59	161.81	0.26
SF CWC	SECTION_01	7082	10 yr	2709.00	496.64	506.26	502.25	506.53	0.002054	4.48	801.02	181.72	0.28
SF CWC	SECTION_01	7082	25 yr	3194.00	496.64	506.77	502.88	507.08	0.002221	4.85	899.53	201.68	0.29
SF CWC	SECTION_01	7082	50 yr	3745.00	496.64	507.25	503.10	507.60	0.002423	5.25	1000.27	218.88	0.31
SF CWC	SECTION_01	7082	100 yr	4529.00	496.64	507.77	503.62	508.19	0.002770	5.82	1117.17	234.90	0.33
SF CWC	SECTION_01	7082	500 yr	6744.00	496.64	508.86	504.80	509.49	0.003800	7.32	1397.78	282.53	0.39
SF CWC	SECTION_01	7082	Ultimate 100 yr	4798.00	496.64	507.92	503.79	508.36	0.002894	6.01	1153.54	239.61	0.34
SF CWC	SECTION_01	6876	2 yr	1225.00	497.00	502.95	501.77	503.54	0.004741	6.19	198.06	63.06	0.62
SF CWC	SECTION_01	6876	5 yr	2177.00	497.00	504.53	503.13	505.25	0.003490	6.95	345.80	120.85	0.56
SF CWC	SECTION_01	6876	10 yr	2709.00	497.00	505.24	503.90	505.97	0.003067	7.15	441.14	148.70	0.54
SF CWC	SECTION_01	6876	25 yr	3194.00	497.00	505.67	504.41	506.49	0.003186	7.67	514.67	203.28	0.56
SF CWC	SECTION_01	6876	50 yr	3745.00	497.00	506.33	504.92	507.05	0.002578	7.41	662.87	237.34	0.51
SF CWC	SECTION_01	6876	100 yr	4529.00	497.00	506.92	505.15	507.62	0.002403	7.58	807.24	256.82	0.50
SF CWC	SECTION_01	6876	500 yr	6744.00	497.00	507.98	506.93	508.81	0.002562	8.59	1098.12	296.09	0.53
SF CWC	SECTION_01	6876	Ultimate 100 yr	4798.00	497.00	507.07	505.33	507.79	0.002399	7.68	848.04	261.47	0.50
SF CWC	SECTION_01	6835		Bridge									
SF CWC	SECTION_01	6783	2 yr	1225.00	497.00	501.65	500.45	502.18	0.004197	5.86	208.89	65.88	0.58
SF CWC	SECTION_01	6783	5 yr	2177.00	497.00	503.09	501.72	503.85	0.003994	7.01	312.89	80.32	0.60
SF CWC	SECTION_01	6783	10 yr	2709.00	497.00	503.69	502.29	504.58	0.003941	7.60	365.42	93.95	0.60
SF CWC	SECTION_01	6783	25 yr	3194.00	497.00	504.17	502.73	505.17	0.003947	8.09	412.73	103.99	0.61

River	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
SF CWC	SECTION_01	6783	50 yr	3745.00	497.00	504.68	503.20	505.78	0.003903	8.54	467.90	120.30	0.62
SF CWC	SECTION_01	6783	100 yr	4529.00	497.00	505.22	503.94	506.50	0.004116	9.30	532.72	151.74	0.65
SF CWC	SECTION_01	6783	500 yr	6744.00	497.00	506.52	505.95	508.05	0.004122	10.53	784.97	216.22	0.67
SF CWC	SECTION_01	6783	Ultimate 100 yr	4798.00	497.00	505.41	504.18	506.74	0.004113	9.48	557.81	169.44	0.65
SF CWC	SECTION_01	6732	2 yr	1225.00	495.09	501.62	499.19	501.92	0.001727	4.39	278.82	69.35	0.39
SF CWC	SECTION_01	6732	5 yr	2177.00	495.09	503.06	500.51	503.55	0.002229	5.62	387.08	80.39	0.45
SF CWC	SECTION_01	6732	10 yr	2709.00	495.09	503.67	501.12	504.27	0.002493	6.18	438.00	85.77	0.48
SF CWC	SECTION_01	6732	25 yr	3194.00	495.09	504.15	501.61	504.84	0.002727	6.65	480.01	90.10	0.51
SF CWC	SECTION_01	6732	50 yr	3745.00	495.09	504.66	502.13	505.44	0.003012	7.11	526.94	96.61	0.54
SF CWC	SECTION_01	6732	100 yr	4529.00	495.09	505.19	502.82	506.14	0.003454	7.81	580.40	103.97	0.58
SF CWC	SECTION_01	6732	500 yr	6744.00	495.09	506.36	504.49	507.77	0.004324	9.54	713.12	127.58	0.66
SF CWC	SECTION_01	6732	Ultimate 100 yr	4798.00	495.09	505.38	503.04	506.37	0.003541	8.00	600.22	106.57	0.59
SF CWC	SECTION_01	6114	2 yr	1225.00	493.00	501.10	496.42	501.22	0.000363	2.84	481.73	170.99	0.19
SF CWC	SECTION_01	6114	5 yr	2177.00	493.00	502.47	497.67	502.65	0.000480	3.69	776.87	257.97	0.23
SF CWC	SECTION_01	6114	10 yr	2709.00	493.00	503.07	498.23	503.27	0.000510	3.99	939.59	291.83	0.24
SF CWC	SECTION_01	6114	25 yr	3194.00	493.00	503.54	498.72	503.75	0.000522	4.18	1084.20	310.88	0.24
SF CWC	SECTION_01	6114	50 yr	3745.00	493.00	504.03	499.21	504.25	0.000527	4.35	1240.88	324.42	0.25
SF CWC	SECTION_01	6114	100 yr	4529.00	493.00	504.54	499.98	504.78	0.000571	4.68	1408.93	339.44	0.26
SF CWC	SECTION_01	6114	500 yr	6744.00	493.00	505.75	502.53	506.06	0.000660	5.43	1861.21	395.31	0.28
SF CWC	SECTION_01	6114	Ultimate 100 yr	4798.00	493.00	504.72	500.27	504.98	0.000589	4.82	1473.90	362.32	0.26
SF CWC	SECTION_01	6060		Bridge									
SF CWC	SECTION_01	5996	2 yr	1225.00	492.75	500.92	496.74	501.11	0.001370	3.56	386.45	100.12	0.24
SF CWC	SECTION_01	5996	5 yr	2177.00	492.75	502.12	498.13	502.47	0.002211	5.03	542.16	170.68	0.31
SF CWC	SECTION_01	5996	10 yr	2709.00	492.75	502.66	498.83	503.06	0.002472	5.55	639.98	195.84	0.33
SF CWC	SECTION_01	5996	25 yr	3194.00	492.75	503.08	499.41	503.53	0.002678	5.96	726.12	219.00	0.35
SF CWC	SECTION_01	5996	50 yr	3745.00	492.75	503.51	500.08	504.01	0.002903	6.40	829.91	262.05	0.37
SF CWC	SECTION_01	5996	100 yr	4529.00	492.75	503.92	501.02	504.50	0.003306	7.03	945.67	294.84	0.39
SF CWC	SECTION_01	5996	500 yr	6744.00	492.75	505.07	503.00	505.74	0.003740	8.04	1377.54	447.59	0.43
SF CWC	SECTION_01	5996	Ultimate 100 yr	4798.00	492.75	504.11	501.45	504.69	0.003321	7.14	1002.09	317.07	0.40
SF CWC	SECTION_01	5765	2 yr	1201.00	491.85	500.57	497.48	500.74	0.001971	3.84	459.49	230.87	0.27
SF CWC	SECTION_01	5765	5 yr	2146.00	491.85	501.76	500.12	501.93	0.001877	4.21	767.22	282.71	0.27
SF CWC	SECTION_01	5765	10 yr	2695.00	491.85	502.27	500.49	502.46	0.002037	4.58	928.46	349.44	0.29
SF CWC	SECTION_01	5765	25 yr	3182.00	491.85	502.70	500.75	502.89	0.001923	4.62	1086.67	374.56	0.28
SF CWC	SECTION_01	5765	50 yr	3712.00	491.85	503.11	500.97	503.32	0.002089	4.96	1251.69	474.06	0.29
SF CWC	SECTION_01	5765	100 yr	4457.00	491.85	503.53	501.31	503.74	0.002020	5.04	1454.85	487.49	0.29
SF CWC	SECTION_01	5765	500 yr	6599.00	491.85	504.72	502.24	504.92	0.001730	5.05	2060.76	538.78	0.28
SF CWC	SECTION_01	5765	Ultimate 100 yr	4725.00	491.85	503.74	501.44	503.94	0.001886	4.94	1557.47	493.88	0.28
SF CWC	SECTION_01	5502	2 yr	1201.00	492.00	499.99	497.17	500.21	0.002171	4.23	394.52	217.98	0.29
SF CWC	SECTION_01	5502	5 yr	2146.00	492.00	501.24	498.89	501.45	0.002083	4.65	753.23	371.54	0.29
SF CWC	SECTION_01	5502	10 yr	2695.00	492.00	501.82	499.52	502.00	0.001807	4.54	974.88	393.62	0.27
SF CWC	SECTION_01	5502	25 yr	3182.00	492.00	502.31	499.81	502.48	0.001582	4.41	1174.10	410.73	0.26
SF CWC	SECTION_01	5502	50 yr	3712.00	492.00	502.72	500.66	502.89	0.001512	4.44	1346.25	425.23	0.26
SF CWC	SECTION_01	5502	100 yr	4457.00	492.00	503.15	500.86	503.32	0.001543	4.62	1529.89	437.71	0.26
SF CWC	SECTION_01	5502	500 yr	6599.00	492.00	504.38	501.86	504.57	0.001422	4.80	2090.16	474.03	0.25
SF CWC	SECTION_01	5502	Ultimate 100 yr	4725.00	492.00	503.38	501.29	503.55	0.001443	4.54	1633.88	442.82	0.25
SF CWC	SECTION_02	5157	2 yr	1526.00	492.00	499.10	497.76	499.31	0.003233	4.74	525.97	261.15	0.35
SF CWC	SECTION_02	5157	5 yr	2719.00	492.00	500.52	498.73	500.69	0.002264	4.59	937.95	315.36	0.30
SF CWC	SECTION_02	5157	10 yr	3456.00	492.00	501.12	499.26	501.31	0.002274	4.86	1139.20	358.61	0.31
SF CWC	SECTION_02	5157	25 yr	4228.00	492.00	501.64	499.52	501.84	0.002210	5.00	1329.96	374.36	0.31
SF CWC	SECTION_02	5157	50 yr	4906.00	492.00	502.06	499.70	502.27	0.002162	5.11	1490.10	386.66	0.31
SF CWC	SECTION_02	5157	100 yr	5647.00	492.00	502.48	500.07	502.70	0.002131	5.24	1655.38	398.86	0.31
SF CWC	SECTION_02	5157	500 yr	8124.00	492.00	503.73	500.71	503.98	0.002020	5.56	2175.92	430.77	0.30
SF CWC	SECTION_02	5157	Ultimate 100 yr	6111.00	492.00	502.72	500.19	502.95	0.002120	5.32	1754.29	405.98	0.31
SF CWC	SECTION_02	4790	2 yr	1526.00	490.00	497.98	495.45	498.28	0.002871	4.88	418.00	137.93	0.34
SF CWC	SECTION_02	4790	5 yr	2719.00	490.00	499.23	497.50	499.71	0.004064	6.53	608.81	225.73	0.42
SF CWC	SECTION_02	4790	10 yr	3456.00	490.00	499.82	498.04	500.34	0.004214	6.99	748.49	244.19	0.43
SF CWC	SECTION_02	4790	25 yr	4228.00	490.00	500.37	498.53	500.90	0.004214	7.29	895.22	258.00	0.43
SF CWC	SECTION_02	4790	50 yr	4906.00	490.00	500.81	498.74	501.35	0.004205	7.52	1001.42	271.44	0.44
SF CWC	SECTION_02	4790	100 yr	5647.00	490.00	501.25	498.77	501.81	0.004156	7.71	1123.69	282.91	0.44
SF CWC	SECTION_02	4790	500 yr	8124.00	490.00	502.54	500.66	503.14	0.004085	8.31	1514.15	328.27	0.44
SF CWC	SECTION_02	4790	Ultimate 100 yr	6111.00	490.00	501.50	498.78	502.07	0.004138	7.83	1195.85	289.02	0.44
SF CWC	SECTION_02	4435	2 yr	1526.00	489.29	497.20	494.61	497.40	0.002294	4.30	508.11	207.63	0.29
SF CWC	SECTION_02	4435	5 yr	2719.00	489.29	498.31	496.81	498.57	0.002659	5.14	751.91	231.83	0.33
SF CWC	SECTION_02	4435	10 yr	3456.00	489.29	498.88	497.17	499.18	0.002728	5.46	888.38	242.68	0.33
SF CWC	SECTION_02	4435	25 yr	4228.00	489.29	499.43	497.50	499.75	0.002765	5.73	1025.41	258.24	0.34
SF CWC	SECTION_02	4435	50 yr	4906.00	489.29	499.87	497.76	500.21	0.002788	5.94	1142.19	276.44	0.34
SF CWC	SECTION_02	4435	100 yr	5647.00	489.29	500.32	498.03	500.68	0.002793	6.14	1272.50	297.80	0.35
SF CWC	SECTION_02	4435	500 yr	8124.00	489.29	501.66	498.88	502.07	0.002641	6.51	1701.75	340.19	0.34
SF CWC	SECTION_02	4435	Ultimate 100 yr	6111.00	489.29	500.58	498.22	500.96	0.002769	6.22	1351.48	304.29	0.35
SF CWC	SECTION_02	4074	2 yr	1526.00	488.77	496.26	495.04	496.51	0.003480	5.02	432.20	220.54	0.36
SF CWC	SECTION_02	4074	5 yr	2719.00	488.77	497.56	496.27	497.79	0.002396	4.73	725.32	231.57	0.31
SF CWC	SECTION_02	4074	10 yr	3456.00	488.77	498.16	496.52	498.42	0.002244	4.82	865.13	235.96	0.30
SF CWC	SECTION_02	4074	25 yr	4228.00	488.77	498.72	496.80	499.01	0.002139	4.92	999.49	240.01	0.30
SF CWC	SECTION_02	4074	50 yr	4906.00	488.77	499.16	497.00	499.48	0.002094	5.04	1106.78	243.20	0.29
SF CWC	SECTION_02	4074	100 yr	5647.00	488.77	499.61	497.20	499.96	0.002062	5.16	1216.95	246.42	0.29
SF CWC	SECTION_02	4074	500 yr	8124.00	488.77	500.95	497.94	501.39	0.001999	5.55	1551.57	254.75	0.30
SF CWC	SECTION_02	4074	Ultimate 100 yr	6111.00	488.77	499.88	497.35	500.25	0.002050	5.24	1282.36	248.32	0.30
SF CWC	SECTION_02	3739	2 yr	1526.00	488.00	494.54	493.52	495.03	0.007503	6.29	346.62	167.95	0.52
SF CWC	SECTION_02	3739	5 yr	2719.00	488.00	496.61	494.89	496.93	0.003660	5.63	717.75	188.68	0.39
SF CWC	SECTION_02	3739	10 yr	3456.00	488.00	497.19	495.33	497.58	0.003925	6.17	830.05	193.56	0.40
SF CWC	SECTION_02	3739	25 yr	4228.00	488.00	497.75	495.74	498.18	0.004133	6.66	938.74	198.02	0.42

River	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
SF CWC	SECTION_02	3739	50 yr	4906.00	488.00	498.16	496.06	498.65	0.004372	7.09	1021.44	201.68	0.44
SF CWC	SECTION_02	3739	100 yr	5647.00	488.00	498.58	496.37	499.13	0.004615	7.52	1106.68	205.86	0.45
SF CWC	SECTION_02	3739	500 yr	8124.00	488.00	499.83	497.31	500.55	0.005186	8.73	1370.69	217.51	0.49
SF CWC	SECTION_02	3739	Ultimate 100 yr	6111.00	488.00	498.83	496.55	499.41	0.004754	7.78	1157.25	207.94	0.46
SF CWC	SECTION_02	3387	2 yr	1526.00	485.00	492.84	489.76	493.14	0.002945	4.69	437.60	159.65	0.33
SF CWC	SECTION_02	3387	5 yr	2719.00	485.00	495.83	492.19	496.02	0.001363	4.17	1037.53	252.02	0.24
SF CWC	SECTION_02	3387	10 yr	3456.00	485.00	496.33	492.82	496.57	0.001672	4.78	1165.29	265.41	0.27
SF CWC	SECTION_02	3387	25 yr	4228.00	485.00	496.81	493.41	497.09	0.001941	5.32	1295.21	277.93	0.30
SF CWC	SECTION_02	3387	50 yr	4906.00	485.00	497.14	493.78	497.47	0.002202	5.79	1389.09	285.86	0.32
SF CWC	SECTION_02	3387	100 yr	5647.00	485.00	497.48	494.01	497.86	0.002467	6.26	1486.66	293.77	0.34
SF CWC	SECTION_02	3387	500 yr	8124.00	485.00	498.54	495.54	499.06	0.003122	7.50	1812.43	319.47	0.38
SF CWC	SECTION_02	3387	Ultimate 100 yr	6111.00	485.00	497.67	494.30	498.09	0.002630	6.55	1544.56	298.70	0.35
SF CWC	SECTION_02	3120	2 yr	1526.00	485.86	492.06	490.23	492.43	0.002321	5.27	334.70	106.98	0.41
SF CWC	SECTION_02	3120	5 yr	2719.00	485.86	495.56	491.63	495.75	0.000688	4.05	857.87	212.41	0.24
SF CWC	SECTION_02	3120	10 yr	3456.00	485.86	495.98	492.26	496.24	0.000865	4.69	950.06	225.46	0.27
SF CWC	SECTION_02	3120	25 yr	4228.00	485.86	496.39	492.97	496.71	0.001023	5.25	1045.21	240.01	0.30
SF CWC	SECTION_02	3120	50 yr	4906.00	485.86	496.65	493.40	497.03	0.001188	5.76	1109.25	248.57	0.33
SF CWC	SECTION_02	3120	100 yr	5647.00	485.86	496.91	493.81	497.36	0.001364	6.28	1175.00	257.02	0.35
SF CWC	SECTION_02	3120	500 yr	8124.00	485.86	497.76	494.96	498.41	0.001839	7.70	1408.00	301.03	0.41
SF CWC	SECTION_02	3120	Ultimate 100 yr	6111.00	485.86	497.06	493.99	497.55	0.001477	6.60	1212.79	262.38	0.37
SF CWC	SECTION_02	2852	2 yr	1535.00	484.90	491.75	488.15	491.94	0.000874	3.56	441.76	321.08	0.26
SF CWC	SECTION_02	2852	5 yr	2729.00	484.90	495.57	489.60	495.59	0.000086	1.56	2516.37	593.33	0.09
SF CWC	SECTION_02	2852	10 yr	3485.00	484.90	496.00	490.20	496.03	0.000108	1.79	2776.67	615.90	0.10
SF CWC	SECTION_02	2852	25 yr	4280.00	484.90	496.42	490.78	496.46	0.000128	2.00	3040.68	636.15	0.11
SF CWC	SECTION_02	2852	50 yr	4971.00	484.90	496.70	491.24	496.74	0.000147	2.19	3216.22	647.53	0.12
SF CWC	SECTION_02	2852	100 yr	5720.00	484.90	496.97	491.72	497.02	0.000168	2.37	3395.14	660.41	0.12
SF CWC	SECTION_02	2852	500 yr	8183.00	484.90	497.87	493.16	497.94	0.000220	2.86	4008.01	707.87	0.14
SF CWC	SECTION_02	2852	Ultimate 100 yr	6197.00	484.90	497.12	492.02	497.18	0.000182	2.49	3497.88	668.55	0.13
SF CWC	SECTION_02	2797			Culvert								
SF CWC	SECTION_02	2723	2 yr	1550.00	483.67	490.91	487.77	491.17	0.001501	4.09	378.87	94.17	0.32
SF CWC	SECTION_02	2723	5 yr	2744.00	483.67	493.97	489.26	494.26	0.000907	4.38	639.69	289.38	0.27
SF CWC	SECTION_02	2723	10 yr	3513.00	483.67	494.65	489.94	495.05	0.001118	5.13	699.21	399.32	0.31
SF CWC	SECTION_02	2723	25 yr	4325.00	483.67	495.63	490.57	495.77	0.000508	3.51	1645.42	458.49	0.21
SF CWC	SECTION_02	2723	50 yr	5032.00	483.67	496.11	491.08	496.27	0.000524	3.69	1878.22	535.42	0.21
SF CWC	SECTION_02	2723	100 yr	5793.00	483.67	496.56	491.63	496.72	0.000513	3.77	2123.96	547.79	0.21
SF CWC	SECTION_02	2723	500 yr	8262.00	483.67	497.64	493.24	497.82	0.000548	4.18	2732.85	587.72	0.22
SF CWC	SECTION_02	2723	Ultimate 100 yr	6277.00	483.67	496.79	491.96	496.95	0.000523	3.86	2246.79	553.42	0.22
SF CWC	SECTION_02	2586	2 yr	1550.00	484.95	489.96	489.25	490.69	0.000654	6.82	227.20	80.07	0.71
SF CWC	SECTION_02	2586	5 yr	2744.00	484.95	493.84	490.49	494.11	0.001314	4.27	696.79	220.53	0.31
SF CWC	SECTION_02	2586	10 yr	3513.00	484.95	494.54	491.12	494.83	0.001317	4.61	909.62	307.89	0.32
SF CWC	SECTION_02	2586	25 yr	4325.00	484.95	495.37	491.78	495.64	0.001099	4.57	1187.01	358.44	0.30
SF CWC	SECTION_02	2586	50 yr	5032.00	484.95	495.87	492.32	496.14	0.001051	4.67	1368.86	375.43	0.29
SF CWC	SECTION_02	2586	100 yr	5793.00	484.95	496.29	492.94	496.59	0.001103	4.95	1544.09	444.29	0.30
SF CWC	SECTION_02	2586	500 yr	8262.00	484.95	497.34	494.14	497.68	0.001127	5.42	2030.45	482.85	0.31
SF CWC	SECTION_02	2586	Ultimate 100 yr	6277.00	484.95	496.51	493.29	496.81	0.001110	5.05	1642.43	449.24	0.31
SF CWC	SECTION_02	2473	2 yr	1550.00	483.20	489.62	486.77	489.96	0.002176	4.64	334.15	74.02	0.38
SF CWC	SECTION_02	2473	5 yr	2744.00	483.20	493.71	488.33	493.99	0.000810	4.23	653.40	238.65	0.26
SF CWC	SECTION_02	2473	10 yr	3513.00	483.20	494.45	489.16	494.70	0.000811	4.19	999.74	312.37	0.26
SF CWC	SECTION_02	2473	25 yr	4325.00	483.20	495.29	489.84	495.54	0.000746	4.29	1253.27	349.89	0.25
SF CWC	SECTION_02	2473	50 yr	5032.00	483.20	495.78	490.37	496.04	0.000764	4.50	1409.79	367.54	0.26
SF CWC	SECTION_02	2473	100 yr	5793.00	483.20	496.18	490.91	496.48	0.000844	4.86	1550.82	426.94	0.27
SF CWC	SECTION_02	2473	500 yr	8262.00	483.20	497.24	492.45	497.57	0.000909	5.39	2103.90	477.74	0.29
SF CWC	SECTION_02	2473	Ultimate 100 yr	6277.00	483.20	496.39	491.23	496.71	0.000892	5.06	1630.27	442.47	0.28
SF CWC	SECTION_02	2413			Culvert								
SF CWC	SECTION_02	2341	2 yr	1550.00	481.13	486.27	484.82	486.89	0.004354	6.33	244.89	65.88	0.54
SF CWC	SECTION_02	2341	5 yr	2744.00	481.13	488.18	486.16	489.11	0.003929	7.71	355.79	74.88	0.55
SF CWC	SECTION_02	2341	10 yr	3513.00	481.13	489.17	486.90	490.11	0.004034	7.75	453.41	82.10	0.55
SF CWC	SECTION_02	2341	25 yr	4325.00	481.13	490.08	487.63	491.14	0.004265	8.25	524.26	93.43	0.57
SF CWC	SECTION_02	2341	50 yr	5032.00	481.13	490.77	488.21	491.93	0.004120	8.67	583.48	105.58	0.57
SF CWC	SECTION_02	2341	100 yr	5793.00	481.13	491.41	488.73	492.71	0.004069	9.14	644.92	117.63	0.58
SF CWC	SECTION_02	2341	500 yr	8262.00	481.13	493.08	490.49	494.51	0.003884	9.75	1030.55	281.08	0.58
SF CWC	SECTION_02	2341	Ultimate 100 yr	6277.00	481.13	491.78	489.12	493.16	0.004082	9.44	682.06	124.26	0.58
SF CWC	SECTION_02	2033	2 yr	1550.00	476.41	485.51	481.19	485.85	0.001511	4.69	330.18	50.88	0.32
SF CWC	SECTION_02	2033	5 yr	2744.00	476.41	487.40	483.06	488.03	0.002107	6.35	438.04	69.73	0.40
SF CWC	SECTION_02	2033	10 yr	3513.00	476.41	488.23	484.05	489.06	0.002465	7.33	503.38	89.38	0.44
SF CWC	SECTION_02	2033	25 yr	4325.00	476.41	489.02	485.00	490.05	0.002753	8.21	587.86	127.07	0.47
SF CWC	SECTION_02	2033	50 yr	5032.00	476.41	489.67	485.78	490.85	0.002914	8.83	684.26	174.52	0.49
SF CWC	SECTION_02	2033	100 yr	5793.00	476.41	490.31	486.50	491.61	0.003038	9.38	836.76	304.63	0.50
SF CWC	SECTION_02	2033	500 yr	8262.00	476.41	492.14	488.92	493.41	0.002761	9.92	1544.58	436.08	0.49
SF CWC	SECTION_02	2033	Ultimate 100 yr	6277.00	476.41	490.72	486.94	492.04	0.002998	9.56	976.61	363.27	0.50
SF CWC	SECTION_02	1806	2 yr	1550.00	476.19	484.89	481.99	485.39	0.002862	5.68	272.84	52.70	0.44
SF CWC	SECTION_02	1806	5 yr	2744.00	476.19	486.48	483.91	487.37	0.004117	7.57	362.62	65.80	0.54
SF CWC	SECTION_02	1806	10 yr	3513.00	476.19	487.05	484.87	488.26	0.005000	8.85	398.38	79.31	0.61
SF CWC	SECTION_02	1806	25 yr	4325.00	476.19	487.55	485.75	489.13	0.005937	10.12	432.40	97.90	0.67
SF CWC	SECTION_02	1806	50 yr	5032.00	476.19	487.91	486.45	489.84	0.006783	11.19	459.65	111.83	0.72
SF CWC	SECTION_02	1806	100 yr	5793.00	476.19	488.26	487.10	490.53	0.007548	12.17	533.83	178.09	0.77
SF CWC	SECTION_02	1806	500 yr	8262.00	476.19	489.81	489.81	492.37	0.007212	13.41	852.76	239.70	0.77
SF CWC	SECTION_02	1806	Ultimate 100 yr	6277.00	476.19	488.47	487.51	490.93	0.007997	12.74	571.48	184.45	0.79
SF CWC	SECTION_02	1438	2 yr	1550.00	477.00	483.67	481.95	484.25	0.003330	6.40	301.41	133.78	0.49
SF CWC	SECTION_02	1438	5 yr	2744.00	477.00	485.20	483.33	485.94	0.003439	7.70	655.84	290.06	0.52

River	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
SF CWC	SECTION_02	1438	10 yr	3513.00	477.00	485.83	484.00	486.58	0.003406	8.13	843.15	299.32	0.52
SF CWC	SECTION_02	1438	25 yr	4325.00	477.00	486.37	484.72	487.16	0.003519	8.65	1006.27	312.16	0.54
SF CWC	SECTION_02	1438	50 yr	5032.00	477.00	486.78	485.91	487.61	0.003584	9.03	1138.33	319.70	0.55
SF CWC	SECTION_02	1438	100 yr	5793.00	477.00	487.20	486.25	488.06	0.003643	9.40	1271.54	326.58	0.56
SF CWC	SECTION_02	1438	500 yr	8262.00	477.00	488.28	487.20	489.31	0.004044	10.69	1642.45	361.07	0.60
SF CWC	SECTION_02	1438	Ultimate 100 yr	6277.00	477.00	487.43	486.50	488.32	0.003717	9.66	1347.87	331.66	0.56
SF CWC	SECTION_02	1142	2 yr	1550.00	476.62	482.88	481.13	483.25	0.003008	4.88	318.72	87.91	0.44
SF CWC	SECTION_02	1142	5 yr	2744.00	476.62	484.53	482.26	484.98	0.002444	5.60	584.67	221.78	0.42
SF CWC	SECTION_02	1142	10 yr	3513.00	476.62	485.11	482.89	485.63	0.002548	6.12	721.89	244.03	0.44
SF CWC	SECTION_02	1142	25 yr	4325.00	476.62	485.57	483.82	486.18	0.002757	6.68	836.89	254.09	0.46
SF CWC	SECTION_02	1142	50 yr	5032.00	476.62	485.94	484.44	486.61	0.002906	7.12	930.66	262.97	0.48
SF CWC	SECTION_02	1142	100 yr	5793.00	476.62	486.27	484.85	487.03	0.003122	7.61	1021.80	280.27	0.50
SF CWC	SECTION_02	1142	500 yr	8262.00	476.62	487.10	485.86	488.13	0.003888	9.14	1273.35	326.59	0.57
SF CWC	SECTION_02	1142	Ultimate 100 yr	6277.00	476.62	486.45	485.11	487.26	0.003302	7.96	1071.04	290.13	0.52
SF CWC	SECTION_02	905	2 yr	1555.00	473.85	482.64	476.98	482.76	0.000456	2.74	567.64	131.34	0.18
SF CWC	SECTION_02	905	5 yr	2747.00	473.85	484.39	478.53	484.54	0.000562	3.24	969.72	264.10	0.21
SF CWC	SECTION_02	905	10 yr	3521.00	473.85	484.97	479.39	485.16	0.000662	3.70	1134.87	299.85	0.23
SF CWC	SECTION_02	905	25 yr	4341.00	473.85	485.42	480.08	485.66	0.000788	4.18	1278.96	340.77	0.25
SF CWC	SECTION_02	905	50 yr	5052.00	473.85	485.78	480.58	486.05	0.000875	4.53	1406.31	366.83	0.27
SF CWC	SECTION_02	905	100 yr	5810.00	473.85	486.12	481.07	486.43	0.000955	4.85	1533.52	382.91	0.28
SF CWC	SECTION_02	905	500 yr	8275.00	473.85	486.95	482.55	487.37	0.001234	5.84	1866.92	420.23	0.33
SF CWC	SECTION_02	905	Ultimate 100 yr	6290.00	473.85	486.29	481.35	486.62	0.001017	5.07	1600.06	390.97	0.29
SF CWC	SECTION_02	825		Culvert									
SF CWC	SECTION_02	761	2 yr	1555.00	473.30	481.40	476.70	481.60	0.000858	3.59	433.07	102.58	0.25
SF CWC	SECTION_02	761	5 yr	2747.00	473.30	482.57	478.25	483.02	0.001523	5.36	512.86	318.67	0.34
SF CWC	SECTION_02	761	10 yr	3521.00	473.30	483.24	479.11	483.57	0.001730	4.82	898.12	521.42	0.36
SF CWC	SECTION_02	761	25 yr	4341.00	473.30	483.78	479.91	484.09	0.001583	4.90	1131.54	531.28	0.35
SF CWC	SECTION_02	761	50 yr	5052.00	473.30	484.23	480.55	484.53	0.001444	4.90	1329.34	543.02	0.33
SF CWC	SECTION_02	761	100 yr	5810.00	473.30	484.67	481.13	484.95	0.001329	4.90	1526.21	553.38	0.32
SF CWC	SECTION_02	761	500 yr	8275.00	473.30	485.69	483.72	486.01	0.001277	5.26	1998.57	578.29	0.32
SF CWC	SECTION_02	761	Ultimate 100 yr	6290.00	473.30	484.85	483.14	485.15	0.001348	5.03	1611.69	560.00	0.33
SF CWC	SECTION_02	346	2 yr	1555.00	476.79	480.93	480.03	481.09	0.001891	3.57	505.40	266.61	0.35
SF CWC	SECTION_02	346	5 yr	2747.00	476.79	482.10	480.45	482.28	0.001414	3.77	836.95	297.46	0.31
SF CWC	SECTION_02	346	10 yr	3521.00	476.79	482.68	480.76	482.88	0.001322	3.96	1012.61	308.27	0.31
SF CWC	SECTION_02	346	25 yr	4341.00	476.79	483.25	481.10	483.47	0.001240	4.12	1190.81	318.53	0.31
SF CWC	SECTION_02	346	50 yr	5052.00	476.79	483.73	481.36	483.96	0.001166	4.21	1345.60	326.48	0.30
SF CWC	SECTION_02	346	100 yr	5810.00	476.79	484.18	481.60	484.43	0.001148	4.39	1498.09	351.07	0.30
SF CWC	SECTION_02	346	500 yr	8275.00	476.79	485.16	482.28	485.49	0.001244	5.01	1844.48	356.32	0.32
SF CWC	SECTION_02	346	Ultimate 100 yr	6290.00	476.79	484.35	481.74	484.62	0.001198	4.56	1557.86	351.97	0.31
WARRIOR CRK	WARRIOR CRK	4887	2 yr	360.00	520.84	525.12	523.07	525.24	0.001113	2.79	129.19	45.52	0.29
WARRIOR CRK	WARRIOR CRK	4887	5 yr	499.00	520.84	525.75	523.52	525.90	0.001205	3.14	158.96	49.64	0.31
WARRIOR CRK	WARRIOR CRK	4887	10 yr	549.00	520.84	525.96	523.65	526.13	0.001215	3.23	169.83	51.06	0.31
WARRIOR CRK	WARRIOR CRK	4887	25 yr	605.00	520.84	526.20	523.80	526.37	0.001224	3.33	184.43	66.81	0.32
WARRIOR CRK	WARRIOR CRK	4887	50 yr	663.00	520.84	526.42	523.95	526.60	0.001235	3.42	199.57	69.68	0.32
WARRIOR CRK	WARRIOR CRK	4887	100 yr	740.00	520.84	526.68	524.13	526.88	0.001258	3.55	218.42	73.05	0.32
WARRIOR CRK	WARRIOR CRK	4887	500 yr	992.00	520.84	527.49	524.67	527.73	0.001268	3.86	281.94	83.38	0.33
WARRIOR CRK	WARRIOR CRK	4887	Ultimate 100 yr	761.00	520.84	526.77	524.18	526.97	0.001246	3.57	224.81	74.11	0.32
WARRIOR CRK	WARRIOR CRK	4677	2 yr	360.00	521.00	524.28	523.87	524.81	0.005845	6.42	67.85	37.47	0.68
WARRIOR CRK	WARRIOR CRK	4677	5 yr	499.00	521.00	524.93	524.32	525.46	0.004759	6.65	94.41	44.98	0.63
WARRIOR CRK	WARRIOR CRK	4677	10 yr	549.00	521.00	525.19	524.48	525.70	0.004191	6.55	106.57	47.71	0.60
WARRIOR CRK	WARRIOR CRK	4677	25 yr	605.00	521.00	525.46	524.66	525.95	0.003734	6.48	119.93	50.54	0.57
WARRIOR CRK	WARRIOR CRK	4677	50 yr	663.00	521.00	525.71	524.81	526.19	0.003428	6.47	132.87	53.14	0.55
WARRIOR CRK	WARRIOR CRK	4677	100 yr	740.00	521.00	525.99	525.00	526.47	0.003213	6.53	148.11	56.05	0.54
WARRIOR CRK	WARRIOR CRK	4677	500 yr	992.00	521.00	526.89	525.55	527.35	0.002539	6.55	202.80	65.48	0.50
WARRIOR CRK	WARRIOR CRK	4677	Ultimate 100 yr	761.00	521.00	526.10	525.04	526.57	0.003048	6.47	154.41	57.21	0.53
WARRIOR CRK	WARRIOR CRK	4248	2 yr	360.00	518.00	523.08	521.07	523.23	0.001001	3.63	124.04	44.32	0.30
WARRIOR CRK	WARRIOR CRK	4248	5 yr	499.00	518.00	523.97	521.58	524.14	0.000883	3.84	166.74	51.25	0.29
WARRIOR CRK	WARRIOR CRK	4248	10 yr	549.00	518.00	524.36	521.72	524.53	0.000786	3.80	187.51	54.33	0.28
WARRIOR CRK	WARRIOR CRK	4248	25 yr	605.00	518.00	524.73	521.90	524.89	0.000726	3.80	208.19	57.23	0.27
WARRIOR CRK	WARRIOR CRK	4248	50 yr	663.00	518.00	525.05	522.07	525.21	0.000698	3.85	226.63	59.71	0.27
WARRIOR CRK	WARRIOR CRK	4248	100 yr	740.00	518.00	525.37	522.29	525.54	0.000702	3.99	245.96	62.20	0.27
WARRIOR CRK	WARRIOR CRK	4248	500 yr	992.00	518.00	526.36	522.88	526.57	0.000738	4.48	314.54	80.42	0.28
WARRIOR CRK	WARRIOR CRK	4248	Ultimate 100 yr	761.00	518.00	525.51	522.34	525.68	0.000676	3.97	255.04	63.33	0.26
WARRIOR CRK	WARRIOR CRK	3967	2 yr	652.00	518.00	522.44	521.33	522.81	0.002794	5.29	147.56	64.55	0.49
WARRIOR CRK	WARRIOR CRK	3967	5 yr	973.00	518.00	523.33	521.98	523.76	0.002569	5.87	214.29	92.06	0.49
WARRIOR CRK	WARRIOR CRK	3967	10 yr	1149.00	518.00	523.76	522.36	524.19	0.002367	5.98	258.63	109.86	0.47
WARRIOR CRK	WARRIOR CRK	3967	25 yr	1343.00	518.00	524.18	522.71	524.59	0.002121	5.98	306.36	115.93	0.45
WARRIOR CRK	WARRIOR CRK	3967	50 yr	1513.00	518.00	524.54	522.93	524.93	0.001946	5.97	348.04	121.13	0.44
WARRIOR CRK	WARRIOR CRK	3967	100 yr	1693.00	518.00	524.88	523.13	525.27	0.001798	5.97	391.02	125.64	0.43
WARRIOR CRK	WARRIOR CRK	3967	500 yr	2190.00	518.00	526.03	524.04	526.35	0.001235	5.55	540.89	135.98	0.36
WARRIOR CRK	WARRIOR CRK	3967	Ultimate 100 yr	1785.00	518.00	525.04	523.12	525.42	0.001759	6.01	410.19	127.31	0.42
WARRIOR CRK	WARRIOR CRK	3692	2 yr	652.00	516.83	520.31	520.31	521.48	0.010821	8.85	79.08	35.77	0.92
WARRIOR CRK	WARRIOR CRK	3692	5 yr	973.00	516.83	521.11	521.11	522.50	0.009754	9.88	109.58	41.36	0.91
WARRIOR CRK	WARRIOR CRK	3692	10 yr	1149.00	516.83	521.47	521.47	522.98	0.009432	10.35	125.32	44.01	0.91
WARRIOR CRK	WARRIOR CRK	3692	25 yr	1343.00	516.83	521.87	521.87	523.47	0.008971	10.74	143.22	46.76	0.90
WARRIOR CRK	WARRIOR CRK	3692	50 yr	1513.00	516.83	522.17	522.17	523.86	0.008813	11.11	157.49	48.89	0.90
WARRIOR CRK	WARRIOR CRK	3692	100 yr	1693.00	516.83	522.49	522.48	524.24	0.008501	11.40	173.58	51.23	0.89
WARRIOR CRK	WARRIOR CRK	3692	500 yr	2190.00	516.83	524.75	523.24	525.73	0.003159	8.89	308.49	70.25	0.58
WARRIOR CRK	WARRIOR CRK	3692	Ultimate 100 yr	1785.00	516.83	522.79	522.63	524.44	0.007469	11.11	189.54	53.41	0.84
WARRIOR CRK	WARRIOR CRK	3510	2 yr	652.00	513.60	518.33	516.21	518.58	0.001765	4.00	163.11	46.20	0.37
WARRIOR CRK	WARRIOR CRK	3510	5 yr	973.00	513.60	519.79	516.96	520.06	0.001393	4.11	236.66	54.41	0.35

River	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
WARRIOR CRK	WARRIOR CRK	3510	10 yr	1149.00	513.60	520.52	517.31	520.79	0.001167	4.17	277.61	93.96	0.32
WARRIOR CRK	WARRIOR CRK	3510	25 yr	1343.00	513.60	521.28	517.67	521.56	0.000991	4.21	324.72	108.27	0.31
WARRIOR CRK	WARRIOR CRK	3510	50 yr	1513.00	513.60	521.93	517.98	522.21	0.000877	4.25	367.08	120.33	0.29
WARRIOR CRK	WARRIOR CRK	3510	100 yr	1693.00	513.60	522.59	518.26	522.86	0.000781	4.27	411.95	132.67	0.28
WARRIOR CRK	WARRIOR CRK	3510	500 yr	2190.00	513.60	524.88	519.00	525.12	0.000481	4.03	570.08	234.63	0.23
WARRIOR CRK	WARRIOR CRK	3510	Ultimate 100 yr	1785.00	513.60	522.92	518.41	523.19	0.000739	4.28	434.58	138.74	0.28
WARRIOR CRK	WARRIOR CRK	3249											
WARRIOR CRK	WARRIOR CRK		Culvert										
WARRIOR CRK	WARRIOR CRK	3079	2 yr	726.00	509.06	515.53	511.99	515.58	0.000597	1.87	398.59	106.09	0.14
WARRIOR CRK	WARRIOR CRK	3079	5 yr	1094.00	509.06	516.31	512.56	516.39	0.000745	2.29	482.44	110.17	0.16
WARRIOR CRK	WARRIOR CRK	3079	10 yr	1308.00	509.06	516.70	512.84	516.80	0.000813	2.49	525.84	112.17	0.17
WARRIOR CRK	WARRIOR CRK	3079	25 yr	1543.00	509.06	517.09	513.11	517.21	0.000883	2.69	570.53	114.91	0.18
WARRIOR CRK	WARRIOR CRK	3079	50 yr	1751.00	509.06	517.42	513.44	517.55	0.000936	2.86	608.21	117.19	0.19
WARRIOR CRK	WARRIOR CRK	3079	100 yr	1966.00	509.06	517.73	513.86	517.88	0.000985	3.01	645.38	119.29	0.19
WARRIOR CRK	WARRIOR CRK	3079	500 yr	2516.00	509.06	518.49	514.37	518.68	0.001107	3.40	738.83	129.45	0.21
WARRIOR CRK	WARRIOR CRK	3079	Ultimate 100 yr	2104.00	509.06	517.92	514.03	518.09	0.001013	3.11	668.70	120.69	0.20
WARRIOR CRK	WARRIOR CRK	2787	2 yr	726.00	509.00	514.74	514.26	515.15	0.010037	5.89	181.82	98.54	0.52
WARRIOR CRK	WARRIOR CRK	2787	5 yr	1094.00	509.00	515.40	514.76	515.88	0.010289	6.62	248.04	102.52	0.54
WARRIOR CRK	WARRIOR CRK	2787	10 yr	1308.00	509.00	515.74	515.02	516.25	0.010293	6.94	283.20	104.51	0.55
WARRIOR CRK	WARRIOR CRK	2787	25 yr	1543.00	509.00	516.07	515.27	516.62	0.010361	7.28	318.66	106.48	0.56
WARRIOR CRK	WARRIOR CRK	2787	50 yr	1751.00	509.00	516.36	515.47	516.93	0.010343	7.53	349.13	108.01	0.56
WARRIOR CRK	WARRIOR CRK	2787	100 yr	1966.00	509.00	516.64	515.66	517.24	0.010318	7.77	379.42	109.51	0.57
WARRIOR CRK	WARRIOR CRK	2787	500 yr	2516.00	509.00	517.31	516.13	517.97	0.010130	8.29	454.26	113.08	0.57
WARRIOR CRK	WARRIOR CRK	2787	Ultimate 100 yr	2104.00	509.00	516.81	515.79	517.43	0.010293	7.92	398.41	110.44	0.57
WARRIOR CRK	WARRIOR CRK	2417	2 yr	726.00	506.00	512.50	510.83	512.70	0.003525	4.46	316.18	178.18	0.33
WARRIOR CRK	WARRIOR CRK	2417	5 yr	1094.00	506.00	513.26	512.20	513.44	0.003260	4.67	452.62	184.11	0.33
WARRIOR CRK	WARRIOR CRK	2417	10 yr	1308.00	506.00	513.64	512.40	513.82	0.003150	4.77	524.76	188.57	0.33
WARRIOR CRK	WARRIOR CRK	2417	25 yr	1543.00	506.00	514.04	512.58	514.22	0.003040	4.87	600.59	193.15	0.32
WARRIOR CRK	WARRIOR CRK	2417	50 yr	1751.00	506.00	514.37	512.76	514.55	0.002946	4.94	664.69	195.86	0.32
WARRIOR CRK	WARRIOR CRK	2417	100 yr	1966.00	506.00	514.69	512.91	514.87	0.002849	5.00	728.44	197.38	0.32
WARRIOR CRK	WARRIOR CRK	2417	500 yr	2516.00	506.00	515.49	513.22	515.67	0.002617	5.12	887.02	201.52	0.31
WARRIOR CRK	WARRIOR CRK	2417	Ultimate 100 yr	2104.00	506.00	514.89	512.99	515.08	0.002794	5.04	768.10	198.32	0.31
WARRIOR CRK	WARRIOR CRK	2135	2 yr	726.00	504.03	511.43	509.62	511.68	0.004635	4.63	239.01	105.77	0.36
WARRIOR CRK	WARRIOR CRK	2135	5 yr	1094.00	504.03	512.14	510.81	512.45	0.005221	5.37	317.13	113.05	0.39
WARRIOR CRK	WARRIOR CRK	2135	10 yr	1308.00	504.03	512.52	511.20	512.85	0.005400	5.69	360.82	118.37	0.40
WARRIOR CRK	WARRIOR CRK	2135	25 yr	1543.00	504.03	512.92	511.47	513.27	0.005500	5.99	409.05	125.11	0.41
WARRIOR CRK	WARRIOR CRK	2135	50 yr	1751.00	504.03	513.26	511.68	513.63	0.005520	6.20	452.08	130.98	0.42
WARRIOR CRK	WARRIOR CRK	2135	100 yr	1966.00	504.03	513.59	511.89	513.98	0.005484	6.38	497.52	137.15	0.42
WARRIOR CRK	WARRIOR CRK	2135	500 yr	2516.00	504.03	514.47	512.34	514.86	0.005077	6.63	624.06	152.06	0.41
WARRIOR CRK	WARRIOR CRK	2135	Ultimate 100 yr	2104.00	504.03	513.80	512.02	514.20	0.005451	6.49	526.79	141.09	0.42
WARRIOR CRK	WARRIOR CRK	1938	2 yr	726.00	505.00	510.83	510.00	510.96	0.003493	4.00	316.60	167.36	0.32
WARRIOR CRK	WARRIOR CRK	1938	5 yr	1094.00	505.00	511.60	510.36	511.73	0.003046	4.12	449.18	177.78	0.31
WARRIOR CRK	WARRIOR CRK	1938	10 yr	1308.00	505.00	512.00	510.56	512.14	0.002860	4.18	522.60	184.43	0.30
WARRIOR CRK	WARRIOR CRK	1938	25 yr	1543.00	505.00	512.43	510.70	512.57	0.002666	4.23	603.14	191.45	0.29
WARRIOR CRK	WARRIOR CRK	1938	50 yr	1751.00	505.00	512.79	510.86	512.93	0.002518	4.26	673.65	197.40	0.29
WARRIOR CRK	WARRIOR CRK	1938	100 yr	1966.00	505.00	513.16	510.99	513.30	0.002384	4.29	746.92	204.19	0.28
WARRIOR CRK	WARRIOR CRK	1938	500 yr	2516.00	505.00	514.11	511.28	514.25	0.001956	4.22	947.84	215.62	0.26
WARRIOR CRK	WARRIOR CRK	1938	Ultimate 100 yr	2104.00	505.00	513.39	511.06	513.52	0.002302	4.30	793.70	207.92	0.28
WARRIOR CRK	WARRIOR CRK	1649	2 yr	726.00	505.00	509.16	508.70	509.76	0.006880	7.29	127.21	56.70	0.66
WARRIOR CRK	WARRIOR CRK	1649	5 yr	1094.00	505.00	510.00	509.36	510.69	0.006213	7.92	178.40	64.88	0.65
WARRIOR CRK	WARRIOR CRK	1649	10 yr	1308.00	505.00	510.46	509.63	511.17	0.005726	8.10	209.00	68.73	0.63
WARRIOR CRK	WARRIOR CRK	1649	25 yr	1543.00	505.00	510.95	510.03	511.67	0.005223	8.23	243.93	73.38	0.61
WARRIOR CRK	WARRIOR CRK	1649	50 yr	1751.00	505.00	511.37	510.30	512.09	0.004825	8.30	275.37	77.23	0.60
WARRIOR CRK	WARRIOR CRK	1649	100 yr	1966.00	505.00	511.79	510.53	512.51	0.004470	8.36	308.28	81.20	0.58
WARRIOR CRK	WARRIOR CRK	1649	500 yr	2516.00	505.00	512.79	511.16	513.56	0.004308	9.04	399.69	108.64	0.59
WARRIOR CRK	WARRIOR CRK	1649	Ultimate 100 yr	2104.00	505.00	512.04	510.67	512.77	0.004305	8.41	328.97	83.91	0.58
WARRIOR CRK	WARRIOR CRK	1428	2 yr	726.00	503.00	508.49	507.31	508.71	0.002052	4.40	213.63	90.07	0.37
WARRIOR CRK	WARRIOR CRK	1428	5 yr	1094.00	503.00	509.52	507.83	509.75	0.001606	4.49	313.05	101.06	0.34
WARRIOR CRK	WARRIOR CRK	1428	10 yr	1308.00	503.00	510.06	508.15	510.29	0.001450	4.55	368.78	106.61	0.33
WARRIOR CRK	WARRIOR CRK	1428	25 yr	1543.00	503.00	510.62	508.40	510.86	0.001351	4.66	431.26	116.50	0.32
WARRIOR CRK	WARRIOR CRK	1428	50 yr	1751.00	503.00	511.09	508.60	511.33	0.001270	4.74	487.88	125.32	0.32
WARRIOR CRK	WARRIOR CRK	1428	100 yr	1966.00	503.00	511.55	508.80	511.79	0.001191	4.79	548.03	134.36	0.31
WARRIOR CRK	WARRIOR CRK	1428	500 yr	2516.00	503.00	512.63	509.32	512.87	0.000971	4.73	698.78	147.82	0.29
WARRIOR CRK	WARRIOR CRK	1428	Ultimate 100 yr	2104.00	503.00	511.83	508.95	512.07	0.001123	4.77	585.95	136.84	0.30
WARRIOR CRK	WARRIOR CRK	1202	2 yr	726.00	501.24	506.54	506.54	507.84	0.010980	9.66	97.96	43.57	0.83
WARRIOR CRK	WARRIOR CRK	1202	5 yr	1094.00	501.24	507.43	507.43	509.00	0.010967	10.98	138.21	46.53	0.86
WARRIOR CRK	WARRIOR CRK	1202	10 yr	1308.00	501.24	507.87	507.87	509.58	0.011007	11.63	158.97	47.82	0.87
WARRIOR CRK	WARRIOR CRK	1202	25 yr	1543.00	501.24	508.34	508.29	510.17	0.010823	12.18	181.84	49.14	0.88
WARRIOR CRK	WARRIOR CRK	1202	50 yr	1751.00	501.24	508.71	508.62	510.66	0.010810	12.67	200.34	50.16	0.89
WARRIOR CRK	WARRIOR CRK	1202	100 yr	1966.00	501.24	509.06	509.00	511.14	0.010911	13.19	217.92	51.14	0.90
WARRIOR CRK	WARRIOR CRK	1202	500 yr	2516.00	501.24	509.86	509.81	512.27	0.011195	14.41	259.76	53.54	0.93
WARRIOR CRK	WARRIOR CRK	1202	Ultimate 100 yr	2104.00	501.24	509.28	509.22	511.44	0.010941	13.49	229.08	51.76	0.90
WARRIOR CRK	WARRIOR CRK	945	2 yr	726.00	499.00	505.86	503.82	505.92	0.000740	2.08	377.91	152.73	0.15
WARRIOR CRK	WARRIOR CRK	945	5 yr	1094.00	499.00	507.09	504.49	507.15	0.000458	1.85	573.43	164.57	0.12
WARRIOR CRK	WARRIOR CRK	945	10 yr	1308.00	499.00	507.71	504.65	507.77	0.000396	1.83	677.28	172.31	0.12
WARRIOR CRK	WARRIOR CRK	945	25 yr	1543.00	499.00	508.30	504.84	508.36	0.000358	1.82	780.46	178.50	0.11
WARRIOR CRK	WARRIOR CRK	945	50 yr	1751.00	499.00	508.76	504.93	508.82	0.000338	1.83	863.41	182.47	0.11
WARRIOR CRK	WARRIOR CRK	945	100 yr	1966.00	499.00	509.19	505.09	509.26	0.000323	1.85	942.43	185.14	0.11
WARRIOR CRK	WARRIOR CRK	945	500 yr	2516.00	499.00	510.19	505.41	510.27	0.000295	1.90	1129.34	189.28	0.10
WARRIOR CRK	WARRIOR CRK	945	Ultimate 100 yr	2104.00	499.00	509.46	505.20	509.53	0.000313	1.86	992.43	186.24	0.11
WARRIOR CRK	WARRIOR CRK	689	2 yr	933.00	498.00	505.03	503.46	505.56	0.007007	6.63	204.66	70.54	0.47
WARRIOR CRK	WARRIOR CRK												

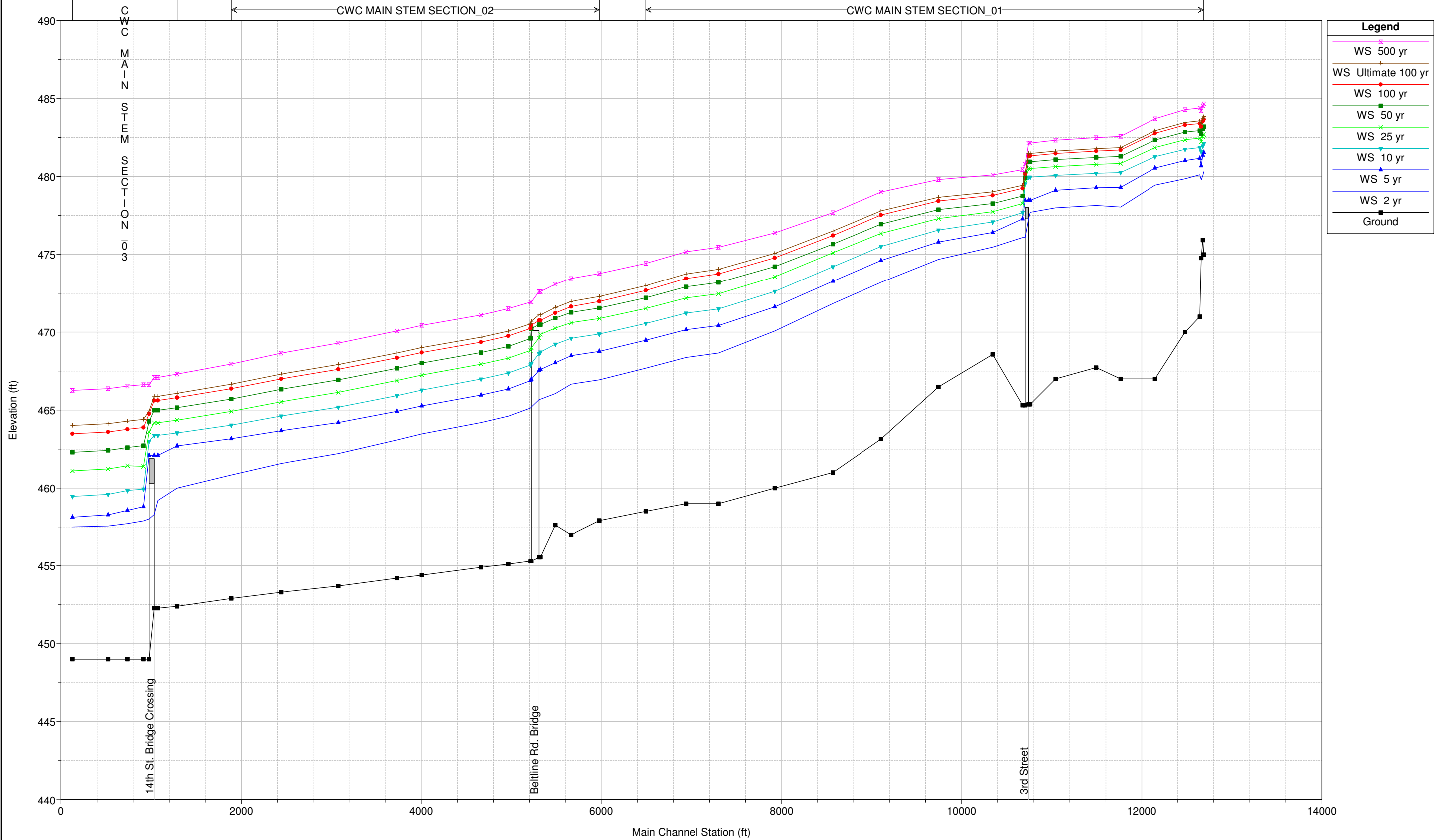
River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
WARRIOR CRK	WARRIOR CRK	689	10 yr	1842.00	498.00	506.84	505.36	507.53	0.007585	8.19	355.40	91.18	0.51
WARRIOR CRK	WARRIOR CRK	689	25 yr	2197.00	498.00	507.40	505.91	508.13	0.007568	8.56	407.79	93.61	0.52
WARRIOR CRK	WARRIOR CRK	689	50 yr	2495.00	498.00	507.84	506.37	508.60	0.007560	8.85	449.30	95.48	0.52
WARRIOR CRK	WARRIOR CRK	689	100 yr	2789.00	498.00	508.25	506.66	509.04	0.007554	9.11	488.57	97.21	0.52
WARRIOR CRK	WARRIOR CRK	689	500 yr	3521.00	498.00	509.20	507.30	510.06	0.007475	9.67	582.97	101.39	0.53
WARRIOR CRK	WARRIOR CRK	689	Ultimate 100 yr	2981.00	498.00	508.51	506.83	509.32	0.007548	9.27	513.57	98.32	0.53
WARRIOR CRK	WARRIOR CRK	433	2 yr	933.00	497.00	502.98	502.12	503.46	0.009946	7.06	207.11	70.54	0.55
WARRIOR CRK	WARRIOR CRK	433	5 yr	1497.00	497.00	504.02	502.90	504.63	0.010707	8.26	282.12	74.92	0.58
WARRIOR CRK	WARRIOR CRK	433	10 yr	1842.00	497.00	504.51	503.31	505.22	0.011387	8.97	319.89	77.50	0.61
WARRIOR CRK	WARRIOR CRK	433	25 yr	2197.00	497.00	505.01	503.67	505.80	0.011690	9.53	359.03	79.89	0.63
WARRIOR CRK	WARRIOR CRK	433	50 yr	2495.00	497.00	505.37	503.97	506.24	0.012100	10.02	388.56	82.07	0.64
WARRIOR CRK	WARRIOR CRK	433	100 yr	2789.00	497.00	505.73	504.25	506.66	0.012369	10.45	417.85	84.28	0.65
WARRIOR CRK	WARRIOR CRK	433	500 yr	3521.00	497.00	506.59	504.91	507.66	0.012710	11.34	493.52	91.52	0.67
WARRIOR CRK	WARRIOR CRK	433	Ultimate 100 yr	2981.00	497.00	505.94	504.46	506.92	0.012579	10.72	436.11	85.83	0.66
WARRIOR CRK	WARRIOR CRK	182	2 yr	933.00	492.00	500.05	499.51	500.77	0.011176	7.72	185.02	84.26	0.55
WARRIOR CRK	WARRIOR CRK	182	5 yr	1497.00	492.00	501.27	500.46	501.98	0.010194	8.32	299.63	106.66	0.54
WARRIOR CRK	WARRIOR CRK	182	10 yr	1842.00	492.00	501.85	500.85	502.55	0.009740	8.56	363.23	113.17	0.54
WARRIOR CRK	WARRIOR CRK	182	25 yr	2197.00	492.00	502.35	501.44	503.08	0.009717	8.91	423.25	122.98	0.54
WARRIOR CRK	WARRIOR CRK	182	50 yr	2495.00	492.00	502.75	501.73	503.48	0.009458	9.07	473.09	126.83	0.54
WARRIOR CRK	WARRIOR CRK	182	100 yr	2789.00	492.00	503.15	501.87	503.88	0.009179	9.20	525.35	133.84	0.54
WARRIOR CRK	WARRIOR CRK	182	500 yr	3521.00	492.00	504.32	502.60	504.98	0.007592	9.07	693.61	159.62	0.50
WARRIOR CRK	WARRIOR CRK	182	Ultimate 100 yr	2981.00	492.00	503.38	502.18	504.12	0.009041	9.29	557.34	137.00	0.53
PLATTNER CRK	PLATTNER CRK	7131	2 yr	642.00	494.36	498.49	498.49	499.74	0.002643	8.94	71.79	29.41	1.01
PLATTNER CRK	PLATTNER CRK	7131	5 yr	996.00	494.36	499.43	499.43	500.92	0.002444	9.79	101.70	34.15	1.00
PLATTNER CRK	PLATTNER CRK	7131	10 yr	1234.00	494.36	499.93	499.93	501.59	0.002416	10.34	119.33	36.54	1.01
PLATTNER CRK	PLATTNER CRK	7131	25 yr	1496.00	494.36	500.43	500.43	502.26	0.002232	10.86	139.18	44.12	0.99
PLATTNER CRK	PLATTNER CRK	7131	50 yr	1717.00	494.36	500.82	500.82	502.78	0.002101	11.26	157.45	49.36	0.98
PLATTNER CRK	PLATTNER CRK	7131	100 yr	1930.00	494.36	501.16	501.16	503.25	0.002021	11.65	175.02	53.09	0.97
PLATTNER CRK	PLATTNER CRK	7131	500 yr	2461.00	494.36	501.97	501.97	504.32	0.001839	12.42	221.22	60.95	0.95
PLATTNER CRK	PLATTNER CRK	7131	Ultimate 100 yr	1981.00	494.36	501.24	501.24	503.36	0.002010	11.75	179.04	53.79	0.97
PLATTNER CRK	PLATTNER CRK	6754	2 yr	642.00	484.00	488.20	488.20	489.53	0.002578	9.25	69.44	26.17	1.00
PLATTNER CRK	PLATTNER CRK	6754	5 yr	996.00	484.00	489.20	489.20	490.82	0.002440	10.21	97.52	30.17	1.00
PLATTNER CRK	PLATTNER CRK	6754	10 yr	1234.00	484.00	489.76	489.76	491.54	0.002377	10.72	115.11	32.37	1.00
PLATTNER CRK	PLATTNER CRK	6754	25 yr	1496.00	484.00	491.68	490.32	492.70	0.000971	8.11	184.57	40.01	0.67
PLATTNER CRK	PLATTNER CRK	6754	50 yr	1717.00	484.00	494.39	490.75	494.88	0.000323	5.58	307.57	50.69	0.40
PLATTNER CRK	PLATTNER CRK	6754	100 yr	1930.00	484.00	495.18	491.14	495.66	0.000291	5.53	348.75	53.81	0.38
PLATTNER CRK	PLATTNER CRK	6754	500 yr	2461.00	484.00	495.91	491.98	496.53	0.000353	6.32	389.24	56.71	0.43
PLATTNER CRK	PLATTNER CRK	6754	Ultimate 100 yr	1981.00	484.00	495.16	491.23	495.66	0.000309	5.70	347.66	53.73	0.39
PLATTNER CRK	PLATTNER CRK	6517	2 yr	642.00	479.80	485.71	482.60	485.88	0.000166	3.25	197.74	46.06	0.28
PLATTNER CRK	PLATTNER CRK	6517	5 yr	996.00	479.80	487.70	483.44	487.87	0.000132	3.34	297.94	55.83	0.26
PLATTNER CRK	PLATTNER CRK	6517	10 yr	1234.00	479.80	489.56	483.92	489.70	0.000087	2.99	412.56	67.00	0.21
PLATTNER CRK	PLATTNER CRK	6517	25 yr	1496.00	479.80	492.21	484.40	492.30	0.000040	2.49	619.13	127.59	0.15
PLATTNER CRK	PLATTNER CRK	6517	50 yr	1717.00	479.80	494.64	484.78	494.71	0.000023	2.20	828.27	185.21	0.12
PLATTNER CRK	PLATTNER CRK	6517	100 yr	1930.00	479.80	495.42	485.13	495.50	0.000022	2.30	895.45	192.38	0.12
PLATTNER CRK	PLATTNER CRK	6517	500 yr	2461.00	479.80	496.23	485.91	496.33	0.000027	2.64	1389.20	204.85	0.13
PLATTNER CRK	PLATTNER CRK	6517	Ultimate 100 yr	1981.00	479.80	495.41	485.21	495.50	0.000024	2.37	894.97	192.32	0.12
PLATTNER CRK	PLATTNER CRK	6407		Culvert									
PLATTNER CRK	PLATTNER CRK	6287	2 yr	642.00	479.30	483.69	481.83	483.90	0.003819	3.62	178.00	58.11	0.35
PLATTNER CRK	PLATTNER CRK	6287	5 yr	996.00	479.30	484.75	482.52	485.02	0.003530	4.20	244.10	67.28	0.36
PLATTNER CRK	PLATTNER CRK	6287	10 yr	1234.00	479.30	485.37	482.91	485.67	0.003380	4.49	287.47	72.36	0.36
PLATTNER CRK	PLATTNER CRK	6287	25 yr	1496.00	479.30	485.95	483.30	486.30	0.003326	4.80	331.22	77.17	0.36
PLATTNER CRK	PLATTNER CRK	6287	50 yr	1717.00	479.30	486.38	483.59	486.76	0.003351	5.07	365.11	83.66	0.37
PLATTNER CRK	PLATTNER CRK	6287	100 yr	1930.00	479.30	486.74	483.86	487.16	0.003376	5.29	395.24	89.40	0.37
PLATTNER CRK	PLATTNER CRK	6287	500 yr	2461.00	479.30	487.56	484.50	488.06	0.003524	5.86	475.93	104.32	0.39
PLATTNER CRK	PLATTNER CRK	6287	Ultimate 100 yr	1981.00	479.30	486.83	483.92	487.25	0.003385	5.35	402.07	90.84	0.37
PLATTNER CRK	PLATTNER CRK	6104	2 yr	642.00	477.70	482.01	481.26	482.66	0.014634	6.46	99.68	36.15	0.67
PLATTNER CRK	PLATTNER CRK	6104	5 yr	996.00	477.70	482.90	482.10	483.80	0.014171	7.61	134.38	42.24	0.69
PLATTNER CRK	PLATTNER CRK	6104	10 yr	1234.00	477.70	483.46	482.56	484.47	0.013548	8.15	161.56	58.02	0.69
PLATTNER CRK	PLATTNER CRK	6104	25 yr	1496.00	477.70	484.04	483.04	485.12	0.012439	8.50	201.58	77.22	0.68
PLATTNER CRK	PLATTNER CRK	6104	50 yr	1717.00	477.70	484.52	483.55	485.61	0.011420	8.65	239.43	84.82	0.66
PLATTNER CRK	PLATTNER CRK	6104	100 yr	1930.00	477.70	484.96	484.08	486.04	0.010415	8.71	279.35	94.32	0.64
PLATTNER CRK	PLATTNER CRK	6104	500 yr	2461.00	477.70	486.07	484.89	487.04	0.007996	8.57	401.27	127.24	0.57
PLATTNER CRK	PLATTNER CRK	6104	Ultimate 100 yr	1981.00	477.70	485.06	484.17	486.14	0.010191	8.72	289.26	96.65	0.63
PLATTNER CRK	PLATTNER CRK	5994	2 yr	642.00	474.34	480.86	479.25	481.43	0.007488	6.16	116.60	57.45	0.50
PLATTNER CRK	PLATTNER CRK	5994	5 yr	996.00	474.34	482.05	480.42	482.60	0.006113	6.48	213.48	72.90	0.47
PLATTNER CRK	PLATTNER CRK	5994	10 yr	1234.00	474.34	482.75	481.20	483.30	0.005614	6.70	267.06	80.66	0.46
PLATTNER CRK	PLATTNER CRK	5994	25 yr	1496.00	474.34	483.48	481.70	484.03	0.005069	6.83	329.47	90.01	0.45
PLATTNER CRK	PLATTNER CRK	5994	50 yr	1717.00	474.34	484.04	482.07	484.58	0.004697	6.91	381.93	96.46	0.44
PLATTNER CRK	PLATTNER CRK	5994	100 yr	1930.00	474.34	484.55	482.38	485.09	0.004389	6.97	432.98	102.33	0.43
PLATTNER CRK	PLATTNER CRK	5994	500 yr	2461.00	474.34	485.78	483.06	486.28	0.003680	6.99	566.46	114.11	0.40
PLATTNER CRK	PLATTNER CRK	5994	Ultimate 100 yr	1981.00	474.34	484.67	482.46	485.20	0.004325	6.98	445.04	103.59	0.42
PLATTNER CRK	PLATTNER CRK	5813	2 yr	642.00	474.00	479.96	477.73	480.28	0.004324	4.60	147.16	45.75	0.39
PLATTNER CRK	PLATTNER CRK	5813	5 yr	996.00	474.00	481.19	478.69	481.62	0.004235	5.37	208.83	55.05	0.40
PLATTNER CRK	PLATTNER CRK	5813	10 yr	1234.00	474.00	481.92	479.20	482.40	0.004121	5.74	253.40	68.78	0.40
PLATTNER CRK	PLATTNER CRK	5813	25 yr	1496.00	474.00	482.71	479.82	483.21	0.003815	5.97	312.22	79.98	0.39
PLATTNER CRK	PLATTNER CRK	5813	50 yr	1717.00	474.00	483.31	480.27	483.82	0.003613	6.13	362.64	87.82	0.39
PLATTNER CRK	PLATTNER CRK	5813	100 yr	1930.00	474.00	483.86	480.65	484.38	0.003429	6.25	412.76	94.95	0.38
PLATTNER CRK	PLATTNER CRK	5813	500 yr	2461.00	474.00	485.17	481.50	485.68	0.002947	6.38	544.15	104.87	0.36
PLATTNER CRK	PLATTNER CRK	5813	Ultimate 100 yr	1981.00	474.00	483.98	480.72	484.50	0.003392	6.27	424.65	96.47	0.38
PLATTNER CRK	PLATTNER CRK	5455	2 yr	642.00	472.51	477.18	476.15	477.89	0.013714	6.74	95.29	27.87	0.64
PLATTNER CRK	PLATTNER CRK	5455	5 yr	996.00	472.51	478.39	477.16	479.29	0.013147	7.59	131.76	33.88	0.65

