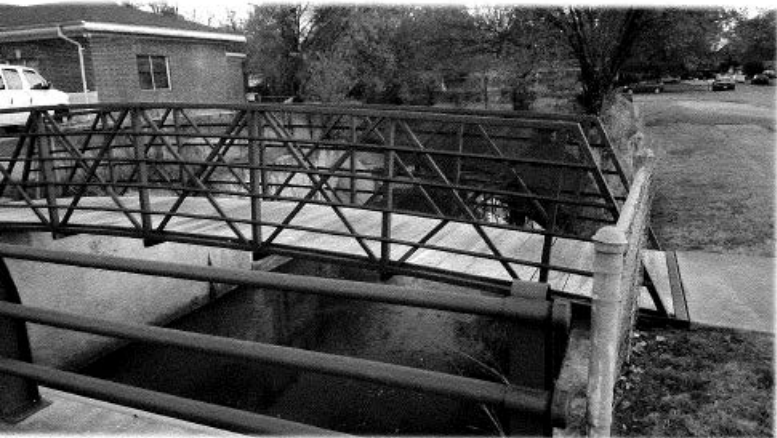


**VALLEY VIEW BRANCH  
FLOOD PROTECTION PLANNING STUDY  
FINAL REPORT**



Prepared By:



Prepared For:

TEXAS WATER DEVELOPMENT BOARD

&

THE CITY OF HURST, TEXAS  
THE CITY OF FORT WORTH, TEXAS  
THE CITY OF BEDFORD TEXAS

AVO 31297

AUGUST 2017

4000 FOSSIL CREEK BLVD.  
FORT WORTH, TEXAS 76137



RECEIVED

SEP -1 2017

WDB CONTRACTS



August 30, 2017  
31297

Mr. Ivan Ortiz, CFM, CTCM  
Mitigation Specialist, Team Lead  
Texas Water Development Board  
PO Box 13231  
1700 North Congress Avenue  
Austin, TX 78711-3231

RE: Final Report – Valley View Branch Flood Protection Planning Study, TWDB Contract No. 1548321879

Dear Mr. Ortiz:

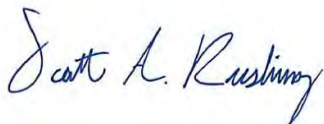
We are pleased to submit the attached Final Report prepared under the above referenced contract. Included are six (6) copies of the report and each copy contains a DVD in Appendix G, with all digital files, models, and a PDF of the report.

Following our submittal of the draft report, we received TWDB comments dated June 17, 2017. These comments have been addressed and were incorporated into the final report submittal. The TWDB comments and responses are included in the final report as Appendix F.

If you have any questions or comments regarding this final report submittal, please contact me at (817) 847-1422.

Sincerely,

HALFF ASSOCIATES, INC.

A handwritten signature in blue ink that reads "Scott A. Rushing". The signature is written in a cursive, flowing style.

Scott A. Rushing, PE, CFM  
Project Manager

Cc: Duane Hengst, PE, City of Hurst, Texas  
Greg Dickens, PE, CFM, City of Hurst, Texas  
Clair Davis, PE, CFM, City of Fort Worth, Texas  
Kenneth Overstreet, City of Bedford, Texas  
Ben Pylant, PE, CFM, Halff Associates, Inc.

# Valley View Branch Flood Protection Planning Study Final Report



**Prepared for:**

**Texas Water Development Board  
&  
The City of Hurst, Texas  
The City of Fort Worth, Texas  
The City of Bedford, Texas**

**Prepared by:**



**Halff Associates, Inc.**  
4000 Fossil Creek Blvd.  
Fort Worth, TX 75081  
TBPE Firm No. F-312



*Scott A. Rushing*  
8-30-2017

**AVO 31297**

**August 2017**



## Acknowledgements

Halff Associates, Inc. gratefully acknowledges the key contributions and support provided for the Valley View Branch Flood Protection Planning Study by the individuals listed below.

### **Texas Water Development Board:**

Connie Townsend, Region C Project Manager  
Ivan Ortiz, CFM, CTCM, Mitigation Specialist  
Gilbert Ward, PG, Federal and State Grants Coordinator

### **City of Hurst:**

Richard Ward, Mayor  
Clay Caruthers, City Manager  
Duane Hengst, PE, City Engineer  
Greg Dickens, PE, CFM, Executive Director of Public Works

### **City of Bedford:**

Jim Griffin, Mayor  
Roger Gibson, City Manager  
Kenneth Overstreet, Director of Public Works

### **City of Fort Worth:**

Betsy Price, Mayor  
David Cooke, City Manager  
Doug Wiersig, PhD, PE, Director of Transportation & Public Works  
Clair Davis, PE, CFM, Floodplain Administrator

### **Halff Associates, Inc. Primary Staff Involved on the Project:**

Benjamin Pylant, PE, CFM  
Scott Rushing, PE, CFM  
Morgan Berry, EIT, CFM

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## List of Acronyms

AMC	Antecedent Moisture Condition
cfs	Cubic Feet per Second
CN	Curve Number
DEM	Digital Elevation Model
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FIPS	Federal Information Processing Standard
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FPPS	Flood Protection Planning Study
ft	Feet
GeoHMS	Geospatial Hydrologic Modeling Extension
GeoRAS	Geospatial River Analysis System
GIS	Geographic Information System
HEC	Hydrologic Engineering Center
HMS	Hydrologic Modeling System
Hr	Hour
iSWM	Integrated Storm Water Management
LiDAR	Light Detection and Ranging
LOMR	Letter of Map Revision
mi	Miles
Min	Minutes
NCTCOG	North Central Texas Council of Governments
NRCS	Natural Resources Conservation Service
NTE	North Tarrant Expressway
RAS	River Analysis System
SCS	Soil Conservation Service
SH	State Highway
sq. mi	Square Miles
SSURGO	Soil Survey Geographic database
TNRIS	Texas Natural Resources Information System
TR	Technical Release
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
USACE	United States Army Corps of Engineers
WSEL	Water Surface Elevation

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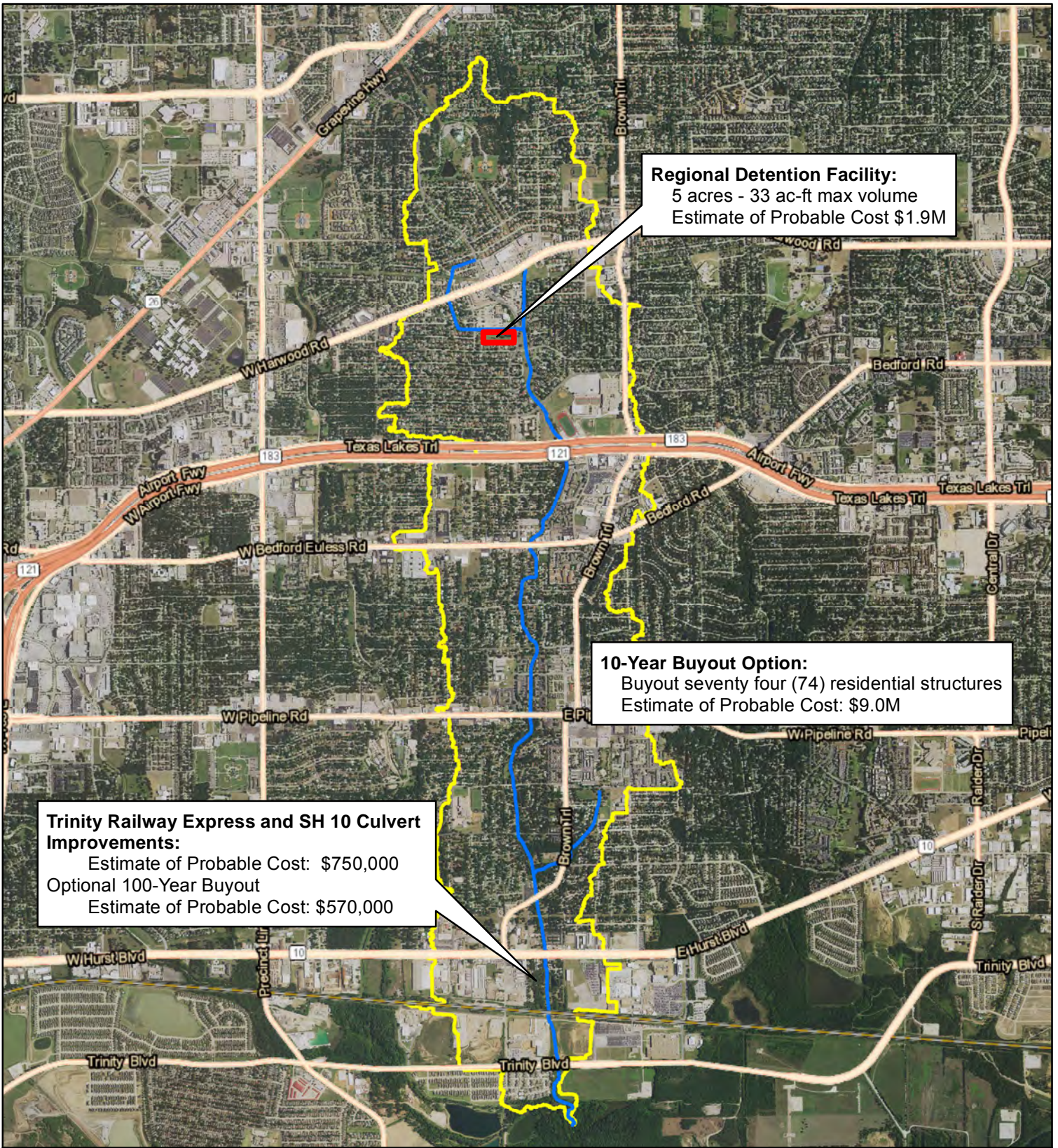
# 1. Executive Summary

The purpose of the Valley View Branch Flood Protection Planning Study (FPPS) was to create new hydrologic and hydraulic models and develop flood mitigation alternatives to aid local officials in planning efforts. The Valley View Branch watershed is located within the Cities of Hurst, Bedford, and Fort Worth as shown in Figure A, Watershed Location Map located in Appendix A. Each of these cities participated in the study and were awarded a Flood Protection Planning Grant from the Texas Water Development Board (TWDB) to help fund half of the project cost.

New detailed hydrologic and hydraulic modeling was performed for two stream in the Valley View Branch watershed: Valley View Branch and Stream VVB-1. Unnamed Tributary to Valley View Branch was studied by approximate methods. Light Detection and Ranging (LiDAR) elevation data produced by Texas Natural Resources Information System (TNRIS) in 2009 and cross section and bridge/culvert surveys were used to enhance the accuracy of the models. The analysis resulted in updated and more accurate discharges and water surface elevations (WSEL) for the 1-, 2-, 5-, 10-, 25-, 50-, 100-, and 500-year storm events. The resulting hydraulic data was then used to determine flood mitigation alternatives throughout the Valley View Branch watershed.

Halff Associates identified multiple buildings and existing roadway crossings at risk of flooding along the studied streams. Structural and non-structural flood reduction alternatives were considered to help reduce or eliminate flooding in the identified flood prone areas during the flood mitigation analysis. The majority of flooded buildings consist of residential properties with some commercial and public properties also being affected. A total of 186 buildings are potentially flooded by the 100-year flood event along Valley View Branch. The conceptual alternatives seen in Figure 1.1, Alternatives Overview, include a regional detention facility, Trinity Railway Express and SH 10 culvert improvements, and voluntary property buyouts for residential buildings potentially flooded by the 10-year flood event.

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**Regional Detention Facility:**  
 5 acres - 33 ac-ft max volume  
 Estimate of Probable Cost \$1.9M

**10-Year Buyout Option:**  
 Buyout seventy four (74) residential structures  
 Estimate of Probable Cost: \$9.0M

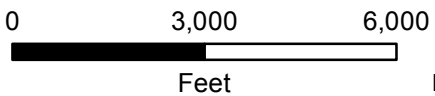
**Trinity Railway Express and SH 10 Culvert Improvements:**  
 Estimate of Probable Cost: \$750,000  
 Optional 100-Year Buyout  
 Estimate of Probable Cost: \$570,000

Valley View Branch Flood Protection Planning Study

Figure 1.1 Alternatives Overview

Legend

- Regional Detention Facility
- Stream Centerline
- Valley View Branch Watershed



Notes: Aerial imagery provided by Landiscor 2014

## 2. Introduction and Background

### 2.1 Community and Watershed Description

The Valley View Branch watershed is located within the Cities of Hurst, Bedford, and Fort Worth as shown in Figure A, Watershed Location Map located in Appendix A. The shape of the watershed is generally long and narrow with land use being primarily residential and commercial. The watershed is almost fully urbanized with at least 90% of the watershed already developed. Valley View Branch generally flows south from Harwood Road downstream to the confluence with Walker Branch.

Three (3) streams were modeled as part of the Valley View Branch FPPS: Valley View Branch, Stream VVB-1, and Unnamed Tributary to Valley View Branch. The confluence of Stream VVB-1 with Valley View Branch occurs approximately 2,800 feet (ft) upstream of SH 121 within the City of Hurst. The confluence of Unnamed Tributary to Valley View Branch with Valley View Branch occurs approximately 1,800 ft upstream of SH 10 within the City of Hurst. The majority of Valley View Branch study reach has been improved with concrete lined channels or earthen channels with concrete pilot channels with a portion improved with gabions or articulated blocks. The lower reach of Stream VVB-1 has been improved with concrete lined channels or earthen channel with concrete pilot channels. The upper reach of Unnamed Tributary to Valley View Branch has undergone extensive channel modifications with a 72" reinforced concrete pipe extension and small overhead earthen channel. There are sixteen (16) structure crossings along Valley View Branch, two (2) structure crossings along Stream VVB-1, and two (2) structure crossing along Unnamed Tributary to Valley View Branch.

Unique attributes of the watershed include Chisholm Park, LD Bell High school, and Bell Helicopter Complex. Major thoroughfares include Harwood Road, SH 121/183, Bedford-Euless Road, Pipeline Road, SH 10/Hurst Boulevard, Trinity Railway Express, and Brown Trail. The watershed is highly urbanized with commercial and retail development along each major thoroughfare.

### 2.2 Purpose of Report

The purpose of the Valley View Branch FPPS is to create new hydrologic and hydraulic models and develop flood mitigation alternatives to aid local officials in planning efforts. Updated floodplain mapping was also performed including a revised floodway to help the Cities regulate future development along stream corridors within the Valley View Branch watershed.

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

### 2.3 Principal Flooding Problems

Valley View Branch has a history of flooding problems particularly with mobile homes located between SH 10/Hurst Boulevard and Trinity Railway Express. Existing development, subject to overbank flooding, is primarily residential, but also includes some commercial property. The primary areas of potential flooding within the study area are as follows:

- Between SH 121/183 and Pipeline Road
- Between Brown Trial and Trinity Railway Express

There are additional isolated areas at risk of flooding throughout the study area but they are not as concentrated as the primary flooding locations in the lower reaches of the study area.

There are approximately 186 buildings, residential, commercial, and public, located within the limits of the revised 100-year floodplain produced by the Valley View Branch FPPS. Based on 2016 Tarrant County Appraisal Data, the total estimated value of these buildings is approximately \$25,000,000 (includes the total appraised value of all residential properties and improvement value only for commercial/public properties).

## 3. Study Procedure

### 3.1 Studied Streams

The Valley View Branch watershed consists of three (3) studied streams: Valley View Branch, Stream VVB-1, and Unnamed Tributary to Valley View Branch. The Valley View Branch FPPS included the development of a new detailed hydrologic model for the entire watershed and new detailed hydraulic models for Valley View Branch and Stream VVB-1. The hydraulic model for Unnamed Tributary to Valley View Branch was prepared using approximate methods. Table 1, Studied Streams, is a summary of each studied stream including the proposed Federal Emergency Management Agency (FEMA) designation, upstream and downstream limits, and stream length. Figure B, Studied Streams, located in Appendix A shows a graphical representation of each studied stream within the Valley View Branch watershed.

**Table 1. Studied Streams**

Stream Name	Proposed FEMA Designation	Downstream Limit	Upstream Limit	Length (miles (mi))
Valley View Branch	Zone AE	Confluence with Walker Branch	Harwood Road	3.96
Stream VVB-1	Zone AE & Zone A	Confluence with Valley View Branch	Norwood Drive	0.64
Unnamed Tributary to Valley View Branch	Zone A	Confluence with Valley View	Pecan Street	0.50
<b>Total Length:</b>				<b>5.10</b>

### 3.2 Data Collection

#### 3.2.1. Site Reconnaissance

Field reconnaissance was performed during multiple site visits to walk the streams and collect structure inventories during the end of 2015 and 2016. Photographs of the channels and structures were taken to aid in hydraulic modeling and to assign Manning's "n" values.

#### 3.2.2. Survey

The survey task included identifying and establishing survey control, conducting channel and structure surveys, and obtaining the physical dimensions of hydraulic and flood control structures. Survey was conducted by Halff Associates in January 2016 with some additional survey data collected in August 2016.

Eight (8) structure surveys and nine (9) channel surveys (not including channel surveys near structures) were taken. Spot elevations were taken to confirm the datum of three (3) structures. Minimum finished floor elevations were surveyed for five (5) houses on Stream VVB-1 to refine



floodplain mapping through these properties. For each surveyed structure, the channel upstream of the structure was surveyed and incorporated into the upstream bridge face cross-section.

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

The field survey was performed using the North American Vertical Datum of 1988. The survey data included in Appendix G is in State Plane Coordinates, Texas North Central Federal Information Processing Standard (FIPS) 4202 (GRID – ft), North American Datum of 1983.

### 3.2.3. Topographic Data

The topographic data utilized for this study was the 2009 TNRIS LiDAR data and was processed in Environmental Systems Research Institute's (ESRI) Arc-Geographic Information System (GIS) software to create a terrain and Digital Elevation Model (DEM) data set for the project area.

### 3.2.4. Previous Studies

Hydrologic and hydraulic data for this study was compiled from multiple sources. The following is a summary of pertinent study and technical data related to the Valley View Branch watershed prior to the FPPS preparation:

- Report on Valley View Drainage Channel for the City of Hurst, Texas – Forrest and Cotton, Inc.
- Engineering Report on Channel Improvements for Valley View Branch, Lorean Branch, and Willow Branch (1980) – Knowlton-English-Flowers, Inc.
- Storm Drainage Study of Major Streams in Hurst, Texas (1983) – Halff Associates developed detailed hydraulic models and proposed improvement alternatives for six (6) major streams within the City of Hurst. Valley View Branch was one of the study streams included within this report. The hydrologic data used in this report was obtained from the Fort Worth District, United States Army Corps of Engineers (USACE) and was the basis for the current effective Flood Insurance Study (FIS) discharges for Valley View Branch. Current effective discharge comparisons to the discharges developed for the Valley View Branch FPPS can be seen in Table 9 under Section 3.5.3 of this report. Proposed bridge/culvert and channel improvement recommendations were included within the 1983 study for Valley View Branch as well as multiple short-term and long-term alternatives. Any short-term alternatives that have not already been implemented were analyzed as part of the Valley View Branch FPPS and are discussed in more detail in Section 4.4 of this report. (Reference 1)
- Reconnaissance Report for Valley View Branch (1990) – USACE prepared a FPPS by examining two (2) reaches of stream along Valley View Branch for flood protection alternatives.
- Valley View Buyout and Demolition Plan (2001) – Halff Associates prepared the Plan that included contract documents for acquisition of six (6) flood-prone properties. The properties were acquired by the City of Hurst utilizing Hazard Mitigation Grant Program funding

provided by FEMA and administered by the Governors Division of Emergency Management in 2003.

- Valley View Branch Letter of Map Revision (LOMR) (2004) – HNTB prepared a LOMR in 2004 to re-map the floodplain from Bedford-Eules Road to Harwood Road. Cross section layout utilized for the Valley View Branch FPPS was based on the 2004 LOMR submittal map through the Bedford-Eules Road to SH 121 reach.
- North Tarrant Expressway (NTE) Segment East Valley View Branch Drainage Report (2011) – Othon, Inc. performed a drainage study to analyze the effects of the reconstruction and widening of SH 121/183 along Valley View Branch. The hydrologic and hydraulic parameters/results of this study were strictly used for comparison purposes to the Valley View Branch FPPS.

### 3.2.5. Structure Data

This study compiles bridge and structure data from multiple sources including surveys performed by Halff Associates and spot elevations, various proposed and as-built plan data, and field observations. See Table 2 below for a summary of the source data used to model the existing structures within the study area.

**Table 2. Structure Data Sources**

Stream Name	Bridge Name	Source
Valley View Branch	Trinity Boulevard	City Proposed Plan Set
Valley View Branch	Bell Helicopter Private Driveway	Halff Survey
Valley View Branch	Trinity Railway Express	Halff Survey
Valley View Branch	SH 10	TxDOT* Plan Set
Valley View Branch	Brown Trail	Halff Survey
Valley View Branch	Redbud Drive	City Plan Set
Valley View Branch	Oak Drive	Halff Survey
Valley View Branch	Pipeline Road	City Plan Set
Valley View Branch	Plaza Boulevard	City Plan Set
Valley View Branch	Cheryl Avenue	City Plan Set
Valley View Branch	Valley View Drive	City Plan Set
Valley View Branch	Bedford Court	Halff Survey
Valley View Branch	Bedford-Eules Road	City Plan Set
Valley View Branch	SH 121/183	NTE Plan Set
Valley View Branch	Pleasantview Drive	Halff Survey
Valley View Branch	Louella Drive	City Plan Set/Halff Spot Elevations

**Table 2. Structure Data Sources (continued)**

Stream Name	Bridge Name	Source
Stream VVB-1	Norwood Drive	City Plan Set/Halff Spot Elevations
Stream VVB-1	Yates Drive	City Plan Set/Halff Spot Elevations
Unnamed Tributary to Valley View Branch	Brown Trail	Halff Survey
Unnamed Tributary to Valley View Branch	Tanglewood Drive	Field Observation

\*Texas Department of Transportation (TxDOT)

The channel geometry for this study was extracted from the 2009 TNRIS LiDAR terrain and supplemented with Halff Associates survey data. Concrete lined channel dimensions were confirmed with measurements performed during field visits to Valley View Branch.

### 3.3 Hydrologic Analysis

A detailed hydrologic analysis was performed on the Valley View Branch watershed within the Cities of Hurst, Bedford, and Fort Worth. Hydrologic Engineering Center (HEC)-Hydrologic Modeling System (HMS) software (Version 4.1) was utilized for the hydrologic modeling in this study (Reference 2). Rainfall events selected for this study include the 1-, 2-, 5-, 10-, 25-, 50-, 100-, and 500-year frequency floods.

#### 3.3.1. Drainage Areas

The Valley View Branch watershed was sub-divided into twenty-eight (28) sub-basins as part of the Valley View Branch FPPS. Sub-basins were delineated utilizing HEC-Geospatial Hydrologic Modeling Extension (GeoHMS) software (Version 10.1) based on the 2009 TNRIS LiDAR data. The sub-basin boundaries were adjusted based on the City of Hurst's GIS storm drain shapefile and the City of Bedford's storm drain map. The Valley View Branch watershed encompasses a total watershed area of approximately 3.28 square miles (sq. mi) (2,100 acres). The average sub-basin area for this study was approximately 0.12 sq. mi (77 acres). See Figure D, Drainage Area Map in Appendix A for the sub-basin delineations for this study.

Three (3) streams within the Valley View Branch watershed were re-studied as part of the Valley View Branch FPPS: Valley View Branch, Stream VVB-1, and Unnamed Tributary to Valley View Branch.

Valley View Branch is approximately 3.96 mi in length through the study area with an average slope of 0.6%. Valley View Branch originates just downstream of Harwood Road and generally flows south to the confluence with Walker Branch.

Stream VVB-1 is approximately 0.64 mi in length through the study area with an average slope of 0.4%. Stream VVB-1 originates just downstream of Norwood Drive and generally flows southeast

then east to the confluence with Valley View Branch. The total watershed contributing to Stream VVB-1 is about 0.38 sq. mi or approximately 240 acres.

Unnamed Tributary to Valley View Branch is approximately 0.50 mi in length through the study area with an average slope of 1.0%. Unnamed Tributary to Valley View Branch originates just downstream of Pecan Street and generally flows southwest to the confluence with Valley View Branch. The total watershed contributing to Unnamed Tributary to Valley View Branch is about 0.33 sq. mi or approximately 210 acres.

### 3.3.2. Precipitation

The North Central Texas Council of Governments (NCTCOG) Integrated Storm Water Management (iSWM) technical manual was used to obtain rainfall parameters. Rainfall intensities from Table 5.15 Tarrant County Rainfall Data and Table 5.17 500-year Storm Rainfall Data of the iSWM manual were converted to point rainfall depths for this study. The rainfall data is summarized below in Table 3, Rainfall Data.

**Table 3. Rainfall Data (inches (in))**

Flood Event		Storm Duration							
Year	%	5 Min*	15 Min	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	24 Hr
1	100%	0.44	0.83	1.36	1.62	1.77	2.04	2.28	2.64
2	50%	0.50	0.98	1.65	2.00	2.19	2.52	2.88	3.36
5	20%	0.59	1.22	2.19	2.68	2.94	3.42	3.96	4.56
10	10%	0.67	1.38	2.52	3.10	3.45	4.08	4.80	5.52
25	4%	0.76	1.62	3.02	3.76	4.20	4.98	5.76	6.72
50	2%	0.85	1.80	3.40	4.26	4.77	5.70	6.72	7.92
100	1%	0.92	2.00	3.84	4.84	5.43	6.54	7.68	9.12
500	0.2%	-----	3.01	4.88	6.08	6.90	8.52	10.56	12.96

\*Minute (Min); Hour (Hr)

### 3.3.3. Rainfall-Runoff Losses

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

The Valley View Branch watershed is currently at least 90% developed primarily with commercial, single family residential, multi-family residential and industrial use. Only the ultimate conditions land use was considered for this study, since the watershed is almost entirely developed. The Valley View Branch watershed land use was developed based on the 2005 NCTCOG land use data and updated based on current aerial photography (2015). Any undeveloped open space was then revised to reflect the City of Hurst Zoning Map to produce the ultimate land use conditions utilized for this study. A map of the ultimate land use within the Valley View Branch watershed can be seen in Figure E located in Appendix A of this report.

Percent impervious is a function of the various land uses within a watershed basin. The NCTCOG iSWM hydrology technical manual Table 1.15 along with drainage design information generally accepted in several comparable Texas communities were used to derive appropriate percent impervious values for each land use. The specific land uses and their corresponding percent impervious values are included in Table 4. A composite percentage of impervious area was computed for each sub-basin for ultimate conditions and then input into the HEC-HMS model.

**Table 4. Percent Impervious**

Land Use Classification	Characteristic Imperviousness
Commercial	85%
Dedicated Parks	10%
Industrial	72%
Institutional	85%
Multi-Family Residential	72%
Open Space	0%
Parking Lots	98%
Roadway	98%
Single-Family Residential	45%
Utilities	15%
Water	100%

The hydrologic soil types in this study were obtained from the NRCS Soil Survey Geographic database (SSURGO) for Tarrant County (Reference 3). Soil properties influence the relationship between rainfall and runoff so the soils are grouped into four hydrologic soil groups: A, B, C, and D based on runoff potential.

The Valley View Branch watershed is predominately Group C and D soils in the upper watershed and predominately Group B soils in the lower watershed. The stream corridors in the watershed are predominately Group A soils. Group A soils are defined as having high infiltration rates and low runoff potential. Group B soils indicate soils having some content of gravelly sand with moderate infiltration rates and a low/moderate runoff potential. Group C soils indicate soils having moderately fine to fine texture and slow infiltration rates. Group D soils are defined as clayey with slow infiltration rates and a high potential for runoff. The hydrologic soils for the Valley View Branch watershed are illustrated in Figure F, Hydrologic Soils Map, found in Appendix A of this report.

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

Baseline CN were obtained from Technical Release (TR)-55, Table 2.2c, for pasture, grassland, or range for AMC-II, average soil moisture conditions. CN were computed based on a composite percentage of soil types within each sub-basin. Group A soils were defined as having a CN of 39, Group B soils were defined as having a CN of 61, Group C soils were defined as having a CN of

74, and Group D soils were defined as having a CN of 80. Percent impervious values calculated based on land use were used in addition to CN for hydrologic computations.

### 3.3.4. Unit Hydrograph Method

The SCS Dimensionless Unit Hydrograph method was used and SCS lag times were computed for each sub-basin to generate runoff hydrographs. Time of concentration was computed based on TR-55 (Reference 4) methodology for overland flow (sheet flow and shallow concentrated flow). Travel times for channel flow were based on velocities from the hydraulic model where available. Channel flows for non-studied reaches were estimated based on Manning's equation. Storm drain velocities were assumed to be 6 feet per second for the purposes of this study.

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

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

Lag times were computed using the following equation:

$$T_p = 0.6 * t_c.$$

Lag time calculations can be found in Appendix B for all sub-basins within the study area. A Summary of Hydrologic Parameters including sub-basin area, SCS lag time, and SCS CN for each sub-basin can also be found in Appendix B.

### 3.3.5. Flood Routing

Routing of flood flows through channels and reservoirs is necessary in order to model the amount of valley storage in the stream reaches. This valley storage reduces peak flows at the downstream end of a reach. The Modified Puls routing method was utilized for this study. This method is based on the conservation of mass and the concept that storage is a function of outflow to route flows through a designated stream reach. To establish storage-outflow relationships, volumes through each reach were determined using a range of steady-flow water surface profiles in the HEC-River Analysis System (RAS) hydraulic models created as part of this study. These relationships were imported into HEC-HMS and used to calculate discharges at the downstream end of each designated reach based on the inflow and storage in each reach. Storage-outflow relationships were determined for existing channel and floodplain conditions.

The Muskingum-Cunge method was used to route flows through storm drain reaches outside of the new hydraulic study reaches. The pipe diameter, length, and slope were input in the HEC-HMS models.

### 3.3.6. Detention

One (1) detention pond was modeled as part of this study and is shown in Figure G, Existing Detention Pond, found in Appendix A. Elevation-Storage and Elevation Discharge curves were taken from the HEC-HMS model developed for the Chisholm Park Dam Emergency Spillway Improvements – Project No. 6414-301.

### 3.3.7. Diversions

Five (5) diversions were utilized as part of this study to divert flow from the channels to either storm drains or to an adjacent street. Three (3) diversions were placed between Louella Drive and SH 121 along Valley View Branch to model the flow leaving the main channel and overflowing along Norwood Drive. The diverted flow reenters the main channel at approximately Bedford-Eules Road. The specified flows applied in the HEC-HMS model were developed by converting the steady state Valley View Branch hydraulic model to unsteady flow to create lateral overflow hydrographs. Lateral structures were utilized to model the flow leaving the main channel at Louella Drive, Pleasantview Drive, and SH 121. Bentley FlowMaster V8i software assisted in modeling the lateral structures at Louella Drive and Pleasantview Drive by providing a rating curve at each location.

Two (2) diversions were placed along Stream VVB-1. The most upstream diversion at the upstream end of Stream VVB-1 simulates the diverted flow through the underground storm drain network. Bentley StormCAD V8i software assisted in modeling the existing culvert along Stream VVB-1 between Norwood Drive and Harwood Road (upstream of river station 21+22). Plan set data provided by the City of Hurst was used to determine culvert sizes, flowline elevations, bend angles, and lateral connection locations. The starting boundary conditions were based on known WSEL from HEC-RAS cross section 21+22. The StormCAD model indicated the 25-year storm event was not contained at the upstream end of the culvert. The 10-year inflow was utilized to create the Inflow-Diversion relationship for the diversion.

The downstream diversion at the downstream end of Stream VVB-1 models the diverted flow into Mayfair Park along the right overbank of Stream VVB-1 and ultimately down Norwood Drive. The diverted flow from downstream of Stream VVB-1 ties in with the diverted flow from Valley View along Norwood Drive. The specified flows applied in the HEC-HMS model were developed by converting the steady state Stream VVB-1 hydraulic model to unsteady flow to create lateral overflow hydrographs. A lateral structure was utilized to model the flow leaving the channel along the ridge through the downstream portion of Stream VVB-1.

## 3.4 Hydraulic Analysis

A hydraulic analysis was performed utilizing the USACE HEC-RAS software, version 5.0.3 (Reference 5). The purpose of the analysis was to develop flood profiles for the 1-, 2-, 5-, 10-, 25-, 50-, 100-, and 500-year storm events for ultimate conditions.

### 3.4.1. Stream Centerlines and Cross Sections

The Valley View Branch, Stream VVB-1, and Unnamed Tributary to Valley View Branch stream centerlines were delineated using aerial photography and the 2009 TNRIS LiDAR data. Hydraulic cross sections used for the study streams' HEC-RAS models were placed at close intervals above and below bridges and culverts, where applicable, in order to compute the significant effective flow and backwater effects of these structures. HEC-Geospatial River Analysis System (GeoRAS) software (Version 10) was used to extract geographical data for centerlines and cross sections. Elevation data was extracted from the terrain model created from the 2009 TNRIS LiDAR data for each cross section and imported into HEC-RAS. The cross section geometry was supplemented with field survey and plan set data for improved channels when available. Flowlines and channels of non-surveyed hydraulic cross sections were interpolated based on nearby channel surveys or

structure data when the topographic data was not sufficient to define the channels. The Trinity Boulevard bridge data and immediate upstream and downstream channel geometry was based on the latest design plans from the Trinity Boulevard Drainage Improvements (City of Fort Worth File No. K-2104) dated June 2013.

### 3.4.2. Modeling Variables

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

Appropriate expansion and contraction coefficients of 0.3 and 0.5 were applied upstream and downstream of structures to account for natural and structural variation in channel cross section shape. Occasionally, the coefficients were adjusted for model stability for cross sections not related to bridges or culverts.

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

Normal depth was used as the starting boundary condition for the Valley View Branch and Unnamed Tributary to Valley View Branch hydraulic models. Known WSEL were used as the starting boundary condition for Stream VVB-1.

**Table 5. Manning's Roughness Coefficients by Type**

Description	Channel n-Values	Overbank n-Values
Concrete Clean well kept	0.015-0.020	
Gabions	0.035	
Rock Rip Rap	0.035	
Clean Straight, but more stones and weeds	0.035-0.040	
Clean, winding, some pools and shoals, some weeds and stones	0.045	
Clean, winding, some pools and shoals, some weeds and stones, lower stages, more ineffective slopes and sections	0.050	
Articulated Blocks in Concrete	0.065	
Mainly Asphalt, Some Obstructions, Curbs, Few Trees, Small Amounts of Grass, Hwy Frontage		0.020
Open Grassy Areas, wild		0.040-0.050
Industrial/Commercial with more vegetation		0.050-0.070
Industrial (bldgs, cars, workers)		0.060
Grassy, some bushes, some trees,		0.050-0.070
Woods, Fields (50/50)		0.070-0.080
Open Yards, Fences, Few Trees, Houses		0.070-0.090
Close Residential, Streets		0.080-0.090
Residential, Many Trees		0.090
Heavy Wooded		0.100-0.120



### **3.4.3. Roadway Crossings**

Existing roadway crossings along each studied stream were evaluated on their level of protection against the existing 50%, 10%, and 1% (2-year, 10-year, and 100-year) annual chance flood events. Table 6 includes the stream crossing ID, the river station and name of the roadway crossing, and if the roadway crossing is overtopped by the existing 50%, 10%, or 1% annual chance flood event. WSEL refer to the upstream face of the structure. A map showing the level of protection for each roadway crossing along Valley View Branch, Stream VVB-1, and Unnamed Tributary to Valley View Branch can be seen in Figure H located in Appendix A of this report.

**Table 6. Roadway Crossing Level of Protection**

Stream Crossing ID	River Station	Roadway Crossing	Minimum Top of Road Elevation	50% Event Overtops Road	10% Event Overtops Road	1% Event Overtops Road
Valley View Branch						
1	1,804	Trinity Boulevard	489.19	No WSEL=485.73	No WSEL=487.19	No WSEL=488.42
2	2,827	Bell Helicopter Private Driveway	490.18	Yes WSEL=494.34	Yes WSEL=495.62	Yes WSEL=496.81
3	3,008	Trinity Railway Express	513.90	No WSEL=498.91	No WSEL=504.57	No WSEL=509
4	4,317	SH 10	506.23	No WSEL=504.52	Yes WSEL=507.79	Yes WSEL=508.90
5	5,612	Brown Trail	507.36	No WSEL=506.41	Yes WSEL=509.45	Yes WSEL=510.27
6	7,117	Redbud Drive	514.18	No WSEL=512.29	No WSEL=513.98	Yes WSEL=515.74
7	8,914	Oak Drive	529.89	No WSEL=528.73	No WSEL=528.96	Yes WSEL=531.04
8	9,952	Pipeline Road	537.65	No WSEL=537.55	Yes WSEL=539.40	Yes WSEL=541.47
9	10,866	Plaza Boulevard	546.60	No WSEL=540.87	No WSEL=546.55	Yes WSEL=548.18
10	11,478	Cheryl Avenue	545.95	Yes WSEL=546.19	Yes WSEL=548.07	Yes WSEL=549.36
11	11,793	Valley View Drive	547.50	Yes WSEL=548.66	Yes WSEL=550.19	Yes WSEL=551.35
12	12,554	Bedford Court	552.73	No WSEL=550.37	Yes WSEL=553.50	Yes WSEL=554.82
13	14,116	Bedford-Eules Road	558.90	Yes WSEL=558.29	Yes WSEL=560.31	Yes WSEL=562.00
14	16,537	SH 121	577.73	No WSEL=566.68	No WSEL=569.21	No WSEL=573.33
15	17,689	Pleasantview Drive	573.17	Yes WSEL=574.83	Yes WSEL=575.48	Yes WSEL=575.97
16	19,016	Louella Drive	580.52	Yes WSEL=581.08	Yes WSEL=581.56	Yes WSEL=581.84
Stream VVB-1						
17	145	Norwood Drive	584.79	No WSEL=583.50	Yes WSEL=585.05	Yes WSEL=585.73
18	1,115	Yates Drive	589.32	No WSEL=587.88	Yes WSEL=589.50	Yes WSEL=590.02
Unnamed Tributary to Valley View Branch						
19	807	Brown Trail	529.58	No WSEL=525.00	No WSEL=527.93	Yes WSEL=530.37
20	2,320	Tanglewood Drive	547.97	Yes WSEL=548.48	Yes WSEL=548.65	Yes WSEL=549.01

### 3.4.4. Lateral Structures

Lateral structures were utilized when cross sections didn't contain the flow. Table 7 below includes the lateral structures, the locations, and the downstream connections.

The lateral structure at station 350 along Stream VVB-1 is not optimized in the steady state analysis. It was utilized in the unsteady analysis to develop the downstream diversion on Stream VVB-1.

**Table 7. Lateral Structures**

Stream Crossing ID	Stream	River Station	Starting Location	Downstream Connection (HEC-RAS)
1	Valley View Branch	1,721	Downstream of Trinity Boulevard (Left Overbank)	Out of the System
2	Stream VVB-1	350	Approximately 200 ft Upstream of Norwood Drive (Right Overbank)	Out of the System*
3	Stream VVB-1	1,145	Upstream of Yates Drive (Right Overbank)	Out of the System*
4	Stream VVB-1	1,682	Approximately 580 ft Upstream of Yates Drive (Left Overbank)	XS 1074 (Left Overbank)

\*Diverted flow connects to Valley View Branch in HEC-HMS model

### 3.4.5. 2D Modeling

2D models were created for the upstream portion of Stream VVB-1 and from the confluence with Stream VVB-1 to Bedford-Eules Road along Valley View Branch. The area upstream of Harwood Drive along Stream VVB-1 was modeled using the non-diverted flow in the upper reach of Stream VVB-1 based on the HEC-HMS analysis. The hydrograph was applied north of the intersection of Norwood Drive and Carolyn Drive. It was allowed to leave using normal depth on the south side of Harwood Drive at the outlet of the storm drain at Stream VVB-1, east of the stream along Harwood Drive, and near the confluence of Stream VVB-1 and Valley View Branch along Norwood.

The area from the confluence of Stream VVB-1 and Valley View Branch to downstream of Bedford-Eules Road along Valley View Branch was modeled using the diverted flow from the remaining four (4) diversions in HEC-HMS along Stream VVB-1 and Valley View Branch at their respective overflow locations. The water was allowed to leave using normal depth downstream of Bedford-Eules Road and up- and downstream of Pleasantview Drive.

## 3.5 Results of Hydrologic and Hydraulic Analyses

### 3.5.1. Peak Discharges

Peak flood discharges calculated for this study include the 1-, 2-, 5-, 10-, 25-, 50-, 100-, and 500-year flood frequencies for ultimate land use conditions. Ultimate land use conditions were analyzed with channel flood routing data based on existing channels and bridges. Table 8 displays peak discharges at discharge break locations for each study stream for ultimate conditions. The hydrologic output data for all sub-basins in the study area can be seen in Appendix C.

### 3.5.2. Water Surface Elevations

Peak WSEL were calculated for the 1-, 2-, 5-, 10-, 25-, 50-, 100-, and 500-year flood frequencies for ultimate land use conditions. Flood profiles and HEC-RAS output tables for ultimate conditions are included in Appendix D. The 100- and 500-year ultimate conditions WSEL were mapped on the 2009 TNRIS LiDAR and are shown along with the cross sections on Figure I, Floodplain Workmaps, located in Appendix A of this report. Floodways were modeled for Valley View Branch and Stream VVB-1 and are also shown on the Floodplain Workmaps. The floodway models were optimized with the maximum encroachment that would not cause a rise of 1-foot or greater at any point along the stream. Existing floodway locations were maintained to the extent possible for this study.

### 3.5.3 Comparison to Effective Discharges

The 2009 Tarrant County FIS Report (Reference 6) includes discharges developed by the Fort Worth District USACE for the Storm Drainage Study of Major Streams in Hurst, Texas performed in 1983. Table 9, Peak Flow Comparison to Previous Studies, is a comparison of the 10-, 50-, 100- and 500-year peak flood discharges of the 2009 Tarrant County FIS Report to the discharges computed for this study. The increase in computed discharges should be expected due to the urbanization of the watershed since it was last studied, almost 30 years ago. The decrease in computed discharges at SH 121 on Valley View Branch and Norwood Drive on Stream VVB-1 are due to the diverted flow along Norwood Drive, downstream of Stream VVB-1. Figure J, Effective Floodplain Comparison, found in Appendix A has the new study 100-year floodplain overlaid on the FEMA 2009 Tarrant County Flood Insurance Rate Map (FIRM) panels which show the effective floodplains through the study area.

### 3.5.4 Model Calibration

No calibrations were conducted on the hydrologic or hydraulic analyses since no stream gage data or high water mark elevations were available.

**Table 8. Peak Discharges**

Location	DA (sq. mi)	XS Station	Ultimate Peak Discharges (cubic feet per second (cfs))							
			1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR
Valley View Branch										
Below Harwood Road	0.231	20850	300	350	500	600	700	800	900	1300
Above Confluence of Stream VVB-1	0.333	20152	400	500	700	850	1000	1150	1300	1900
Below Confluence of Stream VVB-1	0.708	19174	700	900	1250	1450	1700	1900	2100	2900
Below Louella Drive	0.708	18971	700	900	1200	1350	1600	1800	2000	2800
Above Pleasantview Drive	0.980	18218	950	1200	1650	1950	2300	2700	3000	4000
Just Below Pleasantview Drive	0.980	17648	850	1000	1300	1500	1900	2200	2400	3100
Approximately 75 ft Below Pleasantview Drive	1.229	17608	1050	1250	1650	1950	2400	2700	3000	4100
Above SH 121	1.229	16808	1050	1250	1600	1900	2200	2400	2500	2700
Above Bedford-Eules Road	1.450	15320	1300	1700	2300	2800	3300	3500	4100	5200
Below Bedford-Eules Road	1.557	14055	1400	1800	2500	3000	3500	3800	4400	5700
Below Bedford Court	1.808	12496	1600	2000	2700	3200	3700	4000	4300	5500
Below Cheryl Avenue	1.880	11413	1650	2100	2800	3300	3800	4100	4400	5600
Above Pipeline Road	1.956	10408	1650	2100	2800	3200	3700	4000	4400	5400
Below Pipeline Road	2.011	9896	1700	2200	2800	3300	3800	4100	4500	5500
Above Oak Drive	2.084	9359	1750	2200	2800	3300	3800	4100	4500	5500
Below Pecan Street	2.203	8186	1750	2200	2900	3300	3800	4100	4500	5500
Below Redbud Drive	2.290	7046	1800	2300	2900	3300	3800	4200	4600	5600
Above Confluence of Unnamed Tributary to Valley View Branch	2.309	6464	1800	2300	2900	3300	3800	4200	4500	5600

**Table 8. Peak Discharges (continued)**

Location	DA (sq. mi)	XS Station	Ultimate Peak Discharges (cubic feet per second (cfs))							
			1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR
Valley View Branch (continued)										
Below Confluence of Unnamed Tributary to Valley View Branch	2.643	5924	2100	2600	3300	3700	4200	4600	4900	6000
Above Brown Trail	2.681	5671	2100	2600	3400	3700	4200	4600	4800	5900
Below Brown Trail	2.778	5509	2100	2700	3500	3900	4400	4800	5000	6100
Above SH 10	2.932	4602	2100	2500	3400	4000	4400	4700	4800	6000
Above Trinity Railway Express Railroad	3.082	3178	2000	2300	2900	3300	4100	4200	4400	4900
Above Confluence of Walker Branch	3.283	1953	2000	2400	3000	3300	4100	4300	4500	4900
Stream VVB-1										
Below Harwood Drive	0.257	2135	225	275	375	425	500	600	650	900
Above Yates Drive	0.375	1367	325	425	600	700	800	900	1050	1500
Above Norwood Drive	0.375	351	325	425	550	650	700	750	800	1100
Unnamed Tributary to Valley View Branch										
Below Pecan Street	0.030	2624	20	30	40	50	70	80	100	150
Approximately 625 ft Below Tanglewood Drive	0.299	1692	300	375	500	600	750	850	950	1350
Just Above Brown Trail	0.334	899	325	400	550	650	800	900	1050	1500

**Table 9. Peak Flow Comparison to Previous Studies**

Location	10-YR			50-YR			100-YR			500-YR		
	2009 FEMA FIS (cfs)	2017 FPPS (cfs)	% Change	2009 FEMA FIS (cfs)	2017 FPPS (cfs)	% Change	2009 FEMA FIS (cfs)	2017 FPPS (cfs)	% Change	2009 FEMA FIS (cfs)	2017 FPPS (cfs)	% Change
Valley View Branch												
Above SH 121	2,060	1900	-8%	2,540	2400	-6%	2,770	2500	-10%	3,380	2700	-20%
Above Pipeline Road	2,540	3200	26%	3,180	4000	26%	3,460	4400	27%	4,230	5400	28%
Above Brown Trail	3,350	3700	10%	3,900	4600	18%	4,200	4800	14%	4,950	5900	19%
Above Trinity Railway Express Railroad	2,970	3300	11%	3,540	4200	19%	3,810	4400	15%	4,530	4900	8%
Stream VVB-1												
Above Norwood Drive	750	650	-13%	1,000	750	-25%	1,100	800	-27%	1,350	1100	-19%

## 4. Flood Mitigation Alternatives

### 4.1 Alternative Objectives

Alternatives were developed considering the following objectives:

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

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

- Alternatives were focused on alleviating flood damages for the citizens residing within the City of Hurst, City of Fort Worth, and City of Bedford political limits. Benefits of these alternatives may also impact the surrounding communities, but these effects were not examined.
- The formulation of alternatives that reduce flood damages and costs in one area should not result in measurable increases in the extent and magnitude of flooding in another area.
- The formulations of alternatives should avoid adverse impacts to structures.

### 4.2 Alternative Concepts

In general, four concepts were considered for this project:

- Storm Water Detention Pond Facilities
- Channel Modifications (Channelization)
- Culvert/Bridge Structure Upgrade
- Property Buyouts/Acquisition

Storm Water Detention Pond Facilities were explored to minimize flood damages south of the confluence of Stream VVB-1 and Valley View Branch. The main hydraulic function of a detention basin is to reduce the peak flow and release it slowly. Usually the most significant results are obtained by offsetting the timing of peak discharges to impact the timing of peak flows



downstream. Therefore, flow timing was another factor taken into consideration when analyzing the detention facilities.

Channelization was explored in areas where the existing terrain allowed for enough grade and horizontal space to modify the channel. The concept of channelization considers a new channel to convey flow. The City currently maintains a number of previously improved concrete channels.

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

Property Buyouts/Acquisition in flood prone areas are sometimes necessary when flood mitigation alternatives are limited. If the City pursues Property Buyouts as a solution, once the land is purchased and the building is removed, the area should be considered green space. If certain government grants are provided to aid in the buyout process, the land will be required to be utilized as green space.

### 4.3 Conceptual Alternative Improvements

Half Associates identified multiple buildings and existing roadway crossings at risk of flooding along Valley View Branch. The majority of flooded buildings consist of residential properties with some commercial and public properties also being affected. Following are the total number of buildings inundated by the revised floodplain mapping for the 10- and 100-year storm events (comparison of base flood elevations to finish floor surveys was not included in this study):

- 10-Year Storm Event – 91 Buildings Potentially Flooded (74 Residential Buildings)
- 100-Year Storm Event – 186 Buildings Potentially Flooded (146 Residential Buildings)

Each existing roadway crossing along Valley View Branch was evaluated to determine bridge/culvert capacity and level of protection against all storm events. Only three (3) roadway crossings have the capacity to pass the 100-year discharge without the roadway being overtopped: Trinity Boulevard, Trinity Railway Express, and SH 121.

Non-structural and structural measures were considered for conceptual alternative improvements to help reduce or eliminate identified flooding problems within the Valley View Branch watershed. A storm drainage study of major streams in Hurst was performed by Half Associates in 1983, which included Valley View Branch. A number of channel improvement and bridge replacement alternatives were recommended based on existing conditions at the time of the study. Each of the short-term recommendations has been implemented except for the concrete pilot channel with earthen side slopes from SH 121/183 to Pleasantview Drive. This alternative was not considered as part of this study since the capacity of the existing natural channel through this reach is not the source of flooding towards Norwood and currently contains the 10-year storm event based on the HEC-RAS analysis.

The following is a brief description of the conceptual alternative improvements developed as part of this study for the Valley View Branch watershed.

#### 4.3.1 Trinity Railway Express & SH 10 Culvert Improvements

There is a long history of flooding upstream of Trinity Railway Express along Valley View Branch. The railway embankment essentially acts as a dam, backing up water approximately 3,000 ft upstream to Brown Trail for the 100-year storm event. Multiple high water rescues have been documented in the trailer park just downstream of SH 10 due to life-threatening flood elevations. Trinity Railway Express has two (2) existing 10'x10' box culverts, and SH 10 has five (5) existing 8'x8' box culverts (only three (3) of the existing 8'x8' culverts are currently utilized – two (2) of the culverts are intentionally plugged). The railroad is not overtopped by the studied storm events, but SH 10 is overtopped by the 5-year storm event. The conceptual alternative improvement consists of adding two (2) additional 10'x10' culverts at Trinity Railway Express and opening the two (2) additional 8'x8' culverts at SH 10 that are currently plugged. Refer to Figure 4.1 for the locations of the proposed culvert improvements.

This culvert improvements would result in fifteen (15) buildings being removed from the 10-year floodplain and thirteen (13) building being removed from the 100-year floodplain. The maximum decrease in 100-year WSEL through the trailer park is approximately 6.5 ft. The level of service at SH 10 would be increased to 10-year capacity and the flood inundation depth would be reduced by 1.3 ft for the 100-year storm event. The estimated probable cost to implement the Trinity Railway Express and SH 10 culvert improvements is \$750,000. The estimated probable cost for an optional property buyout of residential buildings still inundated by the 100-year storm event is \$570,000. A detailed cost estimate is included in Appendix E.

#### 4.3.2 Regional Detention at Stream VVB-1 Confluence

A regional detention facility was evaluated just south of the confluence of the Stream VVB-1 and Valley View Branch in Mayfair Park. The regional detention pond was conceptually designed to reduce the peak flow at the outlet of Stream VVB-1 by retaining a specified volume of storm water and releasing it slowly. The conceptual regional detention option considered an inline, gravity drained structure with an offline storage area utilizing existing open space currently owned by the City of Hurst. A proposed berm located between the inline and offline storage optimizes offline detention by delaying utilization of detention volume until closer to the hydrograph peak along Stream VVB-1. A multi-stage concrete outlet structure was designed, including a weir, along the creek. This alternative attenuated the peak discharges downstream of the regional detention pond along Valley View Branch and along Norwood Drive. Two (2) additional 8'x5' box culverts were also proposed along Norwood Drive at Stream VVB-1 to provide 100-year level of service for the roadway. Refer to Figure 4.2 for the conceptual location of the regional detention facility and concept drawing of the outlet structure.

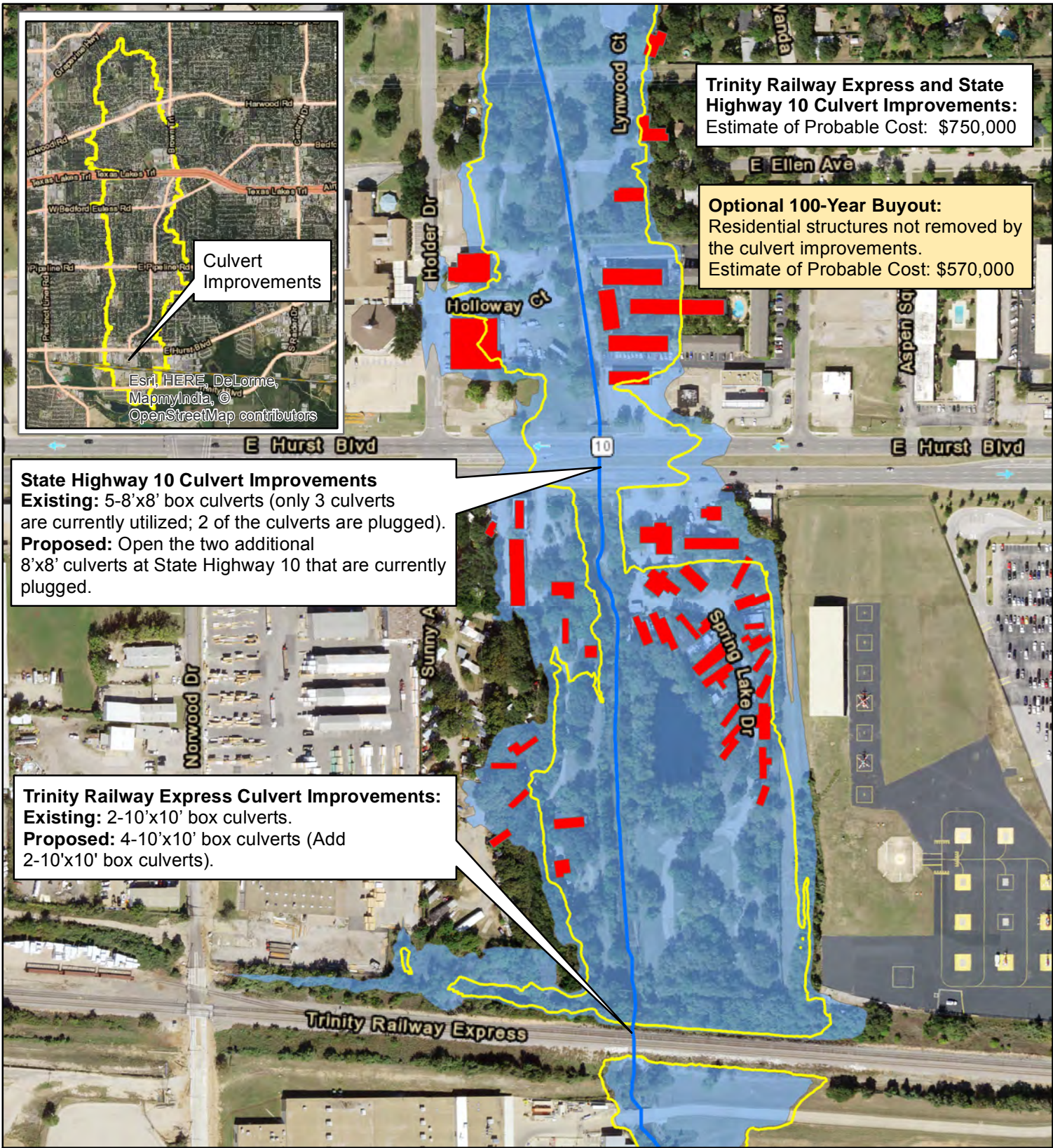
The analysis indicated that approximately 33 ac-ft of storage could be provided by excavation within the described property. It does not appear this alternative would remove any buildings from the 10- or 100- year floodplains, but decreases the 100-year WSEL on average by 0.7 ft from the detention facility to SH 121 along the main stem of Valley View Branch. The resulting discharges along Valley View Branch are decreased by approximately 20% for the 5-, 10-, 25-, 50-, 100-, and 500-year flood events just upstream of Louella Drive and approximately 12% upstream of SH 121. The 100-year overflow to Norwood Drive was reduced by more than 50% between Pleasantview Drive and Louella Drive and approximately 10% between SH 121 and Pleasantview Drive, resultin in reduced flood hazard along Norwood Drive. The estimated probable cost to implement the

regional detention at Stream VVB-1 Confluence is \$1,940,000. A detailed cost estimate is included in Appendix E.

A regional detention facility was considered on the west side of Valley View Branch between SH 121 and Pleasantview Drive. It was determined this area was not as effective at reducing flooding downstream along Norwood Drive since most of the water diverting to Norwood Drive occurs upstream at Louella Drive and Pleasantview Drive. It was decided the regional detention at the confluence of Stream VVB-1 was a much better location to reduce the flooding along Norwood Drive than the detention upstream of SH 121. In addition, the land immediately upstream of SH 121 is owned by the Hurst-Eules-Bedford Independent School District and would need to be purchased to proceed with the detention facility. No other regional detention facilities were considered due to lack of available land.

#### **4.3.3 Property Buyout Alternatives**

A property buyout option was considered for all 10-year potentially flooded residential structures identified by this study. The buyout program must be a voluntary agreement between the property owner and the appropriate City. Seventy four (74) residential buildings were determined to be potentially flooded by the 10-year storm event. Most of these buildings are located between Plaza Boulevard and SH 121 or just upstream of Trinity Railway Express along Valley View Branch. The City of Hurst identified five (5) of the seventy four (74) residential buildings as repetitive loss properties. Conceptual alternative improvements were considered in these areas to alleviate flooding problems but were not considered viable options due to limited space for channelization, feasibility of bridge/culvert improvements, and adverse impacts downstream that would be difficult to mitigate. A few disadvantages to the property buyout alternative include a potential loss of tax revenue, City maintenance on newly undeveloped lots, and potential home-owners associations' issues that need to be examined prior to proceeding. The estimated probable cost to buyout all residential buildings potentially flooded by the 10-year storm event is \$8,990,000. If the buyout alternative is pursued, it is recommended to give higher priority to the five (5) repetitive loss properties mentioned above. A detailed cost estimate is included in Appendix E. Note: the 10-year buyout option does not provide any relief from flooding beyond the selected buildings.



**Trinity Railway Express and State Highway 10 Culvert Improvements:**  
 Estimate of Probable Cost: \$750,000

**Optional 100-Year Buyout:**  
 Residential structures not removed by the culvert improvements.  
 Estimate of Probable Cost: \$570,000

**State Highway 10 Culvert Improvements**  
**Existing:** 5-8'x8' box culverts (only 3 culverts are currently utilized; 2 of the culverts are plugged).  
**Proposed:** Open the two additional 8'x8' culverts at State Highway 10 that are currently plugged.

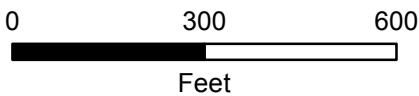
**Trinity Railway Express Culvert Improvements:**  
**Existing:** 2-10'x10' box culverts.  
**Proposed:** 4-10'x10' box culverts (Add 2-10'x10' box culverts).



Valley View Branch Flood Protection Planning Study



**Figure 4.1**  
**Culvert Improvements**

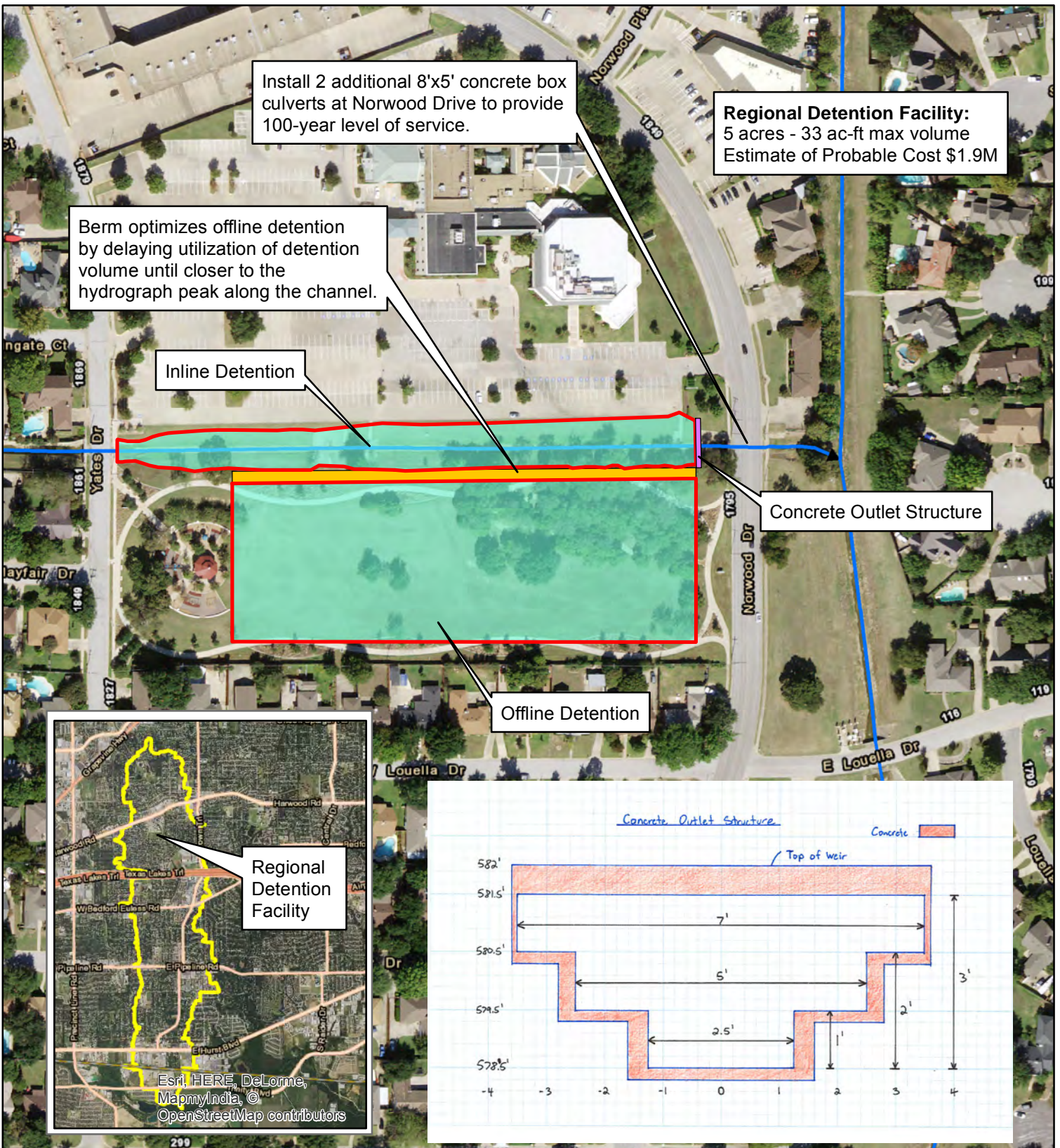


**Legend**

- Stream Centerline
- Alternative 100-Yr Floodplain
- Ultimate 100-Yr Floodplain

**Structure Potentially Flooded By**  
 100-year Ultimate Floodplain

Notes: Aerial imagery provided by StratMap 2015



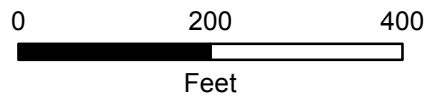
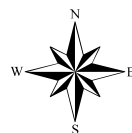
Valley View Branch Flood Protection Planning Study

**Figure 4.2 Regional Detention Facility**

**Legend**

- Regional Detention Facility
- Berm
- Concrete Outfall Structure
- Stream Centerline
- Valley View Branch Watershed

Notes: Aerial imagery provided by StratMap 2015



## 4.4 Funding

If the conceptual alternatives are pursued for flood protection, Halff Associates recommends that the Cities of Hurst, Fort Worth, and Bedford research the following funding sources to assist in the implementation.

- FEMA's Hazard Mitigation Grant Program
- FEMA's Flood Mitigation Assistance
- USACE's Section 205, Small Flood Control Projects Program
- TWDB Financial Assistance Programs

## 4.5 Preventative Alternatives

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

### 4.5.1. Land Use Zoning and Subdivision Regulations

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

### 4.5.2. Informing the Public

Studies have indicated that most flood-related deaths in Texas occur at undersized bridges that are either overtopped or washed out by floodwaters. Using the hydrologic and hydraulic methods discussed in this report, the level of service was listed for each structure.

An alternative to improving dangerous bridges and culverts is to install flood warning signs, barricades, or other systems to inform and alert motorists of hazardous crossings. The Cities should consider the need for a flood warning sign at all crossings that are overtopped by water during the 100-year and more frequent floods.

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

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

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

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

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

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

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

#### **4.5.3. Watershed Management**

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

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

#### **4.5.4. Debris Removal**

The accumulation of trees, brush, sediment, and other debris at bridges, culverts, or other obstructions can have dangerous consequences. Obstructions to flow could cause higher flood stage elevations upstream of the crossing. In addition, masses of debris can break loose as flood flows increase, producing a destructive wall of water and debris that surges downstream. The

force of water on the upstream side of a bridge plugged by debris may exceed the structural capacity of the bridge, causing it to fail. Prevention of debris obstructions can reduce flood damage and potential hazards.

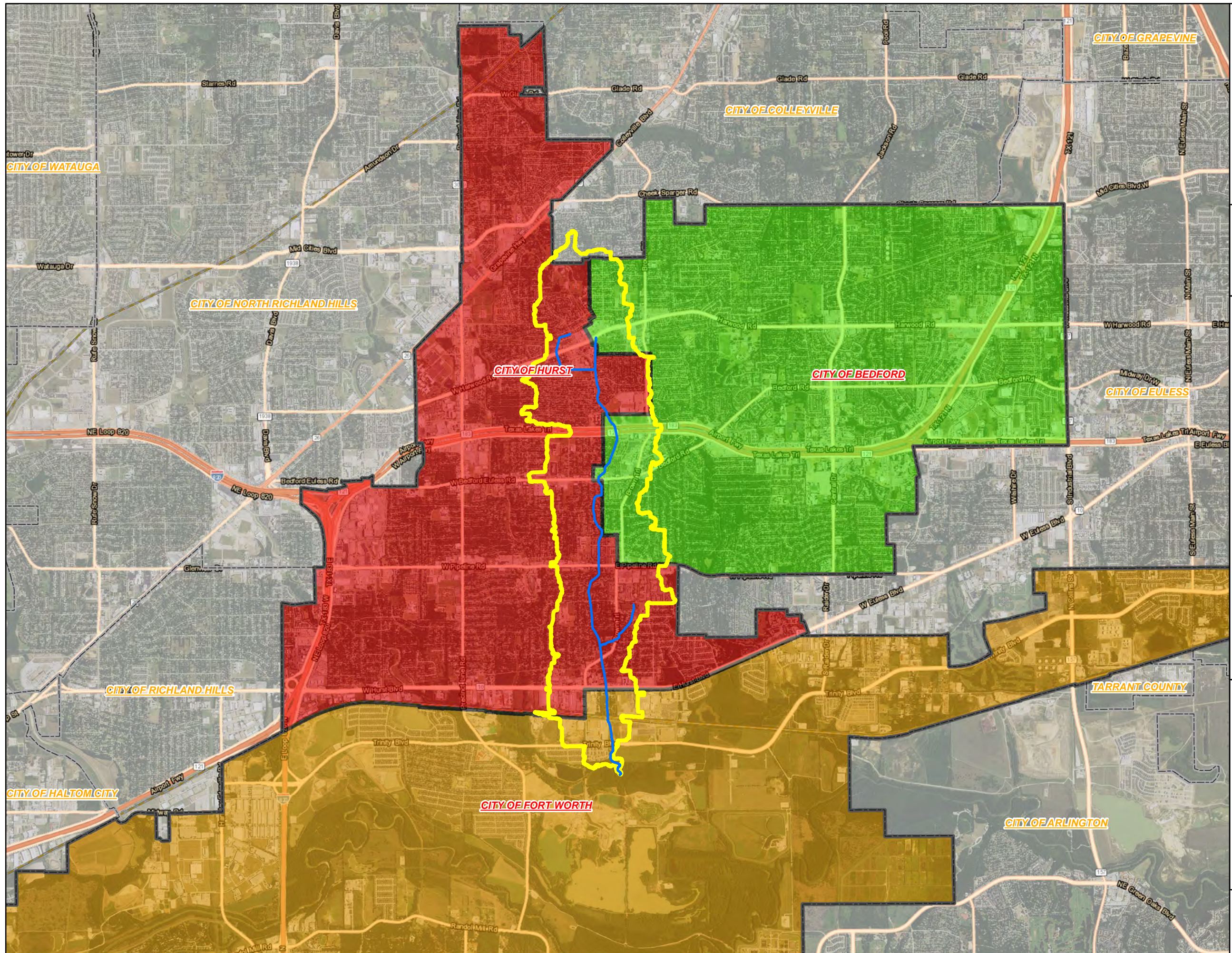


## Bibliography and References

1. A Storm Drainage Study of Major Streams in Hurst, Texas, Halff Associates, Inc., November 1983.
2. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-HMS Version 4.1, Davis, California, July 2015.
3. U.S. Department of Agriculture, Natural Resources Conservation Service, Soil Survey Geographic database, Tarrant County, Texas, September 28, 2015.
4. U.S. Department of Agriculture, Natural Resources Conservation Service, Urban Hydrology for Small Watersheds, Technical Release No. 55. June 1986.
5. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS, Version 5.0, Davis, California, February 2016.
6. Federal Emergency Management Agency, Flood Insurance Study, Tarrant County, Texas and Incorporated Areas, Washington D.C., September 25, 2009.

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**Appendix A**  
**Figures**









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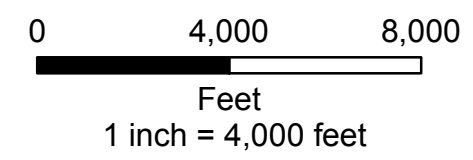
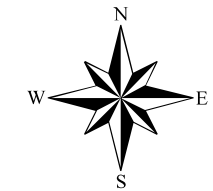
Valley View Branch Flood Protection Planning Study

**Figure A  
Watershed Location  
Map**

**Legend**

-  Stream Centerline
-  Valley View Branch Watershed
-  Other Political Areas
-  City of Hurst
-  City of Fort Worth
-  City of Bedford

Notes:  
1) Aerial imagery provided by Landiscor 2014



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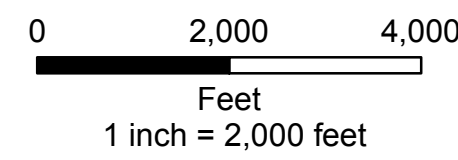
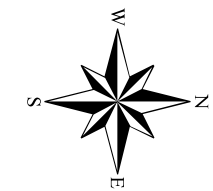
### Valley View Branch Flood Protection Planning Study

## Figure B Studied Streams

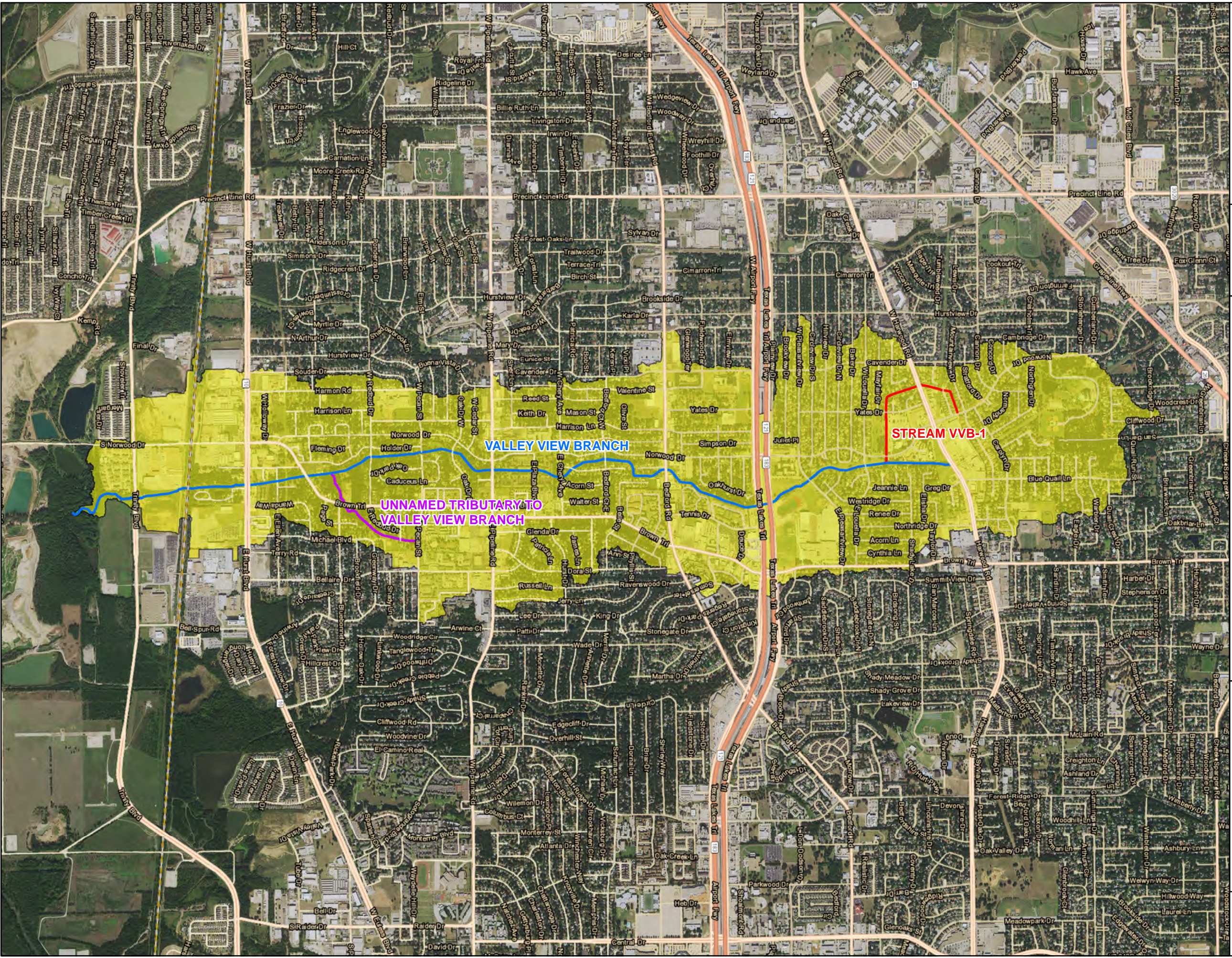
### Legend

-  Valley View Branch Watershed
-  Valley View Branch
-  Stream VVB-1
-  Unnamed Tributary to Valley View Branch

Notes:  
1) Aerial imagery provided by Landiscor 2014



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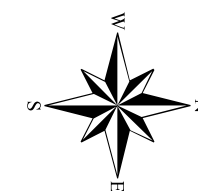
### Valley View Branch Flood Protection Planning Study

## Figure C Study Survey Summary Half Surveys

### Legend

- Survey Structures
- Survey Cross Sections
- Spot Elevations
- Finished Floor Elevation
- Stream Centerline
- Valley View Branch Watershed

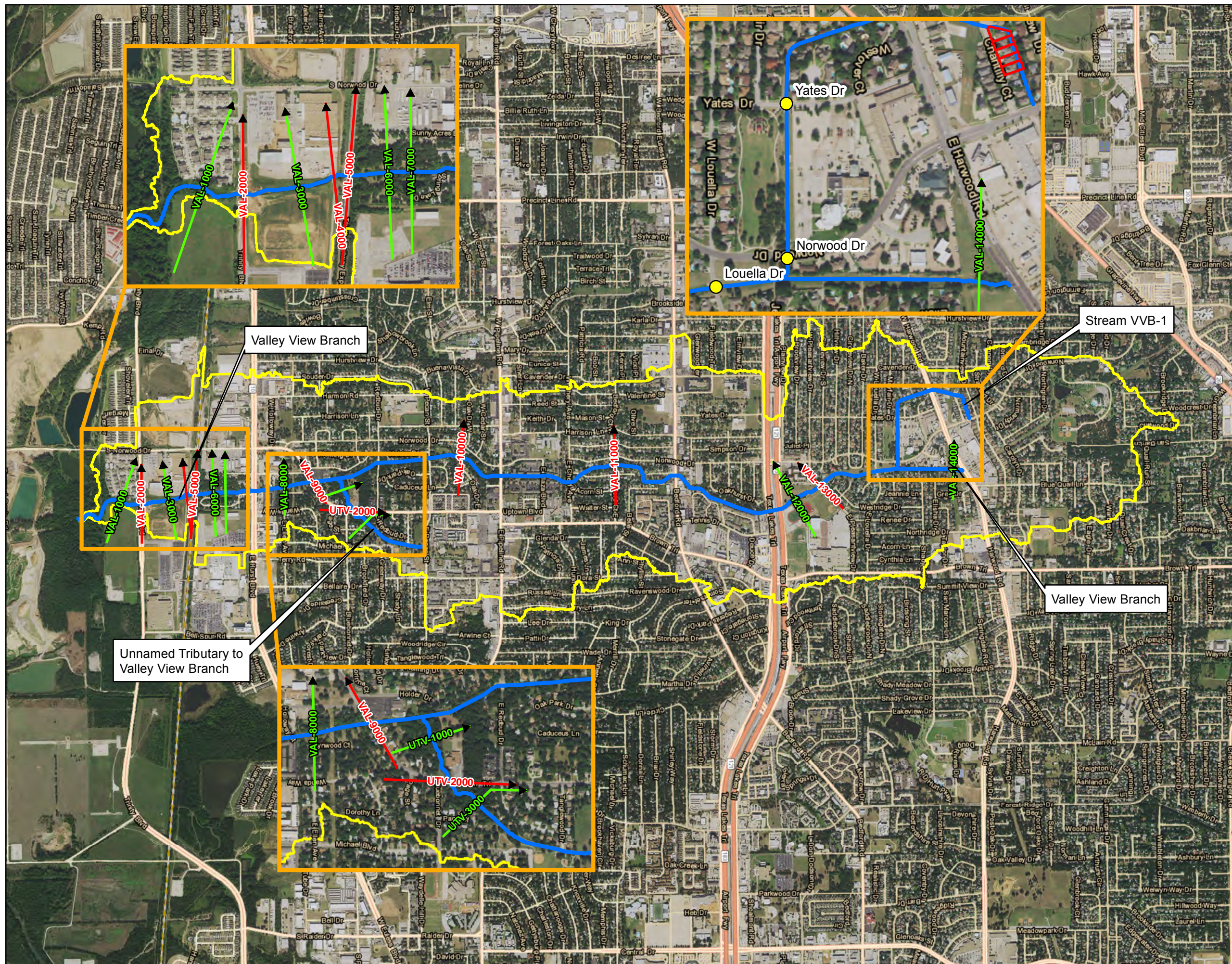
Notes:  
 1) Aerial imagery provided by Landiscor 2014  
 2) Spot elevations taken to confirm plan set data for stream crossings shown  
 3) Finished floor elevations taken along upper portion of Stream VVB-1 to refine floodplain mapping through these properties



0 2,000 4,000

Feet  
1 inch = 2,000 feet

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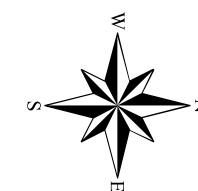
### Valley View Branch Flood Protection Planning Study

## Figure D Drainage Area Map

### Legend

-  Valley View Sub-basins
-  Stream Centerline

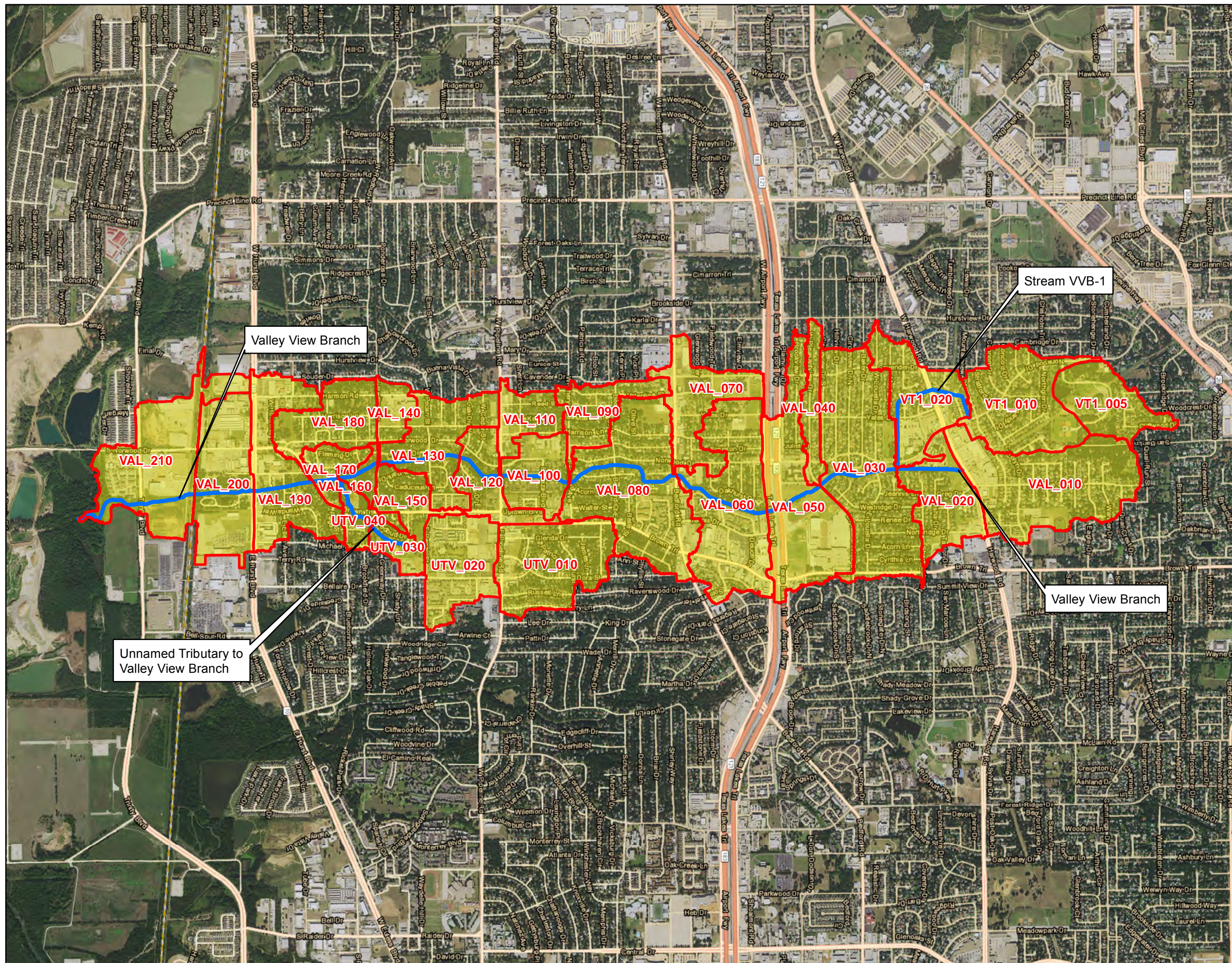
Notes:  
1) Aerial imagery provided by Landscor 2014



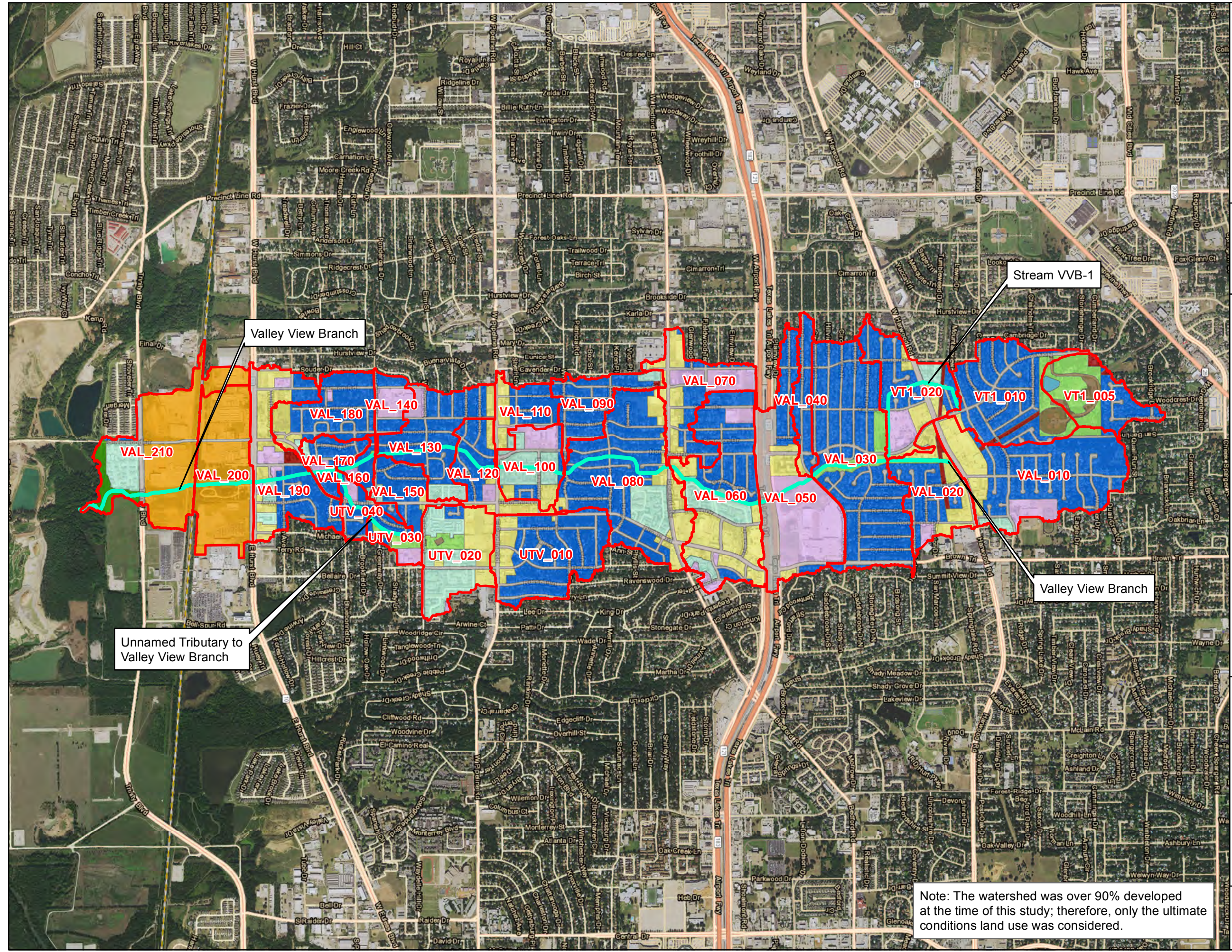
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Feet  
1 inch = 2,000 feet

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**Figure E**  
**Ultimate Land Use Map**



**Legend**

- Commercial
- Dedicated Parks
- Industrial
- Institutional
- Multi-Family Residential
- Open Space
- Parking Lots
- Roads
- Single-Family Residential
- Utilities
- Water
- Stream Centerline

Notes:  
1) Aerial imagery provided by Landscor 2014

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Feet  
1 inch = 2,000 feet

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Note: The watershed was over 90% developed at the time of this study; therefore, only the ultimate conditions land use was considered.