River	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
PLATTNER CRK	PLATTNER CRK	5455	10 yr	1234.00	472.51	479.50	477.77	480.34	0.009137	7.38	175.52	47.79	0.56
PLATTNER CRK	PLATTNER CRK	5455	25 yr	1496.00	472.51	480.89	478.33	481.57	0.005662	6.78	260.47	74.24	0.46
PLATTNER CRK	PLATTNER CRK	5455	50 yr	1717.00	472.51	481.80	478.75	482.39	0.004440	6.53	333.91	87.84	0.42
PLATTNER CRK	PLATTNER CRK	5455	100 yr	1930.00	472.51	482.55	479.22	483.10	0.003759	6.39	404.23	100.00	0.39
PLATTNER CRK	PLATTNER CRK	5455	500 yr	2461.00	472.51	484.21	480.34	484.67	0.002692	6.10	591.22	122.80	0.34
PLATTNER CRK	PLATTNER CRK	5455	Ultimate 100 yr	1981.00	472.51	482.71	479.34	483.25	0.003650	6.38	420.32	102.81	0.38
PLATTNER CRK	PLATTNER CRK	5235	2 yr	749.00	468.59	475.89	472.50	476.04	0.001597	3.23	255.56	50.86	0.24
PLATTNER CRK	PLATTNER CRK	5235	5 yr	1185.00	468.59	477.19	473.32	477.42	0.002032	4.05	330.94	70.42	0.28
PLATTNER CRK	PLATTNER CRK	5235	10 yr	1461.00	468.59	478.78	473.76	478.99	0.001405	3.89	445.93	84.47	0.24
PLATTNER CRK	PLATTNER CRK	5235	25 yr	1776.00	468.59	480.50	474.22	480.69	0.001029	3.77	575.36	95.51	0.21
PLATTNER CRK	PLATTNER CRK	5235	50 yr	2007.00	468.59	481.51	474.54	481.69	0.000888	3.74	710.78	106.08	0.20
PLATTNER CRK	PLATTNER CRK	5235	100 yr	2212.00	468.59	482.31	474.80	482.49	0.000818	3.76	799.39	115.12	0.19
PLATTNER CRK	PLATTNER CRK	5235	500 yr	2847.00	468.59	484.01	475.59	484.21	0.000777	4.01	1012.21	133.75	0.19
PLATTNER CRK	PLATTNER CRK	5235	Ultimate 100 yr	2261.00	468.59	482.47	474.87	482.65	0.000808	3.77	818.72	117.00	0.19
PLATTNER CRK	PLATTNER CRK	4938											
PLATTNER CRK	PLATTNER CRK	4510	2 yr	749.00	468.60	473.63	470.77	473.78	0.001067	3.16	236.66	55.41	0.26
PLATTNER CRK	PLATTNER CRK	4510	5 yr	1185.00	468.60	475.27	471.51	475.48	0.000943	3.65	328.56	69.97	0.26
PLATTNER CRK	PLATTNER CRK	4510	10 yr	1461.00	468.60	475.95	471.92	476.20	0.000998	4.03	368.56	75.67	0.27
PLATTNER CRK	PLATTNER CRK	4510	25 yr	1776.00	468.60	476.56	472.37	476.87	0.001094	4.46	404.76	82.04	0.29
PLATTNER CRK	PLATTNER CRK	4510	50 yr	2007.00	468.60	477.05	472.66	477.35	0.001046	4.45	479.28	87.74	0.28
PLATTNER CRK	PLATTNER CRK	4510	100 yr	2212.00	468.60	477.73	472.90	478.02	0.000922	4.42	541.48	96.36	0.27
PLATTNER CRK	PLATTNER CRK	4510	500 yr	2847.00	468.60	479.68	473.61	479.93	0.000652	4.28	749.65	116.13	0.23
PLATTNER CRK	PLATTNER CRK	4510	Ultimate 100 yr	2261.00	468.60	477.89	472.96	478.18	0.000892	4.41	557.52	98.29	0.27
PLATTNER CRK	PLATTNER CRK	4284	2 yr	1039.00	466.66	471.28	471.28	472.89	0.015050	10.24	103.47	34.16	0.96
PLATTNER CRK	PLATTNER CRK	4284	5 yr	1688.00	466.66	472.80	472.80	474.60	0.010872	11.05	166.65	52.65	0.87
PLATTNER CRK	PLATTNER CRK	4284	10 yr	2066.00	466.66	473.54	473.54	475.33	0.009284	11.20	210.76	65.18	0.82
PLATTNER CRK	PLATTNER CRK	4284	25 yr	2505.00	466.66	474.32	474.21	476.02	0.007837	11.19	264.53	73.83	0.77
PLATTNER CRK	PLATTNER CRK	4284	50 yr	2862.00	466.66	475.48	474.61	476.69	0.004735	9.70	356.64	82.68	0.62
PLATTNER CRK	PLATTNER CRK	4284	100 yr	3173.00	466.66	476.63	474.99	477.52	0.003003	8.48	455.83	89.81	0.50
PLATTNER CRK	PLATTNER CRK	4284	500 yr	4063.00	466.66	478.99	475.75	479.62	0.001618	7.28	686.81	112.68	0.38
PLATTNER CRK	PLATTNER CRK	4284	Ultimate 100 yr	3236.00	466.66	476.88	475.04	477.71	0.002750	8.26	477.60	91.30	0.48
PLATTNER CRK	PLATTNER CRK	4062	2 yr	1039.00	464.20	470.34	467.01	470.53	0.000996	3.53	303.68	69.58	0.27
PLATTNER CRK	PLATTNER CRK	4062	5 yr	1688.00	464.20	472.19	468.01	472.43	0.000889	4.06	453.94	103.55	0.27
PLATTNER CRK	PLATTNER CRK	4062	10 yr	2066.00	464.20	473.19	468.51	473.44	0.000780	4.14	558.89	139.58	0.25
PLATTNER CRK	PLATTNER CRK	4062	25 yr	2505.00	464.20	474.41	469.04	474.64	0.000627	4.07	690.71	189.40	0.23
PLATTNER CRK	PLATTNER CRK	4062	50 yr	2862.00	464.20	475.61	469.45	475.81	0.000489	3.89	819.82	212.68	0.21
PLATTNER CRK	PLATTNER CRK	4062	100 yr	3173.00	464.20	476.75	469.81	476.94	0.000389	3.71	943.12	225.92	0.19
PLATTNER CRK	PLATTNER CRK	4062	500 yr	4063.00	464.20	479.17	470.75	479.26	0.00178	2.85	1847.52	253.09	0.13
PLATTNER CRK	PLATTNER CRK	4062	Ultimate 100 yr	3236.00	464.20	476.99	469.88	477.17	0.000372	3.68	968.75	228.41	0.19
PLATTNER CRK	PLATTNER CRK	3986											
PLATTNER CRK	PLATTNER CRK	3878	2 yr	1039.00	463.25	469.65	466.28	469.81	0.000613	3.26	343.60	77.83	0.24
PLATTNER CRK	PLATTNER CRK	3878	5 yr	1688.00	463.25	470.83	467.21	471.09	0.000801	4.23	442.83	89.65	0.28
PLATTNER CRK	PLATTNER CRK	3878	10 yr	2066.00	463.25	471.36	467.69	471.67	0.000899	4.70	490.08	94.48	0.30
PLATTNER CRK	PLATTNER CRK	3878	25 yr	2505.00	463.25	471.88	468.21	472.26	0.001010	5.22	537.72	104.85	0.33
PLATTNER CRK	PLATTNER CRK	3878	50 yr	2862.00	463.25	472.26	468.57	472.70	0.001096	5.61	573.01	110.67	0.34
PLATTNER CRK	PLATTNER CRK	3878	100 yr	3173.00	463.25	472.57	468.88	473.05	0.001168	5.93	601.69	114.30	0.36
PLATTNER CRK	PLATTNER CRK	3878	500 yr	4063.00	463.25	473.30	469.67	473.98	0.001487	7.07	722.34	175.54	0.41
PLATTNER CRK	PLATTNER CRK	3878	Ultimate 100 yr	3236.00	463.25	472.63	468.95	473.12	0.001182	5.99	607.19	114.99	0.36
PLATTNER CRK	PLATTNER CRK	3634	2 yr	1039.00	464.00	469.23	467.46	469.54	0.001775	4.64	246.02	78.80	0.40
PLATTNER CRK	PLATTNER CRK	3634	5 yr	1688.00	464.00	470.31	468.36	470.76	0.001945	5.66	347.83	104.67	0.43
PLATTNER CRK	PLATTNER CRK	3634	10 yr	2066.00	464.00	470.81	468.80	471.31	0.002008	6.10	401.24	111.08	0.45
PLATTNER CRK	PLATTNER CRK	3634	25 yr	2505.00	464.00	471.30	469.15	471.87	0.002088	6.57	457.31	116.68	0.46
PLATTNER CRK	PLATTNER CRK	3634	50 yr	2862.00	464.00	471.67	469.73	472.29	0.002140	6.91	500.90	121.01	0.47
PLATTNER CRK	PLATTNER CRK	3634	100 yr	3173.00	464.00	471.97	470.15	472.63	0.002180	7.18	537.55	124.63	0.48
PLATTNER CRK	PLATTNER CRK	3634	500 yr	4063.00	464.00	472.74	470.87	473.52	0.002262	7.85	637.76	133.66	0.50
PLATTNER CRK	PLATTNER CRK	3634	Ultimate 100 yr	3236.00	464.00	472.02	470.20	472.70	0.002189	7.23	544.67	125.26	0.48
PLATTNER CRK	PLATTNER CRK	3306	2 yr	1039.00	463.00	468.40	467.14	468.83	0.002724	5.61	235.55	103.02	0.49
PLATTNER CRK	PLATTNER CRK	3306	5 yr	1688.00	463.00	469.55	468.17	470.05	0.002476	6.32	378.72	141.43	0.49
PLATTNER CRK	PLATTNER CRK	3306	10 yr	2066.00	463.00	470.08	468.66	470.60	0.002409	6.64	457.61	157.50	0.49
PLATTNER CRK	PLATTNER CRK	3306	25 yr	2505.00	463.00	470.62	469.20	471.16	0.002318	6.92	544.17	165.80	0.49
PLATTNER CRK	PLATTNER CRK	3306	50 yr	2862.00	463.00	471.00	469.48	471.57	0.002276	7.13	609.71	171.64	0.49
PLATTNER CRK	PLATTNER CRK	3306	100 yr	3173.00	463.00	471.32	469.72	471.90	0.002252	7.32	664.42	176.65	0.49
PLATTNER CRK	PLATTNER CRK	3306	500 yr	4063.00	463.00	472.13	470.47	472.76	0.002216	7.81	813.47	190.90	0.49
PLATTNER CRK	PLATTNER CRK	3306	Ultimate 100 yr	3236.00	463.00	471.38	469.82	471.96	0.002252	7.36	674.82	177.59	0.49
PLATTNER CRK	PLATTNER CRK	2859	2 yr	1039.00	460.45	466.75	465.62	467.45	0.003373	7.18	184.02	76.75	0.55
PLATTNER CRK	PLATTNER CRK	2859	5 yr	1688.00	460.45	467.59	467.22	468.59	0.004310	8.97	256.26	93.06	0.64
PLATTNER CRK	PLATTNER CRK	2859	10 yr	2066.00	460.45	468.01	467.68	469.13	0.004575	9.66	296.92	99.51	0.67
PLATTNER CRK	PLATTNER CRK	2859	25 yr	2505.00	460.45	468.46	468.10	469.70	0.004759	10.31	343.59	107.00	0.69
PLATTNER CRK	PLATTNER CRK	2859	50 yr	2862.00	460.45	468.82	468.47	470.11	0.004784	10.69	382.89	112.34	0.70
PLATTNER CRK	PLATTNER CRK	2859	100 yr	3173.00	460.45	469.13	468.73	470.46	0.004731	10.93	418.75	117.02	0.70
PLATTNER CRK	PLATTNER CRK	2859	500 yr	4063.00	460.45	470.01	469.40	471.37	0.004409	11.34	526.74	129.64	0.69
PLATTNER CRK	PLATTNER CRK	2859	Ultimate 100 yr	3236.00	460.45	469.22	468.78	470.53	0.004626	10.89	429.46	118.37	0.69
PLATTNER CRK	PLATTNER CRK	2368	2 yr	1039.00	460.81	465.78	464.52	466.05	0.001873	4.71	314.05	197.24	0.41
PLATTNER CRK	PLATTNER CRK	2368	5 yr	1688.00	460.81	466.75	465.68	466.98	0.001430	4.73	521.55	225.94	0.37
PLATTNER CRK	PLATTNER CRK	2368	10 yr	2066.00	460.81	467.25	465.96	467.47	0.001241	4.70	637.68	235.41	0.35
PLATTNER CRK	PLATTNER CRK	2368	25 yr	2505.00	460.81	467.78	466.27	467.99	0.001096	4.69	764.18	243.65	0.33
PLATTNER CRK	PLATTNER CRK	2368	50 yr	2862.00	460.81	468.20	466.45	468.41	0.000989	4.65	869.42	249.84	0.32
PLATTNER CRK	PLATTNER CRK	2368	100 yr	3173.00	460.81	468.57	466.60	468.78	0.000903	4.61	963.17	254.93	0.31
PLATTNER CRK	PLATTNER CRK	2368	500 yr	4063.00	460.81	469.60	466.97	469.80	0.000723	4.53	1232.40	269.36	0.28
PLATTNER CRK	PLATTNER CRK	2368	Ultimate 100 yr	3236.00	460.81	46							

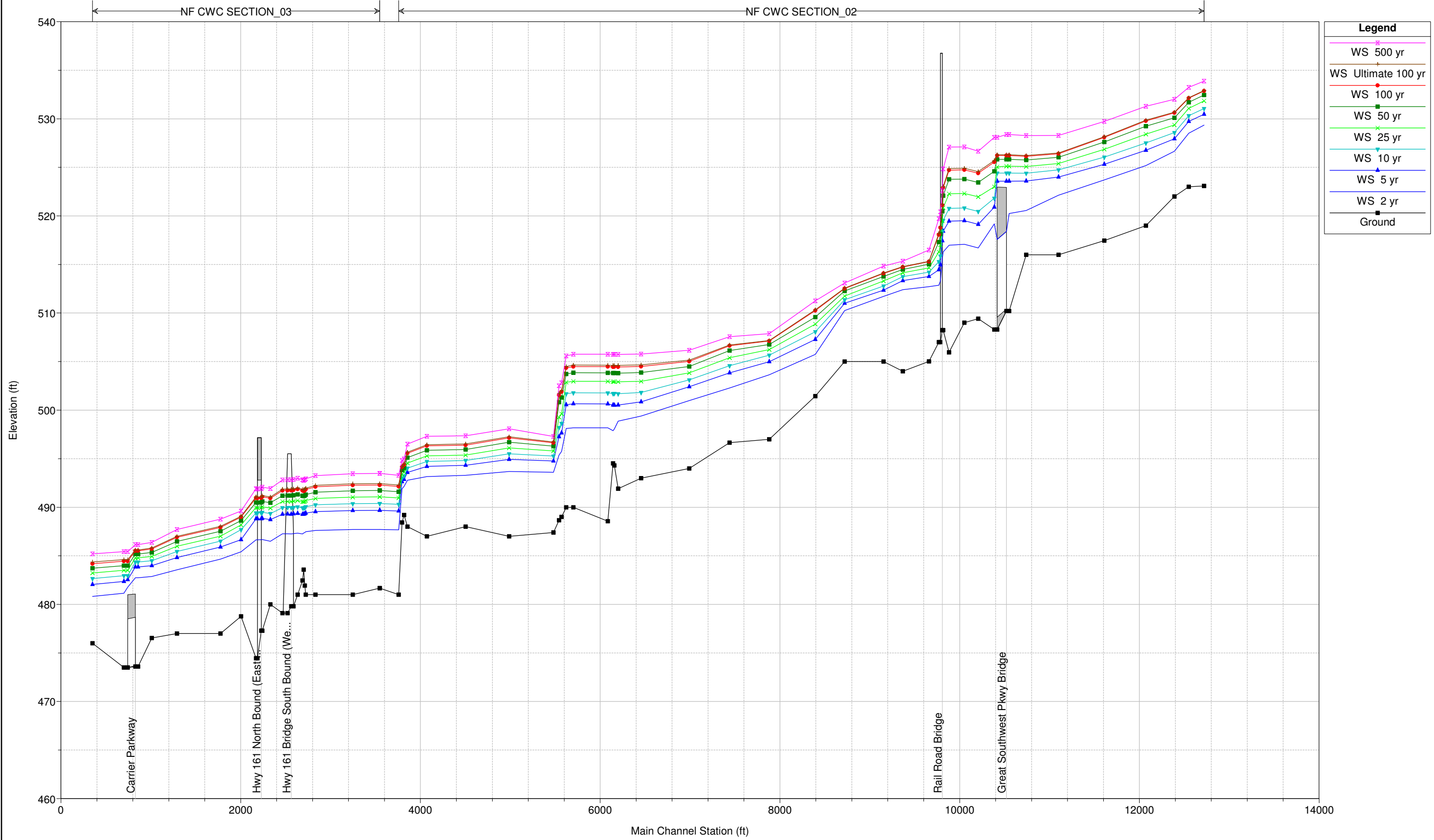
River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
PLATTNER CRK	PLATTNER CRK	2098	2 yr	1039.00	458.00	465.08	463.62	465.49	0.002237	5.70	257.33	147.83	0.45
PLATTNER CRK	PLATTNER CRK	2098	5 yr	1688.00	458.00	466.21	465.20	466.55	0.001703	5.70	446.78	183.60	0.41
PLATTNER CRK	PLATTNER CRK	2098	10 yr	2066.00	458.00	466.79	465.52	467.10	0.001467	5.61	557.02	197.98	0.38
PLATTNER CRK	PLATTNER CRK	2098	25 yr	2505.00	458.00	467.37	465.86	467.66	0.001316	5.62	675.24	212.96	0.37
PLATTNER CRK	PLATTNER CRK	2098	50 yr	2862.00	458.00	467.83	466.11	468.12	0.001190	5.56	777.29	224.79	0.35
PLATTNER CRK	PLATTNER CRK	2098	100 yr	3173.00	458.00	468.24	466.26	468.51	0.001077	5.48	870.76	233.74	0.34
PLATTNER CRK	PLATTNER CRK	2098	500 yr	4063.00	458.00	469.34	466.75	469.59	0.000841	5.27	1140.34	255.79	0.30
PLATTNER CRK	PLATTNER CRK	2098	Ultimate 100 yr	3236.00	458.00	468.38	466.29	468.64	0.001013	5.37	903.46	236.43	0.33
PLATTNER CRK	PLATTNER CRK	1874	2 yr	1039.00	457.57	464.82	462.72	464.97	0.001728	3.56	387.24	168.65	0.26
PLATTNER CRK	PLATTNER CRK	1874	5 yr	1688.00	457.57	466.00	464.03	466.15	0.001370	3.58	604.86	198.67	0.24
PLATTNER CRK	PLATTNER CRK	1874	10 yr	2066.00	457.57	466.60	464.31	466.75	0.001242	3.59	727.75	215.41	0.23
PLATTNER CRK	PLATTNER CRK	1874	25 yr	2505.00	457.57	467.18	464.59	467.35	0.001168	3.66	858.25	230.99	0.22
PLATTNER CRK	PLATTNER CRK	1874	50 yr	2862.00	457.57	467.66	464.81	467.83	0.001089	3.66	971.11	242.32	0.22
PLATTNER CRK	PLATTNER CRK	1874	100 yr	3173.00	457.57	468.07	465.01	468.25	0.001018	3.65	1074.20	252.22	0.21
PLATTNER CRK	PLATTNER CRK	1874	500 yr	4063.00	457.57	469.20	465.43	469.38	0.000851	3.60	1372.26	277.24	0.20
PLATTNER CRK	PLATTNER CRK	1874	Ultimate 100 yr	3236.00	457.57	468.22	465.05	468.39	0.000965	3.59	1111.62	255.81	0.21
PLATTNER CRK	PLATTNER CRK	1654	2 yr	1114.00	458.00	463.73	462.51	464.30	0.008210	6.24	214.95	92.65	0.53
PLATTNER CRK	PLATTNER CRK	1654	5 yr	1867.00	458.00	464.74	463.88	465.56	0.009624	7.79	320.33	118.46	0.60
PLATTNER CRK	PLATTNER CRK	1654	10 yr	2320.00	458.00	465.30	464.40	466.20	0.009556	8.31	391.46	132.91	0.61
PLATTNER CRK	PLATTNER CRK	1654	25 yr	2828.00	458.00	465.89	464.96	466.82	0.009144	8.66	472.06	141.12	0.60
PLATTNER CRK	PLATTNER CRK	1654	50 yr	3238.00	458.00	466.44	465.42	467.33	0.008210	8.67	551.92	148.60	0.58
PLATTNER CRK	PLATTNER CRK	1654	100 yr	3600.00	458.00	466.92	465.70	467.78	0.007479	8.65	625.20	156.25	0.56
PLATTNER CRK	PLATTNER CRK	1654	500 yr	4670.00	458.00	468.17	466.40	468.99	0.006150	8.70	838.27	185.78	0.52
PLATTNER CRK	PLATTNER CRK	1654	Ultimate 100 yr	3712.00	458.00	467.12	465.78	467.95	0.007064	8.55	655.98	160.23	0.55
PLATTNER CRK	PLATTNER CRK	1299	2 yr	1114.00	456.04	462.08	461.23	462.22	0.003427	4.20	554.91	325.70	0.35
PLATTNER CRK	PLATTNER CRK	1299	5 yr	1867.00	456.04	463.35	461.77	463.44	0.001980	3.76	990.87	356.61	0.27
PLATTNER CRK	PLATTNER CRK	1299	10 yr	2320.00	456.04	464.06	462.03	464.14	0.001586	3.63	1250.61	375.02	0.25
PLATTNER CRK	PLATTNER CRK	1299	25 yr	2828.00	456.04	464.81	462.24	464.88	0.001302	3.54	1536.87	392.06	0.23
PLATTNER CRK	PLATTNER CRK	1299	50 yr	3238.00	456.04	465.53	462.38	465.60	0.001063	3.41	1830.89	419.94	0.21
PLATTNER CRK	PLATTNER CRK	1299	100 yr	3600.00	456.04	466.14	462.52	466.21	0.000911	3.31	2095.42	442.56	0.20
PLATTNER CRK	PLATTNER CRK	1299	500 yr	4670.00	456.04	467.62	462.86	467.68	0.000683	3.18	2774.74	477.71	0.18
PLATTNER CRK	PLATTNER CRK	1299	Ultimate 100 yr	3712.00	456.04	466.40	462.56	466.46	0.000829	3.22	2210.66	448.17	0.19
PLATTNER CRK	PLATTNER CRK	1064	2 yr	1114.00	456.00	461.46	460.49	461.54	0.002903	3.56	640.14	339.19	0.30
PLATTNER CRK	PLATTNER CRK	1064	5 yr	1867.00	456.00	463.04	460.87	463.09	0.001320	2.96	1220.61	398.54	0.22
PLATTNER CRK	PLATTNER CRK	1064	10 yr	2320.00	456.00	463.81	461.05	463.86	0.001112	2.95	1567.36	469.11	0.20
PLATTNER CRK	PLATTNER CRK	1064	25 yr	2828.00	456.00	464.61	461.23	464.65	0.000855	2.79	1950.35	485.54	0.18
PLATTNER CRK	PLATTNER CRK	1064	50 yr	3238.00	456.00	465.38	461.37	465.42	0.000650	2.60	2328.35	496.15	0.16
PLATTNER CRK	PLATTNER CRK	1064	100 yr	3600.00	456.00	466.02	461.49	466.05	0.000542	2.49	2646.68	504.97	0.15
PLATTNER CRK	PLATTNER CRK	1064	500 yr	4670.00	456.00	467.53	461.80	467.56	0.000416	2.43	3428.71	529.85	0.13
PLATTNER CRK	PLATTNER CRK	1064	Ultimate 100 yr	3712.00	456.00	466.29	461.52	466.32	0.000494	2.43	2783.90	509.63	0.14
PLATTNER CRK	PLATTNER CRK	642	2 yr	1113.00	457.00	460.63	459.96	460.71	0.004101	3.26	612.40	432.41	0.36
PLATTNER CRK	PLATTNER CRK	642	5 yr	1887.00	457.00	462.85	460.27	462.88	0.000613	1.90	1664.22	504.34	0.15
PLATTNER CRK	PLATTNER CRK	642	10 yr	2261.00	457.00	463.67	460.39	463.69	0.000452	1.81	2085.48	530.18	0.13
PLATTNER CRK	PLATTNER CRK	642	25 yr	2821.00	457.00	464.50	460.57	464.52	0.000391	1.85	2535.08	548.94	0.13
PLATTNER CRK	PLATTNER CRK	642	50 yr	3243.00	457.00	465.30	460.70	465.32	0.000315	1.79	2977.47	560.18	0.12
PLATTNER CRK	PLATTNER CRK	642	100 yr	3632.00	457.00	465.95	460.80	465.97	0.000276	1.78	3344.34	568.72	0.11
PLATTNER CRK	PLATTNER CRK	642	500 yr	4767.00	457.00	467.47	461.10	467.50	0.000233	1.83	4236.56	594.33	0.11
PLATTNER CRK	PLATTNER CRK	642	Ultimate 100 yr	3758.00	457.00	466.22	460.84	466.25	0.000259	1.76	3502.47	576.57	0.11
PLATTNER CRK	PLATTNER CRK	364	2 yr	1113.00	456.93	460.23	458.25	460.24	0.000389	1.08	1574.88	649.71	0.11
PLATTNER CRK	PLATTNER CRK	364	5 yr	1887.00	456.93	462.80	458.46	462.80	0.000107	0.87	3335.13	721.93	0.07
PLATTNER CRK	PLATTNER CRK	364	10 yr	2261.00	456.93	463.63	458.55	463.63	0.000092	0.88	3942.67	742.31	0.06
PLATTNER CRK	PLATTNER CRK	364	25 yr	2821.00	456.93	464.47	458.67	464.47	0.000090	0.95	4573.03	759.47	0.06
PLATTNER CRK	PLATTNER CRK	364	50 yr	3243.00	456.93	465.27	458.76	465.28	0.000080	0.96	5189.86	774.15	0.06
PLATTNER CRK	PLATTNER CRK	364	100 yr	3632.00	456.93	465.93	458.84	465.93	0.000075	0.98	5699.16	784.17	0.06
PLATTNER CRK	PLATTNER CRK	364	500 yr	4767.00	456.93	467.46	459.05	467.47	0.000071	1.07	6919.87	813.65	0.06
PLATTNER CRK	PLATTNER CRK	364	Ultimate 100 yr	3758.00	456.93	466.20	458.86	466.21	0.000071	0.98	5917.72	788.44	0.06
INDIAN HILLS BR	INDIAN HILLS BR	3183	2 yr	420.00	473.94	479.07	478.25	479.76	0.011781	6.66	63.04	21.35	0.68
INDIAN HILLS BR	INDIAN HILLS BR	3183	5 yr	648.00	473.94	480.05	479.17	480.95	0.012061	7.59	85.38	24.03	0.71
INDIAN HILLS BR	INDIAN HILLS BR	3183	10 yr	802.00	473.94	480.61	479.70	481.62	0.012208	8.09	99.11	25.45	0.72
INDIAN HILLS BR	INDIAN HILLS BR	3183	25 yr	971.00	473.94	481.14	480.21	482.29	0.012424	8.59	113.09	26.82	0.74
INDIAN HILLS BR	INDIAN HILLS BR	3183	50 yr	1111.00	473.94	481.56	480.60	482.79	0.012490	8.93	124.48	27.89	0.74
INDIAN HILLS BR	INDIAN HILLS BR	3183	100 yr	1248.00	473.94	481.93	480.96	483.25	0.012613	9.25	134.99	28.83	0.75
INDIAN HILLS BR	INDIAN HILLS BR	3183	500 yr	1579.00	473.94	482.67	481.75	484.24	0.013310	10.05	157.19	30.74	0.78
INDIAN HILLS BR	INDIAN HILLS BR	3183	Ultimate 100 yr	1248.00	473.94	481.92	480.96	483.25	0.012632	9.25	134.91	28.83	0.75
INDIAN HILLS BR	INDIAN HILLS BR	2988	2 yr	420.00	473.00	477.62	476.18	477.99	0.005377	4.89	85.81	27.60	0.49
INDIAN HILLS BR	INDIAN HILLS BR	2988	5 yr	648.00	473.00	478.60	477.00	479.10	0.005671	5.68	114.02	30.05	0.51
INDIAN HILLS BR	INDIAN HILLS BR	2988	10 yr	802.00	473.00	479.14	477.45	479.73	0.005894	6.13	130.77	31.42	0.53
INDIAN HILLS BR	INDIAN HILLS BR	2988	25 yr	971.00	473.00	479.66	477.90	480.33	0.006178	6.59	147.34	32.72	0.55
INDIAN HILLS BR	INDIAN HILLS BR	2988	50 yr	1111.00	473.00	480.07	478.25	480.81	0.006365	6.90	160.92	33.98	0.56
INDIAN HILLS BR	INDIAN HILLS BR	2988	100 yr	1248.00	473.00	480.42	478.57	481.23	0.006584	7.21	173.13	35.06	0.57
INDIAN HILLS BR	INDIAN HILLS BR	2988	500 yr	1579.00	473.00	480.98	479.27	482.01	0.007885	8.17	193.21	37.03	0.63
INDIAN HILLS BR	INDIAN HILLS BR	2988	Ultimate 100 yr	1248.00	473.00	480.41	478.57	481.22	0.006613	7.22	172.85	35.04	0.57
INDIAN HILLS BR	INDIAN HILLS BR	2538	2 yr	420.00	469.52	473.75	473.30	474.44	0.014315	6.65	63.20	27.53	0.77
INDIAN HILLS BR	INDIAN HILLS BR	2538	5 yr	648.00	469.52	474.56	474.07	475.42	0.014115	7.42	87.32	31.78	0.79
INDIAN HILLS BR	INDIAN HILLS BR	2538	10 yr	802.00	469.52	475.03	474.50	475.98	0.013651	7.80	102.77	33.85	0.79
INDIAN HILLS BR	INDIAN HILLS BR	2538	25 yr	971.00	469.52	475.46	474.91	476.52	0.012995	8.29	117.48	35.92	0.79
INDIAN HILLS BR	INDIAN HILLS BR	2538	50 yr	1111.00	469.52	475.75	475.22	476.93	0.012879	8.72	128.34	37.38	0.79
INDIAN HILLS BR	INDIAN HILLS BR	2538	100 yr	1248.00	469.52	476.07	475.51	477.32	0.012312	9.00	140.40	38.84	0.79
INDIAN HILLS BR	INDIAN HILLS BR	2538	500 yr	1579.00	469.52	477.19	476.14	478.34	0.008330	8.70	187.02	44.35	0.67
INDIAN HILLS BR	INDIAN HILLS BR	2538	Ultimate 100 yr	1248.00	469.52	476.09	475.51	477.32	0.012134	8.96	141.06	38.93	0.78
INDIAN HILLS BR	INDIAN HILLS BR												

River	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
INDIAN HILLS BR	INDIAN HILLS BR	2328	10 yr	959.00	469.00	472.72	472.72	474.22	0.002647	9.81	97.71	33.14	1.01
INDIAN HILLS BR	INDIAN HILLS BR	2328	25 yr	1164.00	469.00	473.15	473.15	474.83	0.002574	10.41	111.80	33.53	1.00
INDIAN HILLS BR	INDIAN HILLS BR	2328	50 yr	1333.00	469.00	473.73	473.47	475.33	0.002056	10.14	131.52	34.10	0.91
INDIAN HILLS BR	INDIAN HILLS BR	2328	100 yr	1497.00	469.00	474.31	473.79	475.83	0.001694	9.89	151.42	34.66	0.83
INDIAN HILLS BR	INDIAN HILLS BR	2328	500 yr	1896.00	469.00	476.21	474.46	477.37	0.000864	8.67	220.10	38.10	0.62
INDIAN HILLS BR	INDIAN HILLS BR	2328	Ultimate 100 yr	1500.00	469.00	474.42	473.79	475.87	0.001580	9.67	155.18	34.77	0.81
INDIAN HILLS BR	INDIAN HILLS BR	2140	2 yr	491.00	467.70	471.36	469.72	471.65	0.000430	4.31	113.91	32.16	0.40
INDIAN HILLS BR	INDIAN HILLS BR	2140	5 yr	771.00	467.70	472.26	470.41	472.71	0.000531	5.39	142.93	32.54	0.45
INDIAN HILLS BR	INDIAN HILLS BR	2140	10 yr	959.00	467.70	472.87	470.83	473.41	0.000552	5.88	163.08	32.80	0.46
INDIAN HILLS BR	INDIAN HILLS BR	2140	25 yr	1164.00	467.70	473.57	471.25	474.18	0.000549	6.26	186.04	33.09	0.47
INDIAN HILLS BR	INDIAN HILLS BR	2140	50 yr	1333.00	467.70	474.14	471.58	474.80	0.000540	6.50	205.07	33.33	0.46
INDIAN HILLS BR	INDIAN HILLS BR	2140	100 yr	1497.00	467.70	474.67	471.90	475.37	0.000535	6.72	222.62	33.56	0.46
INDIAN HILLS BR	INDIAN HILLS BR	2140	500 yr	1896.00	467.70	476.41	472.60	477.11	0.000435	6.71	283.03	38.84	0.42
INDIAN HILLS BR	INDIAN HILLS BR	2140	Ultimate 100 yr	1500.00	467.70	474.75	471.90	475.44	0.000517	6.65	225.46	33.59	0.45
INDIAN HILLS BR	INDIAN HILLS BR	2088											
INDIAN HILLS BR	INDIAN HILLS BR	2088	Culvert										
INDIAN HILLS BR	INDIAN HILLS BR	2031	2 yr	491.00	465.00	471.34	466.78	471.38	0.000332	1.55	317.40	79.53	0.11
INDIAN HILLS BR	INDIAN HILLS BR	2031	5 yr	771.00	465.00	472.15	467.35	472.22	0.000524	2.13	362.80	86.56	0.15
INDIAN HILLS BR	INDIAN HILLS BR	2031	10 yr	959.00	465.00	472.66	467.69	472.75	0.000632	2.45	390.90	90.91	0.16
INDIAN HILLS BR	INDIAN HILLS BR	2031	25 yr	1164.00	465.00	473.19	468.01	473.31	0.000727	2.76	421.02	95.60	0.18
INDIAN HILLS BR	INDIAN HILLS BR	2031	50 yr	1333.00	465.00	473.61	468.25	473.75	0.000798	3.00	444.24	129.35	0.19
INDIAN HILLS BR	INDIAN HILLS BR	2031	100 yr	1497.00	465.00	473.95	468.47	474.12	0.000873	3.23	463.55	149.93	0.20
INDIAN HILLS BR	INDIAN HILLS BR	2031	500 yr	1896.00	465.00	475.08	468.97	475.19	0.000788	2.61	793.78	180.50	0.18
INDIAN HILLS BR	INDIAN HILLS BR	2031	Ultimate 100 yr	1500.00	465.00	474.04	468.48	474.20	0.000847	3.20	468.27	153.76	0.20
INDIAN HILLS BR	INDIAN HILLS BR	1700	2 yr	491.00	465.00	470.87	468.80	471.11	0.004973	3.95	128.10	52.08	0.39
INDIAN HILLS BR	INDIAN HILLS BR	1700	5 yr	771.00	465.00	471.36	469.86	471.79	0.007460	5.31	157.90	72.17	0.49
INDIAN HILLS BR	INDIAN HILLS BR	1700	10 yr	959.00	465.00	471.70	470.31	472.23	0.008325	5.95	184.84	86.97	0.52
INDIAN HILLS BR	INDIAN HILLS BR	1700	25 yr	1164.00	465.00	472.19	470.76	472.74	0.007753	6.19	231.47	102.57	0.51
INDIAN HILLS BR	INDIAN HILLS BR	1700	50 yr	1333.00	465.00	472.62	471.09	473.16	0.006942	6.22	277.92	113.87	0.49
INDIAN HILLS BR	INDIAN HILLS BR	1700	100 yr	1497.00	465.00	472.95	471.49	473.49	0.006605	6.34	317.01	121.85	0.48
INDIAN HILLS BR	INDIAN HILLS BR	1700	500 yr	1896.00	465.00	474.30	472.23	474.68	0.003766	5.57	510.76	159.88	0.38
INDIAN HILLS BR	INDIAN HILLS BR	1700	Ultimate 100 yr	1500.00	465.00	473.12	471.50	473.61	0.005774	6.05	338.53	127.63	0.46
INDIAN HILLS BR	INDIAN HILLS BR	1425	2 yr	491.00	465.00	468.81	468.07	469.26	0.010058	5.44	96.38	117.48	0.60
INDIAN HILLS BR	INDIAN HILLS BR	1425	5 yr	771.00	465.00	469.67	468.84	469.97	0.005642	4.96	254.54	184.56	0.48
INDIAN HILLS BR	INDIAN HILLS BR	1425	10 yr	959.00	465.00	470.40	469.42	470.59	0.003147	4.22	396.60	205.81	0.37
INDIAN HILLS BR	INDIAN HILLS BR	1425	25 yr	1164.00	465.00	471.22	469.65	471.34	0.001830	3.63	573.32	226.98	0.29
INDIAN HILLS BR	INDIAN HILLS BR	1425	50 yr	1333.00	465.00	471.83	469.81	471.93	0.001328	3.35	718.35	242.16	0.25
INDIAN HILLS BR	INDIAN HILLS BR	1425	100 yr	1497.00	465.00	472.24	469.95	472.34	0.001177	3.30	818.89	249.64	0.24
INDIAN HILLS BR	INDIAN HILLS BR	1425	500 yr	1896.00	465.00	473.97	470.26	474.02	0.000555	2.69	1270.46	272.46	0.17
INDIAN HILLS BR	INDIAN HILLS BR	1425	Ultimate 100 yr	1500.00	465.00	472.53	469.96	472.61	0.000935	3.04	891.95	254.07	0.21
INDIAN HILLS BR	INDIAN HILLS BR	1086	2 yr	474.00	461.00	467.31	465.04	467.37	0.000894	2.01	282.86	157.01	0.19
INDIAN HILLS BR	INDIAN HILLS BR	1086	5 yr	790.00	461.00	468.96	465.74	468.99	0.000317	1.55	684.82	295.11	0.12
INDIAN HILLS BR	INDIAN HILLS BR	1086	10 yr	980.00	461.00	470.02	466.20	470.05	0.000180	1.32	1018.29	331.30	0.09
INDIAN HILLS BR	INDIAN HILLS BR	1086	25 yr	1186.00	461.00	471.01	466.72	471.03	0.000124	1.21	1359.04	362.43	0.08
INDIAN HILLS BR	INDIAN HILLS BR	1086	50 yr	1345.00	461.00	471.69	466.86	471.71	0.000101	1.16	1611.02	377.57	0.07
INDIAN HILLS BR	INDIAN HILLS BR	1086	100 yr	1483.00	461.00	472.12	466.97	472.13	0.000095	1.16	1774.56	387.76	0.07
INDIAN HILLS BR	INDIAN HILLS BR	1086	500 yr	1881.00	461.00	473.91	467.25	473.93	0.000059	1.05	2506.34	423.29	0.06
INDIAN HILLS BR	INDIAN HILLS BR	1086	Ultimate 100 yr	1486.00	461.00	472.43	466.97	472.45	0.000079	1.09	1898.68	394.80	0.07
INDIAN HILLS BR	INDIAN HILLS BR	778	2 yr	474.00	459.79	467.19	464.26	467.21	0.000184	1.06	606.15	304.01	0.09
INDIAN HILLS BR	INDIAN HILLS BR	778	5 yr	790.00	459.79	468.92	465.53	468.93	0.000077	0.84	1214.48	398.36	0.06
INDIAN HILLS BR	INDIAN HILLS BR	778	10 yr	980.00	459.79	470.01	465.69	470.01	0.000048	0.74	1666.82	435.13	0.05
INDIAN HILLS BR	INDIAN HILLS BR	778	25 yr	1186.00	459.79	471.00	465.83	471.00	0.000035	0.69	2104.64	496.81	0.04
INDIAN HILLS BR	INDIAN HILLS BR	778	50 yr	1345.00	459.79	471.68	465.93	471.69	0.000030	0.67	2477.55	517.16	0.04
INDIAN HILLS BR	INDIAN HILLS BR	778	100 yr	1483.00	459.79	472.11	466.03	472.11	0.000028	0.67	2702.01	531.49	0.04
INDIAN HILLS BR	INDIAN HILLS BR	778	500 yr	1881.00	459.79	473.91	466.23	473.91	0.000019	0.62	3724.38	618.60	0.03
INDIAN HILLS BR	INDIAN HILLS BR	778	Ultimate 100 yr	1486.00	459.79	472.43	466.02	472.43	0.000024	0.63	2873.31	542.91	0.04
DANIELS BR	DANIELS BR	1718	2 yr	657.00	498.00	502.77	502.31	503.17	0.006784	5.61	139.24	88.40	0.56
DANIELS BR	DANIELS BR	1718	5 yr	1010.00	498.00	503.38	502.88	503.84	0.006406	6.15	199.88	108.79	0.56
DANIELS BR	DANIELS BR	1718	10 yr	1250.00	498.00	503.69	503.21	504.19	0.006397	6.49	235.57	118.28	0.57
DANIELS BR	DANIELS BR	1718	25 yr	1522.00	498.00	504.00	503.48	504.54	0.006419	6.83	273.41	127.53	0.58
DANIELS BR	DANIELS BR	1718	50 yr	1738.00	498.00	504.25	503.67	504.82	0.006336	7.05	306.51	138.77	0.58
DANIELS BR	DANIELS BR	1718	100 yr	1954.00	498.00	504.46	503.85	505.06	0.006317	7.26	337.69	148.76	0.59
DANIELS BR	DANIELS BR	1718	500 yr	2447.00	498.00	504.86	504.26	505.52	0.006484	7.76	400.74	166.71	0.60
DANIELS BR	DANIELS BR	1718	Ultimate 100 yr	1954.00	498.00	504.47	503.85	505.06	0.006257	7.23	338.98	149.15	0.58
DANIELS BR	DANIELS BR	1159	2 yr	699.00	495.00	498.29	498.13	498.59	0.009357	5.50	164.52	154.11	0.61
DANIELS BR	DANIELS BR	1159	5 yr	1100.00	495.00	498.56	498.45	499.02	0.011752	6.60	208.94	167.56	0.69
DANIELS BR	DANIELS BR	1159	10 yr	1369.00	495.00	498.73	498.64	499.27	0.012529	7.09	238.38	175.95	0.72
DANIELS BR	DANIELS BR	1159	25 yr	1672.00	495.00	498.91	498.83	499.53	0.013056	7.53	270.69	184.79	0.75
DANIELS BR	DANIELS BR	1159	50 yr	1916.00	495.00	499.02	498.98	499.72	0.013984	7.97	290.77	189.70	0.78
DANIELS BR	DANIELS BR	1159	100 yr	2158.00	495.00	499.12	499.12	499.90	0.014612	8.31	310.28	193.00	0.80
DANIELS BR	DANIELS BR	1159	500 yr	2720.00	495.00	499.40	499.40	500.29	0.014298	8.67	365.17	202.00	0.80
DANIELS BR	DANIELS BR	1159	Ultimate 100 yr	2195.00	495.00	499.14	499.14	499.93	0.014708	8.36	313.15	193.48	0.80
DANIELS BR	DANIELS BR	684	2 yr	699.00	491.00	492.95	492.71	493.21	0.013677	4.18	169.63	160.70	0.69
DANIELS BR	DANIELS BR	684	5 yr	1100.00	491.00	493.42	493.02	493.73	0.009929	4.50	249.20	171.61	0.63
DANIELS BR	DANIELS BR	684	10 yr	1369.00	491.00	493.70	493.21	494.04	0.008865	4.73	297.19	179.46	0.61
DANIELS BR	DANIELS BR	684	25 yr	1672.00	491.00	494.01	493.40	494.38	0.007932	4.96	367.45	277.30	0.59
DANIELS BR	DANIELS BR	684	50 yr	1916.00	491.00	494.25	493.56	494.59	0.006770	4.90	433.07	288.42	0.55
DANIELS BR	DANIELS BR	684	100 yr	2158.00	491.00	494.47	493.66	494.80	0.005864	4.83	499.23	303.89	0.52
DANIELS BR	DANIELS BR	684	500 yr	2720.00	491.00	495.02	494.20	495.30	0.004087	4.58	677.91	349.95	0.45
DANIELS BR	DANIELS BR	684	Ultimate 100 yr	2195.00	491.00	494.52	493.68	494.84	0.005575	4.78	515.14	307.82	0.51

Cottonwood Creek March 2010 Plan: March_2010 4/23/2010



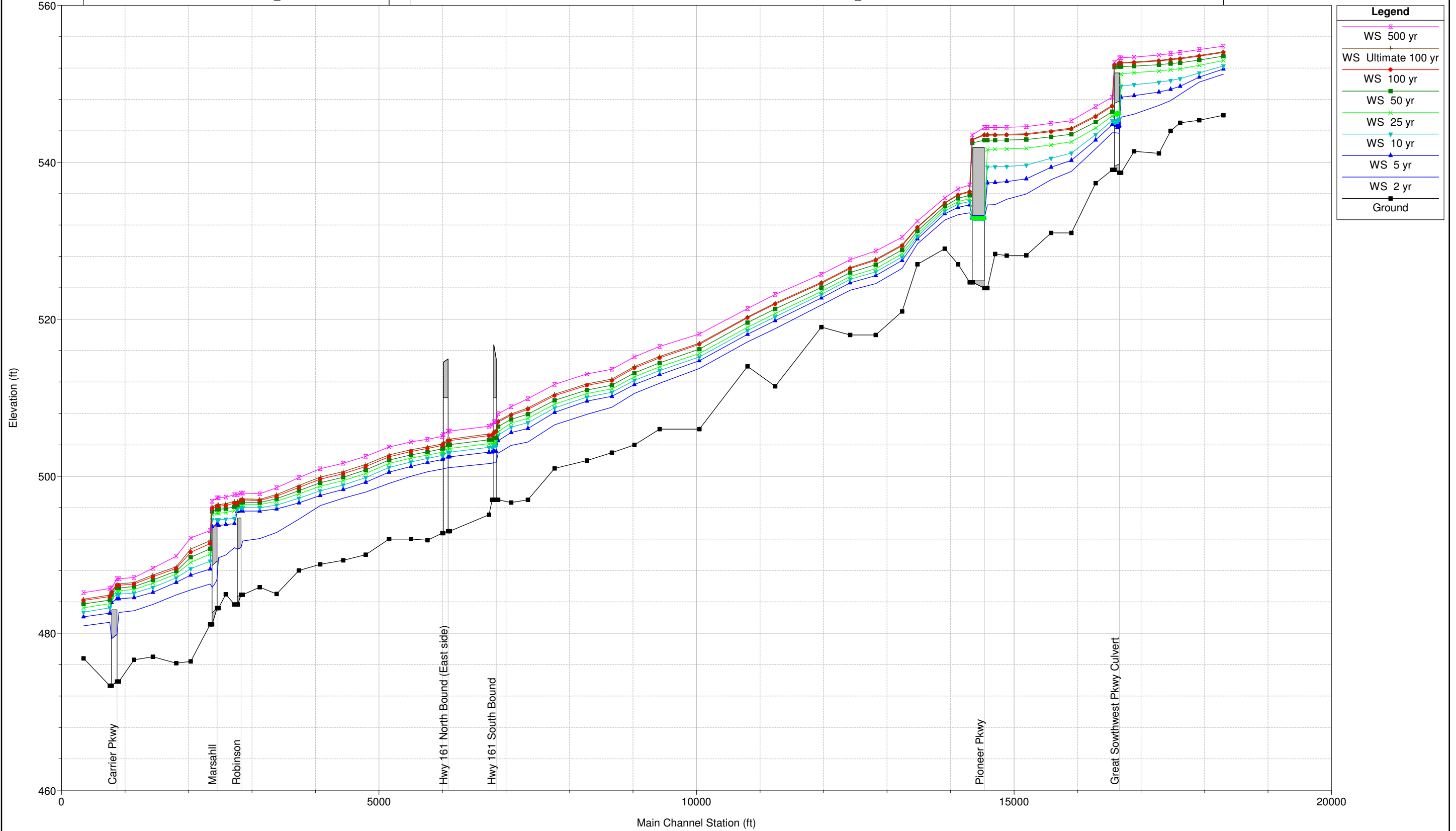
Cottonwood Creek March 2010 Plan: March_2010 4/23/2010



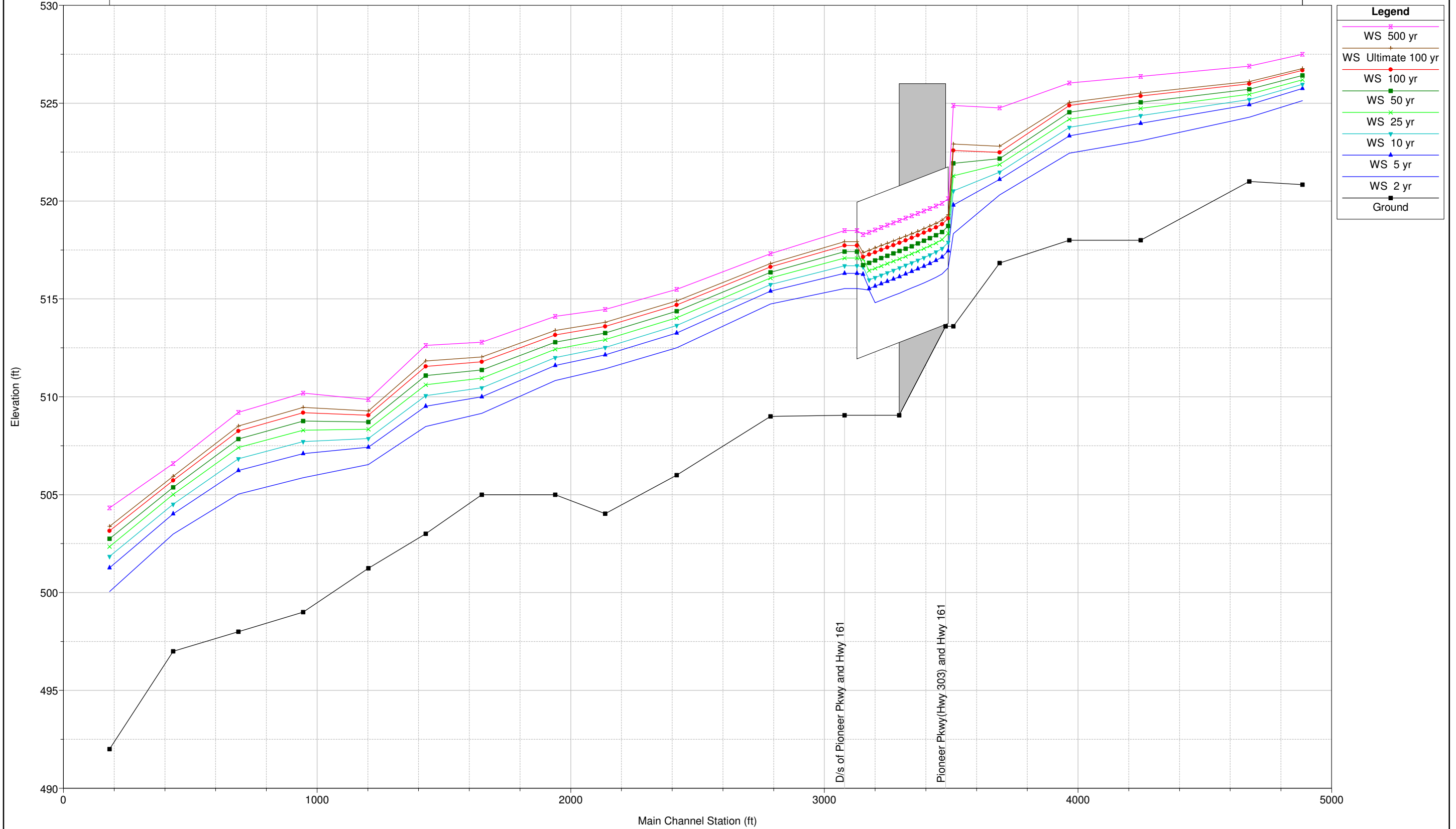
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SF CWC SECTION_02

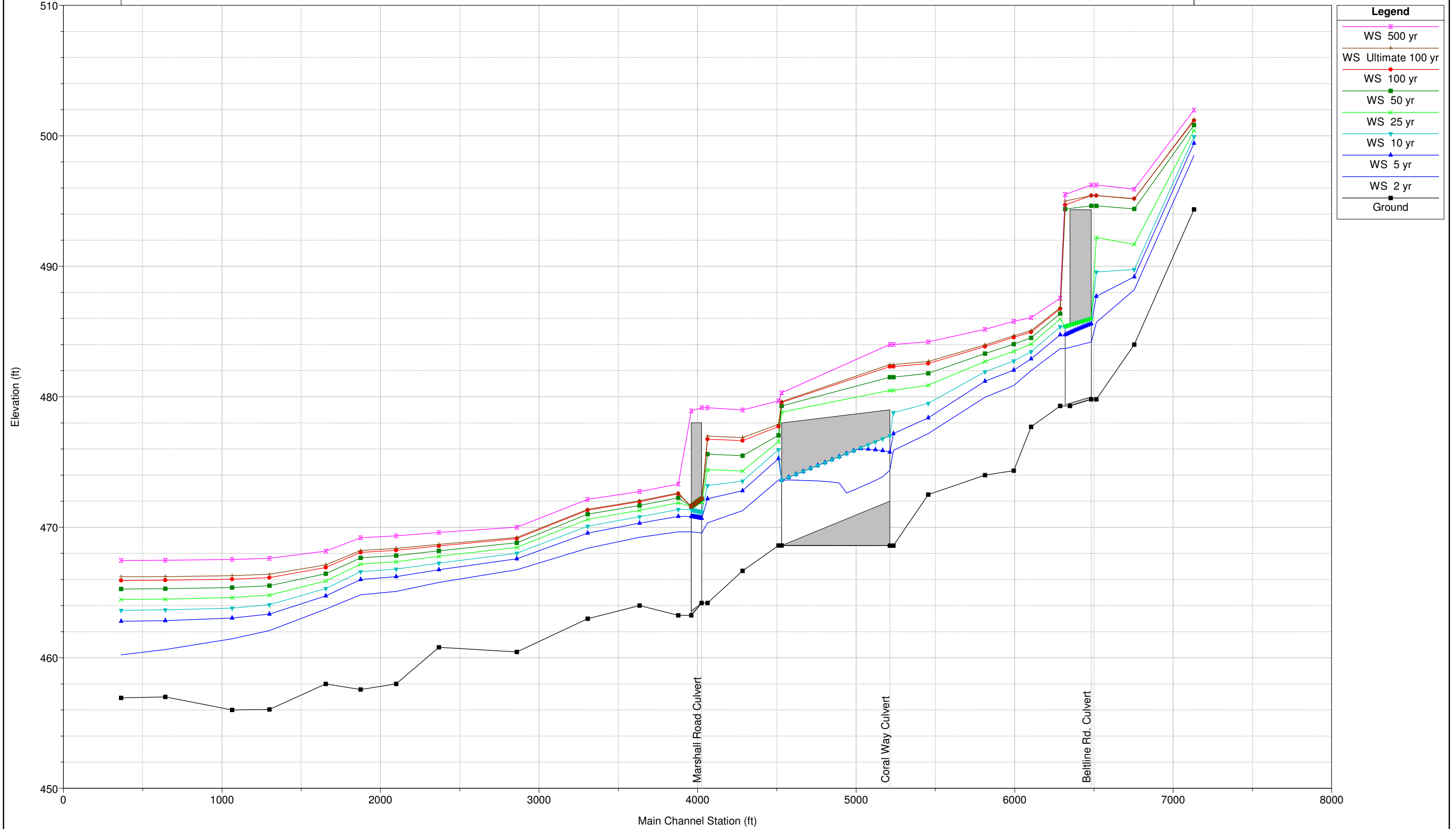
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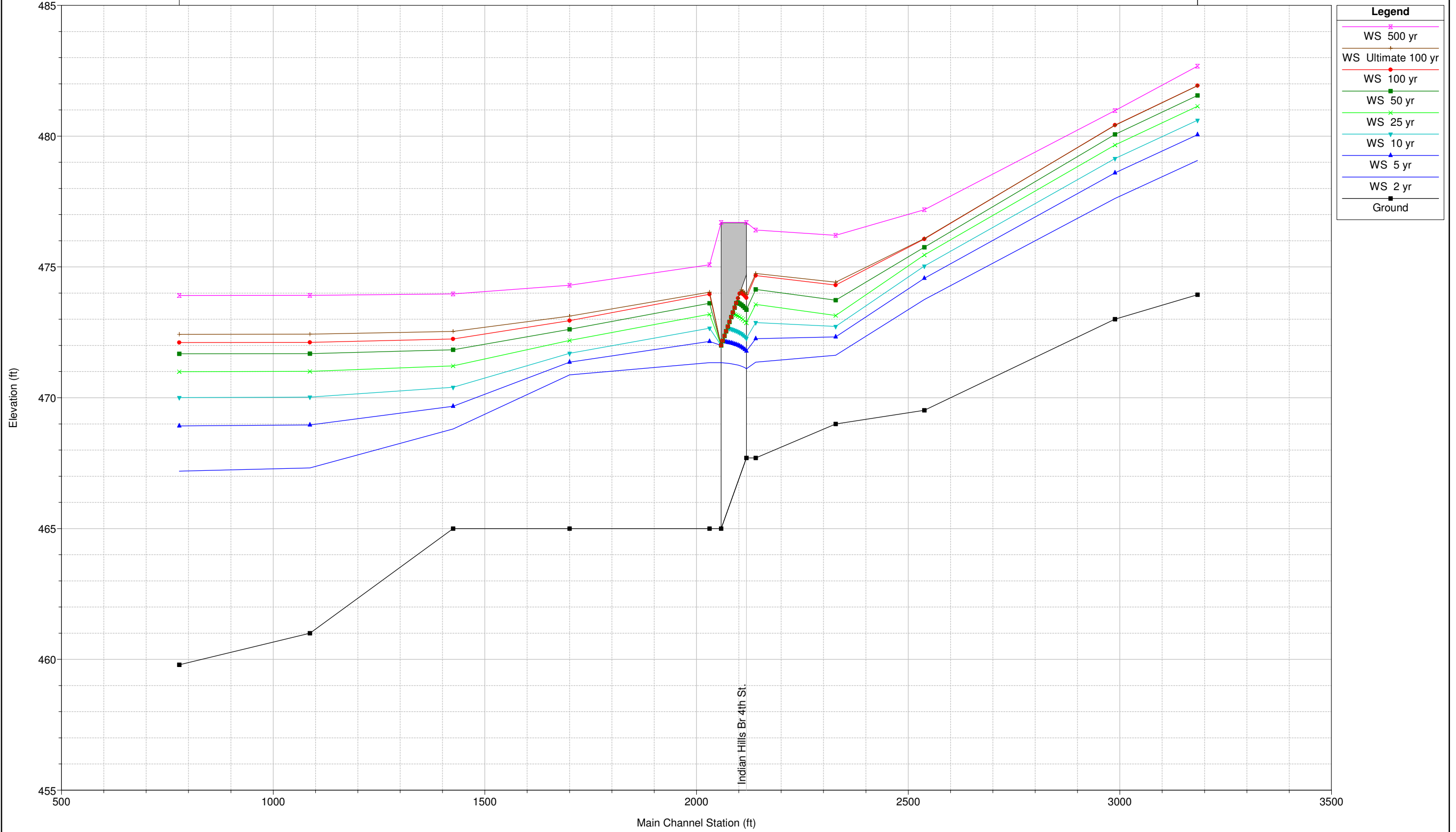
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INDIAN HILLS BR INDIAN HILLS BR



HEC-RAS Locations: User Defined

River	Reach	River Sta	Profile	Plan	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 # Chi
FISH CREEK	MAINSTEM MID2	43484	2 yr	2-50	3222.00	527.00	533.87	532.57	534.99	0.002570	8.48	379.79	78.50	0.68
FISH CREEK	MAINSTEM MID2	43484	100 yr	P-500	13493.00	527.00	539.74	538.91	542.92	0.003259	14.44	1034.18	143.84	0.85
FISH CREEK	MAINSTEM MID2	43484	5 yr	2-50	6252.00	527.00	536.20	534.98	538.01	0.002858	10.80	588.16	104.87	0.75
FISH CREEK	MAINSTEM MID2	43484	Ultimate 100yr	P-500	13786.00	527.00	539.85	539.05	543.09	0.003282	14.57	1049.59	144.70	0.85
FISH CREEK	MAINSTEM MID2	43484	10 yr	2-50	8259.00	527.00	537.34	536.20	539.58	0.003010	12.04	715.65	119.26	0.79
FISH CREEK	MAINSTEM MID2	43484	500yr	P-500	18056.00	527.00	542.51	540.81	545.61	0.002508	14.37	1463.57	166.12	0.77
FISH CREEK	MAINSTEM MID2	43484	25 yr	2-50	10208.00	527.00	538.32	537.30	540.93	0.003111	13.03	837.93	130.16	0.81
FISH CREEK	MAINSTEM MID2	43484	50 yr	2-50	11796.00	527.00	539.04	538.09	541.93	0.003186	13.74	934.53	138.03	0.83
FISH CREEK	MAINSTEM MID2	42943	2 yr	2-50	3222.00	526.00	533.18		533.79	0.001305	6.26	514.42	101.62	0.49
FISH CREEK	MAINSTEM MID2	42943	100 yr	P-500	13493.00	526.00	539.34		541.18	0.001683	10.92	1294.70	189.22	0.62
FISH CREEK	MAINSTEM MID2	42943	5 yr	2-50	6252.00	526.00	535.59		536.59	0.001472	8.04	778.34	118.60	0.55
FISH CREEK	MAINSTEM MID2	42943	Ultimate 100yr	P-500	13786.00	526.00	539.45		541.33	0.001697	11.03	1316.17	198.81	0.62
FISH CREEK	MAINSTEM MID2	42943	10 yr	2-50	8259.00	526.00	536.80		538.05	0.001538	8.99	928.02	129.64	0.57
FISH CREEK	MAINSTEM MID2	42943	500yr	P-500	18056.00	526.00	542.47		544.18	0.001225	10.64	2053.32	280.31	0.55
FISH CREEK	MAINSTEM MID2	42943	25 yr	2-50	10208.00	526.00	537.84		539.32	0.001585	9.75	1068.55	139.29	0.59
FISH CREEK	MAINSTEM MID2	42943	50 yr	2-50	11796.00	526.00	538.61		540.25	0.001626	10.32	1178.10	147.25	0.60
FISH CREEK	MAINSTEM MID2	42574	2 yr	2-50	3219.00	524.00	532.84		533.33	0.000969	5.60	574.32	107.21	0.43
FISH CREEK	MAINSTEM MID2	42574	100 yr	P-500	13551.00	524.00	539.14		540.49	0.001296	9.46	1738.09	306.02	0.54
FISH CREEK	MAINSTEM MID2	42574	5 yr	2-50	6282.00	524.00	535.20		536.04	0.001260	7.38	850.68	128.85	0.50
FISH CREEK	MAINSTEM MID2	42574	Ultimate 100yr	P-500	13820.00	524.00	539.26		540.62	0.001293	9.51	1776.71	310.68	0.54
FISH CREEK	MAINSTEM MID2	42574	10 yr	2-50	8307.00	524.00	536.42		537.46	0.001313	8.21	1045.88	192.49	0.53
FISH CREEK	MAINSTEM MID2	42574	500yr	P-500	18189.00	524.00	542.52		543.62	0.000792	8.76	2996.41	439.29	0.44
FISH CREEK	MAINSTEM MID2	42574	25 yr	2-50	10312.00	524.00	537.49		538.69	0.001339	8.83	1283.91	244.48	0.54
FISH CREEK	MAINSTEM MID2	42574	50 yr	2-50	11898.00	524.00	538.31		539.60	0.001325	9.19	1497.73	278.10	0.54
FISH CREEK	MAINSTEM MID2	42368	2 yr	2-50	3219.00	524.00	532.89	528.29	533.11	0.000387	3.83	840.86	139.29	0.27
FISH CREEK	MAINSTEM MID2	42368	100 yr	P-500	13551.00	524.00	539.55	533.66	540.06	0.000461	6.11	2800.92	431.40	0.33
FISH CREEK	MAINSTEM MID2	42368	5 yr	2-50	6282.00	524.00	535.32	530.28	535.73	0.000501	5.15	1310.10	275.66	0.33
FISH CREEK	MAINSTEM MID2	42368	Ultimate 100yr	P-500	13820.00	524.00	539.68	533.78	540.19	0.000460	6.13	2858.18	439.46	0.33
FISH CREEK	MAINSTEM MID2	42368	10 yr	2-50	8307.00	524.00	536.64	531.33	537.10	0.000507	5.58	1712.58	329.19	0.33
FISH CREEK	MAINSTEM MID2	42368	500yr	P-500	18189.00	524.00	542.93	535.62	543.30	0.000271	5.51	4521.44	571.08	0.26
FISH CREEK	MAINSTEM MID2	42368	25 yr	2-50	10312.00	524.00	537.81	532.24	538.29	0.000494	5.85	2114.80	360.19	0.33
FISH CREEK	MAINSTEM MID2	42368	50 yr	2-50	11898.00	524.00	538.68	532.95	539.18	0.000478	5.99	2445.53	393.59	0.33
FISH CREEK	MAINSTEM MID2	42268			Bridge									
FISH CREEK	MAINSTEM MID2	42222	2 yr	2-50	3219.00	524.52	532.72		533.00	0.000611	4.22	762.65	154.94	0.34
FISH CREEK	MAINSTEM MID2	42222	100 yr	P-500	13551.00	524.52	538.98		539.80	0.000746	7.23	1873.84	195.54	0.41
FISH CREEK	MAINSTEM MID2	42222	5 yr	2-50	6282.00	524.52	535.12		535.58	0.000673	5.42	1158.51	173.31	0.37
FISH CREEK	MAINSTEM MID2	42222	Ultimate 100yr	P-500	13820.00	524.52	539.10		539.93	0.000748	7.29	1896.95	196.08	0.41
FISH CREEK	MAINSTEM MID2	42222	10 yr	2-50	8307.00	524.52	536.35		536.92	0.000705	6.03	1377.39	181.68	0.39
FISH CREEK	MAINSTEM MID2	42222	500yr	P-500	18189.00	524.52	540.97		541.97	0.000758	8.01	2271.30	204.95	0.42
FISH CREEK	MAINSTEM MID2	42222	25 yr	2-50	10312.00	524.52	537.41		538.08	0.000729	6.56	1572.52	187.24	0.40
FISH CREEK	MAINSTEM MID2	42222	50 yr	2-50	11898.00	524.52	538.21		538.95	0.000740	6.91	1722.93	191.86	0.41
FISH CREEK	MAINSTEM MID2	42145	2 yr	2-50	3219.00	523.71	532.52		532.91	0.000802	5.04	638.45	120.30	0.39
FISH CREEK	MAINSTEM MID2	42145	100 yr	P-500	13551.00	523.71	538.18		539.55	0.001381	9.41	1439.43	158.97	0.55
FISH CREEK	MAINSTEM MID2	42145	5 yr	2-50	6282.00	523.71	534.72		535.44	0.001085	6.81	922.86	138.92	0.47
FISH CREEK	MAINSTEM MID2	42145	Ultimate 100yr	P-500	13820.00	523.71	538.28		539.68	0.001389	9.49	1456.56	159.68	0.55
FISH CREEK	MAINSTEM MID2	42145	10 yr	2-50	8307.00	523.71	535.83		536.74	0.001196	7.68	1081.32	145.94	0.50
FISH CREEK	MAINSTEM MID2	42145	500yr	P-500	18189.00	523.71	539.97		541.68	0.001470	10.49	1734.74	170.63	0.58
FISH CREEK	MAINSTEM MID2	42145	25 yr	2-50	10312.00	523.71	536.77		537.88	0.001291	8.44	1221.31	151.28	0.52
FISH CREEK	MAINSTEM MID2	42145	50 yr	2-50	11898.00	523.71	537.48		538.72	0.001339	8.94	1330.17	155.15	0.54
FISH CREEK	MAINSTEM MID2	41987	2 yr	2-50	3219.00	523.69	532.56	528.02	532.77	0.000290	3.68	920.07	160.71	0.24
FISH CREEK	MAINSTEM MID2	41987	100 yr	P-500	13551.00	523.69	538.36	532.87	539.25	0.000597	7.88	1980.93	206.25	0.39
FISH CREEK	MAINSTEM MID2	41987	5 yr	2-50	6282.00	523.69	534.81	529.76	535.23	0.000414	5.29	1299.36	177.67	0.31
FISH CREEK	MAINSTEM MID2	41987	Ultimate 100yr	P-500	13820.00	523.69	538.47	532.97	539.38	0.000602	7.96	2003.71	207.12	0.39
FISH CREEK	MAINSTEM MID2	41987	10 yr	2-50	8307.00	523.69	535.95	530.72	536.50	0.000478	6.14	1507.14	186.81	0.34
FISH CREEK	MAINSTEM MID2	41987	500yr	P-500	18189.00	523.69	540.19	534.44	541.34	0.000658	9.04	2371.83	220.76	0.42
FISH CREEK	MAINSTEM MID2	41987	25 yr	2-50	10312.00	523.69	536.92	531.61	537.61	0.000534	6.89	1691.67	194.66	0.36
FISH CREEK	MAINSTEM MID2	41987	50 yr	2-50	11898.00	523.69	537.65	532.29	538.44	0.000568	7.40	1835.75	200.58	0.37
FISH CREEK	MAINSTEM MID2	41940			Bridge									
FISH CREEK	MAINSTEM MID2	41832	2 yr	2-50	3219.00	523.00	532.50		532.69	0.000261	3.43	952.72	160.29	0.23
FISH CREEK	MAINSTEM MID2	41832	100 yr	P-500	13551.00	523.00	538.22		539.06	0.000557	7.50	1982.78	198.10	0.37
FISH CREEK	MAINSTEM MID2	41832	5 yr	2-50	6282.00	523.00	534.71		535.09	0.000380	4.99	1323.75	176.64	0.29
FISH CREEK	MAINSTEM MID2	41832	Ultimate 100yr	P-500	13820.00	523.00	538.33		539.18	0.000562	7.58	2004.52	198.86	0.37
FISH CREEK	MAINSTEM MID2	41832	10 yr	2-50	8307.00	523.00	535.84		536.35	0.000442	5.81	1526.89	184.36	0.32
FISH CREEK	MAINSTEM MID2	41832	500yr	P-500	18189.00	523.00	540.06		541.15	0.000616	8.64	2355.83	208.38	0.40
FISH CREEK	MAINSTEM MID2	41832	25 yr	2-50	10312.00	523.00	536.79		537.43	0.000496	6.53	1705.38	189.67	0.34
FISH CREEK	MAINSTEM MID2	41832	50 yr	2-50	11898.00	523.00	537.51		538.25	0.000528	7.03	1843.87	193.60	0.36
FISH CREEK	MAINSTEM MID2	41696	2 yr	2-50	3219.00	523.00	532.09		532.55	0.000946	5.42	594.23	114.65	0.42
FISH CREEK	MAINSTEM MID2	41696	100 yr	P-500	13551.00	523.00	536.49		538.56	0.002453	11.56	1172.34	147.65	0.72
FISH CREEK	MAINSTEM MID2	41696	5 yr	2-50	6282.00	523.00	533.94		534.85	0.001443	7.67	819.30	128.55	0.54
FISH CREEK	MAINSTEM MID2	41696	Ultimate 100yr	P-500	13820.00	523.00	536.56		538.68	0.002488	11.68	1182.73	148.11	0.73
FISH CREEK	MAINSTEM MID2	41696	10 yr	2-50	8307.00	523.00	534.80		536.03	0.001752	8.90	933.68	135.49	0.60
FISH CREEK	MAINSTEM MID2	41696	500yr	P-500	18189.00	523.00	537.73		540.50	0.002891	13.36	1361.31	155.81	0.80
FISH CREEK	MAINSTEM MID2	41696	25 yr	2-50	10312.00	523.00	535.48		537.04	0.002075	10.05	1026.46	140.89	0.66
FISH CREEK	MAINSTEM MID2	41696	50 yr	2-50	11898.00	523.00	535.99		537.81	0.002267	10.81	1100.22	144.39	0.69
FISH CREEK	MAINSTEM MID2	41596	2 yr	2-50	3219.00	523.00	532.21	527.77	532.40	0.000332	3.52	913.24	153.78	0.25
FISH CREEK	MAINSTEM MID2	41596	100 yr	P-500	13551.00	523.00	537.14	532.54	538.04	0.000897	7.60	1783.28	199.29	0.45
FISH CREEK	MAINSTEM MID2	41596	5 yr	2-50	6282.00	523.00	534.20	529.55	534.60	0.000535	5.08	1236.54	171.75	0.33
FISH CREEK	MAINSTEM MID2	41596	Ultimate 100yr	P-500	13820.00	523.00	537.23	532.61	538.15	0.000908	7.67	1800.68	199.98	0.45
FISH CREEK	MAINSTEM MID2	41596	10 yr	2-50										