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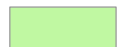
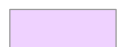



### Valley View Branch Flood Protection Planning Study

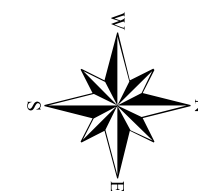
## Figure F Hydrologic Soils Map

### Legend

#### Hydrologic Soil Group

-  A
-  B
-  C
-  D
-  Stream Centerline

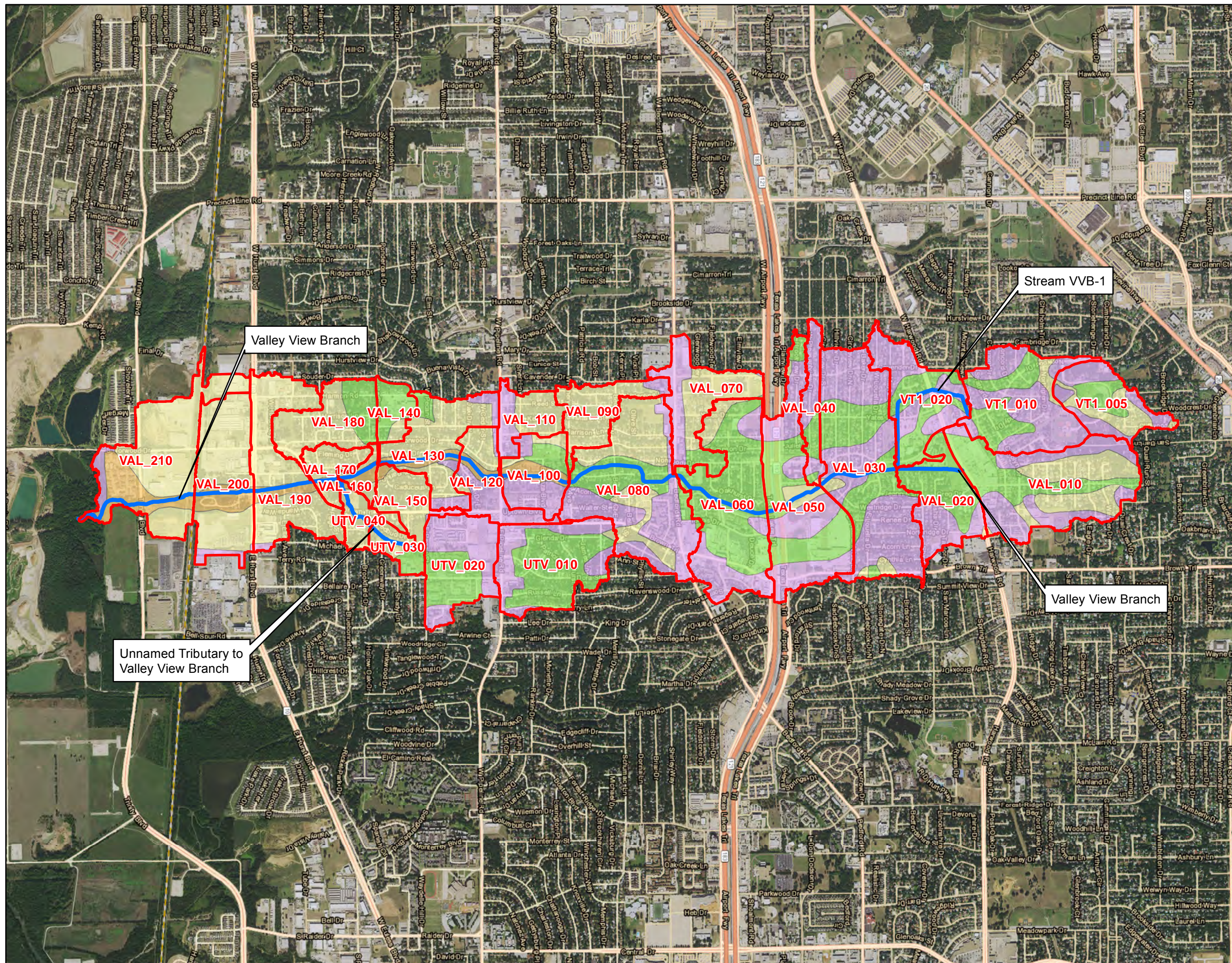
Notes:  
 1) Aerial imagery provided by Landiscor 2014  
 2) Soils data is based on the Natural Resource Conservation Service soil survey for Tarrant County. Spatial data was updated in December 2013 and tabular data was updated in September 2015.



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Feet  
1 inch = 2,000 feet

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Valley View Branch

Stream VVB-1

Unnamed Tributary to Valley View Branch

Valley View Branch







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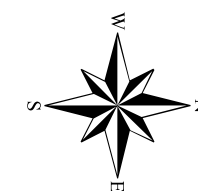
### Valley View Branch Flood Protection Planning Study

## Figure G Existing Detention Ponds

### Legend

-  Existing Detention Ponds
-  Stream Centerline

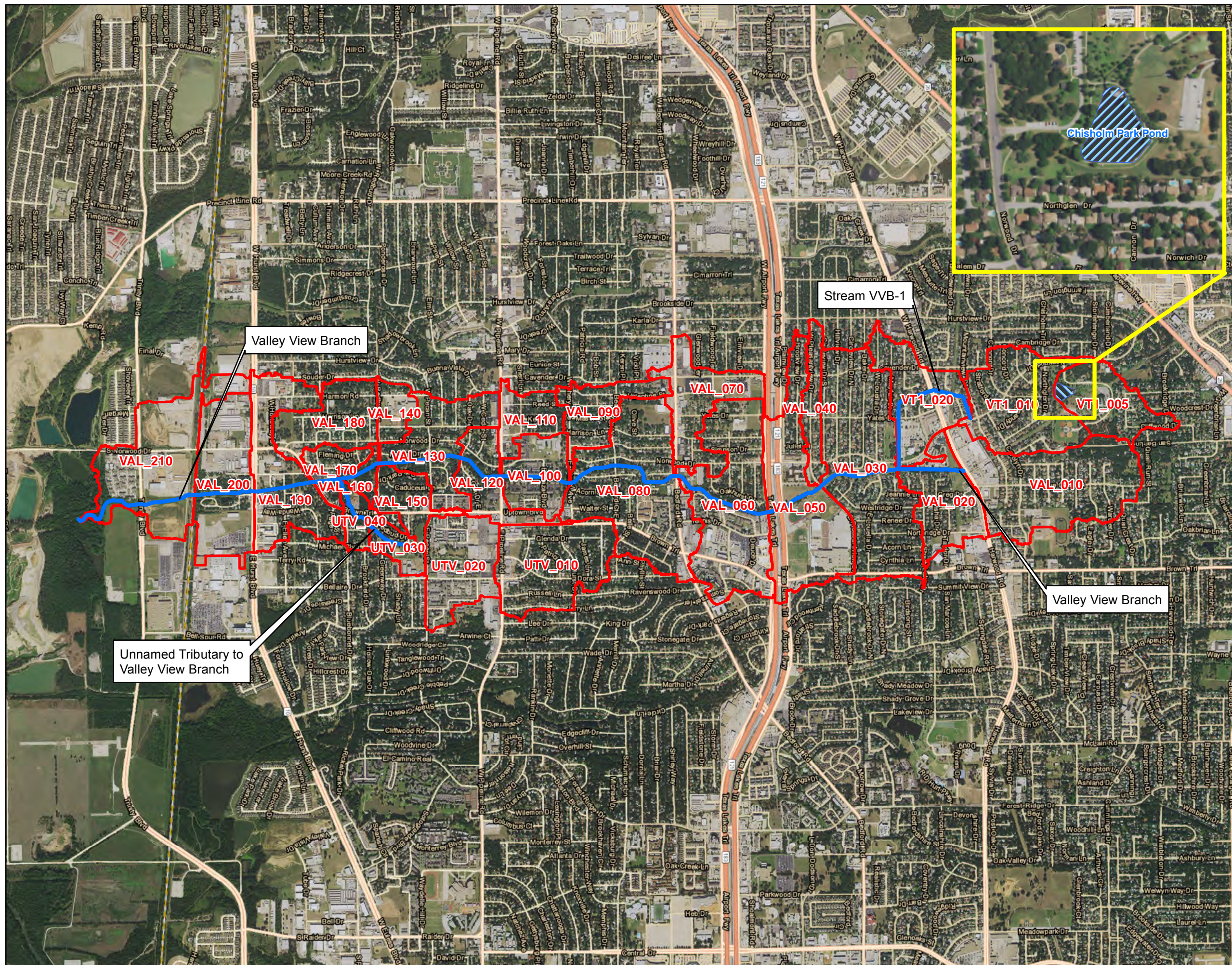
Notes:  
 1) Aerial imagery provided by Landiscor 2014  
 2) The one (1) detention pond shown on this map was modeled as part of this study in HEC-HMS. Several other detention ponds were found in the study area but were not modeled as reservoirs due to limited detention volume or the absence of a defined outlet structure.



0 2,000 4,000

Feet  
1 inch = 2,000 feet

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### Valley View Branch Flood Protection Planning Study

## Figure H Roadway Crossings

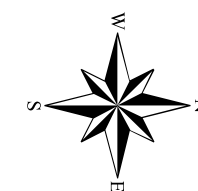
### Legend

- Stream Centerline
- Valley View Branch Watershed

### Existing Level of Protection

- Less Than 1-Year
- 1-Year
- 2-Year
- 5-Year
- 10-Year
- 500-Year

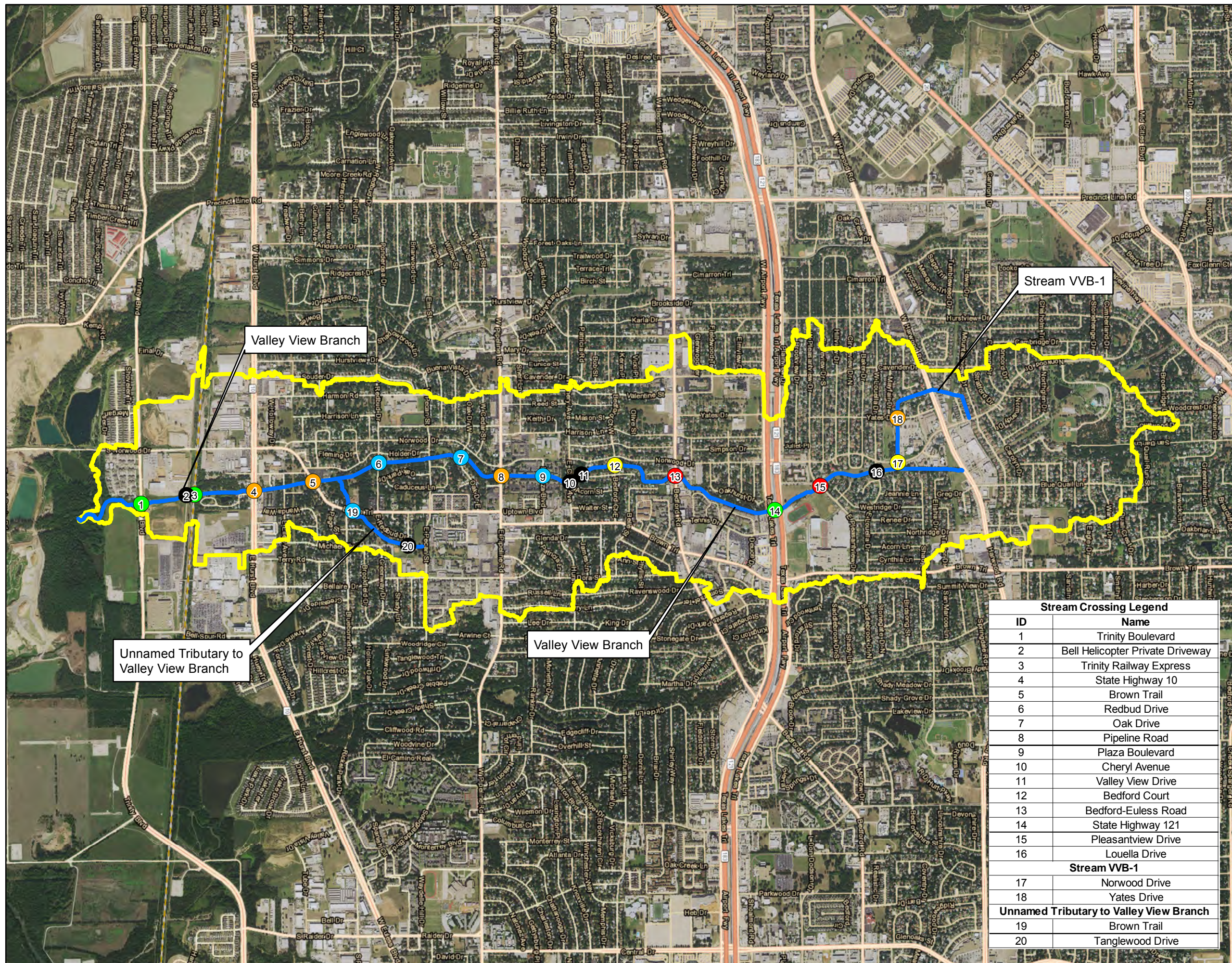
Notes:  
1) Aerial imagery provided by Landiscor 2014



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Feet  
1 inch = 2,000 feet

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Stream Crossing Legend	
ID	Name
1	Trinity Boulevard
2	Bell Helicopter Private Driveway
3	Trinity Railway Express
4	State Highway 10
5	Brown Trail
6	Redbud Drive
7	Oak Drive
8	Pipeline Road
9	Plaza Boulevard
10	Cheryl Avenue
11	Valley View Drive
12	Bedford Court
13	Bedford-Eules Road
14	State Highway 121
15	Pleasantview Drive
16	Louella Drive
<b>Stream VVB-1</b>	
17	Norwood Drive
18	Yates Drive
<b>Unnamed Tributary to Valley View Branch</b>	
19	Brown Trail
20	Tanglewood Drive



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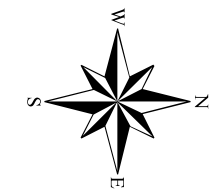
### Valley View Branch Flood Protection Planning Study

## Figure I Floodplain Workmaps Index

### Legend

- Floodplain Workmap Index
- Stream Centerline
- City Boundaries

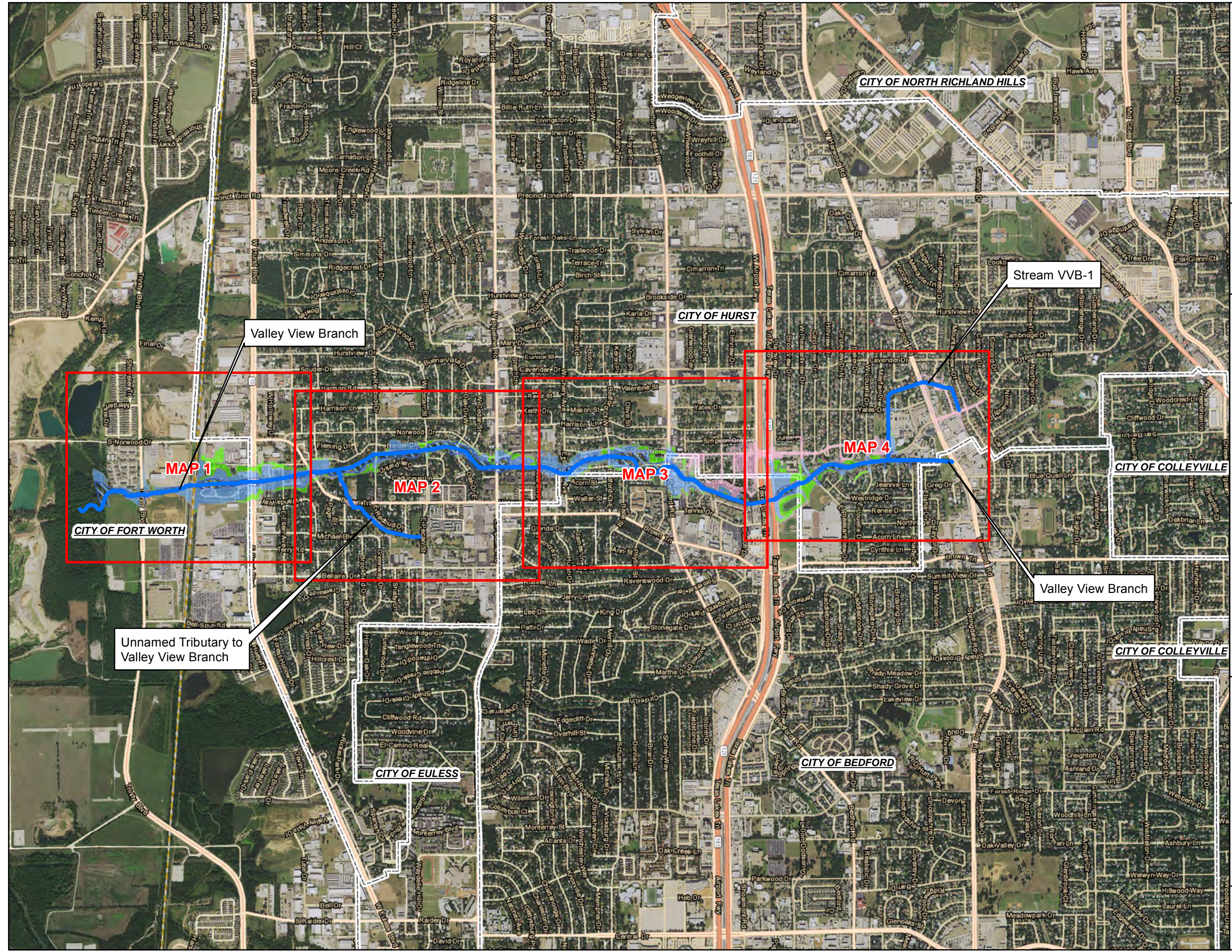
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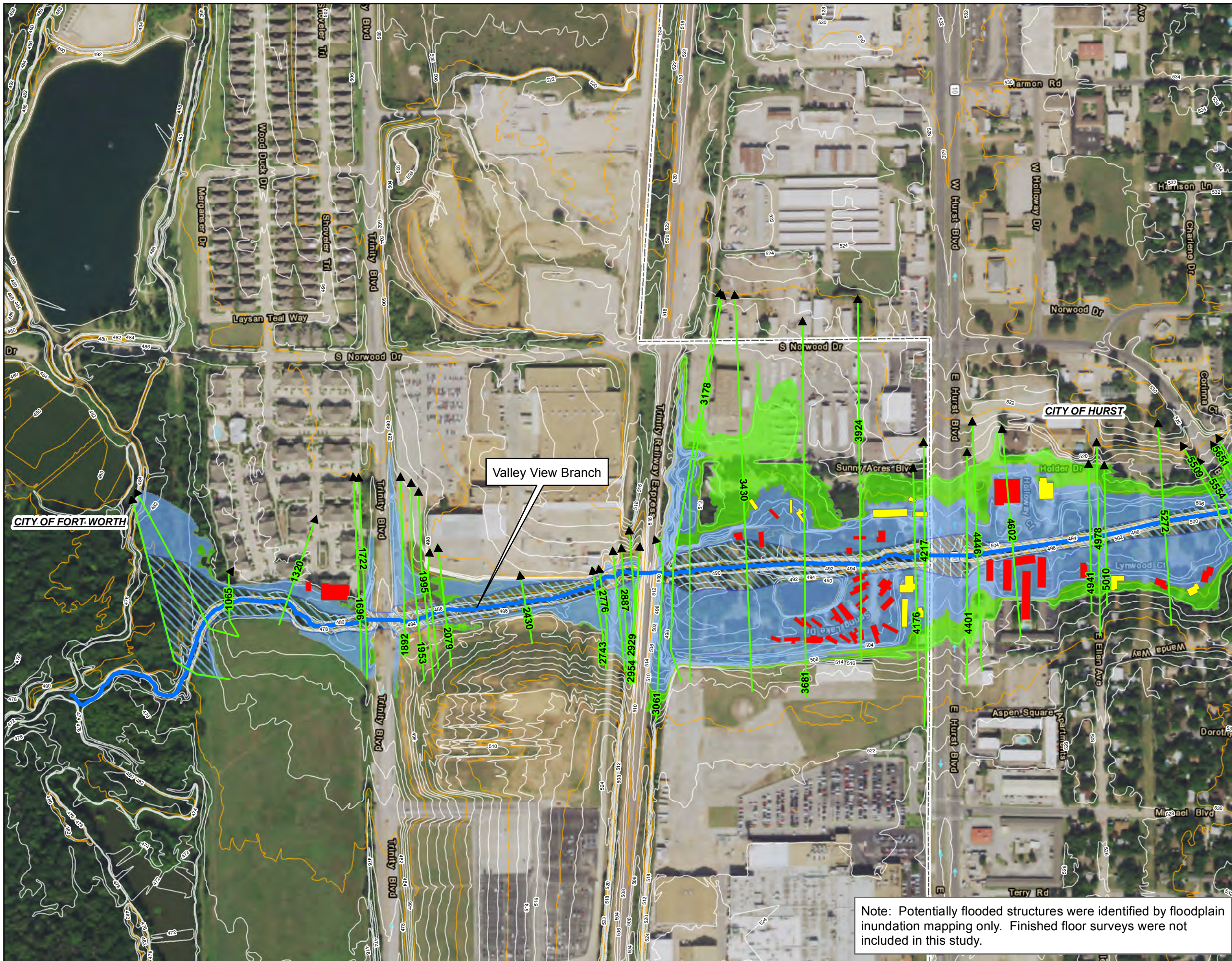


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Feet  
1 inch = 2,000 feet

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Valley View Branch Flood Protection Planning Study

**Figure I**  
**Floodplain Workmaps**  
**VALLEY VIEW BRANCH MAP 1**

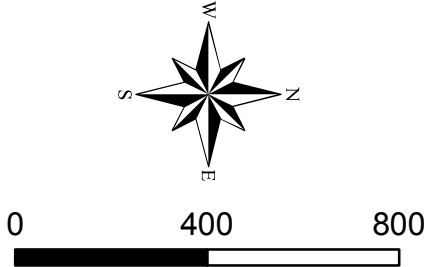
**Legend**

- Cross Sections
- Stream Centerline
- Zone A
- Zone AE
- Floodway
- Zone X, 0.2% Annual Chance
- City Boundaries

**Structure Potentially Flooded By**

- 10-year
- 100-year

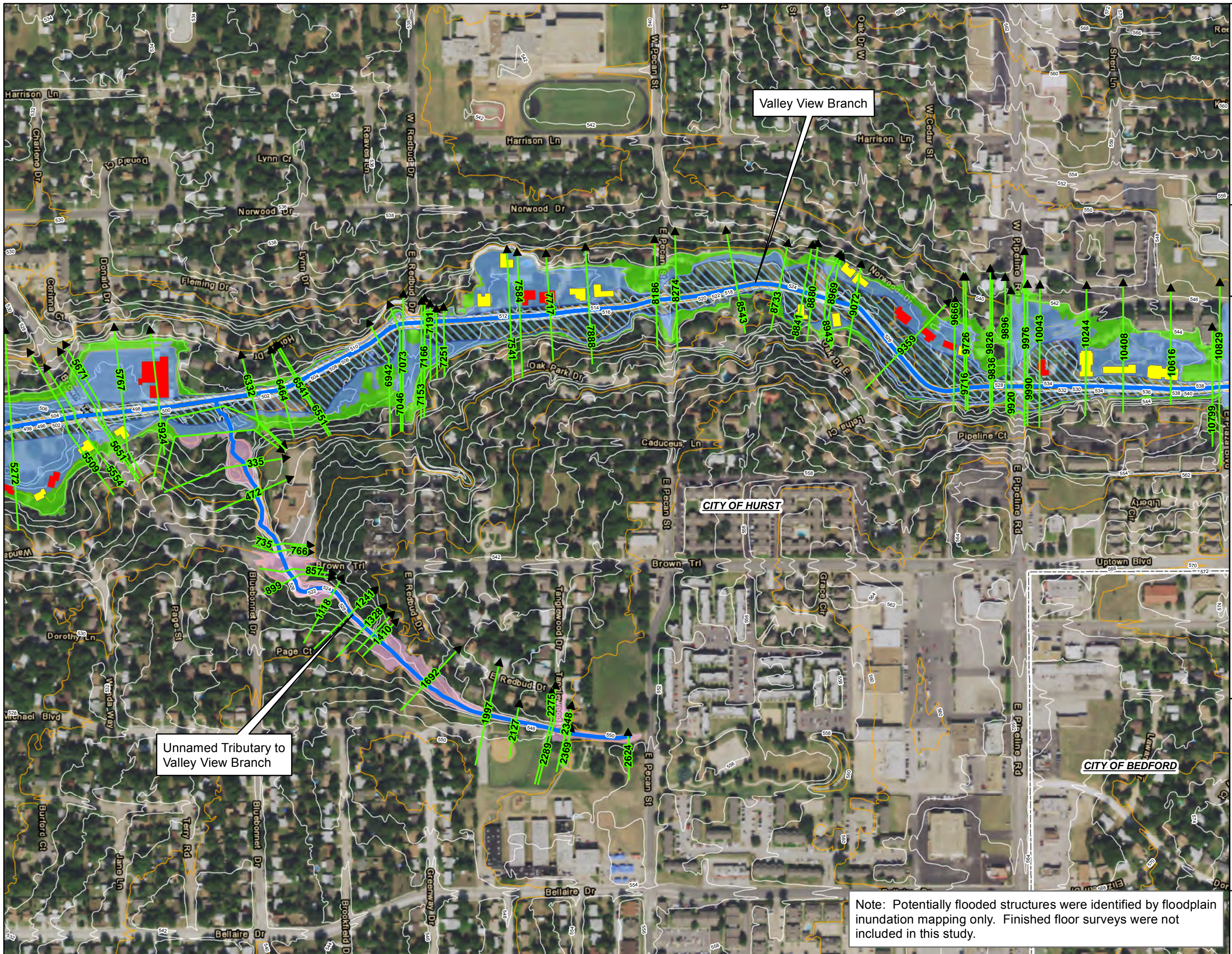
Notes:  
 1) Aerial imagery provided by Landiscor 2014  
 2) Contours reflect 2009 TNRIS LiDAR contour data



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Note: Potentially flooded structures were identified by floodplain inundation mapping only. Finished floor surveys were not included in this study.



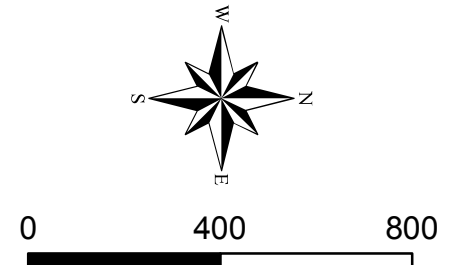
Valley View Branch Flood Protection Planning Study

**Figure I**  
**Floodplain Workmaps**  
**VALLEY VIEW BRANCH MAP 2**

- Legend**
- Cross Sections
  - Stream Centerline
  - Zone A
  - Zone AE
  - Floodway
  - Zone X, 0.2% Annual Chance
  - City Boundaries

- Structure Potentially Flooded By**
- 10-year
  - 100-year

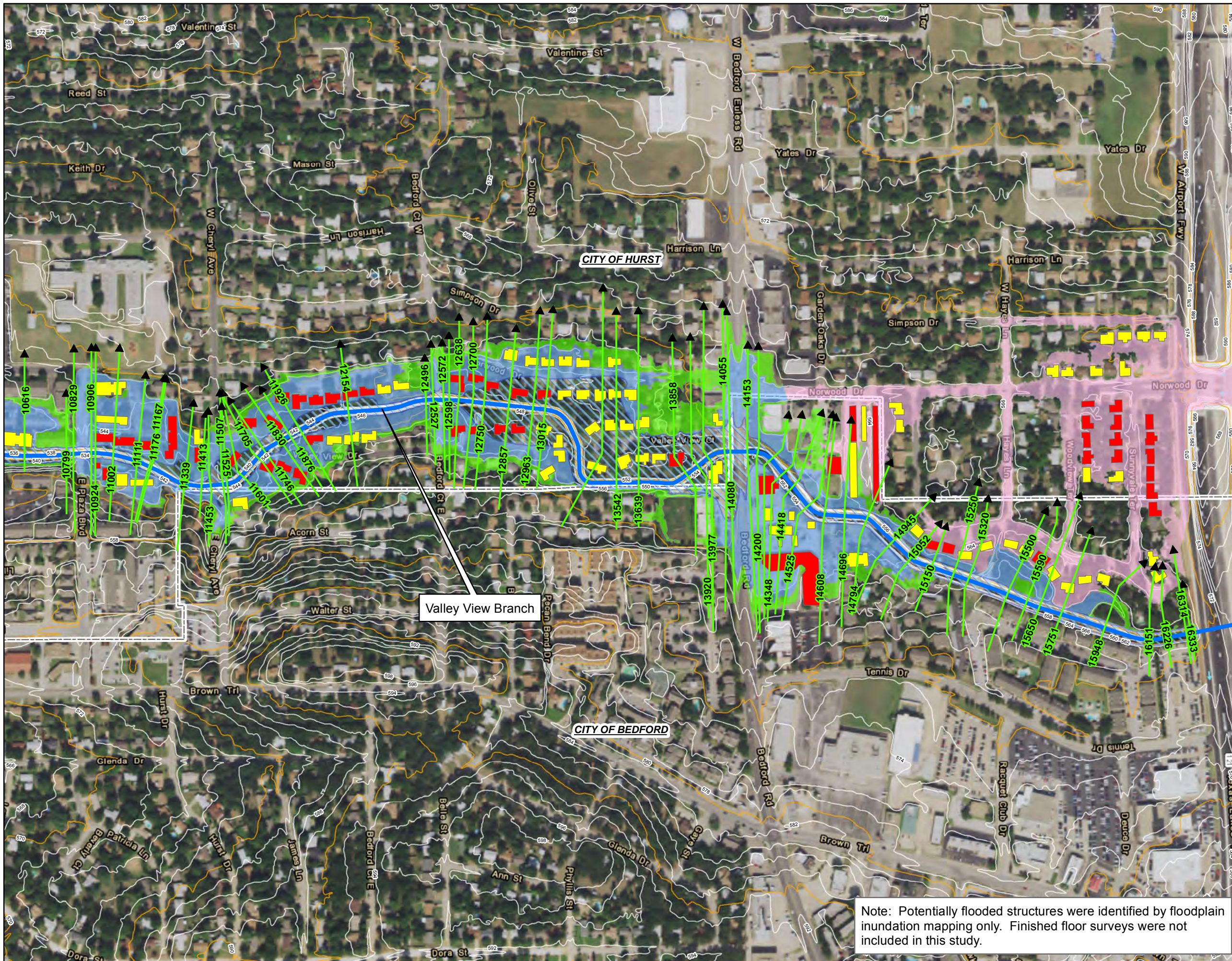
Notes:  
 1) Aerial imagery provided by Landiscor 2014  
 2) Contours reflect 2009 TNRIS LiDAR contour data



Feet  
 1 inch = 400 feet  
 AVO 31297



Note: Potentially flooded structures were identified by floodplain inundation mapping only. Finished floor surveys were not included in this study.



Valley View Branch Flood Protection Planning Study

**Figure I**  
**Floodplain Workmaps**  
**VALLEY VIEW BRANCH MAP 3**

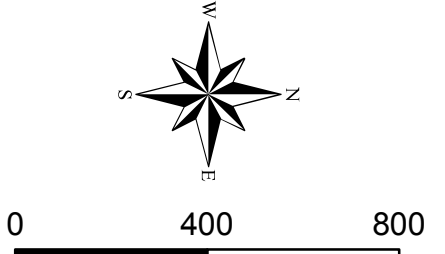
**Legend**

- Cross Sections
- Stream Centerline
- Zone A
- Zone AE
- Floodway
- Zone X, 0.2% Annual Chance
- City Boundaries

**Structure Potentially Flooded By**

- 10-year
- 100-year

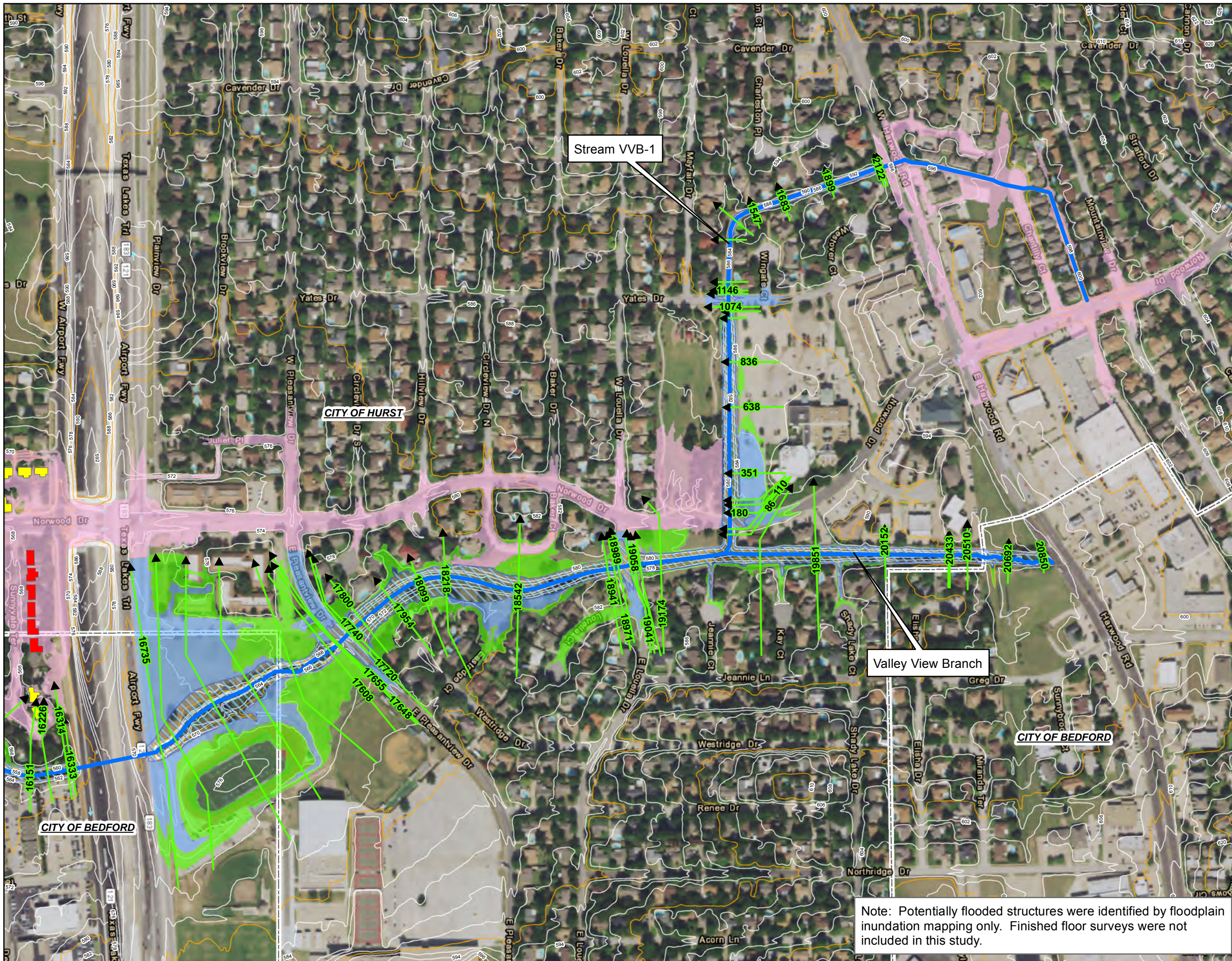
Notes:  
 1) Aerial imagery provided by Landiscor 2014  
 2) Contours reflect 2009 TNRIS LiDAR contour data



Feet  
 1 inch = 400 feet  
 AVO 31297



Note: Potentially flooded structures were identified by floodplain inundation mapping only. Finished floor surveys were not included in this study.



Valley View Branch Flood Protection Planning Study

**Figure I**  
**Floodplain Workmaps**  
**VALLEY VIEW BRANCH MAP 4**

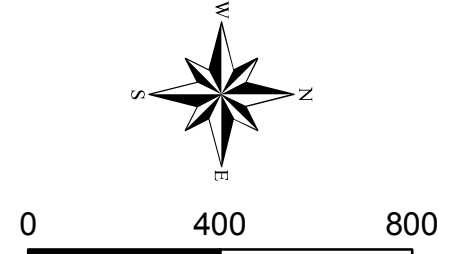
**Legend**

- Cross Sections
- Stream Centerline
- Zone A
- Zone AE
- Floodway
- Zone X, 0.2% Annual Chance
- City Boundaries

**Structure Potentially Flooded By**

- 10-year
- 100-year

Notes:  
 1) Aerial imagery provided by Landiscor 2014  
 2) Contours reflect 2009 TNRIS LiDAR contour data



Feet  
 1 inch = 400 feet  
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Note: Potentially flooded structures were identified by floodplain inundation mapping only. Finished floor surveys were not included in this study.







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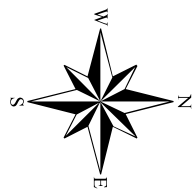
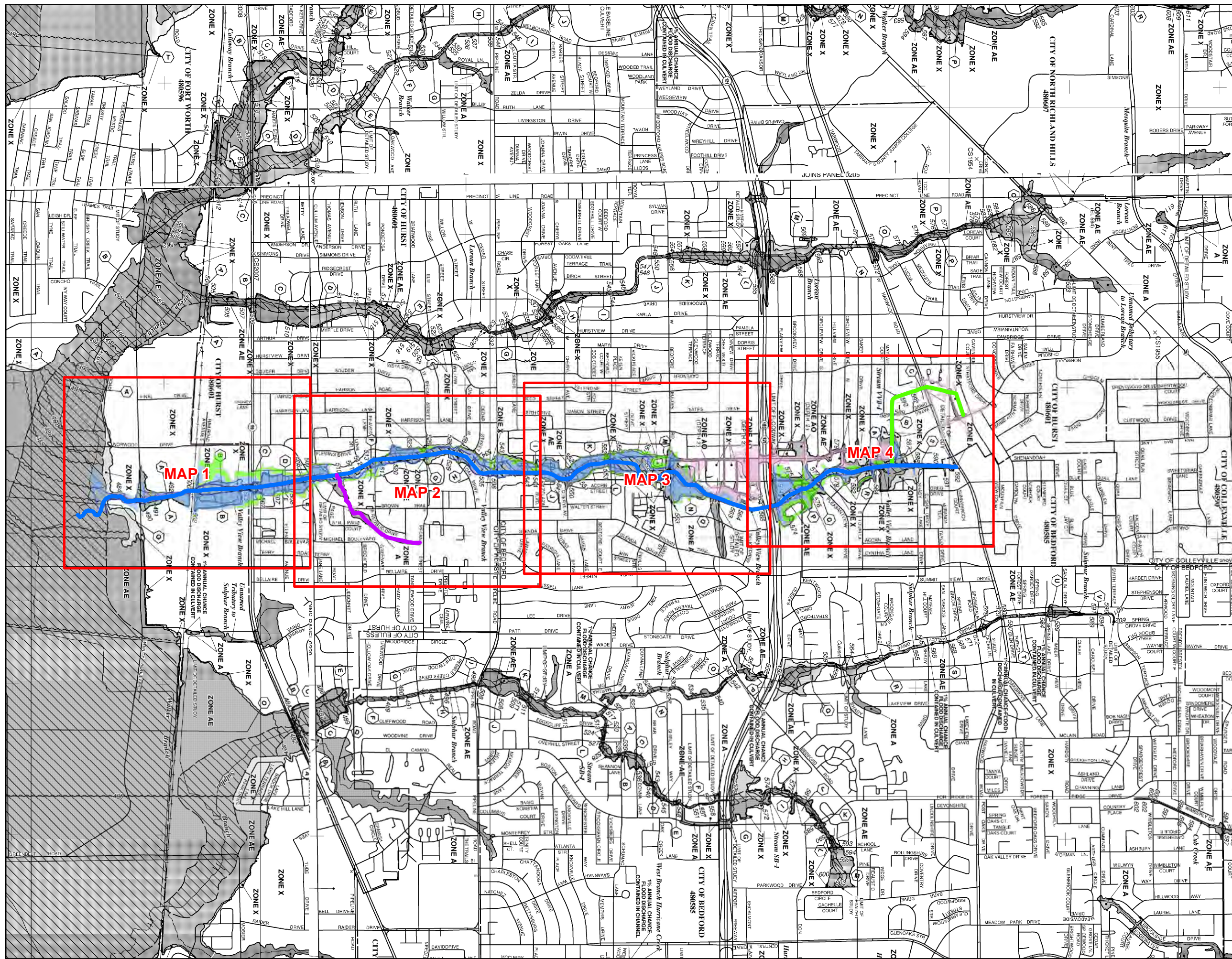


### Valley View Branch Flood Protection Planning Study

## Figure J - Effective Floodplain Comparison Index

### Legend

-  Floodplain Workmap Index
-  Valley View Centerline
-  Unnamed Tributary
-  Stream VVB-1 Centerline



0 2,000 4,000

Feet  
1 inch = 2,000 feet

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Valley View Branch Flood Protection Planning Study

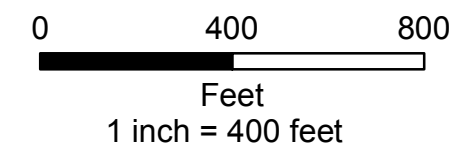
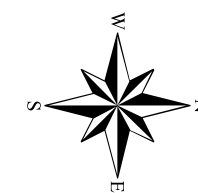
Figure J - Effective Floodplain Comparison  
VALLEY VIEW BRANCH MAP 1

Legend

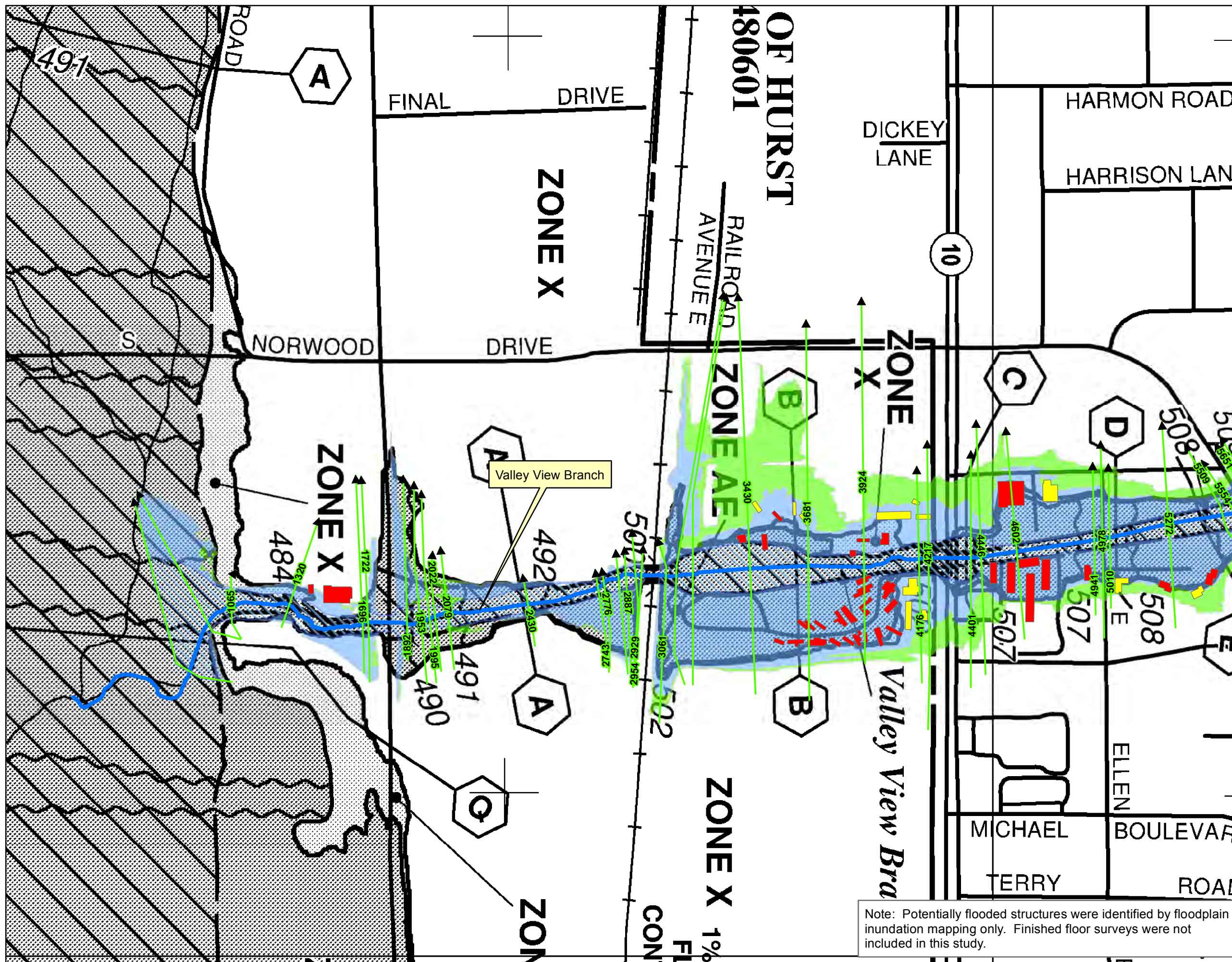
- Cross Sections
- Stream Centerline
- Zone A
- Zone AE
- Floodway
- Zone X, 0.2% Annual

Structure Potentially Flooded By

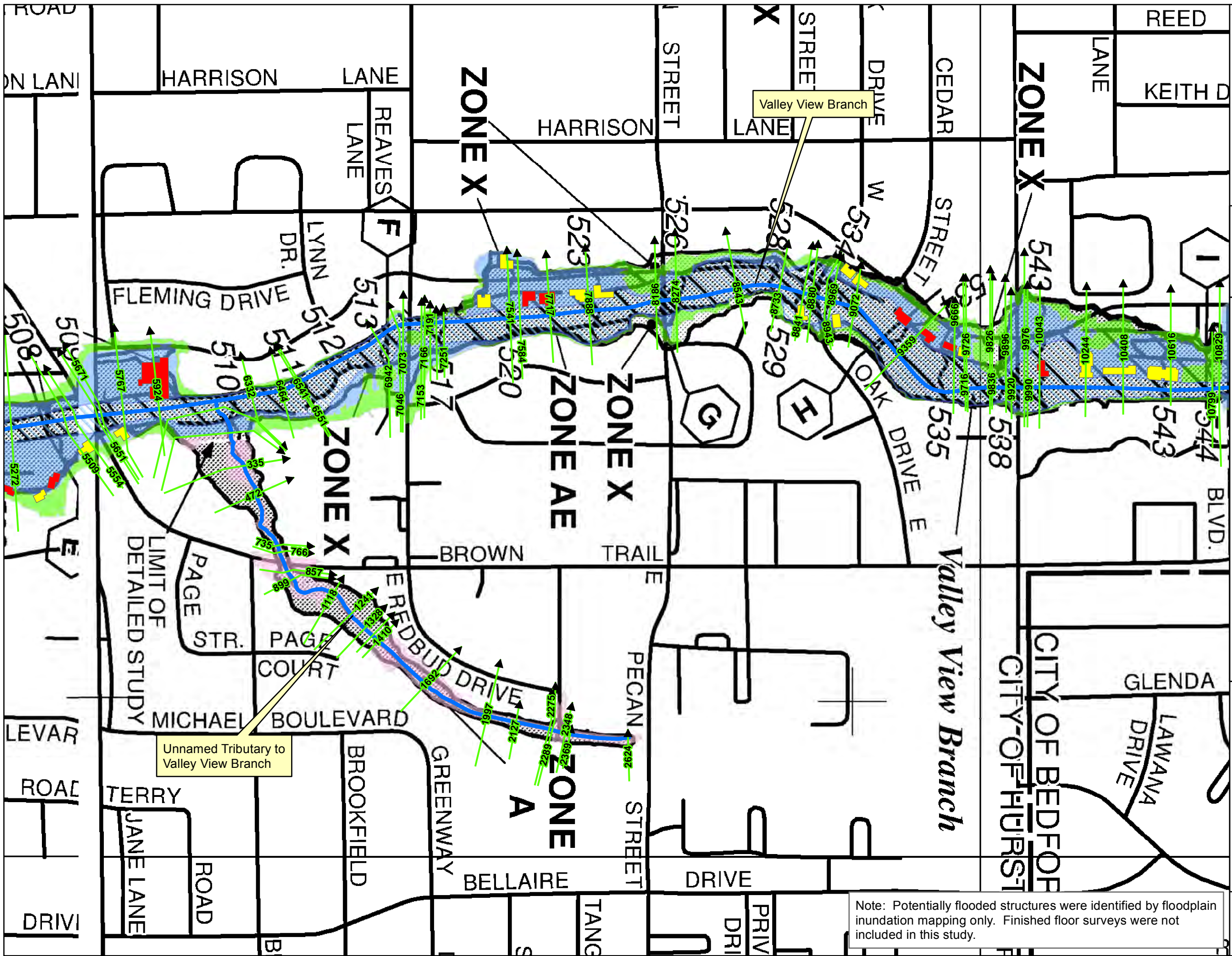
- 10-year
- 100-year



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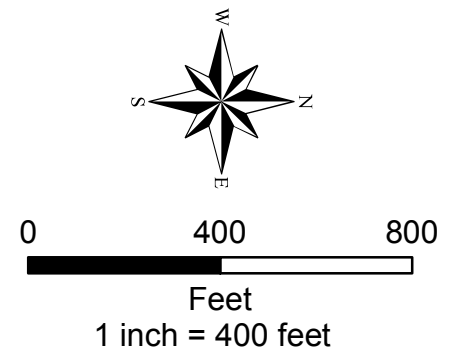
Note: Potentially flooded structures were identified by floodplain inundation mapping only. Finished floor surveys were not included in this study.



Valley View Branch Flood Protection Planning Study

**Figure J - Effective Floodplain Comparison**  
VALLEY VIEW BRANCH MAP 2

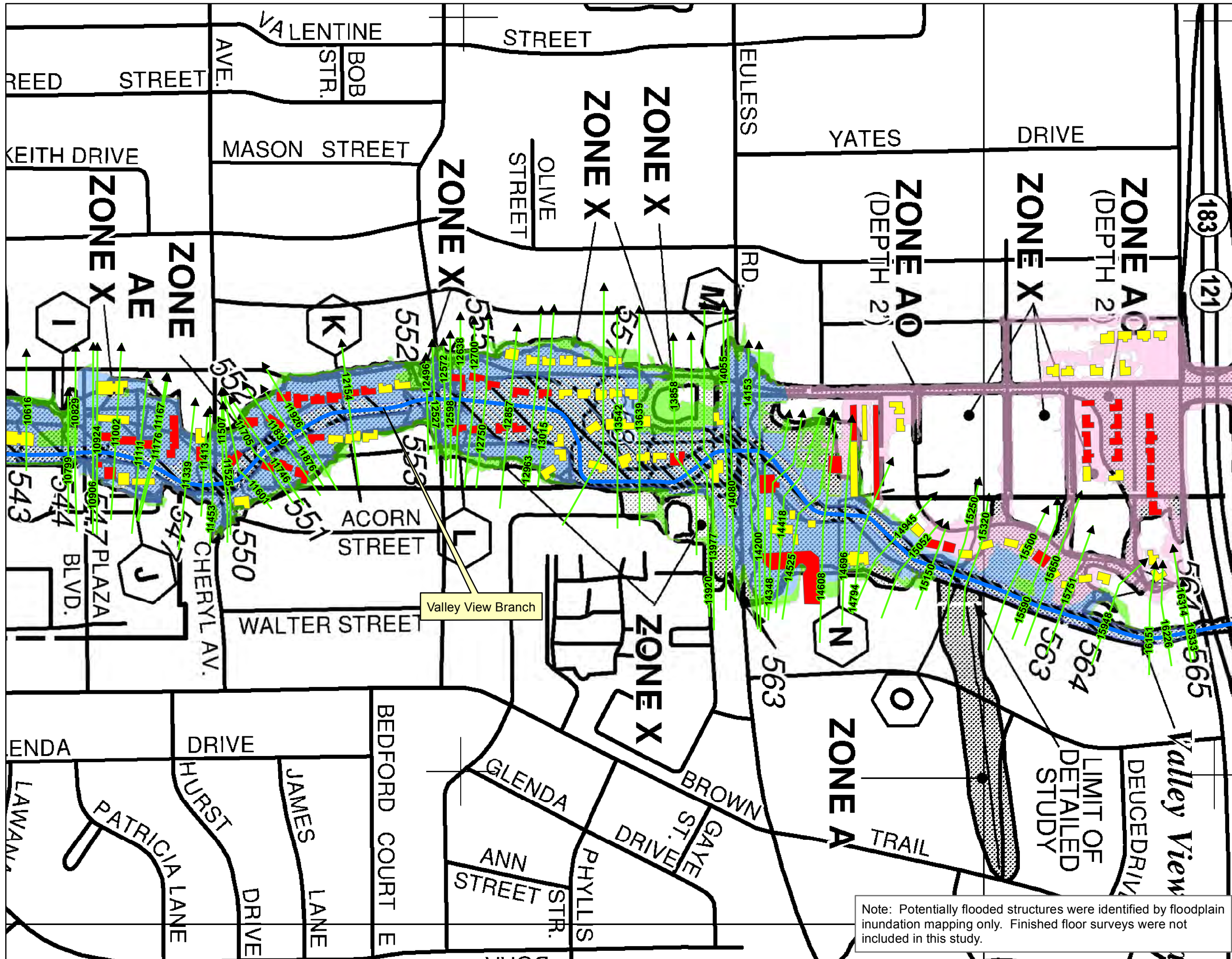
- Legend**
- Cross Sections
  - Stream Centerline
  - Zone A
  - Zone AE
  - Floodway
  - Zone X, 0.2% Annual
- Structure Potentially Flooded By**
- 10-year
  - 100-year



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Note: Potentially flooded structures were identified by floodplain inundation mapping only. Finished floor surveys were not included in this study.



Valley View Branch Flood Protection Planning Study

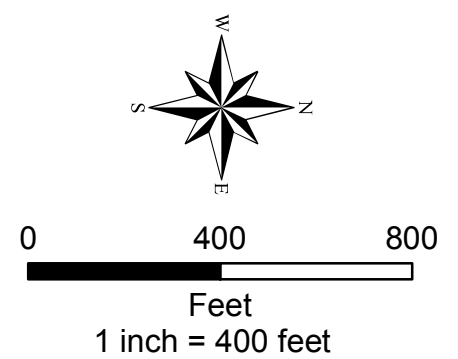
**Figure J - Effective Floodplain Comparison**  
VALLEY VIEW BRANCH MAP 3

**Legend**

- Cross Sections
- Stream Centerline
- Zone A
- Zone AE
- Floodway
- Zone X, 0.2% Annual

**Structure Potentially Flooded By**

- 10-year
- 100-year



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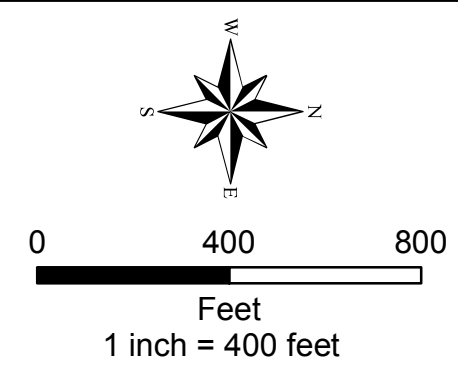


Note: Potentially flooded structures were identified by floodplain inundation mapping only. Finished floor surveys were not included in this study.

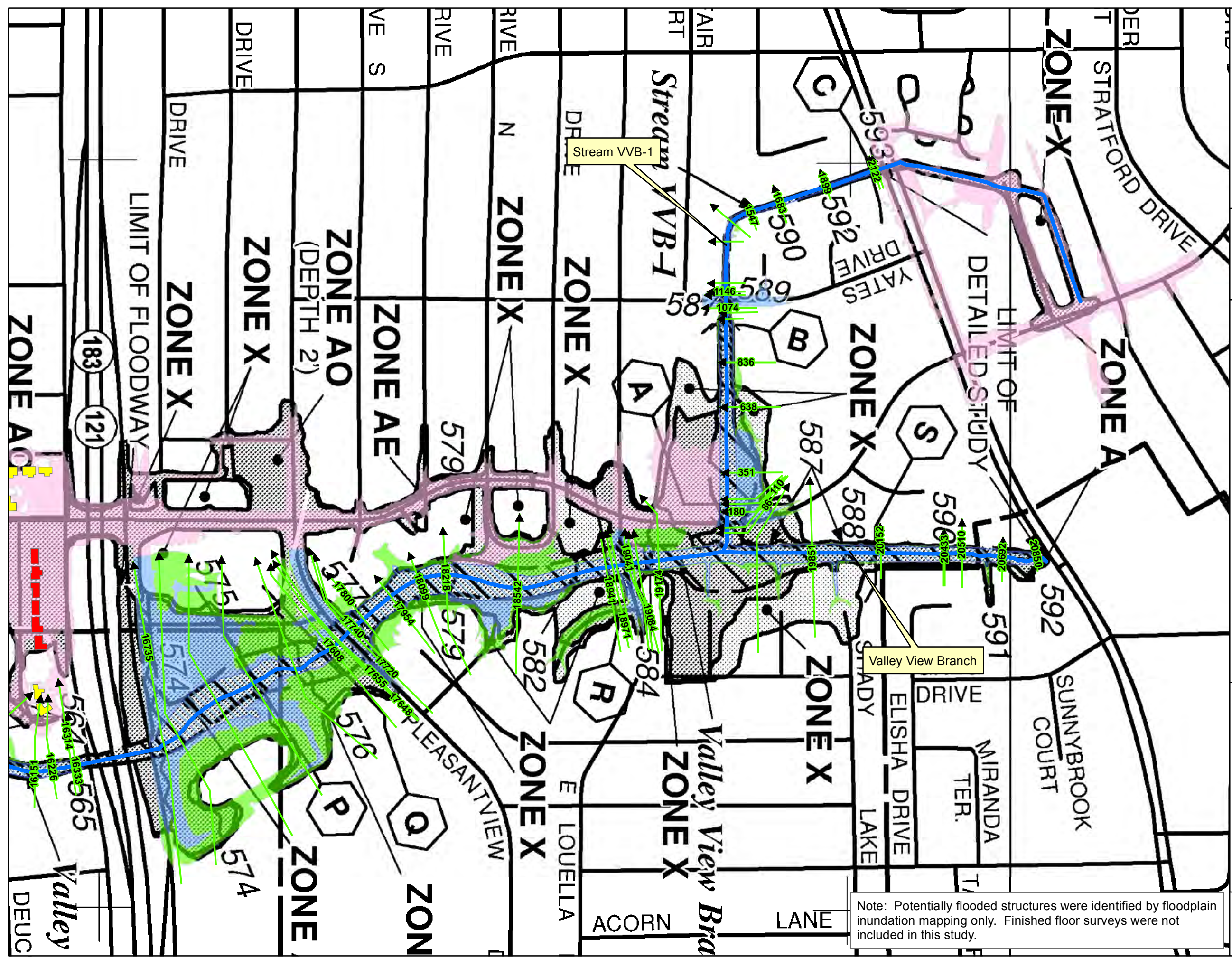
**Figure J - Effective Floodplain Comparison**  
VALLEY VIEW BRANCH MAP 4

**Legend**

- Cross Sections
  - Stream Centerline
  - Zone A
  - Zone AE
  - Floodway
  - Zone X, 0.2% Annual
- Structure Potentially Flooded By**
- 10-year
  - 100-year



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Note: Potentially flooded structures were identified by floodplain inundation mapping only. Finished floor surveys were not included in this study.

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**Appendix B**  
**Hydrologic Parameter Calculations**

---

**Time of Concentration**

Valley View Branch -- Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
VAL010	4401	100	0.150	Short Grass	5.42	3.36	385	682	4.92	3.58	Unpaved	191	3283	0.86	Stormdrain	6.00	547			
								335	2.96	3.50	Paved	96								
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	286				<b>Tc Total</b>	547	20	12	4
VAL020	2642	41	0.150	Short Grass	3.75	3.36	218	1917	1.76	2.70	Paved	710	198	0.52	Open Channel	3.31	60			
													486	0.51	Main Channel	4.00	122			
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	710				<b>Tc Total</b>	181	18	11	3
VAL030	4773	68	0.150	Short Grass	4.18	3.36	314	1087	2.07	2.93	Paved	372	2322	0.64	Stormdrain	6.00	387			
													1296	0.47	Main Channel	4.00	324			
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	372				<b>Tc Total</b>	711	23	14	4
VAL040	3725	100	0.150	Short Grass	1.01	3.36	754	134	0.83	1.47	Unpaved	91	762	0.16	Stormdrain	6.00	127			
								2728	0.82	1.84	Paved	1485								
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	1576				<b>Tc Total</b>	127	41	25	7
VAL050	4531	100	0.150	Short Grass	0.76	3.36	845	118	1.41	1.91	Unpaved	62	549	0.44	Open Channel	4.48	123			
								2353	0.84	1.86	Paved	1264	1411	0.14	Stormdrain	6.00	235			
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	1326				<b>Tc Total</b>	358	42	25	7
VAL060	4086	100	0.150	Short Grass	1.03	3.36	748	288	0.52	1.16	Unpaved	247	2017	0.81	Stormdrain	6.00	336			
								490	0.90	1.93	Paved	254	1191	0.42	Main Channel	4.00	298			
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	501				<b>Tc Total</b>	634	31	19	5
VAL070	4055	46	0.150	Short Grass	4.73	3.36	218	1816	0.57	1.53	Paved	1186	2193	1.24	Stormdrain	6.00	366			
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	1186				<b>Tc Total</b>	366	29	18	5
VAL080	3919	100	0.150	Short Grass	1.13	3.36	721	727	1.03	1.64	Unpaved	443	804	1.24	Stormdrain	6.00	134			
								592	1.07	2.10	Paved	282	1697	0.49	Main Channel	4.00	424			
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	724				<b>Tc Total</b>	558	33	20	6
VAL090	4228	100	0.150	Short Grass	2.91	3.36	494	11	8.74	4.77	Unpaved	2	2588	0.89	Stormdrain	6.00	431			
								1529	0.69	1.69	Paved	907								
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	909				<b>Tc Total</b>	431	31	18	5
VAL100	2112	100	0.150	Short Grass	1.31	3.36	680	51	3.18	2.88	Unpaved	18	358	1.33	Open Channel	2.11	169			
								464	1.37	2.38	Paved	195	1091	1.05	Stormdrain	6.00	182			
												49	1.13	Main Channel	4.00	12				
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	213				<b>Tc Total</b>	363	21	13	4
VAL110	2746	99	0.150	Short Grass	1.86	3.36	584	378	1.15	1.73	Unpaved	218	1388	1.17	Stormdrain	6.00	231			
								880	0.75	1.76	Paved	499								
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	718				<b>Tc Total</b>	231	26	15	4
VAL120	3383	50	0.011	Smooth Surface	4.94	3.36	28	1511	1.15	2.18	Paved	694	782	3.26	Stormdrain	6.00	130			
													1039	0.74	Main Channel	4.00	260			
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	694				<b>Tc Total</b>	390	19	11	3
VAL130	3776	77	0.150	Short Grass	2.87	3.36	405	961	1.78	2.71	Paved	354	1595	1.52	Stormdrain	6.00	266			
													1143	0.90	Main Channel	4.00	286			
							<b>T<sub>O</sub> Total</b>				<b>Ts Total</b>	354				<b>Tc Total</b>	552	22	13	4
VAL140	2372	100	0.150	Short Grass	0.91	3.36	786	644	0.50	1.14	Unpaved	565	1528	0.94	Stormdrain	6.00	255			
								100	0.81	1.83	Paved	54								

Valley View Branch -- Time of Concentration (Tc)

HMS Program Basin Name	Longest Flowpath (ft) (1)	Overland Flow						Shallow Concentrated Flow					Channel Flow					Final Tc (min) (18)	Tlag (min) (19)	Time Step (min) (20)
		Length (ft) (2)	n-Value (3)	Land Use/Surface Description (4)	Slope (%) (5)	Rainfall (in) (6)	TcO (sec) (7)	Length (ft) (8)	Slope (%) (9)	V1 (ft/s) (10)	Assumption for V1 (Paved/Unpaved) (11)	TcS (sec) (12)	Length (ft) (13)	Slope (%) (14)	Conveyance Type (15)	V2 (ft/s) (16)	TcC (sec) (17)			
						<b>T<sub>O</sub> Total</b>	786				<b>Ts Total</b>	619				<b>Tc Total</b>	255	28	17	5
VAL150	2453	100	0.150	Short Grass	1.25	3.36	692	716	0.90	1.53	Unpaved	468	1637	1.64	Stormdrain	6.00	273			
						<b>T<sub>O</sub> Total</b>	692				<b>Ts Total</b>	468				<b>Tc Total</b>	273	24	14	4
VAL160	1082	100	0.150	Short Grass	3.58	3.36	455	688	3.05	2.82	Unpaved	244	294	0.36	Main Channel	4.00	73			
						<b>T<sub>O</sub> Total</b>	455				<b>Ts Total</b>	244				<b>Tc Total</b>	73	13	8	2
VAL170	1791	100	0.150	Short Grass	1.28	3.36	686	170	4.37	3.37	Unpaved	50	292	0.50	Stormdrain	6.00	49			
								849	2.33	3.10	Paved	274	381	0.65	Main Channel	4.00	95			
						<b>T<sub>O</sub> Total</b>	686				<b>Ts Total</b>	324				<b>Tc Total</b>	144	19	12	3
VAL180	3738	100	0.150	Short Grass	1.30	3.36	682	214	0.50	1.14	Unpaved	188	2143	1.14	Stormdrain	6.00	357			
								1280	0.29	1.10	Paved	1161								
						<b>T<sub>O</sub> Total</b>	682				<b>Ts Total</b>	1348				<b>Tc Total</b>	357	40	24	7
VAL190	3701	100	0.150	Short Grass	1.45	3.36	652	547	0.50	1.14	Unpaved	479	2202	1.79	Stormdrain	6.00	367			
								852	0.37	1.24	Paved	689								
						<b>T<sub>O</sub> Total</b>	652				<b>Ts Total</b>	1169				<b>Tc Total</b>	367	36	22	6
VAL200	3012	50	0.011	Smooth Surface	1.40	3.36	47	775	0.75	1.76	Paved	440	1391	2.24	Open Channel	5.48	254			
								743	0.58	1.23	Unpaved	605	53	0.64	Main Channel	4.00	13			
						<b>T<sub>O</sub> Total</b>	47				<b>Ts Total</b>	1044				<b>Tc Total</b>	267	23	14	4
VAL210	5872	100	0.150	Short Grass	0.50	3.36	999	770	0.67	1.32	Unpaved	584	3172	1.14	Open Channel	2.99	1061			
												1830	0.61	Main Channel	4.00	457				
						<b>T<sub>O</sub> Total</b>	999				<b>Ts Total</b>	584				<b>Tc Total</b>	1518	52	31	9
UTV010	3194	100	0.150	Short Grass	0.50	3.36	999	169	1.48	1.96	Unpaved	86	1156	0.57	Stormdrain	6.00	193			
								1768	1.24	2.26	Paved	782								
						<b>T<sub>O</sub> Total</b>	999				<b>Ts Total</b>	868				<b>Tc Total</b>	193	34	21	6
UTV020	2176	50	0.011	Smooth Surface	2.82	3.36	36	912	0.24	1.01	Paved	907	255	1.19	Open Channel	4.00	64			
								730	0.79	1.43	Unpaved	509	229	-0.35	Stormdrain	6.00	38			
						<b>T<sub>O</sub> Total</b>	36				<b>Ts Total</b>	1416				<b>Tc Total</b>	102	26	16	5
UTV030	1548	100	0.150	Short Grass	0.67	3.36	889	869	1.49	1.97	Unpaved	442	579	1.28	Main Channel	4.00	145			
						<b>T<sub>O</sub> Total</b>	889				<b>Ts Total</b>	442				<b>Tc Total</b>	145	25	15	4
UTV040	2083	100	0.150	Short Grass	1.18	3.36	709	279	2.89	2.74	Unpaved	102	851	1.68	Main Channel	4.00	213			
								853	1.24	2.26	Paved	377								
						<b>T<sub>O</sub> Total</b>	709				<b>Ts Total</b>	479				<b>Tc Total</b>	213	23	14	4
VT1005	2778	88	0.150	Short Grass	6.81	3.36	319	1332	1.56	2.54	Paved	524	944	1.66	Stormdrain	6.00	157			
												414	1.35	Open Channel	4.00	104				
						<b>T<sub>O</sub> Total</b>	319				<b>Ts Total</b>	524				<b>Tc Total</b>	261	18	11	3
VT1010	3571	100	0.150	Short Grass	6.10	3.36	367	1218	3.01	2.80	Unpaved	435	886	0.72	Stormdrain	6.00	148			
								1368	1.41	2.41	Paved	567								
						<b>T<sub>O</sub> Total</b>	367				<b>Ts Total</b>	1002				<b>Tc Total</b>	148	25	15	4
VT1020	3664	18	0.150	Short Grass	1.52	3.36	165	1428	0.63	1.61	Paved	886	795	0.68	Stormdrain	6.00	132			
												1423	0.49	Main Channel	4.00	356				
						<b>T<sub>O</sub> Total</b>	165				<b>Ts Total</b>	886				<b>Tc Total</b>	488	26	15	4



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## **Hydrologic Parameter Summary**

**Appendix B - Hydrologic Parameters for the Valley View Branch Watershed (SCS UH Method)**

HEC-HMS Basin Name (1)	Area (ac) (2)	Area (mi <sup>2</sup> ) (3)	Lag Time (min) (4)	% Soil Type A (5)	% Soil Type B (6)	% Soil Type C (7)	% Soil Type D (8)	Composite CN (9)	Initial Abstraction (10)	% Impervious (11)
<b>Valley View Branch</b>		<b>3.283</b>								
B_VAL010	148	0.231	12	0%	33%	31%	37%	72	0.78	61
B_VAL020	65	0.102	11	0%	1%	61%	38%	76	0.63	64
B_VAL030	174	0.272	14	0%	4%	31%	65%	77	0.60	53
B_VAL040	28	0.044	25	0%	2%	29%	69%	78	0.56	58
B_VAL050	131	0.205	25	0%	7%	42%	52%	76	0.63	64
B_VAL060	141	0.221	19	0%	6%	68%	26%	75	0.67	72
B_VAL070	68	0.107	18	0%	50%	13%	37%	70	0.86	77
B_VAL080	161	0.251	20	0%	37%	22%	41%	72	0.78	63
B_VAL090	46	0.072	18	0%	89%	3%	8%	63	1.17	59
B_VAL100	49	0.076	13	21%	11%	19%	49%	68	0.94	75
B_VAL110	35	0.055	15	0%	61%	0%	39%	68	0.94	68
B_VAL120	47	0.073	11	12%	32%	0%	56%	69	0.90	68
B_VAL130	76	0.119	13	10%	67%	7%	16%	63	1.17	60
B_VAL140	22	0.034	17	0%	19%	81%	0%	71	0.82	73
B_VAL150	34	0.053	14	5%	87%	0%	7%	61	1.28	59
B_VAL160	12	0.019	8	47%	51%	1%	0%	51	1.92	50
B_VAL170	24	0.038	12	11%	89%	0%	0%	59	1.39	61
B_VAL180	62	0.097	24	0%	68%	32%	0%	65	1.08	60
B_VAL190	99	0.154	22	8%	90%	0%	2%	60	1.33	72
B_VAL200	96	0.150	14	16%	79%	0%	5%	59	1.39	74
B_VAL210	129	0.201	31	23%	72%	0%	5%	57	1.51	67
B_UTV010	99	0.155	21	0%	1%	63%	36%	76	0.63	62
B_UTV020	73	0.114	16	0%	0%	42%	58%	77	0.60	72
B_UTV030	19	0.030	15	0%	60%	40%	0%	66	1.03	42
B_UTV040	22	0.035	14	4%	96%	0%	0%	60	1.33	61
B_VT1005	59	0.092	11	0%	31%	21%	47%	73	0.74	43
B_VT1010	106	0.165	15	0%	5%	30%	65%	77	0.60	57
B_VT1020	76	0.118	15	0%	0%	45%	55%	77	0.60	68

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**Appendix C**  
**Hydrology Output**

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## **HEC-HMS Results**

Table C.1 -- Ultimate HEC-HMS Results

Basin	DA (sq mi)	Ultimate 1 Year	Ultimate 2 Year	Ultimate 5 Year	Ultimate 10 Year	Ultimate 25 Year	Ultimate 50 Year	Ultimate 100 Year	Ultimate 500 Year
<b>Valley View Branch HECHMS Output</b>									
B_UTV010	0.155	150	200	250	300	375	425	500	700
B_UTV020	0.114	150	175	225	275	325	375	425	600
B_UTV030	0.03	20	30	40	50	70	80	100	150
B_UTV040	0.035	40	40	60	70	90	100	125	175
B_VAL010	0.231	300	350	500	600	700	800	900	1,300
B_VAL020	0.102	150	175	225	275	325	375	425	600
B_VAL030	0.272	300	400	550	650	800	900	1,050	1,500
B_VAL040	0.044	40	50	70	80	100	100	125	175
B_VAL050	0.205	175	225	325	375	450	500	600	850
B_VAL060	0.221	250	300	400	475	600	650	750	1,050
B_VAL070	0.107	125	150	200	250	300	325	375	500
B_VAL080	0.251	250	300	425	500	600	700	800	1,150
B_VAL090	0.072	60	80	100	125	175	200	225	325
B_VAL100	0.076	100	125	175	200	225	275	300	425
B_VAL110	0.055	60	80	100	125	150	175	200	275
B_VAL120	0.073	100	125	175	200	225	275	300	425
B_VAL130	0.119	125	150	225	250	325	375	425	600
B_VAL140	0.034	40	50	70	80	90	100	125	175
B_VAL150	0.053	50	70	90	100	125	150	175	275
B_VAL160	0.019	20	20	30	40	50	60	70	100
B_VAL170	0.038	40	50	70	80	100	125	125	200
B_VAL180	0.097	80	100	125	150	200	225	275	375
B_VAL190	0.154	150	175	250	275	350	400	450	650
B_VAL200	0.15	175	225	300	350	425	475	550	800
B_VAL210	0.201	150	175	225	275	350	400	475	650
B_VT1005	0.092	100	125	175	225	275	325	350	550
B_VT1010	0.165	200	250	325	375	475	550	600	850
B_VT1020	0.118	150	175	250	275	350	400	450	650
Chisholm Park Pond	0.092	40	40	50	50	50	60	60	100
Div_Louella	0.708	700	900	1,200	1,350	1,600	1,800	2,000	2,800
Div_Pleasantview	0.98	850	1,000	1,300	1,500	1,900	2,200	2,400	3,100
Div_SH121	1.229	1,050	1,250	1,600	1,900	2,200	2,400	2,500	2,700
Div_VT1	0.257	0	0	0	10	90	150	225	500

Table C.1 -- Ultimate HEC-HMS Results

	DA	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate
DIV_VT1_DS	0.375	325	425	550	650	700	750	800	1,100
J_Div_Plesantview	0	90	200	400	500	650	800	1,050	1,300
J_Div_SH121	0	70	200	400	500	600	800	1,100	2,000
J_UTV020_CULVERT	0.269	275	350	475	550	700	800	900	1,250
J_UTV030	0.299	300	375	500	600	750	850	950	1,350
J_VAL_UTV	2.643	2,100	2,600	3,300	3,700	4,200	4,500	5,000	5,900
J_VAL_VT1	0.708	700	900	1,250	1,450	1,700	1,900	2,100	2,900
J_VAL020	0.333	400	500	700	850	1,000	1,150	1,300	1,900
J_VAL030	0.98	950	1,200	1,650	1,950	2,300	2,700	3,000	4,000
J_VAL040	1.229	1,050	1,250	1,650	1,950	2,400	2,700	3,000	4,100
J_VAL050	1.229	1,050	1,250	1,600	1,900	2,200	2,400	2,500	2,700
J_VAL060	1.45	1,300	1,650	2,300	2,800	3,200	3,500	4,000	5,100
J_VAL070	1.557	1,400	1,800	2,500	3,000	3,400	3,800	4,300	5,600
J_VAL080	1.808	1,600	2,000	2,700	3,200	3,600	3,900	4,200	5,300
J_VAL090	1.88	1,650	2,100	2,800	3,300	3,700	4,000	4,300	5,500
J_VAL100	1.956	1,650	2,100	2,800	3,200	3,700	4,000	4,400	5,600
J_VAL110	2.011	1,700	2,200	2,800	3,300	3,800	4,100	4,400	5,700
J_VAL120	2.084	1,750	2,200	2,800	3,300	3,800	4,100	4,500	5,600
J_VAL130	2.203	1,750	2,200	2,900	3,300	3,800	4,100	4,500	5,500
J_VAL140	2.29	1,800	2,300	2,900	3,300	3,800	4,200	4,600	5,600
J_VAL160	2.309	1,800	2,300	2,900	3,300	3,800	4,200	4,500	5,400
J_VAL170	2.681	2,100	2,600	3,300	3,700	4,200	4,500	4,900	5,800
J_VAL180	2.778	2,100	2,700	3,500	3,900	4,400	4,700	5,000	6,000
J_VAL190	2.932	2,100	2,500	3,400	4,000	4,400	4,700	4,800	5,600
J_VAL200	3.082	2,000	2,300	2,900	3,300	4,100	4,200	4,400	4,800
J_VT1010	0.257	225	275	375	425	500	600	650	900
J_VT1020	0.257	225	275	375	425	500	600	650	900
R_Div_Louella	0	0	10	70	125	200	250	325	450
R_Div_Pleasantview	0	70	200	400	500	600	750	1,050	1,250
R_UTV020_CULVERT1	0.155	150	200	250	300	375	425	500	700
R_UTV020_CULVERT2	0.155	150	200	250	300	375	425	500	700
R_UTV030_CULVERT1	0.269	275	350	475	550	700	800	900	1,250
R_UTV030_CULVERT2	0.269	275	350	475	550	700	800	900	1,250
R_UTV040	0.299	300	375	500	600	700	850	950	1,350