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
FISH CREEK	MAINSTEM MID2	41446	100 yr	P-500	13551.00	522.45	536.78	532.90	537.61	0.001895	7.78	2032.60	441.56	0.42
FISH CREEK	MAINSTEM MID2	41446	5 yr	2-50	6282.00	522.45	533.88	529.72	534.35	0.001500	5.62	1177.68	184.98	0.35
FISH CREEK	MAINSTEM MID2	41446	Ultimate 100yr	P-500	13820.00	522.45	536.87	532.94	537.70	0.001896	7.82	2062.69	443.23	0.42
FISH CREEK	MAINSTEM MID2	41446	10 yr	2-50	8307.00	522.45	534.74	530.75	535.40	0.001863	6.70	1373.36	297.41	0.40
FISH CREEK	MAINSTEM MID2	41446	500yr	P-500	18189.00	522.45	538.35	534.06	539.25	0.001783	8.26	2565.19	460.78	0.42
FISH CREEK	MAINSTEM MID2	41446	25 yr	2-50	10312.00	522.45	535.55	531.71	536.30	0.001943	7.26	1615.53	393.64	0.42
FISH CREEK	MAINSTEM MID2	41446	50 yr	2-50	11898.00	522.45	536.18	532.34	536.97	0.001926	7.54	1826.63	430.13	0.42
FISH CREEK	MAINSTEM MID2	41093	2 yr	2-50	3352.00	522.00	531.47	528.64	531.80	0.001632	4.81	787.36	215.07	0.35
FISH CREEK	MAINSTEM MID2	41093	100 yr	P-500	14286.00	522.00	535.52	533.32	536.65	0.003035	9.31	1754.25	265.14	0.52
FISH CREEK	MAINSTEM MID2	41093	5 yr	2-50	6601.00	522.00	533.11	530.91	533.68	0.002160	6.52	1154.97	233.86	0.42
FISH CREEK	MAINSTEM MID2	41093	Ultimate 100yr	P-500	14553.00	522.00	535.60	533.38	536.74	0.003053	9.39	1773.56	266.47	0.52
FISH CREEK	MAINSTEM MID2	41093	10 yr	2-50	8763.00	522.00	533.85	531.77	534.60	0.002525	7.51	1331.67	242.34	0.46
FISH CREEK	MAINSTEM MID2	41093	500yr	P-500	19241.00	522.00	536.84	534.47	538.24	0.003244	10.46	2117.90	288.20	0.55
FISH CREEK	MAINSTEM MID2	41093	25 yr	2-50	10890.00	522.00	534.50	532.42	535.41	0.002807	8.33	1491.60	249.78	0.49
FISH CREEK	MAINSTEM MID2	41093	50 yr	2-50	12580.00	522.00	535.02	532.88	536.04	0.002937	8.85	1622.21	256.02	0.51
FISH CREEK	MAINSTEM MID2	40575	2 yr	2-50	3352.00	521.00	529.24	529.09	530.33	0.007638	8.81	449.96	211.55	0.73
FISH CREEK	MAINSTEM MID2	40575	100 yr	P-500	14286.00	521.00	534.12	532.45	535.02	0.003013	8.98	1963.22	355.59	0.51
FISH CREEK	MAINSTEM MID2	40575	5 yr	2-50	6601.00	521.00	531.09	530.68	532.06	0.005195	9.11	948.74	313.76	0.63
FISH CREEK	MAINSTEM MID2	40575	Ultimate 100yr	P-500	14553.00	521.00	534.20	532.53	535.11	0.002997	9.00	1991.81	356.76	0.51
FISH CREEK	MAINSTEM MID2	40575	10 yr	2-50	8763.00	521.00	532.01	531.34	532.93	0.004303	9.06	1243.12	326.62	0.59
FISH CREEK	MAINSTEM MID2	40575	500yr	P-500	19241.00	521.00	535.61	533.34	536.59	0.002673	9.32	2509.49	422.75	0.50
FISH CREEK	MAINSTEM MID2	40575	25 yr	2-50	10890.00	521.00	532.86	531.81	533.76	0.003690	9.03	1523.70	338.46	0.56
FISH CREEK	MAINSTEM MID2	40575	50 yr	2-50	12580.00	521.00	533.48	532.13	534.39	0.003343	9.02	1738.91	347.04	0.54
FISH CREEK	MAINSTEM MID2	40008	2 yr	2-50	3543.00	516.00	525.92	523.67	526.54	0.005142	7.32	672.16	147.99	0.44
FISH CREEK	MAINSTEM MID2	40008	100 yr	P-500	15166.00	516.00	532.54	529.27	533.21	0.003279	8.53	2469.58	346.40	0.38
FISH CREEK	MAINSTEM MID2	40008	5 yr	2-50	6969.00	516.00	528.47	525.97	529.17	0.004721	8.33	1243.13	263.15	0.44
FISH CREEK	MAINSTEM MID2	40008	Ultimate 100yr	P-500	15430.00	516.00	532.63	529.36	533.31	0.003280	8.57	2499.68	356.19	0.39
FISH CREEK	MAINSTEM MID2	40008	10 yr	2-50	9302.00	516.00	529.81	527.66	530.49	0.004173	8.45	1610.80	287.81	0.42
FISH CREEK	MAINSTEM MID2	40008	500yr	P-500	20485.00	516.00	534.17	530.43	534.92	0.003173	8.98	3099.31	425.36	0.38
FISH CREEK	MAINSTEM MID2	40008	25 yr	2-50	11589.00	516.00	530.92	528.37	531.60	0.003823	8.55	1942.61	309.53	0.41
FISH CREEK	MAINSTEM MID2	40008	50 yr	2-50	13393.00	516.00	531.71	528.88	532.40	0.003604	8.62	2192.74	324.85	0.40
FISH CREEK	MAINSTEM MID2	39477	2 yr	2-50	3543.00	514.00	523.33	521.19	523.85	0.005077	7.27	692.33	145.84	0.44
FISH CREEK	MAINSTEM MID2	39477	100 yr	P-500	15166.00	514.00	530.17	526.24	531.21	0.004925	10.59	1977.05	295.08	0.48
FISH CREEK	MAINSTEM MID2	39477	5 yr	2-50	6969.00	514.00	526.16	523.26	526.82	0.004431	8.21	1144.13	173.08	0.43
FISH CREEK	MAINSTEM MID2	39477	Ultimate 100yr	P-500	15430.00	514.00	530.26	526.32	531.30	0.004895	10.60	2005.19	296.79	0.47
FISH CREEK	MAINSTEM MID2	39477	10 yr	2-50	9302.00	514.00	527.56	524.25	528.32	0.004357	8.80	1395.75	187.43	0.43
FISH CREEK	MAINSTEM MID2	39477	500yr	P-500	20485.00	514.00	531.89	527.73	533.02	0.004592	10.97	2498.96	360.36	0.47
FISH CREEK	MAINSTEM MID2	39477	25 yr	2-50	11589.00	514.00	528.61	525.08	529.49	0.004532	9.46	1599.58	200.71	0.45
FISH CREEK	MAINSTEM MID2	39477	50 yr	2-50	13393.00	514.00	529.38	525.69	530.35	0.004590	9.87	1763.69	237.79	0.46
FISH CREEK	MAINSTEM MID2	38979	2 yr	2-50	3543.00	509.00	520.17	517.63	520.98	0.006620	9.11	660.33	144.65	0.50
FISH CREEK	MAINSTEM MID2	38979	100 yr	P-500	15166.00	509.00	527.74	524.55	528.69	0.005336	11.86	2433.95	297.03	0.50
FISH CREEK	MAINSTEM MID2	38979	5 yr	2-50	6969.00	509.00	523.34	520.75	524.25	0.006216	10.58	1241.24	224.81	0.51
FISH CREEK	MAINSTEM MID2	38979	Ultimate 100yr	P-500	15430.00	509.00	527.85	524.64	528.80	0.005331	11.90	2465.48	298.38	0.50
FISH CREEK	MAINSTEM MID2	38979	10 yr	2-50	9302.00	509.00	524.89	522.07	525.83	0.006015	11.20	1624.88	270.03	0.51
FISH CREEK	MAINSTEM MID2	38979	500yr	P-500	20485.00	509.00	529.61	526.14	530.63	0.005200	12.52	3011.06	322.58	0.50
FISH CREEK	MAINSTEM MID2	38979	25 yr	2-50	11589.00	509.00	526.12	523.04	527.05	0.005625	11.43	1966.68	282.02	0.50
FISH CREEK	MAINSTEM MID2	38979	50 yr	2-50	13393.00	509.00	526.99	523.73	527.91	0.005425	11.62	2213.78	288.69	0.50
FISH CREEK	MAINSTEM MID2	38331	2 yr	2-50	3543.00	504.98	517.93	515.79	518.23	0.001525	4.89	987.09	152.75	0.25
FISH CREEK	MAINSTEM MID2	38331	100 yr	P-500	15166.00	504.98	525.41	521.55	526.15	0.002508	8.71	2757.05	329.77	0.35
FISH CREEK	MAINSTEM MID2	38331	5 yr	2-50	6969.00	504.98	520.93	521.47	521.47	0.002194	6.83	1539.98	212.98	0.31
FISH CREEK	MAINSTEM MID2	38331	Ultimate 100yr	P-500	15430.00	504.98	525.52	526.26	526.26	0.002518	8.76	2791.38	333.02	0.35
FISH CREEK	MAINSTEM MID2	38331	10 yr	2-50	9302.00	504.98	522.46	523.08	523.08	0.002367	7.57	1891.64	251.58	0.33
FISH CREEK	MAINSTEM MID2	38331	500yr	P-500	20485.00	504.98	527.28	528.12	528.12	0.002627	9.49	3414.10	397.64	0.36
FISH CREEK	MAINSTEM MID2	38331	25 yr	2-50	11589.00	504.98	523.74	524.42	524.42	0.002446	8.10	2240.63	289.74	0.34
FISH CREEK	MAINSTEM MID2	38331	50 yr	2-50	13393.00	504.98	524.66	525.36	525.36	0.002460	8.40	2514.91	311.05	0.34
FISH CREEK	MAINSTEM MID2	37902	2 yr	2-50	3543.00	503.00	517.19	515.05	517.50	0.001939	5.11	1019.35	188.36	0.27
FISH CREEK	MAINSTEM MID2	37902	100 yr	P-500	15166.00	503.00	524.12	520.42	524.92	0.003377	9.30	2618.85	300.32	0.39
FISH CREEK	MAINSTEM MID2	37902	5 yr	2-50	6969.00	503.00	519.98	520.45	520.45	0.002508	6.74	1590.85	221.22	0.32
FISH CREEK	MAINSTEM MID2	37902	Ultimate 100yr	P-500	15430.00	503.00	524.22	525.03	525.03	0.003398	9.36	2647.48	303.67	0.39
FISH CREEK	MAINSTEM MID2	37902	10 yr	2-50	9302.00	503.00	521.41	521.98	521.98	0.002750	7.54	1919.20	234.88	0.34
FISH CREEK	MAINSTEM MID2	37902	500yr	P-500	20485.00	503.00	525.87	526.81	526.81	0.003678	10.32	3205.02	374.15	0.41
FISH CREEK	MAINSTEM MID2	37902	25 yr	2-50	11589.00	503.00	522.60	523.27	523.27	0.003021	8.30	2206.89	252.76	0.36
FISH CREEK	MAINSTEM MID2	37902	50 yr	2-50	13393.00	503.00	523.42	524.17	524.17	0.003255	8.89	2417.88	269.97	0.38
FISH CREEK	MAINSTEM MID2	37374	2 yr	2-50	3543.00	501.66	516.13	513.99	516.45	0.002103	5.30	999.27	189.30	0.28
FISH CREEK	MAINSTEM MID2	37374	100 yr	P-500	15166.00	501.66	521.77	518.07	522.84	0.005010	10.75	2371.99	318.61	0.46
FISH CREEK	MAINSTEM MID2	37374	5 yr	2-50	6969.00	501.66	518.43	519.00	519.00	0.003184	7.39	1472.17	223.48	0.36
FISH CREEK	MAINSTEM MID2	37374	Ultimate 100yr	P-500	15430.00	501.66	521.85	522.93	522.93	0.005054	10.83	2396.12	320.16	0.46
FISH CREEK	MAINSTEM MID2	37374	10 yr	2-50	9302.00	501.66	519.59	520.32	520.32	0.003811	8.55	1746.89	252.72	0.39
FISH CREEK	MAINSTEM MID2	37374	500yr	P-500	20485.00	501.66	523.19	524.49	524.49	0.005725	12.13	2840.17	338.89	0.50
FISH CREEK	MAINSTEM MID2	37374	25 yr	2-50	11589.00	501.66	520.54	521.42	521.42	0.004376	9.55	1998.67	282.17	0.43
FISH CREEK	MAINSTEM MID2	37374	50 yr	2-50	13393.00	501.66	521.18	521.18	522.17	0.004765	10.23	2186.06	302.46	0.45
FISH CREEK	MAINSTEM MID2	36983	2 yr	2-50	3643.00	501.00	515.35	510.82	515.67	0.002069	5.29	1067.34	242.53	0.28
FISH CREEK	MAINSTEM MID2	36983	100 yr	P-500	15497.00	501.00	520.32	516.20	521.08	0.004184	9.61	2865.43	475.72	0.42
FISH CREEK	MAINSTEM MID2	36983	5 yr	2-50	7009.00	501.00	517.22	513.82	517.79	0.003384	7.50	1642.16	330.77	0.37
FISH CREEK	MAINSTEM MID2	36983	Ultimate 100yr	P-500	15756.00	501.00	520.40	516.20	521.16	0.004187	9.65	2901.15	478.99	0.42
FISH CREEK	MAINSTEM MID2</													

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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
FISH CREEK	MAINSTEM MID2	35879	2 yr	2-50	3643.00	499.00	513.13	509.07	513.46	0.002205	5.57	1018.37	459.58	0.28
FISH CREEK	MAINSTEM MID2	35879	100 yr	P-500	15497.00	499.00	517.22	513.99	517.47	0.001987	6.43	4660.45	666.98	0.28
FISH CREEK	MAINSTEM MID2	35879	5 yr	2-50	7009.00	499.00	514.52	511.48	514.68	0.001498	4.94	2922.40	617.85	0.24
FISH CREEK	MAINSTEM MID2	35879	Ultimate 100yr	P-500	15756.00	499.00	517.29	513.99	517.54	0.001996	6.46	4706.86	668.22	0.28
FISH CREEK	MAINSTEM MID2	35879	10 yr	2-50	9395.00	499.00	515.27	512.41	515.47	0.001786	5.59	3392.60	632.20	0.26
FISH CREEK	MAINSTEM MID2	35879	500yr	P-500	20812.00	499.00	518.77	514.19	519.05	0.002005	6.86	5712.89	697.23	0.29
FISH CREEK	MAINSTEM MID2	35879	25 yr	2-50	11754.00	499.00	515.98	513.87	516.21	0.001971	6.07	3845.47	644.70	0.28
FISH CREEK	MAINSTEM MID2	35879	50 yr	2-50	13603.00	499.00	516.54	513.96	516.79	0.002041	6.33	4211.11	654.42	0.28
FISH CREEK	MAINSTEM MID2	34603	2 yr	2-50	4076.00	496.00	510.60	508.33	510.86	0.002400	5.19	1414.57	504.90	0.29
FISH CREEK	MAINSTEM MID2	34603	100 yr	P-500	17365.00	496.00	515.67	511.30	515.83	0.001391	5.17	6439.74	1130.54	0.23
FISH CREEK	MAINSTEM MID2	34603	5 yr	2-50	7617.00	496.00	512.29	509.99	512.62	0.003079	6.51	2717.21	1048.20	0.33
FISH CREEK	MAINSTEM MID2	34603	Ultimate 100yr	P-500	17691.00	496.00	515.74	511.30	515.90	0.001393	5.19	6514.48	1131.09	0.23
FISH CREEK	MAINSTEM MID2	34603	10 yr	2-50	10047.00	496.00	513.11	510.66	513.37	0.002601	6.25	3588.84	1081.91	0.31
FISH CREEK	MAINSTEM MID2	34603	500yr	P-500	23273.00	496.00	517.41	513.27	517.56	0.001074	4.88	8416.06	1145.68	0.21
FISH CREEK	MAINSTEM MID2	34603	25 yr	2-50	12817.00	496.00	513.95	511.21	514.18	0.002206	6.01	4516.02	1101.57	0.29
FISH CREEK	MAINSTEM MID2	34603	50 yr	2-50	15123.00	496.00	514.67	511.29	514.86	0.001912	5.79	5304.41	1117.49	0.27
FISH CREEK	MAINSTEM MID2	33913	2 yr	2-50	4076.00	495.39	509.52	504.51	509.73	0.001468	4.35	1397.08	516.78	0.24
FISH CREEK	MAINSTEM MID2	33913	100 yr	P-500	17365.00	495.39	515.35	510.73	515.43	0.000492	3.39	7894.58	1161.11	0.15
FISH CREEK	MAINSTEM MID2	33913	5 yr	2-50	7617.00	495.39	511.45	506.83	511.57	0.000925	3.87	3482.30	1090.84	0.20
FISH CREEK	MAINSTEM MID2	33913	Ultimate 100yr	P-500	17691.00	495.39	515.41	510.73	515.50	0.000496	3.42	7970.72	1161.91	0.15
FISH CREEK	MAINSTEM MID2	33913	10 yr	2-50	10047.00	495.39	512.44	507.82	512.55	0.000807	3.81	4574.88	1121.42	0.18
FISH CREEK	MAINSTEM MID2	33913	500yr	P-500	23273.00	495.39	517.16	511.19	517.25	0.000423	3.38	10018.82	1181.08	0.14
FISH CREEK	MAINSTEM MID2	33913	25 yr	2-50	12817.00	495.39	513.41	509.47	513.51	0.000717	3.76	5670.97	1136.23	0.18
FISH CREEK	MAINSTEM MID2	33913	50 yr	2-50	15123.00	495.39	514.20	510.21	514.30	0.000646	3.70	6576.07	1146.40	0.17
FISH CREEK	MAINSTEM MID2	32625	2 yr	2-50	4076.00	496.00	506.63	507.24	507.24	0.003630	6.69	811.14	225.18	0.43
FISH CREEK	MAINSTEM MID2	32625	100 yr	P-500	17365.00	496.00	514.38	514.38	514.74	0.001449	6.81	5687.20	1072.65	0.31
FISH CREEK	MAINSTEM MID2	32625	5 yr	2-50	7617.00	496.00	509.27	510.01	510.01	0.003306	7.82	1678.86	527.45	0.43
FISH CREEK	MAINSTEM MID2	32625	Ultimate 100yr	P-500	17691.00	496.00	514.44	514.44	514.80	0.001461	6.86	5750.70	1074.88	0.31
FISH CREEK	MAINSTEM MID2	32625	10 yr	2-50	10047.00	496.00	510.58	511.24	511.24	0.002859	7.89	2483.82	701.24	0.41
FISH CREEK	MAINSTEM MID2	32625	500yr	P-500	23273.00	496.00	516.44	516.44	516.70	0.001067	6.36	8060.77	1221.00	0.27
FISH CREEK	MAINSTEM MID2	32625	25 yr	2-50	12817.00	496.00	511.88	511.88	512.42	0.002319	7.64	3438.41	774.17	0.38
FISH CREEK	MAINSTEM MID2	32625	50 yr	2-50	15123.00	496.00	512.88	512.88	513.35	0.002014	7.49	4242.61	845.01	0.36
FISH CREEK	MAINSTEM MID2	32167	2 yr	2-50	4076.00	495.67	505.88	501.46	506.09	0.001063	3.80	1270.98	267.41	0.24
FISH CREEK	MAINSTEM MID2	32167	100 yr	P-500	17365.00	495.67	514.07	506.79	514.32	0.000706	4.97	5507.99	1186.04	0.22
FISH CREEK	MAINSTEM MID2	32167	5 yr	2-50	7617.00	495.67	508.70	503.15	508.96	0.001014	4.55	2459.68	643.89	0.24
FISH CREEK	MAINSTEM MID2	32167	Ultimate 100yr	P-500	17691.00	495.67	514.12	506.63	514.38	0.000721	5.03	5539.99	1187.07	0.22
FISH CREEK	MAINSTEM MID2	32167	10 yr	2-50	10047.00	495.67	510.09	504.28	510.36	0.000954	4.78	3204.35	718.12	0.24
FISH CREEK	MAINSTEM MID2	32167	500yr	P-500	23273.00	495.67	516.12	508.74	516.39	0.000684	5.30	6753.37	1229.42	0.22
FISH CREEK	MAINSTEM MID2	32167	25 yr	2-50	12817.00	495.67	511.44	505.23	511.72	0.000960	5.14	3940.49	842.78	0.25
FISH CREEK	MAINSTEM MID2	32167	50 yr	2-50	15123.00	495.67	512.46	505.89	512.75	0.000930	5.32	4542.24	934.25	0.25
FISH CREEK	MAINSTEM MID2	31772	2 yr	2-50	4241.00	489.00	505.62	498.07	505.76	0.000497	3.15	1495.93	242.69	0.17
FISH CREEK	MAINSTEM MID2	31772	100 yr	P-500	18149.00	489.00	513.54	504.25	514.00	0.000824	5.85	3584.18	816.67	0.24
FISH CREEK	MAINSTEM MID2	31772	5 yr	2-50	7961.00	489.00	508.37	500.06	508.63	0.000899	4.31	2158.27	458.81	0.21
FISH CREEK	MAINSTEM MID2	31772	Ultimate 100yr	P-500	18500.00	489.00	513.58	504.39	514.05	0.000848	5.94	3593.99	817.81	0.24
FISH CREEK	MAINSTEM MID2	31772	10 yr	2-50	10542.00	489.00	509.68	501.19	510.02	0.000807	4.96	2514.76	644.62	0.23
FISH CREEK	MAINSTEM MID2	31772	500yr	P-500	24263.00	489.00	515.44	506.36	516.06	0.000955	6.71	4109.56	868.32	0.26
FISH CREEK	MAINSTEM MID2	31772	25 yr	2-50	13433.00	489.00	510.94	502.33	511.35	0.000897	5.52	2863.35	726.64	0.24
FISH CREEK	MAINSTEM MID2	31772	50 yr	2-50	15859.00	489.00	511.90	503.28	512.37	0.000957	5.93	3129.18	766.10	0.25
FISH CREEK	MAINSTEM MID2	31709			Bridge									
FISH CREEK	MAINSTEM MID2	31603	2 yr	2-50	4265.00	487.43	505.49	495.50	505.60	0.000337	2.73	1661.19	239.14	0.14
FISH CREEK	MAINSTEM MID2	31603	100 yr	P-500	18269.00	487.43	512.12	502.16	512.61	0.000888	5.92	3299.20	607.44	0.24
FISH CREEK	MAINSTEM MID2	31603	5 yr	2-50	8016.00	487.43	508.13	497.79	508.34	0.000514	3.84	2260.38	357.19	0.18
FISH CREEK	MAINSTEM MID2	31603	Ultimate 100yr	P-500	18618.00	487.43	512.25	502.30	512.76	0.000892	5.96	3334.00	614.99	0.24
FISH CREEK	MAINSTEM MID2	31603	10 yr	2-50	10623.00	487.43	509.34	499.10	509.62	0.000630	4.48	2574.62	436.09	0.20
FISH CREEK	MAINSTEM MID2	31603	500yr	P-500	24390.00	487.43	513.78	505.26	514.46	0.001074	6.88	3732.47	707.90	0.27
FISH CREEK	MAINSTEM MID2	31603	25 yr	2-50	13529.00	487.43	510.47	500.39	510.84	0.000743	5.10	2870.62	496.31	0.22
FISH CREEK	MAINSTEM MID2	31603	50 yr	2-50	15969.00	487.43	511.33	501.35	511.77	0.000826	5.55	3094.32	546.82	0.23
FISH CREEK	MAINSTEM MID2	31319	2 yr	2-50	4265.00	487.97	505.03	498.94	505.37	0.001832	5.45	1342.45	340.37	0.26
FISH CREEK	MAINSTEM MID2	31319	100 yr	P-500	18269.00	487.97	511.84	507.56	512.21	0.001827	7.14	4705.30	868.11	0.28
FISH CREEK	MAINSTEM MID2	31319	5 yr	2-50	8016.00	487.97	507.70	502.25	508.06	0.001929	6.31	2468.70	650.49	0.28
FISH CREEK	MAINSTEM MID2	31319	Ultimate 100yr	P-500	18618.00	487.97	511.98	507.63	512.35	0.001813	7.15	4779.41	870.07	0.28
FISH CREEK	MAINSTEM MID2	31319	10 yr	2-50	10623.00	487.97	509.00	502.57	509.34	0.001845	6.49	3168.35	734.05	0.27
FISH CREEK	MAINSTEM MID2	31319	500yr	P-500	24390.00	487.97	513.52	508.59	513.94	0.001931	7.74	5609.24	903.76	0.29
FISH CREEK	MAINSTEM MID2	31319	25 yr	2-50	13529.00	487.97	510.19	505.99	510.54	0.001827	6.75	3810.05	792.21	0.28
FISH CREEK	MAINSTEM MID2	31319	50 yr	2-50	15969.00	487.97	511.05	506.95	511.41	0.001841	6.98	4275.34	845.58	0.28
FISH CREEK	MAINSTEM MID2	30732	2 yr	2-50	4265.00	488.00	504.14	504.14	504.41	0.001434	4.65	1472.33	410.26	0.24
FISH CREEK	MAINSTEM MID2	30732	100 yr	P-500	18269.00	488.00	510.91	510.91	511.26	0.001619	6.67	5447.31	778.03	0.27
FISH CREEK	MAINSTEM MID2	30732	5 yr	2-50	8016.00	488.00	506.78	507.08	507.08	0.001512	5.46	2706.05	551.87	0.25
FISH CREEK	MAINSTEM MID2	30732	Ultimate 100yr	P-500	18618.00	488.00	511.02	511.02	511.38	0.001684	6.83	5536.79	844.10	0.28
FISH CREEK	MAINSTEM MID2	30732	10 yr	2-50	10623.00	488.00	508.07	508.07	508.38	0.001552	5.85	3481.75	635.03	0.26
FISH CREEK	MAINSTEM MID2	30732	500yr	P-500	24390.00	488.00	512.54	512.54	512.92	0.001737	7.31	6912.94	936.97	0.29
FISH CREEK	MAINSTEM MID2	30732	25 yr	2-50	13529.00	488.00	509.27	509.27	509.59	0.001562	6.16	4271.22	685.47	0.26
FISH CREEK	MAINSTEM MID2	30732	50 yr	2-50	15969.00	488.00	510.13	510.13	510.45	0.001576	6.39	4873.83	715.39	0.27
FISH CREEK	MAINSTEM MID2	30084	2 yr	2-50	4265.00	486.00	503.35	503.35	503.59	0.001119	4.06	1372.59	426.54	0.21
FISH CREEK	MAINSTEM MID2	30084	100 yr	P-500	18269.00	486.00	510.36	510.36	510.53	0.000743	4.51	6419.23	873.68	0.18
FISH CREEK	MAINSTEM MID2	30084	5 yr	2-50	8016.00	486.00	506.04							

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
FISH CREEK	MAINSTEM MID2	29632	10 yr	2-50	10623.00	485.00	506.81	501.95	507.10	0.001480	5.91	3219.89	474.48	0.25
FISH CREEK	MAINSTEM MID2	29632	500yr	P-500	24390.00	485.00	511.36	505.37	511.72	0.001532	7.00	5809.64	650.49	0.26
FISH CREEK	MAINSTEM MID2	29632	25 yr	2-50	13529.00	485.00	502.77	508.36	500.28	0.001504	6.23	3840.43	520.28	0.25
FISH CREEK	MAINSTEM MID2	29632	50 yr	2-50	15969.00	485.00	508.93	503.37	509.25	0.001549	6.52	4305.86	572.70	0.26
FISH CREEK	MAINSTEM MID2	29091	2 yr	2-50	4265.00	485.00	501.96	495.84	502.28	0.001906	5.01	1497.76	359.25	0.26
FISH CREEK	MAINSTEM MID2	29091	100 yr	P-500	18269.00	485.00	508.06	503.83	508.91	0.003991	9.68	4424.31	709.57	0.41
FISH CREEK	MAINSTEM MID2	29091	5 yr	2-50	8016.00	485.00	504.30	499.77	504.76	0.002531	6.55	2395.77	415.02	0.31
FISH CREEK	MAINSTEM MID2	29091	Ultimate 100yr	P-500	18618.00	485.00	508.16	503.90	509.01	0.004005	9.74	4495.32	714.16	0.41
FISH CREEK	MAINSTEM MID2	29091	10 yr	2-50	10623.00	485.00	505.47	501.40	506.05	0.003006	7.54	2915.91	481.59	0.35
FISH CREEK	MAINSTEM MID2	29091	500yr	P-500	24390.00	485.00	509.64	505.05	510.54	0.004168	10.49	5588.13	757.71	0.43
FISH CREEK	MAINSTEM MID2	29091	25 yr	2-50	13529.00	485.00	506.56	502.54	507.25	0.003437	8.46	3484.53	556.11	0.37
FISH CREEK	MAINSTEM MID2	29091	50 yr	2-50	15969.00	485.00	507.36	503.23	508.11	0.003649	9.00	3938.03	624.10	0.39
FISH CREEK	MAINSTEM MID2	28546	2 yr	2-50	4265.00	484.36	501.26		501.47	0.001098	4.30	1813.33	498.96	0.21
FISH CREEK	MAINSTEM MID2	28546	100 yr	P-500	18269.00	484.36	507.05		507.37	0.001625	6.68	5390.07	742.51	0.27
FISH CREEK	MAINSTEM MID2	28546	5 yr	2-50	8016.00	484.36	503.49		503.73	0.001294	5.19	3019.29	593.71	0.23
FISH CREEK	MAINSTEM MID2	28546	Ultimate 100yr	P-500	18618.00	484.36	507.15		507.47	0.001629	6.71	5462.80	745.18	0.27
FISH CREEK	MAINSTEM MID2	28546	10 yr	2-50	10623.00	484.36	504.60		504.86	0.001402	5.65	3702.67	639.30	0.25
FISH CREEK	MAINSTEM MID2	28546	500yr	P-500	24390.00	484.36	508.59		508.95	0.001716	7.23	6569.49	785.42	0.28
FISH CREEK	MAINSTEM MID2	28546	25 yr	2-50	13529.00	484.36	505.62		505.91	0.001498	6.08	4376.82	673.37	0.26
FISH CREEK	MAINSTEM MID2	28546	50 yr	2-50	15969.00	484.36	506.38		506.69	0.001584	6.44	4898.54	720.82	0.27
FISH CREEK	MAINSTEM MID2	27747	2 yr	2-50	4265.00	485.00	500.08		500.44	0.001690	5.28	1352.35	458.85	0.26
FISH CREEK	MAINSTEM MID2	27747	100 yr	P-500	18269.00	485.00	505.36		505.91	0.002639	8.33	4316.91	641.39	0.35
FISH CREEK	MAINSTEM MID2	27747	5 yr	2-50	8016.00	485.00	502.10		502.53	0.002115	6.52	2373.59	546.82	0.30
FISH CREEK	MAINSTEM MID2	27747	Ultimate 100yr	P-500	18618.00	485.00	505.46		506.01	0.002650	8.38	4376.02	645.26	0.35
FISH CREEK	MAINSTEM MID2	27747	10 yr	2-50	10623.00	485.00	503.10		503.56	0.002311	7.13	2938.49	579.09	0.32
FISH CREEK	MAINSTEM MID2	27747	500yr	P-500	24390.00	485.00	506.81		507.41	0.002814	9.06	5289.35	691.28	0.36
FISH CREEK	MAINSTEM MID2	27747	25 yr	2-50	13529.00	485.00	504.04		504.54	0.002464	7.65	3497.22	604.88	0.33
FISH CREEK	MAINSTEM MID2	27747	50 yr	2-50	15969.00	485.00	504.73		505.26	0.002569	8.03	3918.66	619.59	0.34
FISH CREEK	MAINSTEM MID2	27236	2 yr	2-50	4265.00	483.56	499.22		499.56	0.001825	5.29	1447.77	608.03	0.27
FISH CREEK	MAINSTEM MID2	27236	100 yr	P-500	18269.00	483.56	504.43		504.79	0.002101	7.20	5094.11	786.33	0.30
FISH CREEK	MAINSTEM MID2	27236	5 yr	2-50	8016.00	483.56	501.24		501.56	0.001850	5.91	2757.16	680.57	0.28
FISH CREEK	MAINSTEM MID2	27236	Ultimate 100yr	P-500	18618.00	483.56	504.52		504.89	0.002097	7.22	5167.75	787.68	0.30
FISH CREEK	MAINSTEM MID2	27236	10 yr	2-50	10623.00	483.56	502.21		502.54	0.001938	6.32	3433.58	714.39	0.29
FISH CREEK	MAINSTEM MID2	27236	500yr	P-500	24390.00	483.56	505.86		506.25	0.002121	7.63	6240.48	808.13	0.31
FISH CREEK	MAINSTEM MID2	27236	25 yr	2-50	13529.00	483.56	503.13		503.47	0.002023	6.71	4103.50	747.32	0.30
FISH CREEK	MAINSTEM MID2	27236	50 yr	2-50	15969.00	483.56	503.80		504.16	0.002070	6.98	4610.51	760.50	0.30
FISH CREEK	MAINSTEM MID2	26695	2 yr	2-50	4240.00	482.00	498.29		498.59	0.001939	4.79	1368.34	518.36	0.27
FISH CREEK	MAINSTEM MID2	26695	100 yr	P-500	18669.00	482.00	503.38		503.79	0.002489	7.14	5071.90	875.20	0.32
FISH CREEK	MAINSTEM MID2	26695	5 yr	2-50	7993.00	482.00	500.23		500.59	0.002270	5.84	2534.66	709.35	0.30
FISH CREEK	MAINSTEM MID2	26695	Ultimate 100yr	P-500	19037.00	482.00	503.48		503.89	0.002474	7.15	5160.44	878.25	0.32
FISH CREEK	MAINSTEM MID2	26695	10 yr	2-50	10722.00	482.00	501.13		501.53	0.002512	6.44	3202.07	781.34	0.32
FISH CREEK	MAINSTEM MID2	26695	500yr	P-500	24931.00	482.00	504.87		505.28	0.002417	7.49	6415.67	937.98	0.32
FISH CREEK	MAINSTEM MID2	26695	25 yr	2-50	13771.00	482.00	502.05		502.46	0.002542	6.79	3943.19	822.77	0.32
FISH CREEK	MAINSTEM MID2	26695	50 yr	2-50	16251.00	482.00	502.74		503.15	0.002512	6.97	4522.57	845.63	0.32
FISH CREEK	MAINSTEM MID2	26243	2 yr	2-50	4240.00	481.00	497.12		497.07	0.004247	4.86	1122.25	639.74	0.37
FISH CREEK	MAINSTEM MID2	26243	100 yr	P-500	18669.00	481.00	502.85		503.01	0.001778	3.72	6090.33	996.76	0.25
FISH CREEK	MAINSTEM MID2	26243	5 yr	2-50	7993.00	481.00	499.54		499.67	0.002456	3.30	3022.42	836.95	0.27
FISH CREEK	MAINSTEM MID2	26243	Ultimate 100yr	P-500	19037.00	481.00	502.96		498.66	0.001752	3.73	6197.71	999.77	0.25
FISH CREEK	MAINSTEM MID2	26243	10 yr	2-50	10722.00	481.00	500.46		495.63	0.002311	3.47	3822.19	899.59	0.27
FISH CREEK	MAINSTEM MID2	26243	500yr	P-500	24931.00	481.00	504.37		499.21	0.001634	3.96	7660.95	1070.14	0.25
FISH CREEK	MAINSTEM MID2	26243	25 yr	2-50	13771.00	481.00	501.45		498.28	0.002041	3.57	4727.73	941.27	0.26
FISH CREEK	MAINSTEM MID2	26243	50 yr	2-50	16251.00	481.00	502.18		498.37	0.001902	3.64	5427.86	973.50	0.26
FISH CREEK	MAINSTEM MID2	25980	2 yr	2-50	4387.00	478.57	496.55		487.56	0.000725	3.56	1324.99	465.33	0.17
FISH CREEK	MAINSTEM MID2	25980	100 yr	P-500	19709.00	478.57	502.35		496.37	0.000933	5.07	6870.24	1201.85	0.20
FISH CREEK	MAINSTEM MID2	25980	5 yr	2-50	8304.00	478.57	499.08		499.24	0.000657	3.78	3421.56	900.89	0.16
FISH CREEK	MAINSTEM MID2	25980	Ultimate 100yr	P-500	20123.00	478.57	502.46		496.47	0.000939	5.11	7002.03	1217.05	0.20
FISH CREEK	MAINSTEM MID2	25980	10 yr	2-50	11272.00	478.57	499.96		494.06	0.000823	4.38	4247.33	992.24	0.18
FISH CREEK	MAINSTEM MID2	25980	500yr	P-500	26237.00	478.57	503.90		498.11	0.000890	5.21	8837.43	1323.82	0.20
FISH CREEK	MAINSTEM MID2	25980	25 yr	2-50	14590.00	478.57	500.93		495.02	0.000916	4.79	5264.09	1089.60	0.20
FISH CREEK	MAINSTEM MID2	25980	50 yr	2-50	17184.00	478.57	501.68		495.71	0.000889	4.84	6090.74	1120.06	0.19
FISH CREEK	MAINSTEM MID2	25946			Bridge									
FISH CREEK	MAINSTEM MID2	25904	2 yr	2-50	4387.00	477.24	496.14		487.49	0.001559	5.10	1092.92	232.22	0.24
FISH CREEK	MAINSTEM MID2	25904	100 yr	P-500	19709.00	477.24	502.24		499.00	0.001496	6.35	5575.02	937.15	0.25
FISH CREEK	MAINSTEM MID2	25904	5 yr	2-50	8304.00	477.24	498.40		492.27	0.001987	6.36	2422.73	694.61	0.28
FISH CREEK	MAINSTEM MID2	25904	Ultimate 100yr	P-500	20123.00	477.24	502.35		499.00	0.001482	6.35	5680.80	942.97	0.25
FISH CREEK	MAINSTEM MID2	25904	10 yr	2-50	11272.00	477.24	499.61		494.51	0.001849	6.43	3314.71	794.97	0.27
FISH CREEK	MAINSTEM MID2	25904	500yr	P-500	26237.00	477.24	503.82		499.90	0.001359	6.37	7120.00	1020.67	0.24
FISH CREEK	MAINSTEM MID2	25904	25 yr	2-50	14590.00	477.24	500.77		498.23	0.001623	6.29	4265.97	836.58	0.26
FISH CREEK	MAINSTEM MID2	25904	50 yr	2-50	17184.00	477.24	501.55		498.64	0.001571	6.36	4937.41	898.74	0.25
FISH CREEK	MAINSTEM MID2	25626	2 yr	2-50	4387.00	478.31	495.63		490.66	0.002289	4.97	1030.05	451.85	0.29
FISH CREEK	MAINSTEM MID2	25626	100 yr	P-500	19709.00	478.31	501.98		497.67	0.000961	4.55	5570.81	932.16	0.20
FISH CREEK	MAINSTEM MID2	25626	5 yr	2-50	8304.00	478.31	498.05		493.12	0.001424	4.57	2460.03	595.36	0.23
FISH CREEK	MAINSTEM MID2	25626	Ultimate 100yr	P-500	20123.00	478.31	502.09		497.72	0.000966	4.58	5677.14	949.92	0.20
FISH CREEK	MAINSTEM MID2	25626	10 yr	2-50	11272.00	478.31	499.29		494.62	0.001271	4.62	3232.14	716.66	0.23
FISH CREEK	MAINSTEM MID2	25626	500yr	P-500	26237.00	478.31	503.58		498.36	0.000854	4.58	7145.51	1012.23	0.19
FISH CREEK	MAINSTEM MID2	25626	25 yr	2-50	14590.00	478.31	500.48		496.91	0.001114	4.58	4224.22	870.69	0.21
FISH CREEK	MAINSTEM MID2	25626	50 yr	2-50	17184.00	478.31	501.28		497.33	0.001019	4.55	4925.31	898.05	0.21
FISH CREEK	MAINSTEM MID2	25291	2 yr	2-50	4387.00	478.00	494.82		487.91	0.002277	5.73	1033.76	249.50	0.29
FISH CREEK	MAINSTEM MID2	25291	100 yr	P-500	19709.00									

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
FISH CREEK	MAINSTEM MID2	24966	2 yr	2-50	4387.00	477.81	494.32	487.16	494.62	0.001487	4.61	1117.54	418.51	0.24
FISH CREEK	MAINSTEM MID2	24966	100 yr	P-500	19709.00	477.81	501.39	496.65	501.74	0.001534	6.46	5771.67	789.05	0.27
FISH CREEK	MAINSTEM MID2	24966	5 yr	2-50	8304.00	477.81	497.30	490.33	497.58	0.001309	5.05	2885.43	605.45	0.23
FISH CREEK	MAINSTEM MID2	24966	Ultimate 100yr	P-500	20123.00	477.81	501.50	496.72	501.86	0.001544	6.51	5860.95	795.34	0.27
FISH CREEK	MAINSTEM MID2	24966	10 yr	2-50	11272.00	477.81	498.60	492.15	498.90	0.001412	5.56	3717.42	679.68	0.25
FISH CREEK	MAINSTEM MID2	24966	500yr	P-500	26237.00	477.81	503.02	497.56	503.40	0.001605	6.99	7118.43	849.69	0.28
FISH CREEK	MAINSTEM MID2	24966	25 yr	2-50	14590.00	477.81	499.85	493.76	500.17	0.001451	5.93	4601.69	730.72	0.26
FISH CREEK	MAINSTEM MID2	24966	50 yr	2-50	17184.00	477.81	500.67	495.96	501.00	0.001489	6.20	5213.23	758.19	0.25
FISH CREEK	MAINSTEM MID2	24313	2 yr	2-50	4387.00	477.00	492.91		493.41	0.002464	5.88	890.58	158.12	0.30
FISH CREEK	MAINSTEM MID2	24313	100 yr	P-500	19709.00	477.00	499.76		500.46	0.003128	8.98	4252.16	664.42	0.37
FISH CREEK	MAINSTEM MID2	24313	5 yr	2-50	8304.00	477.00	495.71		496.39	0.003043	7.53	1903.24	489.03	0.35
FISH CREEK	MAINSTEM MID2	24313	Ultimate 100yr	P-500	20123.00	477.00	499.87		500.57	0.003133	9.02	4324.94	669.11	0.37
FISH CREEK	MAINSTEM MID2	24313	10 yr	2-50	11272.00	477.00	496.92		497.64	0.003240	8.19	2536.30	547.87	0.36
FISH CREEK	MAINSTEM MID2	24313	500yr	P-500	26237.00	477.00	501.41		502.10	0.003081	9.43	5381.80	707.90	0.37
FISH CREEK	MAINSTEM MID2	24313	25 yr	2-50	14590.00	477.00	498.24		498.92	0.003084	8.43	3292.86	598.84	0.36
FISH CREEK	MAINSTEM MID2	24313	50 yr	2-50	17184.00	477.00	499.06		499.74	0.003101	8.72	3793.59	634.09	0.36
FISH CREEK	MAINSTEM MID2	23728	2 yr	2-50	4387.00	476.00	491.93		492.25	0.001417	5.15	1141.06	137.89	0.24
FISH CREEK	MAINSTEM MID2	23728	100 yr	P-500	19709.00	476.00	497.97		498.79	0.003355	10.07	4091.62	680.88	0.40
FISH CREEK	MAINSTEM MID2	23728	5 yr	2-50	8304.00	476.00	494.38		494.91	0.002184	7.12	2061.08	439.73	0.31
FISH CREEK	MAINSTEM MID2	23728	Ultimate 100yr	P-500	20123.00	476.00	498.09		498.91	0.003337	10.08	4175.95	683.79	0.40
FISH CREEK	MAINSTEM MID2	23728	10 yr	2-50	11272.00	476.00	495.32		496.01	0.002830	8.41	2491.58	478.57	0.36
FISH CREEK	MAINSTEM MID2	23728	500yr	P-500	26237.00	476.00	499.87		500.60	0.002995	10.10	5409.62	709.18	0.38
FISH CREEK	MAINSTEM MID2	23728	25 yr	2-50	14590.00	476.00	496.45		497.25	0.003238	9.38	3116.32	606.77	0.38
FISH CREEK	MAINSTEM MID2	23728	50 yr	2-50	17184.00	476.00	497.28		498.08	0.003283	9.73	3630.86	643.38	0.39
FISH CREEK	MAINSTEM MID2	22868	2 yr	2-50	4387.00	476.00	490.79	484.53	491.04	0.001514	4.18	1144.15	308.84	0.24
FISH CREEK	MAINSTEM MID2	22868	100 yr	P-500	19709.00	476.00	496.88	492.62	497.15	0.000961	4.64	5080.56	791.63	0.21
FISH CREEK	MAINSTEM MID2	22868	5 yr	2-50	8304.00	476.00	492.82	487.13	493.23	0.002057	5.55	1783.28	581.76	0.29
FISH CREEK	MAINSTEM MID2	22868	Ultimate 100yr	P-500	20123.00	476.00	497.01	492.71	497.28	0.000953	4.65	5183.61	823.15	0.21
FISH CREEK	MAINSTEM MID2	22868	10 yr	2-50	11272.00	476.00	494.01	489.09	494.30	0.001483	5.03	2949.04	707.84	0.25
FISH CREEK	MAINSTEM MID2	22868	500yr	P-500	26237.00	476.00	498.95	493.86	499.22	0.000758	4.48	6913.90	1030.10	0.19
FISH CREEK	MAINSTEM MID2	22868	25 yr	2-50	14590.00	476.00	495.25	490.81	495.52	0.001179	4.78	3845.72	735.71	0.23
FISH CREEK	MAINSTEM MID2	22868	50 yr	2-50	17184.00	476.00	496.16	491.99	496.42	0.001019	4.63	4523.88	759.07	0.21
FISH CREEK	MAINSTEM MID2	22324	2 yr	2-50	4387.00	475.00	489.99	484.08	490.22	0.001779	4.14	1213.59	474.96	0.25
FISH CREEK	MAINSTEM MID2	22324	100 yr	P-500	19709.00	475.00	496.56	491.23	496.79	0.000755	3.97	5735.49	726.49	0.18
FISH CREEK	MAINSTEM MID2	22324	5 yr	2-50	8304.00	475.00	492.23	489.13	492.42	0.001174	3.94	2722.98	654.24	0.21
FISH CREEK	MAINSTEM MID2	22324	Ultimate 100yr	P-500	20123.00	475.00	496.70	491.28	496.93	0.000749	3.98	5833.36	729.20	0.18
FISH CREEK	MAINSTEM MID2	22324	10 yr	2-50	11272.00	475.00	493.54	490.00	493.74	0.000988	3.90	3604.67	684.20	0.20
FISH CREEK	MAINSTEM MID2	22324	500yr	P-500	26237.00	475.00	498.69	492.14	498.94	0.000671	4.09	7331.86	870.49	0.17
FISH CREEK	MAINSTEM MID2	22324	25 yr	2-50	14590.00	475.00	494.87	490.47	495.08	0.000841	3.87	4530.37	702.86	0.19
FISH CREEK	MAINSTEM MID2	22324	50 yr	2-50	17184.00	475.00	495.83	490.85	496.04	0.000767	3.87	5208.00	715.57	0.18
FISH CREEK	MAINSTEM MID2	21694	2 yr	2-50	4387.00	475.00	489.22		489.43	0.000818	4.28	1757.27	545.79	0.22
FISH CREEK	MAINSTEM MID2	21694	100 yr	P-500	19709.00	475.00	496.25		496.41	0.000574	4.90	7117.35	1001.75	0.20
FISH CREEK	MAINSTEM MID2	21694	5 yr	2-50	8304.00	475.00	491.69		491.87	0.000753	4.66	3260.06	679.13	0.22
FISH CREEK	MAINSTEM MID2	21694	Ultimate 100yr	P-500	20123.00	475.00	496.39		496.55	0.000566	4.89	7258.19	1007.46	0.20
FISH CREEK	MAINSTEM MID2	21694	10 yr	2-50	11272.00	475.00	493.09		493.26	0.000702	4.79	4274.32	755.44	0.21
FISH CREEK	MAINSTEM MID2	21694	500yr	P-500	26237.00	475.00	498.44		498.60	0.000486	4.85	9432.52	1151.75	0.19
FISH CREEK	MAINSTEM MID2	21694	25 yr	2-50	14590.00	475.00	494.48		494.66	0.000674	4.97	5427.74	932.70	0.21
FISH CREEK	MAINSTEM MID2	21694	50 yr	2-50	17184.00	475.00	495.50		495.66	0.000588	4.83	6384.15	957.89	0.20
FISH CREEK	MAINSTEM MID2	21523	2 yr	2-50	4432.00	475.00	489.24	481.86	489.29	0.000150	1.96	2675.01	346.51	0.10
FISH CREEK	MAINSTEM MID2	21523	100 yr	P-500	19871.00	475.00	496.08	485.76	496.31	0.000389	4.18	5342.46	788.55	0.17
FISH CREEK	MAINSTEM MID2	21523	5 yr	2-50	8376.00	475.00	491.65	483.36	491.75	0.000241	2.78	3557.03	387.61	0.13
FISH CREEK	MAINSTEM MID2	21523	Ultimate 100yr	P-500	20273.00	475.00	496.21	485.84	496.45	0.000391	4.21	5398.03	792.75	0.17
FISH CREEK	MAINSTEM MID2	21523	10 yr	2-50	11329.00	475.00	493.02	484.06	493.15	0.000288	3.22	4089.30	448.05	0.14
FISH CREEK	MAINSTEM MID2	21523	500yr	P-500	26539.00	475.00	498.19	486.95	498.49	0.000426	4.68	6210.63	891.80	0.18
FISH CREEK	MAINSTEM MID2	21523	25 yr	2-50	14796.00	475.00	494.39	484.79	494.56	0.000337	3.66	4645.49	665.81	0.15
FISH CREEK	MAINSTEM MID2	21523	50 yr	2-50	17462.00	475.00	495.36	485.32	495.56	0.000360	3.92	5046.58	760.82	0.16
FISH CREEK	MAINSTEM MID2	21367												
					Bridge									
FISH CREEK	MAINSTEM MID2	21180	2 yr	2-50	4432.00	473.98	489.16	480.07	489.21	0.000139	2.03	2745.41	295.93	0.09
FISH CREEK	MAINSTEM MID2	21180	100 yr	P-500	19871.00	473.98	495.68	484.48	495.94	0.000496	4.89	5005.85	634.30	0.19
FISH CREEK	MAINSTEM MID2	21180	5 yr	2-50	8376.00	473.98	491.50	481.65	491.59	0.000265	3.09	3521.77	459.85	0.13
FISH CREEK	MAINSTEM MID2	21180	Ultimate 100yr	P-500	20273.00	473.98	495.81	484.56	496.07	0.000501	4.93	5051.64	637.34	0.19
FISH CREEK	MAINSTEM MID2	21180	10 yr	2-50	11329.00	473.98	492.80	482.48	492.94	0.000332	3.63	3978.59	535.67	0.15
FISH CREEK	MAINSTEM MID2	21180	500yr	P-500	26539.00	473.98	497.53	485.73	497.88	0.000590	5.64	5670.91	683.20	0.21
FISH CREEK	MAINSTEM MID2	21180	25 yr	2-50	14796.00	473.98	494.10	483.35	494.28	0.000403	4.18	4437.20	594.68	0.17
FISH CREEK	MAINSTEM MID2	21180	50 yr	2-50	17462.00	473.98	495.02	485.96	495.24	0.000448	4.55	4766.93	618.20	0.18
FISH CREEK	MAINSTEM MID2	20966	2 yr	2-50	4432.00	475.00	489.03	481.87	489.15	0.000512	3.58	1895.29	380.91	0.18
FISH CREEK	MAINSTEM MID2	20966	100 yr	P-500	19871.00	475.00	495.61	486.99	495.86	0.000722	5.62	5444.95	622.95	0.23
FISH CREEK	MAINSTEM MID2	20966	5 yr	2-50	8376.00	475.00	491.34	483.58	491.52	0.000636	4.46	2883.39	517.19	0.20
FISH CREEK	MAINSTEM MID2	20966	Ultimate 100yr	P-500	20273.00	475.00	495.74	487.06	495.99	0.000720	5.63	5525.34	624.30	0.23
FISH CREEK	MAINSTEM MID2	20966	10 yr	2-50	11329.00	475.00	492.65	484.58	492.86	0.000688	4.91	3490.55	575.03	0.21
FISH CREEK	MAINSTEM MID2	20966	500yr	P-500	26539.00	475.00	497.48	487.58	497.77	0.000719	5.96	6629.56	643.31	0.23
FISH CREEK	MAINSTEM MID2	20966	25 yr	2-50	14796.00	475.00	493.98	485.63	494.20	0.000724	5.30	4441.36	605.91	0.22
FISH CREEK	MAINSTEM MID2	20966	50 yr	2-50	17462.00	475.00	494.93	486.35	495.16	0.000706	5.42	5023.79	615.94	0.22
FISH CREEK	MAINSTEM MID2	20722	2 yr	2-50	4432.00	474.51	488.68	482.28	488.95	0.001424	4.48	1358.76	373.13	0.24
FISH CREEK	MAINSTEM MID2	20722	100 yr	P-500	19871.00	474.51	495.22	490.56	495.59	0.001519	6.31	4670.96	616.96	0.27
FISH CREEK	MAINSTEM MID2	20722	5 yr	2-50	8376.00	474.51	490.95	485.16	491.27	0.001626	5.42	2352.97	491.85	0.26
FISH CREEK	MAINSTEM MID2	20722	Ultimate 10											

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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
FISH CREEK	MAINSTEM MID2	20362	500yr	P-500	26539.00	474.00	496.62		496.94	0.001405	6.02	6406.01	733.32	0.25
FISH CREEK	MAINSTEM MID2	20362	25 yr	2-50	14796.00	474.00	492.97		493.30	0.001956	6.08	3809.30	680.70	0.29
FISH CREEK	MAINSTEM MID2	20362	50 yr	2-50	17462.00	474.00	494.01		494.32	0.001685	5.92	4528.43	703.03	0.27
FISH CREEK	MAINSTEM MID2	20046	2 yr	2-50	4432.00	467.69	487.32	476.83	487.55	0.000956	3.84	1215.81	348.73	0.19
FISH CREEK	MAINSTEM MID2	20046	100 yr	P-500	19871.00	467.69	494.31	486.46	494.58	0.001060	5.45	5767.06	749.03	0.22
FISH CREEK	MAINSTEM MID2	20046	5 yr	2-50	8376.00	467.69	489.62	480.08	489.94	0.001300	5.02	2453.01	616.46	0.23
FISH CREEK	MAINSTEM MID2	20046	Ultimate 100yr	P-500	20273.00	467.69	494.45	486.65	494.73	0.001049	5.45	5875.46	750.82	0.22
FISH CREEK	MAINSTEM MID2	20046	10 yr	2-50	11329.00	467.69	491.02	481.93	491.33	0.001281	5.29	3383.18	689.73	0.23
FISH CREEK	MAINSTEM MID2	20046	500yr	P-500	26539.00	467.69	496.27	490.52	496.56	0.001005	5.67	7274.12	783.81	0.22
FISH CREEK	MAINSTEM MID2	20046	25 yr	2-50	14796.00	467.69	492.52	483.92	492.81	0.001160	5.35	4446.15	725.26	0.23
FISH CREEK	MAINSTEM MID2	20046	50 yr	2-50	17462.00	467.69	493.61	485.30	493.88	0.001056	5.31	5249.45	743.25	0.22
FISH CREEK	MAINSTEM MID2	19644	2 yr	2-50	4432.00	468.00	486.69	479.73	487.06	0.001582	5.47	1470.02	539.43	0.26
FISH CREEK	MAINSTEM MID2	19644	100 yr	P-500	19871.00	468.00	493.98	489.00	494.18	0.000851	5.36	6711.50	860.67	0.21
FISH CREEK	MAINSTEM MID2	19644	5 yr	2-50	8376.00	468.00	489.12	483.85	489.40	0.001348	5.64	2956.00	674.49	0.25
FISH CREEK	MAINSTEM MID2	19644	Ultimate 100yr	P-500	20273.00	468.00	494.13	489.05	494.33	0.000836	5.34	6840.40	863.88	0.21
FISH CREEK	MAINSTEM MID2	19644	10 yr	2-50	11329.00	468.00	490.59	487.41	490.82	0.001154	5.54	3976.80	717.87	0.23
FISH CREEK	MAINSTEM MID2	19644	500yr	P-500	26539.00	468.00	495.98	489.81	496.18	0.000754	5.36	8486.23	948.11	0.20
FISH CREEK	MAINSTEM MID2	19644	25 yr	2-50	14796.00	468.00	492.13	488.16	492.35	0.001033	5.55	5153.56	823.78	0.23
FISH CREEK	MAINSTEM MID2	19644	50 yr	2-50	17462.00	468.00	493.28	488.66	493.48	0.000871	5.30	6113.54	848.05	0.21
FISH CREEK	MAINSTEM MID2	19223	2 yr	2-50	4432.00	466.00	486.22		486.49	0.001056	4.45	1521.19	477.44	0.20
FISH CREEK	MAINSTEM MID2	19223	100 yr	P-500	19871.00	466.00	493.47		493.79	0.001275	6.37	6048.16	749.36	0.24
FISH CREEK	MAINSTEM MID2	19223	5 yr	2-50	8376.00	466.00	488.50		488.85	0.001410	5.66	2723.65	585.92	0.24
FISH CREEK	MAINSTEM MID2	19223	Ultimate 100yr	P-500	20273.00	466.00	493.62		493.94	0.001269	6.39	6163.99	757.13	0.24
FISH CREEK	MAINSTEM MID2	19223	10 yr	2-50	11329.00	466.00	489.99		490.33	0.001397	5.95	3638.83	637.73	0.24
FISH CREEK	MAINSTEM MID2	19223	500yr	P-500	26539.00	466.00	495.50		495.82	0.001255	6.70	7638.36	812.45	0.24
FISH CREEK	MAINSTEM MID2	19223	25 yr	2-50	14796.00	466.00	491.58		491.90	0.001315	6.10	4694.41	686.86	0.24
FISH CREEK	MAINSTEM MID2	19223	50 yr	2-50	17462.00	466.00	492.78		493.08	0.001222	6.11	5543.10	725.59	0.23
FISH CREEK	MAINSTEM MID2	18738	2 yr	2-50	4432.00	468.00	485.87		486.02	0.000814	3.55	1961.90	539.02	0.18
FISH CREEK	MAINSTEM MID2	18738	100 yr	P-500	19871.00	468.00	493.16		493.32	0.000675	4.39	6847.08	783.07	0.17
FISH CREEK	MAINSTEM MID2	18738	5 yr	2-50	8376.00	468.00	488.11		488.28	0.000907	4.18	3251.95	613.52	0.19
FISH CREEK	MAINSTEM MID2	18738	Ultimate 100yr	P-500	20273.00	468.00	493.31		493.48	0.000665	4.38	6970.36	785.26	0.17
FISH CREEK	MAINSTEM MID2	18738	10 yr	2-50	11329.00	468.00	489.61		489.78	0.000863	4.35	4228.96	686.34	0.19
FISH CREEK	MAINSTEM MID2	18738	500yr	P-500	26539.00	468.00	495.20		495.38	0.000625	4.51	8473.67	810.65	0.17
FISH CREEK	MAINSTEM MID2	18738	25 yr	2-50	14796.00	468.00	491.25		491.41	0.000744	4.31	5393.43	731.97	0.18
FISH CREEK	MAINSTEM MID2	18738	50 yr	2-50	17462.00	468.00	492.48		492.63	0.000661	4.25	6321.70	769.98	0.17
FISH CREEK	MAINSTEM MID2	18450	2 yr	2-50	4432.00	466.00	485.20		485.65	0.001843	6.79	1535.61	569.63	0.28
FISH CREEK	MAINSTEM MID2	18450	100 yr	P-500	19871.00	466.00	492.97		493.12	0.000640	5.10	7473.00	894.30	0.18
FISH CREEK	MAINSTEM MID2	18450	5 yr	2-50	8376.00	466.00	487.73		487.96	0.001201	5.99	3177.78	720.79	0.23
FISH CREEK	MAINSTEM MID2	18450	Ultimate 100yr	P-500	20273.00	466.00	493.13		493.28	0.000630	5.08	7616.83	897.35	0.18
FISH CREEK	MAINSTEM MID2	18450	10 yr	2-50	11329.00	466.00	489.33		489.50	0.000930	5.55	4394.49	796.86	0.21
FISH CREEK	MAINSTEM MID2	18450	500yr	P-500	26539.00	466.00	495.03		495.19	0.000590	5.16	9347.56	919.34	0.17
FISH CREEK	MAINSTEM MID2	18450	25 yr	2-50	14796.00	466.00	491.03		491.18	0.000736	5.19	5789.41	842.03	0.19
FISH CREEK	MAINSTEM MID2	18450	50 yr	2-50	17462.00	466.00	492.30		492.43	0.000627	4.96	6876.18	874.70	0.18
FISH CREEK	MAINSTEM MID2	17941	2 yr	2-50	4432.00	466.00	484.02	476.20	484.65	0.002156	7.27	1066.08	488.78	0.31
FISH CREEK	MAINSTEM MID2	17941	100 yr	P-500	19871.00	466.00	492.62	487.02	492.83	0.000598	5.01	6458.52	1064.58	0.17
FISH CREEK	MAINSTEM MID2	17941	5 yr	2-50	8376.00	466.00	487.08	481.15	487.38	0.001224	6.11	2748.72	757.19	0.24
FISH CREEK	MAINSTEM MID2	17941	Ultimate 100yr	P-500	20273.00	466.00	492.79	487.08	492.99	0.000590	5.00	6568.88	1069.44	0.17
FISH CREEK	MAINSTEM MID2	17941	10 yr	2-50	11329.00	466.00	488.86	485.53	489.08	0.000886	5.49	3917.61	872.56	0.21
FISH CREEK	MAINSTEM MID2	17941	500yr	P-500	26539.00	466.00	494.68	487.91	494.91	0.000570	5.15	7844.72	1144.23	0.17
FISH CREEK	MAINSTEM MID2	17941	25 yr	2-50	14796.00	466.00	490.65	486.26	490.85	0.000682	5.08	5130.32	957.06	0.18
FISH CREEK	MAINSTEM MID2	17941	50 yr	2-50	17462.00	466.00	491.97	486.68	492.15	0.000578	4.85	6015.49	1045.37	0.17
FISH CREEK	MAINSTEM MID2	17750	2 yr	2-50	4424.00	465.89	483.92	474.99	484.25	0.001093	4.95	1248.90	432.83	0.23
FISH CREEK	MAINSTEM MID2	17750	100 yr	P-500	19798.00	465.89	491.90	486.29	492.60	0.001880	8.70	4516.73	1213.21	0.32
FISH CREEK	MAINSTEM MID2	17750	5 yr	2-50	8307.00	465.89	486.60	476.60	487.10	0.001509	6.52	2041.32	655.56	0.28
FISH CREEK	MAINSTEM MID2	17750	Ultimate 100yr	P-500	20166.00	465.89	492.08	486.38	492.77	0.001838	8.65	4637.27	1215.21	0.32
FISH CREEK	MAINSTEM MID2	17750	10 yr	2-50	11215.00	465.89	488.26	480.82	488.82	0.001630	7.20	2531.60	806.70	0.29
FISH CREEK	MAINSTEM MID2	17750	500yr	P-500	26309.00	465.89	494.06	487.75	494.71	0.001726	8.86	5939.37	1228.81	0.31
FISH CREEK	MAINSTEM MID2	17750	25 yr	2-50	14565.00	465.89	490.00	484.74	490.62	0.001687	7.77	3046.75	973.10	0.30
FISH CREEK	MAINSTEM MID2	17750	50 yr	2-50	17407.00	465.89	491.26	485.64	491.93	0.001794	8.34	4101.40	1203.69	0.31
FISH CREEK	MAINSTEM MID2	17674		Bridge										
FISH CREEK	MAINSTEM MID2	17585	2 yr	2-50	4424.00	464.00	483.60	472.21	483.80	0.000525	4.15	1557.76	159.65	0.17
FISH CREEK	MAINSTEM MID2	17585	100 yr	P-500	19798.00	464.00	490.17	482.37	490.74	0.001346	8.17	4158.82	1182.05	0.29
FISH CREEK	MAINSTEM MID2	17585	5 yr	2-50	8307.00	464.00	485.70	475.81	486.21	0.001164	6.65	1922.93	395.21	0.26
FISH CREEK	MAINSTEM MID2	17585	Ultimate 100yr	P-500	20166.00	464.00	490.36	482.37	490.92	0.001302	8.08	4263.53	1191.01	0.29
FISH CREEK	MAINSTEM MID2	17585	10 yr	2-50	11215.00	464.00	486.86	478.00	487.62	0.001653	8.23	2156.72	588.04	0.31
FISH CREEK	MAINSTEM MID2	17585	500yr	P-500	26309.00	464.00	491.85	485.00	492.44	0.001346	8.54	5064.85	1246.19	0.29
FISH CREEK	MAINSTEM MID2	17585	25 yr	2-50	14565.00	464.00	488.14	479.90	489.13	0.002065	9.56	2421.52	1075.06	0.35
FISH CREEK	MAINSTEM MID2	17585	50 yr	2-50	17407.00	464.00	489.48	481.36	490.05	0.001340	8.00	3791.32	1153.27	0.29
FISH CREEK	MAINSTEM MID1	17314	100 yr	P-500	30050.00	465.00	488.56		490.17	0.000570	4.29	5489.43	907.19	0.17
FISH CREEK	MAINSTEM MID1	17314	Ultimate 100yr	P-500	30661.00	465.00	488.88		490.39	0.000544	4.24	5787.73	933.09	0.16
FISH CREEK	MAINSTEM MID1	17314	500yr	P-500	37489.00	465.00	490.80		492.01	0.000488	4.26	7675.24	1020.25	0.16
FISH CREEK	MAINSTEM MID1	16845	2 yr	2-50	6985.00	463.41	481.86	474.24	482.74	0.002739	7.67	1035.06	487.97	0.35
FISH CREEK	MAINSTEM MID1	16845	100 yr	P-500	30050.00	463.41	488.97	484.78	489.48	0.001696	7.82	6007.24	648.91	0.29
FISH CREEK	MAINSTEM MID1	16845	5 yr	2-50	12463.00	463.41	484.21	478.17	484.71	0.001915	7.07	3000.81	605.65	0.30
FISH CREEK	MAINSTEM MID1	16845	Ultimate 100yr	P-500	30661.00	463.41	489.24	484.85	489.74	0.001616	7.70	6186.30	650.08	0.29
FISH CREEK	MAINSTEM MID1	16845	10 yr	2-50	16898.00	463.41	485.56	482.67	486.05	0.001925	7.45	3825.96	622.94	0.30
FISH CREEK	MAINSTEM MID1	16845	500yr	P-500	37489.00	463.41	490.99	485.57	491.48	0.001441	7.65</			

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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
FISH CREEK	MAINSTEM MID1	16476	25 yr	2-50	21910.00	464.00	486.14	481.58	486.57	0.002148	5.24	4391.93	599.69	0.22
FISH CREEK	MAINSTEM MID1	16476	50 yr	2-50	26151.00	464.00	487.31	482.26	487.76	0.001950	5.21	5106.64	622.84	0.21
FISH CREEK	MAINSTEM MID1	16060	2 yr	2-50	7000.00	463.00	480.10	473.94	480.53	0.001512	5.54	1376.38	212.32	0.35
FISH CREEK	MAINSTEM MID1	16060	100 yr	P-500	30078.00	463.00	487.41	483.26	488.06	0.001315	7.98	5704.50	767.68	0.36
FISH CREEK	MAINSTEM MID1	16060	5 yr	2-50	12488.00	463.00	482.08	478.29	482.79	0.001958	7.31	2147.68	551.86	0.41
FISH CREEK	MAINSTEM MID1	16060	Ultimate 100yr	P-500	30730.00	463.00	487.81	483.35	488.41	0.001210	7.78	6010.09	784.11	0.35
FISH CREEK	MAINSTEM MID1	16060	10 yr	2-50	16913.00	463.00	483.40	479.60	484.18	0.001954	7.94	2918.27	610.41	0.42
FISH CREEK	MAINSTEM MID1	16060	500yr	P-500	37609.00	463.00	489.85	484.28	490.38	0.000971	7.56	7769.16	895.88	0.32
FISH CREEK	MAINSTEM MID1	16060	25 yr	2-50	21969.00	463.00	485.06	481.41	485.79	0.001650	7.99	3991.20	690.72	0.39
FISH CREEK	MAINSTEM MID1	16060	50 yr	2-50	26370.00	463.00	486.40	482.64	487.07	0.001433	7.95	4944.39	736.53	0.37
FISH CREEK	MAINSTEM MID1	15727	2 yr	2-50	7011.00	462.69	479.92	471.87	480.04	0.000851	2.85	2717.70	516.64	0.19
FISH CREEK	MAINSTEM MID1	15727	100 yr	P-500	30039.00	462.69	487.20	479.05	487.57	0.001095	5.22	6930.25	652.82	0.24
FISH CREEK	MAINSTEM MID1	15727	5 yr	2-50	12505.00	462.69	481.92	474.52	482.12	0.001063	3.77	3784.35	551.48	0.22
FISH CREEK	MAINSTEM MID1	15727	Ultimate 100yr	P-500	30756.00	462.69	487.60	479.06	487.96	0.001035	5.16	7192.49	660.22	0.24
FISH CREEK	MAINSTEM MID1	15727	10 yr	2-50	16915.00	462.69	483.23	475.96	483.50	0.001169	4.33	4523.40	573.23	0.24
FISH CREEK	MAINSTEM MID1	15727	500yr	P-500	37663.00	462.69	489.63	480.38	490.02	0.000958	5.42	8613.82	740.23	0.23
FISH CREEK	MAINSTEM MID1	15727	25 yr	2-50	22014.00	462.69	484.88	477.40	485.19	0.001137	4.72	5492.71	600.08	0.24
FISH CREEK	MAINSTEM MID1	15727	50 yr	2-50	26323.00	462.69	486.21	478.54	486.55	0.001097	4.97	6299.72	619.47	0.24
FISH CREEK	MAINSTEM MID1	15620	2 yr	2-50	7011.00	462.30	479.76	469.58	479.98	0.000058	3.82	1836.63	238.71	0.19
FISH CREEK	MAINSTEM MID1	15620	100 yr	P-500	30039.00	462.30	485.56	478.19	487.36	0.000299	10.76	2804.82	585.04	0.47
FISH CREEK	MAINSTEM MID1	15620	5 yr	2-50	12505.00	462.30	481.48	472.27	482.03	0.000124	5.93	2107.84	292.15	0.29
FISH CREEK	MAINSTEM MID1	15620	Ultimate 100yr	P-500	30756.00	462.30	485.95	478.38	487.75	0.000290	10.76	2877.62	666.47	0.46
FISH CREEK	MAINSTEM MID1	15620	10 yr	2-50	16915.00	462.30	482.51	474.08	483.37	0.000183	7.43	2276.38	368.80	0.35
FISH CREEK	MAINSTEM MID1	15620	500yr	P-500	37663.00	462.30	488.71	480.16	489.87	0.000183	9.46	6418.25	1432.33	0.38
FISH CREEK	MAINSTEM MID1	15620	25 yr	2-50	22014.00	462.30	483.82	475.83	485.03	0.000233	8.82	2497.93	438.24	0.40
FISH CREEK	MAINSTEM MID1	15620	50 yr	2-50	26323.00	462.30	484.85	477.14	486.36	0.000266	9.86	2677.33	550.24	0.44
FISH CREEK	MAINSTEM MID1	15591			Bridge									
FISH CREEK	MAINSTEM MID1	15578	2 yr	2-50	7011.00	462.84	479.74	469.16	479.95	0.000051	3.67	1912.83	265.73	0.18
FISH CREEK	MAINSTEM MID1	15578	100 yr	P-500	30039.00	462.84	485.62	477.65	487.30	0.000269	10.39	2902.45	661.59	0.44
FISH CREEK	MAINSTEM MID1	15578	5 yr	2-50	12505.00	462.84	481.44	471.77	481.95	0.000112	5.73	2182.91	417.93	0.28
FISH CREEK	MAINSTEM MID1	15578	Ultimate 100yr	P-500	30756.00	462.84	486.56	477.85	487.58	0.000176	8.71	5506.59	754.44	0.36
FISH CREEK	MAINSTEM MID1	15578	10 yr	2-50	16915.00	462.84	482.44	475.54	483.24	0.000166	7.20	2348.33	484.17	0.34
FISH CREEK	MAINSTEM MID1	15578	500yr	P-500	37663.00	462.84	488.85	479.64	489.80	0.000149	8.70	7319.93	819.08	0.34
FISH CREEK	MAINSTEM MID1	15578	25 yr	2-50	22014.00	462.84	483.71	475.28	484.86	0.000215	8.59	2564.85	554.17	0.39
FISH CREEK	MAINSTEM MID1	15578	50 yr	2-50	26323.00	462.84	484.70	476.60	486.14	0.000249	9.63	2737.14	594.35	0.42
FISH CREEK	MAINSTEM MID1	15537	2 yr	2-50	7011.00	462.07	479.75	469.60	479.94	0.000048	3.51	1995.80	166.75	0.18
FISH CREEK	MAINSTEM MID1	15537	100 yr	P-500	30039.00	462.07	485.70	477.49	487.20	0.000237	9.83	3132.33	248.56	0.42
FISH CREEK	MAINSTEM MID1	15537	5 yr	2-50	12505.00	462.07	481.46	472.00	481.92	0.000104	5.46	2288.30	175.33	0.27
FISH CREEK	MAINSTEM MID1	15537	Ultimate 100yr	P-500	30756.00	462.07	485.88	477.70	487.42	0.000240	9.46	3177.07	254.74	0.42
FISH CREEK	MAINSTEM MID1	15537	10 yr	2-50	16915.00	462.07	482.47	473.61	483.20	0.000153	6.85	2469.11	180.90	0.33
FISH CREEK	MAINSTEM MID1	15537	500yr	P-500	37663.00	462.07	487.66	479.40	489.51	0.000256	10.98	3656.10	327.21	0.44
FISH CREEK	MAINSTEM MID1	15537	25 yr	2-50	22014.00	462.07	483.76	475.24	484.79	0.000192	8.15	2707.07	189.64	0.37
FISH CREEK	MAINSTEM MID1	15537	50 yr	2-50	26323.00	462.07	484.76	476.50	486.06	0.000221	9.14	2901.23	221.30	0.40
FISH CREEK	MAINSTEM MID1	15498	2 yr	2-50	7011.00	462.49	479.74	470.96	479.94	0.000056	3.56	1967.01	181.59	0.19
FISH CREEK	MAINSTEM MID1	15498	100 yr	P-500	30039.00	462.49	485.75	478.20	487.17	0.000245	9.58	3164.10	219.13	0.42
FISH CREEK	MAINSTEM MID1	15498	5 yr	2-50	12505.00	462.49	481.45	473.17	481.92	0.000116	5.47	2286.26	191.16	0.28
FISH CREEK	MAINSTEM MID1	15498	Ultimate 100yr	P-500	30756.00	462.49	485.93	478.37	487.38	0.000248	9.69	3203.71	220.31	0.43
FISH CREEK	MAINSTEM MID1	15498	10 yr	2-50	16915.00	462.49	482.47	474.62	483.19	0.000167	6.81	2483.90	196.91	0.34
FISH CREEK	MAINSTEM MID1	15498	500yr	P-500	37663.00	462.49	487.72	479.94	489.47	0.000259	10.65	3608.89	231.51	0.45
FISH CREEK	MAINSTEM MID1	15498	25 yr	2-50	22014.00	462.49	483.77	476.12	484.77	0.000206	8.03	2745.26	204.58	0.38
FISH CREEK	MAINSTEM MID1	15498	50 yr	2-50	26323.00	462.49	484.79	477.27	486.03	0.000232	8.94	2958.01	213.05	0.41
FISH CREEK	MAINSTEM MID1	15371			Bridge									
FISH CREEK	MAINSTEM MID1	15267	2 yr	2-50	7011.00	461.67	479.72	469.50	479.90	0.000047	3.42	2052.10	174.70	0.18
FISH CREEK	MAINSTEM MID1	15267	100 yr	P-500	30039.00	461.67	485.55	477.39	486.95	0.000251	9.51	3158.74	205.67	0.42
FISH CREEK	MAINSTEM MID1	15267	5 yr	2-50	12505.00	461.67	481.39	472.07	481.83	0.000101	5.32	2352.11	182.99	0.26
FISH CREEK	MAINSTEM MID1	15267	Ultimate 100yr	P-500	30756.00	461.67	485.72	477.56	487.16	0.000253	9.63	3194.99	206.66	0.43
FISH CREEK	MAINSTEM MID1	15267	10 yr	2-50	16915.00	461.67	482.37	473.65	483.07	0.000150	6.67	2534.19	188.25	0.32
FISH CREEK	MAINSTEM MID1	15267	500yr	P-500	37663.00	461.67	487.48	479.21	489.23	0.000267	10.60	3569.51	219.47	0.45
FISH CREEK	MAINSTEM MID1	15267	25 yr	2-50	22014.00	461.67	483.63	475.21	484.61	0.000196	7.93	2775.68	195.06	0.37
FISH CREEK	MAINSTEM MID1	15267	50 yr	2-50	26323.00	461.67	484.62	476.41	485.84	0.000233	8.86	2969.97	200.52	0.41
FISH CREEK	MAINSTEM MID1	15213	2 yr	2-50	7011.00	461.39	479.70	470.46	479.89	0.000054	3.53	1986.85	180.99	0.19
FISH CREEK	MAINSTEM MID1	15213	100 yr	P-500	30039.00	461.39	485.49	477.99	486.93	0.000275	9.61	3126.01	212.48	0.44
FISH CREEK	MAINSTEM MID1	15213	5 yr	2-50	12505.00	461.39	481.36	472.84	481.82	0.000114	5.45	2294.87	189.87	0.28
FISH CREEK	MAINSTEM MID1	15213	Ultimate 100yr	P-500	30756.00	461.39	485.67	478.19	487.14	0.000279	9.72	3163.87	213.56	0.45
FISH CREEK	MAINSTEM MID1	15213	10 yr	2-50	16915.00	461.39	482.33	474.37	483.05	0.000168	6.82	2481.23	195.06	0.34
FISH CREEK	MAINSTEM MID1	15213	500yr	P-500	37663.00	461.39	487.47	479.77	489.21	0.000315	10.58	3558.92	255.84	0.48
FISH CREEK	MAINSTEM MID1	15213	25 yr	2-50	22014.00	461.39	483.58	475.93	484.59	0.000216	8.06	2729.90	201.78	0.39
FISH CREEK	MAINSTEM MID1	15213	50 yr	2-50	26323.00	461.39	484.56	477.08	485.81	0.000253	8.98	2930.15	207.01	0.42
FISH CREEK	MAINSTEM MID1	15169	2 yr	2-50	7011.00	462.00	479.72	469.98	479.88	0.000044	3.21	2183.95	196.42	0.17
FISH CREEK	MAINSTEM MID1	15169	100 yr	P-500	30039.00	462.00	485.66	477.27	486.84	0.000219	8.70	3454.36	232.64	0.40
FISH CREEK	MAINSTEM MID1	15169	5 yr	2-50	12505.00	462.00	481.41	472.24	481.79	0.000092	4.95	2524.96	206.67	0.25
FISH CREEK	MAINSTEM MID1	15169	Ultimate 100yr	P-500	30756.00	462.00	485.85	477.43	487.05	0.000223	8.80	3496.89	234.26	0.40
FISH CREEK	MAINSTEM MID1	15169	10 yr	2-50	16915.00	462.00	482.41	473.75	483.00	0.000134	6.19	2734.02	211.80	0.30
FISH CREEK	MAINSTEM MID1	15169	500yr	P-500	37663.00	462.00	487.70	478.97	489.09	0.000244	9.50	4088.39	427.26	0.42
FISH CREEK	MAINSTEM MID1	15169	25 yr	2-50	22014.00	462.00	483.70	475.21	484.53	0.000172	7.31	3011.48	219.05	0.35
FISH CREEK	MAINSTEM MID1	15169	50 yr	2-50	26323.00	462.00	484.71	476.36	485.74	0.000200	8.14	3235.67	224.85	0.38

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
FISH CREEK	MAINSTEM MID1	15114	50 yr	2-50	26323.00	461.00	484.55	475.89	485.52	0.000190	7.92	3321.62	317.19	0.37
FISH CREEK	MAINSTEM MID1	14866	2 yr	2-50	7011.00	461.00	479.66		479.84	0.000039	3.48	2147.42	184.20	0.16
FISH CREEK	MAINSTEM MID1	14866	100 yr	P-500	30039.00	461.00	484.46		486.22	0.000255	10.87	3292.25	361.04	0.44
FISH CREEK	MAINSTEM MID1	14866	5 yr	2-50	12505.00	461.00	481.23		481.70	0.000085	5.54	2452.61	205.23	0.25
FISH CREEK	MAINSTEM MID1	14866	Ultimate 100yr	P-500	30756.00	461.00	484.56		486.38	0.000262	11.06	3328.52	365.03	0.45
FISH CREEK	MAINSTEM MID1	14866	10 yr	2-50	16915.00	461.00	482.09		482.85	0.000130	7.09	2637.31	226.83	0.31
FISH CREEK	MAINSTEM MID1	14866	500yr	P-500	37663.00	461.00	485.44		487.85	0.000329	12.78	3664.04	388.35	0.51
FISH CREEK	MAINSTEM MID1	14866	25 yr	2-50	22014.00	461.00	483.18		484.30	0.000176	8.61	2903.17	260.75	0.36
FISH CREEK	MAINSTEM MID1	14866	50 yr	2-50	26323.00	461.00	483.89		485.35	0.000218	9.85	3099.31	309.36	0.41
FISH CREEK	MAINSTEM MID1	14725	2 yr	2-50	7025.00	462.28	479.52	470.84	479.82	0.000086	4.39	1601.59	598.10	0.23
FISH CREEK	MAINSTEM MID1	14725	100 yr	P-500	30228.00	462.28	485.19	481.80	485.87	0.000170	8.06	8141.54	1373.17	0.35
FISH CREEK	MAINSTEM MID1	14725	5 yr	2-50	12525.00	462.28	481.10	473.47	481.66	0.000152	6.29	3054.84	1048.58	0.32
FISH CREEK	MAINSTEM MID1	14725	Ultimate 100yr	P-500	30940.00	462.28	485.33	481.91	486.01	0.000169	8.09	8338.77	1380.01	0.35
FISH CREEK	MAINSTEM MID1	14725	10 yr	2-50	16935.00	462.28	482.11	475.22	482.80	0.000183	7.28	4125.89	1198.35	0.35
FISH CREEK	MAINSTEM MID1	14725	500yr	P-500	37759.00	462.28	486.63	482.97	487.29	0.000162	8.34	10183.02	1464.24	0.35
FISH CREEK	MAINSTEM MID1	14725	25 yr	2-50	22123.00	462.28	483.46	477.08	484.15	0.000177	7.62	5843.18	1272.40	0.35
FISH CREEK	MAINSTEM MID1	14725	50 yr	2-50	26347.00	462.28	484.40	478.44	485.09	0.000173	7.87	7076.07	1336.13	0.35
FISH CREEK	MAINSTEM MID1	14668			Bridge									
FISH CREEK	MAINSTEM MID1	14575	2 yr	2-50	7025.00	460.00	479.24	471.68	479.66	0.001602	5.22	1362.17	669.50	0.28
FISH CREEK	MAINSTEM MID1	14575	100 yr	P-500	30228.00	460.00	485.47	481.76	485.78	0.001111	5.85	9380.42	1442.75	0.25
FISH CREEK	MAINSTEM MID1	14575	5 yr	2-50	12525.00	460.00	480.97	474.63	481.61	0.002319	6.92	2880.40	1210.48	0.34
FISH CREEK	MAINSTEM MID1	14575	Ultimate 100yr	P-500	30940.00	460.00	485.61	481.81	485.92	0.001098	5.85	9584.04	1446.89	0.25
FISH CREEK	MAINSTEM MID1	14575	10 yr	2-50	16935.00	460.00	482.33	476.64	482.71	0.001530	6.01	5072.97	1308.04	0.28
FISH CREEK	MAINSTEM MID1	14575	500yr	P-500	37759.00	460.00	486.90	482.41	487.20	0.001001	5.85	11474.39	1492.90	0.24
FISH CREEK	MAINSTEM MID1	14575	25 yr	2-50	22123.00	460.00	483.73	480.84	484.06	0.001269	5.82	6937.94	1355.55	0.26
FISH CREEK	MAINSTEM MID1	14575	50 yr	2-50	26347.00	460.00	484.68	480.99	485.00	0.001174	5.83	8254.35	1405.55	0.25
FISH CREEK	MAINSTEM MID1	14279	2 yr	2-50	7025.00	463.29	478.22	474.93	478.93	0.003571	7.48	1231.85	435.00	0.40
FISH CREEK	MAINSTEM MID1	14279	100 yr	P-500	30228.00	463.29	483.97	481.00	485.06	0.003391	9.63	4447.37	564.79	0.41
FISH CREEK	MAINSTEM MID1	14279	5 yr	2-50	12525.00	463.29	480.09	478.43	480.80	0.003256	7.92	2301.03	466.96	0.39
FISH CREEK	MAINSTEM MID1	14279	Ultimate 100yr	P-500	30940.00	463.29	484.09	481.01	485.20	0.003396	9.68	4516.88	565.88	0.41
FISH CREEK	MAINSTEM MID1	14279	10 yr	2-50	16935.00	463.29	481.27	479.01	482.00	0.003147	8.25	2974.61	486.33	0.39
FISH CREEK	MAINSTEM MID1	14279	500yr	P-500	37759.00	463.29	485.21	481.79	486.47	0.003429	10.16	5157.73	576.16	0.42
FISH CREEK	MAINSTEM MID1	14279	25 yr	2-50	22123.00	463.29	482.43	479.83	483.34	0.003362	9.00	3590.01	550.72	0.41
FISH CREEK	MAINSTEM MID1	14279	50 yr	2-50	26347.00	463.29	483.28	480.43	484.28	0.003347	9.31	4062.95	558.53	0.41
FISH CREEK	MAINSTEM MID1	13701	2 yr	2-50	7025.00	461.00	476.91	473.34	477.17	0.001944	5.26	2641.69	766.42	0.29
FISH CREEK	MAINSTEM MID1	13701	100 yr	P-500	30228.00	461.00	482.99	478.44	483.31	0.001706	6.73	7880.76	911.55	0.29
FISH CREEK	MAINSTEM MID1	13701	5 yr	2-50	12525.00	461.00	478.90	475.97	479.15	0.001809	5.72	4253.68	847.18	0.29
FISH CREEK	MAINSTEM MID1	13701	Ultimate 100yr	P-500	30940.00	461.00	483.12	478.50	483.44	0.001713	6.78	7996.76	915.20	0.29
FISH CREEK	MAINSTEM MID1	13701	10 yr	2-50	16935.00	461.00	480.14	476.95	480.40	0.001745	5.99	5329.04	876.93	0.29
FISH CREEK	MAINSTEM MID1	13701	500yr	P-500	37759.00	461.00	484.28	479.11	484.66	0.001768	7.21	9086.13	952.10	0.30
FISH CREEK	MAINSTEM MID1	13701	25 yr	2-50	22123.00	461.00	481.36	477.60	481.64	0.001724	6.31	6409.52	896.58	0.29
FISH CREEK	MAINSTEM MID1	13701	50 yr	2-50	26347.00	461.00	482.28	478.07	482.58	0.001689	6.50	7233.06	905.33	0.29
FISH CREEK	MAINSTEM MID1	13129	2 yr	2-50	7025.00	461.00	475.94	473.42	476.15	0.001691	5.00	2654.76	614.07	0.27
FISH CREEK	MAINSTEM MID1	13129	100 yr	P-500	30228.00	461.00	481.96	477.12	482.33	0.001942	7.21	7114.72	866.39	0.31
FISH CREEK	MAINSTEM MID1	13129	5 yr	2-50	12525.00	461.00	477.90	474.76	478.15	0.001845	5.84	3923.81	688.20	0.29
FISH CREEK	MAINSTEM MID1	13129	Ultimate 100yr	P-500	30940.00	461.00	482.09	477.19	482.46	0.001944	7.25	7223.58	870.18	0.31
FISH CREEK	MAINSTEM MID1	13129	10 yr	2-50	16935.00	461.00	479.12	475.44	479.41	0.001923	6.34	4804.45	761.04	0.30
FISH CREEK	MAINSTEM MID1	13129	500yr	P-500	37759.00	461.00	483.26	477.87	483.66	0.001924	7.54	8255.45	899.18	0.31
FISH CREEK	MAINSTEM MID1	13129	25 yr	2-50	22123.00	461.00	480.33	476.18	480.65	0.001944	6.74	5752.13	803.58	0.31
FISH CREEK	MAINSTEM MID1	13129	50 yr	2-50	26347.00	461.00	481.27	476.68	481.60	0.001909	6.95	6519.54	839.50	0.31
FISH CREEK	MAINSTEM MID1	12580	2 yr	2-50	7018.00	459.00	475.21	470.82	475.41	0.001319	5.19	2904.14	605.15	0.24
FISH CREEK	MAINSTEM MID1	12580	100 yr	P-500	30103.00	459.00	480.70	476.28	481.22	0.002762	9.34	6563.70	764.31	0.37
FISH CREEK	MAINSTEM MID1	12580	5 yr	2-50	12520.00	459.00	477.00	473.88	477.28	0.001759	6.49	4009.14	629.05	0.29
FISH CREEK	MAINSTEM MID1	12580	Ultimate 100yr	P-500	30824.00	459.00	480.82	476.36	481.35	0.002786	9.41	6653.71	765.85	0.37
FISH CREEK	MAINSTEM MID1	12580	10 yr	2-50	16918.00	459.00	478.11	474.63	478.45	0.002051	7.33	4715.67	649.54	0.31
FISH CREEK	MAINSTEM MID1	12580	500yr	P-500	37803.00	459.00	481.93	477.07	482.53	0.002979	10.09	7515.56	789.48	0.39
FISH CREEK	MAINSTEM MID1	12580	25 yr	2-50	21991.00	459.00	479.21	475.33	479.62	0.002359	8.19	5444.78	694.48	0.34
FISH CREEK	MAINSTEM MID1	12580	50 yr	2-50	26350.00	459.00	480.04	475.84	480.53	0.002653	8.95	6062.11	755.70	0.36
FISH CREEK	MAINSTEM MID1	12085	2 yr	2-50	7053.00	460.00	474.60	471.26	474.79	0.001503	4.87	2999.32	730.46	0.25
FISH CREEK	MAINSTEM MID1	12085	100 yr	P-500	30264.00	460.00	479.56	475.58	480.00	0.002790	8.41	6857.60	822.22	0.36
FISH CREEK	MAINSTEM MID1	12085	5 yr	2-50	12585.00	460.00	476.21	473.39	476.46	0.001948	6.05	4201.09	761.26	0.29
FISH CREEK	MAINSTEM MID1	12085	Ultimate 100yr	P-500	30973.00	460.00	479.67	475.64	480.12	0.002814	8.48	6946.26	823.81	0.37
FISH CREEK	MAINSTEM MID1	12085	10 yr	2-50	16993.00	460.00	477.21	474.08	477.51	0.002223	6.78	4966.63	779.81	0.32
FISH CREEK	MAINSTEM MID1	12085	500yr	P-500	38016.00	460.00	480.69	476.28	481.21	0.003037	9.16	7797.48	845.43	0.38
FISH CREEK	MAINSTEM MID1	12085	25 yr	2-50	22080.00	460.00	478.20	474.71	478.56	0.002483	7.49	5749.60	801.06	0.34
FISH CREEK	MAINSTEM MID1	12085	50 yr	2-50	26449.00	460.00	478.96	475.20	479.36	0.002657	8.00	6361.77	813.43	0.35
FISH CREEK	MAINSTEM MID1	11651	2 yr	2-50	7053.00	459.67	472.94	471.07	473.86	0.006033	8.85	1483.51	600.95	0.51
FISH CREEK	MAINSTEM MID1	11651	100 yr	P-500	30264.00	459.67	477.14	476.21	478.63	0.009194	13.97	4198.68	663.63	0.67
FISH CREEK	MAINSTEM MID1	11651	5 yr	2-50	12585.00	459.67	474.31	473.89						

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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
FISH CREEK	MAINSTEM MID1	10541	Ultimate 100yr	P-500	30969.00	459.00	473.25	472.14	474.11	0.002801	9.44	4287.16	921.11	0.50
FISH CREEK	MAINSTEM MID1	10541	10 yr	2-50	17001.00	459.00	471.68	471.03	472.33	0.002938	8.75	2859.01	895.13	0.49
FISH CREEK	MAINSTEM MID1	10541	500yr	P-500	38038.00	459.00	474.52	472.59	475.29	0.001970	8.50	5476.64	946.63	0.42
FISH CREEK	MAINSTEM MID1	10541	25 yr	2-50	22082.00	459.00	472.21	471.45	472.97	0.003075	9.28	3342.63	902.24	0.51
FISH CREEK	MAINSTEM MID1	10541	50 yr	2-50	26461.00	459.00	472.68	471.51	473.51	0.003050	9.52	3769.10	910.62	0.51
FISH CREEK	MAINSTEM MID1	9945	2 yr	2-50	7062.00	458.03	469.14	468.71	469.49	0.002218	6.18	1876.46	1204.31	0.42
FISH CREEK	MAINSTEM MID1	9945	100 yr	P-500	30207.00	458.03	472.45	470.61	472.81	0.001306	6.16	6452.07	1525.73	0.34
FISH CREEK	MAINSTEM MID1	9945	5 yr	2-50	12617.00	458.03	469.98	469.44	470.35	0.002246	6.71	2927.44	1317.32	0.43
FISH CREEK	MAINSTEM MID1	9945	Ultimate 100yr	P-500	30887.00	458.03	472.58	470.64	472.93	0.001251	6.08	6659.06	1532.49	0.33
FISH CREEK	MAINSTEM MID1	9945	10 yr	2-50	17032.00	458.03	470.57	469.77	470.95	0.002100	6.82	3710.08	1379.08	0.42
FISH CREEK	MAINSTEM MID1	9945	500yr	P-500	38091.00	458.03	474.20	470.99	474.48	0.000684	4.96	9173.77	1564.44	0.25
FISH CREEK	MAINSTEM MID1	9945	25 yr	2-50	22104.00	458.03	471.21	470.16	471.61	0.001866	6.75	4571.18	1432.81	0.40
FISH CREEK	MAINSTEM MID1	9945	50 yr	2-50	26471.00	458.03	471.80	470.40	472.20	0.001621	6.57	5383.16	1467.64	0.38
FISH CREEK	MAINSTEM MID1	9180	2 yr	2-50	7062.00	459.06	467.96	466.80	468.13	0.002180	3.07	2195.72	1154.63	0.35
FISH CREEK	MAINSTEM MID1	9180	100 yr	P-500	30207.00	459.06	471.93	468.89	472.19	0.000912	3.83	7363.63	1391.66	0.27
FISH CREEK	MAINSTEM MID1	9180	5 yr	2-50	12617.00	459.06	468.91	467.68	469.14	0.001900	3.59	3319.98	1239.69	0.35
FISH CREEK	MAINSTEM MID1	9180	Ultimate 100yr	P-500	30887.00	459.06	472.09	468.92	472.35	0.000864	3.79	7589.07	1385.43	0.26
FISH CREEK	MAINSTEM MID1	9180	10 yr	2-50	17032.00	459.06	469.63	468.00	469.90	0.001600	3.76	4211.32	1280.72	0.33
FISH CREEK	MAINSTEM MID1	9180	500yr	P-500	38091.00	459.06	473.93	469.34	474.15	0.000511	3.44	10214.41	1453.31	0.21
FISH CREEK	MAINSTEM MID1	9180	25 yr	2-50	22104.00	459.06	470.39	468.35	470.67	0.001462	4.03	5255.02	1353.79	0.32
FISH CREEK	MAINSTEM MID1	9180	50 yr	2-50	26471.00	459.06	471.14	468.65	471.41	0.001178	3.98	6273.27	1372.42	0.30
FISH CREEK	MAINSTEM MID1	8186	2 yr	2-50	7062.00	458.13	466.57	465.25	466.71	0.001315	4.16	2396.29	1219.20	0.31
FISH CREEK	MAINSTEM MID1	8186	100 yr	P-500	30207.00	458.13	471.51	467.43	471.67	0.000369	3.32	9321.55	1502.23	0.18
FISH CREEK	MAINSTEM MID1	8186	5 yr	2-50	12617.00	458.13	467.88	466.20	468.03	0.000875	3.86	4161.85	1389.81	0.26
FISH CREEK	MAINSTEM MID1	8186	Ultimate 100yr	P-500	30887.00	458.13	471.70	467.47	471.86	0.000352	3.28	9589.92	1506.76	0.18
FISH CREEK	MAINSTEM MID1	8186	10 yr	2-50	17032.00	458.13	468.84	466.56	468.99	0.000653	3.64	5508.11	1409.42	0.23
FISH CREEK	MAINSTEM MID1	8186	500yr	P-500	38091.00	458.13	473.71	467.83	473.85	0.000224	2.93	12539.25	1582.43	0.14
FISH CREEK	MAINSTEM MID1	8186	25 yr	2-50	22104.00	458.13	469.68	466.90	469.85	0.000582	3.67	6996.72	1423.13	0.22
FISH CREEK	MAINSTEM MID1	8186	50 yr	2-50	26471.00	458.13	470.59	467.24	470.76	0.000470	3.52	7986.88	1463.57	0.20
FISH CREEK	MAINSTEM MID1	7473	2 yr	2-50	7045.00	457.38	466.02		466.12	0.000806	3.36	3005.35	1530.49	0.25
FISH CREEK	MAINSTEM MID1	7473	100 yr	P-500	29903.00	457.38	471.42		471.51	0.000189	2.52	12616.33	1882.93	0.13
FISH CREEK	MAINSTEM MID1	7473	5 yr	2-50	12631.00	457.38	467.58		467.66	0.000452	2.95	5578.57	1755.65	0.19
FISH CREEK	MAINSTEM MID1	7473	Ultimate 100yr	P-500	30525.00	457.38	471.61		471.70	0.000180	2.49	12977.45	1887.37	0.13
FISH CREEK	MAINSTEM MID1	7473	10 yr	2-50	17027.00	457.38	468.63		468.72	0.000329	2.75	7465.17	1813.44	0.17
FISH CREEK	MAINSTEM MID1	7473	500yr	P-500	37882.00	457.38	473.67		473.74	0.000119	2.26	16908.07	1938.27	0.11
FISH CREEK	MAINSTEM MID1	7473	25 yr	2-50	21966.00	457.38	469.51		469.60	0.000295	2.78	9064.40	1836.17	0.16
FISH CREEK	MAINSTEM MID1	7473	50 yr	2-50	26191.00	457.38	470.46		470.55	0.000237	2.66	10816.73	1859.37	0.15
FISH CREEK	MAINSTEM DS	5968	2 yr	2-50	7541.00	456.00	465.31		465.39	0.000456	3.22	3404.82	1127.91	0.19
FISH CREEK	MAINSTEM DS	5968	100 yr	P-500	32145.00	456.00	471.13		471.26	0.000235	3.26	10934.48	1382.02	0.15
FISH CREEK	MAINSTEM DS	5968	5 yr	2-50	13593.00	456.00	467.10		467.19	0.000361	3.25	5517.17	1276.34	0.18
FISH CREEK	MAINSTEM DS	5968	Ultimate 100yr	P-500	32889.00	456.00	471.33		471.47	0.000227	3.24	11212.22	1384.28	0.15
FISH CREEK	MAINSTEM DS	5968	10 yr	2-50	18331.00	456.00	468.24		468.35	0.000319	3.28	6996.43	1333.70	0.17
FISH CREEK	MAINSTEM DS	5968	500yr	P-500	40853.00	456.00	473.45		473.58	0.000164	3.02	14175.98	1408.09	0.13
FISH CREEK	MAINSTEM DS	5968	25 yr	2-50	23576.00	456.00	469.12		469.25	0.000322	3.46	8179.53	1356.32	0.17
FISH CREEK	MAINSTEM DS	5968	50 yr	2-50	27896.00	456.00	470.12		470.26	0.000274	3.36	9549.69	1369.54	0.16
FISH CREEK	MAINSTEM DS	4725	2 yr	2-50	7541.00	455.00	464.78		464.80	0.000564	2.00	6821.01	1829.25	0.15
FISH CREEK	MAINSTEM DS	4725	100 yr	P-500	32145.00	455.00	470.85		470.90	0.000427	2.82	18355.23	1936.67	0.14
FISH CREEK	MAINSTEM DS	4725	5 yr	2-50	13593.00	455.00	466.68		466.71	0.000489	2.25	10369.41	1891.19	0.14
FISH CREEK	MAINSTEM DS	4725	Ultimate 100yr	P-500	32889.00	455.00	471.06		471.11	0.000416	2.82	18764.19	1939.13	0.14
FISH CREEK	MAINSTEM DS	4725	10 yr	2-50	18331.00	455.00	467.86		467.90	0.000470	2.43	12619.66	1903.97	0.14
FISH CREEK	MAINSTEM DS	4725	500yr	P-500	40853.00	455.00	473.26		473.31	0.000331	2.81	23072.93	1973.53	0.13
FISH CREEK	MAINSTEM DS	4725	25 yr	2-50	23576.00	455.00	468.73		468.78	0.000520	2.72	14277.50	1913.36	0.15
FISH CREEK	MAINSTEM DS	4725	50 yr	2-50	27896.00	455.00	469.79		469.84	0.000471	2.78	16318.52	1924.82	0.15
FISH CREEK	MAINSTEM DS	4059	2 yr	2-50	7402.00	459.00	464.54		464.55	0.000261	1.21	9509.71	2376.72	0.10
FISH CREEK	MAINSTEM DS	4059	100 yr	P-500	31698.00	459.00	470.67		470.70	0.000226	1.98	24610.31	2534.14	0.11
FISH CREEK	MAINSTEM DS	4059	5 yr	2-50	13553.00	459.00	466.47		466.48	0.000246	1.48	11452.31	2436.92	0.10
FISH CREEK	MAINSTEM DS	4059	Ultimate 100yr	P-500	32492.00	459.00	470.89		470.91	0.000221	1.98	25157.16	2538.48	0.11
FISH CREEK	MAINSTEM DS	4059	10 yr	2-50	18256.00	459.00	467.66		467.68	0.000243	1.65	17079.95	2469.41	0.10
FISH CREEK	MAINSTEM DS	4059	500yr	P-500	40572.00	459.00	473.13		473.15	0.000181	2.03	30918.80	2620.59	0.10
FISH CREEK	MAINSTEM DS	4059	25 yr	2-50	23350.00	459.00	468.51		468.53	0.000274	1.87	19180.63	2488.48	0.11
FISH CREEK	MAINSTEM DS	4059	50 yr	2-50	27578.00	459.00	469.59		469.62	0.000249	1.93	21896.60	2511.49	0.11
FISH CREEK	MAINSTEM DS	3758	2 yr	2-50	7402.00	455.00	464.48		464.49	0.000141	1.33	11303.21	2331.51	0.08
FISH CREEK	MAINSTEM DS	3758	100 yr	P-500	31698.00	455.00	470.60		470.62	0.000180	2.14	26008.68	2469.00	0.10
FISH CREEK	MAINSTEM DS	3758	5 yr	2-50	13553.00	455.00	466.40		466.41	0.000161	1.63	15825.01	2375.92	0.09
FISH CREEK	MAINSTEM DS	3758	Ultimate 100yr	P-500	32492.00	455.00	470.82		470.84	0.000177	2.14	26544.41	2471.17	0.10
FISH CREEK	MAINSTEM DS	3758	10 yr	2-50	18256.00	455.00	467.59		467.61	0.000172	1.80	18671.24	2402.87	0.09
FISH CREEK	MAINSTEM DS	3758	500yr	P-500	40572.00	455.00	473.07		473.09	0.000148	2.15	32125.53	2486.94	0.09
FISH CREEK	MAINSTEM DS	3758	25 yr	2-50	23350.00	455.00	468.43		468.45	0.000202	2.05	20688.98	2423.14	0.10
FISH CREEK	MAINSTEM DS	3758	50 yr	2-50	27578.00	455.00	469.52		469.54	0.000192	2.11	23348.77	2449.03	0.10
FISH CREEK	MAINSTEM DS	3288	2 yr	2-50	7300.00	454.70	464.32		464.38	0.000804	3.11	4166.10	2030.10	0.19
FISH CREEK	MAINSTEM DS	3288	100 yr	P-500	31475.00	454.70	470.24		470.47	0.001419	5.85	8533.60	2212.22	0.27
FISH CREEK	MAINSTEM DS	3288	5 yr	2-50	13519.00	454.70	466.18		466.28	0.001088	4.13	5536.18	2098.12	0.22
FISH CREEK	MAINSTEM DS	3288	Ultimate 100yr	P-500	32284.00	454.70	470.46		470.69	0.001404	5.88	8693.06	2216.21	0.27
FISH CREEK	MAINSTEM DS	3288	10 yr	2-50	18206.00	454.70	467.33		467.41	0.001237	4.71	6382.78	2158.13	0.24
FISH CREEK	MAINSTEM DS	3288	500yr	P-500	40383.00	454.70	472.71		472.96	0.001232	6.05	10353.83	2274.93	0.26
FISH CREEK	MAINSTEM DS	3288	25 yr	2-50	23208.00	454.70	468.09		468.25	0.001522	5.45	6945.78	2172.26	0.27
FISH CREEK	MAINSTEM DS	3288	50 yr	2-50	27394.00	454.70	469.17		469.28	0.001483	5.69	7741.32	2193.25	0.27
FISH CREEK	MAINSTEM DS	3202												

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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
FISH CREEK	MAINSTEM DS	3093	2 yr	2-50	7300.00	458.42	463.67	461.75	463.89	0.004897	5.28	2089.72	2174.70	0.43
FISH CREEK	MAINSTEM DS	3093	100 yr	P-500	31475.00	458.42	468.33	464.77	469.14	0.006928	9.94	4558.08	2536.55	0.57
FISH CREEK	MAINSTEM DS	3093	5 yr	2-50	13519.00	458.42	465.20	462.69	465.58	0.005718	6.88	2898.26	2286.00	0.49
FISH CREEK	MAINSTEM DS	3093	Ultimate 100yr	P-500	32284.00	458.42	468.45	464.85	469.28	0.006966	10.05	4620.89	2541.01	0.58
FISH CREEK	MAINSTEM DS	3093	10 yr	2-50	18206.00	458.42	466.13	463.29	466.63	0.006145	7.84	3395.54	2349.89	0.52
FISH CREEK	MAINSTEM DS	3093	500yr	P-500	40383.00	458.42	469.57	465.65	470.59	0.007285	11.08	5217.85	2630.96	0.60
FISH CREEK	MAINSTEM DS	3093	25 yr	2-50	23208.00	458.42	467.02	463.88	467.64	0.006497	8.71	3866.57	2441.29	0.54
FISH CREEK	MAINSTEM DS	3093	50 yr	2-50	27394.00	458.42	467.71	464.34	468.43	0.006729	9.36	4228.73	2469.00	0.56
FISH CREEK	MAINSTEM DS	2802	2 yr	2-50	7310.00	453.00	462.41	460.71	462.54	0.004597	4.44	2637.77	2458.15	0.32
FISH CREEK	MAINSTEM DS	2802	100 yr	P-500	31553.00	453.00	466.95	462.83	467.34	0.004654	6.53	6342.22	2580.81	0.36
FISH CREEK	MAINSTEM DS	2802	5 yr	2-50	13563.00	453.00	463.87	461.34	464.07	0.004624	5.16	3823.69	2506.50	0.33
FISH CREEK	MAINSTEM DS	2802	Ultimate 100yr	P-500	32359.00	453.00	467.07	462.90	467.47	0.004654	6.58	6439.16	2583.67	0.36
FISH CREEK	MAINSTEM DS	2802	10 yr	2-50	18253.00	453.00	464.78	461.76	465.03	0.004649	5.59	4564.99	2525.68	0.34
FISH CREEK	MAINSTEM DS	2802	500yr	P-500	40490.00	453.00	468.21	463.48	468.68	0.004658	7.05	7365.95	2611.08	0.36
FISH CREEK	MAINSTEM DS	2802	25 yr	2-50	23261.00	453.00	465.85	462.20	465.95	0.004662	5.98	5277.49	2549.29	0.35
FISH CREEK	MAINSTEM DS	2802	50 yr	2-50	27471.00	453.00	466.33	462.53	466.68	0.004655	6.27	5835.30	2565.83	0.35
FISH CREEK	MAINSTEM DS	1848	2 yr	2-50	7310.00	452.00	460.01	457.67	460.03	0.000400	1.68	8753.59	2710.01	0.12
FISH CREEK	MAINSTEM DS	1848	100 yr	P-500	31553.00	452.00	464.69	458.71	464.72	0.000400	2.51	21705.68	2867.45	0.14
FISH CREEK	MAINSTEM DS	1848	5 yr	2-50	13563.00	452.00	461.50	457.99	461.52	0.000400	1.96	12811.04	2745.90	0.13
FISH CREEK	MAINSTEM DS	1848	Ultimate 100yr	P-500	32359.00	452.00	464.81	458.72	464.85	0.000400	2.53	22061.14	2874.72	0.14
FISH CREEK	MAINSTEM DS	1848	10 yr	2-50	18253.00	452.00	462.43	458.24	462.45	0.000400	2.13	15365.30	2759.68	0.13
FISH CREEK	MAINSTEM DS	1848	500yr	P-500	40490.00	452.00	465.99	458.96	466.03	0.000400	2.72	25485.64	2944.40	0.14
FISH CREEK	MAINSTEM DS	1848	25 yr	2-50	23261.00	452.00	463.33	458.39	463.36	0.000400	2.29	17857.22	2787.49	0.13
FISH CREEK	MAINSTEM DS	1848	50 yr	2-50	27471.00	452.00	464.04	458.56	464.07	0.000400	2.41	19862.71	2829.47	0.14
PRAIRIE CREEK	MAINSTEM	26747	2 yr	2-50	2379.00	564.00	569.24	569.24	570.86	0.002308	10.21	233.11	73.28	1.01
PRAIRIE CREEK	MAINSTEM	26747	100 yr	P-500	7536.00	564.00	573.23	573.23	575.63	0.001552	12.51	674.39	245.25	0.91
PRAIRIE CREEK	MAINSTEM	26747	5 yr	2-50	3815.00	564.00	570.55	570.55	572.53	0.002121	11.30	337.67	85.38	1.00
PRAIRIE CREEK	MAINSTEM	26747	Ultimate 100yr	P-500	7724.00	564.00	573.36	573.36	575.75	0.001509	12.51	705.90	261.07	0.90
PRAIRIE CREEK	MAINSTEM	26747	10 yr	2-50	4802.00	564.00	571.26	571.26	573.49	0.002083	12.00	400.25	91.14	1.01
PRAIRIE CREEK	MAINSTEM	26747	500yr	P-500	9604.00	564.00	574.53	574.53	576.74	0.001150	12.32	1095.12	381.23	0.81
PRAIRIE CREEK	MAINSTEM	26747	25 yr	2-50	5862.00	564.00	572.01	572.01	574.41	0.001973	12.44	471.06	97.46	1.00
PRAIRIE CREEK	MAINSTEM	26747	50 yr	2-50	6683.00	564.00	572.73	572.60	575.05	0.001678	12.25	567.24	181.39	0.94
PRAIRIE CREEK	MAINSTEM	25796	2 yr	2-50	2379.00	559.00	564.57	563.30	565.47	0.000852	7.59	313.37	71.40	0.64
PRAIRIE CREEK	MAINSTEM	25796	100 yr	P-500	7536.00	559.00	573.64	567.36	574.22	0.000166	6.28	1536.00	277.94	0.33
PRAIRIE CREEK	MAINSTEM	25796	5 yr	2-50	3815.00	559.00	566.58	564.65	567.62	0.000694	8.19	465.66	80.62	0.60
PRAIRIE CREEK	MAINSTEM	25796	Ultimate 100yr	P-500	7724.00	559.00	573.72	567.47	574.31	0.000170	6.38	1556.47	280.57	0.33
PRAIRIE CREEK	MAINSTEM	25796	10 yr	2-50	4802.00	559.00	569.58	565.44	570.26	0.000308	6.59	728.40	94.31	0.42
PRAIRIE CREEK	MAINSTEM	25796	500yr	P-500	9604.00	559.00	574.45	568.58	575.22	0.000206	7.32	1771.17	301.15	0.37
PRAIRIE CREEK	MAINSTEM	25796	25 yr	2-50	5862.00	559.00	572.21	566.24	572.71	0.000167	5.76	1198.81	198.66	0.32
PRAIRIE CREEK	MAINSTEM	25796	50 yr	2-50	6683.00	559.00	573.12	566.81	573.64	0.000156	5.90	1396.60	259.27	0.32
PRAIRIE CREEK	MAINSTEM	25164	2 yr	2-50	2894.00	557.00	562.75	562.75	564.60	0.002198	10.90	265.46	72.50	1.00
PRAIRIE CREEK	MAINSTEM	25164	100 yr	P-500	8962.00	557.00	573.42	566.96	574.10	0.000185	6.71	1581.98	270.83	0.35
PRAIRIE CREEK	MAINSTEM	25164	5 yr	2-50	4706.00	557.00	565.75	564.26	567.10	0.000879	9.33	504.62	86.64	0.68
PRAIRIE CREEK	MAINSTEM	25164	Ultimate 100yr	P-500	9150.00	557.00	573.49	567.07	574.19	0.000188	6.80	1601.49	273.53	0.35
PRAIRIE CREEK	MAINSTEM	25164	10 yr	2-50	5828.00	557.00	569.31	565.05	570.05	0.000315	6.90	844.20	104.68	0.43
PRAIRIE CREEK	MAINSTEM	25164	500yr	P-500	11238.00	557.00	574.16	568.17	575.07	0.000229	7.79	1800.40	308.92	0.39
PRAIRIE CREEK	MAINSTEM	25164	25 yr	2-50	6988.00	557.00	572.02	565.80	572.59	0.000179	6.07	1240.27	221.58	0.39
PRAIRIE CREEK	MAINSTEM	25164	50 yr	2-50	8004.00	557.00	572.92	566.41	573.53	0.000173	6.31	1451.79	251.97	0.33
PRAIRIE CREEK	MAINSTEM	24976	2 yr	2-50	2894.00	553.90	562.91	557.17	563.06	0.000066	3.06	945.31	128.60	0.20
PRAIRIE CREEK	MAINSTEM	24976	100 yr	P-500	8962.00	553.90	573.78	560.59	573.91	0.000024	3.03	4632.27	702.85	0.18
PRAIRIE CREEK	MAINSTEM	24976	5 yr	2-50	4706.00	553.90	566.49	558.35	566.66	0.000049	3.36	1400.85	147.40	0.13
PRAIRIE CREEK	MAINSTEM	24976	Ultimate 100yr	P-500	9150.00	553.90	573.87	560.67	574.00	0.000025	3.07	4689.60	704.46	0.13
PRAIRIE CREEK	MAINSTEM	24976	10 yr	2-50	5828.00	553.90	569.69	559.01	569.85	0.000032	3.22	1810.68	343.86	0.19
PRAIRIE CREEK	MAINSTEM	24976	500yr	P-500	11238.00	553.90	574.65	561.58	574.82	0.000031	3.53	5275.52	807.57	0.15
PRAIRIE CREEK	MAINSTEM	24976	25 yr	2-50	6988.00	553.90	572.33	559.62	572.43	0.000022	2.74	3630.48	664.63	0.13
PRAIRIE CREEK	MAINSTEM	24976	50 yr	2-50	8004.00	553.90	573.24	560.13	573.36	0.000022	2.85	4255.72	692.37	0.13
PRAIRIE CREEK	MAINSTEM	24725			Culvert									
PRAIRIE CREEK	MAINSTEM	24306	2 yr	2-50	2894.00	548.64	559.64	554.54	559.93	0.001280	4.27	677.04	334.06	0.26
PRAIRIE CREEK	MAINSTEM	24306	100 yr	P-500	8962.00	548.64	562.67	558.50	563.14	0.002207	6.27	2137.56	387.92	0.35
PRAIRIE CREEK	MAINSTEM	24306	5 yr	2-50	4706.00	548.64	560.37	555.98	561.00	0.002567	6.40	735.68	350.54	0.37
PRAIRIE CREEK	MAINSTEM	24306	Ultimate 100yr	P-500	9150.00	548.64	562.76	558.63	563.24	0.002200	6.30	2175.14	388.94	0.35
PRAIRIE CREEK	MAINSTEM	24306	10 yr	2-50	5828.00	548.64	560.97	556.71	561.83	0.003177	7.43	784.57	362.72	0.42
PRAIRIE CREEK	MAINSTEM	24306	500yr	P-500	11238.00	548.64	563.66	559.71	564.19	0.002252	6.75	2533.23	410.23	0.36
PRAIRIE CREEK	MAINSTEM	24306	25 yr	2-50	6988.00	548.64	561.44	557.43	562.56	0.003910	8.50	822.03	371.64	0.47
PRAIRIE CREEK	MAINSTEM	24306	50 yr	2-50	8004.00	548.64	561.90	558.01	563.25	0.004422	9.31	859.42	379.39	0.50
PRAIRIE CREEK	MAINSTEM	24089	2 yr	2-50	3334.00	549.00	558.93	556.41	559.46	0.003736	6.38	769.09	501.91	0.43
PRAIRIE CREEK	MAINSTEM	24089	100 yr	P-500	10403.00	549.00	562.32	559.11	562.58	0.001885	5.91	3327.12	558.70	0.32
PRAIRIE CREEK	MAINSTEM	24089	5 yr	2-50	5436.00	549.00	560.08	558.65	560.28	0.001795	4.90	2123.64	518.13	0.30
PRAIRIE CREEK	MAINSTEM	24089	Ultimate 100yr	P-500	10662.00	549.00	562.42	559.15	562.68	0.001886	5.95	3361.60	559.08	0.32
PRAIRIE CREEK	MAINSTEM	24089	10 yr	2-50	6679.00	549.00	560.72	559.00	560.93	0.001802	5.16	2456.19	526.05	0.31
PRAIRIE CREEK	MAINSTEM	24089	500yr	P-500	13249.00	549.00	563.32	559.61	563.61	0.001910	6.33	3889.00	562.70	0.33
PRAIRIE CREEK	MAINSTEM	24089	25 yr	2-50	7760.00	549.00	561.22	559.01	561.44	0.001816	5.38	2722.88	534.09	0.31
PRAIRIE CREEK	MAINSTEM	24089	50 yr	2-50	8917.00	549.00	561.73	559.01	561.96	0.001841	5.61	2997.49	550.37	0.32
PRAIRIE CREEK	MAINSTEM	23706	2 yr	2-50	3334.00	549.00	557.61		558.01	0.003659	6.30	987.70	334.28	0.41
PRAIRIE CREEK	MAINSTEM	23706	100 yr	P-500	10403.00	549.00	560.96		561.56	0.004251	8.73	2178.28	397.42	0.47
PRAIRIE CREEK	MAINSTEM	23706	5 yr	2-50	5436.00	549.00	558.90		559.34	0.003739	7.09	1423.69	343.74	0.43
PRAIRIE CREEK	MAINSTEM	2												

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
PRAIRIE CREEK	MAINSTEM	23367	10 yr	2-50	6679.00	547.00	557.88		558.47	0.005328	8.11	1521.13	393.82	0.52
PRAIRIE CREEK	MAINSTEM	23367	500yr	P-500	13249.00	547.00	559.89		560.78	0.006607	10.56	2391.25	470.42	0.60
PRAIRIE CREEK	MAINSTEM	23367	25 yr	2-50	7760.00	547.00	558.26		558.90	0.005651	8.63	1671.75	407.00	0.54
PRAIRIE CREEK	MAINSTEM	23367	50 yr	2-50	8917.00	547.00	558.63		559.34	0.005956	9.13	1826.66	421.22	0.56
PRAIRIE CREEK	MAINSTEM	22696	2 yr	2-50	3334.00	546.00	552.90	552.65	553.41	0.009497	7.64	886.07	470.42	0.64
PRAIRIE CREEK	MAINSTEM	22696	100 yr	P-500	10403.00	546.00	555.82		556.31	0.005926	8.47	2298.74	500.63	0.55
PRAIRIE CREEK	MAINSTEM	22696	5 yr	2-50	5436.00	546.00	553.82		554.32	0.008294	8.10	1323.12	477.79	0.62
PRAIRIE CREEK	MAINSTEM	22696	Ultimate 100yr	P-500	10662.00	546.00	555.92		556.41	0.005825	8.47	2349.92	501.82	0.55
PRAIRIE CREEK	MAINSTEM	22696	10 yr	2-50	6679.00	546.00	554.33		554.83	0.007612	8.25	1569.62	483.06	0.60
PRAIRIE CREEK	MAINSTEM	22696	500yr	P-500	13249.00	546.00	556.95		557.44	0.004891	8.47	2876.00	515.54	0.51
PRAIRIE CREEK	MAINSTEM	22696	25 yr	2-50	7760.00	546.00	554.77		555.27	0.007071	8.35	1781.56	488.23	0.59
PRAIRIE CREEK	MAINSTEM	22696	50 yr	2-50	8917.00	546.00	555.23		555.73	0.006538	8.41	2007.74	493.69	0.57
PRAIRIE CREEK	MAINSTEM	22159	2 yr	2-50	3334.00	544.00	550.15		550.26	0.002887	4.34	1468.40	471.37	0.35
PRAIRIE CREEK	MAINSTEM	22159	100 yr	P-500	10403.00	544.00	554.17		554.33	0.001893	5.25	3417.64	498.43	0.31
PRAIRIE CREEK	MAINSTEM	22159	5 yr	2-50	5436.00	544.00	551.47		551.60	0.002465	4.70	2096.86	481.85	0.33
PRAIRIE CREEK	MAINSTEM	22159	Ultimate 100yr	P-500	10662.00	544.00	554.30		554.46	0.001873	5.27	3482.34	499.22	0.31
PRAIRIE CREEK	MAINSTEM	22159	10 yr	2-50	6679.00	544.00	552.19		552.33	0.002275	4.86	2445.41	486.30	0.33
PRAIRIE CREEK	MAINSTEM	22159	500yr	P-500	13249.00	544.00	555.58		555.76	0.001681	5.46	4130.29	507.40	0.30
PRAIRIE CREEK	MAINSTEM	22159	25 yr	2-50	7760.00	544.00	552.79		552.93	0.002141	4.99	2737.30	489.90	0.32
PRAIRIE CREEK	MAINSTEM	22159	50 yr	2-50	8917.00	544.00	553.41		553.56	0.002017	5.10	3042.02	493.71	0.32
PRAIRIE CREEK	MAINSTEM	21693	2 yr	2-50	3334.00	542.00	549.24		549.33	0.002171	4.02	1576.49	452.66	0.30
PRAIRIE CREEK	MAINSTEM	21693	100 yr	P-500	10403.00	542.00	553.56		553.71	0.001531	4.96	3605.83	485.55	0.28
PRAIRIE CREEK	MAINSTEM	21693	5 yr	2-50	5436.00	542.00	550.70		550.80	0.001890	4.38	2242.95	465.19	0.29
PRAIRIE CREEK	MAINSTEM	21693	Ultimate 100yr	P-500	10662.00	542.00	553.70		553.85	0.001518	4.98	3671.71	486.50	0.28
PRAIRIE CREEK	MAINSTEM	21693	10 yr	2-50	6679.00	542.00	551.47		551.59	0.001766	4.54	2607.37	470.69	0.29
PRAIRIE CREEK	MAINSTEM	21693	500yr	P-500	13249.00	542.00	555.04		555.21	0.001391	5.19	4333.93	498.74	0.27
PRAIRIE CREEK	MAINSTEM	21693	25 yr	2-50	7760.00	542.00	552.11		552.24	0.001682	4.68	2909.32	475.23	0.28
PRAIRIE CREEK	MAINSTEM	21693	50 yr	2-50	8917.00	542.00	552.77		552.91	0.001605	4.80	3222.84	479.90	0.28
PRAIRIE CREEK	MAINSTEM	21069	2 yr	2-50	3334.00	537.48	547.45		548.08	0.006320	8.82	730.72	188.88	0.54
PRAIRIE CREEK	MAINSTEM	21069	100 yr	P-500	10403.00	537.48	551.86		552.79	0.006395	11.78	1655.89	229.97	0.58
PRAIRIE CREEK	MAINSTEM	21069	5 yr	2-50	5436.00	537.48	548.92		549.69	0.006776	10.18	1019.85	203.26	0.57
PRAIRIE CREEK	MAINSTEM	21069	Ultimate 100yr	P-500	10662.00	537.48	551.99		552.94	0.006370	11.84	1687.48	231.18	0.58
PRAIRIE CREEK	MAINSTEM	21069	10 yr	2-50	6679.00	537.48	549.73		550.55	0.006697	10.67	1187.63	210.73	0.58
PRAIRIE CREEK	MAINSTEM	21069	500yr	P-500	13249.00	537.48	553.38		554.37	0.005987	12.29	2017.00	246.74	0.57
PRAIRIE CREEK	MAINSTEM	21069	25 yr	2-50	7760.00	537.48	550.39		551.24	0.006611	11.04	1328.29	216.80	0.58
PRAIRIE CREEK	MAINSTEM	21069	50 yr	2-50	8917.00	537.48	551.06		551.95	0.006501	11.38	1475.59	222.93	0.58
PRAIRIE CREEK	MAINSTEM	20194	2 yr	2-50	3334.00	539.00	546.07		546.12	0.001215	3.12	1937.71	478.94	0.23
PRAIRIE CREEK	MAINSTEM	20194	100 yr	P-500	10403.00	539.00	550.88		550.98	0.000904	4.08	4357.40	524.86	0.22
PRAIRIE CREEK	MAINSTEM	20194	5 yr	2-50	5436.00	539.00	547.63		547.70	0.001125	3.54	2696.96	495.55	0.23
PRAIRIE CREEK	MAINSTEM	20194	Ultimate 100yr	P-500	10662.00	539.00	551.03		551.13	0.000897	4.11	4436.57	526.26	0.22
PRAIRIE CREEK	MAINSTEM	20194	10 yr	2-50	6679.00	539.00	548.54		548.62	0.001035	3.68	3151.65	503.98	0.23
PRAIRIE CREEK	MAINSTEM	20194	500yr	P-500	13249.00	539.00	552.56		552.67	0.000819	4.30	5252.56	540.61	0.22
PRAIRIE CREEK	MAINSTEM	20194	25 yr	2-50	7760.00	539.00	549.27		549.36	0.000980	3.80	3524.75	510.25	0.23
PRAIRIE CREEK	MAINSTEM	20194	50 yr	2-50	8917.00	539.00	550.01		550.10	0.000937	3.92	3904.17	516.69	0.22
PRAIRIE CREEK	MAINSTEM	19301	2 yr	2-50	3334.00	533.00	544.13		544.80	0.003879	7.44	666.12	140.48	0.45
PRAIRIE CREEK	MAINSTEM	19301	100 yr	P-500	10403.00	533.00	547.87		549.75	0.007769	13.43	1310.04	207.81	0.68
PRAIRIE CREEK	MAINSTEM	19301	5 yr	2-50	5436.00	533.00	544.98		546.27	0.006837	10.53	790.63	152.41	0.61
PRAIRIE CREEK	MAINSTEM	19301	Ultimate 100yr	P-500	10662.00	533.00	548.02		549.91	0.007736	13.51	1340.95	211.00	0.68
PRAIRIE CREEK	MAINSTEM	19301	10 yr	2-50	6679.00	533.00	545.77		547.26	0.007346	11.52	916.75	168.30	0.64
PRAIRIE CREEK	MAINSTEM	19301	500yr	P-500	13249.00	533.00	549.27		551.50	0.008252	14.88	1631.93	280.30	0.71
PRAIRIE CREEK	MAINSTEM	19301	25 yr	2-50	7760.00	533.00	546.47		548.06	0.007359	12.05	1038.59	178.45	0.65
PRAIRIE CREEK	MAINSTEM	19301	50 yr	2-50	8917.00	533.00	547.11		548.84	0.007575	12.71	1158.56	192.38	0.66
PRAIRIE CREEK	MAINSTEM	18958	2 yr	2-50	3334.00	532.00	541.79	540.16	543.06	0.007439	9.29	434.53	319.74	0.61
PRAIRIE CREEK	MAINSTEM	18958	100 yr	P-500	10403.00	532.00	547.31	544.22	547.78	0.002384	7.65	2626.03	404.78	0.38
PRAIRIE CREEK	MAINSTEM	18958	5 yr	2-50	5436.00	532.00	543.66	542.61	544.34	0.004204	8.13	1259.67	348.86	0.47
PRAIRIE CREEK	MAINSTEM	18958	Ultimate 100yr	P-500	10662.00	532.00	547.48	544.28	547.95	0.002351	7.66	2694.89	410.26	0.37
PRAIRIE CREEK	MAINSTEM	18958	10 yr	2-50	6679.00	532.00	544.77	543.09	545.32	0.003268	7.73	1654.08	363.91	0.42
PRAIRIE CREEK	MAINSTEM	18958	500yr	P-500	13249.00	532.00	548.95	544.91	549.40	0.002075	7.73	3320.13	437.58	0.36
PRAIRIE CREEK	MAINSTEM	18958	25 yr	2-50	7760.00	532.00	545.68	543.47	546.17	0.002732	7.48	1993.30	376.70	0.39
PRAIRIE CREEK	MAINSTEM	18958	50 yr	2-50	8917.00	532.00	546.45	543.83	546.92	0.002516	7.50	2284.45	387.24	0.38
PRAIRIE CREEK	MAINSTEM	18557	2 yr	2-50	3334.00	530.59	540.93	537.07	541.09	0.001638	4.55	1332.57	281.42	0.28
PRAIRIE CREEK	MAINSTEM	18557	100 yr	P-500	10403.00	530.59	546.79	540.55	547.05	0.001472	6.19	3174.00	386.24	0.29
PRAIRIE CREEK	MAINSTEM	18557	5 yr	2-50	5436.00	530.59	543.02	539.12	543.20	0.001445	4.98	1934.86	294.12	0.27
PRAIRIE CREEK	MAINSTEM	18557	Ultimate 100yr	P-500	10662.00	530.59	546.96	540.63	547.22	0.001479	6.25	3240.18	394.77	0.29
PRAIRIE CREEK	MAINSTEM	18557	10 yr	2-50	6679.00	530.59	544.23	539.52	544.42	0.001309	5.10	2294.29	309.88	0.27
PRAIRIE CREEK	MAINSTEM	18557	500yr	P-500	13249.00	530.59	548.45	541.21	548.74	0.001497	6.72	3897.09	464.37	0.30
PRAIRIE CREEK	MAINSTEM	18557	25 yr	2-50	7760.00	530.59	545.18	539.84	545.38	0.001331	5.42	2603.00	335.03	0.27
PRAIRIE CREEK	MAINSTEM	18557	50 yr	2-50	8917.00	530.59	545.96	540.17	546.18	0.001341	5.67	2867.89	346.39	0.27
PRAIRIE CREEK	MAINSTEM	18097	2 yr	2-50	3334.00	530.00	539.79		540.20	0.003190	6.05	847.82	204.86	0.40
PRAIRIE CREEK	MAINSTEM	18097	100 yr	P-500	10403.00	530.00	545.89		546.37	0.002030	7.32	2434.44	302.39	0.36
PRAIRIE CREEK	MAINSTEM	18097	5 yr	2-50	5436.00	530.00	542.01		542.45	0.002583	6.54	1338.95	237.31	0.38
PRAIRIE CREEK	MAINSTEM	18097	Ultimate 100yr	P-500	10662.00	530.00	546.06		546.55	0.002008	7.35	2487.45	303.87	0.36
PRAIRIE CREEK	MAINSTEM	18097	10 yr	2-50	6679.00	530.00	543.30		543.75	0.002287	6.72	1882.87	277.40	0.36
PRAIRIE CREEK	MAINSTEM	18097	500yr	P-500	13249.00	530.00	547.56		548.08	0.001927	7.73	2951.05	318.05	0.35
PRAIRIE CREEK	MAINSTEM	18097	25 yr	2-50	7760.00	530.00	544.31		544.74	0.002042	6.74	1966.49	289.97	0.35
PRAIRIE CREEK	MAINSTEM	18097	50 yr	2-50	8917.00	530.00	545.09		545.54	0.001985	6.95	2196.88	295.82	0.35
PRAIRIE CREEK	MAINSTEM	17616	2 yr	2-50	2895.00	528.52	538.48	534.86	538.88	0.002705	6.38	809.07	184.48	0.37
PRAIRIE CREEK	MAINSTEM	17616	100 yr	P-500	10396.00	528.52	544.75	540.08	545.37	0.002732	9.09	2235.1		

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
PRAIRIE CREEK	MAINSTEM	17216	5 yr	2-50	5142.00	525.61	538.78		539.91	0.005662	9.94	811.19	158.07	0.54
PRAIRIE CREEK	MAINSTEM	17216	Ultimate 100yr	P-500	10708.00	525.61	542.70		544.11	0.005556	12.16	1676.74	276.86	0.56
PRAIRIE CREEK	MAINSTEM	17216	10 yr	2-50	6588.00	525.61	539.87		541.22	0.006185	11.09	1001.69	193.88	0.57
PRAIRIE CREEK	MAINSTEM	17216	500yr	P-500	13512.00	525.61	544.44		545.83	0.005104	12.58	2238.75	369.71	0.55
PRAIRIE CREEK	MAINSTEM	17216	25 yr	2-50	7853.00	525.61	540.81		542.24	0.006158	11.66	1201.07	227.25	0.58
PRAIRIE CREEK	MAINSTEM	17216	50 yr	2-50	9044.00	525.61	541.63		543.05	0.005914	11.92	1395.05	247.83	0.57
PRAIRIE CREEK	MAINSTEM	16737	2 yr	2-50	2895.00	525.00	535.05		535.61	0.003557	7.02	630.50	147.81	0.43
PRAIRIE CREEK	MAINSTEM	16737	100 yr	P-500	10396.00	525.00	540.72		541.84	0.004361	11.01	1609.11	199.20	0.52
PRAIRIE CREEK	MAINSTEM	16737	5 yr	2-50	5142.00	525.00	536.78		537.66	0.004692	9.16	906.41	166.42	0.51
PRAIRIE CREEK	MAINSTEM	16737	Ultimate 100yr	P-500	10708.00	525.00	540.91		542.06	0.004392	11.15	1647.53	204.70	0.52
PRAIRIE CREEK	MAINSTEM	16737	10 yr	2-50	6588.00	525.00	537.84		538.84	0.004845	9.95	1086.29	172.55	0.53
PRAIRIE CREEK	MAINSTEM	16737	500yr	P-500	13512.00	525.00	542.42		543.86	0.004903	12.60	2032.23	306.88	0.56
PRAIRIE CREEK	MAINSTEM	16737	25 yr	2-50	7853.00	525.00	538.95		539.95	0.004455	10.16	1280.89	178.51	0.51
PRAIRIE CREEK	MAINSTEM	16737	50 yr	2-50	9044.00	525.00	539.85		540.89	0.004299	10.47	1444.14	184.32	0.51
PRAIRIE CREEK	MAINSTEM	16385	2 yr	2-50	2895.00	523.00	533.22		534.07	0.006909	8.88	609.44	220.02	0.54
PRAIRIE CREEK	MAINSTEM	16385	100 yr	P-500	10396.00	523.00	540.17		540.61	0.002412	7.88	2379.43	280.03	0.36
PRAIRIE CREEK	MAINSTEM	16385	5 yr	2-50	5142.00	523.00	535.50		536.12	0.004682	8.60	1146.50	247.41	0.47
PRAIRIE CREEK	MAINSTEM	16385	Ultimate 100yr	P-500	10708.00	523.00	540.37		540.82	0.002385	7.91	2437.37	281.38	0.35
PRAIRIE CREEK	MAINSTEM	16385	10 yr	2-50	6588.00	523.00	536.82		537.37	0.003808	8.39	1480.63	256.99	0.43
PRAIRIE CREEK	MAINSTEM	16385	500yr	P-500	13512.00	523.00	542.00		542.48	0.002305	8.31	2905.45	295.66	0.35
PRAIRIE CREEK	MAINSTEM	16385	25 yr	2-50	7853.00	523.00	538.21		538.66	0.002890	7.87	1843.37	266.93	0.38
PRAIRIE CREEK	MAINSTEM	16385	50 yr	2-50	9044.00	523.00	539.22		539.66	0.002562	7.78	2118.12	273.66	0.36
PRAIRIE CREEK	MAINSTEM	15832	2 yr	2-50	2895.00	521.00	531.21		531.61	0.001957	5.42	745.17	175.59	0.32
PRAIRIE CREEK	MAINSTEM	15832	100 yr	P-500	10396.00	521.00	539.28		539.72	0.001285	6.70	2730.36	343.93	0.28
PRAIRIE CREEK	MAINSTEM	15832	5 yr	2-50	5142.00	521.00	533.99		534.44	0.001807	6.22	1312.38	228.22	0.32
PRAIRIE CREEK	MAINSTEM	15832	Ultimate 100yr	P-500	10708.00	521.00	539.50		539.93	0.001266	6.76	2803.32	350.91	0.29
PRAIRIE CREEK	MAINSTEM	15832	10 yr	2-50	6588.00	521.00	535.55		535.99	0.001625	6.40	1681.98	245.84	0.31
PRAIRIE CREEK	MAINSTEM	15832	500yr	P-500	13512.00	521.00	541.09		541.60	0.001393	7.46	3421.07	427.45	0.30
PRAIRIE CREEK	MAINSTEM	15832	25 yr	2-50	7853.00	521.00	537.23		537.62	0.001304	6.20	2112.89	266.29	0.28
PRAIRIE CREEK	MAINSTEM	15832	50 yr	2-50	9044.00	521.00	538.32		538.73	0.001270	6.41	2417.32	300.75	0.28
PRAIRIE CREEK	MAINSTEM	15272	2 yr	2-50	2895.00	519.00	528.63		529.83	0.007188	8.84	339.20	66.10	0.58
PRAIRIE CREEK	MAINSTEM	15272	100 yr	P-500	10396.00	519.00	538.26		538.92	0.001898	7.96	2015.28	252.72	0.34
PRAIRIE CREEK	MAINSTEM	15272	5 yr	2-50	5142.00	519.00	531.33		532.82	0.006419	10.30	626.68	143.19	0.57
PRAIRIE CREEK	MAINSTEM	15272	Ultimate 100yr	P-500	10708.00	519.00	538.48		539.14	0.001886	8.00	2070.39	255.84	0.34
PRAIRIE CREEK	MAINSTEM	15272	10 yr	2-50	6588.00	519.00	533.75		534.76	0.003699	9.03	1026.12	184.73	0.45
PRAIRIE CREEK	MAINSTEM	15272	500yr	P-500	13512.00	519.00	540.04		540.77	0.001927	8.57	2488.34	280.55	0.35
PRAIRIE CREEK	MAINSTEM	15272	25 yr	2-50	7853.00	519.00	536.07		536.76	0.002206	7.82	1496.10	220.05	0.36
PRAIRIE CREEK	MAINSTEM	15272	50 yr	2-50	9044.00	519.00	537.27		537.92	0.001961	7.77	1771.54	238.37	0.34
PRAIRIE CREEK	MAINSTEM	14909	2 yr	2-50	2895.00	517.00	526.34		527.36	0.006132	8.15	367.57	73.75	0.53
PRAIRIE CREEK	MAINSTEM	14909	100 yr	P-500	10396.00	517.00	537.91		538.35	0.001190	6.70	2771.47	317.71	0.27
PRAIRIE CREEK	MAINSTEM	14909	5 yr	2-50	5142.00	517.00	529.83		530.83	0.004061	8.56	829.35	165.13	0.46
PRAIRIE CREEK	MAINSTEM	14909	Ultimate 100yr	P-500	10708.00	517.00	538.13		538.58	0.001193	6.76	2841.11	322.21	0.27
PRAIRIE CREEK	MAINSTEM	14909	10 yr	2-50	6588.00	517.00	533.05		533.66	0.002035	7.20	1445.10	220.89	0.34
PRAIRIE CREEK	MAINSTEM	14909	500yr	P-500	13512.00	517.00	539.68		540.18	0.001279	7.37	3362.16	349.06	0.28
PRAIRIE CREEK	MAINSTEM	14909	25 yr	2-50	7853.00	517.00	535.67		536.10	0.001271	6.37	2109.45	277.41	0.27
PRAIRIE CREEK	MAINSTEM	14909	50 yr	2-50	9044.00	517.00	536.92		537.33	0.001175	6.42	2465.24	297.08	0.27
PRAIRIE CREEK	MAINSTEM	14375	2 yr	2-50	2895.00	515.28	524.57		525.10	0.001831	5.84	496.46	68.27	0.36
PRAIRIE CREEK	MAINSTEM	14375	100 yr	P-500	10396.00	515.28	537.72		537.94	0.000346	4.78	4183.48	388.76	0.18
PRAIRIE CREEK	MAINSTEM	14375	5 yr	2-50	5142.00	515.28	528.86		529.36	0.001121	6.03	1251.33	244.04	0.30
PRAIRIE CREEK	MAINSTEM	14375	Ultimate 100yr	P-500	10708.00	515.28	537.93		538.16	0.000350	4.84	4268.29	392.06	0.18
PRAIRIE CREEK	MAINSTEM	14375	10 yr	2-50	6588.00	515.28	532.67		532.95	0.000513	4.87	2390.33	322.34	0.21
PRAIRIE CREEK	MAINSTEM	14375	500yr	P-500	13512.00	515.28	539.47		539.74	0.000403	5.44	4888.45	421.00	0.20
PRAIRIE CREEK	MAINSTEM	14375	25 yr	2-50	7853.00	515.28	535.46		535.66	0.000338	4.39	3339.63	359.01	0.18
PRAIRIE CREEK	MAINSTEM	14375	50 yr	2-50	9044.00	515.28	536.72		536.93	0.000329	4.52	3803.43	375.25	0.18
PRAIRIE CREEK	MAINSTEM	14089	2 yr	2-50	2895.00	515.00	522.89		524.21	0.006345	9.47	354.69	78.30	0.66
PRAIRIE CREEK	MAINSTEM	14089	100 yr	P-500	10396.00	515.00	537.67		537.84	0.000318	4.68	4115.96	376.30	0.18
PRAIRIE CREEK	MAINSTEM	14089	5 yr	2-50	5142.00	515.00	528.54		529.02	0.001324	6.58	1370.53	222.54	0.33
PRAIRIE CREEK	MAINSTEM	14089	Ultimate 100yr	P-500	10708.00	515.00	537.88		538.06	0.000320	4.73	4198.34	382.33	0.18
PRAIRIE CREEK	MAINSTEM	14089	10 yr	2-50	6588.00	515.00	532.57		532.80	0.000518	4.98	2432.45	295.80	0.22
PRAIRIE CREEK	MAINSTEM	14089	500yr	P-500	13512.00	515.00	539.41		539.63	0.000358	5.24	4815.11	422.11	0.19
PRAIRIE CREEK	MAINSTEM	14089	25 yr	2-50	7853.00	515.00	535.40		535.56	0.000319	4.35	3321.16	317.97	0.18
PRAIRIE CREEK	MAINSTEM	14089	50 yr	2-50	9044.00	515.00	536.67		536.83	0.000304	4.44	3754.87	352.14	0.17
PRAIRIE CREEK	MAINSTEM	13910	2 yr	2-50	2895.00	514.00	522.68		523.17	0.002432	5.57	519.74	97.51	0.42
PRAIRIE CREEK	MAINSTEM	13910	100 yr	P-500	10396.00	514.00	537.64		537.79	0.000159	3.43	3677.67	310.70	0.13
PRAIRIE CREEK	MAINSTEM	13910	5 yr	2-50	5142.00	514.00	528.52		528.78	0.000549	4.30	1380.02	220.21	0.23
PRAIRIE CREEK	MAINSTEM	13910	Ultimate 100yr	P-500	10708.00	514.00	537.86		538.01	0.000161	3.48	3745.37	317.42	0.14
PRAIRIE CREEK	MAINSTEM	13910	10 yr	2-50	6588.00	514.00	532.55		532.70	0.000225	3.88	2317.48	243.95	0.15
PRAIRIE CREEK	MAINSTEM	13910	500yr	P-500	13512.00	514.00	539.38		539.57	0.000186	3.93	4268.08	362.73	0.15
PRAIRIE CREEK	MAINSTEM	13910	25 yr	2-50	7853.00	514.00	535.39		535.51	0.000150	3.09	3033.10	265.67	0.13
PRAIRIE CREEK	MAINSTEM	13910	50 yr	2-50	9044.00	514.00	536.65		536.78	0.000149	3.22	3381.06	285.66	0.13
PRAIRIE CREEK	MAINSTEM	13805	2 yr	2-50	2890.00	513.00	522.23		522.88	0.002742	6.48	446.20	66.93	0.44
PRAIRIE CREEK	MAINSTEM	13805	100 yr	P-500	10210.00	513.00	537.60		537.77	0.000201	3.76	3281.90	294.19	0.14
PRAIRIE CREEK	MAINSTEM	13805	5 yr	2-50	5012.00	513.00	528.31		528.70	0.000828	5.20	1103.65	196.74	0.27
PRAIRIE CREEK	MAINSTEM	13805	Ultimate 100yr	P-500	10589.00	513.00	537.81		537.99	0.000206	3.83	3345.06	298.87	0.15
PRAIRIE CREEK	MAINSTEM	13805	10 yr	2-50	6238.00	513.00	532.50		532.68	0.000289	3.76	1995.14	228.84	0.17
PRAIRIE CREEK	MAINSTEM	13805	500yr	P-500	13768.00	513.00	539.31		539.55	0.000250	4.42	3813.92	326.15	0.16
PRAIRIE CREEK	MAINSTEM	13805	25 yr	2-50	7468.00	513.00	535.35		535.49	0.000185	3.35	2676.77	249.86	0.14
PRAIRIE CREEK	MAINSTEM	13805	50 yr	2-50	8751.00	513.00	536.61		536.77	0.000186	3.50	3003.61	271.59	0.14
PRAIRIE CREEK	MAINSTEM	13687	2 yr	2-50	2890.00	510.97	522.24	516.06	522.58	0.000747	4			