Table C.1 -- Ultimate HEC-HMS Results

	DA	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate
R_VAL020	0.231	275	350	475	550	700	800	900	1,300
R_VAL030	0.708	700	850	1,150	1,350	1,600	1,800	2,000	2,700
R_VAL050	1.229	1,050	1,250	1,600	1,900	2,200	2,400	2,500	2,700
R_VAL060	1.229	1,050	1,250	1,600	1,850	2,100	2,300	2,400	2,600
R_VAL080	1.557	1,400	1,750	2,400	2,800	3,200	3,500	3,800	4,700
R_VAL100	1.88	1,650	2,100	2,700	3,200	3,700	4,000	4,300	5,400
R_VAL120	2.011	1,700	2,200	2,800	3,200	3,700	4,100	4,400	5,500
R_VAL130	2.084	1,700	2,200	2,800	3,200	3,700	4,100	4,400	5,400
R_VAL160	2.29	1,800	2,300	2,900	3,300	3,800	4,200	4,500	5,400
R_VAL170	2.643	2,100	2,600	3,300	3,700	4,200	4,500	4,900	5,800
R_VAL190	2.778	2,000	2,400	3,300	3,800	4,300	4,500	4,700	5,500
R_VAL200	2.932	1,950	2,300	2,900	3,300	4,000	4,200	4,400	4,800
R_VAL210	3.082	1,950	2,300	2,900	3,300	4,000	4,200	4,400	4,800
R_VT1010_CULVERT1	0.092	40	40	50	50	50	60	60	100
R_VT1010_CULVERT2	0.092	40	40	50	50	50	60	60	100
R_VT1010_CULVERT3	0.092	40	40	50	50	50	60	60	100
R_VT1010_CULVERT4	0.092	40	40	50	50	50	60	60	100
R_VT1020	0.257	200	275	350	425	500	550	650	900
R_VT1020_CULVERT	0	225	275	375	425	425	425	425	425
UTV_OUTLET	0.334	325	400	550	650	800	900	1,050	1,500
VAL_OUTLET	3.283	2,000	2,400	3,000	3,300	4,100	4,300	4,500	4,900
VT1_OUTLET	0.375	325	425	600	700	800	900	1,050	1,500

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**Appendix D**  
**Hydraulic Output and Profiles**



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## **HEC-RAS Output**

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1

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
Reach-1	20850	1YR	300.00	586.07	588.49	588.35	589.00	0.019931	5.72	52.44	37.88	0.86
Reach-1	20850	2YR	350.00	586.07	588.66	588.48	589.21	0.019233	5.94	58.90	39.08	0.85
Reach-1	20850	5YR	500.00	586.07	589.13	588.88	589.77	0.017312	6.42	77.90	42.40	0.83
Reach-1	20850	10YR	600.00	586.07	589.40		590.09	0.016391	6.69	89.66	43.90	0.83
Reach-1	20850	25YR	700.00	586.07	589.66		590.40	0.015519	6.92	101.21	45.18	0.81
Reach-1	20850	50YR	800.00	586.07	589.90		590.69	0.014936	7.13	112.16	46.37	0.81
Reach-1	20850	100YR	900.00	586.07	590.14		590.96	0.014438	7.29	123.50	48.17	0.80
Reach-1	20850	500YR	1300.00	586.07	591.01		591.93	0.013087	7.69	168.95	56.49	0.78
Reach-1	20692	1YR	300.00	583.06	586.90		587.16	0.007071	4.10	73.15	38.27	0.52
Reach-1	20692	2YR	350.00	583.06	587.14		587.42	0.006853	4.24	82.60	40.25	0.52
Reach-1	20692	5YR	500.00	583.06	587.75		588.08	0.006549	4.60	108.61	45.34	0.52
Reach-1	20692	10YR	600.00	583.06	588.11		588.47	0.006281	4.77	125.87	48.43	0.52
Reach-1	20692	25YR	700.00	583.06	588.46		588.83	0.006038	4.89	143.15	51.56	0.52
Reach-1	20692	50YR	800.00	583.06	588.78		589.17	0.005766	4.99	160.20	54.06	0.51
Reach-1	20692	100YR	900.00	583.06	589.09		589.49	0.005530	5.08	177.23	56.57	0.51
Reach-1	20692	500YR	1300.00	583.06	590.15		590.60	0.004825	5.39	240.97	63.42	0.49
Reach-1	20510	1YR	300.00	582.37	586.10	584.82	586.26	0.003466	3.19	94.18	44.14	0.38
Reach-1	20510	2YR	350.00	582.37	586.40	584.99	586.57	0.003178	3.24	107.91	46.05	0.37
Reach-1	20510	5YR	500.00	582.37	587.04	585.44	587.25	0.003120	3.61	138.50	49.48	0.38
Reach-1	20510	10YR	600.00	582.37	587.44	585.70	587.67	0.003027	3.78	158.68	51.60	0.38
Reach-1	20510	25YR	700.00	582.37	587.81	585.92	588.05	0.002972	3.93	178.03	53.78	0.38
Reach-1	20510	50YR	800.00	582.37	588.15	586.14	588.41	0.002927	4.07	196.74	55.80	0.38
Reach-1	20510	100YR	900.00	582.37	588.48	586.33	588.75	0.002893	4.18	215.20	57.98	0.38
Reach-1	20510	500YR	1300.00	582.37	589.56	587.01	589.89	0.002917	4.60	282.58	66.33	0.39
Reach-1	20433	1YR	300.00	581.89	585.78	584.68	585.96	0.004213	3.41	88.00	43.03	0.42
Reach-1	20433	2YR	350.00	581.89	586.13	584.84	586.30	0.003662	3.39	103.30	45.87	0.40
Reach-1	20433	5YR	500.00	581.89	586.78	585.27	586.99	0.003565	3.71	134.89	51.25	0.40
Reach-1	20433	10YR	600.00	581.89	587.19	585.52	587.42	0.003382	3.82	156.95	54.69	0.40
Reach-1	20433	25YR	700.00	581.89	587.57	585.75	587.81	0.003239	3.92	178.37	57.84	0.39
Reach-1	20433	50YR	800.00	581.89	587.93	585.97	588.18	0.003096	4.02	199.19	60.26	0.39
Reach-1	20433	100YR	900.00	581.89	588.26	586.17	588.52	0.002964	4.10	219.69	62.39	0.38
Reach-1	20433	500YR	1300.00	581.89	589.36	586.87	589.67	0.002814	4.44	292.60	70.66	0.38
Reach-1	20427	1YR	300.00	581.81	585.74	584.71	585.93	0.004585	3.49	85.84	43.11	0.44
Reach-1	20427	2YR	350.00	581.81	586.10	584.87	586.28	0.003912	3.45	101.52	46.18	0.41
Reach-1	20427	5YR	500.00	581.81	586.75	585.30	586.97	0.003740	3.74	133.58	51.89	0.41
Reach-1	20427	10YR	600.00	581.81	587.17	585.55	587.40	0.003511	3.85	156.02	55.47	0.40
Reach-1	20427	25YR	700.00	581.81	587.55	585.78	587.79	0.003310	3.94	177.85	58.38	0.40
Reach-1	20427	50YR	800.00	581.81	587.91	585.98	588.16	0.003128	4.02	198.90	60.52	0.39
Reach-1	20427	100YR	900.00	581.81	588.24	586.19	588.50	0.002981	4.10	219.53	62.55	0.39
Reach-1	20427	500YR	1300.00	581.81	589.34	586.88	589.65	0.002836	4.44	293.02	71.34	0.39
Reach-1	20152	1YR	400.00	580.34	584.31	583.19	584.57	0.005211	4.10	97.56	42.17	0.48
Reach-1	20152	2YR	500.00	580.34	584.69	583.49	584.99	0.005298	4.37	114.42	45.50	0.49
Reach-1	20152	5YR	700.00	580.34	585.34	583.98	585.70	0.005330	4.81	145.42	50.20	0.50
Reach-1	20152	10YR	850.00	580.34	585.77	584.32	586.17	0.005334	5.08	167.31	53.26	0.51
Reach-1	20152	25YR	1000.00	580.34	586.16	584.64	586.60	0.005271	5.29	189.13	56.18	0.51
Reach-1	20152	50YR	1150.00	580.34	586.53	584.92	586.99	0.005276	5.48	209.95	59.19	0.51
Reach-1	20152	100YR	1300.00	580.34	586.85	585.17	587.35	0.005328	5.65	229.93	62.28	0.52
Reach-1	20152	500YR	1900.00	580.34	587.78	586.06	588.44	0.006023	6.52	291.64	71.41	0.56
Reach-1	19851	1YR	400.00	579.00	582.98	581.76	583.17	0.004063	3.56	112.22	50.04	0.42
Reach-1	19851	2YR	500.00	579.00	583.38	582.03	583.60	0.003915	3.75	133.40	53.63	0.42
Reach-1	19851	5YR	700.00	579.00	584.10	582.48	584.35	0.003681	4.03	173.87	59.89	0.42
Reach-1	19851	10YR	850.00	579.00	584.53	582.79	584.81	0.003683	4.23	200.74	64.13	0.42
Reach-1	19851	25YR	1000.00	579.00	584.97	583.06	585.27	0.003559	4.35	230.04	68.86	0.42
Reach-1	19851	50YR	1150.00	579.00	585.33	583.31	585.64	0.003616	4.50	255.36	73.40	0.43
Reach-1	19851	100YR	1300.00	579.00	585.64	583.56	585.98	0.003682	4.66	279.27	79.91	0.43
Reach-1	19851	500YR	1900.00	579.00	586.49	584.37	586.95	0.003852	5.47	362.80	148.47	0.46
Reach-1	19608	1YR	400.00	577.62	581.80	580.75	582.04	0.005328	3.96	100.94	47.00	0.48
Reach-1	19608	2YR	500.00	577.62	582.45	581.03	582.67	0.003764	3.75	133.37	51.90	0.41

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	19608	5YR	700.00	577.62	583.27	581.51	583.51	0.003185	3.93	177.94	56.61	0.39
Reach-1	19608	10YR	850.00	577.62	583.70	581.83	583.97	0.003225	4.20	202.48	58.82	0.40
Reach-1	19608	25YR	1000.00	577.62	584.17	582.11	584.47	0.003041	4.33	231.18	61.55	0.39
Reach-1	19608	50YR	1150.00	577.62	584.50	582.36	584.82	0.003145	4.58	251.49	64.44	0.40
Reach-1	19608	100YR	1300.00	577.62	584.79	582.59	585.15	0.003186	4.82	270.82	72.48	0.41
Reach-1	19608	500YR	1900.00	577.62	585.31	583.42	585.91	0.004595	6.26	315.01	107.67	0.50
Reach-1	19174	1YR	700.00	575.40	580.63	578.56	580.87	0.001984	3.91	179.13	55.02	0.38
Reach-1	19174	2YR	900.00	575.40	581.31	579.01	581.58	0.002063	4.12	218.56	60.98	0.38
Reach-1	19174	5YR	1250.00	575.40	581.81	579.70	582.20	0.002884	5.00	250.07	65.25	0.45
Reach-1	19174	10YR	1450.00	575.40	582.05	580.05	582.52	0.003362	5.45	266.06	67.56	0.48
Reach-1	19174	25YR	1700.00	575.40	582.37	580.44	582.91	0.003872	5.91	287.66	70.82	0.52
Reach-1	19174	50YR	1900.00	575.40	582.56	580.72	583.18	0.004167	6.31	301.55	88.11	0.54
Reach-1	19174	100YR	2100.00	575.40	582.76	580.99	583.45	0.004358	6.65	316.96	109.39	0.56
Reach-1	19174	500YR	2900.00	575.40	584.05	581.96	584.53	0.002492	5.96	594.00	280.40	0.44
Reach-1	19084	1YR	700.00	575.11	580.49	578.25	580.70	0.001666	3.70	189.00	56.93	0.36
Reach-1	19084	2YR	900.00	575.11	581.16	578.72	581.40	0.001738	3.92	229.33	62.94	0.36
Reach-1	19084	5YR	1250.00	575.11	581.58	579.40	581.95	0.002555	4.87	256.71	66.70	0.44
Reach-1	19084	10YR	1450.00	575.11	581.78	579.74	582.23	0.002994	5.37	270.05	71.04	0.47
Reach-1	19084	25YR	1700.00	575.11	582.04	580.13	582.58	0.003407	5.90	289.56	77.91	0.51
Reach-1	19084	50YR	1900.00	575.11	582.18	580.42	582.81	0.003854	6.38	301.17	85.01	0.54
Reach-1	19084	100YR	2100.00	575.11	582.35	580.69	583.06	0.004209	6.78	316.03	99.44	0.57
Reach-1	19084	500YR	2900.00	575.11	583.56	581.62	584.25	0.003226	6.85	509.14	209.61	0.51
Reach-1	19058	1YR	700.00	574.83	580.50	577.78	580.68	0.000199	3.39	206.31	53.64	0.30
Reach-1	19058	2YR	900.00	574.83	581.17	578.24	581.38	0.000194	3.73	246.20	69.63	0.31
Reach-1	19058	5YR	1250.00	574.83	581.58	578.92	581.93	0.000279	4.73	277.93	86.98	0.37
Reach-1	19058	10YR	1450.00	574.83	581.77	579.24	582.20	0.000331	5.28	294.94	93.53	0.41
Reach-1	19058	25YR	1700.00	574.83	582.02	579.67	582.56	0.000386	5.88	319.87	108.91	0.44
Reach-1	19058	50YR	1900.00	574.83	582.16	579.97	582.79	0.000444	6.41	335.48	125.72	0.48
Reach-1	19058	100YR	2100.00	574.83	582.30	580.24	583.03	0.000496	6.89	354.52	147.05	0.51
Reach-1	19058	500YR	2900.00	574.83	583.32	581.17	584.20	0.000500	7.73	562.17	281.72	0.53
Reach-1	19041	1YR	700.00	574.82	580.44	577.56	580.66	0.000213	3.77	185.84	42.82	0.31
Reach-1	19041	2YR	900.00	574.82	581.08	578.03	581.36	0.000227	4.24	223.95	91.35	0.33
Reach-1	19041	5YR	1250.00	574.82	581.42	578.77	581.89	0.000350	5.49	264.17	172.85	0.41
Reach-1	19041	10YR	1450.00	574.82	581.56	579.14	582.15	0.000428	6.18	287.80	189.49	0.46
Reach-1	19041	25YR	1700.00	574.82	581.75	579.58	582.49	0.000519	6.96	322.13	223.34	0.51
Reach-1	19041	50YR	1900.00	574.82	581.80	579.92	582.70	0.000630	7.70	330.79	235.74	0.56
Reach-1	19041	100YR	2100.00	574.82	581.84	580.22	582.92	0.000745	8.42	340.53	243.04	0.61
Reach-1	19041	500YR	2900.00	574.82	581.98	581.98	583.88	0.001291	11.25	369.46	262.26	0.80
Reach-1	19016		Culvert									
Reach-1	18989	1YR	700.00	574.63	578.51	576.88	578.82	0.000423	4.46	157.03	46.02	0.43
Reach-1	18989	2YR	900.00	574.63	579.03	577.27	579.41	0.000454	4.96	181.30	47.49	0.45
Reach-1	18989	5YR	1250.00	574.63	579.60	577.89	580.16	0.000574	5.98	209.06	49.12	0.51
Reach-1	18989	10YR	1450.00	574.63	579.80	578.21	580.48	0.000674	6.62	218.90	49.69	0.56
Reach-1	18989	25YR	1700.00	574.63	580.19	578.59	580.98	0.000716	7.12	238.62	51.25	0.58
Reach-1	18989	50YR	1900.00	574.63	580.47	578.88	581.35	0.000740	7.52	253.04	54.06	0.59
Reach-1	18989	100YR	2100.00	574.63	580.71	579.16	581.69	0.000769	7.92	269.30	88.89	0.61
Reach-1	18989	500YR	2900.00	574.63	581.37	580.15	582.79	0.000965	9.60	352.27	234.14	0.70
Reach-1	18971	1YR	700.00	574.51	578.23	577.38	578.74	0.000959	5.75	121.83	46.56	0.63
Reach-1	18971	2YR	900.00	574.51	578.76	577.81	579.34	0.000934	6.10	147.60	50.50	0.63
Reach-1	18971	5YR	1200.00	574.51	579.46	578.38	580.12	0.000896	6.50	184.76	55.69	0.63
Reach-1	18971	10YR	1350.00	574.51	579.78	578.64	580.47	0.000881	6.66	202.67	58.03	0.63
Reach-1	18971	25YR	1600.00	574.51	580.19	579.02	580.96	0.000883	7.05	227.30	63.48	0.64
Reach-1	18971	50YR	1800.00	574.51	580.47	579.32	581.31	0.000878	7.38	245.76	66.33	0.64
Reach-1	18971	100YR	2000.00	574.51	580.72	579.59	581.65	0.000885	7.71	263.10	73.07	0.65
Reach-1	18971	500YR	2800.00	574.51	581.40	580.50	582.74	0.001063	9.30	321.44	163.95	0.73
Reach-1	18941	1YR	700.00	574.44	578.08	577.48	578.68	0.004560	6.22	112.55	46.68	0.71
Reach-1	18941	2YR	900.00	574.44	578.64	577.91	579.28	0.004604	6.45	139.55	50.95	0.69

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	18941	5YR	1200.00	574.44	579.35	578.46	580.06	0.004702	6.74	178.09	56.89	0.67
Reach-1	18941	10YR	1350.00	574.44	579.68	578.70	580.41	0.004768	6.84	197.28	60.07	0.67
Reach-1	18941	25YR	1600.00	574.44	580.11	579.09	580.90	0.005034	7.15	223.69	63.95	0.67
Reach-1	18941	50YR	1800.00	574.44	580.42	579.37	581.26	0.005239	7.38	244.06	68.99	0.68
Reach-1	18941	100YR	2000.00	574.44	580.69	579.65	581.59	0.005513	7.62	262.43	79.23	0.69
Reach-1	18941	500YR	2800.00	574.44	581.41	580.59	582.64	0.006088	8.92	317.84	125.52	0.75
Reach-1	18542	1YR	700.00	572.44	576.63	575.49	576.96	0.003731	4.66	150.14	59.32	0.52
Reach-1	18542	2YR	900.00	572.44	577.20	575.88	577.56	0.003667	4.83	186.15	66.00	0.51
Reach-1	18542	5YR	1200.00	572.44	578.02	576.40	578.39	0.003327	4.93	243.65	74.94	0.48
Reach-1	18542	10YR	1350.00	572.44	578.43	576.60	578.80	0.003036	4.88	281.03	103.03	0.46
Reach-1	18542	25YR	1600.00	572.44	578.87	576.98	579.26	0.002976	5.08	327.24	126.94	0.46
Reach-1	18542	50YR	1800.00	572.44	579.31	577.24	579.69	0.002606	5.05	377.26	163.61	0.44
Reach-1	18542	100YR	2000.00	572.44	579.61	577.47	580.02	0.002496	5.18	415.15	189.13	0.43
Reach-1	18542	500YR	2800.00	572.44	580.45	578.39	580.94	0.002493	5.80	572.41	314.64	0.44
Reach-1	18218	1YR	950.00	570.78	575.18	574.10	575.63	0.004366	5.37	176.95	63.80	0.57
Reach-1	18218	2YR	1200.00	570.78	575.85	574.51	576.30	0.004040	5.40	222.14	71.61	0.54
Reach-1	18218	5YR	1650.00	570.78	576.59	575.16	577.14	0.004265	5.93	278.62	83.77	0.56
Reach-1	18218	10YR	1950.00	570.78	576.94	575.55	577.57	0.004344	6.36	310.50	96.84	0.57
Reach-1	18218	25YR	2300.00	570.78	577.32	575.93	578.04	0.004369	6.79	349.96	108.77	0.58
Reach-1	18218	50YR	2700.00	570.78	577.75	576.35	578.53	0.004284	7.16	398.17	118.29	0.58
Reach-1	18218	100YR	3000.00	570.78	578.02	576.63	578.87	0.004319	7.47	431.75	136.17	0.59
Reach-1	18218	500YR	4000.00	570.78	579.01	577.56	579.89	0.003718	7.82	620.27	225.10	0.57
Reach-1	18099	1YR	950.00	570.32	574.71	573.60	575.14	0.003831	5.30	179.28	63.09	0.55
Reach-1	18099	2YR	1200.00	570.32	575.41	573.99	575.85	0.003516	5.31	226.07	70.65	0.52
Reach-1	18099	5YR	1650.00	570.32	576.08	574.62	576.63	0.004185	5.97	276.25	78.96	0.56
Reach-1	18099	10YR	1950.00	570.32	576.40	575.00	577.05	0.004403	6.46	302.71	87.42	0.58
Reach-1	18099	25YR	2300.00	570.32	576.75	575.42	577.50	0.004546	6.96	335.58	100.41	0.60
Reach-1	18099	50YR	2700.00	570.32	577.18	575.82	578.01	0.004454	7.36	381.88	115.86	0.61
Reach-1	18099	100YR	3000.00	570.32	577.43	576.14	578.34	0.004529	7.69	412.02	121.11	0.62
Reach-1	18099	500YR	4000.00	570.32	578.44	577.03	579.42	0.003964	8.17	562.92	198.76	0.60
Reach-1	17954	1YR	950.00	569.62	574.24	572.84	574.60	0.003366	4.79	198.34	66.36	0.49
Reach-1	17954	2YR	1200.00	569.62	575.02	573.24	575.37	0.002815	4.75	252.87	74.84	0.45
Reach-1	17954	5YR	1650.00	569.62	575.61	573.87	576.09	0.003134	5.57	299.48	82.82	0.49
Reach-1	17954	10YR	1950.00	569.62	575.87	574.25	576.46	0.003538	6.17	321.82	87.35	0.52
Reach-1	17954	25YR	2300.00	569.62	576.17	574.66	576.88	0.003926	6.79	348.74	96.30	0.56
Reach-1	17954	50YR	2700.00	569.62	576.59	575.05	577.39	0.003980	7.24	392.67	111.91	0.57
Reach-1	17954	100YR	3000.00	569.62	576.80	575.32	577.70	0.004238	7.68	417.46	121.42	0.59
Reach-1	17954	500YR	4000.00	569.62	577.96	576.21	578.87	0.003461	7.93	588.47	171.90	0.55
Reach-1	17800	1YR	950.00	568.81	574.16	572.19	574.42	0.000454	4.06	234.08	71.74	0.40
Reach-1	17800	2YR	1200.00	568.81	574.94	572.63	575.20	0.000429	4.09	293.33	80.95	0.38
Reach-1	17800	5YR	1650.00	568.81	575.52	573.29	575.88	0.000570	4.83	341.63	87.36	0.43
Reach-1	17800	10YR	1950.00	568.81	575.76	573.66	576.21	0.000688	5.36	363.86	92.79	0.47
Reach-1	17800	25YR	2300.00	568.81	576.05	574.07	576.59	0.000815	5.91	390.88	99.80	0.51
Reach-1	17800	50YR	2700.00	568.81	576.47	574.47	577.08	0.000891	6.29	436.12	119.96	0.52
Reach-1	17800	100YR	3000.00	568.81	576.67	574.80	577.36	0.000986	6.68	461.23	126.05	0.55
Reach-1	17800	500YR	4000.00	568.81	577.84	575.65	578.56	0.000947	6.88	678.86	288.07	0.52
Reach-1	17740	1YR	950.00	568.57	574.19	571.27	574.38	0.000185	3.52	270.03	64.36	0.30
Reach-1	17740	2YR	1200.00	568.57	574.95	571.70	575.17	0.000172	3.78	323.77	76.10	0.29
Reach-1	17740	5YR	1650.00	568.57	575.51	572.38	575.85	0.000229	4.67	371.15	102.14	0.35
Reach-1	17740	10YR	1950.00	568.57	575.75	572.79	576.18	0.000278	5.29	397.88	119.63	0.38
Reach-1	17740	25YR	2300.00	568.57	576.01	573.21	576.56	0.000332	5.95	431.10	134.87	0.42
Reach-1	17740	50YR	2700.00	568.57	576.39	573.68	577.05	0.000369	6.53	494.09	189.26	0.45
Reach-1	17740	100YR	3000.00	568.57	576.57	574.00	577.32	0.000412	7.02	528.93	221.48	0.48
Reach-1	17740	500YR	4000.00	568.57	577.66	574.92	578.51	0.000402	7.66	846.65	345.12	0.48
Reach-1	17720	1YR	950.00	568.46	574.09	571.28	574.36	0.000235	4.11	231.84	56.58	0.33
Reach-1	17720	2YR	1200.00	568.46	574.83	571.72	575.14	0.000231	4.48	280.36	87.44	0.34
Reach-1	17720	5YR	1650.00	568.46	575.31	572.46	575.80	0.000325	5.63	333.75	145.38	0.40
Reach-1	17720	10YR	1950.00	568.46	575.48	572.90	576.11	0.000411	6.44	360.77	180.65	0.46

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	17720	25YR	2300.00	568.46	575.64	573.39	576.47	0.000517	7.35	390.79	187.79	0.51
Reach-1	17720	50YR	2700.00	568.46	575.95	573.90	576.94	0.000590	8.10	453.03	218.06	0.55
Reach-1	17720	100YR	3000.00	568.46	575.97	574.28	577.17	0.000722	8.98	456.01	219.02	0.61
Reach-1	17720	500YR	4000.00	568.46	575.97	575.97	578.11	0.001280	11.96	456.80	219.27	0.82
Reach-1	17689		Culvert									
Reach-1	17655	1YR	950.00	568.17	570.97	570.97	572.25	0.002573	9.08	104.64	41.28	1.01
Reach-1	17655	2YR	1200.00	568.17	571.43	571.43	572.89	0.002443	9.67	124.04	42.56	1.00
Reach-1	17655	5YR	1650.00	568.17	572.16	572.16	573.90	0.002315	10.58	155.98	44.60	1.00
Reach-1	17655	10YR	1950.00	568.17	572.60	572.60	574.51	0.002262	11.09	175.82	52.28	1.00
Reach-1	17655	25YR	2300.00	568.17	573.09	573.09	575.18	0.002200	11.59	198.41	82.12	1.00
Reach-1	17655	50YR	2700.00	568.17	573.58	573.58	575.88	0.002156	12.16	222.29	97.50	1.00
Reach-1	17655	100YR	3000.00	568.17	574.02	574.02	576.38	0.001966	12.33	251.45	205.83	0.97
Reach-1	17655	500YR	4000.00	568.17	575.59	575.59	577.19	0.001062	10.87	805.91	479.93	0.75
Reach-1	17648	1YR	850.00	567.02	569.95	569.95	571.15	0.002514	8.77	96.91	40.13	1.00
Reach-1	17648	2YR	1000.00	567.02	570.24	570.24	571.56	0.002479	9.19	108.85	41.54	1.00
Reach-1	17648	5YR	1300.00	567.02	570.98	570.80	572.31	0.001987	9.22	140.93	45.11	0.92
Reach-1	17648	10YR	1500.00	567.02	571.89	571.12	572.93	0.001241	8.16	183.82	49.48	0.75
Reach-1	17648	25YR	1900.00	567.02	573.03	571.74	573.98	0.000858	7.83	242.94	69.42	0.64
Reach-1	17648	50YR	2200.00	567.02	573.84	572.16	574.76	0.000669	7.71	291.22	124.14	0.58
Reach-1	17648	100YR	2400.00	567.02	574.38	572.41	575.28	0.000574	7.61	339.67	192.63	0.55
Reach-1	17648	500YR	3100.00	567.02	575.57	573.17	576.35	0.000431	7.44	776.93	463.06	0.49
Reach-1	17608	1YR	1050.00	564.85	569.94	568.25	570.42	0.005894	5.58	188.30	46.54	0.49
Reach-1	17608	2YR	1250.00	564.85	570.45	568.60	570.99	0.005833	5.88	212.45	47.71	0.49
Reach-1	17608	5YR	1650.00	564.85	571.32	569.25	571.96	0.006330	6.44	256.40	53.31	0.52
Reach-1	17608	10YR	1950.00	564.85	572.04	569.67	572.71	0.006585	6.55	297.76	62.35	0.53
Reach-1	17608	25YR	2400.00	564.85	573.17	570.27	573.81	0.005784	6.39	375.59	74.26	0.50
Reach-1	17608	50YR	2700.00	564.85	574.02	570.66	574.60	0.004662	6.11	446.10	155.05	0.46
Reach-1	17608	100YR	3000.00	564.85	574.55	571.09	575.13	0.004207	6.15	500.92	178.39	0.44
Reach-1	17608	500YR	4100.00	564.85	575.70	572.52	576.23	0.003441	6.24	837.72	478.93	0.41
Reach-1	17420	1YR	1050.00	562.48	569.54	566.30	569.75	0.001934	3.69	284.93	54.45	0.28
Reach-1	17420	2YR	1250.00	562.48	570.04	566.60	570.29	0.002080	4.00	312.38	55.41	0.30
Reach-1	17420	5YR	1650.00	562.48	570.84	567.19	571.18	0.002427	4.62	357.43	56.96	0.32
Reach-1	17420	10YR	1950.00	562.48	571.53	567.58	571.90	0.002488	4.91	396.87	58.28	0.33
Reach-1	17420	25YR	2400.00	562.48	572.66	568.13	573.08	0.002396	5.17	464.28	60.90	0.33
Reach-1	17420	50YR	2700.00	562.48	573.55	568.48	573.97	0.002210	5.20	519.53	63.32	0.32
Reach-1	17420	100YR	3000.00	562.48	574.07	568.81	574.52	0.002311	5.43	552.56	65.28	0.33
Reach-1	17420	500YR	4100.00	562.48	575.17	569.95	575.69	0.002449	6.03	925.46	528.39	0.35
Reach-1	17217	1YR	1050.00	562.11	568.53	566.41	569.01	0.008344	5.56	188.88	60.78	0.56
Reach-1	17217	2YR	1250.00	562.11	569.01	566.85	569.51	0.008384	5.67	220.65	69.53	0.56
Reach-1	17217	5YR	1650.00	562.11	569.80	568.02	570.35	0.007575	5.92	278.65	76.10	0.55
Reach-1	17217	10YR	1950.00	562.11	570.67	568.64	571.16	0.005576	5.62	347.23	81.47	0.48
Reach-1	17217	25YR	2400.00	562.11	572.07	569.19	572.48	0.003645	5.12	471.79	103.61	0.40
Reach-1	17217	50YR	2700.00	562.11	573.15	569.51	573.48	0.002386	4.66	622.35	287.91	0.33
Reach-1	17217	100YR	3000.00	562.11	573.74	569.79	574.04	0.002013	4.55	759.96	457.12	0.31
Reach-1	17217	500YR	4100.00	562.11	575.10	570.71	575.27	0.001087	3.79	1665.22	810.00	0.24
Reach-1	17038	1YR	1050.00	560.32	568.21	564.66	568.33	0.001667	2.82	371.85	99.61	0.26
Reach-1	17038	2YR	1250.00	560.32	568.71	565.09	568.85	0.001600	2.96	422.68	102.43	0.26
Reach-1	17038	5YR	1650.00	560.32	569.52	566.35	569.68	0.001642	3.25	507.84	109.02	0.27
Reach-1	17038	10YR	1950.00	560.32	570.46	566.61	570.61	0.001429	3.16	617.43	125.26	0.25
Reach-1	17038	25YR	2400.00	560.32	571.95	566.98	572.09	0.001011	2.92	822.23	160.17	0.22
Reach-1	17038	50YR	2700.00	560.32	573.10	567.22	573.21	0.000664	2.68	1087.68	500.99	0.18
Reach-1	17038	100YR	3000.00	560.32	573.70	567.45	573.80	0.000577	2.64	1277.01	578.65	0.17
Reach-1	17038	500YR	4100.00	560.32	575.01	568.22	575.12	0.000519	2.79	1779.05	942.79	0.17
Reach-1	16808	1YR	1050.00	561.43	565.75	565.75	567.21	0.027083	9.71	108.10	36.80	1.00
Reach-1	16808	2YR	1250.00	561.43	566.13	566.13	567.75	0.026485	10.20	122.58	37.98	1.00
Reach-1	16808	5YR	1600.00	561.43	567.34	566.75	568.70	0.016644	9.37	170.73	41.94	0.82
Reach-1	16808	10YR	1900.00	561.43	568.89	567.25	569.87	0.008933	7.92	239.79	46.99	0.62

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	16808	25YR	2200.00	561.43	571.01	567.71	571.63	0.004314	6.32	349.49	140.43	0.44
Reach-1	16808	50YR	2400.00	561.43	572.52	568.00	572.93	0.002265	5.28	509.42	592.13	0.33
Reach-1	16808	100YR	2500.00	561.43	573.26	568.15	573.58	0.001637	4.77	618.46	650.51	0.29
Reach-1	16808	500YR	2700.00	561.43	574.78	568.42	574.97	0.000838	3.81	937.75	1197.06	0.21
Reach-1	16735	1YR	1050.00	560.47	565.99	563.33	566.25	0.000253	4.13	253.96	57.07	0.35
Reach-1	16735	2YR	1250.00	560.47	566.68	563.66	566.96	0.000234	4.25	294.45	59.84	0.34
Reach-1	16735	5YR	1600.00	560.47	567.82	564.20	568.12	0.000207	4.38	365.45	64.41	0.32
Reach-1	16735	10YR	1900.00	560.47	569.21	564.61	569.48	0.000154	4.14	458.62	69.96	0.29
Reach-1	16735	25YR	2200.00	560.47	571.19	565.02	571.40	0.000095	3.63	607.82	747.33	0.23
Reach-1	16735	50YR	2400.00	560.47	572.62	565.25	572.79	0.000064	3.33	766.02	1168.18	0.19
Reach-1	16735	100YR	2500.00	560.47	573.33	565.39	573.49	0.000053	3.20	852.30	1228.13	0.18
Reach-1	16735	500YR	2700.00	560.47	574.80	565.60	574.94	0.000038	2.98	1031.13	1345.69	0.16
Reach-1	16537	Culvert										
Reach-1	16333	1YR	1050.00	558.57	561.86	561.86	563.23	0.002505	9.37	112.01	41.08	1.00
Reach-1	16333	2YR	1250.00	558.57	562.21	562.21	563.73	0.002448	9.89	126.45	41.90	1.00
Reach-1	16333	5YR	1600.00	558.57	562.79	562.79	564.53	0.002349	10.61	150.82	43.23	1.00
Reach-1	16333	10YR	1900.00	558.57	563.24	563.24	565.17	0.002275	11.12	170.84	44.30	1.00
Reach-1	16333	25YR	2200.00	558.57	563.67	563.67	565.75	0.002222	11.58	189.95	45.29	1.00
Reach-1	16333	50YR	2400.00	558.57	563.92	563.92	566.13	0.002222	11.92	201.40	45.88	1.00
Reach-1	16333	100YR	2500.00	558.57	564.07	564.07	566.31	0.002182	12.00	208.30	46.22	1.00
Reach-1	16333	500YR	2700.00	558.57	564.50	564.33	566.67	0.001941	11.83	228.28	47.22	0.95
Reach-1	16314	1YR	1050.00	558.47	561.57	561.57	562.83	0.002536	8.99	116.84	46.45	1.00
Reach-1	16314	2YR	1250.00	558.47	561.90	561.90	563.29	0.002461	9.48	131.88	47.09	1.00
Reach-1	16314	5YR	1600.00	558.47	562.42	562.42	564.04	0.002353	10.20	156.87	48.14	1.00
Reach-1	16314	10YR	1900.00	558.47	562.81	562.81	564.63	0.002328	10.80	175.99	48.93	1.00
Reach-1	16314	25YR	2200.00	558.47	563.21	563.21	565.18	0.002259	11.25	195.56	49.72	1.00
Reach-1	16314	50YR	2400.00	558.47	563.46	563.46	565.53	0.002225	11.53	208.09	50.22	1.00
Reach-1	16314	100YR	2500.00	558.47	563.59	563.59	565.70	0.002206	11.66	214.37	50.47	1.00
Reach-1	16314	500YR	2700.00	558.47	564.83	563.82	566.29	0.001170	9.70	278.48	54.49	0.75
Reach-1	16226	1YR	1050.00	558.13	561.32	561.24	562.49	0.002284	8.69	120.82	46.62	0.95
Reach-1	16226	2YR	1250.00	558.13	561.57	561.56	562.95	0.002427	9.44	132.47	47.12	0.99
Reach-1	16226	5YR	1600.00	558.13	562.07	562.07	563.70	0.002373	10.23	156.44	48.12	1.00
Reach-1	16226	10YR	1900.00	558.13	562.49	562.47	564.29	0.002292	10.74	176.89	48.97	1.00
Reach-1	16226	25YR	2200.00	558.13	562.88	562.87	564.84	0.002243	11.22	196.02	49.74	1.00
Reach-1	16226	50YR	2400.00	558.13	563.18	563.12	565.19	0.002138	11.38	210.86	50.33	0.98
Reach-1	16226	100YR	2500.00	558.13	563.36	563.24	565.36	0.002037	11.36	220.07	50.70	0.96
Reach-1	16226	500YR	2700.00	558.13	564.87	563.47	566.14	0.000949	9.04	298.69	53.71	0.68
Reach-1	16151	1YR	1050.00	557.95	561.05	561.05	562.31	0.002563	9.02	116.45	46.43	1.00
Reach-1	16151	2YR	1250.00	557.95	561.37	561.37	562.77	0.002468	9.49	131.76	47.09	1.00
Reach-1	16151	5YR	1600.00	557.95	561.87	561.87	563.52	0.002418	10.29	155.49	48.08	1.01
Reach-1	16151	10YR	1900.00	557.95	562.31	562.31	564.11	0.002307	10.76	176.51	48.95	1.00
Reach-1	16151	25YR	2200.00	557.95	562.69	562.69	564.66	0.002254	11.24	195.72	49.73	1.00
Reach-1	16151	50YR	2400.00	557.95	562.94	562.94	565.01	0.002231	11.54	207.91	50.22	1.00
Reach-1	16151	100YR	2500.00	557.95	563.24	563.04	565.19	0.001947	11.19	223.37	50.83	0.94
Reach-1	16151	500YR	2700.00	557.95	564.85	563.30	566.05	0.000862	8.79	309.01	62.40	0.65
Reach-1	15948	1YR	1050.00	557.04	560.15	560.15	561.40	0.002526	8.98	116.99	46.45	1.00
Reach-1	15948	2YR	1250.00	557.04	560.46	560.46	561.86	0.002464	9.48	131.82	47.09	1.00
Reach-1	15948	5YR	1600.00	557.04	560.99	560.99	562.61	0.002348	10.19	156.98	48.15	1.00
Reach-1	15948	10YR	1900.00	557.04	561.51	561.40	563.20	0.002091	10.43	182.25	49.18	0.95
Reach-1	15948	25YR	2200.00	557.04	562.64	561.78	563.96	0.001227	9.20	239.17	51.45	0.75
Reach-1	15948	50YR	2400.00	557.04	562.63	562.02	564.21	0.001468	10.05	238.71	51.43	0.82
Reach-1	15948	100YR	2500.00	557.04	563.50	562.15	564.70	0.000948	8.81	283.82	70.86	0.67
Reach-1	15948	500YR	2700.00	557.04	564.95	562.37	565.81	0.000518	7.44	366.52	124.22	0.51
Reach-1	15751	1YR	1050.00	556.22	559.33	559.33	560.58	0.002529	8.98	116.95	46.45	1.00
Reach-1	15751	2YR	1250.00	556.22	559.64	559.64	561.04	0.002468	9.49	131.76	47.09	1.00
Reach-1	15751	5YR	1600.00	556.22	560.68	560.16	561.89	0.001493	8.80	181.83	49.17	0.81
Reach-1	15751	10YR	1900.00	556.22	561.68	560.58	562.72	0.001004	8.19	231.90	51.16	0.68