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
PRAIRIE CREEK	MAINSTEM	10784	500yr	P-500	13768.00	502.00	523.78		524.07	0.001440	6.28	4190.20	526.89	0.25
PRAIRIE CREEK	MAINSTEM	10784	25 yr	2-50	7468.00	502.00	520.50		520.73	0.001252	5.18	2668.76	420.05	0.23
PRAIRIE CREEK	MAINSTEM	10784	50 yr	2-50	8751.00	502.00	521.30		521.54	0.001268	5.38	3006.82	433.77	0.23
PRAIRIE CREEK	MAINSTEM	10515	2 yr	2-50	2890.00	501.00	514.45		515.02	0.003213	6.33	555.43	93.61	0.33
PRAIRIE CREEK	MAINSTEM	10515	100 yr	P-500	10210.00	501.00	520.31		521.73	0.005779	11.24	1564.71	293.55	0.48
PRAIRIE CREEK	MAINSTEM	10515	5 yr	2-50	5012.00	501.00	517.06		517.92	0.004001	8.12	855.88	144.85	0.39
PRAIRIE CREEK	MAINSTEM	10515	Ultimate 100yr	P-500	10589.00	501.00	520.47		521.92	0.005901	11.43	1611.28	302.13	0.49
PRAIRIE CREEK	MAINSTEM	10515	10 yr	2-50	6238.00	501.00	518.17		519.17	0.004389	8.96	1043.88	191.06	0.41
PRAIRIE CREEK	MAINSTEM	10515	500yr	P-500	13768.00	501.00	521.77		523.36	0.006382	12.48	2047.26	366.80	0.51
PRAIRIE CREEK	MAINSTEM	10515	25 yr	2-50	7468.00	501.00	518.98		520.14	0.004861	9.77	1216.35	233.09	0.43
PRAIRIE CREEK	MAINSTEM	10515	50 yr	2-50	8751.00	501.00	519.62		520.92	0.005381	10.55	1372.59	261.16	0.46
PRAIRIE CREEK	MAINSTEM	10240	2 yr	2-50	2824.00	501.00	513.71	509.15	514.15	0.002875	5.76	654.72	134.71	0.32
PRAIRIE CREEK	MAINSTEM	10240	100 yr	P-500	10308.00	501.00	519.60	515.49	520.26	0.003359	8.51	2352.52	447.78	0.38
PRAIRIE CREEK	MAINSTEM	10240	5 yr	2-50	4935.00	501.00	516.31	512.02	516.87	0.002998	6.88	1054.18	249.58	0.38
PRAIRIE CREEK	MAINSTEM	10240	Ultimate 100yr	P-500	10685.00	501.00	519.76	515.73	520.43	0.003354	8.56	2426.87	451.20	0.34
PRAIRIE CREEK	MAINSTEM	10240	10 yr	2-50	6199.00	501.00	517.34	512.99	518.02	0.003388	7.71	1249.37	322.69	0.37
PRAIRIE CREEK	MAINSTEM	10240	500yr	P-500	14065.00	501.00	521.09	516.54	521.77	0.003365	9.05	3050.38	485.88	0.38
PRAIRIE CREEK	MAINSTEM	10240	25 yr	2-50	7521.00	501.00	518.16	514.16	518.86	0.003511	8.16	1733.41	414.53	0.38
PRAIRIE CREEK	MAINSTEM	10240	50 yr	2-50	8802.00	501.00	518.84	514.82	519.53	0.003467	8.37	2021.29	431.77	0.38
PRAIRIE CREEK	MAINSTEM	9960	2 yr	2-50	2824.00	502.35	512.43		513.09	0.005355	6.94	513.46	118.96	0.43
PRAIRIE CREEK	MAINSTEM	9960	100 yr	P-500	10308.00	502.35	518.30		519.18	0.004782	9.47	1878.15	321.84	0.45
PRAIRIE CREEK	MAINSTEM	9960	5 yr	2-50	4935.00	502.35	514.97		515.81	0.005159	8.20	921.73	230.42	0.44
PRAIRIE CREEK	MAINSTEM	9960	Ultimate 100yr	P-500	10685.00	502.35	518.45		519.34	0.004816	9.58	1926.82	323.74	0.45
PRAIRIE CREEK	MAINSTEM	9960	10 yr	2-50	6199.00	502.35	516.14		516.93	0.004680	8.37	1224.35	281.75	0.43
PRAIRIE CREEK	MAINSTEM	9960	500yr	P-500	14065.00	502.35	519.63		520.64	0.005209	10.51	2320.87	348.19	0.48
PRAIRIE CREEK	MAINSTEM	9960	25 yr	2-50	7521.00	502.35	516.98		517.78	0.004570	8.66	1467.23	296.33	0.43
PRAIRIE CREEK	MAINSTEM	9960	50 yr	2-50	8802.00	502.35	517.56		518.42	0.004828	9.18	1643.85	310.41	0.45
PRAIRIE CREEK	MAINSTEM	9439	2 yr	2-50	2824.00	498.26	510.82		511.15	0.002144	4.79	644.06	114.17	0.27
PRAIRIE CREEK	MAINSTEM	9439	100 yr	P-500	10308.00	498.26	517.18		517.61	0.001970	6.42	2205.39	466.16	0.28
PRAIRIE CREEK	MAINSTEM	9439	5 yr	2-50	4935.00	498.26	513.52		513.96	0.002212	5.73	990.95	167.01	0.29
PRAIRIE CREEK	MAINSTEM	9439	Ultimate 100yr	P-500	10685.00	498.26	517.36		517.78	0.001919	6.39	2288.32	470.17	0.28
PRAIRIE CREEK	MAINSTEM	9439	10 yr	2-50	6199.00	498.26	514.75		515.23	0.002302	6.22	1261.56	279.94	0.30
PRAIRIE CREEK	MAINSTEM	9439	500yr	P-500	14065.00	498.26	518.64		519.06	0.001742	6.40	2913.48	507.00	0.27
PRAIRIE CREEK	MAINSTEM	9439	25 yr	2-50	7521.00	498.26	515.64		516.13	0.002350	6.56	1567.70	391.70	0.30
PRAIRIE CREEK	MAINSTEM	9439	50 yr	2-50	8802.00	498.26	516.32		516.78	0.002156	6.48	1843.14	407.94	0.29
PRAIRIE CREEK	MAINSTEM	9231	2 yr	2-50	2824.00	499.00	510.11		510.62	0.003735	6.00	509.64	94.45	0.36
PRAIRIE CREEK	MAINSTEM	9231	100 yr	P-500	10308.00	499.00	516.66		517.25	0.002842	7.57	1912.08	416.23	0.34
PRAIRIE CREEK	MAINSTEM	9231	5 yr	2-50	4935.00	499.00	512.92		513.49	0.003184	6.66	861.67	158.22	0.34
PRAIRIE CREEK	MAINSTEM	9231	Ultimate 100yr	P-500	10685.00	499.00	516.86		517.43	0.002774	7.54	1993.42	429.15	0.34
PRAIRIE CREEK	MAINSTEM	9231	10 yr	2-50	6199.00	499.00	514.12		514.75	0.003360	7.30	1094.62	245.79	0.36
PRAIRIE CREEK	MAINSTEM	9231	500yr	P-500	14065.00	499.00	518.24		518.77	0.002357	7.36	2625.29	479.91	0.31
PRAIRIE CREEK	MAINSTEM	9231	25 yr	2-50	7521.00	499.00	515.08		515.68	0.003095	7.35	1372.36	308.22	0.35
PRAIRIE CREEK	MAINSTEM	9231	50 yr	2-50	8802.00	499.00	515.82		516.39	0.002803	7.24	1603.71	320.29	0.33
PRAIRIE CREEK	MAINSTEM	8815	2 yr	2-50	2824.00	495.79	508.68		509.20	0.003155	5.82	527.01	94.58	0.33
PRAIRIE CREEK	MAINSTEM	8815	100 yr	P-500	10308.00	495.79	514.76		515.83	0.004510	9.62	1800.48	353.22	0.43
PRAIRIE CREEK	MAINSTEM	8815	5 yr	2-50	4935.00	495.79	511.34		512.10	0.003628	7.34	879.05	179.94	0.37
PRAIRIE CREEK	MAINSTEM	8815	Ultimate 100yr	P-500	10685.00	495.79	514.95		516.03	0.004538	9.73	1868.21	365.48	0.43
PRAIRIE CREEK	MAINSTEM	8815	10 yr	2-50	6199.00	495.79	512.41		513.27	0.003899	8.04	1105.06	247.01	0.39
PRAIRIE CREEK	MAINSTEM	8815	500yr	P-500	14065.00	495.79	516.35		517.49	0.004714	10.49	2416.88	426.28	0.44
PRAIRIE CREEK	MAINSTEM	8815	25 yr	2-50	7521.00	495.79	513.29		514.23	0.004133	8.63	1337.71	287.41	0.40
PRAIRIE CREEK	MAINSTEM	8815	50 yr	2-50	8802.00	495.79	514.02		515.01	0.004259	9.06	1555.91	310.00	0.41
PRAIRIE CREEK	MAINSTEM	8600	2 yr	2-50	2824.00	495.00	508.03		508.53	0.003039	5.76	567.86	126.97	0.32
PRAIRIE CREEK	MAINSTEM	8600	100 yr	P-500	10308.00	495.00	514.33		514.91	0.002840	7.72	2459.69	478.67	0.34
PRAIRIE CREEK	MAINSTEM	8600	5 yr	2-50	4935.00	495.00	510.75		511.34	0.003019	6.75	1096.37	271.05	0.33
PRAIRIE CREEK	MAINSTEM	8600	Ultimate 100yr	P-500	10685.00	495.00	514.54		515.11	0.002783	7.71	2559.93	484.89	0.33
PRAIRIE CREEK	MAINSTEM	8600	10 yr	2-50	6199.00	495.00	511.87		512.46	0.002953	7.06	1445.56	346.33	0.33
PRAIRIE CREEK	MAINSTEM	8600	500yr	P-500	14065.00	495.00	515.99		516.55	0.002682	8.01	3322.72	553.23	0.33
PRAIRIE CREEK	MAINSTEM	8600	25 yr	2-50	7521.00	495.00	512.80		513.38	0.002899	7.30	1789.51	396.93	0.34
PRAIRIE CREEK	MAINSTEM	8600	50 yr	2-50	8802.00	495.00	513.56		514.14	0.002857	7.50	2106.05	435.25	0.34
PRAIRIE CREEK	MAINSTEM	8218	2 yr	2-50	2824.00	494.00	507.13		507.51	0.002176	5.07	656.42	121.19	0.28
PRAIRIE CREEK	MAINSTEM	8218	100 yr	P-500	10308.00	494.00	513.27		513.92	0.002804	7.88	2365.68	441.32	0.34
PRAIRIE CREEK	MAINSTEM	8218	5 yr	2-50	4935.00	494.00	509.68		510.27	0.002738	6.60	1063.73	261.05	0.33
PRAIRIE CREEK	MAINSTEM	8218	Ultimate 100yr	P-500	10685.00	494.00	513.50		514.13	0.002748	7.87	2468.57	448.17	0.34
PRAIRIE CREEK	MAINSTEM	8218	10 yr	2-50	6199.00	494.00	510.79		511.41	0.002793	7.04	1385.81	329.01	0.33
PRAIRIE CREEK	MAINSTEM	8218	500yr	P-500	14065.00	494.00	514.91		515.58	0.002874	8.50	3156.92	525.07	0.35
PRAIRIE CREEK	MAINSTEM	8218	25 yr	2-50	7521.00	494.00	511.70		512.35	0.002837	7.41	1716.13	383.87	0.34
PRAIRIE CREEK	MAINSTEM	8218	50 yr	2-50	8802.00	494.00	512.49		513.13	0.002796	7.61	2032.31	413.46	0.34
PRAIRIE CREEK	MAINSTEM	8043	2 yr	2-50	2824.00	494.00	505.99		506.89	0.006272	7.80	424.47	92.90	0.45
PRAIRIE CREEK	MAINSTEM	8043	100 yr	P-500	10308.00	494.00	511.90		513.16	0.006742	11.15	1643.39	330.78	0.50
PRAIRIE CREEK	MAINSTEM	8043	5 yr	2-50	4935.00	494.00	508.23		509.50	0.007456	9.79	702.51	171.73	0.50
PRAIRIE CREEK	MAINSTEM	8043	Ultimate 100yr	P-500	10685.00	494.00	512.10		513.38	0.006826	11.31	1710.80	357.90	0.50
PRAIRIE CREEK	MAINSTEM	8043	10 yr	2-50	6199.00	494.00	509.25		510.62	0.007685	10.50	899.98	226.64	0.52
PRAIRIE CREEK	MAINSTEM	8043	500yr	P-500	14065.00	494.00	513.65		514.84	0.006222	11.51	2311.38	416.92	0.49
PRAIRIE CREEK	MAINSTEM	8043	25 yr	2-50	7521.00	494.00	510.19		511.56	0.007502	10.87	1128.30	264.96	0.52
PRAIRIE CREEK	MAINSTEM	8043	50 yr	2-50	8802.00	494.00	511.01		512.35	0.007241	11.11	1361.71	303.96	0.51
PRAIRIE CREEK	MAINSTEM	7687	2 yr	2-50	2824.00	492.00	504.85		505.22	0.002312	5.10	712.64	177.88	0.29
PRAIRIE CREEK	MAINSTEM	7687	100 yr	P-500	10308.00	492.00	510.64		511.35	0.003154	8.11	1968.93	281.01	0.36
PRAIRIE CREEK	MAINSTEM	7687	5 yr	2-50	4935.00	492.00	507.06		507.54	0.002616	6.21	1126.50	197.68	0.32
PRAIRIE CREEK	MAINSTEM	7687	Ultimate 100yr	P-500	10685.00	492.00	510.83		511.55	0.003190	8.23	20		

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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
PRAIRIE CREEK	MAINSTEM	7462	Ultimate 100yr	P-500	10685.00	492.06	509.56		510.75	0.006354	10.84	1578.54	274.33	0.50
PRAIRIE CREEK	MAINSTEM	7462	10 yr	2-50	6199.00	492.06	506.87		507.82	0.006034	9.22	1011.98	182.02	0.47
PRAIRIE CREEK	MAINSTEM	7462	500yr	P-500	14065.00	492.06	510.99		512.29	0.006510	11.68	2013.29	332.60	0.51
PRAIRIE CREEK	MAINSTEM	7462	25 yr	2-50	7521.00	492.06	507.77		508.78	0.006074	9.71	1181.01	194.56	0.48
PRAIRIE CREEK	MAINSTEM	7462	50 yr	2-50	8802.00	492.06	508.57		509.64	0.006103	10.13	1341.25	206.09	0.48
PRAIRIE CREEK	MAINSTEM	7152	2 yr	2-50	2824.00	491.00	502.50		502.79	0.002513	4.93	870.18	248.37	0.30
PRAIRIE CREEK	MAINSTEM	7152	100 yr	P-500	10308.00	491.00	508.68		509.00	0.001846	6.07	2790.63	362.60	0.28
PRAIRIE CREEK	MAINSTEM	7152	5 yr	2-50	4935.00	491.00	505.06		505.33	0.001934	5.15	1562.41	307.55	0.27
PRAIRIE CREEK	MAINSTEM	7152	Ultimate 100yr	P-500	10685.00	491.00	508.87		509.19	0.001859	6.14	2857.98	365.51	0.28
PRAIRIE CREEK	MAINSTEM	7152	10 yr	2-50	6199.00	491.00	506.09		506.37	0.001893	5.40	1891.73	329.26	0.27
PRAIRIE CREEK	MAINSTEM	7152	500yr	P-500	14065.00	491.00	510.28		510.68	0.002015	6.79	3403.04	402.10	0.30
PRAIRIE CREEK	MAINSTEM	7152	25 yr	2-50	7521.00	491.00	507.02		507.32	0.001869	5.64	2205.88	343.74	0.27
PRAIRIE CREEK	MAINSTEM	7152	50 yr	2-50	8802.00	491.00	507.86		508.16	0.001830	5.81	2495.84	352.37	0.27
PRAIRIE CREEK	MAINSTEM	6800	2 yr	2-50	2824.00	489.00	501.75		502.08	0.001965	5.14	778.26	151.81	0.28
PRAIRIE CREEK	MAINSTEM	6800	100 yr	P-500	10308.00	489.00	507.62		508.33	0.003098	8.62	2177.65	347.05	0.37
PRAIRIE CREEK	MAINSTEM	6800	5 yr	2-50	4935.00	489.00	504.18		504.67	0.002453	6.57	1215.67	239.52	0.32
PRAIRIE CREEK	MAINSTEM	6800	Ultimate 100yr	P-500	10685.00	489.00	507.80		508.52	0.003108	8.70	2242.13	351.33	0.37
PRAIRIE CREEK	MAINSTEM	6800	10 yr	2-50	6199.00	489.00	505.19		505.72	0.002537	7.03	1465.44	252.35	0.33
PRAIRIE CREEK	MAINSTEM	6800	500yr	P-500	14065.00	489.00	509.19		509.97	0.003281	9.43	2742.49	369.71	0.39
PRAIRIE CREEK	MAINSTEM	6800	25 yr	2-50	7521.00	489.00	506.09		506.67	0.002687	7.53	1699.11	272.06	0.34
PRAIRIE CREEK	MAINSTEM	6800	50 yr	2-50	8802.00	489.00	506.83		507.49	0.002970	8.17	1912.42	314.10	0.36
PRAIRIE CREEK	MAINSTEM	6575	2 yr	2-50	2824.00	488.48	501.05		501.54	0.003273	5.95	610.79	136.02	0.33
PRAIRIE CREEK	MAINSTEM	6575	100 yr	P-500	10308.00	488.48	506.57		507.56	0.004965	9.77	1795.87	363.24	0.43
PRAIRIE CREEK	MAINSTEM	6575	5 yr	2-50	4935.00	488.48	503.36		504.04	0.003839	7.39	992.23	201.69	0.37
PRAIRIE CREEK	MAINSTEM	6575	Ultimate 100yr	P-500	10685.00	488.48	506.75		507.75	0.004973	9.86	1864.32	378.37	0.44
PRAIRIE CREEK	MAINSTEM	6575	10 yr	2-50	6199.00	488.48	504.33		505.07	0.004057	7.98	1193.64	218.62	0.38
PRAIRIE CREEK	MAINSTEM	6575	500yr	P-500	14065.00	488.48	508.21		509.20	0.004884	10.35	2466.98	440.61	0.44
PRAIRIE CREEK	MAINSTEM	6575	25 yr	2-50	7521.00	488.48	505.15		505.98	0.004375	8.62	1383.09	243.06	0.40
PRAIRIE CREEK	MAINSTEM	6575	50 yr	2-50	8802.00	488.48	505.84		506.75	0.004679	9.19	1562.64	282.20	0.42
PRAIRIE CREEK	MAINSTEM	6270	2 yr	2-50	2875.00	488.00	500.48		500.74	0.001593	4.18	811.32	180.43	0.24
PRAIRIE CREEK	MAINSTEM	6270	100 yr	P-500	10585.00	488.00	505.73		506.32	0.002632	7.24	2336.34	427.58	0.34
PRAIRIE CREEK	MAINSTEM	6270	5 yr	2-50	5041.00	488.00	502.71		503.09	0.001918	5.29	1283.18	257.09	0.28
PRAIRIE CREEK	MAINSTEM	6270	Ultimate 100yr	P-500	11001.00	488.00	505.91		506.51	0.002657	7.33	2412.94	435.46	0.34
PRAIRIE CREEK	MAINSTEM	6270	10 yr	2-50	6354.00	488.00	503.61		504.06	0.002172	5.92	1540.03	318.89	0.30
PRAIRIE CREEK	MAINSTEM	6270	500yr	P-500	14582.00	488.00	507.26		507.97	0.002941	8.19	3079.83	552.15	0.36
PRAIRIE CREEK	MAINSTEM	6270	25 yr	2-50	7725.00	488.00	504.37		504.89	0.002376	6.44	1799.16	361.30	0.31
PRAIRIE CREEK	MAINSTEM	6270	50 yr	2-50	9038.00	488.00	505.03		505.59	0.002519	6.85	2048.36	396.65	0.33
PRAIRIE CREEK	MAINSTEM	5803	2 yr	2-50	2875.00	487.00	499.30		499.76	0.002978	5.83	674.91	158.92	0.33
PRAIRIE CREEK	MAINSTEM	5803	100 yr	P-500	10585.00	487.00	504.15		504.87	0.004107	8.92	2172.94	383.06	0.41
PRAIRIE CREEK	MAINSTEM	5803	5 yr	2-50	5041.00	487.00	501.28		501.91	0.003690	7.32	1158.88	310.77	0.37
PRAIRIE CREEK	MAINSTEM	5803	Ultimate 100yr	P-500	11001.00	487.00	504.32		505.05	0.004105	8.98	2241.39	385.70	0.41
PRAIRIE CREEK	MAINSTEM	5803	10 yr	2-50	6354.00	487.00	502.09		502.76	0.003918	7.88	1427.17	343.15	0.39
PRAIRIE CREEK	MAINSTEM	5803	500yr	P-500	14582.00	487.00	505.64		506.42	0.004193	9.61	2761.92	401.60	0.42
PRAIRIE CREEK	MAINSTEM	5803	25 yr	2-50	7725.00	487.00	502.83		503.52	0.004012	8.28	1683.85	357.66	0.40
PRAIRIE CREEK	MAINSTEM	5803	50 yr	2-50	9038.00	487.00	503.46		504.17	0.004071	8.60	1914.24	370.11	0.40
PRAIRIE CREEK	MAINSTEM	5463	2 yr	2-50	2875.00	486.00	498.41		498.78	0.002712	5.43	808.64	233.50	0.31
PRAIRIE CREEK	MAINSTEM	5463	100 yr	P-500	10585.00	486.00	503.06		503.58	0.003411	7.91	2499.78	443.90	0.37
PRAIRIE CREEK	MAINSTEM	5463	5 yr	2-50	5041.00	486.00	500.23		500.71	0.003264	6.69	1341.63	362.72	0.35
PRAIRIE CREEK	MAINSTEM	5463	Ultimate 100yr	P-500	11001.00	486.00	503.25		503.77	0.003377	7.94	2583.58	446.32	0.37
PRAIRIE CREEK	MAINSTEM	5463	10 yr	2-50	6354.00	486.00	500.99		501.50	0.003451	7.18	1628.66	395.26	0.36
PRAIRIE CREEK	MAINSTEM	5463	500yr	P-500	14582.00	486.00	504.53		505.10	0.003513	8.57	3181.84	481.55	0.38
PRAIRIE CREEK	MAINSTEM	5463	25 yr	2-50	7725.00	486.00	501.72		502.24	0.003472	7.48	1923.02	414.29	0.37
PRAIRIE CREEK	MAINSTEM	5463	50 yr	2-50	9038.00	486.00	502.36		502.88	0.003465	7.71	2192.13	430.03	0.37
PRAIRIE CREEK	MAINSTEM	5252	2 yr	2-50	2943.00	487.00	497.15		497.94	0.006382	7.58	537.81	194.30	0.46
PRAIRIE CREEK	MAINSTEM	5252	100 yr	P-500	10981.00	487.00	502.21		502.81	0.004328	8.56	2307.93	394.51	0.41
PRAIRIE CREEK	MAINSTEM	5252	5 yr	2-50	5206.00	487.00	499.20		499.87	0.005233	7.94	1175.44	360.19	0.43
PRAIRIE CREEK	MAINSTEM	5252	Ultimate 100yr	P-500	11469.00	487.00	502.39		503.00	0.004363	8.67	2377.96	397.38	0.41
PRAIRIE CREEK	MAINSTEM	5252	10 yr	2-50	6553.00	487.00	500.07		500.68	0.004745	7.98	1493.06	369.13	0.42
PRAIRIE CREEK	MAINSTEM	5252	500yr	P-500	15234.00	487.00	503.59		504.29	0.004694	9.52	2876.87	437.83	0.44
PRAIRIE CREEK	MAINSTEM	5252	25 yr	2-50	7972.00	487.00	500.85		501.44	0.004484	8.11	1784.83	377.68	0.41
PRAIRIE CREEK	MAINSTEM	5252	50 yr	2-50	9347.00	487.00	501.51		502.09	0.004370	8.30	2034.75	384.33	0.41
PRAIRIE CREEK	MAINSTEM	5060	2 yr	2-50	2943.00	485.00	496.76		497.12	0.000846	4.96	690.08	180.33	0.30
PRAIRIE CREEK	MAINSTEM	5060	100 yr	P-500	10981.00	485.00	501.86		502.26	0.000754	6.44	2607.48	470.17	0.31
PRAIRIE CREEK	MAINSTEM	5060	5 yr	2-50	5206.00	485.00	498.76		499.21	0.000924	5.99	1263.48	390.14	0.33
PRAIRIE CREEK	MAINSTEM	5060	Ultimate 100yr	P-500	11469.00	485.00	502.03		502.44	0.000758	6.51	2690.74	473.67	0.31
PRAIRIE CREEK	MAINSTEM	5060	10 yr	2-50	6553.00	485.00	499.66		500.08	0.000848	6.07	1631.68	417.76	0.32
PRAIRIE CREEK	MAINSTEM	5060	500yr	P-500	15234.00	485.00	503.23		503.69	0.000795	7.05	3272.13	499.35	0.32
PRAIRIE CREEK	MAINSTEM	5060	25 yr	2-50	7972.00	485.00	500.47		496.63	0.000798	6.16	1976.55	437.03	0.31
PRAIRIE CREEK	MAINSTEM	5060	50 yr	2-50	9347.00	485.00	501.14		497.94	0.000777	6.30	2275.34	455.27	0.31
PRAIRIE CREEK	MAINSTEM	4985			Bridge									
PRAIRIE CREEK	MAINSTEM	4832	2 yr	2-50	2943.00	484.59	496.18		496.67	0.003230	5.87	623.34	185.80	0.34
PRAIRIE CREEK	MAINSTEM	4832	100 yr	P-500	10981.00	484.59	500.48		501.54	0.005762	10.16	1952.72	429.19	0.49
PRAIRIE CREEK	MAINSTEM	4832	5 yr	2-50	5206.00	484.59	497.88		498.62	0.004389	7.67	1046.98	288.54	0.41
PRAIRIE CREEK	MAINSTEM	4832	Ultimate 100yr	P-500	11469.00	484.59	500.64		501.72	0.005818	10.29	2022.55	434.76	0.49
PRAIRIE CREEK	MAINSTEM	4832	10 yr	2-50	6553.00	484.59	498.61		499.46	0.004838	8.42	1269.63	317.42	0.44
PRAIRIE CREEK	MAINSTEM	4832	500yr	P-500	15234.00	484.59	501.76		502.91	0.006126	11.13	2523.08	459.54	0.51
PRAIRIE CREEK	MAINSTEM	4832	25 yr	2-50	7972.00	484.59	499.30		500.22	0.005170	9.04	1496.91	349.45	0.46
PRAIRIE CREEK	MAINSTEM	4832	50 yr	2-50	9347.00	484.59	499.88		500.86	0.005415	9.55	1708.47	377.90	0.47
PRAIRIE CREEK	MAINSTEM	4462	2 yr	2-50	2937.00	482.00	494.86		495.44	0.003424	6.31	559.63	287.69	0.35
PRAIRIE CREEK	MAINSTEM	4462	100 yr	P-500	10968.00	482.00	498.96		497.41	0.005077				

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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
PRAIRIE CREEK	MAINSTEM	4317	2 yr	2-50	2937.00	482.00	494.63	489.54	494.99	0.002266	5.18	732.06	248.95	0.29
PRAIRIE CREEK	MAINSTEM	4317	100 yr	P-500	10968.00	482.00	498.38	495.13	499.26	0.004902	9.46	1243.52	456.50	0.45
PRAIRIE CREEK	MAINSTEM	4317	5 yr	2-50	5191.00	482.00	496.14	492.24	496.70	0.003287	6.87	2242.62	337.82	0.36
PRAIRIE CREEK	MAINSTEM	4317	Ultimate 100yr	P-500	11461.00	482.00	498.54	496.70	499.43	0.004952	9.59	2217.47	462.26	0.46
PRAIRIE CREEK	MAINSTEM	4317	10 yr	2-50	6552.00	482.00	496.77	493.62	497.44	0.003800	7.66	1424.89	373.30	0.39
PRAIRIE CREEK	MAINSTEM	4317	500yr	P-500	15198.00	482.00	499.67	498.02	500.63	0.005246	10.40	2778.08	524.22	0.48
PRAIRIE CREEK	MAINSTEM	4317	25 yr	2-50	7969.00	482.00	497.34	494.50	498.12	0.004399	8.50	1686.44	416.95	0.42
PRAIRIE CREEK	MAINSTEM	4317	50 yr	2-50	9341.00	482.00	497.84	495.13	498.67	0.004662	8.98	1900.69	436.71	0.44
PRAIRIE CREEK	MAINSTEM	4008	2 yr	2-50	2937.00	483.00	494.09	491.05	494.31	0.002238	4.57	1110.95	365.42	0.28
PRAIRIE CREEK	MAINSTEM	4008	100 yr	P-500	10968.00	483.00	497.60	495.03	498.05	0.003664	7.40	2598.88	503.30	0.38
PRAIRIE CREEK	MAINSTEM	4008	5 yr	2-50	5191.00	483.00	495.55	493.34	495.83	0.002601	5.49	1689.94	423.20	0.31
PRAIRIE CREEK	MAINSTEM	4008	Ultimate 100yr	P-500	11461.00	483.00	497.75	495.15	498.21	0.003721	7.52	2667.85	509.23	0.38
PRAIRIE CREEK	MAINSTEM	4008	10 yr	2-50	6552.00	483.00	496.13	493.87	496.45	0.002921	6.04	1939.11	439.12	0.33
PRAIRIE CREEK	MAINSTEM	4008	500yr	P-500	15198.00	483.00	498.82	496.05	499.36	0.004035	8.29	3164.54	540.32	0.43
PRAIRIE CREEK	MAINSTEM	4008	25 yr	2-50	7969.00	483.00	496.85	494.24	497.00	0.003192	6.53	2167.57	457.63	0.41
PRAIRIE CREEK	MAINSTEM	4008	50 yr	2-50	9341.00	483.00	497.11	494.71	497.50	0.003411	6.94	2374.23	478.49	0.36
PRAIRIE CREEK	MAINSTEM	3492	2 yr	2-50	2937.00	481.98	492.93		493.29	0.002968	5.61	899.41	357.86	0.32
PRAIRIE CREEK	MAINSTEM	3492	100 yr	P-500	10968.00	481.98	496.52		496.96	0.003828	7.89	2816.70	578.94	0.39
PRAIRIE CREEK	MAINSTEM	3492	5 yr	2-50	5191.00	481.98	494.29		494.74	0.003774	6.92	1569.47	535.71	0.37
PRAIRIE CREEK	MAINSTEM	3492	Ultimate 100yr	P-500	11461.00	481.98	496.67		497.12	0.003861	7.99	2904.71	584.66	0.39
PRAIRIE CREEK	MAINSTEM	3492	10 yr	2-50	6552.00	481.98	494.91		495.35	0.003811	7.22	1906.97	554.67	0.38
PRAIRIE CREEK	MAINSTEM	3492	500yr	P-500	15198.00	481.98	497.78		498.26	0.003890	8.46	3577.94	618.81	0.39
PRAIRIE CREEK	MAINSTEM	3492	25 yr	2-50	7969.00	481.98	495.48		495.91	0.003827	7.47	2221.91	564.71	0.38
PRAIRIE CREEK	MAINSTEM	3492	50 yr	2-50	9341.00	481.98	495.99		496.42	0.003790	7.64	2514.42	572.54	0.38
PRAIRIE CREEK	MAINSTEM	3262	2 yr	2-50	2937.00	481.00	492.30		492.70	0.002800	5.81	930.89	401.78	0.33
PRAIRIE CREEK	MAINSTEM	3262	100 yr	P-500	10968.00	481.00	495.74		496.30	0.004146	8.64	2609.67	533.67	0.42
PRAIRIE CREEK	MAINSTEM	3262	5 yr	2-50	5191.00	481.00	493.58		494.06	0.003526	7.08	1510.55	485.89	0.37
PRAIRIE CREEK	MAINSTEM	3262	Ultimate 100yr	P-500	11461.00	481.00	495.88		496.45	0.004190	8.75	2688.28	536.98	0.42
PRAIRIE CREEK	MAINSTEM	3262	10 yr	2-50	6552.00	481.00	494.18		494.68	0.003704	7.51	1808.43	497.70	0.39
PRAIRIE CREEK	MAINSTEM	3262	500yr	P-500	15198.00	481.00	497.03		497.61	0.004186	9.23	3311.41	556.54	0.43
PRAIRIE CREEK	MAINSTEM	3262	25 yr	2-50	7969.00	481.00	494.73		495.24	0.003870	7.92	2082.09	506.93	0.40
PRAIRIE CREEK	MAINSTEM	3262	50 yr	2-50	9341.00	481.00	495.23		495.76	0.003986	8.25	2341.60	523.37	0.41
PRAIRIE CREEK	MAINSTEM	3021	2 yr	2-50	2937.00	479.80	491.50		491.92	0.003931	5.94	874.06	435.95	0.37
PRAIRIE CREEK	MAINSTEM	3021	100 yr	P-500	10968.00	479.80	494.45		495.11	0.006122	9.13	2284.35	512.17	0.49
PRAIRIE CREEK	MAINSTEM	3021	5 yr	2-50	5191.00	479.80	492.52		493.06	0.005169	7.37	1337.76	467.34	0.43
PRAIRIE CREEK	MAINSTEM	3021	Ultimate 100yr	P-500	11461.00	479.80	494.58		495.26	0.006173	9.24	2352.81	514.30	0.49
PRAIRIE CREEK	MAINSTEM	3021	10 yr	2-50	6552.00	479.80	493.03		493.62	0.005566	7.94	1582.77	481.96	0.45
PRAIRIE CREEK	MAINSTEM	3021	500yr	P-500	15198.00	479.80	495.84		496.49	0.005452	9.33	3013.54	531.67	0.47
PRAIRIE CREEK	MAINSTEM	3021	25 yr	2-50	7969.00	479.80	493.51		494.13	0.005842	8.41	1816.09	490.50	0.47
PRAIRIE CREEK	MAINSTEM	3021	50 yr	2-50	9341.00	479.80	494.00		494.63	0.005847	8.68	2059.35	504.83	0.47
PRAIRIE CREEK	MAINSTEM	2733	2 yr	2-50	2937.00	478.40	490.95	486.91	491.13	0.001743	4.12	1348.62	559.18	0.25
PRAIRIE CREEK	MAINSTEM	2733	100 yr	P-500	10968.00	478.40	493.62	491.76	494.01	0.003519	7.04	2905.09	596.84	0.37
PRAIRIE CREEK	MAINSTEM	2733	5 yr	2-50	5191.00	478.40	491.76	489.68	492.05	0.002770	5.53	1813.06	578.24	0.32
PRAIRIE CREEK	MAINSTEM	2733	Ultimate 100yr	P-500	11461.00	478.40	493.75	491.83	494.14	0.003566	7.14	2982.26	597.80	0.38
PRAIRIE CREEK	MAINSTEM	2733	10 yr	2-50	6552.00	478.40	492.23	490.78	492.55	0.003109	6.05	2083.77	585.04	0.34
PRAIRIE CREEK	MAINSTEM	2733	500yr	P-500	15198.00	478.40	495.18	492.46	495.55	0.002996	7.09	3844.86	645.97	0.35
PRAIRIE CREEK	MAINSTEM	2733	25 yr	2-50	7969.00	478.40	492.68	491.14	493.03	0.003347	6.47	2349.08	588.86	0.36
PRAIRIE CREEK	MAINSTEM	2733	50 yr	2-50	9341.00	478.40	493.21	491.43	493.56	0.003261	6.61	2662.94	593.78	0.36
PRAIRIE CREEK	MAINSTEM	2575	2 yr	2-50	2937.00	477.70	488.53	488.51	490.47	0.024749	11.78	310.69	102.09	0.85
PRAIRIE CREEK	MAINSTEM	2575	100 yr	P-500	10968.00	477.70	492.68	491.68	493.33	0.008356	9.73	2236.71	565.57	0.54
PRAIRIE CREEK	MAINSTEM	2575	5 yr	2-50	5191.00	477.70	490.48	490.48	491.37	0.011756	9.80	1079.90	484.31	0.61
PRAIRIE CREEK	MAINSTEM	2575	Ultimate 100yr	P-500	11461.00	477.70	492.81	491.72	493.47	0.008323	9.80	2311.36	568.30	0.54
PRAIRIE CREEK	MAINSTEM	2575	10 yr	2-50	6552.00	477.70	490.86	490.81	491.81	0.012752	10.53	1265.15	490.17	0.64
PRAIRIE CREEK	MAINSTEM	2575	500yr	P-500	15198.00	477.70	494.61	492.45	495.06	0.004989	8.45	3361.84	602.17	0.43
PRAIRIE CREEK	MAINSTEM	2575	25 yr	2-50	7969.00	477.70	491.62	491.12	492.33	0.009551	9.67	1644.16	529.08	0.57
PRAIRIE CREEK	MAINSTEM	2575	50 yr	2-50	9341.00	477.70	492.34	491.40	492.93	0.007794	9.18	2042.87	558.40	0.52
PRAIRIE CREEK	MAINSTEM	2527	2 yr	2-50	2937.00	481.80	487.22	487.22	489.04	0.034867	10.82	271.62	75.57	1.00
PRAIRIE CREEK	MAINSTEM	2527	100 yr	P-500	10968.00	481.80	492.37	491.07	492.94	0.005952	8.01	2376.28	566.51	0.48
PRAIRIE CREEK	MAINSTEM	2527	5 yr	2-50	5191.00	481.80	489.61	489.61	490.67	0.012863	9.15	908.83	473.35	0.66
PRAIRIE CREEK	MAINSTEM	2527	Ultimate 100yr	P-500	11461.00	481.80	492.50	491.16	493.08	0.005999	8.12	2447.54	569.84	0.48
PRAIRIE CREEK	MAINSTEM	2527	10 yr	2-50	6552.00	481.80	490.35	490.10	491.20	0.010136	8.78	1280.35	517.73	0.60
PRAIRIE CREEK	MAINSTEM	2527	500yr	P-500	15198.00	481.80	494.41	491.75	494.83	0.003639	7.20	3576.65	612.31	0.39
PRAIRIE CREEK	MAINSTEM	2527	25 yr	2-50	7969.00	481.80	491.29	490.45	491.89	0.006757	7.82	1777.54	540.37	0.50
PRAIRIE CREEK	MAINSTEM	2527	50 yr	2-50	9341.00	481.80	492.08	490.75	492.57	0.005258	7.36	2209.76	560.06	0.45
PRAIRIE CREEK	MAINSTEM	2489	2 yr	2-50	2937.00	480.06	485.04	485.04	486.96	0.003879	11.14	263.76	214.51	1.00
PRAIRIE CREEK	MAINSTEM	2489	100 yr	P-500	10968.00	480.06	492.24	488.48	492.81	0.005007	7.77	3919.20	569.90	0.43
PRAIRIE CREEK	MAINSTEM	2489	5 yr	2-50	5191.00	480.06	486.97	486.97	489.48	0.003552	12.73	407.92	298.47	1.00
PRAIRIE CREEK	MAINSTEM	2489	Ultimate 100yr	P-500	11461.00	480.06	492.34	488.60	492.94	0.005034	8.02	3974.55	572.03	0.44
PRAIRIE CREEK	MAINSTEM	2489	10 yr	2-50	6552.00	480.06	487.85	487.85	490.74	0.003290	13.63	489.66	393.94	0.99
PRAIRIE CREEK	MAINSTEM	2489	500yr	P-500	15198.00	480.06	494.03	488.08	494.72	0.005019	8.74	4974.18	611.63	0.44
PRAIRIE CREEK	MAINSTEM	2489	25 yr	2-50	7969.00	480.06	489.37	489.37	491.56	0.001969	12.29	1149.81	489.67	0.80
PRAIRIE CREEK	MAINSTEM	2489	50 yr	2-50	9341.00	480.06	489.99	489.99	492.25	0.001903	12.75	1461.08	512.52	0.79
PRAIRIE CREEK	MAINSTEM	2457	2 yr	2-50	2937.00	479.00	484.04	484.04	485.95	0.003881	11.10	264.64	210.48	1.00
PRAIRIE CREEK	MAINSTEM	2457	100 yr	P-500	10968.00	479.00	492.26	489.00	492.78	0.004424	7.29	4032.53	569.06	0.39
PRAIRIE CREEK	MAINSTEM	2457	5 yr	2-50	5191.00	479.00	485.91	485.91	488.51	0.003541	12.93	401.36	331.52	1.00
PRAIRIE CREEK	MAINSTEM	2457	Ultimate 100yr	P-500	11461.00	479.00	492.35	489.01	492.91	0.004446	7.53	4088.27	570.84	0.40
PRAIRIE CREEK	MAINSTEM	2457	10 yr	2-50	6552.00	479.00	486.86	486.86	489.79	0.003428	13.75	476.		

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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
PRAIRIE CREEK	MAINSTEM	2439	25 yr	2-50	7969.00	477.00	489.36	486.63	489.88	0.000291	6.96	2279.46	488.09	0.41
PRAIRIE CREEK	MAINSTEM	2439	50 yr	2-50	9341.00	477.00	490.70	487.54	491.12	0.000210	6.51	2955.44	524.29	0.36
PRAIRIE CREEK	MAINSTEM	2210	2 yr	2-50	2887.00	475.20	482.64	481.07	483.88	0.000919	8.95	322.51	101.77	0.67
PRAIRIE CREEK	MAINSTEM	2210	100 yr	P-500	10943.00	475.20	491.74	487.65	492.62	0.000286	8.43	2414.72	496.68	0.43
PRAIRIE CREEK	MAINSTEM	2210	5 yr	2-50	5174.00	475.20	484.46	483.46	486.65	0.001297	11.87	436.01	118.67	0.82
PRAIRIE CREEK	MAINSTEM	2210	Ultimate 100yr	P-500	11379.00	475.20	491.82	487.91	492.74	0.000300	8.67	2451.80	499.41	0.44
PRAIRIE CREEK	MAINSTEM	2210	10 yr	2-50	6555.00	475.20	485.74	484.64	488.16	0.001263	12.48	525.18	131.45	0.82
PRAIRIE CREEK	MAINSTEM	2210	500yr	P-500	15035.00	475.20	493.63	490.23	494.51	0.000264	8.92	3445.36	587.99	0.42
PRAIRIE CREEK	MAINSTEM	2210	25 yr	2-50	7981.00	475.20	487.00	485.72	489.56	0.001197	12.85	620.90	153.94	0.81
PRAIRIE CREEK	MAINSTEM	2210	50 yr	2-50	9372.00	475.20	488.12	486.69	490.81	0.001115	13.15	714.21	178.22	0.79
PRAIRIE CREEK	MAINSTEM	2054	2 yr	2-50	2887.00	474.00	483.19	478.71	483.52	0.000180	4.64	622.76	91.48	0.31
PRAIRIE CREEK	MAINSTEM	2054	100 yr	P-500	10943.00	474.00	491.94	484.06	492.49	0.000117	6.44	2855.93	671.86	0.29
PRAIRIE CREEK	MAINSTEM	2054	5 yr	2-50	5174.00	474.00	485.45	480.60	486.05	0.000224	6.20	843.18	127.31	0.37
PRAIRIE CREEK	MAINSTEM	2054	Ultimate 100yr	P-500	11379.00	474.00	492.02	484.27	492.60	0.000123	6.64	2892.22	677.38	0.30
PRAIRIE CREEK	MAINSTEM	2054	10 yr	2-50	6555.00	474.00	486.81	481.58	487.53	0.000223	6.80	991.09	171.00	0.37
PRAIRIE CREEK	MAINSTEM	2054	500yr	P-500	15035.00	474.00	493.82	485.89	494.38	0.000115	6.91	4575.03	740.04	0.29
PRAIRIE CREEK	MAINSTEM	2054	25 yr	2-50	7981.00	474.00	488.10	482.47	488.93	0.000221	7.33	1154.43	292.23	0.38
PRAIRIE CREEK	MAINSTEM	2054	50 yr	2-50	9372.00	474.00	489.24	483.27	490.17	0.000220	7.79	1340.43	387.17	0.38
PRAIRIE CREEK	MAINSTEM	1988												
PRAIRIE CREEK	MAINSTEM	1988			Bridge									
PRAIRIE CREEK	MAINSTEM	1887	2 yr	2-50	2887.00	473.00	482.95	478.73	483.31	0.000201	4.80	601.43	92.44	0.33
PRAIRIE CREEK	MAINSTEM	1887	100 yr	P-500	10943.00	473.00	490.28	484.17	490.86	0.000156	6.69	3125.43	760.72	0.33
PRAIRIE CREEK	MAINSTEM	1887	5 yr	2-50	5174.00	473.00	484.99	480.66	485.64	0.000290	6.45	802.11	103.83	0.41
PRAIRIE CREEK	MAINSTEM	1887	Ultimate 100yr	P-500	11379.00	473.00	490.47	484.38	491.05	0.000156	6.77	3263.57	764.42	0.33
PRAIRIE CREEK	MAINSTEM	1887	10 yr	2-50	6555.00	473.00	486.27	481.63	487.03	0.000280	7.01	940.79	169.51	0.41
PRAIRIE CREEK	MAINSTEM	1887	500yr	P-500	15035.00	473.00	492.38	485.96	492.89	0.000131	6.79	4795.23	830.14	0.31
PRAIRIE CREEK	MAINSTEM	1887	25 yr	2-50	7981.00	473.00	487.49	482.52	488.36	0.000270	7.50	1092.36	440.62	0.41
PRAIRIE CREEK	MAINSTEM	1887	50 yr	2-50	9372.00	473.00	488.66	483.33	489.45	0.000226	7.37	1992.23	673.36	0.38
PRAIRIE CREEK	MAINSTEM	1270	2 yr	2-50	2916.00	471.89	482.65	478.88	483.17	0.000295	5.77	505.17	76.71	0.40
PRAIRIE CREEK	MAINSTEM	1270	100 yr	P-500	11027.00	471.89	490.02	485.10	490.75	0.000219	7.56	4020.61	950.77	0.38
PRAIRIE CREEK	MAINSTEM	1270	5 yr	2-50	5228.00	471.89	484.39	481.00	485.39	0.000503	8.05	649.20	89.55	0.53
PRAIRIE CREEK	MAINSTEM	1270	Ultimate 100yr	P-500	11451.00	471.89	490.20	485.31	490.94	0.000221	7.66	4186.32	958.03	0.38
PRAIRIE CREEK	MAINSTEM	1270	10 yr	2-50	6608.00	471.89	485.64	482.07	486.79	0.000510	8.60	783.92	150.49	0.54
PRAIRIE CREEK	MAINSTEM	1270	500yr	P-500	15168.00	471.89	492.07	488.18	492.78	0.000195	7.90	6054.47	1030.66	0.37
PRAIRIE CREEK	MAINSTEM	1270	25 yr	2-50	8051.00	471.89	487.03	483.17	488.16	0.000417	8.66	1482.80	757.10	0.50
PRAIRIE CREEK	MAINSTEM	1270	50 yr	2-50	9479.00	471.89	488.32	484.12	489.30	0.000324	8.32	2517.39	833.35	0.45
PRAIRIE CREEK	MAINSTEM	1188	2 yr	2-50	2916.00	471.44	482.75	477.29	483.10	0.000164	4.76	612.15	79.59	0.30
PRAIRIE CREEK	MAINSTEM	1188	100 yr	P-500	11027.00	471.44	489.56	483.56	490.69	0.000264	8.71	1517.83	191.20	0.42
PRAIRIE CREEK	MAINSTEM	1188	5 yr	2-50	5228.00	471.44	484.55	479.54	485.28	0.000290	6.86	762.53	87.55	0.41
PRAIRIE CREEK	MAINSTEM	1188	Ultimate 100yr	P-500	11451.00	471.44	489.68	483.80	490.87	0.000275	8.96	1540.04	191.86	0.43
PRAIRIE CREEK	MAINSTEM	1188	10 yr	2-50	6608.00	471.44	485.79	480.65	486.67	0.000309	7.56	877.50	103.44	0.43
PRAIRIE CREEK	MAINSTEM	1188	500yr	P-500	15168.00	471.44	491.04	485.69	492.67	0.000336	10.55	1806.63	199.65	0.48
PRAIRIE CREEK	MAINSTEM	1188	25 yr	2-50	8051.00	471.44	487.09	481.72	488.10	0.000296	8.07	1065.49	170.89	0.43
PRAIRIE CREEK	MAINSTEM	1188	50 yr	2-50	9479.00	471.44	488.14	482.64	489.25	0.000295	8.56	1251.77	182.68	0.44
PRAIRIE CREEK	MAINSTEM	1081												
PRAIRIE CREEK	MAINSTEM	1081			Bridge									
PRAIRIE CREEK	MAINSTEM	971	2 yr	2-50	2916.00	471.69	482.64		483.01	0.000178	4.84	602.44	81.45	0.31
PRAIRIE CREEK	MAINSTEM	971	100 yr	P-500	11027.00	471.69	489.38		490.48	0.000268	8.62	1549.75	193.08	0.42
PRAIRIE CREEK	MAINSTEM	971	5 yr	2-50	5228.00	471.69	484.34		485.10	0.000319	6.99	747.55	89.92	0.43
PRAIRIE CREEK	MAINSTEM	971	Ultimate 100yr	P-500	11451.00	471.69	489.49		490.65	0.000280	8.87	1569.96	193.77	0.43
PRAIRIE CREEK	MAINSTEM	971	10 yr	2-50	6608.00	471.69	485.56		486.47	0.000338	7.67	870.24	127.76	0.45
PRAIRIE CREEK	MAINSTEM	971	500yr	P-500	15168.00	471.69	490.78		492.38	0.000345	10.48	1826.81	202.01	0.49
PRAIRIE CREEK	MAINSTEM	971	25 yr	2-50	8051.00	471.69	486.87		487.88	0.000314	8.09	1086.25	176.40	0.44
PRAIRIE CREEK	MAINSTEM	971	50 yr	2-50	9479.00	471.69	487.92		489.02	0.000308	8.54	1274.45	183.38	0.44
KIRBY CREEK	MAINSTEM US	23654	2 yr	2-50	275.00	554.00	555.98	555.91	556.60	0.002667	6.31	43.57	31.10	0.94
KIRBY CREEK	MAINSTEM US	23654	100 yr	P-500	661.00	554.00	557.56		558.29	0.001364	6.86	96.33	35.85	0.74
KIRBY CREEK	MAINSTEM US	23654	5 yr	2-50	383.00	554.00	556.47		557.12	0.002025	6.49	58.99	32.57	0.85
KIRBY CREEK	MAINSTEM US	23654	Ultimate 100yr	P-500	661.00	554.00	557.56		558.29	0.001364	6.86	96.33	35.85	0.74
KIRBY CREEK	MAINSTEM US	23654	10 yr	2-50	455.00	554.00	556.77		557.45	0.001762	6.59	69.10	33.49	0.81
KIRBY CREEK	MAINSTEM US	23654	500yr	P-500	1396.00	554.00	559.80		560.69	0.000908	7.58	184.24	42.50	0.64
KIRBY CREEK	MAINSTEM US	23654	25 yr	2-50	531.00	554.00	557.08		557.77	0.001564	6.67	79.56	34.42	0.77
KIRBY CREEK	MAINSTEM US	23654	50 yr	2-50	596.00	554.00	557.33		558.04	0.001451	6.77	88.08	35.16	0.75
KIRBY CREEK	MAINSTEM US	23415	2 yr	2-50	275.00	553.00	555.43		556.05	0.001936	6.28	43.76	24.26	0.82
KIRBY CREEK	MAINSTEM US	23415	100 yr	P-500	661.00	553.00	556.75	556.51	557.87	0.001909	8.50	79.26	31.21	0.88
KIRBY CREEK	MAINSTEM US	23415	5 yr	2-50	383.00	553.00	555.87		556.63	0.001946	7.03	54.49	25.40	0.85
KIRBY CREEK	MAINSTEM US	23415	Ultimate 100yr	P-500	661.00	553.00	556.75	556.51	557.87	0.001909	8.50	79.26	31.21	0.88
KIRBY CREEK	MAINSTEM US	23415	10 yr	2-50	455.00	553.00	556.12	555.86	556.99	0.001938	7.45	61.15	26.61	0.85
KIRBY CREEK	MAINSTEM US	23415	500yr	P-500	1396.00	553.00	558.32	558.31	560.29	0.001938	11.41	136.74	42.07	0.95
KIRBY CREEK	MAINSTEM US	23415	25 yr	2-50	531.00	553.00	556.37	556.11	557.33	0.001931	7.86	67.92	28.45	0.86
KIRBY CREEK	MAINSTEM US	23415	50 yr	2-50	596.00	553.00	556.57	556.32	557.61	0.001925	8.18	73.73	29.93	0.87
KIRBY CREEK	MAINSTEM US	23186	2 yr	2-50	275.00	552.50	554.68	554.68	555.49	0.002975	7.23	38.01	23.57	1.00
KIRBY CREEK	MAINSTEM US	23186	100 yr	P-500	661.00	552.50	555.99	555.99	557.33	0.002638	9.31	71.02	26.80	1.01
KIRBY CREEK	MAINSTEM US	23186	5 yr	2-50	383.00	552.50	555.09	555.09	556.08	0.002846	7.98	47.98	24.58	1.01
KIRBY CREEK	MAINSTEM US	23186	Ultimate 100yr	P-500	661.00	552.50	555.99	555.99	557.33	0.002638	9.31	71.02	26.80	1.01
KIRBY CREEK	MAINSTEM US	23186	10 yr	2-50	455.00	552.50	555.34	555.34	556.44	0.002778	8.39	54.25	25.19	1.01
KIRBY CREEK	MAINSTEM US	23186	500yr	P-500	1396.00	552.50	557.83	557.83	559.83	0.002025	11.39	130.29	43.71	0.96
KIRBY CREEK	MAINSTEM US	23186	25 yr	2-50	531.00	552.50	555.59	555.59	556.79	0.002717	8.76	60.63	25.81	1.01
KIRBY CREEK	MAINSTEM US	23186	50 yr	2-50	596.00	552.50	555.80	555.80	557.07	0.002672	9.04	65.91	26.32	1.01
KIRBY CREEK	MAINSTEM US	22788	2 yr	2-50	275.00	551.00	553.17	553.17	553.94	0.002974	7.08	38.84	24.80	1.00
KIRBY CREEK	MAINSTEM US	227												

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
KIRBY CREEK	MAINSTEM US	22389	2 yr	2-50	275.00	549.00	551.18	551.18	551.95	0.002941	7.06	38.93	24.83	0.99
KIRBY CREEK	MAINSTEM US	22389	100 yr	P-500	661.00	549.00	553.16	552.45	553.93	0.001243	7.04	93.88	30.57	0.71
KIRBY CREEK	MAINSTEM US	22389	5 yr	2-50	383.00	549.00	551.58	551.58	552.52	0.002819	7.80	49.11	25.96	1.00
KIRBY CREEK	MAINSTEM US	22389	Ultimate 100yr	P-500	661.00	549.00	553.32	552.45	554.02	0.001093	6.68	98.89	31.61	0.67
KIRBY CREEK	MAINSTEM US	22389	10 yr	2-50	455.00	549.00	551.86	551.82	552.86	0.002605	8.05	56.55	26.74	0.98
KIRBY CREEK	MAINSTEM US	22389	500yr	P-500	1396.00	549.00	554.31	554.31	556.00	0.002158	10.44	138.54	63.74	0.96
KIRBY CREEK	MAINSTEM US	22389	25 yr	2-50	531.00	549.00	552.35	552.06	553.24	0.001880	7.58	70.08	28.18	0.85
KIRBY CREEK	MAINSTEM US	22389	50 yr	2-50	596.00	549.00	552.76	552.26	553.58	0.001509	7.29	81.75	29.36	0.77
KIRBY CREEK	MAINSTEM US	21997	2 yr	2-50	275.00	548.00	550.12	549.79	550.63	0.001630	5.73	48.01	26.64	0.75
KIRBY CREEK	MAINSTEM US	21997	100 yr	P-500	661.00	548.00	553.17	551.03	553.49	0.000332	4.61	176.85	156.20	0.39
KIRBY CREEK	MAINSTEM US	21997	5 yr	2-50	383.00	548.00	551.07	550.18	551.48	0.000837	5.13	74.65	29.12	0.56
KIRBY CREEK	MAINSTEM US	21997	Ultimate 100yr	P-500	661.00	548.00	553.34	551.03	553.62	0.000282	4.36	204.03	182.85	0.36
KIRBY CREEK	MAINSTEM US	21997	10 yr	2-50	455.00	548.00	551.66	550.42	552.04	0.000630	4.93	92.25	30.52	0.50
KIRBY CREEK	MAINSTEM US	21997	500yr	P-500	1396.00	548.00	553.94	552.95	554.70	0.000705	7.48	330.74	283.90	0.58
KIRBY CREEK	MAINSTEM US	21997	25 yr	2-50	531.00	548.00	552.26	550.64	552.62	0.000484	4.78	112.38	42.51	0.45
KIRBY CREEK	MAINSTEM US	21997	50 yr	2-50	596.00	548.00	552.72	550.85	553.06	0.000401	4.72	136.28	62.45	0.42
KIRBY CREEK	MAINSTEM US	21707	2 yr	2-50	610.00	546.00	548.86	548.86	549.98	0.002645	8.51	71.67	31.99	1.00
KIRBY CREEK	MAINSTEM US	21707	100 yr	P-500	1681.00	546.00	551.00	551.00	553.14	0.002114	11.78	148.85	41.31	1.00
KIRBY CREEK	MAINSTEM US	21707	5 yr	2-50	917.00	546.00	549.57	549.57	551.02	0.002425	9.66	95.30	34.35	1.00
KIRBY CREEK	MAINSTEM US	21707	Ultimate 100yr	P-500	1735.00	546.00	551.00	551.00	553.28	0.002248	12.15	148.94	41.35	1.03
KIRBY CREEK	MAINSTEM US	21707	10 yr	2-50	1118.00	546.00	549.97	549.97	551.63	0.002325	10.32	109.51	35.69	1.00
KIRBY CREEK	MAINSTEM US	21707	500yr	P-500	2213.00	546.00	552.29	552.29	554.30	0.001442	11.58	236.43	95.16	0.86
KIRBY CREEK	MAINSTEM US	21707	25 yr	2-50	1336.00	546.00	550.42	550.42	552.24	0.002170	10.85	125.92	38.03	0.99
KIRBY CREEK	MAINSTEM US	21707	50 yr	2-50	1511.00	546.00	550.76	550.76	552.71	0.002076	11.24	139.03	39.85	0.98
KIRBY CREEK	MAINSTEM US	21529	2 yr	2-50	610.00	544.45	547.82	546.25	548.06	0.000364	3.89	156.62	48.34	0.38
KIRBY CREEK	MAINSTEM US	21529	100 yr	P-500	1681.00	544.45	551.20	547.94	551.62	0.000279	5.18	330.08	69.36	0.36
KIRBY CREEK	MAINSTEM US	21529	5 yr	2-50	917.00	544.45	548.90	546.79	549.20	0.000331	4.38	209.38	48.20	0.37
KIRBY CREEK	MAINSTEM US	21529	Ultimate 100yr	P-500	1735.00	544.45	551.40	548.00	551.82	0.000268	5.17	344.90	77.78	0.35
KIRBY CREEK	MAINSTEM US	21529	10 yr	2-50	1118.00	544.45	549.54	547.12	549.87	0.000319	4.64	240.77	49.70	0.37
KIRBY CREEK	MAINSTEM US	21529	500yr	P-500	2213.00	544.45	552.67	548.62	553.11	0.000234	5.43	475.60	130.85	0.34
KIRBY CREEK	MAINSTEM US	21529	25 yr	2-50	1336.00	544.45	550.17	547.45	550.54	0.000311	4.90	272.42	50.20	0.37
KIRBY CREEK	MAINSTEM US	21529	50 yr	2-50	1511.00	544.45	550.65	547.70	551.05	0.000305	5.10	296.78	53.62	0.37
KIRBY CREEK	MAINSTEM US	21435			Culvert									
KIRBY CREEK	MAINSTEM US	21375	2 yr	2-50	610.00	543.75	547.44	545.51	547.57	0.000170	2.89	214.06	101.09	0.28
KIRBY CREEK	MAINSTEM US	21375	100 yr	P-500	1681.00	543.75	550.31	546.90	550.60	0.000165	4.30	397.51	307.18	0.30
KIRBY CREEK	MAINSTEM US	21375	5 yr	2-50	917.00	543.75	548.41	545.97	548.59	0.000165	3.38	275.78	124.04	0.29
KIRBY CREEK	MAINSTEM US	21375	Ultimate 100yr	P-500	1735.00	543.75	550.43	546.95	550.72	0.000165	4.36	404.91	320.62	0.30
KIRBY CREEK	MAINSTEM US	21375	10 yr	2-50	1118.00	543.75	548.97	546.23	549.17	0.000164	3.65	311.57	139.66	0.29
KIRBY CREEK	MAINSTEM US	21375	500yr	P-500	2213.00	543.75	551.61	547.46	551.79	0.000097	3.72	1033.65	366.16	0.24
KIRBY CREEK	MAINSTEM US	21375	25 yr	2-50	1336.00	543.75	549.52	546.50	549.75	0.000164	3.92	346.72	163.40	0.30
KIRBY CREEK	MAINSTEM US	21375	50 yr	2-50	1511.00	543.75	549.93	546.71	550.19	0.000165	4.12	373.01	234.31	0.30
KIRBY CREEK	MAINSTEM US	21312	2 yr	2-50	610.00	544.00	547.07	546.03	547.47	0.000636	5.28	136.40	325.64	0.53
KIRBY CREEK	MAINSTEM US	21312	100 yr	P-500	1681.00	544.00	549.61	547.94	550.42	0.000593	7.62	288.29	352.89	0.57
KIRBY CREEK	MAINSTEM US	21312	5 yr	2-50	917.00	544.00	547.93	546.65	548.46	0.000614	6.11	183.32	333.28	0.54
KIRBY CREEK	MAINSTEM US	21312	Ultimate 100yr	P-500	1735.00	544.00	549.71	548.02	550.54	0.000594	7.72	295.17	354.71	0.57
KIRBY CREEK	MAINSTEM US	21312	10 yr	2-50	1118.00	544.00	548.43	547.03	549.04	0.000601	6.55	212.67	337.92	0.55
KIRBY CREEK	MAINSTEM US	21312	500yr	P-500	2213.00	544.00	550.50	548.70	551.52	0.000623	8.61	356.05	377.12	0.56
KIRBY CREEK	MAINSTEM US	21312	25 yr	2-50	1336.00	544.00	548.92	547.40	549.60	0.000595	6.98	242.72	342.46	0.56
KIRBY CREEK	MAINSTEM US	21312	50 yr	2-50	1511.00	544.00	549.28	547.67	550.03	0.000592	7.31	266.09	346.89	0.56
KIRBY CREEK	MAINSTEM US	21186	2 yr	2-50	610.00	543.78	547.09	545.70	547.37	0.000447	4.54	173.32	337.70	0.48
KIRBY CREEK	MAINSTEM US	21186	100 yr	P-500	1681.00	543.78	549.72	547.43	550.28	0.000424	6.60	372.94	383.61	0.45
KIRBY CREEK	MAINSTEM US	21186	5 yr	2-50	917.00	543.78	547.97	546.27	548.35	0.000441	5.31	230.96	350.95	0.46
KIRBY CREEK	MAINSTEM US	21186	Ultimate 100yr	P-500	1735.00	543.78	549.83	547.50	550.40	0.000423	6.68	382.84	385.54	0.48
KIRBY CREEK	MAINSTEM US	21186	10 yr	2-50	1118.00	543.78	548.49	546.61	548.92	0.000436	5.72	268.36	360.49	0.47
KIRBY CREEK	MAINSTEM US	21186	500yr	P-500	2213.00	543.78	550.69	548.14	551.35	0.000419	7.27	468.49	465.64	0.49
KIRBY CREEK	MAINSTEM US	21186	25 yr	2-50	1336.00	543.78	548.99	546.93	549.48	0.000433	6.10	308.59	370.07	0.48
KIRBY CREEK	MAINSTEM US	21186	50 yr	2-50	1511.00	543.78	549.37	547.21	549.90	0.000428	6.37	341.14	377.10	0.48
KIRBY CREEK	MAINSTEM US	21105	2 yr	2-50	610.00	543.00	546.52	546.16	547.26	0.001643	6.90	88.39	152.55	0.80
KIRBY CREEK	MAINSTEM US	21105	100 yr	P-500	1681.00	543.00	549.12	548.20	550.18	0.001033	8.31	214.38	234.15	0.70
KIRBY CREEK	MAINSTEM US	21105	5 yr	2-50	917.00	543.00	547.36	546.84	548.24	0.001458	7.52	121.93	164.41	0.78
KIRBY CREEK	MAINSTEM US	21105	Ultimate 100yr	P-500	1735.00	543.00	549.22	548.28	550.30	0.001012	8.36	223.11	240.78	0.70
KIRBY CREEK	MAINSTEM US	21105	10 yr	2-50	1118.00	543.00	547.88	547.25	548.81	0.001354	7.73	144.56	188.27	0.76
KIRBY CREEK	MAINSTEM US	21105	500yr	P-500	2213.00	543.00	550.20	548.98	551.26	0.000797	8.46	334.64	304.81	0.64
KIRBY CREEK	MAINSTEM US	21105	25 yr	2-50	1336.00	543.00	548.39	547.64	549.37	0.001205	7.96	168.83	202.07	0.73
KIRBY CREEK	MAINSTEM US	21105	50 yr	2-50	1511.00	543.00	548.76	547.96	549.79	0.001113	8.16	189.71	216.30	0.72
KIRBY CREEK	MAINSTEM US	20852	2 yr	2-50	610.00	543.00	545.62	545.62	546.71	0.002677	8.39	72.71	33.80	1.00
KIRBY CREEK	MAINSTEM US	20852	100 yr	P-500	1681.00	543.00	547.82	547.82	549.76	0.001905	11.28	165.06	53.91	0.95
KIRBY CREEK	MAINSTEM US	20852	5 yr	2-50	917.00	543.00	546.32	546.32	547.73	0.002380	9.53	97.30	36.95	0.99
KIRBY CREEK	MAINSTEM US	20852	Ultimate 100yr	P-500	1735.00	543.00	547.92	547.92	549.88	0.001871	11.35	170.66	55.10	0.95
KIRBY CREEK	MAINSTEM US	20852	10 yr	2-50	1118.00	543.00	546.75	546.75	548.32	0.002215	11.09	114.04	41.52	0.98
KIRBY CREEK	MAINSTEM US	20852	500yr	P-500	2213.00	543.00	548.78	548.78	550.89	0.001624	10.90	228.01	78.19	0.91
KIRBY CREEK	MAINSTEM US	20852	25 yr	2-50	1336.00	543.00	547.18	547.18	548.91	0.002088	10.62	132.85	46.47	0.97
KIRBY CREEK	MAINSTEM US	20852	50 yr	2-50	1511.00	543.00	547.52	547.52	549.35	0.001976	10.95	149.33	50.41	0.96
KIRBY CREEK	MAINSTEM US	20578	2 yr	2-50	610.00	541.00	544.06	544.06	545.24	0.002583	8.71	70.23	30.89	0.99
KIRBY CREEK	MAINSTEM US	20578	100 yr	P-500	1681.00	541.00	546.50	546.50	548.46	0.001752	11.45	173.96	62.88	0.92
KIRBY CREEK	MAINSTEM US	20578	5 yr	2-50	917.00	541.00	544.82	544.82	546.33	0.002307	9.89	95.86	36.54	0.98
KIRBY CREEK	MAINSTEM US	20578	Ultimate 100yr	P-500	1735.00	541.00	546.61	546.61	548.59	0.001709	11.49	181.52		

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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
KIRBY CREEK	MAINSTEM US	20341	500yr	P-500	2213.00	540.00	547.46	546.00	547.48	0.000043	2.10	2285.42	491.27	0.15
KIRBY CREEK	MAINSTEM US	20341	25 yr	2-50	1336.00	540.00	544.36	544.36	546.18	0.002363	10.81	123.53	258.71	1.00
KIRBY CREEK	MAINSTEM US	20341	50 yr	2-50	1511.00	540.00	544.74	544.74	546.64	0.002339	11.06	136.56	264.70	1.00
KIRBY CREEK	MAINSTEM US	20121	2 yr	2-50	610.00	539.00	542.10	542.10	543.21	0.002655	8.44	72.29	446.26	1.00
KIRBY CREEK	MAINSTEM US	20121	100 yr	P-500	1681.00	539.00	544.31	544.31	546.20	0.002202	11.04	153.77	484.71	0.99
KIRBY CREEK	MAINSTEM US	20121	5 yr	2-50	917.00	539.00	542.84	542.84	544.22	0.002463	9.42	97.38	455.31	0.99
KIRBY CREEK	MAINSTEM US	20121	Ultimate 100yr	P-500	1735.00	539.00	544.41	544.41	546.32	0.002151	11.10	158.92	489.49	0.98
KIRBY CREEK	MAINSTEM US	20121	10 yr	2-50	1118.00	539.00	543.26	543.26	544.80	0.002403	9.96	112.30	460.39	1.00
KIRBY CREEK	MAINSTEM US	20121	500yr	P-500	2213.00	539.00	545.37	545.37	547.28	0.001644	11.20	229.74	559.61	0.89
KIRBY CREEK	MAINSTEM US	20121	25 yr	2-50	1336.00	539.00	543.68	543.68	545.38	0.002372	10.45	127.82	465.83	1.00
KIRBY CREEK	MAINSTEM US	20121	50 yr	2-50	1511.00	539.00	544.01	544.01	545.81	0.002325	10.75	140.54	470.60	1.00
KIRBY CREEK	MAINSTEM US	19799	2 yr	2-50	610.00	537.47	540.26	540.26	541.40	0.002629	8.57	71.20	246.67	1.00
KIRBY CREEK	MAINSTEM US	19799	100 yr	P-500	1681.00	537.47	542.55	542.55	544.49	0.002304	11.16	150.57	279.89	1.00
KIRBY CREEK	MAINSTEM US	19799	5 yr	2-50	917.00	537.47	541.00	541.00	542.45	0.002508	9.66	94.97	258.84	1.00
KIRBY CREEK	MAINSTEM US	19799	Ultimate 100yr	P-500	1735.00	537.47	542.65	542.65	544.61	0.002291	11.24	154.35	289.75	1.00
KIRBY CREEK	MAINSTEM US	19799	10 yr	2-50	1118.00	537.47	541.46	541.46	543.05	0.002426	10.12	110.51	263.68	1.00
KIRBY CREEK	MAINSTEM US	19799	500yr	P-500	2213.00	537.47	543.41	543.41	545.62	0.002122	11.93	187.31	385.26	0.99
KIRBY CREEK	MAINSTEM US	19799	25 yr	2-50	1336.00	537.47	541.91	541.91	543.64	0.002378	10.58	126.26	270.27	1.00
KIRBY CREEK	MAINSTEM US	19799	50 yr	2-50	1511.00	537.47	542.25	542.25	544.08	0.002329	10.88	138.91	275.36	1.00
KIRBY CREEK	MAINSTEM US	19464	2 yr	2-50	499.00	536.00	538.59	538.59	539.58	0.002746	7.98	62.53	31.43	1.00
KIRBY CREEK	MAINSTEM US	19464	100 yr	P-500	1779.00	536.00	541.28	541.28	543.34	0.002107	11.55	158.02	47.88	0.97
KIRBY CREEK	MAINSTEM US	19464	5 yr	2-50	795.00	536.00	539.33	539.33	540.64	0.002586	9.20	86.39	33.01	1.00
KIRBY CREEK	MAINSTEM US	19464	Ultimate 100yr	P-500	1840.00	536.00	541.39	541.39	543.48	0.002062	11.62	163.71	50.26	0.97
KIRBY CREEK	MAINSTEM US	19464	10 yr	2-50	1059.00	536.00	539.91	539.91	541.46	0.002474	9.99	105.97	34.26	1.00
KIRBY CREEK	MAINSTEM US	19464	500yr	P-500	2307.00	536.00	543.52	542.39	544.72	0.000759	9.14	369.90	153.28	0.63
KIRBY CREEK	MAINSTEM US	19464	25 yr	2-50	1328.00	536.00	540.44	540.44	542.21	0.002361	10.68	124.47	35.66	1.00
KIRBY CREEK	MAINSTEM US	19464	50 yr	2-50	1559.00	536.00	540.86	540.86	542.81	0.002269	11.21	139.87	39.33	0.99
KIRBY CREEK	MAINSTEM US	19333	2 yr	2-50	499.00	534.75	537.59	536.35	537.83	0.000448	3.88	128.62	47.82	0.42
KIRBY CREEK	MAINSTEM US	19333	100 yr	P-500	1779.00	534.75	542.11	538.44	542.46	0.000231	4.80	385.92	99.26	0.34
KIRBY CREEK	MAINSTEM US	19333	5 yr	2-50	795.00	534.75	538.76	536.92	539.04	0.000364	4.28	185.67	50.16	0.39
KIRBY CREEK	MAINSTEM US	19333	Ultimate 100yr	P-500	1840.00	534.75	542.35	538.51	542.70	0.000216	4.77	410.61	130.09	0.33
KIRBY CREEK	MAINSTEM US	19333	10 yr	2-50	1059.00	534.75	539.67	537.38	539.99	0.000326	4.56	232.11	51.86	0.38
KIRBY CREEK	MAINSTEM US	19333	500yr	P-500	2307.00	534.75	544.11	539.11	544.38	0.000131	4.35	834.41	344.06	0.27
KIRBY CREEK	MAINSTEM US	19333	25 yr	2-50	1328.00	534.75	540.51	537.79	540.87	0.000310	4.80	276.88	54.85	0.38
KIRBY CREEK	MAINSTEM US	19333	50 yr	2-50	1559.00	534.75	541.21	538.13	541.59	0.000295	4.92	318.34	67.53	0.37
KIRBY CREEK	MAINSTEM US	19260			Culvert									
KIRBY CREEK	MAINSTEM US	19126	2 yr	2-50	499.00	534.31	537.22	535.95	537.46	0.000436	3.88	128.73	46.77	0.41
KIRBY CREEK	MAINSTEM US	19126	100 yr	P-500	1779.00	534.31	541.00	538.05	541.49	0.000355	5.65	314.63	51.71	0.40
KIRBY CREEK	MAINSTEM US	19126	5 yr	2-50	795.00	534.31	538.30	536.53	538.60	0.000389	4.42	179.91	48.38	0.40
KIRBY CREEK	MAINSTEM US	19126	Ultimate 100yr	P-500	1840.00	534.31	541.14	538.10	541.64	0.000355	5.72	321.82	51.89	0.40
KIRBY CREEK	MAINSTEM US	19126	10 yr	2-50	1059.00	534.31	539.12	536.98	539.48	0.000371	4.81	219.97	49.26	0.40
KIRBY CREEK	MAINSTEM US	19126	500yr	P-500	2307.00	534.31	542.08	538.71	542.68	0.000354	6.20	383.96	109.01	0.41
KIRBY CREEK	MAINSTEM US	19126	25 yr	2-50	1328.00	534.31	539.88	537.41	540.29	0.000361	5.16	257.56	50.25	0.40
KIRBY CREEK	MAINSTEM US	19126	50 yr	2-50	1559.00	534.31	540.46	537.73	540.92	0.000358	5.43	287.24	51.01	0.40
KIRBY CREEK	MAINSTEM US	18839	2 yr	2-50	499.00	533.00	535.99	535.99	537.00	0.002705	8.09	61.66	30.17	1.00
KIRBY CREEK	MAINSTEM US	18839	100 yr	P-500	1779.00	533.00	538.72	538.72	540.83	0.002200	11.67	153.51	41.25	0.99
KIRBY CREEK	MAINSTEM US	18839	5 yr	2-50	795.00	533.00	536.76	536.76	538.10	0.002536	9.29	85.56	31.92	1.00
KIRBY CREEK	MAINSTEM US	18839	Ultimate 100yr	P-500	1840.00	533.00	538.83	538.83	540.98	0.002162	11.76	158.19	43.57	0.99
KIRBY CREEK	MAINSTEM US	18839	10 yr	2-50	1059.00	533.00	537.36	537.36	538.93	0.002420	10.06	105.28	33.32	1.00
KIRBY CREEK	MAINSTEM US	18839	500yr	P-500	2307.00	533.00	539.67	539.67	541.99	0.001888	12.28	202.24	61.26	0.94
KIRBY CREEK	MAINSTEM US	18839	25 yr	2-50	1328.00	533.00	537.90	537.90	539.69	0.002374	10.75	123.49	34.54	1.00
KIRBY CREEK	MAINSTEM US	18839	50 yr	2-50	1559.00	533.00	538.34	538.34	540.29	0.002297	11.22	139.03	36.07	1.00
KIRBY CREEK	MAINSTEM US	18792	2 yr	2-50	499.00	533.00	536.05	535.57	536.66	0.001370	6.25	79.82	34.26	0.72
KIRBY CREEK	MAINSTEM US	18792	100 yr	P-500	1779.00	533.00	538.23	538.23	540.01	0.002353	10.73	165.81	46.76	1.00
KIRBY CREEK	MAINSTEM US	18792	5 yr	2-50	795.00	533.00	536.75	536.30	537.65	0.001574	7.62	104.35	36.55	0.79
KIRBY CREEK	MAINSTEM US	18792	Ultimate 100yr	P-500	1840.00	533.00	538.34	538.34	540.14	0.002319	10.75	171.10	47.52	1.00
KIRBY CREEK	MAINSTEM US	18792	10 yr	2-50	1059.00	533.00	537.11	536.89	538.36	0.002040	8.99	117.77	39.04	0.91
KIRBY CREEK	MAINSTEM US	18792	500yr	P-500	2307.00	533.00	539.03	539.03	540.99	0.002254	11.23	205.35	52.16	1.00
KIRBY CREEK	MAINSTEM US	18792	25 yr	2-50	1328.00	533.00	537.45	537.45	539.03	0.002403	10.09	131.55	41.38	1.00
KIRBY CREEK	MAINSTEM US	18792	50 yr	2-50	1559.00	533.00	537.87	537.87	539.56	0.002371	10.43	149.48	44.28	1.00
KIRBY CREEK	MAINSTEM US	18744	2 yr	2-50	499.00	533.00	536.14	535.30	536.55	0.000846	5.13	97.20	39.65	0.58
KIRBY CREEK	MAINSTEM US	18744	100 yr	P-500	1779.00	533.00	537.95	537.71	539.58	0.001866	10.23	173.96	44.64	0.91
KIRBY CREEK	MAINSTEM US	18744	5 yr	2-50	795.00	533.00	536.91	535.99	537.50	0.000921	6.18	128.66	41.96	0.62
KIRBY CREEK	MAINSTEM US	18744	Ultimate 100yr	P-500	1840.00	533.00	537.97	537.79	539.69	0.001965	10.52	174.87	44.69	0.94
KIRBY CREEK	MAINSTEM US	18744	10 yr	2-50	1059.00	533.00	537.34	536.52	538.15	0.001088	7.19	147.26	43.09	0.69
KIRBY CREEK	MAINSTEM US	18744	500yr	P-500	2307.00	533.00	538.45	538.45	540.59	0.002185	11.74	196.54	45.90	1.00
KIRBY CREEK	MAINSTEM US	18744	25 yr	2-50	1328.00	533.00	537.66	537.00	538.72	0.001306	8.24	161.15	43.91	0.76
KIRBY CREEK	MAINSTEM US	18744	50 yr	2-50	1559.00	533.00	537.85	537.36	539.16	0.001552	9.21	169.34	44.38	0.83
KIRBY CREEK	MAINSTEM US	18691	2 yr	2-50	499.00	532.21	536.26	534.50	536.45	0.000290	3.56	140.29	43.94	0.35
KIRBY CREEK	MAINSTEM US	18691	100 yr	P-500	1779.00	532.21	538.43	536.80	539.28	0.000726	7.39	240.62	48.52	0.59
KIRBY CREEK	MAINSTEM US	18691	5 yr	2-50	795.00	532.21	537.07	535.16	537.38	0.000366	4.50	176.60	45.61	0.40
KIRBY CREEK	MAINSTEM US	18691	Ultimate 100yr	P-500	1840.00	532.21	538.48	536.89	539.37	0.000751	7.56	243.36	48.63	0.60
KIRBY CREEK	MAINSTEM US	18691	10 yr	2-50	1059.00	532.21	537.56	535.66	538.00	0.000451	5.32	199.24	46.67	0.45
KIRBY CREEK	MAINSTEM US	18691	500yr	P-500	2307.00	532.21	538.81	537.52	540.04	0.000981	8.89	259.45	49.51	0.68
KIRBY CREEK	MAINSTEM US	18691	25 yr	2-50	1328.00	532.21	537.95	536.11	538.53	0.000546	6.10	217.54	47.53	0.50
KIRBY CREEK	MAINSTEM US	18691	50 yr	2-50	1559.00	532.21	538.21	536.47	538.92	0.000636	6.77	230.20	48.09	0.55
KIRBY CREEK	MAINSTEM US	18496	2 yr	2-50	499.00	532.00	536.29	533.66	536.38	0.000104				

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
KIRBY CREEK	MAINSTEM US	18444	100 yr	P-500	1779.00	532.00	538.50	536.39	539.02	0.000443	5.79	307.38	72.76	0.46
KIRBY CREEK	MAINSTEM US	18444	5 yr	2-50	795.00	532.00	537.06	534.99	537.27	0.000250	3.62	219.50	59.86	0.33
KIRBY CREEK	MAINSTEM US	18444	Ultimate 100yr	P-500	1840.00	532.00	538.56	536.45	539.10	0.000456	5.91	311.32	73.81	0.47
KIRBY CREEK	MAINSTEM US	18444	10 yr	2-50	1059.00	532.00	537.57	535.45	537.85	0.000296	4.23	250.08	60.90	0.37
KIRBY CREEK	MAINSTEM US	18444	500yr	P-500	2307.00	532.00	538.94	536.97	539.68	0.000571	6.88	335.49	81.14	0.53
KIRBY CREEK	MAINSTEM US	18444	25 yr	2-50	1328.00	532.00	537.98	535.82	538.34	0.000347	4.83	275.05	61.67	0.40
KIRBY CREEK	MAINSTEM US	18444	50 yr	2-50	1559.00	532.00	538.26	536.12	538.70	0.000396	5.33	292.62	68.78	0.43
KIRBY CREEK	MAINSTEM US	18397	2 yr	2-50	499.00	531.00	536.27	533.30	536.33	0.000628	2.00	249.43	64.58	0.18
KIRBY CREEK	MAINSTEM US	18397	100 yr	P-500	1779.00	531.00	538.65	535.18	538.91	0.001524	4.18	477.70	188.79	0.30
KIRBY CREEK	MAINSTEM US	18397	5 yr	2-50	795.00	531.00	537.11	533.84	537.22	0.000872	2.61	305.14	67.63	0.22
KIRBY CREEK	MAINSTEM US	18397	Ultimate 100yr	P-500	1840.00	531.00	538.72	535.26	538.99	0.001544	4.25	491.62	191.07	0.30
KIRBY CREEK	MAINSTEM US	18397	10 yr	2-50	1059.00	531.00	537.64	534.25	537.79	0.001072	3.11	342.05	73.32	0.24
KIRBY CREEK	MAINSTEM US	18397	500yr	P-500	2307.00	531.00	539.20	535.79	539.51	0.001701	4.69	588.10	210.44	0.32
KIRBY CREEK	MAINSTEM US	18397	25 yr	2-50	1328.00	531.00	538.07	534.62	538.27	0.001280	3.58	374.45	143.20	0.27
KIRBY CREEK	MAINSTEM US	18397	50 yr	2-50	1559.00	531.00	538.38	534.91	538.61	0.001428	3.93	427.77	180.37	0.29
KIRBY CREEK	MAINSTEM US	18126	2 yr	2-50	499.00	528.00	535.88	533.00	536.05	0.002546	3.47	185.82	124.61	0.29
KIRBY CREEK	MAINSTEM US	18126	100 yr	P-500	1779.00	528.00	538.18	535.41	538.41	0.002810	4.80	603.74	240.10	0.32
KIRBY CREEK	MAINSTEM US	18126	5 yr	2-50	795.00	528.00	536.68	536.87	537.22	0.002614	3.92	296.56	146.22	0.30
KIRBY CREEK	MAINSTEM US	18126	Ultimate 100yr	P-500	1840.00	528.00	538.26	538.48	538.48	0.002815	4.83	621.49	245.15	0.32
KIRBY CREEK	MAINSTEM US	18126	10 yr	2-50	1059.00	528.00	537.18	537.39	537.79	0.002747	4.27	381.82	211.30	0.31
KIRBY CREEK	MAINSTEM US	18126	500yr	P-500	2307.00	528.00	538.72	538.97	539.50	0.002950	5.17	742.73	277.65	0.34
KIRBY CREEK	MAINSTEM US	18126	25 yr	2-50	1328.00	528.00	537.61	537.82	538.27	0.002721	4.45	475.11	219.52	0.31
KIRBY CREEK	MAINSTEM US	18126	50 yr	2-50	1559.00	528.00	537.92	538.13	538.61	0.002758	4.63	542.83	225.41	0.32
KIRBY CREEK	MAINSTEM US	17876	2 yr	2-50	499.00	528.00	535.46	531.70	535.56	0.001247	2.65	244.24	135.03	0.21
KIRBY CREEK	MAINSTEM US	17876	100 yr	P-500	1779.00	528.00	537.61	535.50	537.79	0.001989	4.25	686.67	269.37	0.28
KIRBY CREEK	MAINSTEM US	17876	5 yr	2-50	795.00	528.00	536.20	532.69	536.34	0.001532	3.23	363.10	180.45	0.24
KIRBY CREEK	MAINSTEM US	17876	Ultimate 100yr	P-500	1840.00	528.00	537.68	535.61	537.87	0.001992	4.28	706.31	271.45	0.28
KIRBY CREEK	MAINSTEM US	17876	10 yr	2-50	1059.00	528.00	536.66	533.42	536.81	0.001741	3.61	450.06	209.01	0.25
KIRBY CREEK	MAINSTEM US	17876	500yr	P-500	2307.00	528.00	538.11	538.25	538.31	0.002176	4.64	823.64	320.00	0.29
KIRBY CREEK	MAINSTEM US	17876	25 yr	2-50	1328.00	528.00	537.07	534.07	537.24	0.001845	3.88	545.93	254.13	0.27
KIRBY CREEK	MAINSTEM US	17876	50 yr	2-50	1559.00	528.00	537.36	535.05	537.54	0.001925	4.08	620.32	262.28	0.27
KIRBY CREEK	MAINSTEM US	17526	2 yr	2-50	703.00	527.00	534.70	533.30	534.88	0.004195	3.77	248.67	149.15	0.36
KIRBY CREEK	MAINSTEM US	17526	100 yr	P-500	2521.00	527.00	536.30	535.56	536.69	0.006930	6.24	627.67	285.39	0.49
KIRBY CREEK	MAINSTEM US	17526	5 yr	2-50	1162.00	527.00	535.17	534.28	535.46	0.006092	4.94	335.14	233.14	0.44
KIRBY CREEK	MAINSTEM US	17526	Ultimate 100yr	P-500	2622.00	527.00	536.37	535.62	536.76	0.007013	6.32	645.02	288.82	0.49
KIRBY CREEK	MAINSTEM US	17526	10 yr	2-50	1506.00	527.00	535.51	534.66	535.83	0.006481	5.38	416.47	247.41	0.46
KIRBY CREEK	MAINSTEM US	17526	500yr	P-500	3173.00	527.00	536.68	535.90	537.11	0.007388	6.75	737.88	307.68	0.51
KIRBY CREEK	MAINSTEM US	17526	25 yr	2-50	1896.00	527.00	535.88	535.13	536.22	0.006389	5.65	512.48	263.41	0.46
KIRBY CREEK	MAINSTEM US	17526	50 yr	2-50	2217.00	527.00	536.11	535.36	536.47	0.006710	5.98	572.20	274.09	0.48
KIRBY CREEK	MAINSTEM US	17238	2 yr	2-50	703.00	526.00	532.35	530.77	533.00	0.013053	6.49	108.27	698.03	0.78
KIRBY CREEK	MAINSTEM US	17238	100 yr	P-500	2521.00	526.00	535.25	533.72	535.33	0.001903	2.41	1268.24	1652.37	0.24
KIRBY CREEK	MAINSTEM US	17238	5 yr	2-50	1162.00	526.00	533.59	533.09	533.74	0.005538	3.28	419.37	1234.37	0.46
KIRBY CREEK	MAINSTEM US	17238	Ultimate 100yr	P-500	2622.00	526.00	535.30	533.75	535.38	0.001943	2.45	1293.92	1658.00	0.24
KIRBY CREEK	MAINSTEM US	17238	10 yr	2-50	1506.00	526.00	534.45	533.30	534.52	0.002118	2.25	830.97	1508.93	0.26
KIRBY CREEK	MAINSTEM US	17238	500yr	P-500	3173.00	526.00	535.56	533.93	535.64	0.002109	2.65	1432.79	1888.24	0.25
KIRBY CREEK	MAINSTEM US	17238	25 yr	2-50	1896.00	526.00	534.92	533.47	534.98	0.001671	2.14	1085.37	1526.52	0.22
KIRBY CREEK	MAINSTEM US	17238	50 yr	2-50	2217.00	526.00	535.10	533.61	535.16	0.001798	2.28	1182.62	1633.60	0.23
KIRBY CREEK	MAINSTEM US	17223		Bridge										
KIRBY CREEK	MAINSTEM US	17166	2 yr	2-50	703.00	524.00	530.01	529.10	530.97	0.017551	7.89	92.22	31.53	0.72
KIRBY CREEK	MAINSTEM US	17166	100 yr	P-500	2521.00	524.00	533.92	533.92	534.56	0.011480	7.51	526.62	467.82	0.59
KIRBY CREEK	MAINSTEM US	17166	5 yr	2-50	1162.00	524.00	531.25	530.81	532.45	0.019252	9.06	139.50	45.23	0.77
KIRBY CREEK	MAINSTEM US	17166	Ultimate 100yr	P-500	2622.00	524.00	533.96	533.96	534.61	0.011701	7.62	545.10	472.90	0.60
KIRBY CREEK	MAINSTEM US	17166	10 yr	2-50	1506.00	524.00	531.93	531.62	533.25	0.019629	9.61	172.12	52.69	0.78
KIRBY CREEK	MAINSTEM US	17166	500yr	P-500	3173.00	524.00	534.26	534.26	534.83	0.010902	7.64	719.12	617.44	0.58
KIRBY CREEK	MAINSTEM US	17166	25 yr	2-50	1896.00	524.00	532.91	532.48	534.02	0.021207	8.94	230.81	78.19	0.78
KIRBY CREEK	MAINSTEM US	17166	50 yr	2-50	2217.00	524.00	533.59	533.59	534.37	0.013854	7.88	389.35	362.33	0.64
KIRBY CREEK	MAINSTEM US	16948	2 yr	2-50	703.00	521.00	527.68	526.10	528.00	0.006796	4.57	153.98	50.35	0.46
KIRBY CREEK	MAINSTEM US	16948	100 yr	P-500	2521.00	521.00	531.09	528.99	531.82	0.006157	7.05	396.77	322.65	0.49
KIRBY CREEK	MAINSTEM US	16948	5 yr	2-50	1162.00	521.00	528.76	527.11	529.23	0.006909	5.49	213.70	60.31	0.48
KIRBY CREEK	MAINSTEM US	16948	Ultimate 100yr	P-500	2622.00	521.00	531.25	529.12	531.98	0.006029	7.09	415.04	368.45	0.49
KIRBY CREEK	MAINSTEM US	16948	10 yr	2-50	1506.00	521.00	529.42	527.65	529.99	0.006869	6.06	255.36	66.82	0.50
KIRBY CREEK	MAINSTEM US	16948	500yr	P-500	3173.00	521.00	532.08	529.73	532.78	0.005261	7.17	562.67	799.88	0.47
KIRBY CREEK	MAINSTEM US	16948	25 yr	2-50	1896.00	521.00	530.08	528.19	530.74	0.006798	6.59	302.08	75.02	0.50
KIRBY CREEK	MAINSTEM US	16948	50 yr	2-50	2217.00	521.00	530.61	528.61	531.31	0.006536	6.88	346.52	120.29	0.50
KIRBY CREEK	MAINSTEM US	16894		Bridge										
KIRBY CREEK	MAINSTEM US	16828	2 yr	2-50	703.00	521.00	526.44	524.78	526.56	0.002982	3.13	287.52	163.85	0.31
KIRBY CREEK	MAINSTEM US	16828	100 yr	P-500	2521.00	521.00	530.34	526.88	530.42	0.000886	2.84	1162.44	287.54	0.19
KIRBY CREEK	MAINSTEM US	16828	5 yr	2-50	1162.00	521.00	527.58	525.91	527.68	0.001945	2.99	495.41	200.23	0.26
KIRBY CREEK	MAINSTEM US	16828	Ultimate 100yr	P-500	2622.00	521.00	530.53	526.94	530.61	0.000845	2.83	1217.62	294.64	0.19
KIRBY CREEK	MAINSTEM US	16828	10 yr	2-50	1506.00	521.00	528.35	526.20	528.44	0.001497	2.94	656.79	222.19	0.23
KIRBY CREEK	MAINSTEM US	16828	500yr	P-500	3173.00	521.00	531.50	527.19	531.58	0.000673	2.75	1518.86	400.82	0.17
KIRBY CREEK	MAINSTEM US	16828	25 yr	2-50	1896.00	521.00	529.14	526.49	529.23	0.001196	2.91	842.58	245.86	0.21
KIRBY CREEK	MAINSTEM US	16828	50 yr	2-50	2217.00	521.00	529.77	526.70	529.86	0.001019	2.88	1004.35	267.65	0.20
KIRBY CREEK	MAINSTEM US	16614	2 yr	2-50	703.00	519.34	524.92	525.43	525.43	0.011557	5.71	123.17	42.56	0.59
KIRBY CREEK	MAINSTEM US	16614	100 yr	P-500	2521.00	519.34	528.70	529.78	529.78	0.008789	8.38	308.13	54.84	0.59
KIRBY CREEK	MAINSTEM US	16614	5 yr	2-50	1162.00	519.34	526.16	526.81	527.61	0.010459	6.51	178.49	47.07	0.59
KIRBY CREEK	MAINSTEM US	16614	Ultimate 100yr	P-500	2622.00	519.34	528.88	529.98	529.98	0.008658	8.47	317.79	55.38	0.58

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
KIRBY CREEK	MAINSTEM US	14354	2 yr	2-50	545.00	508.56	514.36		514.83	0.009792	5.49	99.29	36.15	0.58
KIRBY CREEK	MAINSTEM US	14354	100 yr	P-500	2392.00	508.56	520.68		521.19	0.002683	5.84	432.77	78.93	0.36
KIRBY CREEK	MAINSTEM US	14354	5 yr	2-50	976.00	508.56	515.97		516.52	0.007738	5.95	164.15	44.15	0.54
KIRBY CREEK	MAINSTEM US	14354	Ultimate 100yr	P-500	2530.00	508.56	521.14		521.63	0.002425	5.76	470.75	89.65	0.35
KIRBY CREEK	MAINSTEM US	14354	10 yr	2-50	1337.00	508.56	517.23		517.79	0.006020	6.02	222.25	48.97	0.49
KIRBY CREEK	MAINSTEM US	14354	500yr	P-500	3250.00	508.56	522.66		523.12	0.001929	5.73	651.11	140.83	0.32
KIRBY CREEK	MAINSTEM US	14354	25 yr	2-50	1698.00	508.56	518.44		519.00	0.004377	6.00	286.69	56.83	0.44
KIRBY CREEK	MAINSTEM US	14354	50 yr	2-50	2041.00	508.56	519.59		520.12	0.003346	5.91	355.81	64.20	0.40
KIRBY CREEK	MAINSTEM US	14182	2 yr	2-50	545.00	508.00	512.70	511.52	513.21	0.008901	5.75	94.78	29.89	0.57
KIRBY CREEK	MAINSTEM US	14182	100 yr	P-500	2392.00	508.00	520.16	515.46	520.71	0.002789	6.04	409.92	68.09	0.36
KIRBY CREEK	MAINSTEM US	14182	5 yr	2-50	976.00	508.00	514.75	512.75	515.31	0.006224	6.01	162.36	35.71	0.50
KIRBY CREEK	MAINSTEM US	14182	Ultimate 100yr	P-500	2530.00	508.00	520.66	515.67	521.20	0.002513	5.95	445.99	75.10	0.35
KIRBY CREEK	MAINSTEM US	14182	10 yr	2-50	1337.00	508.00	516.25	513.57	516.83	0.005043	6.11	218.68	39.37	0.46
KIRBY CREEK	MAINSTEM US	14182	500yr	P-500	3250.00	508.00	522.21	516.71	522.76	0.002176	6.15	595.99	157.25	0.33
KIRBY CREEK	MAINSTEM US	14182	25 yr	2-50	1698.00	508.00	517.67	514.28	518.25	0.004230	6.13	277.18	43.16	0.43
KIRBY CREEK	MAINSTEM US	14182	50 yr	2-50	2041.00	508.00	518.95	514.89	519.52	0.003479	6.09	337.11	52.45	0.40
KIRBY CREEK	MAINSTEM US	14111	2 yr	2-50	545.00	507.62	512.69	509.31	512.75	0.000282	2.10	259.85	60.24	0.18
KIRBY CREEK	MAINSTEM US	14111	100 yr	P-500	2392.00	507.62	520.36	511.92	520.48	0.000157	2.79	861.18	128.54	0.15
KIRBY CREEK	MAINSTEM US	14111	5 yr	2-50	976.00	507.62	514.85	510.06	514.94	0.000271	2.41	404.76	74.25	0.18
KIRBY CREEK	MAINSTEM US	14111	Ultimate 100yr	P-500	2530.00	507.62	520.86	512.08	520.98	0.000150	2.81	904.09	134.41	0.15
KIRBY CREEK	MAINSTEM US	14111	10 yr	2-50	1337.00	507.62	516.40	510.60	516.50	0.000238	2.54	525.96	110.40	0.18
KIRBY CREEK	MAINSTEM US	14111	500yr	P-500	3250.00	507.62	522.42	512.89	522.55	0.000140	2.91	1271.64	243.06	0.15
KIRBY CREEK	MAINSTEM US	14111	25 yr	2-50	1698.00	507.62	517.85	511.08	517.95	0.000204	2.63	645.65	96.41	0.17
KIRBY CREEK	MAINSTEM US	14111	50 yr	2-50	2041.00	507.62	519.14	511.51	519.26	0.000175	2.70	756.64	112.71	0.16
KIRBY CREEK	MAINSTEM US	14040			Culvert									
KIRBY CREEK	MAINSTEM US	13971	2 yr	2-50	545.00	507.03	512.47	508.57	512.52	0.000448	1.72	316.55	78.51	0.13
KIRBY CREEK	MAINSTEM US	13971	100 yr	P-500	2392.00	507.03	518.18	510.87	518.39	0.000748	3.63	659.12	140.61	0.19
KIRBY CREEK	MAINSTEM US	13971	5 yr	2-50	976.00	507.03	514.50	509.21	514.57	0.000487	2.23	438.01	88.10	0.15
KIRBY CREEK	MAINSTEM US	13971	Ultimate 100yr	P-500	2530.00	507.03	518.41	511.01	518.63	0.000782	3.76	672.86	151.70	0.20
KIRBY CREEK	MAINSTEM US	13971	10 yr	2-50	1337.00	507.03	515.78	509.68	515.88	0.000532	2.60	514.96	94.18	0.16
KIRBY CREEK	MAINSTEM US	13971	500yr	P-500	3250.00	507.03	519.82	511.70	519.96	0.000614	3.02	1181.47	208.72	0.17
KIRBY CREEK	MAINSTEM US	13971	25 yr	2-50	1698.00	507.03	516.79	510.12	516.93	0.000591	2.95	575.89	99.29	0.17
KIRBY CREEK	MAINSTEM US	13971	50 yr	2-50	2041.00	507.03	517.58	510.50	517.75	0.000657	3.28	623.18	106.76	0.18
KIRBY CREEK	MAINSTEM US	13820	2 yr	2-50	545.00	505.00	512.01		512.32	0.004567	4.42	123.22	28.79	0.38
KIRBY CREEK	MAINSTEM US	13820	100 yr	P-500	2392.00	505.00	516.81		517.91	0.006625	8.54	306.30	50.38	0.51
KIRBY CREEK	MAINSTEM US	13820	5 yr	2-50	976.00	505.00	513.87		514.33	0.004598	5.41	182.33	35.22	0.40
KIRBY CREEK	MAINSTEM US	13820	Ultimate 100yr	P-500	2530.00	505.00	516.94		518.13	0.007046	8.89	312.53	51.09	0.53
KIRBY CREEK	MAINSTEM US	13820	10 yr	2-50	1337.00	505.00	515.01		515.60	0.004670	6.14	225.33	40.21	0.41
KIRBY CREEK	MAINSTEM US	13820	500yr	P-500	3250.00	505.00	517.80		519.36	0.008288	10.25	360.04	59.74	0.58
KIRBY CREEK	MAINSTEM US	13820	25 yr	2-50	1698.00	505.00	515.87		516.59	0.005026	6.89	261.36	44.54	0.44
KIRBY CREEK	MAINSTEM US	13820	50 yr	2-50	2041.00	505.00	516.48		517.36	0.005558	7.62	289.66	48.39	0.46
KIRBY CREEK	MAINSTEM US	13672	2 yr	2-50	545.00	505.00	510.62		511.29	0.012637	6.55	83.19	23.02	0.61
KIRBY CREEK	MAINSTEM US	13672	100 yr	P-500	2392.00	505.00	515.54	515.21	516.72	0.010011	9.40	375.32	145.32	0.60
KIRBY CREEK	MAINSTEM US	13672	5 yr	2-50	976.00	505.00	512.36		513.28	0.012745	7.72	126.42	26.80	0.63
KIRBY CREEK	MAINSTEM US	13672	Ultimate 100yr	P-500	2530.00	505.00	515.81	515.40	516.91	0.009237	9.24	414.34	147.04	0.58
KIRBY CREEK	MAINSTEM US	13672	10 yr	2-50	1337.00	505.00	513.35	511.82	514.51	0.013333	8.67	157.69	51.70	0.65
KIRBY CREEK	MAINSTEM US	13672	500yr	P-500	3250.00	505.00	517.35		518.07	0.005585	8.09	648.33	156.99	0.46
KIRBY CREEK	MAINSTEM US	13672	25 yr	2-50	1698.00	505.00	514.25	512.67	515.49	0.011989	9.10	219.50	84.27	0.64
KIRBY CREEK	MAINSTEM US	13672	50 yr	2-50	2041.00	505.00	514.93	513.92	516.21	0.011298	9.45	287.93	132.85	0.63
KIRBY CREEK	MAINSTEM MID	13143	2 yr	2-50	438.00	501.00	508.01		508.20	0.002635	3.49	123.27	26.71	0.28
KIRBY CREEK	MAINSTEM MID	13143	100 yr	P-500	1846.00	501.00	513.40		513.96	0.003338	6.14	334.21	54.59	0.35
KIRBY CREEK	MAINSTEM MID	13143	5 yr	2-50	738.00	501.00	509.79		510.06	0.002932	4.17	176.79	31.02	0.31
KIRBY CREEK	MAINSTEM MID	13143	Ultimate 100yr	P-500	1984.00	501.00	513.73		514.33	0.003379	6.32	352.60	55.94	0.36
KIRBY CREEK	MAINSTEM MID	13143	10 yr	2-50	971.00	501.00	510.77		511.11	0.003020	4.68	209.13	35.07	0.32
KIRBY CREEK	MAINSTEM MID	13143	500yr	P-500	2839.00	501.00	515.52		516.29	0.003612	7.33	460.34	65.91	0.38
KIRBY CREEK	MAINSTEM MID	13143	25 yr	2-50	1300.00	501.00	511.89		512.33	0.003162	5.31	256.94	47.79	0.34
KIRBY CREEK	MAINSTEM MID	13143	50 yr	2-50	1567.00	501.00	512.67		513.17	0.003256	5.74	295.59	51.63	0.35
KIRBY CREEK	MAINSTEM MID	12896	2 yr	2-50	438.00	501.00	507.41		507.56	0.002474	3.03	144.54	33.94	0.26
KIRBY CREEK	MAINSTEM MID	12896	100 yr	P-500	1846.00	501.00	512.96		513.22	0.001882	4.40	557.31	123.14	0.26
KIRBY CREEK	MAINSTEM MID	12896	5 yr	2-50	738.00	501.00	509.18		509.37	0.002453	3.53	209.52	39.69	0.27
KIRBY CREEK	MAINSTEM MID	12896	Ultimate 100yr	P-500	1984.00	501.00	513.32		513.58	0.001828	4.44	601.64	126.59	0.25
KIRBY CREEK	MAINSTEM MID	12896	10 yr	2-50	971.00	501.00	510.18		510.41	0.002386	3.89	262.37	78.73	0.27
KIRBY CREEK	MAINSTEM MID	12896	500yr	P-500	2839.00	501.00	515.22		515.49	0.001604	4.70	884.57	159.71	0.24
KIRBY CREEK	MAINSTEM MID	12896	25 yr	2-50	1300.00	501.00	511.36		511.61	0.002192	4.17	372.80	105.45	0.27
KIRBY CREEK	MAINSTEM MID	12896	50 yr	2-50	1567.00	501.00	512.19		512.44	0.002025	4.30	464.44	115.55	0.26
KIRBY CREEK	MAINSTEM MID	12606	2 yr	2-50	438.00	496.64	504.37		504.67	0.004355	4.38	101.91	26.18	0.36
KIRBY CREEK	MAINSTEM MID	12606	100 yr	P-500	1846.00	496.64	509.34		510.08	0.004744	7.45	335.94	72.44	0.42
KIRBY CREEK	MAINSTEM MID	12606	5 yr	2-50	738.00	496.64	505.91		506.35	0.004496	5.39	149.37	37.44	0.38
KIRBY CREEK	MAINSTEM MID	12606	Ultimate 100yr	P-500	1984.00	496.64	509.63		510.39	0.004822	7.66	356.99	75.87	0.43
KIRBY CREEK	MAINSTEM MID	12606	10 yr	2-50	971.00	496.64	506.85		507.37	0.004559	5.97	189.03	46.79	0.40
KIRBY CREEK	MAINSTEM MID	12606	500yr	P-500	2839.00	496.64	511.10		512.04	0.005288	8.80	482.95	97.65	0.46
KIRBY CREEK	MAINSTEM MID	12606	25 yr	2-50	1300.00	496.64	507.94		508.55	0.004592	6.60	245.73	56.99	0.41
KIRBY CREEK	MAINSTEM MID	12606	50 yr	2-50	1567.00	496.64	508.69		509.36	0.004631	7.02	290.98	64.47	0.41
KIRBY CREEK	MAINSTEM MID	11513	2 yr	2-50	438.00	494.41	500.34		500.86	0.009861	5.75	76.27	21.28	0.53
KIRBY CREEK	MAINSTEM MID	11513	100 yr	P-500	1846.00	494.41	504.17	503.26	505.80	0.013452	10.76	219.66	68.60	0.69
KIRBY CREEK	MAINSTEM MID	11513	5 yr	2-50	738.00	494.41	501.57		502.37	0.010644	7.22	106.30	28.28	0.57
KIRBY CREEK	MAINSTEM MID	11513	Ultimate 100yr	P-500	1984.00	494.41	504.40	503.82	506.09	0.013553	11.02	235.80	70.60	0.70
KIRBY CREEK	MAINSTEM MID	11513	10 yr	2-50	971.00	494.41	502.27		503.29	0.011517	8.20	127.79	33.50	0.61

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
KIRBY CREEK	MAINSTEM MID	11513	500yr	P-500	2839.00	494.41	505.65	505.32	507.58	0.013783	12.28	331.13	81.56	0.72
KIRBY CREEK	MAINSTEM MID	11513	25 yr	2-50	1300.00	494.41	503.09		504.39	0.012470	9.35	158.33	42.17	0.65
KIRBY CREEK	MAINSTEM MID	11513	50 yr	2-50	1567.00	494.41	503.65	502.55	505.15	0.013083	10.13	186.67	58.11	0.67
KIRBY CREEK	MAINSTEM MID	11073	2 yr	2-50	438.00	491.00	496.30		496.71	0.008839	5.18	84.50	26.52	0.51
KIRBY CREEK	MAINSTEM MID	11073	100 yr	P-500	1846.00	491.00	500.33		501.19	0.007314	7.96	294.22	69.74	0.53
KIRBY CREEK	MAINSTEM MID	11073	5 yr	2-50	738.00	491.00	497.56		498.13	0.008359	6.08	128.54	48.37	0.52
KIRBY CREEK	MAINSTEM MID	11073	Ultimate 100yr	P-500	1984.00	491.00	500.59		501.48	0.007295	8.14	312.20	71.35	0.53
KIRBY CREEK	MAINSTEM MID	11073	10 yr	2-50	971.00	491.00	498.30		498.95	0.007924	6.59	166.80	54.97	0.52
KIRBY CREEK	MAINSTEM MID	11073	500yr	P-500	2839.00	491.00	501.96		503.02	0.007300	9.14	416.12	80.25	0.55
KIRBY CREEK	MAINSTEM MID	11073	25 yr	2-50	1300.00	491.00	499.17		499.90	0.007588	7.18	217.36	61.94	0.52
KIRBY CREEK	MAINSTEM MID	11073	50 yr	2-50	1567.00	491.00	499.77		500.57	0.007409	7.58	256.12	66.09	0.53
KIRBY CREEK	MAINSTEM MID	10813	2 yr	2-50	438.00	489.25	494.94		495.13	0.002845	3.53	124.89	32.14	0.30
KIRBY CREEK	MAINSTEM MID	10813	100 yr	P-500	1846.00	489.25	498.92		499.65	0.004712	7.10	312.15	68.66	0.44
KIRBY CREEK	MAINSTEM MID	10813	5 yr	2-50	738.00	489.25	496.25		496.56	0.003203	4.50	170.13	38.24	0.34
KIRBY CREEK	MAINSTEM MID	10813	Ultimate 100yr	P-500	1984.00	489.25	499.15		499.93	0.004880	7.36	328.16	71.34	0.45
KIRBY CREEK	MAINSTEM MID	10813	10 yr	2-50	971.00	489.25	496.99		497.40	0.003570	5.16	201.39	46.35	0.36
KIRBY CREEK	MAINSTEM MID	10813	500yr	P-500	2839.00	489.25	500.37		501.43	0.005767	8.76	425.84	88.95	0.50
KIRBY CREEK	MAINSTEM MID	10813	25 yr	2-50	1300.00	489.25	497.83		498.37	0.004038	5.98	244.35	55.86	0.40
KIRBY CREEK	MAINSTEM MID	10813	50 yr	2-50	1567.00	489.25	498.40		499.04	0.004375	6.55	278.26	62.61	0.42
KIRBY CREEK	MAINSTEM MID	10252	2 yr	2-50	438.00	487.43	492.52		492.87	0.006804	4.75	92.18	27.34	0.45
KIRBY CREEK	MAINSTEM MID	10252	100 yr	P-500	1846.00	487.43	496.27		496.93	0.006005	7.29	362.43	98.49	0.48
KIRBY CREEK	MAINSTEM MID	10252	5 yr	2-50	738.00	487.43	493.69		494.17	0.006590	5.66	152.19	64.60	0.47
KIRBY CREEK	MAINSTEM MID	10252	Ultimate 100yr	P-500	1984.00	487.43	496.48		497.16	0.006042	7.46	383.09	99.16	0.49
KIRBY CREEK	MAINSTEM MID	10252	10 yr	2-50	971.00	487.43	494.38		494.90	0.006388	6.12	199.25	72.95	0.47
KIRBY CREEK	MAINSTEM MID	10252	500yr	P-500	2839.00	487.43	497.74		498.50	0.005868	8.17	510.57	103.25	0.49
KIRBY CREEK	MAINSTEM MID	10252	25 yr	2-50	1300.00	487.43	495.16		495.75	0.006322	6.68	259.85	82.84	0.48
KIRBY CREEK	MAINSTEM MID	10252	50 yr	2-50	1567.00	487.43	495.74		496.38	0.006169	7.02	311.18	93.10	0.48
KIRBY CREEK	MAINSTEM MID	9794	2 yr	2-50	438.00	485.18	490.12		490.37	0.003999	4.03	111.23	35.87	0.36
KIRBY CREEK	MAINSTEM MID	9794	100 yr	P-500	1846.00	485.18	495.00		495.23	0.001732	4.56	590.30	179.22	0.27
KIRBY CREEK	MAINSTEM MID	9794	5 yr	2-50	738.00	485.18	491.80		492.04	0.002676	4.19	211.94	77.86	0.31
KIRBY CREEK	MAINSTEM MID	9794	Ultimate 100yr	P-500	1984.00	485.18	495.23		495.45	0.001737	4.64	630.12	180.45	0.27
KIRBY CREEK	MAINSTEM MID	9794	10 yr	2-50	971.00	485.18	492.74		492.97	0.002170	4.19	292.01	91.22	0.29
KIRBY CREEK	MAINSTEM MID	9794	500yr	P-500	2839.00	485.18	496.67		496.90	0.001545	4.83	896.66	189.73	0.26
KIRBY CREEK	MAINSTEM MID	9794	25 yr	2-50	1300.00	485.18	493.65		493.89	0.002050	4.44	379.68	102.62	0.29
KIRBY CREEK	MAINSTEM MID	9794	50 yr	2-50	1567.00	485.18	494.35		494.59	0.001922	4.56	475.94	169.87	0.28
KIRBY CREEK	MAINSTEM DS	9393	2 yr	2-50	1050.00	479.00	488.64	483.58	488.71	0.000840	2.32	524.27	107.20	0.16
KIRBY CREEK	MAINSTEM DS	9393	100 yr	P-500	3560.00	479.00	494.28	486.60	494.39	0.000684	3.22	1725.88	271.77	0.16
KIRBY CREEK	MAINSTEM DS	9393	5 yr	2-50	1695.00	479.00	490.75	484.61	490.84	0.000787	2.73	731.36	194.06	0.17
KIRBY CREEK	MAINSTEM DS	9393	Ultimate 100yr	P-500	3720.00	479.00	494.50	486.74	494.61	0.000678	3.24	1786.83	272.77	0.16
KIRBY CREEK	MAINSTEM DS	9393	10 yr	2-50	2149.00	479.00	491.83	485.20	491.94	0.000835	3.05	1079.66	251.46	0.17
KIRBY CREEK	MAINSTEM DS	9393	500yr	P-500	4687.00	479.00	496.04	487.45	496.15	0.000589	3.27	2213.66	282.08	0.16
KIRBY CREEK	MAINSTEM DS	9393	25 yr	2-50	2691.00	479.00	492.10	485.79	492.90	0.000785	3.15	1328.20	262.50	0.17
KIRBY CREEK	MAINSTEM DS	9393	50 yr	2-50	3130.00	479.00	493.56	486.22	493.66	0.000733	3.19	1530.08	267.93	0.17
KIRBY CREEK	MAINSTEM DS	8980	2 yr	2-50	1050.00	479.00	487.82		488.17	0.003352	4.71	223.53	39.74	0.34
KIRBY CREEK	MAINSTEM DS	8980	100 yr	P-500	3560.00	479.00	493.75		494.04	0.001589	5.17	1139.57	219.65	0.27
KIRBY CREEK	MAINSTEM DS	8980	5 yr	2-50	1695.00	479.00	489.86		490.33	0.003105	5.53	340.40	110.45	0.35
KIRBY CREEK	MAINSTEM DS	8980	Ultimate 100yr	P-500	3720.00	479.00	493.99		494.27	0.001553	5.18	1191.25	220.72	0.26
KIRBY CREEK	MAINSTEM DS	8980	10 yr	2-50	2149.00	479.00	490.99		491.43	0.002659	5.59	549.93	206.70	0.33
KIRBY CREEK	MAINSTEM DS	8980	500yr	P-500	4687.00	479.00	495.63		495.87	0.001221	5.00	1559.63	228.05	0.24
KIRBY CREEK	MAINSTEM DS	8980	25 yr	2-50	2691.00	479.00	492.10		492.47	0.002163	5.45	781.65	212.47	0.30
KIRBY CREEK	MAINSTEM DS	8980	50 yr	2-50	3130.00	479.00	492.96		493.28	0.001832	5.30	965.52	216.22	0.28
KIRBY CREEK	MAINSTEM DS	8365	2 yr	2-50	1050.00	476.00	486.96		487.00	0.000245	1.76	730.19	149.93	0.10
KIRBY CREEK	MAINSTEM DS	8365	100 yr	P-500	3560.00	476.00	493.42		493.48	0.000240	2.52	2340.75	308.23	0.11
KIRBY CREEK	MAINSTEM DS	8365	5 yr	2-50	1695.00	476.00	489.17		489.22	0.000257	2.10	1167.43	232.36	0.11
KIRBY CREEK	MAINSTEM DS	8365	Ultimate 100yr	P-500	3720.00	476.00	493.66		493.73	0.000243	2.56	2415.77	311.11	0.11
KIRBY CREEK	MAINSTEM DS	8365	10 yr	2-50	2149.00	476.00	490.42		490.48	0.000252	2.23	1476.96	261.01	0.11
KIRBY CREEK	MAINSTEM DS	8365	500yr	P-500	4687.00	476.00	495.38		495.44	0.000229	2.66	2962.61	325.90	0.11
KIRBY CREEK	MAINSTEM DS	8365	25 yr	2-50	2691.00	476.00	491.64		491.70	0.000252	2.37	1811.28	285.99	0.11
KIRBY CREEK	MAINSTEM DS	8365	50 yr	2-50	3130.00	476.00	492.57		492.63	0.000246	2.45	2082.97	298.21	0.11
KIRBY CREEK	MAINSTEM DS	8128	2 yr	2-50	1050.00	477.00	486.59		486.88	0.002171	4.49	299.66	91.29	0.23
KIRBY CREEK	MAINSTEM DS	8128	100 yr	P-500	3560.00	477.00	493.13		493.38	0.001187	5.01	1174.41	170.84	0.29
KIRBY CREEK	MAINSTEM DS	8128	5 yr	2-50	1695.00	477.00	488.83		489.10	0.001664	4.67	544.66	121.66	0.26
KIRBY CREEK	MAINSTEM DS	8128	Ultimate 100yr	P-500	3720.00	477.00	493.37		493.62	0.001191	5.08	1215.48	173.69	0.24
KIRBY CREEK	MAINSTEM DS	8128	10 yr	2-50	2149.00	477.00	490.11		490.37	0.001466	4.75	707.57	134.72	0.25
KIRBY CREEK	MAINSTEM DS	8128	500yr	P-500	4687.00	477.00	495.09		495.34	0.001083	5.22	1533.92	196.70	0.23
KIRBY CREEK	MAINSTEM DS	8128	25 yr	2-50	2691.00	477.00	491.33		491.59	0.001380	4.94	883.04	152.53	0.25
KIRBY CREEK	MAINSTEM DS	8128	50 yr	2-50	3130.00	477.00	492.27		492.52	0.001269	4.97	1031.47	162.03	0.24
KIRBY CREEK	MAINSTEM DS	8038	2 yr	2-50	1050.00	476.00	486.35		486.66	0.002674	4.57	258.31	64.97	0.30
KIRBY CREEK	MAINSTEM DS	8038	100 yr	P-500	3560.00	476.00	492.81		493.25	0.002007	6.06	833.46	110.72	0.29
KIRBY CREEK	MAINSTEM DS	8038	5 yr	2-50	1695.00	476.00	488.57		488.93	0.002330	5.10	418.86	80.64	0.29
KIRBY CREEK	MAINSTEM DS	8038	Ultimate 100yr	P-500	3720.00	476.00	493.04		493.49	0.002033	6.16	858.97	111.96	0.29
KIRBY CREEK	MAINSTEM DS	8038	10 yr	2-50	2149.00	476.00	489.83		490.21	0.002213	5.40	528.12	93.26	0.29
KIRBY CREEK	MAINSTEM DS	8038	500yr	P-500	4687.00	476.00	494.75		495.22	0.001909	6.45	1058.81	121.51	0.29
KIRBY CREEK	MAINSTEM DS	8038	25 yr	2-50	2691.00	476.00	491.03		491.44	0.002157	5.72	644.91	100.78	0.29
KIRBY CREEK	MAINSTEM DS	8038	50 yr	2-50	3130.00	476.00	491.96		492.39	0.002076	5.90	741.23	106.11	0.29
KIRBY CREEK	MAINSTEM DS	7763	2 yr	2-50	1050.00	475.00	486.03	479.73	486.14	0.000683	2.85	455.48	88.99	0.17
KIRBY CREEK	MAINSTEM DS	7763	100 yr	P-500	3560.00	475.00	492.57	484.15	492.80	0.000798	4.44	1165.54	171.79	0.20
KIRBY CREEK	MAINSTEM DS	7763	5 yr	2-50	1695.00	475.00	488.30	481.01	488.45	0.000695	3.34	671.65	102.24	0.18
KIRBY CREEK	MAINSTEM DS	7763	Ultimate 100yr	P-500	3720.00	475.00	492.79	484.37	493.03	0.000821	4.54	1197.64	180.50	0.20
KIRBY CREEK	MAINSTEM DS	7763	10 yr	2-50										

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
KIRBY CREEK	MAINSTEM DS	7486	Ultimate 100yr	P-500	4813.00	476.73	492.29	486.49	492.72	0.001683	6.18	1145.00	133.32	0.29
KIRBY CREEK	MAINSTEM DS	7486	10 yr	2-50	2851.00	476.73	489.10	484.11	489.45	0.001775	5.36	746.54	115.81	0.28
KIRBY CREEK	MAINSTEM DS	7486	500yr	P-500	6130.00	476.73	493.97	487.48	494.46	0.001719	6.73	1378.56	164.70	0.30
KIRBY CREEK	MAINSTEM DS	7486	25 yr	2-50	3508.00	476.73	490.30	485.25	490.67	0.001721	5.65	889.33	122.74	0.28
KIRBY CREEK	MAINSTEM DS	7486	50 yr	2-50	4079.00	476.73	491.22	485.83	491.62	0.001698	5.89	1005.61	128.23	0.29
KIRBY CREEK	MAINSTEM DS	7431	2 yr	2-50	1358.00	476.97	485.29	482.03	485.69	0.003113	5.33	319.03	82.99	0.35
KIRBY CREEK	MAINSTEM DS	7431	100 yr	P-500	4651.00	476.97	491.94	486.83	492.39	0.001898	6.46	1084.84	146.65	0.31
KIRBY CREEK	MAINSTEM DS	7431	5 yr	2-50	2241.00	476.97	487.60	483.65	488.03	0.002526	5.80	546.72	110.02	0.33
KIRBY CREEK	MAINSTEM DS	7431	Ultimate 100yr	P-500	4813.00	476.97	492.16	486.96	492.62	0.001886	6.51	1114.60	149.18	0.31
KIRBY CREEK	MAINSTEM DS	7431	10 yr	2-50	2851.00	476.97	488.90	484.76	489.33	0.002293	6.02	697.25	121.80	0.32
KIRBY CREEK	MAINSTEM DS	7431	500yr	P-500	6130.00	476.97	493.88	487.99	494.36	0.001811	6.89	1345.78	168.59	0.31
KIRBY CREEK	MAINSTEM DS	7431	25 yr	2-50	3508.00	476.97	490.13	485.72	490.56	0.002081	6.16	851.18	132.14	0.31
KIRBY CREEK	MAINSTEM DS	7431	50 yr	2-50	4079.00	476.97	491.08	486.32	491.52	0.001966	6.30	972.83	139.10	0.31
KIRBY CREEK	MAINSTEM DS	7366		Bridge										
KIRBY CREEK	MAINSTEM DS	7299	2 yr	2-50	1358.00	475.00	484.81	478.53	484.89	0.000540	2.40	620.40	86.66	0.14
KIRBY CREEK	MAINSTEM DS	7299	100 yr	P-500	4651.00	475.00	490.52	481.73	490.83	0.001051	4.68	1185.26	118.76	0.22
KIRBY CREEK	MAINSTEM DS	7299	5 yr	2-50	2241.00	475.00	486.83	479.60	486.97	0.000701	3.14	803.36	94.42	0.17
KIRBY CREEK	MAINSTEM DS	7299	Ultimate 100yr	P-500	4813.00	475.00	490.71	481.86	491.03	0.001076	4.78	1207.65	121.56	0.21
KIRBY CREEK	MAINSTEM DS	7299	10 yr	2-50	2851.00	475.00	487.95	480.19	488.13	0.000796	3.57	911.26	99.10	0.18
KIRBY CREEK	MAINSTEM DS	7299	500yr	P-500	6130.00	475.00	492.18	482.84	492.58	0.001201	5.38	1390.22	143.63	0.24
KIRBY CREEK	MAINSTEM DS	7299	25 yr	2-50	3508.00	475.00	489.00	480.79	489.22	0.000885	3.99	1017.77	103.35	0.20
KIRBY CREEK	MAINSTEM DS	7299	50 yr	2-50	4079.00	475.00	489.80	481.28	490.07	0.000966	4.34	1103.31	109.39	0.21
KIRBY CREEK	MAINSTEM DS	7235	2 yr	2-50	1358.00	475.00	484.56		484.79	0.002187	4.02	390.45	87.11	0.27
KIRBY CREEK	MAINSTEM DS	7235	100 yr	P-500	4651.00	475.00	490.27		490.71	0.002179	5.99	1056.93	140.50	0.30
KIRBY CREEK	MAINSTEM DS	7235	5 yr	2-50	2241.00	475.00	486.54		486.85	0.002241	4.81	578.21	108.01	0.28
KIRBY CREEK	MAINSTEM DS	7235	Ultimate 100yr	P-500	4813.00	475.00	490.46		490.90	0.002193	6.07	1083.56	142.26	0.30
KIRBY CREEK	MAINSTEM DS	7235	10 yr	2-50	2851.00	475.00	487.64		488.00	0.002264	5.22	707.76	124.30	0.29
KIRBY CREEK	MAINSTEM DS	7235	500yr	P-500	6130.00	475.00	491.90		492.44	0.002370	6.77	1302.99	170.59	0.32
KIRBY CREEK	MAINSTEM DS	7235	25 yr	2-50	3508.00	475.00	488.71		489.10	0.002204	5.52	845.29	131.66	0.29
KIRBY CREEK	MAINSTEM DS	7235	50 yr	2-50	4079.00	475.00	489.53		489.94	0.002174	5.75	955.25	135.78	0.29
KIRBY CREEK	MAINSTEM DS	7077	2 yr	2-50	1358.00	474.38	484.14		484.42	0.002510	4.47	365.37	81.47	0.29
KIRBY CREEK	MAINSTEM DS	7077	100 yr	P-500	4651.00	474.38	489.75		490.32	0.002812	6.90	910.99	110.02	0.34
KIRBY CREEK	MAINSTEM DS	7077	5 yr	2-50	2241.00	474.38	486.10		486.47	0.002602	5.33	539.05	94.85	0.31
KIRBY CREEK	MAINSTEM DS	7077	Ultimate 100yr	P-500	4813.00	474.38	489.92		490.51	0.002847	7.01	930.70	110.99	0.34
KIRBY CREEK	MAINSTEM DS	7077	10 yr	2-50	2851.00	474.38	487.20		487.62	0.002633	5.77	645.33	98.96	0.31
KIRBY CREEK	MAINSTEM DS	7077	500yr	P-500	6130.00	474.38	491.32		492.01	0.003046	7.75	1090.23	118.07	0.36
KIRBY CREEK	MAINSTEM DS	7077	25 yr	2-50	3508.00	474.38	488.24		488.72	0.002668	6.19	751.01	103.17	0.32
KIRBY CREEK	MAINSTEM DS	7077	50 yr	2-50	4079.00	474.38	489.04		489.56	0.002728	6.55	834.40	106.60	0.33
KIRBY CREEK	MAINSTEM DS	6860	2 yr	2-50	1358.00	473.17	483.85		483.98	0.001183	3.33	587.46	137.13	0.21
KIRBY CREEK	MAINSTEM DS	6860	100 yr	P-500	4651.00	473.17	489.57		489.79	0.001185	4.76	1463.04	167.68	0.23
KIRBY CREEK	MAINSTEM DS	6860	5 yr	2-50	2241.00	473.17	485.86		486.01	0.001138	3.79	874.58	148.75	0.21
KIRBY CREEK	MAINSTEM DS	6860	Ultimate 100yr	P-500	4813.00	473.17	489.75		489.97	0.001198	4.83	1493.36	168.52	0.23
KIRBY CREEK	MAINSTEM DS	6860	10 yr	2-50	2851.00	473.17	486.97		487.14	0.001138	4.06	1044.11	154.84	0.21
KIRBY CREEK	MAINSTEM DS	6860	500yr	P-500	6130.00	473.17	491.16		491.43	0.001289	5.34	1736.66	177.91	0.24
KIRBY CREEK	MAINSTEM DS	6860	25 yr	2-50	3508.00	473.17	488.04		488.23	0.001142	4.32	1212.29	160.56	0.22
KIRBY CREEK	MAINSTEM DS	6860	50 yr	2-50	4079.00	473.17	488.85		489.05	0.001157	4.54	1343.77	164.31	0.22
KIRBY CREEK	MAINSTEM DS	6282	2 yr	2-50	1358.00	473.00	482.87		483.09	0.002287	3.91	383.03	83.33	0.27
KIRBY CREEK	MAINSTEM DS	6282	100 yr	P-500	4651.00	473.00	488.40		488.89	0.002460	6.14	978.57	136.48	0.31
KIRBY CREEK	MAINSTEM DS	6282	5 yr	2-50	2241.00	473.00	484.84		485.15	0.002283	4.68	562.77	100.52	0.28
KIRBY CREEK	MAINSTEM DS	6282	Ultimate 100yr	P-500	4813.00	473.00	488.56		489.07	0.002493	6.24	1000.83	138.07	0.32
KIRBY CREEK	MAINSTEM DS	6282	10 yr	2-50	2851.00	473.00	485.92		486.29	0.002310	5.10	677.03	110.61	0.29
KIRBY CREEK	MAINSTEM DS	6282	500yr	P-500	6130.00	473.00	489.86		490.46	0.002646	6.88	1188.86	150.78	0.33
KIRBY CREEK	MAINSTEM DS	6282	25 yr	2-50	3508.00	473.00	486.96		487.37	0.002315	5.47	797.01	119.46	0.30
KIRBY CREEK	MAINSTEM DS	6282	50 yr	2-50	4079.00	473.00	487.74		488.18	0.002360	5.79	891.69	126.51	0.30
KIRBY CREEK	MAINSTEM DS	6009	2 yr	2-50	1405.00	473.13	482.02		482.36	0.003177	4.80	326.30	71.62	0.32
KIRBY CREEK	MAINSTEM DS	6009	100 yr	P-500	5015.00	473.13	487.11		488.00	0.004529	8.31	834.45	152.05	0.42
KIRBY CREEK	MAINSTEM DS	6009	5 yr	2-50	2381.00	473.13	483.86		484.38	0.003629	6.02	471.00	84.66	0.36
KIRBY CREEK	MAINSTEM DS	6009	Ultimate 100yr	P-500	5177.00	473.13	487.26		488.16	0.004571	8.41	857.23	155.76	0.43
KIRBY CREEK	MAINSTEM DS	6009	10 yr	2-50	3052.00	473.13	484.87		485.48	0.003864	6.68	559.41	91.59	0.38
KIRBY CREEK	MAINSTEM DS	6009	500yr	P-500	6631.00	473.13	488.47		489.51	0.004821	9.21	1065.23	185.73	0.45
KIRBY CREEK	MAINSTEM DS	6009	25 yr	2-50	3765.00	473.13	485.80		486.53	0.004177	7.38	656.49	120.45	0.40
KIRBY CREEK	MAINSTEM DS	6009	50 yr	2-50	4391.00	473.13	486.51		487.32	0.004334	7.85	748.25	137.25	0.41
KIRBY CREEK	MAINSTEM DS	5682	2 yr	2-50	1405.00	473.24	480.07		480.80	0.008672	7.20	234.49	66.90	0.53
KIRBY CREEK	MAINSTEM DS	5682	100 yr	P-500	5015.00	473.24	483.76	483.24	485.66	0.013797	12.66	595.38	136.45	0.73
KIRBY CREEK	MAINSTEM DS	5682	5 yr	2-50	2381.00	473.24	481.33		482.52	0.011267	9.37	328.40	85.08	0.63
KIRBY CREEK	MAINSTEM DS	5682	Ultimate 100yr	P-500	5177.00	473.24	483.87	483.40	485.80	0.013927	12.81	610.20	138.53	0.73
KIRBY CREEK	MAINSTEM DS	5682	10 yr	2-50	3052.00	473.24	481.98	480.93	483.45	0.012893	10.63	387.15	97.53	0.68
KIRBY CREEK	MAINSTEM DS	5682	500yr	P-500	6631.00	473.24	484.80	484.38	487.00	0.014712	14.02	750.80	163.30	0.76
KIRBY CREEK	MAINSTEM DS	5682	25 yr	2-50	3765.00	473.24	482.59	481.92	484.33	0.014103	11.71	450.78	110.02	0.72
KIRBY CREEK	MAINSTEM DS	5682	50 yr	2-50	4391.00	473.24	483.15	482.40	485.04	0.014458	12.39	515.70	123.83	0.74
KIRBY CREEK	MAINSTEM DS	5432	2 yr	2-50	1405.00	471.00	477.36	476.46	478.23	0.013033	7.79	218.59	90.08	0.63
KIRBY CREEK	MAINSTEM DS	5432	100 yr	P-500	5015.00	471.00	482.53		483.11	0.004982	7.83	1087.59	236.65	0.44
KIRBY CREEK	MAINSTEM DS	5432	5 yr	2-50	2381.00	471.00	479.03	477.86	479.89	0.009939	8.30	417.70	149.04	0.57
KIRBY CREEK	MAINSTEM DS	5432	Ultimate 100yr	P-500	5177.00	471.00	482.64		483.23	0.005003	7.91	1114.45	239.15	0.44
KIRBY CREEK	MAINSTEM DS	5432	10 yr	2-50	3052.00	471.00	479.88		480.71	0.008772	8.46	551.88	165.43	0.55
KIRBY CREEK	MAINSTEM DS	5432	500yr	P-500	6631.00	471.00	483.68		484.30	0.004920	8.37	1375.41	264.23	0.44
KIRBY CREEK	MAINSTEM DS	5432	25 yr	2-50	3765.00	471.00	480.68		481.48	0.007909	8.61	688.75	179.33	0.53
KIRBY CREEK	MAINSTEM DS	5432	50 yr	2-50	4391.00	471.00	481.34		482.15	0.007530	8.85	821.98	212.60	0.53
KIRBY CREEK	MAINSTEM DS	5031	2 yr	2-50	1405.00	465.00	474.92		475.13	0.001641	3.68	402.62	68.09	0.24