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W. S. (ft)	E. G. Elev (ft)	E. G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	15751	25YR	2200.00	556.22	562.74	560.96	563.66	0.000707	7.65	287.43	53.29	0.58
Reach-1	15751	50YR	2400.00	556.22	562.77	561.21	563.84	0.000831	8.32	288.54	53.33	0.63
Reach-1	15751	100YR	2500.00	556.22	563.58	561.34	564.46	0.000583	7.52	333.05	56.83	0.54
Reach-1	15751	500YR	2700.00	556.22	565.00	561.56	565.67	0.000350	6.56	419.84	150.33	0.43
Reach-1	15650	1YR	1050.00	555.76	558.85	558.85	560.12	0.002570	9.02	116.35	46.43	1.00
Reach-1	15650	2YR	1250.00	555.76	559.19	559.19	560.58	0.002448	9.46	132.11	47.10	1.00
Reach-1	15650	5YR	1600.00	555.76	560.77	559.70	561.68	0.000978	7.66	208.87	98.31	0.66
Reach-1	15650	10YR	1900.00	555.76	561.74	560.12	562.58	0.000724	7.35	258.52	123.82	0.58
Reach-1	15650	25YR	2200.00	555.76	562.79	560.50	563.55	0.000541	7.00	314.44	145.96	0.51
Reach-1	15650	50YR	2400.00	555.76	562.82	560.75	563.71	0.000634	7.59	316.07	146.43	0.56
Reach-1	15650	100YR	2500.00	555.76	563.74	560.87	564.32	0.000371	6.34	627.19	180.25	0.43
Reach-1	15650	500YR	2700.00	555.76	565.15	561.12	565.57	0.000213	5.46	851.11	405.10	0.34
Reach-1	15590	1YR	1050.00	555.55	558.66	558.66	559.91	0.002519	8.97	117.10	46.46	1.00
Reach-1	15590	2YR	1250.00	555.55	559.18	558.97	560.39	0.001980	8.84	141.42	47.50	0.90
Reach-1	15590	5YR	1600.00	555.55	560.77	559.50	561.60	0.000837	7.28	219.84	87.17	0.62
Reach-1	15590	10YR	1900.00	555.55	561.74	559.91	562.51	0.000636	7.04	269.93	102.77	0.55
Reach-1	15590	25YR	2200.00	555.55	562.79	560.29	563.50	0.000485	6.74	326.27	117.29	0.49
Reach-1	15590	50YR	2400.00	555.55	562.83	560.54	563.66	0.000568	7.32	327.99	117.65	0.53
Reach-1	15590	100YR	2500.00	555.55	563.71	560.65	564.30	0.000364	6.33	557.73	155.03	0.43
Reach-1	15590	500YR	2700.00	555.55	565.09	560.91	565.55	0.000231	5.60	773.87	334.04	0.35
Reach-1	15500	1YR	1050.00	554.97	558.08	558.08	559.33	0.002516	8.96	117.13	46.46	1.00
Reach-1	15500	2YR	1250.00	554.97	559.37	558.40	560.13	0.000959	6.99	178.85	49.05	0.65
Reach-1	15500	5YR	1600.00	554.97	560.86	558.92	561.48	0.000541	6.30	253.97	65.74	0.50
Reach-1	15500	10YR	1900.00	554.97	561.81	559.32	562.42	0.000445	6.24	304.35	88.40	0.46
Reach-1	15500	25YR	2200.00	554.97	562.85	559.71	563.42	0.000359	6.09	361.34	108.50	0.42
Reach-1	15500	50YR	2400.00	554.97	562.89	559.96	563.57	0.000419	6.60	363.95	112.16	0.46
Reach-1	15500	100YR	2500.00	554.97	563.72	560.09	564.25	0.000298	5.95	570.58	226.64	0.39
Reach-1	15500	500YR	2700.00	554.97	565.12	560.33	565.51	0.000183	5.16	858.00	299.27	0.31
Reach-1	15320	1YR	1300.00	553.88	557.89	557.39	558.92	0.001463	8.13	159.92	48.27	0.79
Reach-1	15320	2YR	1700.00	553.88	558.89	557.96	559.92	0.001105	8.14	208.79	50.25	0.70
Reach-1	15320	5YR	2300.00	553.88	560.25	558.75	561.31	0.000842	8.24	279.26	52.98	0.63
Reach-1	15320	10YR	2800.00	553.88	561.09	559.35	562.25	0.000798	8.63	324.51	54.66	0.62
Reach-1	15320	25YR	3300.00	553.88	562.11	559.90	563.27	0.000683	8.65	395.85	93.30	0.59
Reach-1	15320	50YR	3500.00	553.88	562.07	560.12	563.39	0.000782	9.22	392.45	90.99	0.63
Reach-1	15320	100YR	4100.00	553.88	562.41	560.70	564.04	0.000920	10.28	423.85	96.75	0.68
Reach-1	15320	500YR	5200.00	553.88	563.11	561.80	565.25	0.001066	11.77	512.13	177.80	0.75
Reach-1	15250	1YR	1300.00	553.82	557.31	557.31	558.75	0.002488	9.65	134.78	47.21	1.01
Reach-1	15250	2YR	1700.00	553.82	558.80	557.90	559.84	0.001129	8.20	207.34	50.19	0.71
Reach-1	15250	5YR	2300.00	553.82	560.19	558.67	561.25	0.000841	8.23	279.37	75.28	0.63
Reach-1	15250	10YR	2800.00	553.82	561.04	559.29	562.19	0.000796	8.62	324.78	84.87	0.62
Reach-1	15250	25YR	3300.00	553.82	562.12	559.84	563.20	0.000634	8.43	465.16	99.89	0.57
Reach-1	15250	50YR	3500.00	553.82	562.08	560.04	563.32	0.000726	8.99	461.51	99.68	0.61
Reach-1	15250	100YR	4100.00	553.82	562.43	560.66	563.95	0.000840	9.99	496.28	101.68	0.66
Reach-1	15250	500YR	5200.00	553.82	563.16	561.64	565.13	0.000960	11.39	572.48	107.38	0.71
Reach-1	15150	1YR	1300.00	553.17	557.38	556.68	558.29	0.001227	7.68	169.32	48.66	0.73
Reach-1	15150	2YR	1700.00	553.17	558.93	557.25	559.66	0.000663	6.88	247.17	51.76	0.55
Reach-1	15150	5YR	2300.00	553.17	560.30	558.03	561.10	0.000561	7.19	320.08	54.50	0.52
Reach-1	15150	10YR	2800.00	553.17	561.15	558.64	562.05	0.000556	7.63	367.02	61.09	0.53
Reach-1	15150	25YR	3300.00	553.17	562.18	559.18	563.10	0.000481	7.74	452.98	99.35	0.50
Reach-1	15150	50YR	3500.00	553.17	562.15	559.40	563.20	0.000548	8.24	450.13	99.13	0.53
Reach-1	15150	100YR	4100.00	553.17	562.50	560.00	563.81	0.000640	9.19	486.56	105.43	0.58
Reach-1	15150	500YR	5200.00	553.17	563.25	561.04	564.97	0.000748	10.56	579.19	145.29	0.64
Reach-1	15052	1YR	1300.00	553.05	557.26	556.54	558.17	0.001229	7.68	169.23	48.65	0.73
Reach-1	15052	2YR	1700.00	553.05	558.88	557.13	559.59	0.000635	6.78	250.83	51.90	0.54
Reach-1	15052	5YR	2300.00	553.05	560.26	557.92	561.04	0.000539	7.09	324.49	54.66	0.51
Reach-1	15052	10YR	2800.00	553.05	561.11	558.52	561.99	0.000536	7.54	371.43	77.80	0.52
Reach-1	15052	25YR	3300.00	553.05	562.15	559.07	563.05	0.000457	7.61	487.82	147.25	0.49
Reach-1	15052	50YR	3500.00	553.05	562.12	559.28	563.14	0.000521	8.11	483.09	137.67	0.52

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	15052	100YR	4100.00	553.05	562.48	559.90	563.73	0.000608	9.03	540.19	186.57	0.57
Reach-1	15052	500YR	5200.00	553.05	563.27	560.93	564.86	0.000690	10.25	673.84	213.57	0.61
Reach-1	14945	1YR	1300.00	552.33	557.40	555.84	557.98	0.000618	6.14	211.87	50.37	0.53
Reach-1	14945	2YR	1700.00	552.33	558.96	556.42	559.48	0.000398	5.80	293.00	53.50	0.44
Reach-1	14945	5YR	2300.00	552.33	560.34	557.19	560.94	0.000370	6.24	368.52	72.93	0.43
Reach-1	14945	10YR	2800.00	552.33	561.19	557.78	561.89	0.000382	6.71	417.24	98.58	0.44
Reach-1	14945	25YR	3300.00	552.33	562.24	558.35	562.95	0.000326	6.80	597.58	190.99	0.42
Reach-1	14945	50YR	3500.00	552.33	562.22	558.57	563.02	0.000370	7.23	594.49	190.55	0.44
Reach-1	14945	100YR	4100.00	552.33	562.62	559.17	563.60	0.000428	8.02	659.38	209.21	0.48
Reach-1	14945	500YR	5200.00	552.33	563.45	560.21	564.70	0.000492	9.14	804.18	275.86	0.52
Reach-1	14794	1YR	1300.00	551.64	557.44	555.15	557.86	0.000378	5.22	249.18	51.83	0.42
Reach-1	14794	2YR	1700.00	551.64	558.99	555.72	559.40	0.000275	5.12	332.10	54.94	0.37
Reach-1	14794	5YR	2300.00	551.64	560.37	556.52	560.86	0.000262	5.62	415.42	75.88	0.37
Reach-1	14794	10YR	2800.00	551.64	561.23	557.11	561.80	0.000264	6.07	528.59	166.91	0.38
Reach-1	14794	25YR	3300.00	551.64	562.29	557.65	562.87	0.000231	6.17	723.60	194.72	0.36
Reach-1	14794	50YR	3500.00	551.64	562.28	557.88	562.93	0.000261	6.55	721.52	194.49	0.38
Reach-1	14794	100YR	4100.00	551.64	562.70	558.49	563.48	0.000302	7.26	799.78	223.62	0.41
Reach-1	14794	500YR	5200.00	551.64	563.57	559.51	564.56	0.000346	8.23	973.04	341.84	0.45
Reach-1	14696	1YR	1300.00	551.38	557.43	554.89	557.81	0.000324	4.95	262.45	52.34	0.39
Reach-1	14696	2YR	1700.00	551.38	558.99	555.46	559.36	0.000243	4.91	346.32	55.46	0.35
Reach-1	14696	5YR	2300.00	551.38	560.37	556.26	560.82	0.000228	5.41	459.24	106.72	0.35
Reach-1	14696	10YR	2800.00	551.38	561.24	556.85	561.76	0.000231	5.85	585.53	190.98	0.35
Reach-1	14696	25YR	3300.00	551.38	562.31	557.40	562.83	0.000202	5.93	849.50	344.69	0.34
Reach-1	14696	50YR	3500.00	551.38	562.30	557.61	562.89	0.000228	6.29	847.03	342.76	0.36
Reach-1	14696	100YR	4100.00	551.38	562.73	558.23	563.43	0.000260	6.93	962.98	455.28	0.39
Reach-1	14696	500YR	5200.00	551.38	563.64	559.27	564.48	0.000289	7.74	1208.84	691.45	0.41
Reach-1	14608	1YR	1300.00	550.80	557.46	554.31	557.77	0.000229	4.41	294.82	53.57	0.33
Reach-1	14608	2YR	1700.00	550.80	559.01	554.87	559.32	0.000184	4.47	380.29	56.67	0.30
Reach-1	14608	5YR	2300.00	550.80	560.40	555.67	560.79	0.000186	5.00	465.04	133.45	0.31
Reach-1	14608	10YR	2800.00	550.80	561.26	556.27	561.72	0.000193	5.46	556.73	224.13	0.32
Reach-1	14608	25YR	3300.00	550.80	562.31	556.82	562.81	0.000180	5.69	680.26	335.80	0.32
Reach-1	14608	50YR	3500.00	550.80	562.30	557.04	562.86	0.000204	6.04	679.27	334.57	0.34
Reach-1	14608	100YR	4100.00	550.80	562.71	557.65	563.41	0.000242	6.76	728.82	390.48	0.37
Reach-1	14608	500YR	5200.00	550.80	563.50	558.67	564.44	0.000299	7.89	833.77	476.10	0.42
Reach-1	14525	1YR	1300.00	550.57	557.46	554.08	557.74	0.000203	4.23	307.12	54.02	0.31
Reach-1	14525	2YR	1700.00	550.57	559.01	554.65	559.30	0.000167	4.32	393.35	57.13	0.29
Reach-1	14525	5YR	2300.00	550.57	560.40	555.43	560.77	0.000168	4.86	481.40	75.13	0.30
Reach-1	14525	10YR	2800.00	550.57	561.26	556.03	561.70	0.000178	5.34	553.93	253.77	0.31
Reach-1	14525	25YR	3300.00	550.57	562.31	556.56	562.79	0.000169	5.59	684.66	479.73	0.31
Reach-1	14525	50YR	3500.00	550.57	562.30	556.81	562.84	0.000190	5.93	683.43	479.18	0.33
Reach-1	14525	100YR	4100.00	550.57	562.70	557.42	563.38	0.000227	6.65	742.34	519.33	0.36
Reach-1	14525	500YR	5200.00	550.57	563.50	558.45	564.41	0.000279	7.74	873.57	706.63	0.41
Reach-1	14418	1YR	1300.00	550.13	557.47	553.62	557.71	0.000161	3.92	331.55	54.92	0.28
Reach-1	14418	2YR	1700.00	550.13	559.02	554.21	559.28	0.000137	4.05	442.52	107.38	0.26
Reach-1	14418	5YR	2300.00	550.13	560.42	555.00	560.73	0.000134	4.50	631.59	158.17	0.27
Reach-1	14418	10YR	2800.00	550.13	561.30	555.60	561.66	0.000139	4.89	777.15	362.46	0.28
Reach-1	14418	25YR	3300.00	550.13	562.37	556.14	562.74	0.000129	5.05	976.16	577.32	0.27
Reach-1	14418	50YR	3500.00	550.13	562.37	556.35	562.79	0.000145	5.36	976.02	577.26	0.29
Reach-1	14418	100YR	4100.00	550.13	562.80	556.98	563.31	0.000170	5.97	1060.03	615.67	0.32
Reach-1	14418	500YR	5200.00	550.13	563.64	558.02	564.32	0.000207	6.90	1234.15	715.46	0.35
Reach-1	14348	1YR	1300.00	549.83	557.48	553.34	557.69	0.000139	3.73	348.40	55.53	0.26
Reach-1	14348	2YR	1700.00	549.83	559.03	553.92	559.26	0.000123	3.89	437.02	59.77	0.25
Reach-1	14348	5YR	2300.00	549.83	560.42	554.69	560.72	0.000129	4.42	535.16	146.19	0.26
Reach-1	14348	10YR	2800.00	549.83	561.28	555.30	561.65	0.000138	4.88	617.43	392.55	0.28
Reach-1	14348	25YR	3300.00	549.83	562.32	555.85	562.73	0.000135	5.15	735.70	645.67	0.28
Reach-1	14348	50YR	3500.00	549.83	562.31	556.07	562.77	0.000152	5.47	734.78	645.21	0.30
Reach-1	14348	100YR	4100.00	549.83	562.71	556.68	563.29	0.000183	6.15	786.44	686.11	0.33
Reach-1	14348	500YR	5200.00	549.83	563.50	557.71	564.29	0.000229	7.21	895.96	774.78	0.37



HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	14266	1YR	1300.00	549.46	557.30	553.02	557.66	0.000255	4.85	267.82	34.18	0.31
Reach-1	14266	2YR	1700.00	549.46	558.79	553.70	559.23	0.000264	5.33	320.16	46.70	0.31
Reach-1	14266	5YR	2300.00	549.46	560.07	554.66	560.67	0.000319	6.29	417.19	104.21	0.34
Reach-1	14266	10YR	2800.00	549.46	560.85	555.40	561.60	0.000361	7.01	510.79	225.63	0.37
Reach-1	14266	25YR	3300.00	549.46	561.89	556.09	562.67	0.000350	7.31	697.16	641.45	0.37
Reach-1	14266	50YR	3500.00	549.46	561.81	556.34	562.71	0.000405	7.83	680.19	621.29	0.39
Reach-1	14266	100YR	4100.00	549.46	562.06	557.10	563.21	0.000510	8.91	732.64	717.32	0.44
Reach-1	14266	500YR	5200.00	549.46	562.62	558.42	564.18	0.000671	10.52	856.59	814.26	0.51
Reach-1	14200	1YR	1300.00	549.25	557.29	552.81	557.64	0.000237	4.73	274.89	34.18	0.29
Reach-1	14200	2YR	1700.00	549.25	558.78	553.51	559.20	0.000248	5.22	330.39	59.32	0.30
Reach-1	14200	5YR	2300.00	549.25	560.07	554.45	560.64	0.000298	6.11	460.35	164.79	0.33
Reach-1	14200	10YR	2800.00	549.25	560.87	555.19	561.55	0.000331	6.76	592.47	553.75	0.35
Reach-1	14200	25YR	3300.00	549.25	561.94	555.88	562.62	0.000312	6.96	797.96	871.94	0.34
Reach-1	14200	50YR	3500.00	549.25	561.86	556.13	562.65	0.000361	7.45	782.70	828.00	0.37
Reach-1	14200	100YR	4100.00	549.25	562.13	556.88	563.13	0.000448	8.43	837.15	972.08	0.41
Reach-1	14200	500YR	5200.00	549.25	562.73	558.22	564.07	0.000584	9.92	954.51	1109.57	0.48
Reach-1	14153	1YR	1300.00	549.12	556.89	553.41	557.54	0.000510	6.42	202.35	26.16	0.41
Reach-1	14153	2YR	1700.00	549.12	558.29	554.25	559.08	0.000541	7.12	239.18	34.62	0.42
Reach-1	14153	5YR	2300.00	549.12	559.43	555.38	560.48	0.000633	8.33	391.47	264.76	0.46
Reach-1	14153	10YR	2800.00	549.12	560.31	556.25	561.41	0.000633	8.79	595.16	592.43	0.46
Reach-1	14153	25YR	3300.00	549.12	561.82	557.08	562.58	0.000428	7.87	1028.65	971.62	0.39
Reach-1	14153	50YR	3500.00	549.12	561.67	557.40	562.59	0.000516	8.57	985.83	937.14	0.43
Reach-1	14153	100YR	4100.00	549.12	562.00	560.36	563.09	0.000607	9.46	1082.61	1030.48	0.47
Reach-1	14153	500YR	5200.00	549.12	562.75	561.57	564.00	0.000699	10.54	1302.01	1153.43	0.50
Reach-1	14116		Culvert									
Reach-1	14080	1YR	1300.00	548.62	555.11	552.97	556.08	0.000914	7.91	164.37	25.32	0.55
Reach-1	14080	2YR	1700.00	548.62	555.93	553.81	557.24	0.001112	9.18	185.11	25.32	0.60
Reach-1	14080	5YR	2300.00	548.62	557.42	554.98	559.08	0.001198	10.32	223.03	27.08	0.61
Reach-1	14080	10YR	2800.00	548.62	558.19	555.88	560.24	0.001337	11.52	259.82	118.76	0.66
Reach-1	14080	25YR	3300.00	548.62	561.63	556.70	562.01	0.000258	6.21	1390.95	858.78	0.30
Reach-1	14080	50YR	3500.00	548.62	561.33	556.99	561.85	0.000347	7.09	1268.97	822.09	0.35
Reach-1	14080	100YR	4100.00	548.62	561.76	560.30	562.31	0.000369	7.48	1442.33	872.34	0.36
Reach-1	14080	500YR	5200.00	548.62	562.85	560.94	563.24	0.000292	7.01	2144.15	1108.72	0.33
Reach-1	14055	1YR	1400.00	548.38	554.89	552.95	556.01	0.001051	8.49	164.88	25.32	0.59
Reach-1	14055	2YR	1800.00	548.38	555.70	553.79	557.16	0.001244	9.72	185.26	25.32	0.63
Reach-1	14055	5YR	2500.00	548.38	556.69	555.11	558.88	0.001676	11.88	210.37	25.32	0.73
Reach-1	14055	10YR	3000.00	548.38	557.03	555.98	559.94	0.002159	13.71	218.90	25.32	0.82
Reach-1	14055	25YR	3500.00	548.38	557.66	556.80	561.09	0.002323	14.87	242.06	58.12	0.86
Reach-1	14055	50YR	3800.00	548.38	559.48	559.48	561.41	0.001162	11.86	550.90	480.48	0.63
Reach-1	14055	100YR	4400.00	548.38	560.17	560.17	561.92	0.001064	11.81	755.53	602.87	0.61
Reach-1	14055	500YR	5700.00	548.38	561.14	561.14	562.83	0.001045	12.34	1069.49	702.49	0.61
Reach-1	13977	1YR	1400.00	548.16	553.66	553.66	555.79	0.002437	11.73	119.40	27.99	1.00
Reach-1	13977	2YR	1800.00	548.16	554.52	554.52	556.94	0.002355	12.46	144.45	29.73	1.00
Reach-1	13977	5YR	2500.00	548.16	555.83	555.83	558.67	0.002282	13.52	184.93	32.34	1.00
Reach-1	13977	10YR	3000.00	548.16	556.64	556.64	559.76	0.002245	14.16	211.95	35.23	1.00
Reach-1	13977	25YR	3500.00	548.16	558.41	558.41	560.57	0.001187	12.13	393.89	174.08	0.76
Reach-1	13977	50YR	3800.00	548.16	558.82	558.82	560.92	0.001114	12.15	470.79	225.39	0.74
Reach-1	13977	100YR	4400.00	548.16	559.50	559.50	561.53	0.001028	12.29	625.17	361.13	0.72
Reach-1	13977	500YR	5700.00	548.16	560.74	560.74	562.50	0.000855	12.21	1048.36	723.24	0.67
Reach-1	13920	1YR	1400.00	547.66	553.17	553.17	555.29	0.002414	11.69	119.80	28.02	1.00
Reach-1	13920	2YR	1800.00	547.66	554.01	554.01	556.44	0.002373	12.50	144.05	29.70	1.00
Reach-1	13920	5YR	2500.00	547.66	555.33	555.33	558.17	0.002285	13.52	184.86	32.33	1.00
Reach-1	13920	10YR	3000.00	547.66	557.23	557.23	559.20	0.001233	11.50	357.59	178.20	0.76
Reach-1	13920	25YR	3500.00	547.66	557.92	557.92	559.79	0.001102	11.55	483.75	199.16	0.72
Reach-1	13920	50YR	3800.00	547.66	558.28	558.28	560.11	0.001047	11.60	566.79	254.02	0.71
Reach-1	13920	100YR	4400.00	547.66	558.84	558.84	560.65	0.001001	11.85	717.88	312.16	0.70
Reach-1	13920	500YR	5700.00	547.66	559.78	559.78	561.57	0.000956	12.40	1015.11	500.77	0.70

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	13858	1YR	1400.00	547.69	552.79	552.42	554.40	0.001829	10.17	137.72	33.21	0.88
Reach-1	13858	2YR	1800.00	547.69	553.78	553.18	555.49	0.001608	10.51	171.30	35.17	0.84
Reach-1	13858	5YR	2500.00	547.69	555.26	554.33	557.17	0.001397	11.08	227.82	61.10	0.80
Reach-1	13858	10YR	3000.00	547.69	556.21	555.10	558.22	0.001217	11.41	287.48	151.32	0.77
Reach-1	13858	25YR	3500.00	547.69	556.11	555.85	558.93	0.001736	13.51	281.46	137.57	0.91
Reach-1	13858	50YR	3800.00	547.69	556.33	556.33	559.39	0.001821	14.12	311.42	192.43	0.94
Reach-1	13858	100YR	4400.00	547.69	557.69	557.69	560.03	0.001176	12.77	513.77	247.79	0.78
Reach-1	13858	500YR	5700.00	547.69	559.11	559.11	561.17	0.000935	12.64	856.16	533.44	0.71
Reach-1	13639	1YR	1400.00	546.59	552.97	551.33	553.89	0.001055	7.70	181.74	35.76	0.60
Reach-1	13639	2YR	1800.00	546.59	553.95	552.08	555.01	0.001042	8.26	217.80	37.73	0.61
Reach-1	13639	5YR	2500.00	546.59	555.47	553.26	556.71	0.000954	8.97	318.04	125.37	0.60
Reach-1	13639	10YR	3000.00	546.59	556.48	554.01	557.78	0.000856	9.27	416.53	306.28	0.58
Reach-1	13639	25YR	3500.00	546.59	556.83	554.78	558.24	0.000920	9.89	531.68	462.31	0.60
Reach-1	13639	50YR	3800.00	546.59	556.52	555.25	558.41	0.001273	11.34	476.08	335.13	0.70
Reach-1	13639	100YR	4400.00	546.59	556.61	556.05	559.05	0.001625	12.91	492.38	392.65	0.80
Reach-1	13639	500YR	5700.00	546.59	557.98	557.98	559.96	0.001226	12.43	899.06	576.11	0.71
Reach-1	13542	1YR	1400.00	546.34	551.56	551.56	553.62	0.003088	11.51	121.68	29.44	1.00
Reach-1	13542	2YR	1800.00	546.34	552.38	552.38	554.73	0.003005	12.28	146.54	31.08	1.00
Reach-1	13542	5YR	2500.00	546.34	553.63	553.63	556.41	0.002924	13.38	186.84	33.58	1.00
Reach-1	13542	10YR	3000.00	546.34	554.43	554.43	557.47	0.002865	13.99	214.50	36.12	1.00
Reach-1	13542	25YR	3500.00	546.34	556.99	555.18	558.05	0.000800	9.18	742.09	538.12	0.56
Reach-1	13542	50YR	3800.00	546.34	556.61	556.61	558.19	0.001208	10.95	641.45	533.98	0.68
Reach-1	13542	100YR	4400.00	546.34	557.03	557.03	558.66	0.001229	11.42	753.77	544.07	0.69
Reach-1	13542	500YR	5700.00	546.34	557.76	557.76	559.55	0.001311	12.46	954.82	611.42	0.72
Reach-1	13412	1YR	1400.00	545.54	550.76	550.76	552.82	0.003082	11.50	121.76	29.44	1.00
Reach-1	13412	2YR	1800.00	545.54	551.58	551.58	553.93	0.003007	12.29	146.50	31.08	1.00
Reach-1	13412	5YR	2500.00	545.54	552.84	552.84	555.61	0.002907	13.35	187.24	33.60	1.00
Reach-1	13412	10YR	3000.00	545.54	553.62	553.62	556.67	0.002878	14.01	214.16	35.17	1.00
Reach-1	13412	25YR	3500.00	545.54	554.30	554.30	557.65	0.002805	14.70	238.52	134.33	1.00
Reach-1	13412	50YR	3800.00	545.54	555.97	555.97	557.44	0.001088	10.62	623.63	527.26	0.65
Reach-1	13412	100YR	4400.00	545.54	556.36	556.36	557.87	0.001110	11.06	728.49	544.38	0.66
Reach-1	13412	500YR	5700.00	545.54	557.03	557.03	558.69	0.001209	12.12	904.99	629.72	0.70
Reach-1	13015	1YR	1400.00	543.89	549.11	549.11	551.17	0.002404	11.51	121.68	29.44	1.00
Reach-1	13015	2YR	1800.00	543.89	550.07	549.91	552.28	0.002152	11.93	150.92	31.36	0.96
Reach-1	13015	5YR	2500.00	543.89	552.14	551.17	554.14	0.001434	11.37	219.92	35.98	0.80
Reach-1	13015	10YR	3000.00	543.89	553.14	551.98	555.27	0.001250	11.72	273.40	128.44	0.77
Reach-1	13015	25YR	3500.00	543.89	553.81	552.72	556.19	0.001245	12.42	328.09	328.41	0.78
Reach-1	13015	50YR	3800.00	543.89	555.45	553.15	556.27	0.000439	8.37	853.90	501.42	0.48
Reach-1	13015	100YR	4400.00	543.89	556.21	554.07	556.92	0.000372	8.10	1059.30	540.04	0.44
Reach-1	13015	500YR	5700.00	543.89	557.34	555.62	558.01	0.000341	8.31	1363.19	592.72	0.43
Reach-1	12963	1YR	1400.00	543.53	549.58	548.50	550.79	0.001178	8.85	158.27	33.09	0.71
Reach-1	12963	2YR	1800.00	543.53	550.59	549.29	551.94	0.001114	9.34	192.68	35.11	0.70
Reach-1	12963	5YR	2500.00	543.53	552.49	550.50	553.91	0.000811	9.57	270.07	80.71	0.63
Reach-1	12963	10YR	3000.00	543.53	553.50	551.24	555.04	0.000742	9.98	349.28	310.58	0.61
Reach-1	12963	25YR	3500.00	543.53	554.22	551.90	555.94	0.000754	10.63	405.46	386.54	0.63
Reach-1	12963	50YR	3800.00	543.53	555.47	552.28	556.24	0.000355	7.96	894.02	473.46	0.44
Reach-1	12963	100YR	4400.00	543.53	556.18	553.23	556.90	0.000326	7.98	1080.10	504.05	0.43
Reach-1	12963	500YR	5700.00	543.53	557.24	555.33	557.99	0.000325	8.47	1365.77	544.69	0.43
Reach-1	12857	1YR	1400.00	543.27	549.53	548.24	550.64	0.001038	8.46	165.45	33.52	0.67
Reach-1	12857	2YR	1800.00	543.27	550.55	549.02	551.80	0.000995	8.98	200.52	35.55	0.67
Reach-1	12857	5YR	2500.00	543.27	552.53	550.24	553.78	0.000682	9.05	342.00	227.82	0.58
Reach-1	12857	10YR	3000.00	543.27	553.58	551.00	554.90	0.000615	9.37	432.41	366.76	0.56
Reach-1	12857	25YR	3500.00	543.27	554.32	551.87	555.79	0.000622	9.95	496.04	384.38	0.57
Reach-1	12857	50YR	3800.00	543.27	555.57	552.30	556.15	0.000272	7.15	1073.04	420.24	0.39
Reach-1	12857	100YR	4400.00	543.27	556.24	553.02	556.82	0.000264	7.34	1237.76	486.11	0.39
Reach-1	12857	500YR	5700.00	543.27	557.27	554.37	557.93	0.000283	8.06	1489.77	538.80	0.40
Reach-1	12750	1YR	1400.00	542.74	549.60	547.70	550.48	0.000746	7.53	185.86	34.72	0.57

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	12750	2YR	1800.00	542.74	550.62	548.50	551.64	0.000723	8.11	223.94	58.26	0.58
Reach-1	12750	5YR	2500.00	542.74	552.62	549.71	553.65	0.000516	8.26	421.04	216.78	0.51
Reach-1	12750	10YR	3000.00	542.74	553.70	550.46	554.77	0.000465	8.52	550.45	404.49	0.49
Reach-1	12750	25YR	3500.00	542.74	554.47	551.34	555.64	0.000466	8.99	643.15	418.01	0.50
Reach-1	12750	50YR	3800.00	542.74	555.48	551.75	556.11	0.000269	7.28	1117.23	435.70	0.39
Reach-1	12750	100YR	4400.00	542.74	556.15	552.65	556.79	0.000263	7.49	1295.53	445.63	0.39
Reach-1	12750	500YR	5700.00	542.74	557.18	554.01	557.89	0.000284	8.23	1568.48	526.39	0.41
Reach-1	12700	1YR	1400.00	542.44	549.09	547.95	550.39	0.001211	9.14	153.10	30.31	0.72
Reach-1	12700	2YR	1800.00	542.44	550.02	548.81	551.54	0.001236	9.89	182.06	32.16	0.73
Reach-1	12700	5YR	2500.00	542.44	552.41	550.11	553.60	0.000656	9.05	460.04	191.70	0.56
Reach-1	12700	10YR	3000.00	542.44	553.58	551.37	554.73	0.000550	9.08	616.39	302.64	0.53
Reach-1	12700	25YR	3500.00	542.44	554.38	552.06	555.61	0.000536	9.49	724.17	411.87	0.53
Reach-1	12700	50YR	3800.00	542.44	555.19	552.43	556.07	0.000388	8.50	1036.17	434.77	0.46
Reach-1	12700	100YR	4400.00	542.44	555.93	553.07	556.75	0.000357	8.52	1243.01	446.55	0.44
Reach-1	12700	500YR	5700.00	542.44	557.01	554.26	557.86	0.000360	9.09	1550.33	511.09	0.45
Reach-1	12638	1YR	1400.00	542.19	549.08	547.70	550.26	0.001892	8.73	160.33	30.78	0.67
Reach-1	12638	2YR	1800.00	542.19	550.01	548.51	551.41	0.001957	9.48	189.81	32.64	0.69
Reach-1	12638	5YR	2500.00	542.19	552.11	549.86	553.53	0.001348	9.58	286.39	71.26	0.60
Reach-1	12638	10YR	3000.00	542.19	553.10	550.64	554.64	0.001268	10.05	380.31	131.54	0.60
Reach-1	12638	25YR	3500.00	542.19	553.82	551.41	555.51	0.001281	10.65	475.39	255.69	0.61
Reach-1	12638	50YR	3800.00	542.19	554.12	551.73	555.93	0.001327	11.07	519.33	323.78	0.62
Reach-1	12638	100YR	4400.00	542.19	554.15	552.98	556.56	0.001760	12.77	523.09	326.05	0.72
Reach-1	12638	500YR	5700.00	542.19	556.14	555.88	557.75	0.001104	11.43	1104.85	451.52	0.59
Reach-1	12598	1YR	1400.00	541.96	549.28	546.60	549.96	0.000906	6.58	212.76	35.47	0.47
Reach-1	12598	2YR	1800.00	541.96	550.24	547.38	551.06	0.000976	7.27	247.51	37.06	0.50
Reach-1	12598	5YR	2500.00	541.96	552.33	548.56	553.23	0.000831	7.61	330.97	52.88	0.47
Reach-1	12598	10YR	3000.00	541.96	553.34	549.36	554.33	0.000794	8.04	457.06	229.89	0.47
Reach-1	12598	25YR	3500.00	541.96	554.08	550.07	555.16	0.000798	8.49	572.69	306.41	0.47
Reach-1	12598	50YR	3800.00	541.96	554.41	550.48	555.57	0.000828	8.83	623.02	328.32	0.48
Reach-1	12598	100YR	4400.00	541.96	554.56	551.24	556.04	0.001047	10.02	646.30	333.14	0.55
Reach-1	12598	500YR	5700.00	541.96	556.29	553.53	557.51	0.000801	9.71	1167.28	458.05	0.49
Reach-1	12572	1YR	1400.00	542.02	549.38	546.17	549.82	0.000565	5.31	263.55	45.59	0.39
Reach-1	12572	2YR	1800.00	542.02	550.37	546.87	550.90	0.000584	5.81	309.95	48.29	0.40
Reach-1	12572	5YR	2500.00	542.02	552.48	547.95	553.05	0.000440	6.08	424.89	73.13	0.37
Reach-1	12572	10YR	3000.00	542.02	553.50	548.63	554.14	0.000425	6.44	586.13	255.65	0.37
Reach-1	12572	25YR	3500.00	542.02	554.26	549.27	554.95	0.000426	6.79	765.61	343.67	0.37
Reach-1	12572	50YR	3800.00	542.02	554.61	549.63	555.34	0.000440	7.04	845.76	401.19	0.38
Reach-1	12572	100YR	4400.00	542.02	554.82	550.31	555.74	0.000542	7.93	896.60	414.42	0.42
Reach-1	12572	500YR	5700.00	542.02	556.40	551.53	557.38	0.000513	8.43	1266.81	476.47	0.42
Reach-1	12554	Bridge										
Reach-1	12527	1YR	1400.00	541.79	549.30	545.94	549.72	0.000526	5.18	270.25	45.98	0.38
Reach-1	12527	2YR	1800.00	541.79	550.28	546.64	550.78	0.000546	5.69	316.50	48.87	0.39
Reach-1	12527	5YR	2500.00	541.79	551.85	547.72	552.48	0.000515	6.37	398.89	56.91	0.39
Reach-1	12527	10YR	3000.00	541.79	552.93	548.39	553.63	0.000488	6.73	507.12	166.79	0.39
Reach-1	12527	25YR	3500.00	541.79	553.92	549.05	554.64	0.000451	6.93	701.23	316.78	0.38
Reach-1	12527	50YR	3800.00	541.79	554.37	549.37	555.12	0.000448	7.10	790.73	378.61	0.38
Reach-1	12527	100YR	4400.00	541.79	554.62	550.08	555.56	0.000547	7.97	841.15	389.07	0.42
Reach-1	12527	500YR	5700.00	541.79	556.30	551.30	557.31	0.000510	8.47	1178.18	457.09	0.42
Reach-1	12496	1YR	1600.00	541.72	547.50	547.08	549.28	0.001806	10.69	149.63	32.57	0.88
Reach-1	12496	2YR	2000.00	541.72	548.36	547.81	550.32	0.001710	11.21	178.39	34.29	0.87
Reach-1	12496	5YR	2700.00	541.72	549.10	548.94	551.83	0.002025	13.25	204.73	37.99	0.96
Reach-1	12496	10YR	3200.00	541.72	549.66	549.66	552.85	0.002100	14.33	227.72	46.67	0.99
Reach-1	12496	25YR	3700.00	541.72	550.35	550.35	553.80	0.001983	14.91	269.39	69.27	0.98
Reach-1	12496	50YR	4000.00	541.72	551.04	551.04	554.33	0.001689	14.63	332.10	112.00	0.92
Reach-1	12496	100YR	4300.00	541.72	551.46	551.46	554.81	0.001611	14.80	382.59	124.66	0.91
Reach-1	12496	500YR	5500.00	541.72	552.86	552.86	556.49	0.001469	15.68	597.46	193.15	0.89
Reach-1	12154	1YR	1600.00	540.55	547.56	545.92	548.65	0.000901	8.37	191.06	35.02	0.63

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	12154	2YR	2000.00	540.55	548.46	546.68	549.70	0.000868	8.94	242.46	99.65	0.63
Reach-1	12154	5YR	2700.00	540.55	549.44	547.84	551.03	0.000936	10.24	350.62	195.03	0.67
Reach-1	12154	10YR	3200.00	540.55	550.04	548.78	551.87	0.000976	11.03	425.65	252.73	0.70
Reach-1	12154	25YR	3700.00	540.55	550.70	549.57	552.67	0.000961	11.56	515.65	271.25	0.70
Reach-1	12154	50YR	4000.00	540.55	551.06	549.93	553.10	0.000956	11.85	567.57	278.01	0.70
Reach-1	12154	100YR	4300.00	540.55	551.41	550.31	553.52	0.000947	12.10	618.73	286.90	0.70
Reach-1	12154	500YR	5500.00	540.55	552.86	551.63	555.12	0.000869	12.78	829.23	320.62	0.69
Reach-1	11926	1YR	1600.00	538.98	547.79	544.35	548.38	0.000349	6.18	319.15	112.17	0.41
Reach-1	11926	2YR	2000.00	538.98	548.74	545.10	549.41	0.000343	6.66	430.78	146.22	0.41
Reach-1	11926	5YR	2700.00	538.98	549.82	546.26	550.68	0.000386	7.70	575.60	244.97	0.45
Reach-1	11926	10YR	3200.00	538.98	550.48	547.16	551.48	0.000413	8.34	667.20	309.70	0.47
Reach-1	11926	25YR	3700.00	538.98	551.16	547.97	552.26	0.000425	8.85	761.53	368.75	0.48
Reach-1	11926	50YR	4000.00	538.98	551.53	548.41	552.70	0.000434	9.15	812.54	390.36	0.49
Reach-1	11926	100YR	4300.00	538.98	551.89	548.75	553.12	0.000443	9.44	861.03	406.66	0.50
Reach-1	11926	500YR	5500.00	538.98	553.29	550.07	554.73	0.000459	10.40	1054.29	475.80	0.52
Reach-1	11876	1YR	1600.00	538.96	547.57	544.57	548.34	0.000474	7.02	235.90	49.10	0.47
Reach-1	11876	2YR	2000.00	538.96	548.42	545.36	549.36	0.000499	7.78	299.67	175.00	0.49
Reach-1	11876	5YR	2700.00	538.96	549.31	546.59	550.61	0.000615	9.27	391.55	253.45	0.55
Reach-1	11876	10YR	3200.00	538.96	549.81	547.34	551.39	0.000701	10.27	443.86	301.62	0.60
Reach-1	11876	25YR	3700.00	538.96	550.34	548.25	552.16	0.000759	11.10	499.13	324.51	0.63
Reach-1	11876	50YR	4000.00	538.96	550.60	548.84	552.59	0.000802	11.61	526.47	339.24	0.65
Reach-1	11876	100YR	4300.00	538.96	550.83	549.24	552.99	0.000849	12.13	550.76	347.82	0.67
Reach-1	11876	500YR	5500.00	538.96	551.77	550.62	554.56	0.000998	13.94	648.11	381.49	0.74
Reach-1	11830	1YR	1600.00	538.33	547.77	542.28	548.11	0.000185	4.71	341.85	70.27	0.27
Reach-1	11830	2YR	2000.00	538.33	548.66	542.91	549.10	0.000211	5.34	441.36	203.24	0.29
Reach-1	11830	5YR	2700.00	538.33	549.62	543.92	550.26	0.000275	6.47	571.04	282.77	0.34
Reach-1	11830	10YR	3200.00	538.33	550.19	544.59	550.97	0.000319	7.20	647.11	330.60	0.37
Reach-1	11830	25YR	3700.00	538.33	550.78	545.23	551.68	0.000353	7.83	725.59	362.11	0.39
Reach-1	11830	50YR	4000.00	538.33	551.08	545.60	552.06	0.000376	8.20	765.94	377.47	0.41
Reach-1	11830	100YR	4300.00	538.33	551.35	545.95	552.42	0.000399	8.58	802.83	396.49	0.42
Reach-1	11830	500YR	5500.00	538.33	552.44	547.33	553.83	0.000476	9.87	948.99	443.85	0.46
Reach-1	11793		Culvert									
Reach-1	11746	1YR	1600.00	537.93	546.21	541.87	546.65	0.000287	5.37	298.04	36.70	0.33
Reach-1	11746	2YR	2000.00	537.93	547.12	542.50	547.69	0.000316	6.04	334.98	52.96	0.35
Reach-1	11746	5YR	2700.00	537.93	548.48	543.53	549.24	0.000356	7.03	466.23	180.44	0.38
Reach-1	11746	10YR	3200.00	537.93	549.39	544.20	550.25	0.000366	7.54	588.95	285.21	0.39
Reach-1	11746	25YR	3700.00	537.93	550.19	544.82	551.14	0.000376	7.99	702.82	331.21	0.40
Reach-1	11746	50YR	4000.00	537.93	550.60	545.19	551.61	0.000386	8.28	760.92	347.41	0.41
Reach-1	11746	100YR	4300.00	537.93	550.97	545.56	552.04	0.000398	8.57	813.98	368.14	0.42
Reach-1	11746	500YR	5500.00	537.93	552.37	546.94	553.66	0.000433	9.56	1013.16	441.97	0.44
Reach-1	11705	1YR	1600.00	537.61	545.55	543.22	546.49	0.000701	7.76	206.05	33.89	0.56
Reach-1	11705	2YR	2000.00	537.61	546.36	544.02	547.50	0.000726	8.56	237.24	43.19	0.58
Reach-1	11705	5YR	2700.00	537.61	547.46	545.26	548.99	0.000800	9.93	292.48	65.00	0.62
Reach-1	11705	10YR	3200.00	537.61	548.19	546.02	549.96	0.000829	10.71	367.97	190.42	0.64
Reach-1	11705	25YR	3700.00	537.61	548.92	546.72	550.83	0.000819	11.23	472.77	262.42	0.64
Reach-1	11705	50YR	4000.00	537.61	549.24	547.12	551.27	0.000843	11.65	521.32	283.33	0.66
Reach-1	11705	100YR	4300.00	537.61	549.50	547.52	551.68	0.000879	12.11	562.68	293.17	0.68
Reach-1	11705	500YR	5500.00	537.61	550.29	549.57	553.16	0.001066	14.03	697.19	330.03	0.75
Reach-1	11601	1YR	1600.00	536.67	545.68	542.28	546.36	0.000408	6.58	259.56	76.38	0.43
Reach-1	11601	2YR	2000.00	536.67	546.53	543.08	547.34	0.000431	7.29	329.88	91.29	0.46
Reach-1	11601	5YR	2700.00	536.67	547.73	544.32	548.78	0.000471	8.37	480.26	165.63	0.49
Reach-1	11601	10YR	3200.00	536.67	548.56	545.05	549.71	0.000471	8.87	649.01	248.88	0.49
Reach-1	11601	25YR	3700.00	536.67	549.38	545.95	550.55	0.000447	9.11	874.57	306.19	0.49
Reach-1	11601	50YR	4000.00	536.67	549.76	546.40	550.96	0.000446	9.31	982.32	312.78	0.49
Reach-1	11601	100YR	4300.00	536.67	550.10	546.88	551.33	0.000450	9.54	1075.88	319.34	0.49
Reach-1	11601	500YR	5500.00	536.67	551.26	549.08	552.64	0.000474	10.43	1398.80	354.06	0.52
Reach-1	11525	1YR	1600.00	536.45	545.61	541.40	546.31	0.000788	6.74	247.26	48.63	0.39