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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
KIRBY CREEK	MAINSTEM DS	4947	2 yr	2-50	1405.00	465.00	474.49		474.91	0.004436	5.19	272.66	50.62	0.37
KIRBY CREEK	MAINSTEM DS	4947	100 yr	P-500	5015.00	465.00	480.97		481.61	0.003250	7.14	963.32	148.92	0.35
KIRBY CREEK	MAINSTEM DS	4947	5 yr	2-50	2381.00	465.00	476.60		477.20	0.004457	6.32	426.27	93.10	0.38
KIRBY CREEK	MAINSTEM DS	4947	Ultimate 100yr	P-500	5177.00	465.00	481.04		481.71	0.003374	7.30	974.42	149.87	0.36
KIRBY CREEK	MAINSTEM DS	4947	10 yr	2-50	3052.00	465.00	477.51		478.23	0.004850	7.06	516.66	107.02	0.41
KIRBY CREEK	MAINSTEM DS	4947	500yr	P-500	6631.00	465.00	481.83		482.72	0.004218	8.49	1097.42	160.72	0.41
KIRBY CREEK	MAINSTEM DS	4947	25 yr	2-50	3765.00	465.00	478.31		479.15	0.005202	7.72	608.16	119.19	0.43
KIRBY CREEK	MAINSTEM DS	4947	50 yr	2-50	4391.00	465.00	478.97		479.89	0.005365	8.18	689.01	126.67	0.44
KIRBY CREEK	MAINSTEM DS	4860	2 yr	2-50	1405.00	463.68	474.24	470.31	474.55	0.002948	4.76	344.87	68.04	0.31
KIRBY CREEK	MAINSTEM DS	4860	100 yr	P-500	5015.00	463.68	480.65	475.10	481.33	0.003156	7.47	901.93	108.46	0.35
KIRBY CREEK	MAINSTEM DS	4860	5 yr	2-50	2381.00	463.68	476.38	472.24	476.83	0.003135	5.81	503.67	80.50	0.33
KIRBY CREEK	MAINSTEM DS	4860	Ultimate 100yr	P-500	5177.00	463.68	480.70	475.26	481.42	0.003312	7.67	907.67	109.09	0.36
KIRBY CREEK	MAINSTEM DS	4860	10 yr	2-50	3052.00	463.68	477.24	473.08	477.82	0.003647	6.65	575.39	85.53	0.36
KIRBY CREEK	MAINSTEM DS	4860	500yr	P-500	6631.00	463.68	481.29	476.49	482.32	0.004563	9.26	1097.07	116.18	0.43
KIRBY CREEK	MAINSTEM DS	4860	25 yr	2-50	3765.00	463.68	477.99	473.88	478.70	0.004197	7.47	641.14	89.90	0.39
KIRBY CREEK	MAINSTEM DS	4860	50 yr	2-50	4391.00	463.68	478.59	474.50	479.43	0.004613	8.11	696.50	93.42	0.42
KIRBY CREEK	MAINSTEM DS	4818			Bridge									
KIRBY CREEK	MAINSTEM DS	4762	2 yr	2-50	1405.00	463.00	473.89	468.56	474.16	0.001707	4.16	364.72	69.21	0.26
KIRBY CREEK	MAINSTEM DS	4762	100 yr	P-500	5015.00	463.00	478.43	473.95	479.35	0.003699	8.25	776.92	123.36	0.41
KIRBY CREEK	MAINSTEM DS	4762	5 yr	2-50	2381.00	463.00	475.99	470.36	476.40	0.002041	5.31	535.57	93.73	0.29
KIRBY CREEK	MAINSTEM DS	4762	Ultimate 100yr	P-500	5177.00	463.00	478.55	474.14	479.50	0.003787	8.40	789.54	124.98	0.41
KIRBY CREEK	MAINSTEM DS	4762	10 yr	2-50	3052.00	463.00	476.77	471.36	477.30	0.002473	6.14	609.84	102.88	0.33
KIRBY CREEK	MAINSTEM DS	4762	500yr	P-500	6631.00	463.00	479.53	475.67	480.76	0.004546	9.67	894.15	136.97	0.46
KIRBY CREEK	MAINSTEM DS	4762	25 yr	2-50	3765.00	463.00	477.43	472.33	478.10	0.002953	6.97	674.40	113.58	0.36
KIRBY CREEK	MAINSTEM DS	4762	50 yr	2-50	4391.00	463.00	477.95	473.17	478.74	0.003345	7.64	726.76	117.91	0.39
KIRBY CREEK	MAINSTEM DS	4443	2 yr	2-50	1405.00	462.00	472.82		473.33	0.003765	5.88	273.45	61.66	0.37
KIRBY CREEK	MAINSTEM DS	4443	100 yr	P-500	5015.00	462.00	477.22		478.01	0.004622	8.74	1033.17	230.93	0.44
KIRBY CREEK	MAINSTEM DS	4443	5 yr	2-50	2381.00	462.00	474.80		475.46	0.004059	7.08	520.80	189.65	0.40
KIRBY CREEK	MAINSTEM DS	4443	Ultimate 100yr	P-500	5177.00	462.00	477.34		478.13	0.004651	8.83	1059.36	232.60	0.44
KIRBY CREEK	MAINSTEM DS	4443	10 yr	2-50	3052.00	462.00	475.60		476.29	0.004143	7.53	679.19	204.36	0.41
KIRBY CREEK	MAINSTEM DS	4443	500yr	P-500	6631.00	462.00	478.26		479.11	0.004883	9.49	1280.79	245.89	0.46
KIRBY CREEK	MAINSTEM DS	4443	25 yr	2-50	3765.00	462.00	476.28		477.00	0.004295	7.99	821.93	216.07	0.42
KIRBY CREEK	MAINSTEM DS	4443	50 yr	2-50	4391.00	462.00	476.78		477.53	0.004455	8.38	932.61	224.24	0.43
KIRBY CREEK	MAINSTEM DS	4070	2 yr	2-50	1405.00	460.08	471.70		472.06	0.002666	4.83	309.38	69.82	0.31
KIRBY CREEK	MAINSTEM DS	4070	100 yr	P-500	5015.00	460.08	475.98		476.52	0.003195	7.13	1255.22	297.38	0.37
KIRBY CREEK	MAINSTEM DS	4070	5 yr	2-50	2381.00	460.08	473.65		474.11	0.002826	5.79	605.88	258.87	0.33
KIRBY CREEK	MAINSTEM DS	4070	Ultimate 100yr	P-500	5177.00	460.08	476.08		476.63	0.003231	7.21	1285.95	300.36	0.37
KIRBY CREEK	MAINSTEM DS	4070	10 yr	2-50	3052.00	460.08	474.47		474.93	0.002805	6.10	824.15	272.97	0.33
KIRBY CREEK	MAINSTEM DS	4070	500yr	P-500	6631.00	460.08	476.95		477.54	0.003451	7.81	1557.65	322.54	0.38
KIRBY CREEK	MAINSTEM DS	4070	25 yr	2-50	3765.00	460.08	475.12		475.60	0.002899	6.46	1006.12	283.79	0.34
KIRBY CREEK	MAINSTEM DS	4070	50 yr	2-50	4391.00	460.08	475.59		476.09	0.003035	6.79	1139.16	291.18	0.35
KIRBY CREEK	MAINSTEM DS	3494	2 yr	2-50	1405.00	461.00	469.11	466.64	469.76	0.007606	6.46	217.45	80.18	0.51
KIRBY CREEK	MAINSTEM DS	3494	100 yr	P-500	5015.00	461.00	472.68	472.28	473.91	0.009232	10.11	797.08	307.52	0.61
KIRBY CREEK	MAINSTEM DS	3494	5 yr	2-50	2381.00	461.00	470.70	468.53	471.67	0.008325	8.05	354.50	225.69	0.55
KIRBY CREEK	MAINSTEM DS	3494	Ultimate 100yr	P-500	5177.00	461.00	472.81	472.37	474.02	0.009016	10.09	830.16	310.94	0.60
KIRBY CREEK	MAINSTEM DS	3494	10 yr	2-50	3052.00	461.00	471.06	469.50	472.37	0.010740	9.47	424.99	267.18	0.63
KIRBY CREEK	MAINSTEM DS	3494	500yr	P-500	6631.00	461.00	474.32	473.04	475.20	0.006095	9.23	1226.30	355.97	0.51
KIRBY CREEK	MAINSTEM DS	3494	25 yr	2-50	3765.00	461.00	471.58	471.50	472.99	0.011150	10.13	539.52	279.92	0.65
KIRBY CREEK	MAINSTEM DS	3494	50 yr	2-50	4391.00	461.00	472.09	471.93	473.45	0.010523	10.29	656.74	292.56	0.64
KIRBY CREEK	MAINSTEM DS	3062	2 yr	2-50	1424.00	459.80	467.01	464.26	467.44	0.002843	5.24	271.72	89.43	0.43
KIRBY CREEK	MAINSTEM DS	3062	100 yr	P-500	5337.00	459.80	471.58	469.15	471.73	0.005550	3.65	1856.52	554.73	0.21
KIRBY CREEK	MAINSTEM DS	3062	5 yr	2-50	2434.00	459.80	468.60	465.82	469.18	0.002779	6.31	441.66	329.92	0.45
KIRBY CREEK	MAINSTEM DS	3062	Ultimate 100yr	P-500	5499.00	459.80	471.76	469.15	471.90	0.005155	3.57	1943.90	585.66	0.21
KIRBY CREEK	MAINSTEM DS	3062	10 yr	2-50	3157.00	459.80	469.23	466.82	469.53	0.001616	5.13	843.70	383.13	0.35
KIRBY CREEK	MAINSTEM DS	3062	500yr	P-500	6988.00	459.80	473.74	469.59	473.82	0.002227	2.69	3220.87	655.67	0.14
KIRBY CREEK	MAINSTEM DS	3062	25 yr	2-50	3968.00	459.80	469.94	467.68	470.18	0.001210	4.74	1126.70	414.23	0.30
KIRBY CREEK	MAINSTEM DS	3062	50 yr	2-50	4654.00	459.80	470.72	468.70	470.91	0.000809	4.14	1460.23	438.91	0.25
KC SOUTH FORK	SOUTH FORK	1368	2 yr	2-50	166.00	513.93	518.04		518.17	0.000615	2.86	57.95	17.49	0.28
KC SOUTH FORK	SOUTH FORK	1368	100 yr	P-500	594.00	513.93	520.29		520.84	0.001689	5.92	100.38	20.12	0.47
KC SOUTH FORK	SOUTH FORK	1368	5 yr	2-50	284.00	513.93	518.85		519.09	0.000956	3.92	72.52	18.49	0.35
KC SOUTH FORK	SOUTH FORK	1368	Ultimate 100yr	P-500	654.00	513.93	520.52		521.12	0.001814	6.23	104.91	20.39	0.48
KC SOUTH FORK	SOUTH FORK	1368	10 yr	2-50	363.00	513.93	519.28		519.60	0.001158	4.50	80.64	18.97	0.38
KC SOUTH FORK	SOUTH FORK	1368	500yr	P-500	768.00	513.93	520.93		521.64	0.002022	6.77	113.42	20.89	0.51
KC SOUTH FORK	SOUTH FORK	1368	25 yr	2-50	450.00	513.93	519.70		520.10	0.001364	5.07	88.69	19.41	0.42
KC SOUTH FORK	SOUTH FORK	1368	50 yr	2-50	523.00	513.93	520.01		520.49	0.001533	5.52	94.79	19.77	0.44
KC SOUTH FORK	SOUTH FORK	1332	2 yr	2-50	166.00	513.00	518.08		518.12	0.000570	1.54	107.60	31.21	0.15
KC SOUTH FORK	SOUTH FORK	1332	100 yr	P-500	594.00	513.00	520.52		520.66	0.001492	3.04	195.30	41.81	0.25
KC SOUTH FORK	SOUTH FORK	1332	5 yr	2-50	284.00	513.00	518.93		519.00	0.000884	2.10	135.50	34.31	0.19
KC SOUTH FORK	SOUTH FORK	1332	Ultimate 100yr	P-500	654.00	513.00	520.77		520.92	0.001576	3.17	206.03	43.11	0.26
KC SOUTH FORK	SOUTH FORK	1332	10 yr	2-50	363.00	513.00	519.40		519.49	0.001059	2.39	151.86	36.03	0.21
KC SOUTH FORK	SOUTH FORK	1332	500yr	P-500	768.00	513.00	521.24		521.41	0.001697	3.39	226.72	45.50	0.27
KC SOUTH FORK	SOUTH FORK	1332	25 yr	2-50	450.00	513.00	519.86		519.97	0.001242	2.67	168.84	38.38	0.22
KC SOUTH FORK	SOUTH FORK	1332	50 yr	2-50	523.00	513.00	520.20		520.33	0.001377	2.87	182.43	40.17	0.24
KC SOUTH FORK	SOUTH FORK	1271	2 yr	2-50	166.00	514.96	517.83		518.04	0.006355	3.63	45.78	23.06	0.45
KC SOUTH FORK	SOUTH FORK	1271	100 yr	P-500	594.00	514.96	519.93		520.46	0.008456	5.85	101.58	30.16	0.56
KC SOUTH FORK	SOUTH FORK	1271	5 yr	2-50	284.00	514.96	518.57		518.88	0.007177	4.46	63.73	25.53	0.50
KC SOUTH FORK	SOUTH FORK	1271	Ultimate 100yr	P-500	654.00	514.96	520.15		520.72	0.008679	6.04	108.33	31.27	0.57
KC SOUTH FORK	SOUTH FORK	1271	10 yr	2-50	363.00	514.96	518.97		519.35	0.007590	4.89	74.27	26.87	0.52
KC SOUTH FORK	SOUTH FORK	1271	500yr	P-500	768.00	514.96	520.58		521.20	0.008813	6.28	122.22	33.63	0.58
KC SOUTH FORK	SOUTH FORK	1271	25 yr	2-50	450.00									

HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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 # Chi
KC SOUTH FORK	SOUTH FORK	1084	10 yr	2-50	363.00	514.00	517.72		517.92	0.007127	3.60	100.88	43.62	0.42
KC SOUTH FORK	SOUTH FORK	1084	500yr	P-500	768.00	514.00	519.45		519.70	0.005936	4.04	190.21	60.22	0.40
KC SOUTH FORK	SOUTH FORK	1084	25 yr	2-50	450.00	514.00	518.13		518.35	0.006921	3.77	119.38	47.05	0.42
KC SOUTH FORK	SOUTH FORK	1084	50 yr	2-50	523.00	514.00	518.43		518.66	0.006879	3.90	134.04	49.92	0.42
KC SOUTH FORK	SOUTH FORK	905	2 yr	2-50	166.00	512.00	515.40		515.50	0.004004	2.54	65.44	30.85	0.31
KC SOUTH FORK	SOUTH FORK	905	100 yr	P-500	594.00	512.00	517.66		517.88	0.005156	3.78	157.21	49.09	0.37
KC SOUTH FORK	SOUTH FORK	905	5 yr	2-50	284.00	512.00	516.26		516.40	0.004496	2.98	95.40	38.60	0.33
KC SOUTH FORK	SOUTH FORK	905	Ultimate 100yr	P-500	654.00	512.00	517.88		518.12	0.005168	3.88	168.45	50.52	0.37
KC SOUTH FORK	SOUTH FORK	905	10 yr	2-50	363.00	512.00	516.70		516.86	0.004693	3.21	113.14	42.25	0.35
KC SOUTH FORK	SOUTH FORK	905	500yr	P-500	768.00	512.00	518.53		518.75	0.004656	3.77	203.65	58.97	0.36
KC SOUTH FORK	SOUTH FORK	905	25 yr	2-50	450.00	512.00	517.10		517.28	0.004937	3.44	130.67	45.55	0.36
KC SOUTH FORK	SOUTH FORK	905	50 yr	2-50	523.00	512.00	517.38		517.59	0.005085	3.63	144.09	47.37	0.37
KC SOUTH FORK	SOUTH FORK	672	2 yr	2-50	166.00	511.16	513.13	513.13	513.71	0.053248	6.11	27.15	24.03	1.01
KC SOUTH FORK	SOUTH FORK	672	100 yr	P-500	594.00	511.16	515.35		515.96	0.018691	6.28	94.64	36.16	0.68
KC SOUTH FORK	SOUTH FORK	672	5 yr	2-50	284.00	511.16	513.66	513.66	514.42	0.048653	6.98	40.67	27.47	1.01
KC SOUTH FORK	SOUTH FORK	672	Ultimate 100yr	P-500	654.00	511.16	515.67		516.26	0.016104	6.12	106.79	37.79	0.64
KC SOUTH FORK	SOUTH FORK	672	10 yr	2-50	363.00	511.16	513.95	513.95	514.80	0.046760	7.41	49.00	29.36	1.01
KC SOUTH FORK	SOUTH FORK	672	500yr	P-500	768.00	511.16	517.20		517.51	0.006077	4.52	170.07	45.46	0.41
KC SOUTH FORK	SOUTH FORK	672	25 yr	2-50	450.00	511.16	514.40	514.24	515.20	0.034804	7.17	62.79	31.55	0.90
KC SOUTH FORK	SOUTH FORK	672	50 yr	2-50	523.00	511.16	514.85	514.46	515.56	0.025821	6.77	77.27	33.71	0.79
KC SOUTH FORK	SOUTH FORK	603	2 yr	2-50	166.00	508.60	510.94	509.79	511.05	0.000882	2.71	61.28	31.17	0.34
KC SOUTH FORK	SOUTH FORK	603	100 yr	P-500	594.00	508.60	515.04	511.25	515.15	0.000277	2.64	224.98	48.65	0.22
KC SOUTH FORK	SOUTH FORK	603	5 yr	2-50	284.00	508.60	512.03	510.27	512.16	0.000661	2.90	97.82	35.82	0.31
KC SOUTH FORK	SOUTH FORK	603	Ultimate 100yr	P-500	654.00	508.60	515.44	511.40	515.55	0.000266	2.67	244.55	50.33	0.24
KC SOUTH FORK	SOUTH FORK	603	10 yr	2-50	363.00	508.60	512.77	510.55	512.90	0.000533	2.90	125.27	38.95	0.28
KC SOUTH FORK	SOUTH FORK	603	500yr	P-500	768.00	508.60	517.15	511.69	517.23	0.000150	2.28	336.54	57.61	0.17
KC SOUTH FORK	SOUTH FORK	603	25 yr	2-50	450.00	508.60	513.66	510.83	513.78	0.000397	2.78	161.87	42.76	0.25
KC SOUTH FORK	SOUTH FORK	603	50 yr	2-50	523.00	508.60	514.36	511.05	514.48	0.000329	2.71	192.84	45.75	0.23
KC SOUTH FORK	SOUTH FORK	536			Culvert									
KC SOUTH FORK	SOUTH FORK	457	2 yr	2-50	166.00	508.00	510.67	509.29	510.76	0.003503	2.38	69.89	31.75	0.28
KC SOUTH FORK	SOUTH FORK	457	100 yr	P-500	594.00	508.00	514.58	510.69	514.69	0.001620	2.74	217.05	48.20	0.22
KC SOUTH FORK	SOUTH FORK	457	5 yr	2-50	284.00	508.00	511.66	509.74	511.78	0.003288	2.77	102.59	34.69	0.28
KC SOUTH FORK	SOUTH FORK	457	Ultimate 100yr	P-500	654.00	508.00	514.93	510.85	515.05	0.001607	2.81	232.46	50.18	0.22
KC SOUTH FORK	SOUTH FORK	457	10 yr	2-50	363.00	508.00	512.35	510.01	512.48	0.002877	2.85	127.38	36.92	0.27
KC SOUTH FORK	SOUTH FORK	457	500yr	P-500	768.00	508.00	516.64	511.14	516.74	0.000945	2.46	312.15	59.90	0.17
KC SOUTH FORK	SOUTH FORK	457	25 yr	2-50	450.00	508.00	513.23	510.28	513.35	0.002238	2.79	161.29	40.53	0.24
KC SOUTH FORK	SOUTH FORK	457	50 yr	2-50	523.00	508.00	513.91	510.49	514.03	0.001890	2.77	188.87	44.42	0.23
KC SOUTH FORK	SOUTH FORK	366	2 yr	2-50	166.00	507.36	510.15		510.31	0.007086	3.21	51.77	26.07	0.40
KC SOUTH FORK	SOUTH FORK	366	100 yr	P-500	594.00	507.36	514.37		514.51	0.002253	3.08	192.92	42.17	0.25
KC SOUTH FORK	SOUTH FORK	366	5 yr	2-50	284.00	507.36	511.18		511.37	0.005772	3.55	80.01	29.13	0.38
KC SOUTH FORK	SOUTH FORK	366	Ultimate 100yr	P-500	654.00	507.36	514.72		514.88	0.002221	3.14	208.13	43.60	0.25
KC SOUTH FORK	SOUTH FORK	366	10 yr	2-50	363.00	507.36	511.95		512.14	0.004545	3.51	103.34	31.66	0.34
KC SOUTH FORK	SOUTH FORK	366	500yr	P-500	768.00	507.36	516.53		516.64	0.001223	2.61	293.93	51.70	0.19
KC SOUTH FORK	SOUTH FORK	366	25 yr	2-50	450.00	507.36	512.93		513.10	0.003310	3.30	136.46	36.10	0.30
KC SOUTH FORK	SOUTH FORK	366	50 yr	2-50	523.00	507.36	513.66		513.82	0.002716	3.19	164.14	39.32	0.27
KC SOUTH FORK	SOUTH FORK	36	2 yr	2-50	166.00	505.00	508.22		508.34	0.004836	2.88	61.07	35.95	0.34
KC SOUTH FORK	SOUTH FORK	36	100 yr	P-500	594.00	505.00	513.98		514.05	0.000522	2.22	367.69	78.04	0.14
KC SOUTH FORK	SOUTH FORK	36	5 yr	2-50	284.00	505.00	510.07		510.15	0.001535	2.43	135.48	43.91	0.21
KC SOUTH FORK	SOUTH FORK	36	Ultimate 100yr	P-500	654.00	505.00	514.35		514.41	0.000523	2.28	396.42	80.22	0.14
KC SOUTH FORK	SOUTH FORK	36	10 yr	2-50	363.00	505.00	511.12		511.20	0.001089	2.36	183.66	48.06	0.18
KC SOUTH FORK	SOUTH FORK	36	500yr	P-500	768.00	505.00	516.34		516.38	0.000285	1.94	567.27	91.71	0.11
KC SOUTH FORK	SOUTH FORK	36	25 yr	2-50	450.00	505.00	512.34		512.41	0.000781	2.32	248.27	63.46	0.16
KC SOUTH FORK	SOUTH FORK	36	50 yr	2-50	523.00	505.00	513.19		513.25	0.000637	2.28	307.26	73.53	0.15
BRIAN BRANCH	Main	2540	2 yr	2-50	144.00	512.00	515.08		515.20	0.000264	2.76	52.13	20.96	0.31
BRIAN BRANCH	Main	2540	100 yr	P-500	434.00	512.00	517.57		517.82	0.000266	3.98	109.17	24.85	0.33
BRIAN BRANCH	Main	2540	5 yr	2-50	224.00	512.00	515.96		516.11	0.000258	3.15	71.02	22.32	0.31
BRIAN BRANCH	Main	2540	Ultimate 100yr	P-500	434.00	512.00	517.57		517.82	0.000266	3.98	109.17	24.85	0.33
BRIAN BRANCH	Main	2540	10 yr	2-50	278.00	512.00	516.44		516.62	0.000261	3.39	82.12	23.09	0.32
BRIAN BRANCH	Main	2540	500yr	P-500	549.00	512.00	518.28		518.58	0.000262	4.36	127.41	27.05	0.33
BRIAN BRANCH	Main	2540	25 yr	2-50	337.00	512.00	516.91		517.12	0.000267	3.62	93.12	23.81	0.32
BRIAN BRANCH	Main	2540	50 yr	2-50	386.00	512.00	517.26		517.49	0.000266	3.80	101.52	24.37	0.33
BRIAN BRANCH	Main	2270	2 yr	2-50	144.00	511.00	513.95	513.95	514.84	0.003326	7.57	19.02	10.60	1.00
BRIAN BRANCH	Main	2270	100 yr	P-500	434.00	511.00	515.94	515.94	517.34	0.002918	9.49	45.72	16.20	1.00
BRIAN BRANCH	Main	2270	5 yr	2-50	224.00	511.00	514.64	514.64	515.71	0.003160	8.30	26.99	12.52	1.00
BRIAN BRANCH	Main	2270	Ultimate 100yr	P-500	434.00	511.00	515.94	515.94	517.34	0.002918	9.49	45.72	16.20	1.00
BRIAN BRANCH	Main	2270	10 yr	2-50	278.00	511.00	515.02	515.02	516.19	0.003102	8.70	31.95	13.58	1.00
BRIAN BRANCH	Main	2270	500yr	P-500	549.00	511.00	516.43	516.43	518.05	0.002771	10.23	54.40	19.79	0.99
BRIAN BRANCH	Main	2270	25 yr	2-50	337.00	511.00	515.39	515.39	516.66	0.003024	9.04	37.28	14.63	1.00
BRIAN BRANCH	Main	2270	50 yr	2-50	386.00	511.00	515.68	515.68	517.02	0.002983	9.30	41.50	15.44	1.00
BRIAN BRANCH	Main	1990	2 yr	2-50	144.00	509.00	512.15	512.15	513.05	0.003465	7.63	18.88	10.63	1.01
BRIAN BRANCH	Main	1990	100 yr	P-500	434.00	509.00	514.09	514.09	515.54	0.002865	9.68	45.26	17.09	1.00
BRIAN BRANCH	Main	1990	5 yr	2-50	224.00	509.00	512.83	512.83	513.92	0.003290	8.36	26.79	12.59	1.01
BRIAN BRANCH	Main	1990	Ultimate 100yr	P-500	434.00	509.00	514.09	514.09	515.54	0.002865	9.68	45.26	17.09	1.00
BRIAN BRANCH	Main	1990	10 yr	2-50	278.00	509.00	513.24	513.24	514.40	0.003127	8.63	32.23	13.93	1.00
BRIAN BRANCH	Main	1990	500yr	P-500	549.00	509.00	514.60	514.60	516.28	0.002669	10.40	54.77	20.06	0.99
BRIAN BRANCH	Main	1990	25 yr	2-50	337.00	509.00	513.59	513.59	514.86	0.003091	9.05	37.25	15.15	1.01
BRIAN BRANCH	Main	1990	50 yr	2-50	386.00	509.00	513.86	513.86	515.21	0.002970	9.34	41.50	16.10	1.00
BRIAN BRANCH	Main	1690	2 yr	2-50	144.00	507.00	509.99	509.99	510.89	0.003362	7.61	18.93	10.48	1.00
BRIAN BRANCH	Main	1690	100 yr	P-500	434.00	507.00	511.95	511.95	513.38	0.002692	9.62	45.63	17.04	0.97
BRIAN BRANCH	Main	1690	5 yr	2-50	224.00	507.00	510.69	510.69	511.76	0.003190	8.28	27.06	12.68	1.00
BRIAN BRANCH	Main	1690	Ultimate 100yr	P-500	434.00	507.00	511.95	511.95	513.38	0.002692	9.62	45.63	17.04	0.97
BRIAN BRANCH	Main	1690	10 yr	2-50										

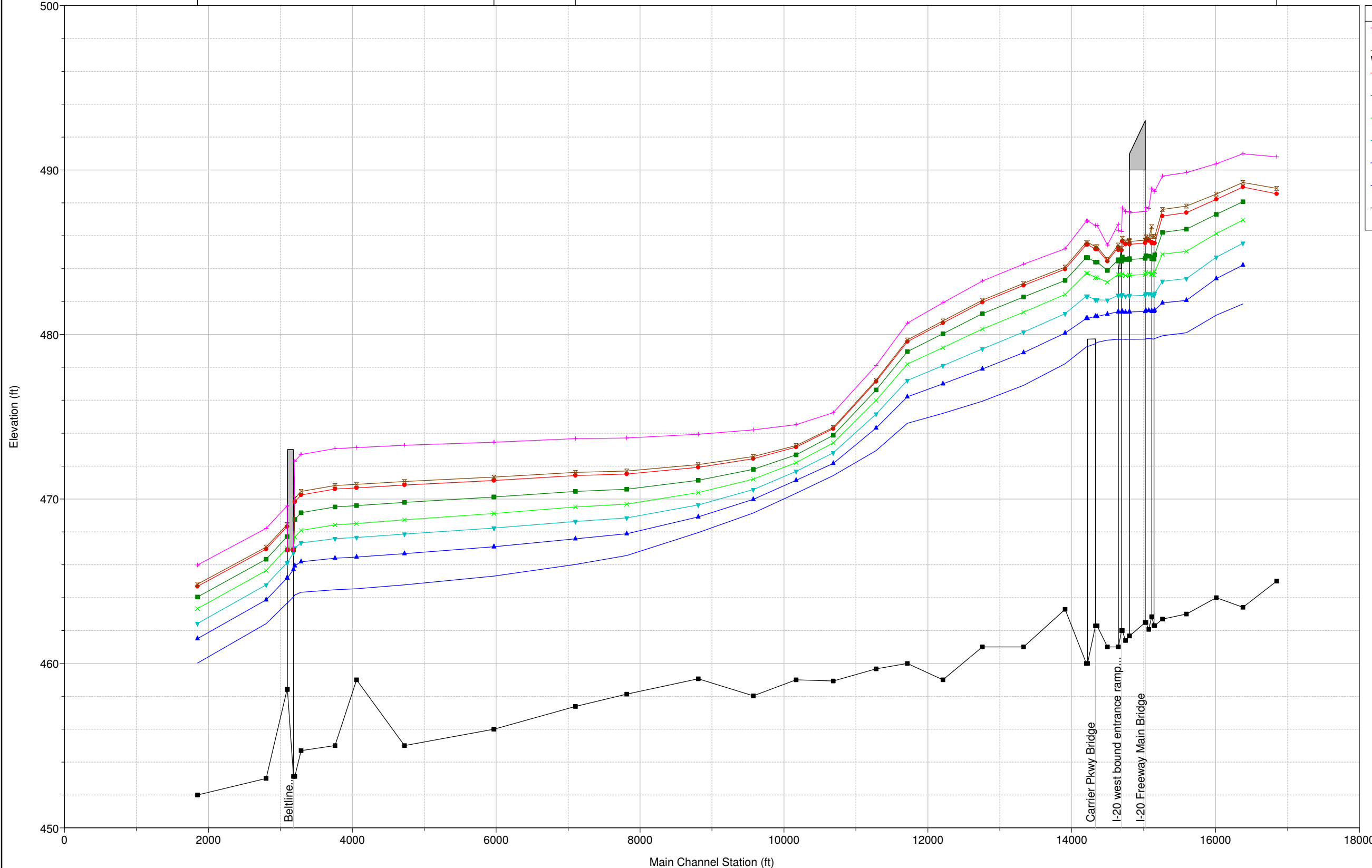
HEC-RAS Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Plan	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
BRIAN BRANCH	Main	1430	2 yr	2-50	144.00	505.00	508.05	508.05	508.95	0.003410	7.63	18.87	10.41	1.00
BRIAN BRANCH	Main	1430	100 yr	P-500	434.00	505.00	510.68		511.44	0.001356	6.96	64.13	25.28	0.71
BRIAN BRANCH	Main	1430	5 yr	2-50	224.00	505.00	508.76	508.76	509.83	0.003237	8.29	27.03	12.70	1.00
BRIAN BRANCH	Main	1430	Ultimate 100yr	P-500	434.00	505.00	510.68		511.44	0.001356	6.96	64.13	25.28	0.71
BRIAN BRANCH	Main	1430	10 yr	2-50	278.00	505.00	509.23	509.23	510.29	0.003148	8.26	33.64	15.90	1.00
BRIAN BRANCH	Main	1430	500yr	P-500	549.00	505.00	513.07		513.43	0.000296	4.81	139.20	37.32	0.37
BRIAN BRANCH	Main	1430	25 yr	2-50	337.00	505.00	509.63	509.63	510.70	0.003052	8.30	40.63	19.01	1.00
BRIAN BRANCH	Main	1430	50 yr	2-50	386.00	505.00	509.87	509.87	510.99	0.003008	8.52	45.31	20.66	1.00
BRIAN BRANCH	Main	1260	2 yr	2-50	144.00	502.72	506.29	504.58	506.49	0.000383	3.59	40.06	13.78	0.35
BRIAN BRANCH	Main	1260	100 yr	P-500	434.00	502.72	510.77	506.40	511.08	0.000234	4.46	97.42	30.05	0.29
BRIAN BRANCH	Main	1260	5 yr	2-50	224.00	502.72	507.51	505.16	507.77	0.000356	4.07	55.03	15.63	0.34
BRIAN BRANCH	Main	1260	Ultimate 100yr	P-500	434.00	502.72	510.77	506.40	511.08	0.000234	4.46	97.42	30.05	0.29
BRIAN BRANCH	Main	1260	10 yr	2-50	278.00	502.72	508.23	505.51	508.52	0.000350	4.34	64.01	16.75	0.34
BRIAN BRANCH	Main	1260	500yr	P-500	549.00	502.72	513.07	506.99	513.35	0.000150	4.28	128.23	47.55	0.24
BRIAN BRANCH	Main	1260	25 yr	2-50	337.00	502.72	508.96	505.86	509.29	0.000349	4.61	73.17	18.05	0.34
BRIAN BRANCH	Main	1260	50 yr	2-50	386.00	502.72	509.91	506.14	510.22	0.000281	4.49	85.88	24.23	0.31
BRIAN BRANCH	Main	1190												
BRIAN BRANCH	Main				Culvert									
BRIAN BRANCH	Main	1120	2 yr	2-50	144.00	501.72	503.48	503.48	504.26	0.003368	7.09	20.30	13.04	1.00
BRIAN BRANCH	Main	1120	100 yr	P-500	434.00	501.72	505.18	505.18	506.73	0.002890	9.99	43.45	15.84	1.00
BRIAN BRANCH	Main	1120	5 yr	2-50	224.00	501.72	504.03	504.03	505.05	0.003130	8.10	27.65	13.95	1.00
BRIAN BRANCH	Main	1120	Ultimate 100yr	P-500	434.00	501.72	505.18	505.18	506.73	0.002890	9.99	43.45	15.84	1.00
BRIAN BRANCH	Main	1120	10 yr	2-50	278.00	501.72	504.35	504.35	505.52	0.003046	8.68	32.02	14.48	1.00
BRIAN BRANCH	Main	1120	500yr	P-500	549.00	501.72	505.72	505.72	507.51	0.002821	10.74	51.10	16.72	1.00
BRIAN BRANCH	Main	1120	25 yr	2-50	337.00	501.72	504.68	504.68	506.00	0.002975	9.23	36.53	15.02	1.00
BRIAN BRANCH	Main	1120	50 yr	2-50	386.00	501.72	504.93	504.93	506.38	0.002942	9.64	40.03	15.44	1.00
BRIAN BRANCH	Main	960	2 yr	2-50	144.00	498.00	500.60	500.60	501.57	0.003536	7.90	18.22	9.51	1.01
BRIAN BRANCH	Main	960	100 yr	P-500	434.00	498.00	502.75	502.75	504.32	0.003148	10.05	43.18	13.73	1.00
BRIAN BRANCH	Main	960	5 yr	2-50	224.00	498.00	501.32	501.32	502.51	0.003400	8.75	25.60	10.91	1.01
BRIAN BRANCH	Main	960	Ultimate 100yr	P-500	434.00	498.00	502.75	502.75	504.32	0.003148	10.05	43.18	13.73	1.00
BRIAN BRANCH	Main	960	10 yr	2-50	278.00	498.00	501.75	501.75	503.05	0.003291	9.14	30.43	11.74	1.00
BRIAN BRANCH	Main	960	500yr	P-500	549.00	498.00	503.30	503.30	505.10	0.003050	10.77	51.07	14.84	1.00
BRIAN BRANCH	Main	960	25 yr	2-50	337.00	498.00	502.16	502.16	503.57	0.003233	9.53	35.37	12.55	1.00
BRIAN BRANCH	Main	960	50 yr	2-50	386.00	498.00	502.46	502.46	503.96	0.003220	9.84	39.21	13.15	1.00
BRIAN BRANCH	Main	770	2 yr	2-50	144.00	493.00	495.05		495.35	0.001287	4.44	32.43	22.64	0.65
BRIAN BRANCH	Main	770	100 yr	P-500	434.00	493.00	497.01		497.39	0.000730	4.95	87.69	33.67	0.54
BRIAN BRANCH	Main	770	5 yr	2-50	224.00	493.00	495.70		496.03	0.001011	4.63	48.34	26.29	0.60
BRIAN BRANCH	Main	770	Ultimate 100yr	P-500	434.00	493.00	497.04		497.41	0.000705	4.90	88.62	33.83	0.53
BRIAN BRANCH	Main	770	10 yr	2-50	278.00	493.00	496.08		496.43	0.000900	4.72	58.85	28.42	0.58
BRIAN BRANCH	Main	770	500yr	P-500	549.00	493.00	497.80		498.16	0.000481	4.80	116.23	38.19	0.46
BRIAN BRANCH	Main	770	25 yr	2-50	337.00	493.00	496.44		496.80	0.000842	4.86	69.31	30.44	0.57
BRIAN BRANCH	Main	770	50 yr	2-50	386.00	493.00	496.72		497.10	0.000794	4.94	78.12	32.03	0.56
BRIAN BRANCH	Main	620	2 yr	2-50	144.00	490.35	494.92		495.01	0.003417	2.39	60.34	26.78	0.28
BRIAN BRANCH	Main	620	100 yr	P-500	434.00	490.35	496.96		497.15	0.003697	3.56	123.07	34.44	0.32
BRIAN BRANCH	Main	620	5 yr	2-50	224.00	490.35	495.61		495.73	0.003759	2.81	79.72	29.62	0.30
BRIAN BRANCH	Main	620	Ultimate 100yr	P-500	434.00	490.35	496.99		497.18	0.003600	3.53	124.12	34.54	0.31
BRIAN BRANCH	Main	620	10 yr	2-50	278.00	490.35	496.01		496.15	0.003873	3.03	91.88	31.18	0.31
BRIAN BRANCH	Main	620	500yr	P-500	549.00	490.35	497.78		497.99	0.003061	3.68	152.87	37.66	0.30
BRIAN BRANCH	Main	620	25 yr	2-50	337.00	490.35	496.37		496.54	0.003854	3.26	103.50	32.43	0.32
BRIAN BRANCH	Main	620	50 yr	2-50	386.00	490.35	496.66		496.84	0.003822	3.43	112.98	33.42	0.32
BRIAN BRANCH	Main	420	2 yr	2-50	144.00	491.00	493.89		494.05	0.007974	3.21	44.83	24.13	0.42
BRIAN BRANCH	Main	420	100 yr	P-500	434.00	491.00	495.94		496.22	0.006072	4.28	102.74	31.85	0.40
BRIAN BRANCH	Main	420	5 yr	2-50	224.00	491.00	494.44		494.67	0.008856	3.80	58.87	26.42	0.45
BRIAN BRANCH	Main	420	Ultimate 100yr	P-500	434.00	491.00	496.03		496.30	0.005592	4.17	105.53	32.15	0.39
BRIAN BRANCH	Main	420	10 yr	2-50	278.00	491.00	494.81		495.06	0.008744	4.04	68.89	27.93	0.45
BRIAN BRANCH	Main	420	500yr	P-500	549.00	491.00	497.06		497.31	0.003808	4.07	140.30	35.32	0.33
BRIAN BRANCH	Main	420	25 yr	2-50	337.00	491.00	495.21		495.48	0.007977	4.20	80.30	29.39	0.44
BRIAN BRANCH	Main	420	50 yr	2-50	386.00	491.00	495.56		495.84	0.007036	4.27	90.90	30.56	0.42
BRIAN BRANCH	Main	300	2 yr	2-50	144.00	490.09	492.82	492.02	492.95	0.010482	2.96	48.70	32.61	0.43
BRIAN BRANCH	Main	300	100 yr	P-500	434.00	490.09	495.52	493.11	495.65	0.002709	2.94	155.07	50.02	0.25
BRIAN BRANCH	Main	300	5 yr	2-50	224.00	490.09	493.56	492.39	493.70	0.006817	3.03	74.81	37.68	0.36
BRIAN BRANCH	Main	300	Ultimate 100yr	P-500	434.00	490.09	495.65	493.11	495.77	0.002432	2.84	160.42	50.90	0.24
BRIAN BRANCH	Main	300	10 yr	2-50	278.00	490.09	494.05	492.60	494.19	0.005204	3.03	94.21	40.79	0.33
BRIAN BRANCH	Main	300	500yr	P-500	549.00	490.09	496.84	493.41	496.95	0.001559	2.68	232.68	58.60	0.20
BRIAN BRANCH	Main	300	25 yr	2-50	337.00	490.09	494.58	492.81	494.72	0.004060	3.02	116.02	43.90	0.30
BRIAN BRANCH	Main	300	50 yr	2-50	386.00	490.09	495.05	492.97	495.18	0.003300	2.99	135.30	46.76	0.28

FISH CREEK_March_2010 Plan: 1) 2-50 4/23/2010 2) P-500 4/23/2010

FISH CREEK MAINSTEM DS

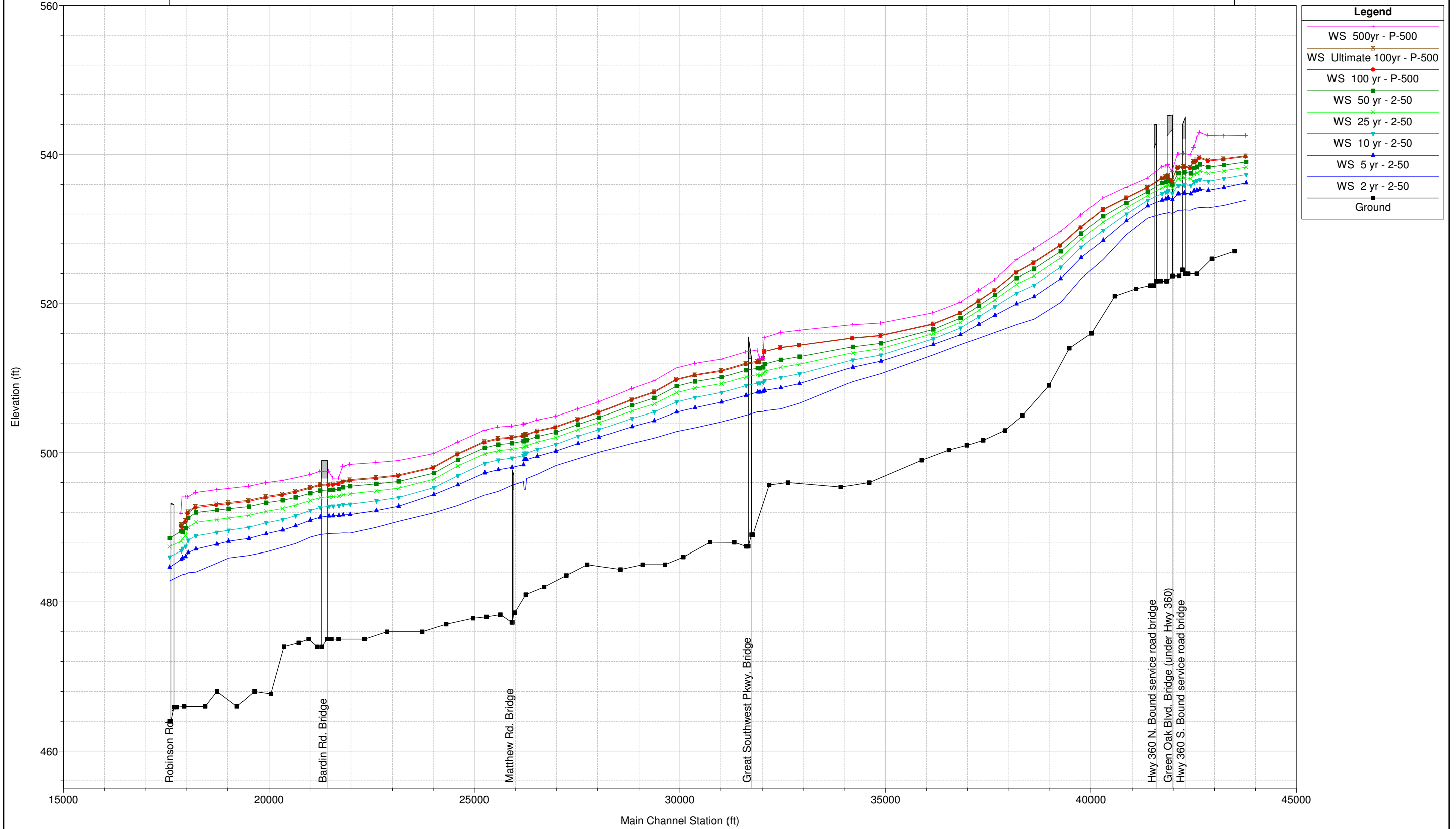
FISH CREEK MAINSTEM MID1



Legend

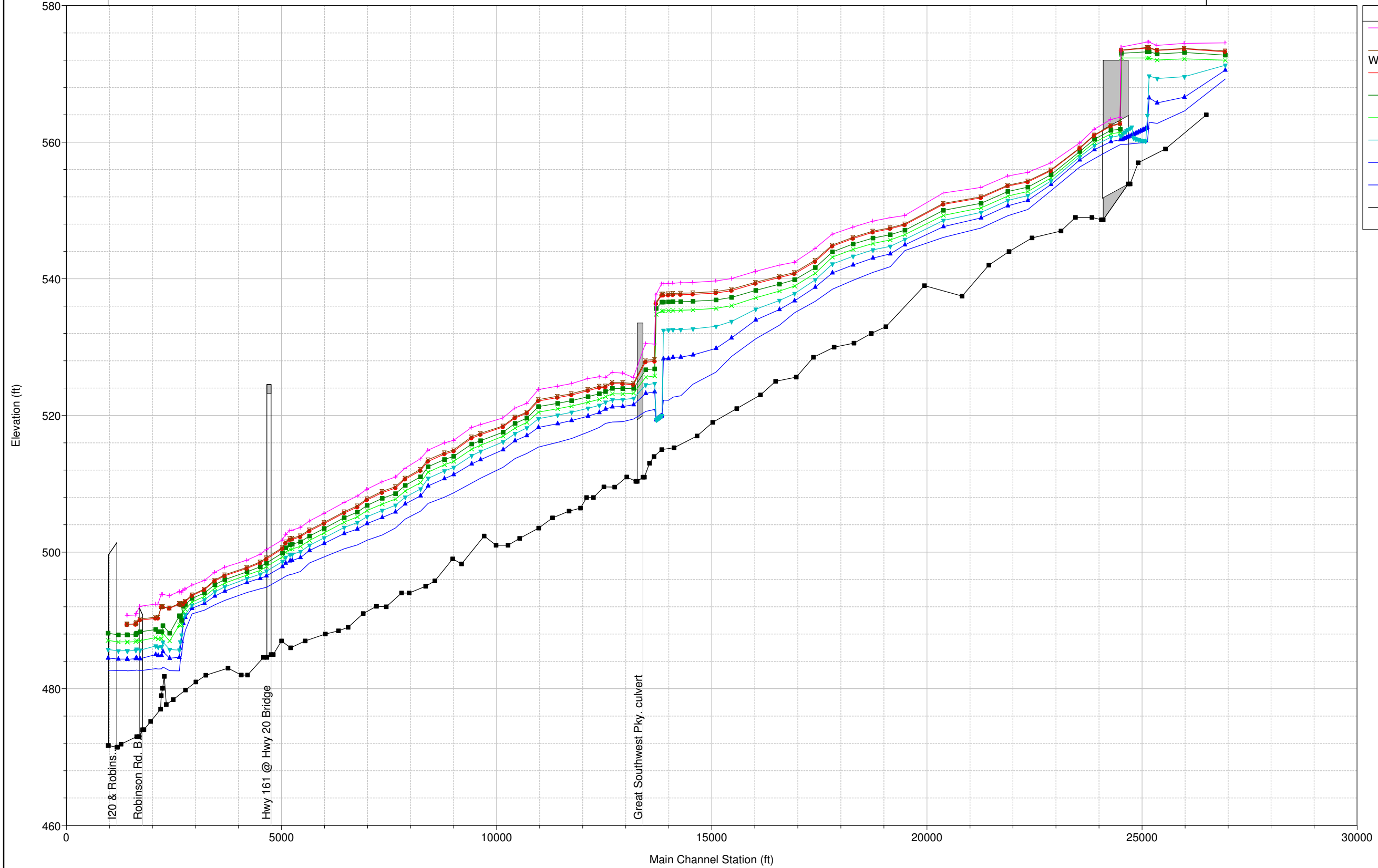
- WS 500yr - P-500
- WS Ultimate 100yr - P-500
- WS 100 yr - P-500
- WS 50 yr - 2-50
- WS 25 yr - 2-50
- WS 10 yr - 2-50
- WS 5 yr - 2-50
- WS 2 yr - 2-50
- Ground

FISH CREEK MAINSTEM MID2



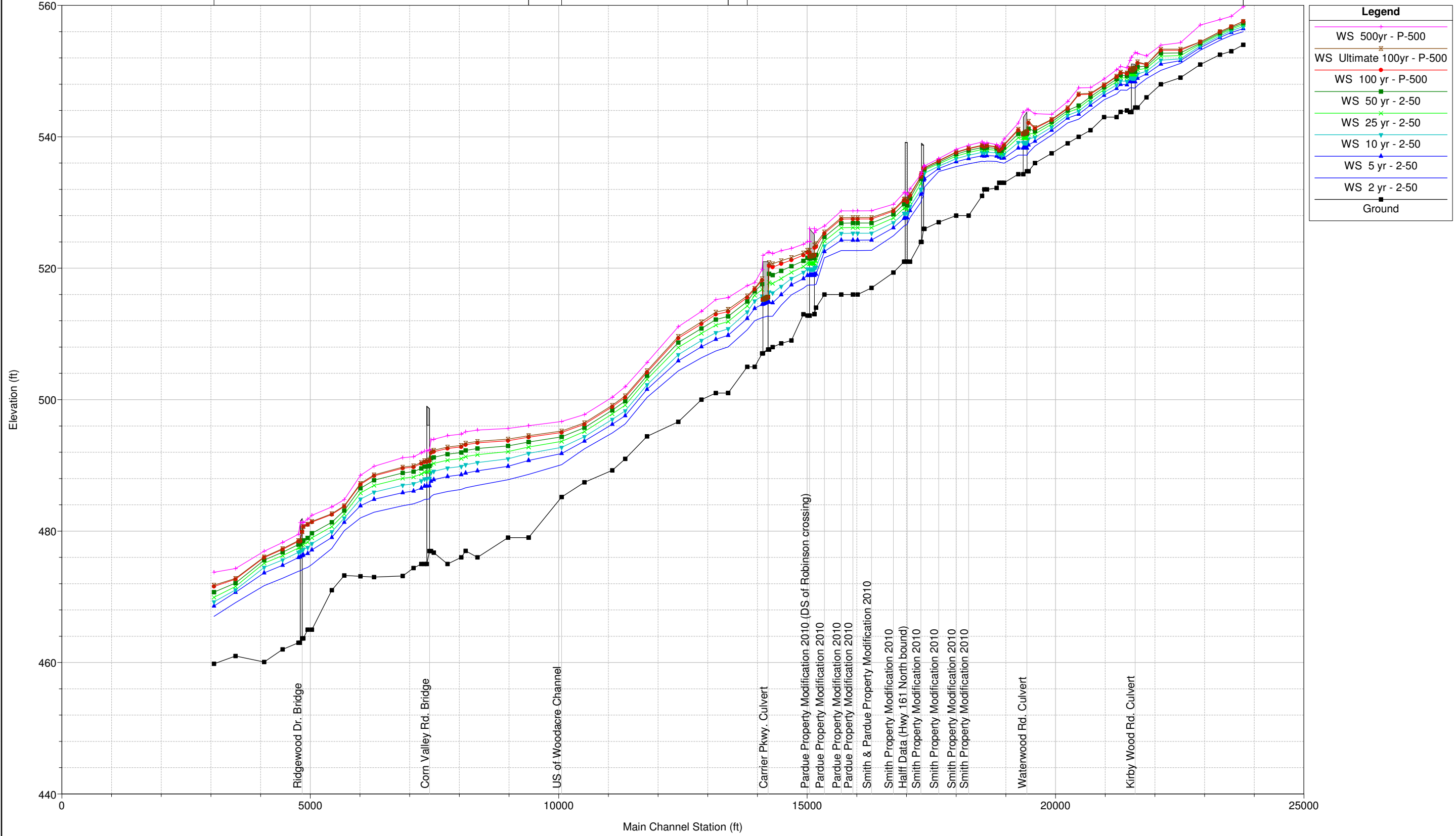
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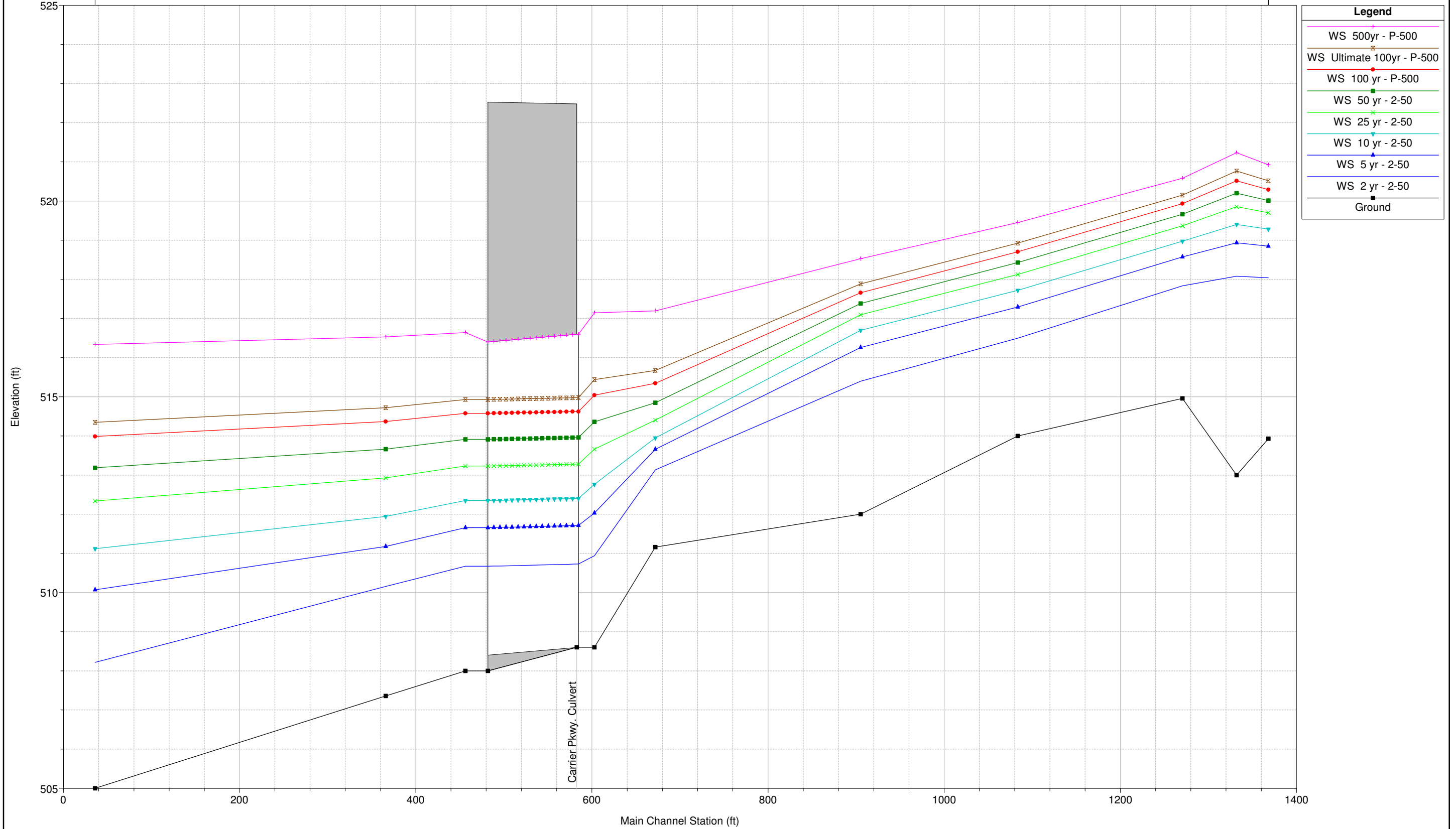
PRAIRIE CREEK MAINSTEM



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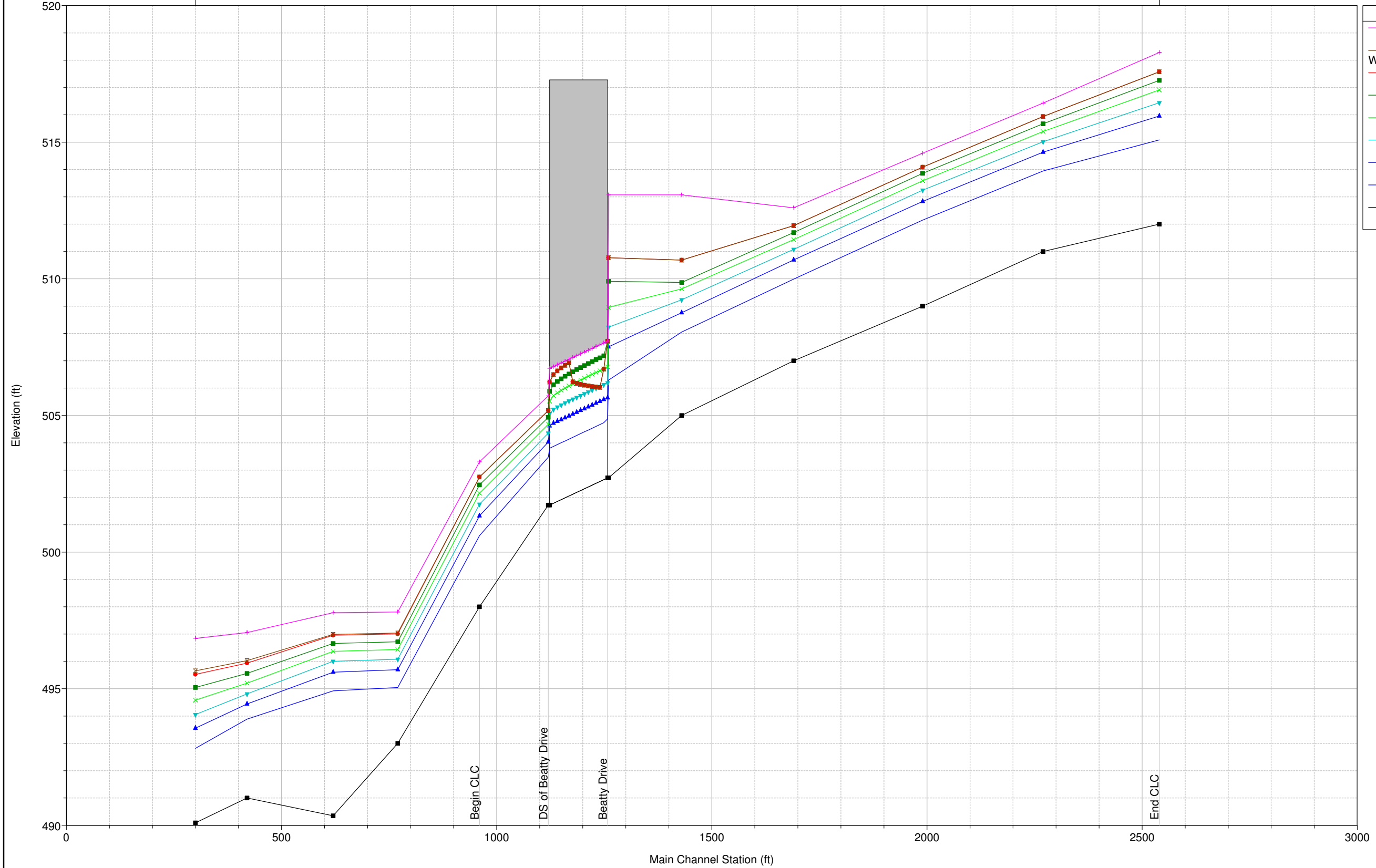
← KIRBY CREEK MAINSTEM DS | KIRBY CREEK MAINSTEM MID | KIRBY CREEK MAINSTEM US →





FISH CREEK_March_2010 Plan: 1) 2-50 4/23/2010 2) P-500 4/23/2010

BRIAN BRANCH Main



Legend

- WS 500yr - P-500
- WS Ultimate 100yr - P-500
- WS 100 yr - P-500
- WS 50 yr - 2-50
- WS 25 yr - 2-50
- WS 10 yr - 2-50
- WS 5 yr - 2-50
- WS 2 yr - 2-50
- Ground

Appendix **G**
Cost Estimates

Storage Projects

Cottonwood Creek Upstream of Great Southwest Pkwy.				
350 ac-ft				
Description	Quantity	Units	Unit Price	Cost
Land	50	ac	\$22,000.00	\$1,100,000.00
Clearing	10	ac	\$5,000.00	\$50,000.00
Tree Planting	10	ac	\$1,000.00	\$10,000.00
Excavation & Embankment	285,000	cy	\$10.00	\$2,850,000.00
Erosion Control	6,000	lf	\$3.00	\$18,000.00
Construction Cost				\$4,028,000.00
Construction Cost				\$4,028,000.00
Non-Construction Cost (22%)				\$886,000.00
Total Project				\$4,914,000.00

South Cottonwood Creek Upstream of Robinson Rd.				
800 ac-ft				
Description	Quantity	Units	Unit Price	Cost
Land	110	ac	\$20,000.00	\$2,200,000.00
Clearing	30	ac	\$5,000.00	\$150,000.00
Tree Planting	30	ac	\$1,000.00	\$30,000.00
Excavation & Embankment	650,000	cy	\$10.00	\$6,500,000.00
Erosion Control	9,000	lf	\$3.00	\$27,000.00
Construction Cost				\$8,907,000.00
Construction Cost				\$8,907,000.00
Non-Construction Cost (22%)				\$1,960,000.00
Total Project				\$10,867,000.00

Cottonwood Creek Upstream of Beltline Rd.				
375 ac-ft				
Description	Quantity	Units	Unit Price	Cost
Land	50	ac	\$10,000.00	\$500,000.00
Clearing	50	ac	\$5,000.00	\$250,000.00
Tree Planting	50	ac	\$1,000.00	\$50,000.00
Excavation & Embankment	305,000	cy	\$10.00	\$3,050,000.00
Erosion Control	5,900	lf	\$3.00	\$17,700.00
Construction Cost				\$3,867,700.00
Construction Cost				\$3,868,000.00
Non-Construction Cost (22%)				\$851,000.00
Total Project				\$4,719,000.00

Fish Creek Creek Upstream of Robinson Rd.				
2,700 ac-ft				
Description	Quantity	Units	Unit Price	Cost
Land	360	ac	\$15,000.00	\$5,400,000.00
Clearing	360	ac	\$5,000.00	\$1,800,000.00
Tree Planting	360	ac	\$1,000.00	\$360,000.00
Excavation & Embankment	2,200,000	cy	\$10.00	\$22,000,000.00
Erosion Control	16,000	lf	\$3.00	\$48,000.00
Construction Cost				\$29,608,000.00
Construction Cost				\$29,608,000.00
Non-Construction Cost (22%)				\$6,514,000.00
Total Project				\$36,122,000.00

Prairie Creek Creek Upstream of Robinson Rd.				
1,000 ac-ft				
Description	Quantity	Units	Unit Price	Cost
Land	150	ac	\$15,000.00	\$2,250,000.00
Clearing	150	ac	\$5,000.00	\$750,000.00
Tree Planting	150	ac	\$1,000.00	\$150,000.00
Excavation & Embankment	807,000	cy	\$10.00	\$8,070,000.00
Erosion Control	10,250	lf	\$3.00	\$30,750.00
Construction Cost				\$11,250,750.00
Construction Cost				\$11,251,000.00
Non-Construction Cost (22%)				\$2,475,000.00
Total Project				\$13,726,000.00

Beltline at Cottonwood				
150' channel DS to confluence with Plattner Creek				
Description	Quantity	Units	Unit Price	Cost
Land	20	ac	\$10,000.00	\$200,000.00
Clearing	20	ac	\$5,000.00	\$100,000.00
Tree Planting	20	ac	\$1,000.00	\$20,000.00
Channel Excavation	172,509	cy	\$20.00	\$3,450,180.00
Erosion Control	4,000	lf	\$3.00	\$12,000.00
Construction Cost				\$3,782,180.00
Construction Cost				\$3,782,000.00
Non-Construction Cost				\$832,000.00
Total Project				\$4,614,000.00

3rd Street at Cottonwood				
Raise the roadway 1' , lengthen bridge to 240', 150' channel DS to Beltline				
Description	Quantity	Units	Unit Price	Cost
Land	24	ac	\$10,000.00	\$240,000.00
Clearing	24	ac	\$5,000.00	\$120,000.00
Tree Planting	24	ac	\$1,000.00	\$24,000.00
Channel Excavation	249,000	cy	\$20.00	\$4,980,000.00
Erosion Control	4,100	lf	\$3.00	\$12,300.00
Embankment	1,200	lf	\$60.00	\$72,000.00
Pavement	1,200	lf	\$114.00	\$136,800.00
Bridge abutments	2	ea	\$42,000.00	\$84,000.00
Bridge	240	lf	\$10,100.00	\$2,424,000.00
Construction Cost				\$8,093,100.00
Construction Cost				\$8,093,000.00
Non-Construction Cost				\$1,780,000.00
Total Project				\$9,873,000.00

Carrier Parkway at Cottonwood				
Raise the roadway to 485.5 and lengthen Cottonwood bridge to 140' & South Cottonwood to 160'				
Description	Quantity	Units	Unit Price	Cost
Embankment	1,700	lf	\$295.00	\$501,500.00
Pavement	1,700	lf	\$144.00	\$244,800.00
Bridge abutments	4	ea	\$53,000.00	\$212,000.00
Bridge	300	lf	\$12,346.00	\$3,703,800.00
Construction Cost				\$4,662,100.00
Construction Cost				\$4,662,000.00
Non-Construction Cost				\$1,026,000.00
Total Project				\$5,688,000.00

Great Southwest at Cottonwood				
Raise the roadway 3.5, 7-9x10 MBC, lengthen railroad bridge to 200', 50' flat bottom channel				
Description	Quantity	Units	Unit Price	Cost
Embankment	900	lf	\$220.00	\$198,000.00
Pavement	900	lf	\$144.00	\$129,600.00
10x9 Box Culvert	700	lf	\$800.00	\$560,000.00
Channel Excavation	20,000	cy	\$20.00	\$400,000.00
Bridge abutments	2	ea	\$53,000.00	\$106,000.00
Bridge	200	lf	\$12,346.00	\$2,469,200.00
Construction Cost				\$3,862,800.00
Construction Cost				\$3,863,000.00
Non-Construction Cost (22%)				\$850,000.00
Total Project				\$4,713,000.00

Marshall at South Cottonwood				
Raise the roadway 1', 10-10x10 MBC				
Description	Quantity	Units	Unit Price	Cost
Embankment	250	lf	\$74.00	\$18,500.00
Pavement	250	lf	\$144.00	\$36,000.00
10x10 Box Culvert	720	lf	\$820.00	\$590,400.00
Construction Cost				\$644,900.00
Construction Cost				\$645,000.00
Non-Construction Cost				\$142,000.00
Total Project				\$787,000.00

Robinson at South Cottonwood				
10-10x10 MBC, 100' flat bottom channel				
Description	Quantity	Units	Unit Price	Cost
Pavement	120	lf	\$114.00	\$13,680.00
10x10 Box Culvert	610	lf	\$820.00	\$500,200.00
Channel Excavation	16,000	cy	\$20.00	\$320,000.00
Construction Cost				\$833,880.00
Construction Cost				\$834,000.00
Non-Construction Cost				\$183,000.00
Total Project				\$1,017,000.00

Pioneer at South Cottonwood				
1-10x10 RCB				
Description	Quantity	Units	Unit Price	Cost
Pavement	120	lf	\$114.00	\$13,680.00
10x10 Box Culvert	200	lf	\$820.00	\$164,000.00
Construction Cost				\$177,680.00
Construction Cost				\$178,000.00
Non-Construction Cost				\$39,000.00
Total Project				\$217,000.00

Great Southwest at South Cottonwood				
4-10x10 MBC				
Description	Quantity	Units	Unit Price	Cost
Pavement	100	lf	\$114.00	\$11,400.00
10x10 Box Culvert	312	lf	\$820.00	\$255,840.00
Construction Cost				\$267,240.00
Construction Cost				\$267,000.00
Non-Construction Cost				\$59,000.00
Total Project				\$326,000.00

Beltline at Plattner				
1-6x6 MBC				
Description	Quantity	Units	Unit Price	Cost
Pavement	100	lf	\$200.00	\$20,000.00
6x6 Box Culvert	144	lf	\$650.00	\$93,600.00
Construction Cost				\$113,600.00
Construction Cost				\$114,000.00
Non-Construction Cost				\$25,000.00
Total Project				\$139,000.00

Great Southwest at Prairie				
4-10x10 MBC				
Description	Quantity	Units	Unit Price	Cost
Pavement	100	lf	\$144.00	\$14,400.00
10x10 Box Culvert	552	lf	\$820.00	\$452,640.00
Construction Cost				\$467,040.00
Construction Cost				\$467,000.00
Non-Construction Cost				\$103,000.00
Total Project				\$570,000.00

Fish Creek at Interstate 20 Tunnel				
Description	Quantities	Units	Unit Price	Cost
Tunnel Inlet & Diversion Headworks	1	ls	\$26,000,000	\$26,000,000
Tunnel	9000	lf	\$7,500	\$67,500,000
Outlet	1	ls	\$15,000,000	\$15,000,000
				\$108,500,000
Construction Cost				\$108,500,000.00
Non-Construction Cost				\$23,870,000.00
Total Project				\$132,370,000.00

Appendix **H**
Advisory and Public Meeting Notes



**COTTONWOOD and FISH CREEK WATERSHEADS
FLOOD PROTECTION PLAN
Advisory Committee Meeting
November 14, 2008
Agenda**

1. Introductions
2. Discuss Project Scope & Goals
 - Data Collection Status
 - Study Area
 - Drainage Basins
3. Other



**COTTONWOOD and FISH CREEK WATERSHEADS
FLOOD PROTECTION PLAN
Agenda**

1. Introductions
2. Team Sub-consultants
 - Halff Associates, Inc.
 - Marshall Lancaster & Associates, Inc.
3. Discuss Project Scope & Goals
4. Proposed Deliverables
5. Advisory Committee Planning
6. Baseline Data
 - Current FIS & COE models
 - LOMARs
 - Lidar contours and point data most recent.
 - Model calibration data
 - List of problem areas from City
 - Construction plans
 - Arlington
 - TxDOT
 - Cultural or Environmental sensitive areas.
7. Other



**08073.00 GP Cottonwood and Fish Creek FPP
Kickoff Meeting Minutes
November 14, 2008**

- Intro
 - Touched on TxDOT flooding, TRA facilities

- Jack Tidwell, NCTCOG

- County Representation
- COE has to be selective
- TCEQ critical miss

- 50% of complaints to GP
- Main focus on transportation

- Error on study area Kirby Creek
- Joe Sherwin (?) 1 ft above ultimo devel condition
- 4 last year repititi
- Goal of 0 repit
- Key for city with 30% of city in f.p.
- Need:
- TxDOT improves going forward with updated models
- Joe-TRA commented TRA's concern will be stream bank velocities NCTCOG reinforced CDC and noted anticipated future CDC or other
- TxDOT Moody=if hydraulic prob something to be addressed; if identified, they will consider

Name	Entity/Firm	Phone	Email
Kenneth Tillman	EC	214-951-0807	ktillman@espeyconsultants.com
Joshua Crowley	EC	512-326-5659	jcrowley@espeyconsultants.com
Gordon Moodie	TxDOT	214-320-6623	gmoodie@dot.state.tx.us
Wayne Hunter	EC	214-951-0807	whunter@espeyconsultants.com
A. (?) Flores	TxDOT-SWAO	972-293-4486	aflore4@dot.state.tx.us
Tony Payberah	TxDOT-SWAO	972-291-4043	tpayber@dot.state.tx.us
Stephen Crawford	Halff Associates	817-847-1422	scrawford@halff.com
Romin Khavari	City of Grand Prairie	972-237-8145	rkhavari@gptx.org
Karen Stafford-Brown	Trinity River Authority	817-493-5100	brownk@trinityra.org
Joe Sherwin	City of Grand Prairie	972-237-8157	jsherwin@gptx.org
Jack Tidwell	NCTCOG	817-695-9220	jtidwell@nctcog.org

- TxDOT wants new facilities
- Error=> TxDOT data collection
- Joe+Romin identify strength of viability of study being funded was coop team approach to considering alt for common identif prob
- Consider of pooled resources through in kind using what we do best
- Noted need for TxDOT and TRA
- JC
- Benefit cost will include priorities of indiv rev of Advisory comm., not just ranking but value
- Key TxDOT hotspots
- FC silti TxDOT ; colverts at Carrier major problem
- JT Trading info
- Beyond existing structures, need report to go to maint geomorphology issues new issues water qty and water quality/sediment major issue cited floodplain mgrs group; working on pilot watersheds
- TRA has need for info for CIP Plan; KT committed to share
- JS noted
- Website + monthly pipeline include schedule
- TxDOT design manual still underway
- TxDOT NTIS should be added to list handover SH161 Dec 2010 sent TRA to Karen CC Bart

Cottonwood and Fish Creeks
Flood Protection Planning Study
Public Meeting
November 14, 2008

Sponsored by
City of Grand Prairie and the
Texas Water Development Board



Agenda

- Introduction of Sponsors, Stakeholders, and Interested Parties
- Background and City of Grand Prairie Flood Protection Goals
- Scope of Study
- Public Discussion



Cottonwood & Fish Creeks Flood
Protection Planning Study
Will Utilize a Broad Range of Participants

- Study Sponsors (Financial Commitments)
 - City of Grand Prairie and TWDB
- Study Stakeholders (Resource Commitments)
 - City of Arlington, TxDOT, USACE, Dallas County, Tarrant County
- Notable Interested Parties (Functional Interests)
 - NCTCOG, TCEQ
 - General Public



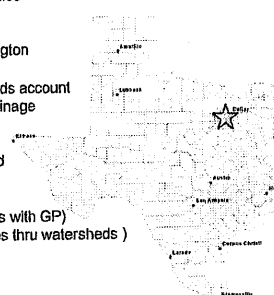
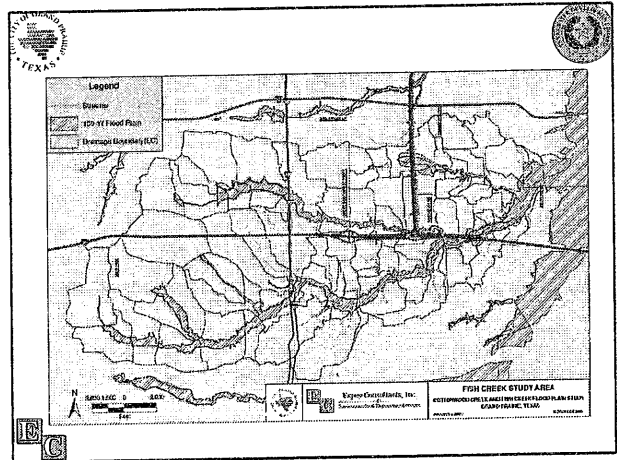
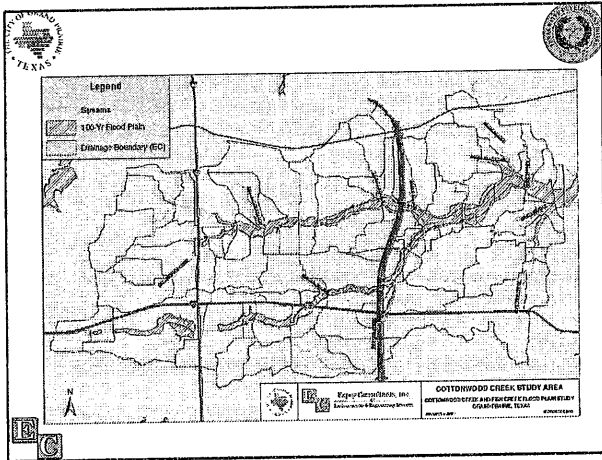
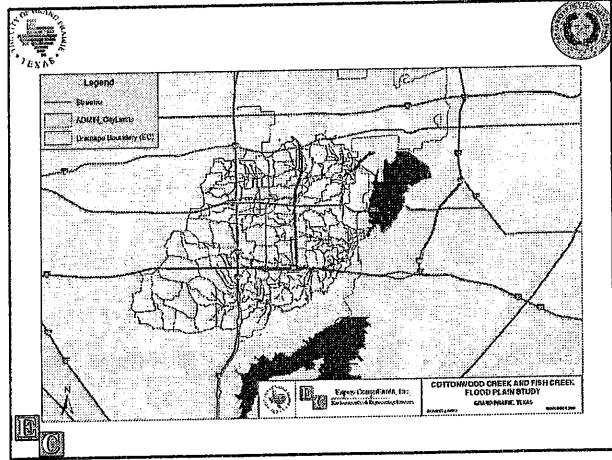
Agenda


- Introduction of Sponsors, Stakeholders, and Interested Parties
- Background and City of Grand Prairie Flood Protection Goals
- Scope of Study
- Public Discussion




Background on Cottonwood & Fish Creeks Drainage Area in Grand Prairie

- Watersheds**
 - Cottonwood Creek – 14.4 Square Miles
 - Fish Creek – 26.7 Square Miles
 - Tributary to Mountain Creek Lake
 - Extends thru Grand Prairie into Arlington
- Current Status**
 - Cottonwood & Fish Creek Watersheds account for approximately fifty percent of drainage complaints in Grand Prairie
 - Critical Transportation Corridors
 - I-20, SH 360, & SH 161 are affected
 - Comprehensive Hydrologic Model
- Participation/Support**
 - City of Arlington (shares watersheds with GP)
 - TxDOT (Major Transportation Routes thru watersheds)
 - US Army Corps of Engineers









FEMA Goals Provide Basis for Flood Reduction Planning





- Protect human life and health
- Minimize the expenditure of public funding for costly flood control projects
- Minimize the need for rescue and relief efforts
- Minimize damage to public facilities
- Help maintain a stable tax base by providing for sound use of flood prone areas
- Help potential buyers become aware of property subject to flooding


City of Grand Prairie has Adopted More Stringent Goals Than FEMA





- Ensure lowest floor of structure be elevated not less than 1 foot above FEMA base flood elevation
- Reduce number of repetitive losses
- Reduce impact from development
- Acquire floodplain where feasible
- Perform creek studies


City of Grand Prairie has Adopted More Stringent Goals Than FEMA




- Create GIS planning tool to identify:
 - Drainage problems
 - Erosion problems
 - Open space
 - Special flood hazard areas
- Keep city owned floodplain natural
- Encourage reduction of runoff through better design

City of Grand Prairie has Adopted More Stringent Goals Than FEMA



- Notify citizens that flood insurance is available
- Increase the flood policy base
- Maintain the Floodplain Mgmt. Ordinance
- Ensure residents are given adequate flood warnings
- Ensure real estate disclosure to homebuyers





Flood Insurance Statistics
Point to Potential Value of Study

	Historical Losses		Value of Property in 100yr FP	
	Grand Prairie	Arlington	Grand Prairie	Arlington
Cottonwood Creek	\$ 220,000.00	\$ 229,333.33	\$ 111,264,000.00	\$ 115,990,000.00
Fish Creek	\$ 95,000.00	\$ 168,468.61	\$ 295,340,000.00	\$ 523,750,000.00
Total	\$ 315,000.00	\$ 397,801.94	\$ 406,604,000.00	\$ 639,740,000.00

- Agenda**
- Introduction of Sponsors, Stakeholders, and Interested Parties
 - City of Grand Prairie Flood Protection Goals
 - Scope of Study
 - Public Discussion




- Project Scope Provides Methodical Application of Updated Information to Existing Conditions**
- Data collection and baseline study
 - Identification of environmental constraints
 - Identify problem areas
 - H/H model development
 - Criteria and alternatives to be evaluated
 - Benefit / Cost analysis
 - Implementation and phasing plan
 - Other (funding alt., non-structural alt., etc.)