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	11525	2YR	2000.00	536.45	546.37	542.18	547.29	0.000927	7.71	291.01	71.52	0.43
Reach-1	11525	5YR	2700.00	536.45	547.41	543.43	548.70	0.001165	9.24	378.45	92.64	0.49
Reach-1	11525	10YR	3200.00	536.45	548.09	544.28	549.61	0.001295	10.14	447.30	137.49	0.52
Reach-1	11525	25YR	3700.00	536.45	548.72	545.14	550.43	0.001387	10.87	531.47	303.94	0.55
Reach-1	11525	50YR	4000.00	536.45	549.00	545.81	550.84	0.001461	11.33	596.90	330.81	0.56
Reach-1	11525	100YR	4300.00	536.45	549.24	546.50	551.20	0.001542	11.79	652.93	341.47	0.58
Reach-1	11525	500YR	5500.00	536.45	550.10	549.57	552.48	0.001808	13.33	860.50	388.36	0.64
Reach-1	11507	1YR	1600.00	536.51	545.48	541.54	546.27	0.000953	7.12	231.12	41.12	0.42
Reach-1	11507	2YR	2000.00	536.51	546.19	542.36	547.23	0.001146	8.21	262.28	64.23	0.47
Reach-1	11507	5YR	2700.00	536.51	547.16	543.65	548.63	0.001453	9.86	383.62	170.13	0.53
Reach-1	11507	10YR	3200.00	536.51	548.07	544.51	549.58	0.001402	10.23	547.27	250.81	0.53
Reach-1	11507	25YR	3700.00	536.51	548.79	545.38	550.32	0.001385	10.58	687.83	393.29	0.53
Reach-1	11507	50YR	4000.00	536.51	549.10	546.09	550.69	0.001421	10.90	749.30	396.09	0.54
Reach-1	11507	100YR	4300.00	536.51	549.36	548.17	551.02	0.001476	11.26	800.83	400.36	0.55
Reach-1	11507	500YR	5500.00	536.51	550.29	549.40	552.23	0.001675	12.57	983.89	421.48	0.60
Reach-1	11478		Culvert									
Reach-1	11453	1YR	1600.00	536.27	543.64	541.28	544.81	0.001766	8.68	184.28	25.00	0.56
Reach-1	11453	2YR	2000.00	536.27	544.58	542.12	546.02	0.001933	9.63	207.93	27.91	0.59
Reach-1	11453	5YR	2700.00	536.27	545.22	543.41	547.47	0.002735	12.04	234.14	53.96	0.71
Reach-1	11453	10YR	3200.00	536.27	546.15	544.25	548.65	0.002696	12.77	305.24	129.12	0.72
Reach-1	11453	25YR	3700.00	536.27	546.99	545.41	549.54	0.002557	13.13	447.48	197.73	0.71
Reach-1	11453	50YR	4000.00	536.27	547.41	547.35	549.95	0.002484	13.28	527.81	234.29	0.70
Reach-1	11453	100YR	4300.00	536.27	547.81	547.81	550.32	0.002413	13.40	605.85	245.59	0.70
Reach-1	11453	500YR	5500.00	536.27	548.94	548.94	551.58	0.002435	14.33	833.90	287.66	0.71
Reach-1	11413	1YR	1650.00	536.35	542.07	542.07	544.37	0.004259	12.16	135.72	42.37	1.00
Reach-1	11413	2YR	2100.00	536.35	542.92	542.92	545.55	0.004226	13.00	161.56	45.23	1.01
Reach-1	11413	5YR	2800.00	536.35	545.31	544.10	547.18	0.002109	11.17	312.82	66.16	0.74
Reach-1	11413	10YR	3300.00	536.35	546.34	544.87	548.28	0.001846	11.44	427.21	144.57	0.71
Reach-1	11413	25YR	3800.00	536.35	547.26	545.21	549.10	0.001572	11.35	570.27	234.46	0.67
Reach-1	11413	50YR	4100.00	536.35	547.68	545.21	549.52	0.001513	11.47	640.20	245.80	0.66
Reach-1	11413	100YR	4400.00	536.35	548.01	545.58	549.90	0.001508	11.71	696.93	254.13	0.66
Reach-1	11413	500YR	5600.00	536.35	548.19	548.18	551.07	0.002262	14.52	728.06	260.54	0.81
Reach-1	11339	1YR	1650.00	535.93	542.02	541.64	543.99	0.003424	11.25	146.64	30.18	0.90
Reach-1	11339	2YR	2100.00	535.93	542.89	542.53	545.16	0.003451	12.09	173.71	31.92	0.91
Reach-1	11339	5YR	2800.00	535.93	545.18	543.76	547.03	0.001940	11.01	310.85	150.62	0.71
Reach-1	11339	10YR	3300.00	535.93	546.41	544.75	548.07	0.001473	10.64	478.94	215.08	0.64
Reach-1	11339	25YR	3800.00	535.93	547.33	545.88	548.92	0.001288	10.64	612.86	237.64	0.61
Reach-1	11339	50YR	4100.00	535.93	547.74	546.25	549.35	0.001258	10.81	674.40	246.50	0.60
Reach-1	11339	100YR	4400.00	535.93	548.05	546.59	549.74	0.001269	11.09	723.21	254.01	0.61
Reach-1	11339	500YR	5600.00	535.93	548.25	547.73	550.82	0.001900	13.74	753.98	261.61	0.75
Reach-1	11176	1YR	1650.00	535.31	541.03	541.03	543.33	0.004259	12.16	135.72	29.44	1.00
Reach-1	11176	2YR	2100.00	535.31	541.92	541.92	544.51	0.004150	12.91	162.61	31.22	1.00
Reach-1	11176	5YR	2800.00	535.31	545.29	543.11	546.62	0.001254	9.55	426.43	295.64	0.59
Reach-1	11176	10YR	3300.00	535.31	546.61	544.36	547.72	0.000921	9.04	596.66	353.97	0.52
Reach-1	11176	25YR	3800.00	535.31	547.53	545.24	548.60	0.000824	9.09	714.64	427.33	0.50
Reach-1	11176	50YR	4100.00	535.31	547.94	545.59	549.04	0.000812	9.26	767.81	441.90	0.49
Reach-1	11176	100YR	4400.00	535.31	548.27	545.90	549.41	0.000824	9.51	810.32	458.97	0.50
Reach-1	11176	500YR	5600.00	535.31	548.65	546.92	550.30	0.001157	11.53	859.48	479.20	0.60
Reach-1	11167	1YR	1650.00	535.12	540.82	540.82	543.10	0.004251	12.12	136.11	29.76	1.00
Reach-1	11167	2YR	2100.00	535.12	541.70	541.70	544.28	0.004137	12.87	163.17	31.58	1.00
Reach-1	11167	5YR	2800.00	535.12	545.33	542.88	546.58	0.001131	9.26	432.59	303.43	0.56
Reach-1	11167	10YR	3300.00	535.12	546.62	544.08	547.70	0.000855	8.86	601.62	355.44	0.50
Reach-1	11167	25YR	3800.00	535.12	547.54	545.03	548.59	0.000771	8.93	721.23	425.86	0.48
Reach-1	11167	50YR	4100.00	535.12	547.95	545.41	549.02	0.000763	9.11	775.03	445.66	0.48
Reach-1	11167	100YR	4400.00	535.12	548.28	545.73	549.40	0.000774	9.36	818.15	457.96	0.49
Reach-1	11167	500YR	5600.00	535.12	548.66	546.83	550.28	0.001090	11.35	868.13	479.80	0.58
Reach-1	11111	1YR	1650.00	534.79	540.48	540.48	542.77	0.004268	12.14	135.91	29.74	1.00

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	11111	2YR	2100.00	534.79	541.37	541.37	543.95	0.004142	12.88	163.09	31.57	1.00
Reach-1	11111	5YR	2800.00	534.79	545.27	542.58	546.52	0.001085	9.13	395.16	224.19	0.55
Reach-1	11111	10YR	3300.00	534.79	546.47	543.41	547.64	0.000895	9.05	536.45	341.05	0.51
Reach-1	11111	25YR	3800.00	534.79	547.36	544.34	548.53	0.000819	9.18	648.34	456.98	0.50
Reach-1	11111	50YR	4100.00	534.79	547.76	544.73	548.97	0.000816	9.39	697.94	499.99	0.50
Reach-1	11111	100YR	4400.00	534.79	548.08	545.33	549.34	0.000835	9.68	736.85	511.79	0.51
Reach-1	11111	500YR	5600.00	534.79	548.22	546.78	550.18	0.001281	12.09	755.10	516.79	0.63
Reach-1	11002	1YR	1650.00	534.17	539.86	539.86	542.15	0.004268	12.14	135.91	29.74	1.00
Reach-1	11002	2YR	2100.00	534.17	540.75	540.75	543.33	0.004142	12.88	163.09	31.57	1.00
Reach-1	11002	5YR	2800.00	534.17	545.32	541.96	546.35	0.000818	8.34	442.08	166.44	0.48
Reach-1	11002	10YR	3300.00	534.17	546.50	542.83	547.51	0.000709	8.41	553.00	187.65	0.46
Reach-1	11002	25YR	3800.00	534.17	547.36	543.67	548.42	0.000687	8.73	634.08	306.13	0.46
Reach-1	11002	50YR	4100.00	534.17	547.74	544.08	548.86	0.000701	9.01	669.92	328.98	0.47
Reach-1	11002	100YR	4400.00	534.17	548.03	544.55	549.24	0.000731	9.36	697.84	387.58	0.48
Reach-1	11002	500YR	5600.00	534.17	548.14	545.97	550.04	0.001145	11.78	707.60	421.50	0.60
Reach-1	10924	1YR	1650.00	533.41	539.75	539.10	541.50	0.002916	10.60	155.62	31.08	0.84
Reach-1	10924	2YR	2100.00	533.41	540.79	539.99	542.71	0.002743	11.11	189.07	33.23	0.82
Reach-1	10924	5YR	2800.00	533.41	545.39	541.20	546.24	0.000606	7.60	520.82	201.61	0.42
Reach-1	10924	10YR	3300.00	533.41	546.59	541.94	547.40	0.000524	7.62	674.76	230.98	0.40
Reach-1	10924	25YR	3800.00	533.41	547.47	542.70	548.30	0.000504	7.85	788.53	326.58	0.40
Reach-1	10924	50YR	4100.00	533.41	547.86	543.37	548.74	0.000511	8.09	839.53	416.99	0.40
Reach-1	10924	100YR	4400.00	533.41	548.18	543.79	549.10	0.000530	8.37	879.91	461.66	0.41
Reach-1	10924	500YR	5600.00	533.41	548.40	545.63	549.81	0.000798	10.38	908.98	473.99	0.51
Reach-1	10906	1YR	1650.00	533.08	539.83	538.79	541.32	0.002333	9.79	168.52	31.92	0.75
Reach-1	10906	2YR	2100.00	533.08	540.87	539.66	542.54	0.002258	10.35	202.84	34.07	0.75
Reach-1	10906	5YR	2800.00	533.08	545.41	540.87	546.21	0.000544	7.36	496.58	191.01	0.40
Reach-1	10906	10YR	3300.00	533.08	546.55	541.58	547.38	0.000504	7.61	595.74	237.81	0.39
Reach-1	10906	25YR	3800.00	533.08	547.47	542.31	548.29	0.000472	7.74	792.78	386.87	0.39
Reach-1	10906	50YR	4100.00	533.08	547.86	542.91	548.72	0.000480	7.97	847.04	468.12	0.39
Reach-1	10906	100YR	4400.00	533.08	548.18	543.37	549.08	0.000499	8.25	889.99	479.01	0.40
Reach-1	10906	500YR	5600.00	533.08	548.40	544.93	549.78	0.000751	10.24	920.73	486.72	0.49
Reach-1	10866		Bridge									
Reach-1	10829	1YR	1650.00	532.82	538.50	538.50	540.80	0.004299	12.17	135.57	29.72	1.00
Reach-1	10829	2YR	2100.00	532.82	539.38	539.38	541.98	0.004189	12.93	162.43	31.53	1.00
Reach-1	10829	5YR	2800.00	532.82	540.59	540.59	543.57	0.004055	13.86	202.09	34.02	1.00
Reach-1	10829	10YR	3300.00	532.82	541.33	541.33	544.60	0.003876	14.50	227.90	36.05	1.00
Reach-1	10829	25YR	3800.00	532.82	542.01	542.01	545.56	0.003703	15.13	254.34	42.06	0.99
Reach-1	10829	50YR	4100.00	532.82	542.43	542.43	546.11	0.003562	15.41	272.83	45.38	0.98
Reach-1	10829	100YR	4400.00	532.82	542.83	542.83	546.64	0.003451	15.69	291.74	48.85	0.97
Reach-1	10829	500YR	5600.00	532.82	544.88	544.88	548.55	0.002515	15.57	447.22	136.32	0.86
Reach-1	10799	1YR	1650.00	532.59	538.30	538.30	540.57	0.002380	12.10	136.34	29.77	1.00
Reach-1	10799	2YR	2100.00	532.59	539.17	539.17	541.75	0.002330	12.88	163.09	31.57	1.00
Reach-1	10799	5YR	2800.00	532.59	540.38	540.38	543.34	0.002257	13.80	202.86	34.07	1.00
Reach-1	10799	10YR	3300.00	532.59	541.09	541.09	544.37	0.002194	14.53	227.47	36.06	1.00
Reach-1	10799	25YR	3800.00	532.59	541.76	541.76	545.33	0.002098	15.16	254.06	43.98	0.99
Reach-1	10799	50YR	4100.00	532.59	542.20	542.20	545.89	0.002006	15.42	274.42	48.80	0.98
Reach-1	10799	100YR	4400.00	532.59	542.60	542.60	546.42	0.001941	15.69	295.95	57.50	0.97
Reach-1	10799	500YR	5600.00	532.59	544.45	544.45	548.24	0.001504	15.84	461.46	245.30	0.89
Reach-1	10616	1YR	1650.00	531.93	537.64	537.64	539.91	0.002383	12.11	136.26	29.77	1.00
Reach-1	10616	2YR	2100.00	531.93	538.51	538.51	541.09	0.002325	12.87	163.20	31.58	1.00
Reach-1	10616	5YR	2800.00	531.93	539.70	539.70	542.68	0.002269	13.84	202.27	34.26	1.00
Reach-1	10616	10YR	3300.00	531.93	540.43	540.43	543.71	0.002144	14.53	230.11	47.62	0.99
Reach-1	10616	25YR	3800.00	531.93	541.23	541.23	544.66	0.001937	14.89	273.97	124.98	0.96
Reach-1	10616	50YR	4100.00	531.93	541.66	541.66	545.19	0.001855	15.12	301.90	174.44	0.95
Reach-1	10616	100YR	4400.00	531.93	542.10	542.10	545.69	0.001762	15.29	332.50	248.46	0.93
Reach-1	10616	500YR	5600.00	531.93	543.59	543.59	547.52	0.001588	16.18	446.36	299.79	0.91
Reach-1	10408	1YR	1650.00	530.38	536.10	536.10	538.40	0.002398	12.16	135.68	29.44	1.00

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W. S. (ft)	E. G. Elev (ft)	E. G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	10408	2YR	2100.00	530.38	536.99	536.99	539.58	0.002335	12.91	162.61	31.22	1.00
Reach-1	10408	5YR	2800.00	530.38	538.19	538.19	541.19	0.002283	13.89	201.55	33.62	1.00
Reach-1	10408	10YR	3200.00	530.38	538.88	538.88	542.01	0.002072	14.21	235.47	66.26	0.97
Reach-1	10408	25YR	3700.00	530.38	539.72	539.72	542.92	0.001828	14.45	296.99	201.92	0.93
Reach-1	10408	50YR	4000.00	530.38	540.21	540.21	543.42	0.001700	14.53	339.09	219.69	0.91
Reach-1	10408	100YR	4400.00	530.38	540.73	540.73	544.05	0.001628	14.83	388.17	233.64	0.90
Reach-1	10408	500YR	5400.00	530.38	541.94	541.94	545.44	0.001483	15.47	513.98	348.63	0.87
Reach-1	10244	1YR	1650.00	529.46	535.19	535.19	537.45	0.002384	12.07	136.67	30.06	1.00
Reach-1	10244	2YR	2100.00	529.46	537.07	536.06	538.84	0.001324	10.67	197.48	35.33	0.77
Reach-1	10244	5YR	2800.00	529.46	537.54	537.19	540.24	0.001832	13.19	215.97	45.90	0.92
Reach-1	10244	10YR	3200.00	529.46	538.54	537.85	541.12	0.001454	12.94	274.48	68.06	0.84
Reach-1	10244	25YR	3700.00	529.46	539.27	538.68	542.05	0.001396	13.50	328.16	78.22	0.83
Reach-1	10244	50YR	4000.00	529.46	540.08	539.15	542.66	0.001156	13.08	395.01	151.44	0.77
Reach-1	10244	100YR	4400.00	529.46	540.52	539.68	543.29	0.001176	13.62	434.66	277.60	0.78
Reach-1	10244	500YR	5400.00	529.46	541.55	540.95	544.74	0.001201	14.76	534.31	388.40	0.81
Reach-1	10043	1YR	1650.00	528.02	534.50	533.74	536.18	0.001543	10.40	158.69	30.96	0.81
Reach-1	10043	2YR	2100.00	528.02	537.25	534.63	538.32	0.000604	8.35	298.38	90.04	0.54
Reach-1	10043	5YR	2800.00	528.02	537.87	535.81	539.43	0.000807	10.17	360.17	113.59	0.63
Reach-1	10043	10YR	3200.00	528.02	538.91	536.57	540.37	0.000659	9.96	546.52	266.50	0.58
Reach-1	10043	25YR	3700.00	528.02	539.82	537.45	541.15	0.000568	9.84	789.73	352.50	0.55
Reach-1	10043	50YR	4000.00	528.02	540.70	537.70	541.77	0.000438	9.14	1035.90	434.35	0.49
Reach-1	10043	100YR	4400.00	528.02	541.25	539.34	542.29	0.000413	9.17	1195.10	467.77	0.48
Reach-1	10043	500YR	5400.00	528.02	542.54	540.27	543.50	0.000363	9.22	1573.56	501.95	0.45
Reach-1	9990	1YR	1650.00	527.39	534.77	533.10	535.97	0.000973	8.81	187.24	32.76	0.65
Reach-1	9990	2YR	2100.00	527.39	537.38	533.99	538.22	0.000427	7.44	353.19	182.52	0.46
Reach-1	9990	5YR	2800.00	527.39	538.14	535.19	539.27	0.000528	8.77	540.44	262.18	0.52
Reach-1	9990	10YR	3200.00	527.39	539.23	535.94	540.19	0.000415	8.39	769.27	339.36	0.47
Reach-1	9990	25YR	3700.00	527.39	540.07	536.78	541.01	0.000384	8.52	959.08	400.96	0.45
Reach-1	9990	50YR	4000.00	527.39	540.84	537.18	541.68	0.000325	8.20	1141.32	467.62	0.42
Reach-1	9990	100YR	4400.00	527.39	541.36	538.36	542.21	0.000322	8.39	1265.64	479.71	0.42
Reach-1	9990	500YR	5400.00	527.39	542.58	539.34	543.46	0.000311	8.80	1566.34	541.63	0.42
Reach-1	9976	1YR	1650.00	527.12	535.02	532.86	535.70	0.000530	6.63	251.28	53.44	0.51
Reach-1	9976	2YR	2100.00	527.12	537.55	533.62	538.04	0.000227	5.64	398.18	180.82	0.36
Reach-1	9976	5YR	2800.00	527.12	538.37	534.56	539.02	0.000275	6.64	593.47	282.21	0.40
Reach-1	9976	10YR	3200.00	527.12	539.40	535.01	540.01	0.000229	6.53	803.04	352.37	0.37
Reach-1	9976	25YR	3700.00	527.12	540.21	535.56	540.85	0.000219	6.75	981.73	413.21	0.37
Reach-1	9976	50YR	4000.00	527.12	540.96	535.88	541.55	0.000192	6.62	1153.07	472.58	0.35
Reach-1	9976	100YR	4400.00	527.12	541.47	536.27	542.11	0.000193	6.83	1275.13	490.32	0.35
Reach-1	9976	500YR	5400.00	527.12	542.67	537.22	543.35	0.000192	7.27	1568.82	555.87	0.36
Reach-1	9952	Bridge										
Reach-1	9920	1YR	1650.00	526.68	534.82	532.54	535.52	0.000543	6.75	246.07	51.90	0.51
Reach-1	9920	2YR	2100.00	526.68	536.24	533.33	536.95	0.000399	6.77	319.77	63.32	0.46
Reach-1	9920	5YR	2800.00	526.68	537.62	534.36	538.47	0.000378	7.45	439.46	134.23	0.46
Reach-1	9920	10YR	3200.00	526.68	538.89	534.82	539.68	0.000293	7.23	605.72	304.05	0.41
Reach-1	9920	25YR	3700.00	526.68	539.97	535.38	540.77	0.000263	7.36	761.11	368.69	0.40
Reach-1	9920	50YR	4000.00	526.68	540.71	535.69	541.49	0.000238	7.33	877.44	431.44	0.39
Reach-1	9920	100YR	4400.00	526.68	541.20	536.11	542.04	0.000245	7.65	957.64	464.50	0.39
Reach-1	9920	500YR	5400.00	526.68	542.29	537.15	543.29	0.000263	8.41	1146.87	522.35	0.41
Reach-1	9896	1YR	1700.00	526.42	532.59	532.59	534.99	0.002408	12.43	136.76	28.34	1.00
Reach-1	9896	2YR	2200.00	526.42	533.56	533.56	536.32	0.002357	13.33	165.14	30.67	1.00
Reach-1	9896	5YR	2800.00	526.42	534.56	534.56	537.75	0.002185	14.34	198.33	35.38	0.99
Reach-1	9896	10YR	3300.00	526.42	535.37	535.37	538.86	0.002043	15.00	230.70	44.68	0.98
Reach-1	9896	25YR	3800.00	526.42	536.15	536.15	539.88	0.001917	15.54	268.65	51.80	0.96
Reach-1	9896	50YR	4100.00	526.42	536.32	536.32	540.47	0.002080	16.41	277.44	57.09	1.01
Reach-1	9896	100YR	4500.00	526.42	537.48	537.48	541.18	0.001574	15.59	380.56	109.23	0.90
Reach-1	9896	500YR	5500.00	526.42	539.34	539.34	542.60	0.001154	15.05	698.33	365.67	0.79
Reach-1	9836	1YR	1700.00	525.53	532.50	531.68	534.25	0.001540	10.61	160.23	30.54	0.81

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W. S. (ft)	E. G. Elev (ft)	E. G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	9836	2YR	2200.00	525.53	533.65	532.68	535.62	0.001341	11.27	210.59	61.31	0.78
Reach-1	9836	5YR	2800.00	525.53	534.70	533.82	536.96	0.001284	12.18	294.38	94.46	0.78
Reach-1	9836	10YR	3300.00	525.53	534.98	534.79	537.84	0.001559	13.75	321.71	99.62	0.86
Reach-1	9836	25YR	3800.00	525.53	535.62	535.61	538.71	0.001543	14.41	389.00	111.00	0.87
Reach-1	9836	50YR	4100.00	525.53	536.02	536.02	539.19	0.001504	14.67	434.48	115.00	0.87
Reach-1	9836	100YR	4500.00	525.53	536.49	536.49	539.79	0.001483	15.07	489.62	119.79	0.87
Reach-1	9836	500YR	5500.00	525.53	537.62	537.56	541.22	0.001428	15.96	634.04	187.88	0.87
Reach-1	9826	1YR	1700.00	525.59	531.74	531.74	534.16	0.002393	12.48	136.28	28.73	1.00
Reach-1	9826	2YR	2200.00	525.59	532.70	532.70	535.52	0.002197	13.48	167.15	40.35	0.98
Reach-1	9826	5YR	2800.00	525.59	534.10	534.10	536.89	0.001665	13.55	274.85	99.86	0.89
Reach-1	9826	10YR	3300.00	525.59	534.97	534.97	537.83	0.001507	13.90	368.10	115.19	0.86
Reach-1	9826	25YR	3800.00	525.59	535.68	535.68	538.66	0.001438	14.36	452.73	123.74	0.85
Reach-1	9826	50YR	4100.00	525.59	536.07	536.07	539.12	0.001406	14.62	502.21	127.01	0.85
Reach-1	9826	100YR	4500.00	525.59	536.50	536.50	539.70	0.001408	15.08	557.58	129.73	0.86
Reach-1	9826	500YR	5500.00	525.59	537.85	537.85	541.11	0.001255	15.54	751.41	304.96	0.83
Reach-1	9726	1YR	1700.00	524.86	531.05	531.05	533.43	0.002332	12.38	139.31	42.43	0.99
Reach-1	9726	2YR	2200.00	524.86	532.12	532.12	534.73	0.001984	13.03	197.49	68.67	0.94
Reach-1	9726	5YR	2800.00	524.86	533.30	533.24	536.04	0.001679	13.51	294.64	97.49	0.89
Reach-1	9726	10YR	3300.00	524.86	533.92	533.92	537.00	0.001713	14.43	360.34	116.43	0.91
Reach-1	9726	25YR	3800.00	524.86	535.20	535.20	537.81	0.001244	13.61	572.54	210.53	0.80
Reach-1	9726	50YR	4100.00	524.86	535.48	535.48	538.22	0.001269	14.04	628.24	241.12	0.81
Reach-1	9726	100YR	4500.00	524.86	536.06	536.06	538.71	0.001172	14.04	745.55	347.71	0.79
Reach-1	9726	500YR	5500.00	524.86	536.93	536.93	539.83	0.001197	15.01	926.14	388.46	0.81
Reach-1	9716	1YR	1700.00	524.78	530.95	530.95	533.35	0.002408	12.43	136.77	28.34	1.00
Reach-1	9716	2YR	2200.00	524.78	531.96	531.96	534.68	0.002275	13.22	168.95	46.76	0.99
Reach-1	9716	5YR	2800.00	524.78	533.21	533.21	536.01	0.001819	13.53	259.24	91.99	0.91
Reach-1	9716	10YR	3300.00	524.78	534.28	534.28	536.96	0.001478	13.43	390.87	155.66	0.84
Reach-1	9716	25YR	3800.00	524.78	534.81	534.81	537.73	0.001506	14.16	477.63	173.25	0.86
Reach-1	9716	50YR	4100.00	524.78	535.44	535.44	538.15	0.001305	13.83	595.03	244.23	0.81
Reach-1	9716	100YR	4500.00	524.78	535.99	535.99	538.65	0.001215	13.88	707.66	344.57	0.79
Reach-1	9716	500YR	5500.00	524.78	536.88	536.88	539.76	0.001227	14.80	892.29	389.03	0.81
Reach-1	9666	1YR	1700.00	524.53	530.70	530.70	533.10	0.002408	12.43	136.76	28.34	1.00
Reach-1	9666	2YR	2200.00	524.53	531.67	531.67	534.43	0.002357	13.32	165.29	32.73	1.00
Reach-1	9666	5YR	2800.00	524.53	533.09	533.09	535.82	0.001730	13.31	268.21	136.71	0.89
Reach-1	9666	10YR	3300.00	524.53	534.25	534.25	536.68	0.001310	12.84	463.39	262.66	0.80
Reach-1	9666	25YR	3800.00	524.53	534.85	534.85	537.37	0.001281	13.32	578.45	309.02	0.80
Reach-1	9666	50YR	4100.00	524.53	535.19	535.19	537.76	0.001266	13.58	643.79	331.24	0.80
Reach-1	9666	100YR	4500.00	524.53	535.57	535.57	538.25	0.001275	14.01	718.20	347.22	0.81
Reach-1	9666	500YR	5500.00	524.53	536.48	536.48	539.37	0.001272	14.88	899.98	375.10	0.82
Reach-1	9359	1YR	1750.00	522.21	528.46	528.46	530.92	0.002432	12.58	139.15	28.51	1.00
Reach-1	9359	2YR	2200.00	522.21	529.36	529.36	532.11	0.002332	13.28	165.82	51.20	1.00
Reach-1	9359	5YR	2800.00	522.21	530.99	530.99	533.28	0.001451	12.44	384.40	177.77	0.82
Reach-1	9359	10YR	3300.00	522.21	531.74	531.74	534.04	0.001326	12.72	526.06	213.19	0.80
Reach-1	9359	25YR	3800.00	522.21	532.29	532.29	534.70	0.001316	13.25	633.15	233.50	0.80
Reach-1	9359	50YR	4100.00	522.21	532.53	532.53	535.08	0.001357	13.71	680.83	240.61	0.82
Reach-1	9359	100YR	4500.00	522.21	532.99	532.99	535.55	0.001308	13.93	772.83	254.07	0.81
Reach-1	9359	500YR	5500.00	522.21	533.81	533.81	536.63	0.001341	14.93	940.09	327.77	0.83
Reach-1	9072	1YR	1750.00	520.53	527.38	526.81	529.32	0.001758	11.19	156.38	29.69	0.86
Reach-1	9072	2YR	2200.00	520.53	528.10	527.67	530.47	0.001830	12.35	180.49	40.46	0.89
Reach-1	9072	5YR	2800.00	520.53	528.92	528.92	531.83	0.001904	13.73	233.75	89.38	0.93
Reach-1	9072	10YR	3300.00	520.53	530.00	530.00	532.77	0.001528	13.58	367.61	164.63	0.86
Reach-1	9072	25YR	3800.00	520.53	530.80	530.80	533.54	0.001371	13.72	495.20	184.48	0.82
Reach-1	9072	50YR	4100.00	520.53	531.15	531.15	533.96	0.001351	14.00	554.14	193.22	0.82
Reach-1	9072	100YR	4500.00	520.53	531.41	531.41	534.50	0.001452	14.78	596.55	204.88	0.86
Reach-1	9072	500YR	5500.00	520.53	532.64	532.64	535.72	0.001285	15.12	834.97	261.79	0.82
Reach-1	8969	1YR	1750.00	519.50	527.84	525.87	528.91	0.001200	8.48	267.86	61.46	0.56
Reach-1	8969	2YR	2200.00	519.50	528.64	526.71	530.00	0.001324	9.57	327.23	105.53	0.60
Reach-1	8969	5YR	2800.00	519.50	528.00	527.63	530.60	0.002837	13.24	278.10	64.04	0.87



HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	8969	10YR	3300.00	519.50	528.70	528.39	531.72	0.002910	14.26	333.31	120.45	0.89
Reach-1	8969	25YR	3800.00	519.50	529.92	528.58	532.48	0.002147	13.48	481.75	216.50	0.79
Reach-1	8969	50YR	4100.00	519.50	531.28	528.58	533.01	0.001316	11.58	795.41	268.63	0.63
Reach-1	8969	100YR	4500.00	519.50	531.88	530.87	533.54	0.001213	11.54	914.79	292.20	0.61
Reach-1	8969	500YR	5500.00	519.50	533.36	531.70	534.86	0.001007	11.43	1204.31	326.15	0.57
Reach-1	8943	1YR	1750.00	519.17	527.89	525.33	528.79	0.000980	7.64	240.06	45.86	0.51
Reach-1	8943	2YR	2200.00	519.17	528.73	526.18	529.85	0.001046	8.53	285.23	64.52	0.54
Reach-1	8943	5YR	2800.00	519.17	528.16	527.11	530.30	0.002197	11.74	252.98	48.69	0.78
Reach-1	8943	10YR	3300.00	519.17	528.96	527.85	531.32	0.002120	12.38	300.51	66.63	0.77
Reach-1	8943	25YR	3800.00	519.17	529.97	528.67	532.34	0.001837	12.48	376.03	209.99	0.74
Reach-1	8943	50YR	4100.00	519.17	530.95	529.02	532.90	0.001382	11.60	626.80	262.01	0.65
Reach-1	8943	100YR	4500.00	519.17	531.04	529.75	533.32	0.001596	12.55	648.02	265.54	0.70
Reach-1	8943	500YR	5500.00	519.17	533.34	531.69	534.82	0.000903	10.83	1201.93	348.14	0.54
Reach-1	8914		Bridge									
Reach-1	8880	1YR	1750.00	518.88	525.14	525.14	527.59	0.004300	12.55	139.42	28.53	1.00
Reach-1	8880	2YR	2200.00	518.88	526.03	526.03	528.78	0.004164	13.30	165.47	30.85	1.00
Reach-1	8880	5YR	2800.00	518.88	527.03	527.03	530.20	0.003855	14.30	199.75	36.71	0.99
Reach-1	8880	10YR	3300.00	518.88	527.74	527.74	531.30	0.003772	15.16	226.86	39.75	0.99
Reach-1	8880	25YR	3800.00	518.88	528.61	528.61	532.32	0.003400	15.52	266.63	67.05	0.96
Reach-1	8880	50YR	4100.00	518.88	530.44	529.68	532.85	0.001783	12.88	548.89	261.98	0.72
Reach-1	8880	100YR	4500.00	518.88	531.09	531.09	533.26	0.001555	12.55	724.02	276.33	0.68
Reach-1	8880	500YR	5500.00	518.88	531.87	531.87	534.15	0.001593	13.31	946.09	297.72	0.70
Reach-1	8841	1YR	1750.00	518.48	524.73	524.73	527.19	0.004343	12.60	138.92	28.49	1.01
Reach-1	8841	2YR	2200.00	518.48	525.60	525.60	528.38	0.004244	13.38	164.49	30.31	1.01
Reach-1	8841	5YR	2800.00	518.48	526.60	526.60	529.81	0.003919	14.38	196.30	33.02	1.00
Reach-1	8841	10YR	3300.00	518.48	527.31	527.31	530.92	0.003848	15.27	220.29	34.89	1.00
Reach-1	8841	25YR	3800.00	518.48	528.43	528.43	531.95	0.003103	15.10	285.63	95.75	0.92
Reach-1	8841	50YR	4100.00	518.48	529.06	529.06	532.47	0.002763	14.96	353.10	122.35	0.88
Reach-1	8841	100YR	4500.00	518.48	530.62	530.62	532.98	0.001666	12.93	667.12	260.96	0.70
Reach-1	8841	500YR	5500.00	518.48	531.71	531.71	533.87	0.001469	12.97	995.00	323.42	0.67
Reach-1	8733	1YR	1750.00	517.49	523.77	523.77	526.20	0.004264	12.51	139.84	28.55	1.00
Reach-1	8733	2YR	2200.00	517.49	524.63	524.63	527.39	0.004143	13.33	165.17	30.94	1.00
Reach-1	8733	5YR	2800.00	517.49	526.16	526.16	528.78	0.002888	13.10	248.00	87.85	0.87
Reach-1	8733	10YR	3300.00	517.49	527.04	527.04	529.63	0.002523	13.24	331.74	101.33	0.83
Reach-1	8733	25YR	3800.00	517.49	527.74	527.74	530.37	0.002365	13.56	405.88	111.27	0.81
Reach-1	8733	50YR	4100.00	517.49	528.00	528.00	530.78	0.002432	14.02	435.47	115.75	0.83
Reach-1	8733	100YR	4500.00	517.49	528.30	528.30	531.31	0.002554	14.69	471.94	129.17	0.85
Reach-1	8733	500YR	5500.00	517.49	529.73	529.73	532.42	0.002024	14.40	702.78	194.95	0.78
Reach-1	8543	1YR	1750.00	515.93	522.21	522.21	524.64	0.004264	12.51	139.84	28.55	1.00
Reach-1	8543	2YR	2200.00	515.93	523.07	523.07	525.83	0.004171	13.31	165.33	30.08	1.00
Reach-1	8543	5YR	2800.00	515.93	524.04	524.04	527.27	0.003948	14.41	194.64	31.19	1.00
Reach-1	8543	10YR	3300.00	515.93	524.93	524.93	528.37	0.003540	14.88	232.22	60.66	0.97
Reach-1	8543	25YR	3800.00	515.93	526.53	526.53	529.11	0.002175	13.29	417.24	152.22	0.78
Reach-1	8543	50YR	4100.00	515.93	527.12	527.12	529.48	0.001892	12.94	514.41	171.00	0.74
Reach-1	8543	100YR	4500.00	515.93	527.51	527.51	529.92	0.001883	13.26	583.06	179.82	0.74
Reach-1	8543	500YR	5500.00	515.93	528.43	528.43	530.90	0.001827	13.85	759.25	201.90	0.74
Reach-1	8274	1YR	1750.00	514.12	520.40	520.40	522.83	0.004264	12.51	139.84	28.55	1.00
Reach-1	8274	2YR	2200.00	514.12	521.26	521.26	524.02	0.004171	13.31	165.35	30.31	1.00
Reach-1	8274	5YR	2800.00	514.12	522.24	522.24	525.45	0.003911	14.37	196.36	34.01	0.99
Reach-1	8274	10YR	3300.00	514.12	523.36	523.36	526.53	0.003149	14.34	252.45	71.09	0.92
Reach-1	8274	25YR	3800.00	514.12	524.51	524.51	527.39	0.002447	13.88	356.28	105.85	0.83
Reach-1	8274	50YR	4100.00	514.12	525.13	525.13	527.81	0.002137	13.58	432.13	135.08	0.78
Reach-1	8274	100YR	4500.00	514.12	525.66	525.66	528.31	0.002024	13.70	508.19	155.16	0.77
Reach-1	8274	500YR	5500.00	514.12	527.73	526.64	529.59	0.001247	12.21	858.43	371.02	0.62
Reach-1	8186	1YR	1750.00	513.12	519.40	519.40	521.83	0.004264	12.51	139.84	28.55	1.00
Reach-1	8186	2YR	2200.00	513.12	520.26	520.26	523.02	0.004190	13.33	165.13	30.42	1.00
Reach-1	8186	5YR	2900.00	513.12	521.41	521.41	524.68	0.003852	14.51	202.53	34.66	0.99