Description	2008			2009							2010							
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
Project Start, Collection of Baseline Information, Base Map	█	█	█															
Environmental Constraints																		
Review and Identification of Flood Problem Areas																		
Field Survey Data Collection																		
Hydrologic Model Development																		
Hydraulic Model Development																		
Evaluation of Criteria, Measures, Alternatives																		
Hydrologic and Hydraulic Analysis of Alternatives																		
Benefit/Cost Analysis																		
Implementation and Phasing Plan																		
Final Deliverables																		




Key to Success of this Project will be the Identification of Two Types of Solutions

- **Structural**
 - Detention Ponds
 - Channel Improvements
 - Bridge / Culvert Improvements
 - Channel Diversions
- **Non-Structural**
 - Development Regulations
 - Floodplain Land Acquisition
 - Warning Systems

Agenda

- Introduction of Sponsors, Stakeholders, and Interested Parties
- City of Grand Prairie Flood Protection Goals
- Scope of Study
- Public Discussion

For More Information


■ **Kenneth Tillman**

Espey Consultants, Inc.
2777 N. Stemmons Frwy
Suite 1102
Dallas Texas 75207
Telephone: (214) 951-0807
FAX: (214) 951-0906

Email: ktillman@espeyconsultants.com

■ **Gilbert Ward**

Texas Water Development Board
Research and Planning Fund
1700 North Congress Avenue
PO Box 13231
Austin Texas 78711-3231
Telephone: (512) 463-6418
FAX: (512) 463-9893
Email: gilbert.ward@twdb.state.tx.us





Cottonwood and Fish Creek-Flood Protection Study-Advisory Committee Mtg. Sheet 1 of 1

Meeting Location: The Development Center – The Prairie Conference room

DATE: January 16, 2009 1:00 P.M.

Attendees

Organization

Phone

E-mail

Attendees	Organization	Phone	E-mail
Joe Sherwin	City of Grand Prairie	972-257-8157	jsherwin@gp.tx.us
Romin Khatun	" " " ENGINCEALC	972-237-8145	Rkhatun@GP173-016
Bart Hines	Trinity River Authority	817-493-5100	hinesb@trinityra.org
MARK THURPEN	T. R. A.	(817) 493-5181	thturpen@trinityra.org
Stephen Crawford	Half	(817) 847-1422	scrawford@half.com
Tony Payberah	TxDOT	(972) 291-4043	tpayber@dot.state.tx.us
Aureliano Flores	TxDOT	972-293-4486	afloret@dot.state.tx.us
Wayne Hunter	Espey Consu Hands	214 951-0807	whunter@espeyconsuHands.com

See Attached Minutes:

File:



Cottonwood and Fish Creek-Flood Protection Study-Advisory Committee Mtg. Sheet 2 of

Meeting Location: The Development Center – The Prairie Conference room

DATE: January 16, 2009 1:00 P.M.

Attendees

Organization

Phone

E-mail

Attendees	Organization	Phone	E-mail
Gene Rice	USACE - FT. WORTH	817 886-1374	Gene.J.Rice@ USACE.ARMY.MIL
Kenneth Tillman	Espey	214-951-0807	ktillman@ espeyconsulting.com
JACK TIDWELL	NCTCOS	817/695-9220	jtiddwell@nctcos.org

See Attached Minutes:

File:

STATE OF TEXAS
COUNTY OF TARRANT

Before me, a Notary Public in and for said County and State, this day

personally appeared Christine Lopez, Advertising Representative for the Star-Telegram, published by the Star-Telegram, Inc. at Fort Worth, in Tarrant County, Texas and distributed in other surrounding Counties; and who, after being duly sworn, did dispose and say that the following clipping of an advertisement was published in the above named paper on the following dates:

Fri Nov 6, 2009

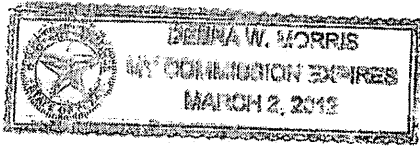
Wed Nov 11, 2009

Signed

[Signature]

Subscribed and sworn to before me, this the 1 day of December 2009

Notary Public Debra W. Morris
Tarrant County, Texas



PUBLIC HEARING
NOTICE
CITY OF GRAND
PRAIRIE
COTTONWOOD and
FISH CREEK WA-
TERSHEDS
FLOOD PROTECTION
PLAN
GRAND PRAIRIE DE-
VELOPMENT CEN-
TER
206 W. CHURCH
STREET
THE GRAND CON-
FERENCE ROOM
THURSDAY, NOVEM-
BER 12, 2009
1:00 P.M. TO 2:00
P.M.
The City of Grand
Prairie is jointly
participating with
the Texas Water
Development Board
for a Flood Protec-
tion Planning Study
of the Cottonwood
Creek and Fish Creek
watersheds. The
study location ex-
tends from the
confluence of each
creek with Mountain
Creek Lake upstream
to the beginning of
each creek in the City
of Arlington Texas.
In Grand Prairie this
includes areas
bounded approxi-
mately by Jefferson
Boulevard to the
north, Mountain
Creek Lake to the
east, Camp Wisdom
Road to the south,
and State Highway
360 to the west. This
meeting will focus on
preliminary findings
from work complet-
ed to date.
AGENDA
I. Introduction
A. Welcome of inter-
ested parties
B. Introduction of
project sponsors
C. Introduction of
stakeholders
II. Project Status
A. Project location
B. Project status
III. Flood Protection
Goals
A. Design flood cri-
teria
IV. Areas of Concern
A. Roadway overtop-
ping
B. Property flooding
V. Citizen Comments
VI. Adjournment
The Development
Center is wheelchair
accessible. If you
plan to attend this
public meeting and
you have a disability
that requires special
arrangements,
please call 972-237-
8035 at least 24
hours in advance.
Reasonable accom-
modations will be
made to assist your
needs. In accordance
with Chapter 551,
subchapter 6, of the
Texas Government
Code, this meeting
notice and agenda
was prepared and
posted on this the
th day of 2009.

ENGINEERING DATE: November 12, 2009 1:00 PM

Attendees	Organization	City of Grand Prairie	Phone	E-mail
Gabriel Johnson			972-237-8157	gjohnson@gpctx.org
<i>W. K. H.</i>		Espey Consultants	214 951-0807	whunter@espeyconsultants.com
Gilbert Ward		Texas Water Development Board	512-463-6418	gward@twd.b.state.tx.us
Josha Crowley		ESPEY	512-326-5659	jcrowley@espeyconsultants.com
Kenneth Tillman		Espey	214 951-0807	ktillman@espeyconsultants.com
Stephen Crawford		Halfff	214-201-1270	scrawford@halfff.com

See Attached Minutes:
File:

2. Action Items		
No.	Action	By
1	SCAN NEWSPAPER ARTICLE AND AFFIDAVIT TO GILBERT	GABE
2	GIVE CTP FORM TO KEN	GABE
3	EMAIL PRESENTATION TO GABE	KEN

3. Notes

4. Next Meeting (if applicable)			
Date: (MM/DD/YYYY)		Time:	
Meeting Facilitator:		Location:	
Objective:			

Cottonwood and Fish Creeks Flood Protection Planning Study Public Meeting November 12, 2009

Sponsored by
City of Grand Prairie and the
Texas Water Development Board



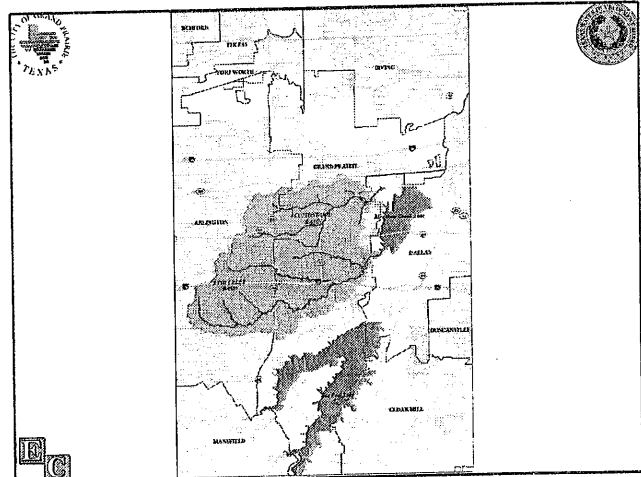
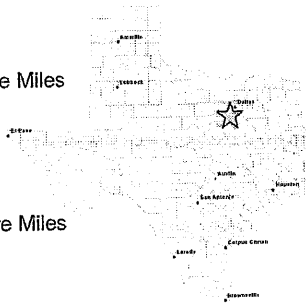
Cottonwood & Fish Creeks Flood Protection Planning Study Will Utilize a Broad Range of Participants

- Study Sponsors (Financial Commitments)
 - City of Grand Prairie and TWDB
- Study Stakeholders (Resource Commitments)
 - City of Arlington, TxDOT, USACE, Dallas County, Tarrant County
- Notable Interested Parties (Functional Interests)
 - NCTCOG, TCEQ
 - General Public



Cottonwood & Fish Creeks Grand Prairie

- Cottonwood Creek
 - Six Modeled Tributaries
 - Stream Length - 16.5 Miles
 - Drainage Area - 14.4 Square Miles
 - Twenty-eight Structures
- Fish Creek
 - Five Modeled Tributaries
 - Stream Length - 28.2 Miles
 - Drainage Area - 26.7 Square Miles
 - Thirty-nine Structures



Tasks & Schedule

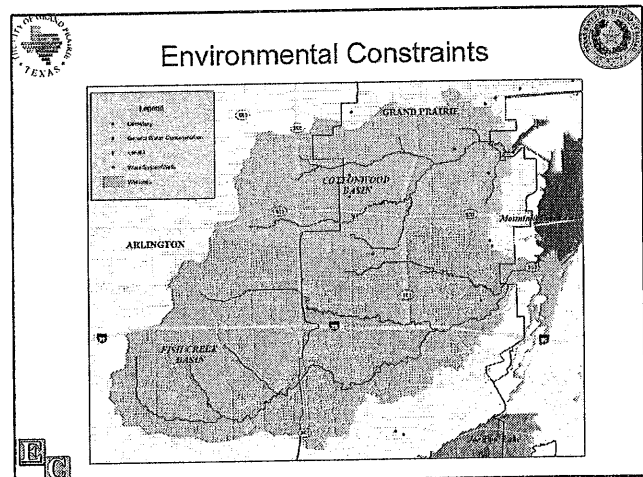
Task No.	Description	MONTH																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
a	Project Start, Collection of Baseline Information, Base Map	■																	
b	Environmental Constraints	■	■																
c	Review and Identification of Flood Problem Areas	■	■	■															
d	Field Survey Data Collection		■	■	■														
e	Hydrologic Model Development			■	■	■													
f	Hydraulic Model Development				■	■	■												
g	Evaluation of Criteria, Measures, Alternatives					■	■	■											
h	Hydrologic and Hydraulic Analysis of Alternatives						■	■	■										
i	Benefit/Cost Analysis							■	■	■									
j	Implementation and Phasing Plan								■	■	■								
k	Final Deliverables										■	■	■						

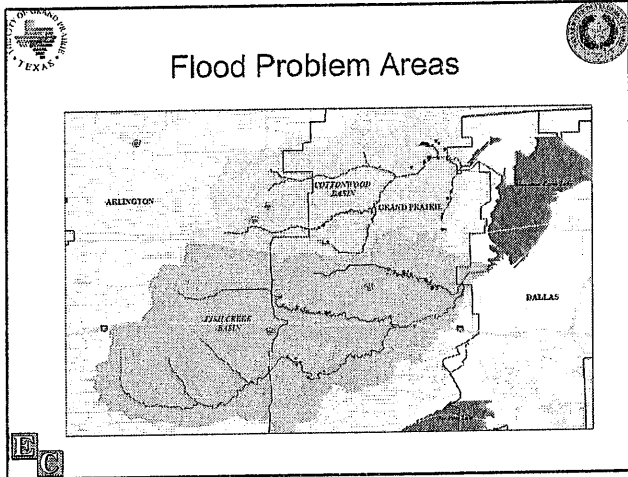
Baseline Information

Current Computer Models	HEC-2 1990 Fish Creek HEC-2 1996 Cottonwood HEC-RAS Conversion 2002
Site Specific Flood Studies	LOMRS, CLOMRs, Drainage Studies
Geo-referenced Data	Grand Prairie GIS Arlington GIS
Structures	Construction Drawings
Land Use	Current Zoning Future Planned Uses
Topographic Data	2' Contours from NCTCOG

Baseline Information was Augmented with 1' LiDARs in Grand Prairie

2009 Data	Current information accounts for recent erosion.
One Foot contours	Greater detail than two foot contours
NAD83 Horizontal NAVD88 Vertical State Plane Zone Texas North Central (TNC4202)	Matches City-wide survey monuments & provides consistency



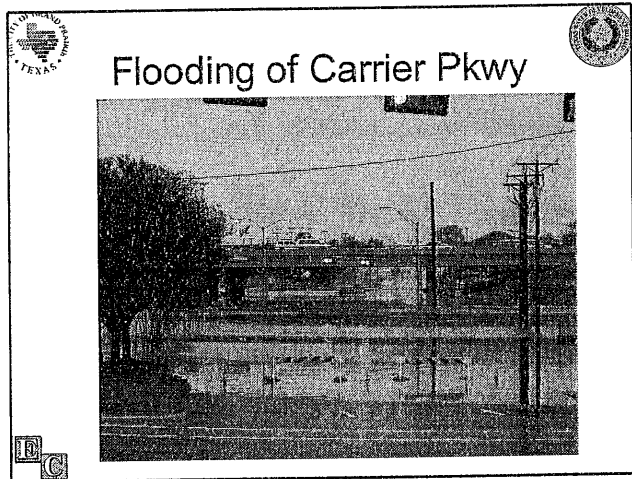


Flood Problem Areas

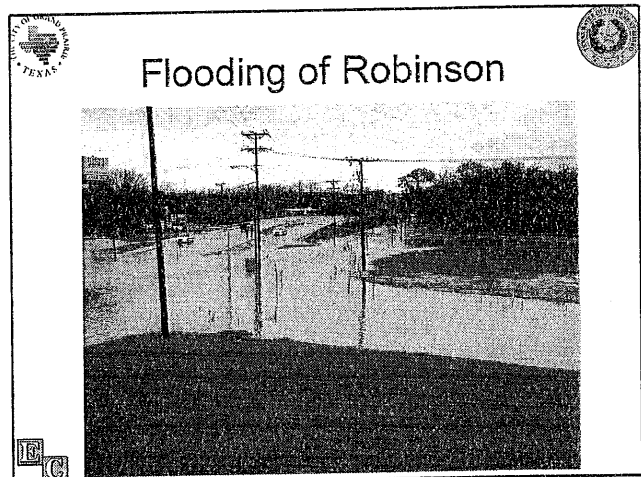
The table provides a detailed breakdown of drainage complaints for two specific areas. The columns represent different types of complaints: Hot Spots, Erosion, Street, Property, Structure, and Total. The rows list Cottonwood Creek and Fish Creek.

Stream Names	Drainage Complaints					Total
	Hot Spots	Erosion	Street	Property	Structure	
Cottonwood Creek	13	17	32	112	78	253
Fish Creek	17	40	74	118	21	271

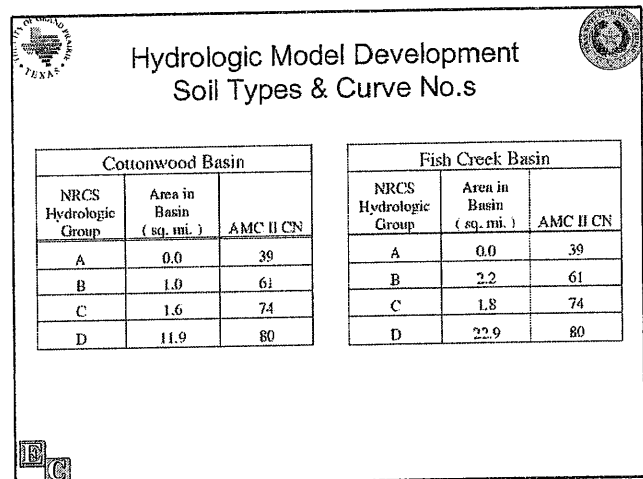
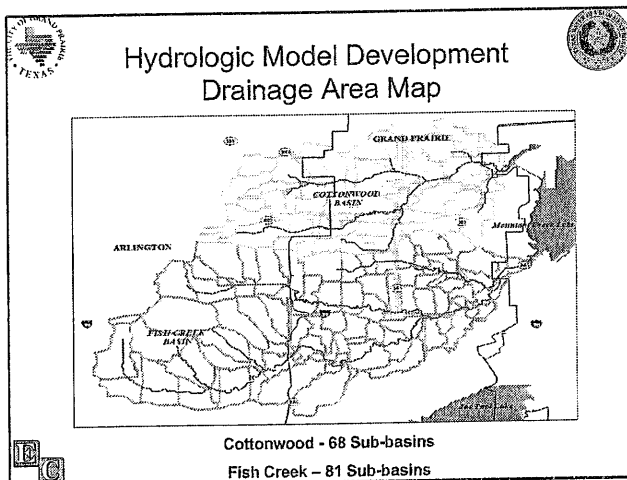
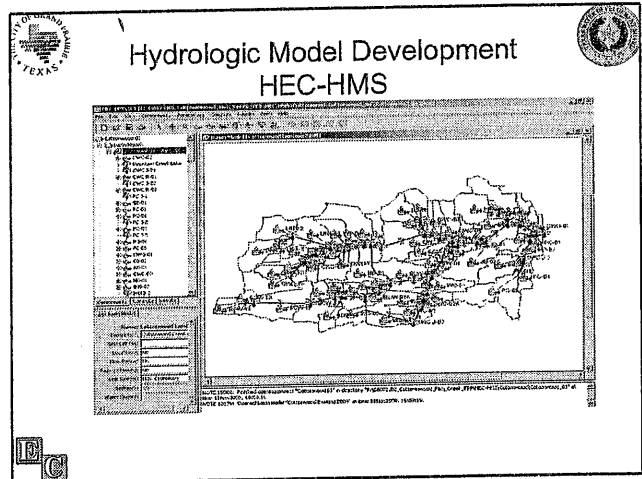
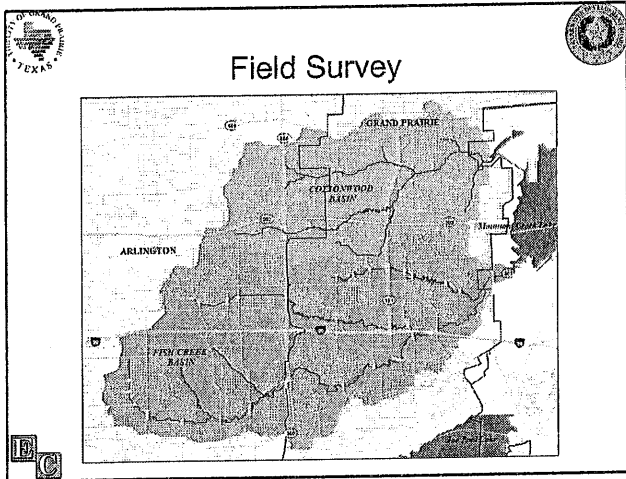
Flood Problem Areas

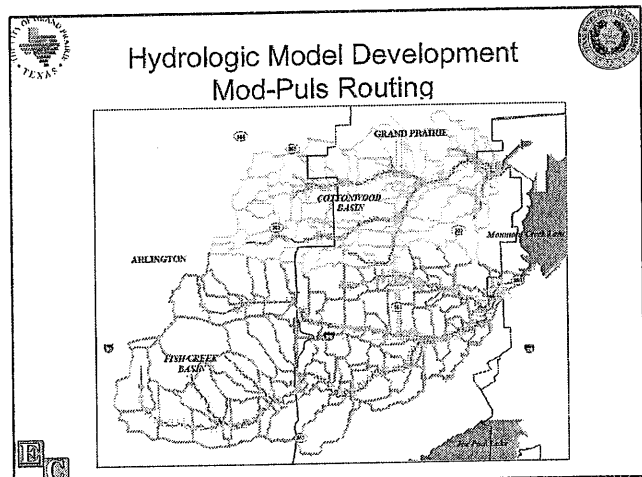
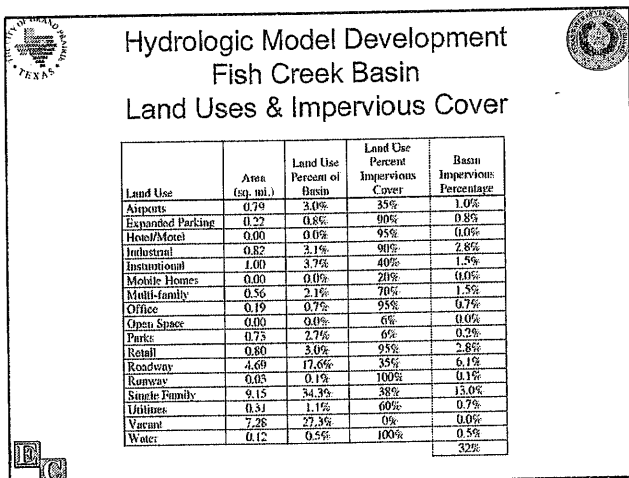
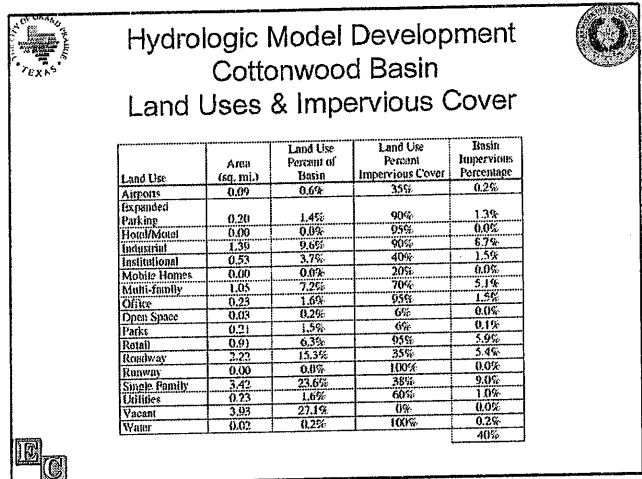
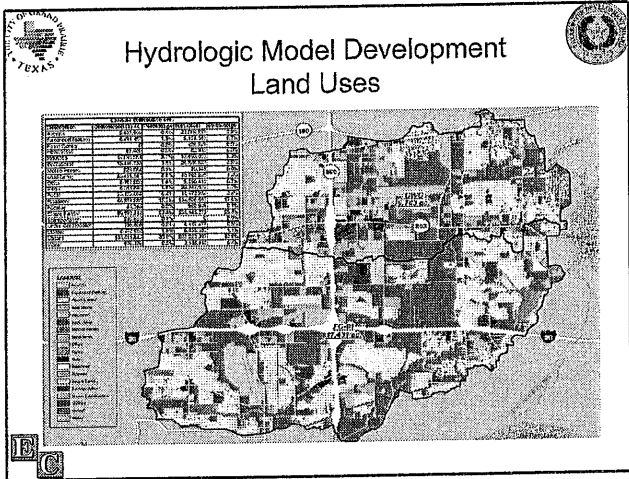


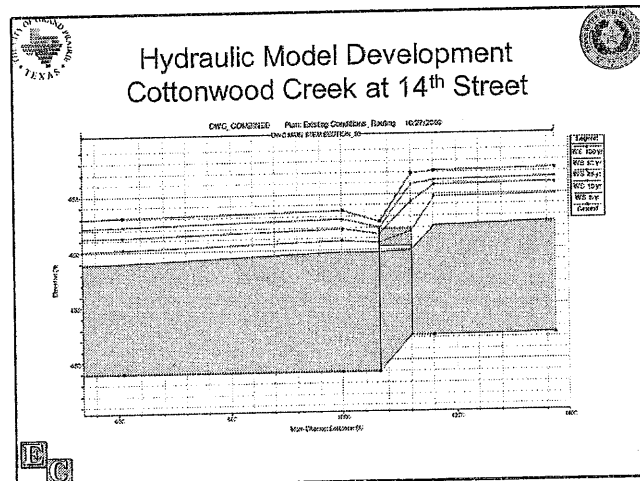
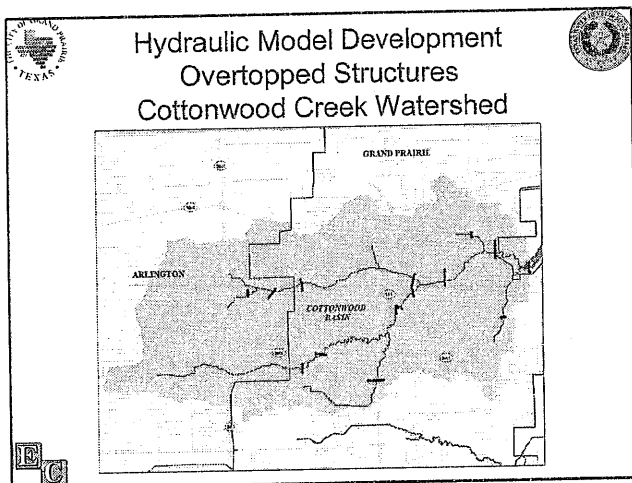
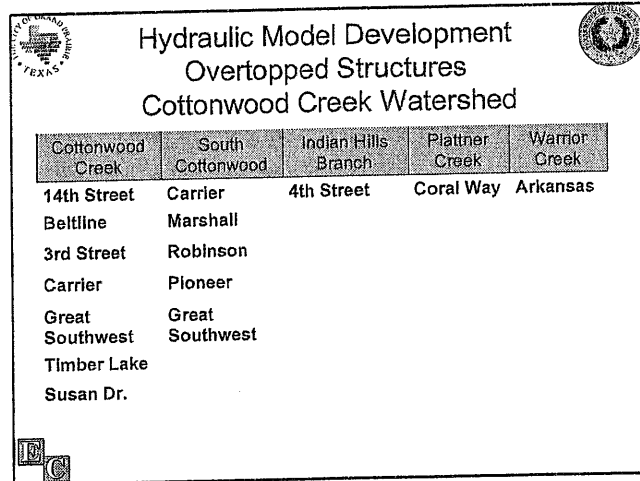
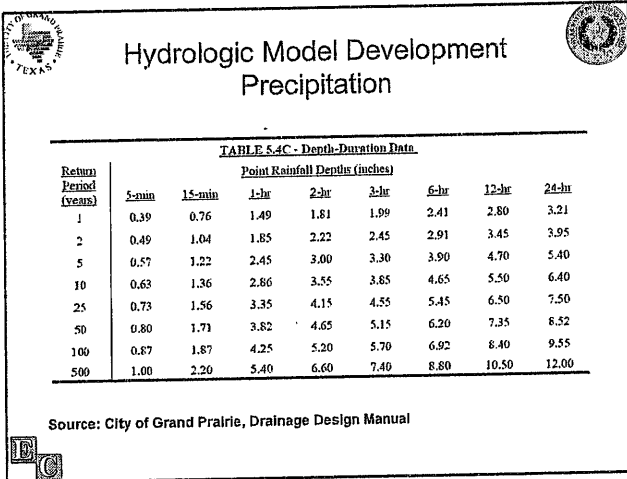
Flooding of Carrier Pkwy

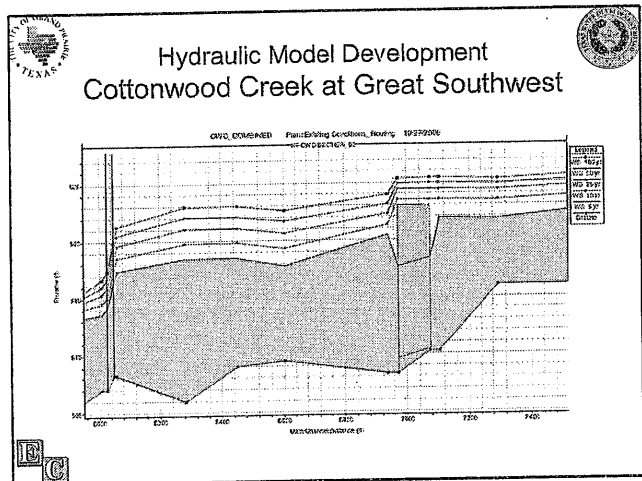
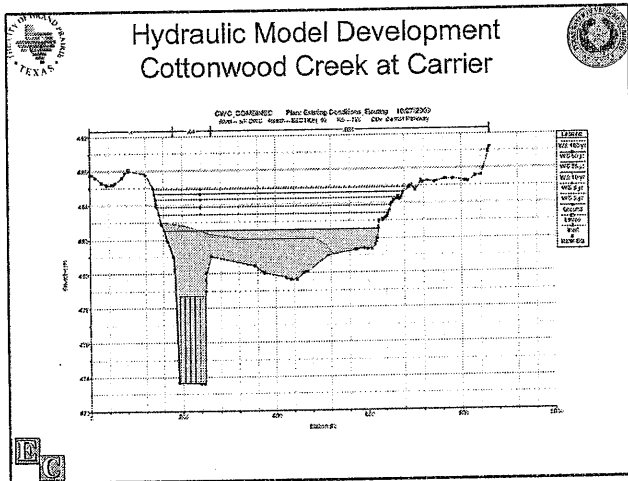
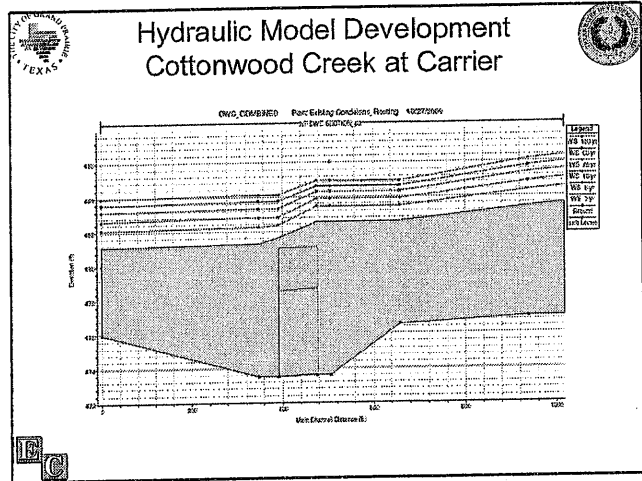
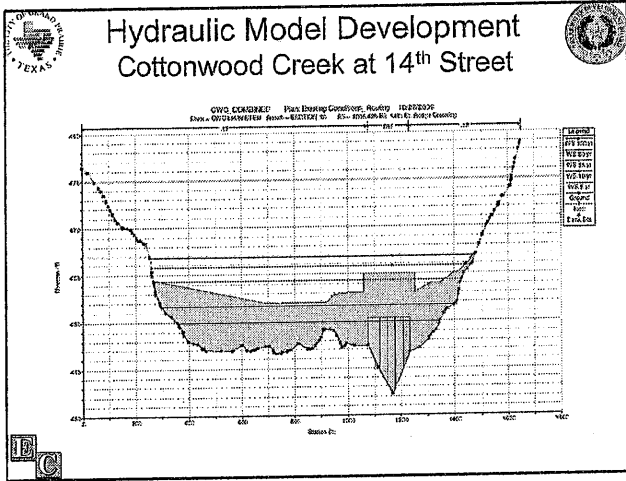


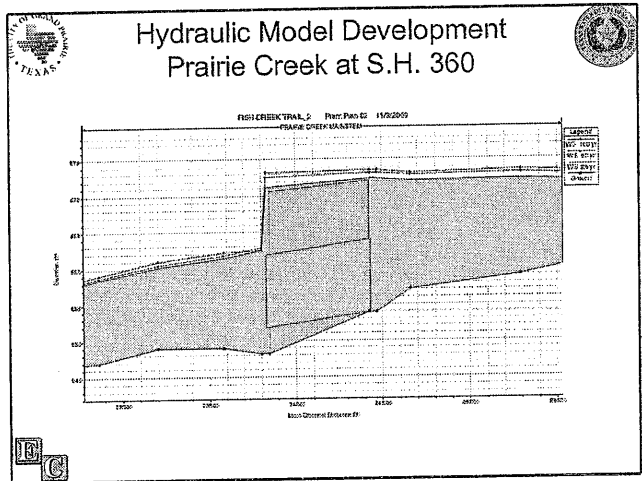
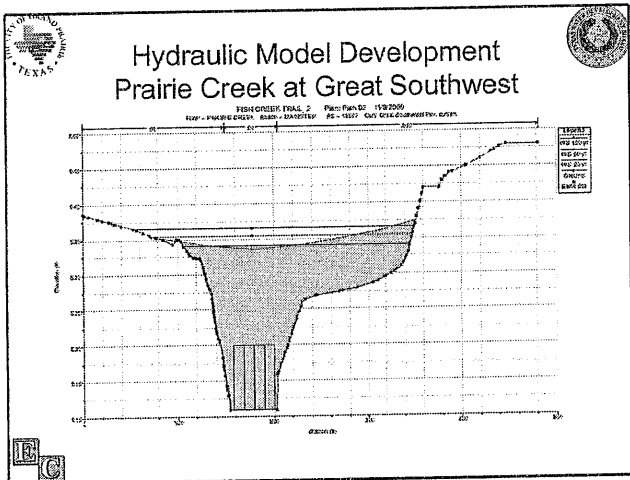
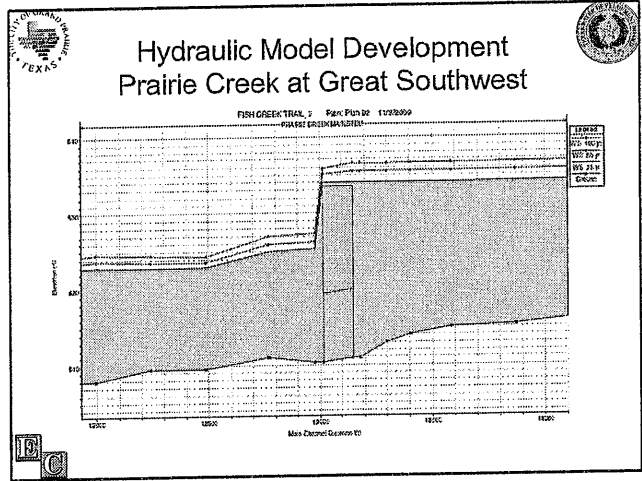
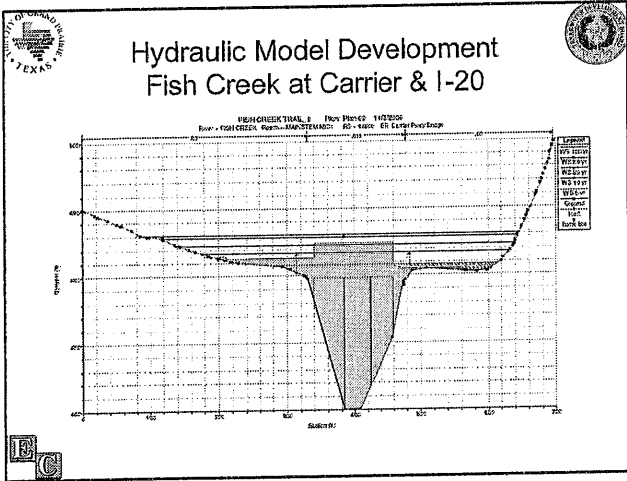
Flooding of Robinson

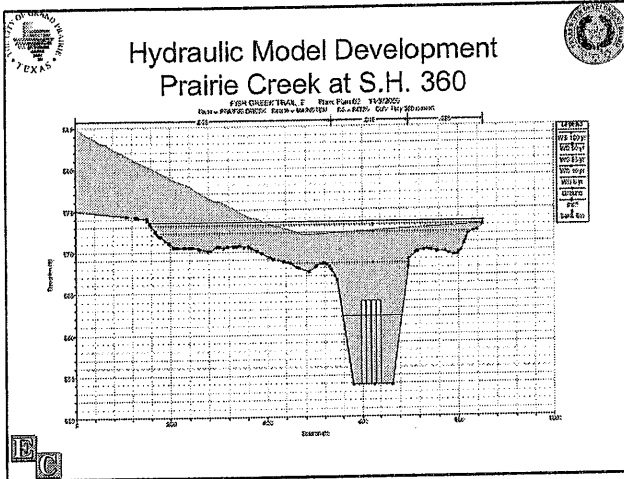














- ## What's Next
- Evaluation Criteria
 - Analysis of Alternatives
 - Benefit/Cost analysis
 - Implementation and Phasing
 - Final Report

- ## Evaluation Criteria
- 2yr, 5yr, 10yr, 25 yr, 50yr, 100yr, 500yr Storms
 - Impacts from changes in Valley Storage
 - Stream Stability/Erosion
 - Environmental Impacts
 - Corps of Engineers Permit Requirements




Analysis of Alternatives

Structural	Canal Improvements Detention Ponds Enlarge Bridges/Culverts
Non-Structural	Buy-outs Flood Proofing




Benefit/Cost Analysis

<p style="text-align: center;">Benefits</p> <ol style="list-style-type: none"> 1. Reduction of Flood Damage 2. Level of Flood Protection 3. Reduction in Flood Insurance Claims 	<p style="text-align: center;">Cost</p> <ol style="list-style-type: none"> 1. Construction and/or Acquisition Cost 2. Right-of-Way Requirements 3. Environmental Impacts
---	--




Implementation and Phasing

- Capital Improvements Plan
- City's Comprehensive Plan
- Identify Potential Funding Sources
- Hydraulic Considerations

Final Report


- Presented in a Public Meeting
- Report will include
 - Technical Analysis
 - Supporting Documentation
 - Maps
 - Implementation and Phasing Plan
 - Cost-Benefit Analysis.

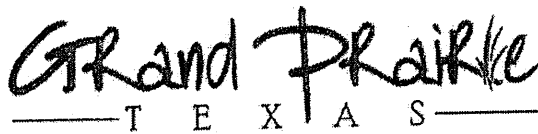




For More Information

<ul style="list-style-type: none"> ■ Romin A. Khavari ■ Gabe G. Johnson <p>City of Grand Prairie, Engineering 206 W. Church Street Grand Prairie, Texas 76063-4045. Telephone: (972) 237-8157 Email: rkhavari@gpctx.org gjohnson@gpctx.org</p>	<ul style="list-style-type: none"> ■ Kenneth Tillman ■ Josha Crowley <p>Eespey Consultants, Inc. 2777 N. Stemmons Frwy Suite 1102 Dallas Texas 75207 Telephone: (214) 951-0807 FAX: (214) 951-0906 Email: ktillman@eespeyconsultants.com jcrowley@eespeyconsultants.com</p>
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<ul style="list-style-type: none"> ■ Gilbert Ward <p>Texas Water Development Board Research and Planning Fund 1700 North Congress Avenue PO Box 13231 Austin Texas 78711-3231 Telephone: (512) 463-6416 FAX: (512) 463-9883 Email: gilbert.ward@twdb.state.tx.us</p>	
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PUBLIC HEARING NOTICE
CITY OF GRAND PRAIRIE
COTTONWOOD and FISH CREEK WATERSHEDS
FLOOD PROTECTION PLAN
GRAND PRAIRIE DEVELOPMENT CENTER
206 W. CHURCH STREET
THE GRAND CONFERENCE ROOM
THURSDAY, FEBRUARY 25, 2010
3:00 P.M. TO 4:00 P.M.

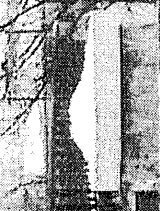
The City of Grand Prairie is jointly participating with the Texas Water Development Board for a Flood Protection Planning Study of the Cottonwood Creek and Fish Creek watersheds. The study location extends from the confluence of each creek with Mountain Creek Lake upstream to the beginning of each creek in the City of Arlington Texas. In Grand Prairie, this includes areas bounded approximately by Jefferson Boulevard to the north, Mountain Creek Lake to the east, Camp Wisdom Road to the south, and State Highway 360 to the west. This meeting will focus on preliminary findings from work completed to date.

AGENDA

- I. Brief Overview of Project
 - A. Objective of Study
 - B. Schedule Update
- II. Review of Flood Impacts
- III. Alternatives for Reducing Impacts
- IV. Planned Actions for Future Meetings
- V. Citizen Comments
- VI. Adjournment

The Development Center is wheelchair accessible. If you plan to attend this public meeting and you have a disability that requires special arrangements, please call 972-237-8035 at least 24 hours in advance. Reasonable accommodations will be made to assist your needs. In accordance with Chapter 551, subchapter 6, of the Texas Government Code, this meeting notice and agenda was prepared and posted on this the 24th day of February, 2010.

Posted by: Gabe Johnson, PE, PH, CFM
Floodplain Administrator



Grand Prairie Event Calendar

Public Hearing: Cottonwood and Fish Creek Watersheds Flood Protection Plan

Date: 2/25/2010 3:00 PM - 4:00 PM
 Location: Grand Prairie Development Center
 206 W. Church St.
 Grand Prairie, Texas 75030

[Add to my Outlook Calendar](#)

Download: Public Hearing Notice (PDF)

PUBLIC HEARING NOTICE
 CITY OF GRAND PRAIRIE
 COTTONWOOD and FISH CREEK WATERSHEDS
 FLOOD PROTECTION PLAN
 GRAND PRAIRIE DEVELOPMENT CENTER
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Cottonwood and Fish Creeks
Flood Protection Planning Study
Public Meeting
February 25, 2010



Sponsored by
City of Grand Prairie and the
Texas Water Development Board



Agenda

- Welcome
- Introduction of Sponsors, and Stakeholders
- Project Location and Status
- Flood Protection Goals
- Alternatives for Reducing Flooding in Cottonwood and Fish creek Watersheds
- Public Discussion



Cottonwood & Fish Creeks Flood
Protection Planning Study
Will Utilize a Broad Range of Participants

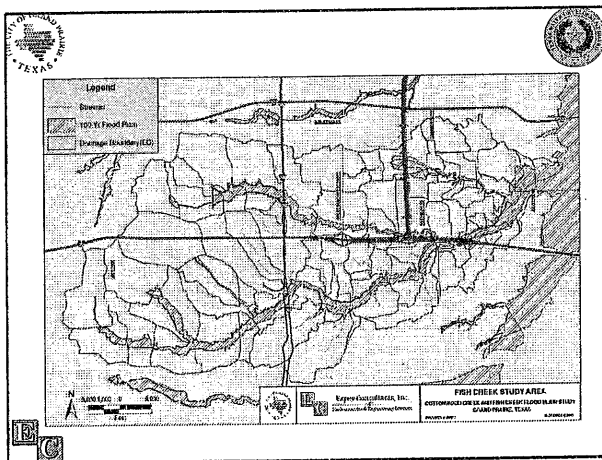
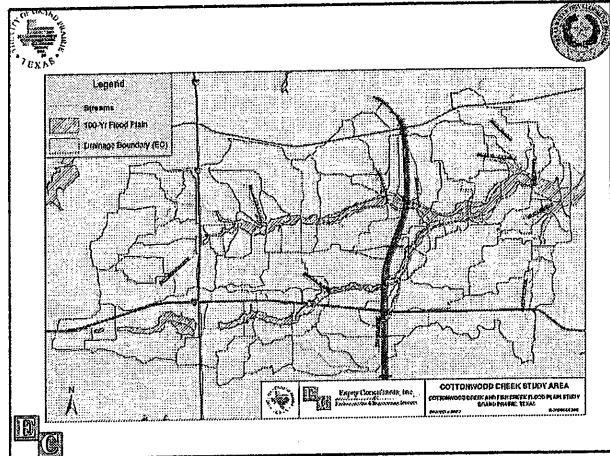
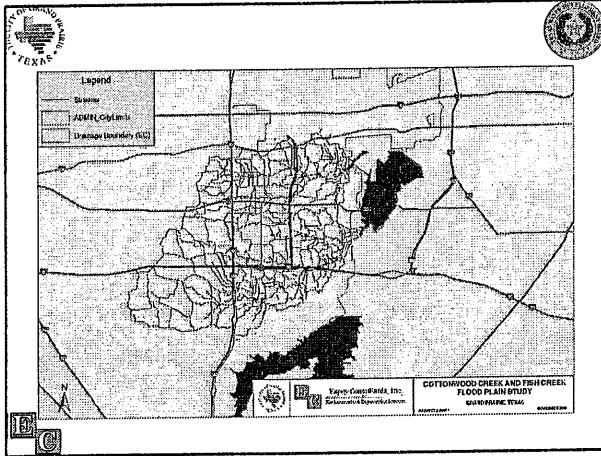
- Study Sponsors (Financial Commitments)
 - City of Grand Prairie and TWDB
- Study Stakeholders (Resource Commitments)
 - City of Arlington, TxDOT, USACE, Dallas County, Tarrant County
- Notable Interested Parties (Functional Interests)
 - NCTCOG (regional), TCEQ (regulatory), TRA (facilities)
 - General Public



Agenda



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- Public Discussion








Status

- Hydrologic & Hydraulic Base Models have been completed.
- Areas of concern have been identified.
- Alternatives to reduce flood impact are being proposed for discussion




Agenda

- Welcome
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FEMA Goals Provide Basis for Flood Reduction Planning

- Protect human life and health
- Minimize the expenditure of public funding for costly flood control projects
- Minimize the need for rescue and relief efforts
- Minimize damage to public facilities
- Help maintain a stable tax base by providing for sound use of flood prone areas
- Help potential buyers become aware of property subject to flooding


City of Grand Prairie has Adopted More Stringent Goals Than FEMA

- Ensure lowest floor of structure be elevated not less than 1 foot above FEMA base flood elevation
- Reduce number of repetitive losses
- Reduce impact from development
- Acquire floodplain where feasible
- Perform creek studies

Flood Frequencies

- One percent chance event; _____ also called 100 yr storm.
- 2% - 50 yr storm
- 4% - 25 yr storm
- 10% - 10 year storm
- This study will focus on the 1% chance event (100 yr) assuming ultimate build-out conditions in the watershed.

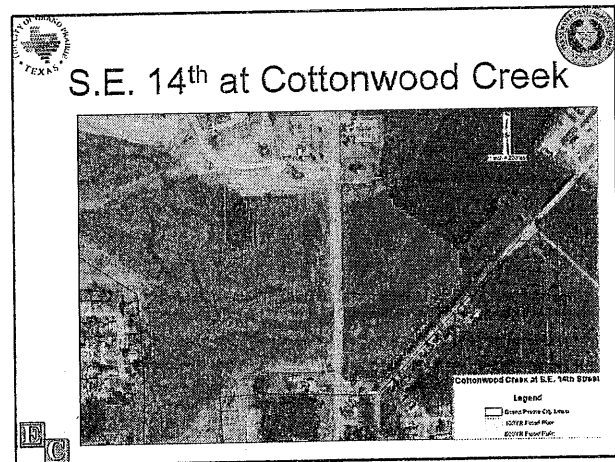
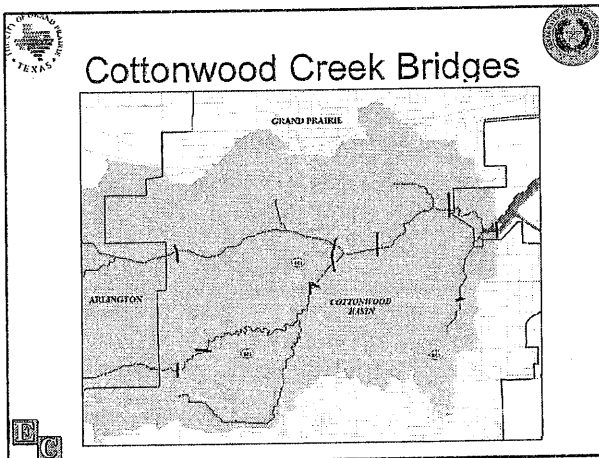


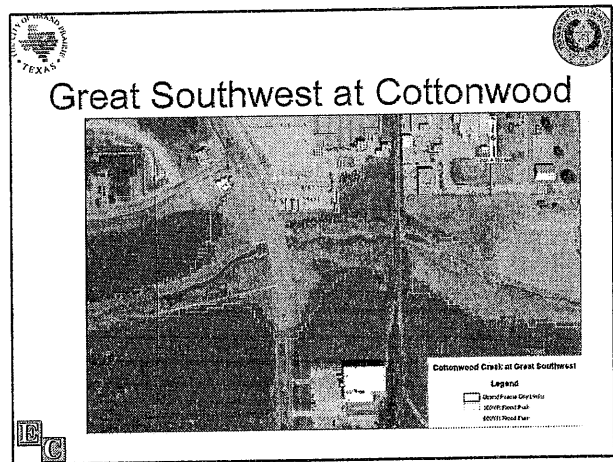
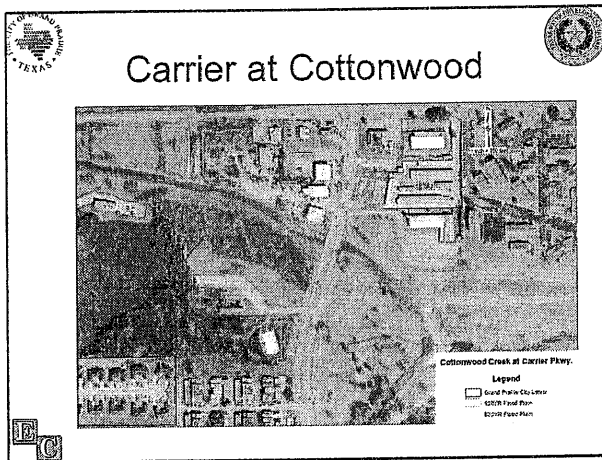
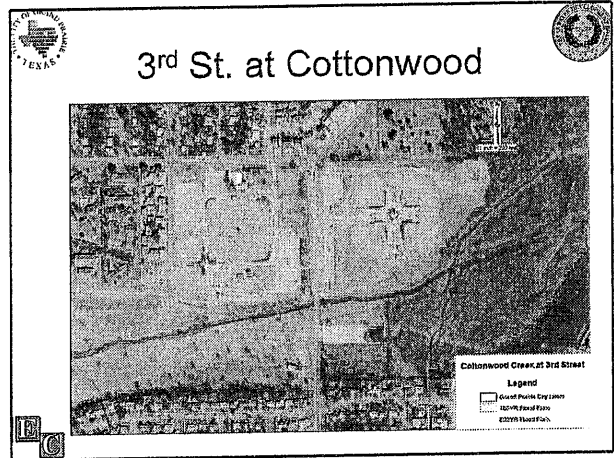
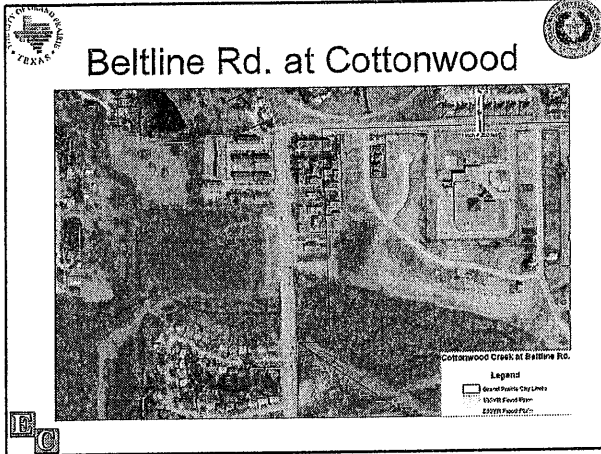
Agenda

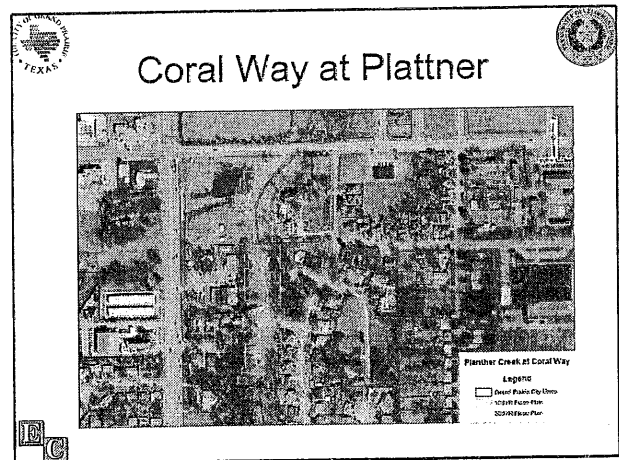
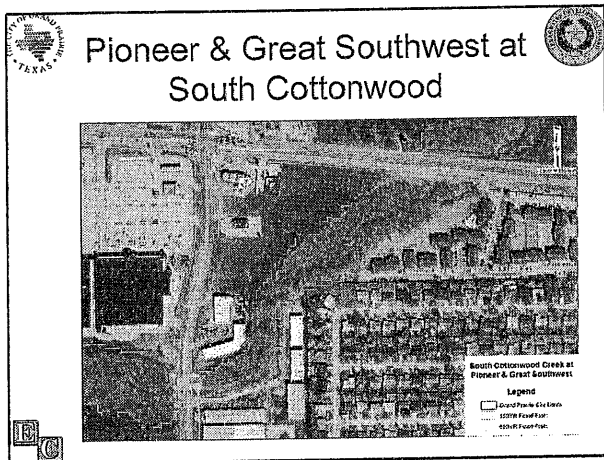
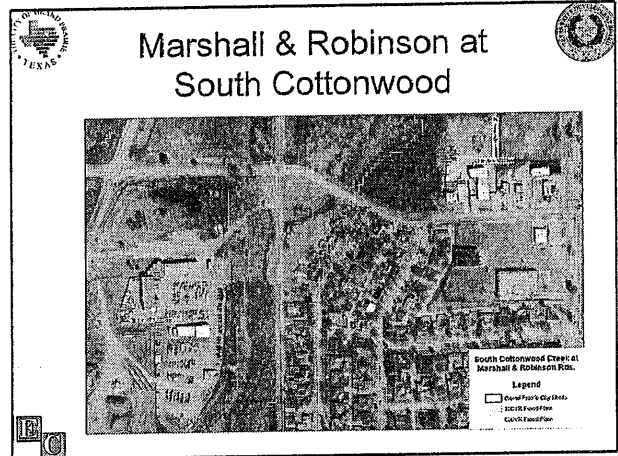
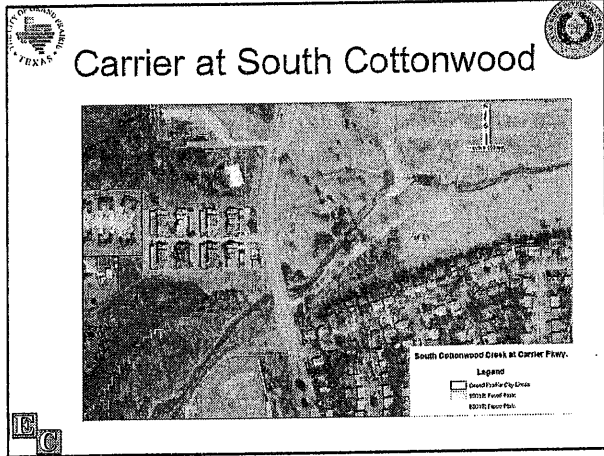
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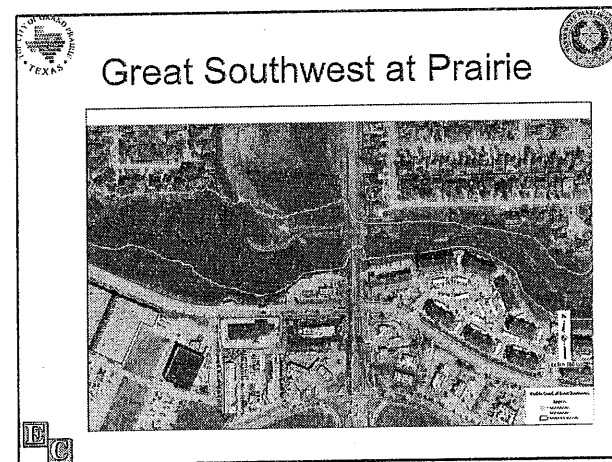
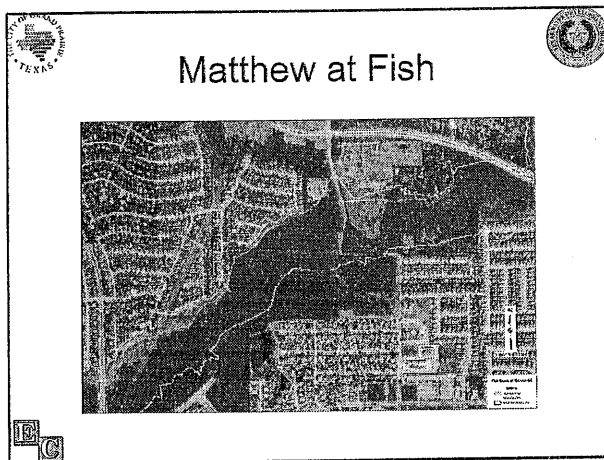
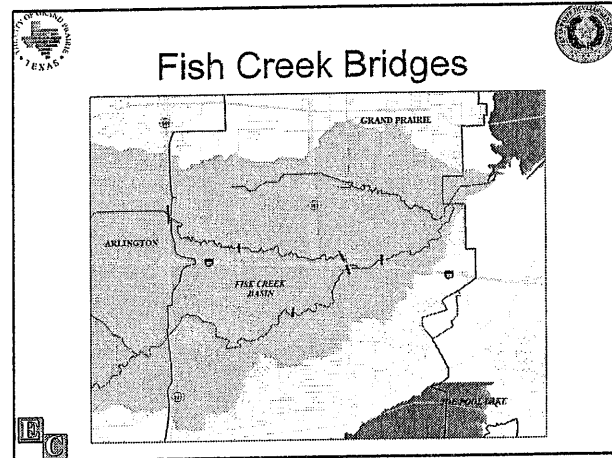
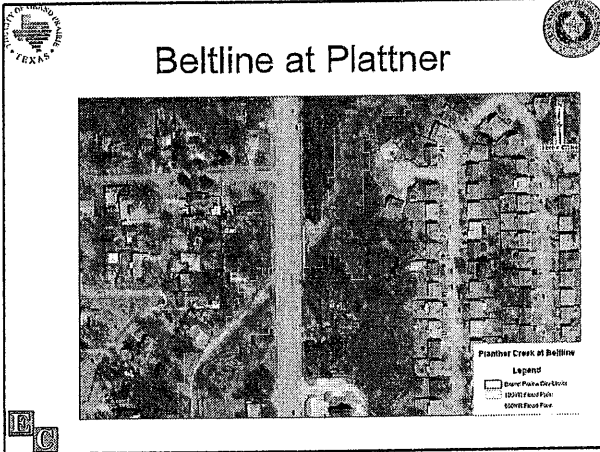
Roadway Overtopping

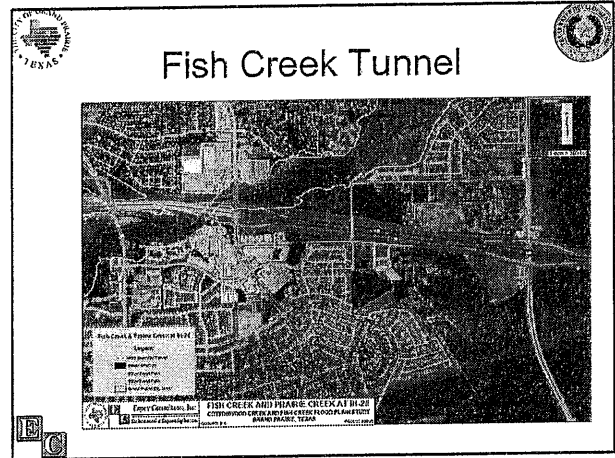
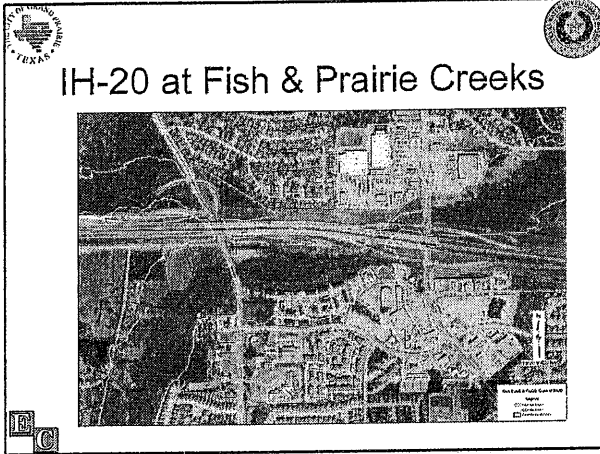
- Cottonwood Creek Basin has 12 Bridges which are overtopped by the 1% chance event.
- Fish Creek Basin has 6 Bridges which are overtopped by the 1% chance event.











Plan Forward

- Alternative evaluation through HAZUS Benefit Cost Analysis
- Implementation Plan
- Public Meeting

For More Information

<ul style="list-style-type: none"> ■ Romin Khavari or Gabe Johnson City of Grand Prairie Engineering Department <p>206 W. Church Street P.O. Box 534045 Grand Prairie, Texas 75053-4045.</p> <p>Phone: (972) 237-8145 Fax: (972) 237-8116 Email: rkhavari@gptx.org gjohnson@gptx.org</p>	<ul style="list-style-type: none"> ■ Gilbert Ward Texas Water Development Board Research and Planning Fund <p>1700 North Congress Avenue PO Box 13231 Austin Texas 78711-3231</p> <p>Phone: (512) 463-6418 FAX: (512) 463-9893 Email: gilbert.ward@twdb.state.tx.us</p>
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Appendix **I**
Digital Data

Appendix **J**
Comments and Response

Review of Draft Report for Contract No. 0804830836
City of Grand Prairie — Cottonwood and Fish Creeks Flood Protection Plan

1. **Comment:** Please update Sections 1.2 and 1.3 to include the final Public Advisory Committee meeting and public meeting conducted.

Response: The table in Section 1.2 has been updated to show the final public meeting date. The last sentence of section 1.3 has been revised

2. **Comment:** Not all references cited are listed in Section 6.0 References, for example pg. 18 cites (NRCS 1985) but is not listed in Section 6.0. Please review text to ensure all citations are listed and amend Section 6.0 as necessary.

Response: We have reviewed the text and citations for accuracy and revised Section 6.0 as needed.

3. **Comment:** Section 6.0, references list should be either alphabetized or listed in the order as they appear in the text. Please amend appropriately. Also, please amend the references to follow standard guidance for citing references.

Response: The citations in Section 6.0 have been listed alphabetically and revised to follow the standard guidance.

4. **Comment:** Pg. 9, under Acknowledgements, please amend to indicate Gilbert Ward is a PG, not PE or CFM.

Response: Revised to show Gilbert Ward, P.G.

5. **Comment:** Under the Executive Summary, 2nd paragraph (and again in Section 2.0, 2' paragraph), a statement has 2% and 4% reversed where listing of the peak flows analyzed are given. Please correct.

Response: Corrected at both locations.

6. **Comment:** Section 1.1, 1st paragraph, last sentence of 1st paragraph states that “a detailed description of the scope for this study is included in Appendix A”. Located in Appendix A are miscellaneous exhibits for a discussion of the hydrologic and hydraulic analyses performed by the study, however a detailed description of the scope is not included. Please either modify the statement in Section 1.1 or include the discussion as necessary within Appendix A.

Response: The last sentence has been removed.

7. **Comment:** Section 4.3.3; the last sentence states that detailed costs are included in Appendix H, however they are actually located in Appendix G. Please amend to reflect the correct Appendix for the data.

Response: Revised to show Appendix G.

8. **Comment:** Section 4.3.3.11; the statement under the 2nd bullet seems to have a word missing (“This configuration would the construction of an over-pass...”). Please amend.

Response: Revised to read (“This configuration would be the construction of an over-pass...”)

9. **Comment:** The study follows standard methodologies and practice utilizing acceptable HEC modeling in the engineering aspects of hydrologic and hydraulic techniques. The hydrologic modeling parameters were determined based on the calculation and engineering judgments for the existing and ultimate conditions. 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 363.40 1-404, as well as necessary information to make legal findings as required by Texas Water Code Chapter 17.77 1- 776, would be required at the time of loan application.

Response: No response required.