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	8186	10YR	3300.00	513.12	522.09	522.09	525.56	0.003607	14.97	228.83	44.38	0.97
Reach-1	8186	25YR	3800.00	513.12	523.08	523.08	526.57	0.003079	15.06	290.86	79.99	0.92
Reach-1	8186	50YR	4100.00	513.12	523.59	523.59	527.11	0.002898	15.19	332.89	92.49	0.90
Reach-1	8186	100YR	4500.00	513.12	524.27	524.27	527.76	0.002644	15.25	398.58	135.20	0.87
Reach-1	8186	500YR	5500.00	513.12	525.49	525.49	529.25	0.002490	16.04	528.53	230.36	0.86
Reach-1	7888	1YR	1750.00	511.64	517.92	517.92	520.35	0.004264	12.51	139.84	28.55	1.00
Reach-1	7888	2YR	2200.00	511.64	518.78	518.78	521.54	0.004171	13.31	165.34	30.11	1.00
Reach-1	7888	5YR	2900.00	511.64	520.66	520.66	522.96	0.002472	12.46	358.40	151.59	0.81
Reach-1	7888	10YR	3300.00	511.64	521.27	521.27	523.56	0.002295	12.65	454.76	190.97	0.79
Reach-1	7888	25YR	3800.00	511.64	522.11	521.85	524.23	0.001965	12.51	597.51	318.14	0.74
Reach-1	7888	50YR	4100.00	511.64	522.86	522.14	524.69	0.001586	11.87	729.97	331.34	0.68
Reach-1	7888	100YR	4500.00	511.64	523.58	522.52	525.27	0.001389	11.65	856.82	341.39	0.64
Reach-1	7888	500YR	5500.00	511.64	524.98	523.34	526.58	0.001184	11.71	1113.81	359.39	0.60
Reach-1	7717	1YR	1750.00	510.70	516.98	516.98	519.41	0.004264	12.51	139.84	28.55	1.00
Reach-1	7717	2YR	2200.00	510.70	517.84	517.84	520.60	0.004171	13.31	165.40	30.93	1.00
Reach-1	7717	5YR	2900.00	510.70	519.34	519.34	522.19	0.003181	13.64	250.40	133.21	0.91
Reach-1	7717	10YR	3300.00	510.70	520.08	520.08	522.93	0.002834	13.76	320.10	239.76	0.87
Reach-1	7717	25YR	3800.00	510.70	520.75	520.75	523.75	0.002726	14.27	388.45	249.15	0.87
Reach-1	7717	50YR	4100.00	510.70	521.11	521.11	524.22	0.002704	14.61	426.11	255.09	0.87
Reach-1	7717	100YR	4500.00	510.70	521.60	521.60	524.80	0.002631	14.94	480.55	263.84	0.87
Reach-1	7717	500YR	5500.00	510.70	522.74	522.74	526.12	0.002466	15.64	618.36	282.81	0.85
Reach-1	7584	1YR	1750.00	509.64	515.92	515.92	518.35	0.004264	12.51	139.84	28.55	1.00
Reach-1	7584	2YR	2200.00	509.64	516.78	516.78	519.54	0.004190	13.33	165.13	30.48	1.00
Reach-1	7584	5YR	2900.00	509.64	517.94	517.94	521.20	0.003839	14.49	203.45	36.03	0.99
Reach-1	7584	10YR	3300.00	509.64	518.99	518.99	522.03	0.002985	14.09	280.91	317.46	0.89
Reach-1	7584	25YR	3800.00	509.64	519.75	519.75	522.88	0.002765	14.44	360.61	334.09	0.87
Reach-1	7584	50YR	4100.00	509.64	520.31	520.31	523.35	0.002511	14.35	424.21	345.97	0.84
Reach-1	7584	100YR	4500.00	509.64	520.77	520.77	523.92	0.002474	14.73	479.34	352.30	0.84
Reach-1	7584	500YR	5500.00	509.64	521.87	521.87	525.22	0.002367	15.50	615.72	363.76	0.84
Reach-1	7541	1YR	1750.00	509.20	515.48	515.48	517.91	0.004262	12.51	139.87	28.56	1.00
Reach-1	7541	2YR	2200.00	509.20	516.37	516.37	519.10	0.004179	13.24	166.11	30.34	1.00
Reach-1	7541	5YR	2900.00	509.20	518.02	518.02	520.68	0.002940	13.18	269.51	231.80	0.87
Reach-1	7541	10YR	3300.00	509.20	518.73	518.73	521.36	0.002625	13.28	350.60	291.65	0.84
Reach-1	7541	25YR	3800.00	509.20	519.40	519.40	522.12	0.002497	13.68	432.76	368.76	0.83
Reach-1	7541	50YR	4100.00	509.20	519.75	519.75	522.54	0.002469	13.97	476.57	374.40	0.83
Reach-1	7541	100YR	4500.00	509.20	520.20	520.20	523.07	0.002423	14.31	535.39	380.52	0.83
Reach-1	7541	500YR	5500.00	509.20	521.15	521.15	524.27	0.002402	15.21	665.21	389.71	0.84
Reach-1	7251	1YR	1750.00	506.97	513.24	513.24	515.68	0.004274	12.52	139.72	28.55	1.00
Reach-1	7251	2YR	2200.00	506.97	514.49	514.49	516.74	0.003069	12.18	240.08	136.99	0.87
Reach-1	7251	5YR	2900.00	506.97	515.87	515.87	517.75	0.002166	11.74	466.65	184.72	0.76
Reach-1	7251	10YR	3300.00	506.97	516.27	516.27	518.25	0.002197	12.24	535.08	187.12	0.77
Reach-1	7251	25YR	3800.00	506.97	516.72	516.72	518.82	0.002248	12.85	612.03	189.81	0.79
Reach-1	7251	50YR	4100.00	506.97	516.97	516.97	519.15	0.002277	13.19	655.39	191.31	0.80
Reach-1	7251	100YR	4500.00	506.97	517.29	517.29	519.56	0.002317	13.63	710.49	194.14	0.81
Reach-1	7251	500YR	5500.00	506.97	517.94	517.94	520.38	0.002405	14.57	883.40	203.59	0.83
Reach-1	7218	1YR	1750.00	506.55	512.34	512.34	514.67	0.004236	12.23	143.05	30.99	1.00
Reach-1	7218	2YR	2200.00	506.55	513.20	513.20	515.79	0.004087	12.92	170.30	41.12	1.00
Reach-1	7218	5YR	2900.00	506.55	514.98	514.98	517.14	0.002563	12.05	338.84	180.17	0.82
Reach-1	7218	10YR	3300.00	506.55	515.47	515.47	517.71	0.002483	12.43	404.94	189.33	0.82
Reach-1	7218	25YR	3800.00	506.55	516.00	516.00	518.36	0.002448	12.94	476.76	194.82	0.82
Reach-1	7218	50YR	4100.00	506.55	516.28	516.28	518.73	0.002452	13.26	515.13	197.74	0.83
Reach-1	7218	100YR	4500.00	506.55	516.61	516.61	519.19	0.002501	13.75	559.51	201.83	0.84
Reach-1	7218	500YR	5500.00	506.55	517.34	517.34	519.71	0.002282	13.89	853.20	209.46	0.81
Reach-1	7191	1YR	1750.00	504.04	510.89	509.84	512.41	0.002325	9.89	176.87	33.10	0.75
Reach-1	7191	2YR	2200.00	504.04	512.04	510.69	513.65	0.002057	10.17	216.29	35.47	0.72
Reach-1	7191	5YR	2900.00	504.04	513.10	511.83	515.13	0.002110	11.45	255.72	81.36	0.75
Reach-1	7191	10YR	3300.00	504.04	513.56	512.39	515.88	0.002221	12.24	275.04	114.83	0.78
Reach-1	7191	25YR	3800.00	504.04	514.30	513.04	516.83	0.002151	12.81	326.06	182.39	0.78

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	7191	50YR	4100.00	504.04	514.78	513.43	517.35	0.002047	12.96	377.36	205.90	0.77
Reach-1	7191	100YR	4500.00	504.04	515.34	514.21	517.97	0.001956	13.19	438.52	212.51	0.76
Reach-1	7191	500YR	5500.00	504.04	517.85	515.77	519.15	0.000871	10.30	1209.61	259.83	0.52
Reach-1	7166	1YR	1750.00	503.72	510.98	509.53	512.29	0.001881	9.17	190.75	33.93	0.68
Reach-1	7166	2YR	2200.00	503.72	512.13	510.36	513.54	0.001663	9.54	231.26	37.48	0.66
Reach-1	7166	5YR	2900.00	503.72	513.20	511.51	515.01	0.001738	10.80	274.37	70.50	0.69
Reach-1	7166	10YR	3300.00	503.72	513.68	512.05	515.75	0.001835	11.55	295.27	116.75	0.71
Reach-1	7166	25YR	3800.00	503.72	514.42	512.74	516.71	0.001814	12.17	331.83	180.50	0.72
Reach-1	7166	50YR	4100.00	503.72	514.84	513.11	517.25	0.001804	12.51	363.73	219.37	0.72
Reach-1	7166	100YR	4500.00	503.72	515.33	513.61	517.90	0.001804	12.95	405.88	228.54	0.73
Reach-1	7166	500YR	5500.00	503.72	517.87	515.18	519.11	0.000799	10.05	1271.02	337.36	0.50
Reach-1	7153	1YR	1750.00	503.53	511.12	509.20	512.11	0.001372	7.99	218.93	39.26	0.60
Reach-1	7153	2YR	2200.00	503.53	512.29	510.00	513.34	0.001262	8.26	266.49	42.46	0.58
Reach-1	7153	5YR	2900.00	503.53	513.44	511.07	514.74	0.001372	9.13	317.62	83.75	0.61
Reach-1	7153	10YR	3300.00	503.53	513.98	511.64	515.42	0.001438	9.63	342.81	111.45	0.63
Reach-1	7153	25YR	3800.00	503.53	514.78	512.30	516.32	0.001360	9.97	384.73	182.94	0.62
Reach-1	7153	50YR	4100.00	503.53	515.22	512.69	516.83	0.001317	10.17	412.57	198.53	0.62
Reach-1	7153	100YR	4500.00	503.53	515.74	513.17	517.45	0.001291	10.49	449.40	233.07	0.62
Reach-1	7153	500YR	5500.00	503.53	518.02	514.26	518.95	0.000623	8.48	1353.96	411.40	0.45
Reach-1	7117	Bridge										
Reach-1	7073	1YR	1750.00	503.06	510.49	508.74	511.57	0.001528	8.34	209.80	38.09	0.63
Reach-1	7073	2YR	2200.00	503.06	511.77	509.54	512.88	0.001286	8.45	260.68	41.62	0.59
Reach-1	7073	5YR	2900.00	503.06	512.70	510.62	514.17	0.001423	9.72	300.78	50.52	0.63
Reach-1	7073	10YR	3300.00	503.06	512.81	511.24	514.65	0.001753	10.90	306.09	54.25	0.70
Reach-1	7073	25YR	3800.00	503.06	513.70	511.85	515.64	0.001587	11.18	353.82	200.89	0.68
Reach-1	7073	50YR	4100.00	503.06	514.17	512.18	516.18	0.001533	11.40	380.11	271.64	0.68
Reach-1	7073	100YR	4500.00	503.06	514.46	512.62	516.72	0.001653	12.10	396.84	315.10	0.71
Reach-1	7073	500YR	5500.00	503.06	516.42	515.08	517.83	0.000935	10.36	1317.87	430.37	0.55
Reach-1	7046	1YR	1800.00	502.95	509.25	508.86	511.24	0.003329	11.33	158.86	45.51	0.90
Reach-1	7046	2YR	2300.00	502.95	510.13	509.78	512.46	0.003386	12.24	187.95	48.34	0.91
Reach-1	7046	5YR	2900.00	502.95	511.17	510.76	513.77	0.003375	12.94	224.15	52.59	0.92
Reach-1	7046	10YR	3300.00	502.95	512.78	511.43	514.58	0.001985	11.00	371.37	144.32	0.73
Reach-1	7046	25YR	3800.00	502.95	513.72	512.09	515.53	0.001706	11.08	441.35	224.10	0.69
Reach-1	7046	50YR	4200.00	502.95	514.14	512.55	516.13	0.001753	11.62	473.67	278.14	0.71
Reach-1	7046	100YR	4600.00	502.95	514.44	512.97	516.65	0.001859	12.25	498.14	334.71	0.73
Reach-1	7046	500YR	5600.00	502.95	516.52	513.80	517.68	0.000900	9.83	1592.47	447.83	0.53
Reach-1	6942	1YR	1800.00	502.56	508.44	508.44	510.81	0.004241	12.34	145.85	31.17	1.01
Reach-1	6942	2YR	2300.00	502.56	509.35	509.35	512.04	0.004134	13.14	175.05	32.99	1.01
Reach-1	6942	5YR	2900.00	502.56	510.33	510.33	513.35	0.004042	13.93	208.25	34.94	1.01
Reach-1	6942	10YR	3300.00	502.56	510.88	510.88	514.15	0.003906	14.50	227.85	36.20	1.00
Reach-1	6942	25YR	3800.00	502.56	511.59	511.59	515.11	0.003673	15.06	256.22	57.35	0.99
Reach-1	6942	50YR	4200.00	502.56	512.61	512.61	515.79	0.002812	14.40	357.96	131.56	0.88
Reach-1	6942	100YR	4600.00	502.56	513.33	513.33	516.35	0.002441	14.19	460.40	152.48	0.84
Reach-1	6942	500YR	5600.00	502.56	515.17	515.17	517.45	0.001588	12.96	982.75	338.99	0.70
Reach-1	6551	1YR	1800.00	500.59	506.48	506.48	508.84	0.004234	12.33	145.93	31.17	1.01
Reach-1	6551	2YR	2300.00	500.59	507.38	507.38	510.07	0.004135	13.14	175.04	32.99	1.01
Reach-1	6551	5YR	2900.00	500.59	509.23	508.36	511.52	0.002572	12.15	240.73	41.58	0.82
Reach-1	6551	10YR	3300.00	500.59	509.47	508.92	512.24	0.002970	13.35	251.03	46.28	0.89
Reach-1	6551	25YR	3800.00	500.59	509.66	509.65	513.13	0.003600	14.97	260.52	53.51	0.98
Reach-1	6551	50YR	4200.00	500.59	511.16	511.16	513.73	0.002158	13.14	478.51	195.48	0.78
Reach-1	6551	100YR	4600.00	500.59	511.66	511.66	514.19	0.002029	13.22	579.39	204.41	0.77
Reach-1	6551	500YR	5600.00	500.59	513.70		515.44	0.001207	11.65	1023.93	233.90	0.61
Reach-1	6541	1YR	1800.00	499.90	506.90		508.42	0.002273	9.90	181.90	33.40	0.75
Reach-1	6541	2YR	2300.00	499.90	507.62		509.55	0.002601	11.13	206.57	34.85	0.81
Reach-1	6541	5YR	2900.00	499.90	509.62	507.67	511.32	0.001569	10.47	284.76	51.84	0.66
Reach-1	6541	10YR	3300.00	499.90	509.99	508.23	511.99	0.001743	11.37	311.66	92.12	0.70
Reach-1	6541	25YR	3800.00	499.90	510.40	508.89	512.77	0.001945	12.40	358.66	141.99	0.74

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	6541	50YR	4200.00	499.90	510.67	509.38	513.33	0.002110	13.19	400.03	161.87	0.78
Reach-1	6541	100YR	4600.00	499.90	510.70	510.70	513.86	0.002496	14.38	405.19	164.74	0.85
Reach-1	6541	500YR	5600.00	499.90	513.77	512.17	515.40	0.001013	11.15	1052.04	238.00	0.57
Reach-1	6464	1YR	1800.00	499.54	506.85		508.21	0.001945	9.36	192.33	34.02	0.69
Reach-1	6464	2YR	2300.00	499.54	507.56		509.31	0.002219	10.59	217.16	35.62	0.75
Reach-1	6464	5YR	2900.00	499.54	509.62	507.32	511.17	0.001349	10.00	307.75	85.46	0.61
Reach-1	6464	10YR	3300.00	499.54	510.01	507.87	511.80	0.001480	10.80	346.33	108.32	0.65
Reach-1	6464	25YR	3800.00	499.54	510.47	508.54	512.54	0.001606	11.65	403.93	136.65	0.68
Reach-1	6464	50YR	4200.00	499.54	510.81	509.03	513.06	0.001691	12.25	452.00	146.41	0.70
Reach-1	6464	100YR	4500.00	499.54	511.12	509.76	513.45	0.001702	12.55	497.84	156.61	0.71
Reach-1	6464	500YR	5600.00	499.54	513.87		515.25	0.000838	10.39	1035.24	231.44	0.52
Reach-1	6332	1YR	1800.00	499.05	506.73		507.93	0.001627	8.78	205.01	34.76	0.64
Reach-1	6332	2YR	2300.00	499.05	507.42		508.99	0.001849	10.03	230.31	38.44	0.69
Reach-1	6332	5YR	2900.00	499.05	509.60		510.95	0.001103	9.38	357.05	85.61	0.56
Reach-1	6332	10YR	3300.00	499.05	509.98	507.40	511.56	0.001221	10.15	391.67	92.89	0.59
Reach-1	6332	25YR	3800.00	499.05	510.42	508.06	512.28	0.001363	11.07	434.67	103.72	0.63
Reach-1	6332	50YR	4200.00	499.05	510.70	508.68	512.81	0.001498	11.83	464.18	110.79	0.67
Reach-1	6332	100YR	4500.00	499.05	510.94	509.03	513.21	0.001569	12.31	491.98	117.58	0.68
Reach-1	6332	500YR	5600.00	499.05	512.94	510.66	515.04	0.001198	12.14	811.20	212.88	0.62
Reach-1	5924	1YR	2100.00	497.61	505.95	504.07	507.28	0.001483	9.25	229.60	38.95	0.63
Reach-1	5924	2YR	2600.00	497.61	506.48	504.90	508.23	0.001769	10.62	251.37	43.86	0.69
Reach-1	5924	5YR	3300.00	497.61	509.05	505.91	510.51	0.001005	9.79	403.43	110.87	0.55
Reach-1	5924	10YR	3700.00	497.61	509.38	506.50	511.07	0.001119	10.56	432.11	132.56	0.58
Reach-1	5924	25YR	4200.00	497.61	509.74	507.18	511.73	0.001269	11.50	464.42	158.38	0.62
Reach-1	5924	50YR	4600.00	497.61	509.89	507.73	512.19	0.001446	12.39	477.77	212.80	0.67
Reach-1	5924	100YR	4900.00	497.61	509.99	508.07	512.54	0.001581	13.04	487.61	256.48	0.70
Reach-1	5924	500YR	6000.00	497.61	512.31	509.83	514.56	0.001126	12.53	762.27	420.06	0.61
Reach-1	5767	1YR	2100.00	496.76	505.84	503.23	506.88	0.001080	8.21	267.89	57.53	0.54
Reach-1	5767	2YR	2600.00	496.76	506.36	504.09	507.72	0.001301	9.43	299.91	67.63	0.60
Reach-1	5767	5YR	3300.00	496.76	509.19	505.19	509.83	0.000488	7.10	746.73	329.80	0.38
Reach-1	5767	10YR	3700.00	496.76	509.58	505.83	510.24	0.000496	7.34	828.16	339.16	0.39
Reach-1	5767	25YR	4200.00	496.76	510.01	506.64	510.70	0.000511	7.64	923.37	357.04	0.40
Reach-1	5767	50YR	4600.00	496.76	510.22	507.15	510.97	0.000552	8.04	972.05	366.79	0.42
Reach-1	5767	100YR	4900.00	496.76	510.38	507.15	511.17	0.000579	8.30	1011.12	383.15	0.43
Reach-1	5767	500YR	6000.00	496.76	512.77	509.38	513.21	0.000288	6.63	1679.41	470.59	0.31
Reach-1	5671	1YR	2100.00	496.25	505.81	502.71	506.73	0.000879	7.73	279.88	47.09	0.49
Reach-1	5671	2YR	2600.00	496.25	506.31	503.57	507.55	0.001088	8.96	304.76	52.79	0.55
Reach-1	5671	5YR	3400.00	496.25	508.97	504.75	509.74	0.000534	7.57	692.55	251.51	0.40
Reach-1	5671	10YR	3700.00	496.25	509.46	505.16	510.17	0.000490	7.46	794.78	273.36	0.39
Reach-1	5671	25YR	4200.00	496.25	509.87	505.83	510.62	0.000514	7.82	886.62	302.96	0.40
Reach-1	5671	50YR	4600.00	496.25	510.06	506.39	510.89	0.000560	8.26	932.36	313.25	0.42
Reach-1	5671	100YR	4800.00	496.25	510.30	506.67	511.11	0.000542	8.23	991.26	332.67	0.42
Reach-1	5671	500YR	5900.00	496.25	512.75	509.22	513.18	0.000271	6.57	1725.27	421.09	0.30
Reach-1	5651	1YR	2100.00	495.95	505.88	501.94	506.63	0.000650	6.95	313.90	46.44	0.42
Reach-1	5651	2YR	2600.00	495.95	506.41	502.78	507.41	0.000810	8.07	338.92	50.07	0.47
Reach-1	5651	5YR	3400.00	495.95	508.97	503.98	509.71	0.000482	7.35	680.14	234.44	0.38
Reach-1	5651	10YR	3700.00	495.95	509.45	504.42	510.15	0.000451	7.30	786.29	257.58	0.37
Reach-1	5651	25YR	4200.00	495.95	509.86	505.12	510.61	0.000477	7.68	880.12	276.52	0.38
Reach-1	5651	50YR	4600.00	495.95	510.05	505.64	510.88	0.000524	8.13	924.45	284.60	0.40
Reach-1	5651	100YR	4800.00	495.95	510.27	505.89	511.09	0.000516	8.16	979.87	311.97	0.40
Reach-1	5651	500YR	5900.00	495.95	512.71	509.09	513.17	0.000271	6.64	1705.29	417.79	0.30
Reach-1	5612		Bridge									
Reach-1	5554	1YR	2100.00	495.03	502.55	500.89	503.84	0.000943	9.10	230.74	38.57	0.66
Reach-1	5554	2YR	2600.00	495.03	504.71	501.69	505.76	0.000534	8.21	321.62	48.61	0.51
Reach-1	5554	5YR	3400.00	495.03	507.38	502.83	508.34	0.000338	7.93	555.14	167.52	0.43
Reach-1	5554	10YR	3700.00	495.03	507.99	503.22	508.97	0.000325	8.06	662.58	186.42	0.42
Reach-1	5554	25YR	4200.00	495.03	508.43	503.81	509.57	0.000361	8.72	749.52	205.52	0.45

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	5554	50YR	4600.00	495.03	508.56	504.25	509.89	0.000415	9.42	776.21	210.89	0.48
Reach-1	5554	100YR	4800.00	495.03	508.91	504.47	510.24	0.000403	9.47	853.51	231.17	0.48
Reach-1	5554	500YR	5900.00	495.03	512.21	505.66	513.09	0.000218	8.18	1857.25	348.11	0.37
Reach-1	5509	1YR	2100.00	494.88	502.54	500.74	503.77	0.000885	8.90	236.07	38.84	0.64
Reach-1	5509	2YR	2700.00	494.88	504.59	501.69	505.71	0.000568	8.49	326.89	60.14	0.53
Reach-1	5509	5YR	3500.00	494.88	507.39	502.81	508.29	0.000319	7.78	733.28	202.39	0.42
Reach-1	5509	10YR	3900.00	494.88	507.99	503.32	508.94	0.000320	8.07	856.80	213.60	0.42
Reach-1	5509	25YR	4400.00	494.88	508.44	503.89	509.53	0.000350	8.67	959.12	238.27	0.44
Reach-1	5509	50YR	4800.00	494.88	508.58	504.33	509.83	0.000398	9.31	992.30	244.81	0.48
Reach-1	5509	100YR	5000.00	494.88	508.93	504.57	510.18	0.000385	9.34	1082.80	267.50	0.47
Reach-1	5509	500YR	6100.00	494.88	512.24	506.31	513.04	0.000204	7.97	2159.49	374.55	0.36
Reach-1	5272	1YR	2100.00	493.82	502.64		503.50	0.000511	7.44	286.33	62.75	0.49
Reach-1	5272	2YR	2700.00	493.82	504.79		505.49	0.000311	6.92	739.60	303.65	0.40
Reach-1	5272	5YR	3500.00	493.82	507.68		508.10	0.000152	5.81	1706.14	356.46	0.29
Reach-1	5272	10YR	3900.00	493.82	508.30		508.73	0.000150	5.96	1931.41	362.92	0.29
Reach-1	5272	25YR	4400.00	493.82	508.82		509.29	0.000159	6.30	2119.77	368.32	0.31
Reach-1	5272	50YR	4800.00	493.82	509.02		509.55	0.000176	6.71	2195.46	373.13	0.32
Reach-1	5272	100YR	5000.00	493.82	509.38		509.91	0.000170	6.71	2331.80	381.70	0.32
Reach-1	5272	500YR	6100.00	493.82	512.51		512.88	0.000102	5.96	3664.33	464.63	0.26
Reach-1	5010	1YR	2100.00	493.31	502.60	499.16	503.35	0.000413	6.98	305.21	57.55	0.45
Reach-1	5010	2YR	2700.00	493.31	504.67	500.12	505.40	0.000295	6.93	435.39	192.32	0.39
Reach-1	5010	5YR	3500.00	493.31	507.68	501.24	508.05	0.000127	5.46	1405.03	329.75	0.27
Reach-1	5010	10YR	3900.00	493.31	508.32	501.73	508.67	0.000120	5.49	1626.08	357.39	0.27
Reach-1	5010	25YR	4400.00	493.31	508.86	502.32	509.22	0.000123	5.70	1818.88	367.28	0.27
Reach-1	5010	50YR	4800.00	493.31	509.07	502.85	509.47	0.000134	6.02	1899.11	372.31	0.28
Reach-1	5010	100YR	5000.00	493.31	509.45	503.10	509.82	0.000126	5.93	2039.57	381.00	0.28
Reach-1	5010	500YR	6100.00	493.31	512.60	504.33	512.81	0.000064	4.82	3449.89	558.18	0.20
Reach-1	4978	1YR	2100.00	493.50	501.85	500.13	503.27	0.001098	9.54	220.21	33.96	0.66
Reach-1	4978	2YR	2700.00	493.50	504.06	501.12	505.34	0.000756	9.05	299.37	39.40	0.56
Reach-1	4978	5YR	3500.00	493.50	507.14	502.32	507.99	0.000371	7.74	830.44	347.09	0.41
Reach-1	4978	10YR	3900.00	493.50	507.84	502.88	508.62	0.000334	7.65	1084.14	379.71	0.39
Reach-1	4978	25YR	4400.00	493.50	508.37	503.54	509.17	0.000334	7.88	1291.45	396.92	0.40
Reach-1	4978	50YR	4800.00	493.50	508.53	504.04	509.42	0.000371	8.38	1352.75	402.45	0.42
Reach-1	4978	100YR	5000.00	493.50	508.97	504.30	509.78	0.000331	8.11	1535.29	417.14	0.40
Reach-1	4978	500YR	6100.00	493.50	512.45	507.37	512.79	0.000130	5.97	3236.15	583.47	0.26
Reach-1	4941	1YR	2100.00	492.84	502.32	498.69	503.04	0.000380	6.81	312.41	46.04	0.43
Reach-1	4941	2YR	2700.00	492.84	504.45	499.65	505.15	0.000269	6.74	458.26	186.93	0.38
Reach-1	4941	5YR	3500.00	492.84	507.46	500.77	507.84	0.000127	5.52	1425.89	353.86	0.27
Reach-1	4941	10YR	3900.00	492.84	508.11	501.28	508.50	0.000123	5.63	1668.48	386.66	0.27
Reach-1	4941	25YR	4400.00	492.84	508.63	501.85	509.05	0.000130	5.92	1875.85	406.53	0.28
Reach-1	4941	50YR	4800.00	492.84	508.82	502.29	509.28	0.000145	6.31	1950.12	410.82	0.30
Reach-1	4941	100YR	5000.00	492.84	509.22	502.59	509.66	0.000136	6.24	2116.46	420.71	0.29
Reach-1	4941	500YR	6100.00	492.84	512.51	503.87	512.76	0.000071	5.15	3771.85	571.63	0.21
Reach-1	4602	1YR	2100.00	491.91	502.31	497.76	502.88	0.000260	6.07	357.82	55.53	0.36
Reach-1	4602	2YR	2500.00	491.91	504.52	498.40	505.01	0.000168	5.68	498.96	82.26	0.30
Reach-1	4602	5YR	3400.00	491.91	507.26	499.71	507.78	0.000137	5.95	854.68	458.23	0.28
Reach-1	4602	10YR	4000.00	491.91	507.78	500.45	508.42	0.000162	6.64	951.93	497.87	0.31
Reach-1	4602	25YR	4400.00	491.91	508.27	500.90	508.97	0.000170	6.96	1044.23	529.21	0.32
Reach-1	4602	50YR	4700.00	491.91	508.43	501.25	509.19	0.000186	7.33	1073.04	540.27	0.34
Reach-1	4602	100YR	4800.00	491.91	508.85	501.35	509.58	0.000172	7.18	1152.47	572.84	0.33
Reach-1	4602	500YR	6000.00	491.91	512.33	502.66	512.72	0.000087	5.85	2418.54	626.30	0.24
Reach-1	4446	1YR	2100.00	491.52	502.31		502.83	0.000224	5.80	374.31	50.75	0.34
Reach-1	4446	2YR	2500.00	491.52	504.51		504.98	0.000151	5.51	497.66	63.20	0.29
Reach-1	4446	5YR	3400.00	491.52	507.24		507.76	0.000129	5.89	833.87	230.17	0.28
Reach-1	4446	10YR	4000.00	491.52	507.76		508.40	0.000153	6.57	959.86	253.54	0.30
Reach-1	4446	25YR	4400.00	491.52	508.25		508.94	0.000160	6.87	1089.94	271.53	0.31
Reach-1	4446	50YR	4700.00	491.52	508.41		509.16	0.000174	7.22	1132.19	277.44	0.33
Reach-1	4446	100YR	4800.00	491.52	508.84		509.55	0.000161	7.08	1258.45	322.75	0.32

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W. S. Elev (ft)	Crit W. S. (ft)	E. G. Elev (ft)	E. G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	4446	500YR	6000.00	491.52	512.31		512.71	0.000084	5.85	3126.64	689.08	0.24
Reach-1	4401	1YR	2100.00	491.47	502.31	497.32	502.82	0.000219	5.75	385.49	57.70	0.34
Reach-1	4401	2YR	2500.00	491.47	504.52	497.96	504.97	0.000146	5.43	512.45	89.57	0.29
Reach-1	4401	5YR	3400.00	491.47	507.26	499.27	507.73	0.000118	5.65	1053.44	306.23	0.27
Reach-1	4401	10YR	4000.00	491.47	507.79	500.03	508.35	0.000138	6.26	1222.34	333.81	0.29
Reach-1	4401	25YR	4400.00	491.47	508.30	500.50	508.88	0.000142	6.50	1406.62	413.31	0.30
Reach-1	4401	50YR	4700.00	491.47	508.46	500.84	509.10	0.000154	6.82	1474.24	425.55	0.31
Reach-1	4401	100YR	4800.00	491.47	508.90	500.96	509.48	0.000138	6.59	1664.94	454.67	0.29
Reach-1	4401	500YR	6000.00	491.47	512.36	502.22	512.66	0.000070	5.33	3777.40	778.24	0.22
Reach-1	4317		Culvert									
Reach-1	4217	1YR	2100.00	487.60	499.25	491.60	499.43	0.000537	3.40	618.41	86.52	0.18
Reach-1	4217	2YR	2500.00	487.60	499.92	492.03	500.14	0.000628	3.82	654.87	88.88	0.20
Reach-1	4217	5YR	3400.00	487.60	502.85	492.94	503.00	0.000487	3.09	1100.16	99.47	0.16
Reach-1	4217	10YR	4000.00	487.60	504.84	493.50	504.98	0.000407	3.07	1306.61	109.49	0.15
Reach-1	4217	25YR	4400.00	487.60	507.30	493.87	507.41	0.000255	2.74	1884.99	355.57	0.12
Reach-1	4217	50YR	4700.00	487.60	507.90	494.12	508.01	0.000247	2.77	2129.49	450.10	0.12
Reach-1	4217	100YR	4800.00	487.60	509.17	494.22	509.26	0.000177	2.46	2783.39	553.90	0.11
Reach-1	4217	500YR	6000.00	487.60	512.58	495.21	512.63	0.000100	2.10	5033.15	757.39	0.08
Reach-1	4176	1YR	2100.00	487.60	499.26		499.38	0.000553	2.83	743.19	84.33	0.17
Reach-1	4176	2YR	2500.00	487.60	499.93		500.08	0.000633	3.12	800.14	86.18	0.18
Reach-1	4176	5YR	3400.00	487.60	502.82		502.98	0.000526	3.20	1062.12	95.15	0.17
Reach-1	4176	10YR	4000.00	487.60	504.81		504.96	0.000434	3.18	1271.53	154.43	0.16
Reach-1	4176	25YR	4400.00	487.60	507.28		507.40	0.000267	2.81	1892.82	365.63	0.13
Reach-1	4176	50YR	4700.00	487.60	507.88		508.00	0.000258	2.84	2127.54	419.75	0.13
Reach-1	4176	100YR	4800.00	487.60	509.16		509.25	0.000185	2.53	2780.93	566.30	0.11
Reach-1	4176	500YR	6000.00	487.60	512.58		512.63	0.000105	2.15	5013.34	750.00	0.08
Reach-1	3924	1YR	2100.00	486.94	498.64		499.08	0.002804	5.35	392.57	56.10	0.36
Reach-1	3924	2YR	2500.00	486.94	499.20		499.73	0.003245	5.88	432.06	91.18	0.39
Reach-1	3924	5YR	3400.00	486.94	502.58		502.79	0.001041	4.16	1374.27	402.51	0.23
Reach-1	3924	10YR	4000.00	486.94	504.74		504.83	0.000443	3.09	2408.50	521.12	0.16
Reach-1	3924	25YR	4400.00	486.94	507.28		507.32	0.000172	2.18	3787.50	554.92	0.10
Reach-1	3924	50YR	4700.00	486.94	507.89		507.92	0.000157	2.14	4124.86	562.27	0.10
Reach-1	3924	100YR	4800.00	486.94	509.17		509.20	0.000104	1.84	4851.18	569.51	0.08
Reach-1	3924	500YR	6000.00	486.94	512.58		512.60	0.000062	1.61	6924.44	745.91	0.06
Reach-1	3681	1YR	2100.00	485.95	498.57	492.40	498.67	0.000733	3.01	1266.94	343.71	0.18
Reach-1	3681	2YR	2500.00	485.95	499.18	493.01	499.28	0.000733	3.10	1476.89	348.63	0.18
Reach-1	3681	5YR	3400.00	485.95	502.59	494.24	502.63	0.000260	2.19	2889.90	496.79	0.11
Reach-1	3681	10YR	4000.00	485.95	504.73	496.17	504.76	0.000150	1.86	3992.76	525.64	0.09
Reach-1	3681	25YR	4400.00	485.95	507.27	496.49	507.29	0.000077	1.50	5351.90	563.70	0.07
Reach-1	3681	50YR	4700.00	485.95	507.88	496.71	507.89	0.000073	1.50	5687.97	630.89	0.06
Reach-1	3681	100YR	4800.00	485.95	509.16	496.75	509.18	0.000053	1.34	6419.43	695.67	0.06
Reach-1	3681	500YR	6000.00	485.95	512.57	497.27	512.58	0.000034	1.21	9220.13	880.58	0.05
Reach-1	3430	1YR	2100.00	485.30	498.52	491.40	498.55	0.000230	1.82	1990.26	467.14	0.10
Reach-1	3430	2YR	2500.00	485.30	499.13	492.06	499.16	0.000230	1.90	2287.98	517.06	0.11
Reach-1	3430	5YR	3400.00	485.30	502.57	494.72	502.59	0.000078	1.35	4163.69	559.28	0.06
Reach-1	3430	10YR	4000.00	485.30	504.72	495.10	504.73	0.000050	1.19	5386.01	580.69	0.05
Reach-1	3430	25YR	4400.00	485.30	507.27	495.19	507.28	0.000029	0.99	6910.38	609.80	0.04
Reach-1	3430	50YR	4700.00	485.30	507.87	495.56	507.88	0.000028	1.00	7279.61	612.49	0.04
Reach-1	3430	100YR	4800.00	485.30	509.16	495.63	509.17	0.000021	0.92	8074.61	626.02	0.04
Reach-1	3430	500YR	6000.00	485.30	512.57	496.14	512.58	0.000016	0.88	10289.08	1018.48	0.03
Reach-1	3178	1YR	2000.00	484.83	498.47	489.96	498.50	0.000184	1.79	1581.94	448.65	0.10
Reach-1	3178	2YR	2300.00	484.83	499.07	490.39	499.11	0.000188	1.88	1743.50	462.85	0.10
Reach-1	3178	5YR	2900.00	484.83	502.54	491.69	502.57	0.000087	1.53	2714.91	515.27	0.07
Reach-1	3178	10YR	3300.00	484.83	504.70	492.14	504.72	0.000061	1.41	3336.15	541.67	0.06
Reach-1	3178	25YR	4100.00	484.83	507.25	493.31	507.27	0.000052	1.42	4086.68	613.62	0.06
Reach-1	3178	50YR	4200.00	484.83	507.85	493.38	507.87	0.000047	1.39	4266.35	689.27	0.05
Reach-1	3178	100YR	4400.00	484.83	509.14	493.52	509.16	0.000040	1.33	4650.08	881.26	0.05

## HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	3178	500YR	4900.00	484.83	512.56	493.84	512.57	0.000027	1.20	5679.38	1067.85	0.04
Reach-1	3106	1YR	2000.00	485.74	498.32	491.07	498.47	0.000627	3.26	790.30	414.21	0.18
Reach-1	3106	2YR	2300.00	485.74	498.91	491.52	499.07	0.000644	3.43	886.89	441.75	0.18
Reach-1	3106	5YR	2900.00	485.74	502.47	492.36	502.55	0.000269	2.67	1534.70	508.79	0.12
Reach-1	3106	10YR	3300.00	485.74	504.64	492.85	504.70	0.000181	2.41	1935.18	546.74	0.10
Reach-1	3106	25YR	4100.00	485.74	507.19	493.81	507.25	0.000147	2.39	2406.02	638.58	0.10
Reach-1	3106	50YR	4200.00	485.74	507.80	493.92	507.86	0.000134	2.33	2518.23	750.38	0.09
Reach-1	3106	100YR	4400.00	485.74	509.10	494.17	509.15	0.000112	2.22	2756.85	890.92	0.08
Reach-1	3106	500YR	4900.00	485.74	512.53	494.73	512.57	0.000073	1.98	3388.59	1064.73	0.07
Reach-1	3061	1YR	2000.00	485.03	498.33	489.42	498.42	0.000276	2.54	825.18	418.18	0.13
Reach-1	3061	2YR	2300.00	485.03	498.91	489.74	499.03	0.000310	2.78	868.05	422.85	0.14
Reach-1	3061	5YR	2900.00	485.03	502.42	490.31	502.53	0.000213	2.71	1123.61	508.25	0.12
Reach-1	3061	10YR	3300.00	485.03	504.57	490.69	504.68	0.000180	2.71	1280.49	537.59	0.11
Reach-1	3061	25YR	4100.00	485.03	507.10	491.38	507.23	0.000179	2.94	1464.64	571.69	0.11
Reach-1	3061	50YR	4200.00	485.03	507.71	491.45	507.83	0.000170	2.92	1508.90	581.30	0.11
Reach-1	3061	100YR	4400.00	485.03	509.00	491.62	509.12	0.000153	2.88	1603.14	602.28	0.11
Reach-1	3061	500YR	4900.00	485.03	512.43	492.01	512.54	0.000118	2.78	1852.97	703.97	0.10
Reach-1	3008		Culvert									
Reach-1	2954	1YR	2000.00	485.52	493.94	490.21	494.49	0.002210	5.97	335.25	65.66	0.38
Reach-1	2954	2YR	2300.00	485.52	494.40	490.60	495.05	0.002419	6.48	354.86	68.51	0.40
Reach-1	2954	5YR	2900.00	485.52	495.16	491.36	496.03	0.002865	7.48	387.61	80.68	0.44
Reach-1	2954	10YR	3300.00	485.52	495.61	491.83	496.63	0.003156	8.11	406.86	132.68	0.46
Reach-1	2954	25YR	4100.00	485.52	496.42	492.72	497.76	0.003699	9.28	441.91	353.97	0.51
Reach-1	2954	50YR	4200.00	485.52	496.49	492.81	497.88	0.003792	9.44	445.01	360.37	0.52
Reach-1	2954	100YR	4400.00	485.52	496.68	493.01	498.14	0.003926	9.72	452.89	379.01	0.53
Reach-1	2954	500YR	4900.00	485.52	497.10	493.54	498.78	0.004263	10.40	471.32	403.35	0.55
Reach-1	2929	1YR	2000.00	482.21	494.07	488.17	494.30	0.000889	3.81	526.50	206.23	0.24
Reach-1	2929	2YR	2300.00	482.21	494.55	488.58	494.82	0.000968	4.13	560.16	282.89	0.25
Reach-1	2929	5YR	2900.00	482.21	495.38	489.35	495.72	0.001129	4.74	618.44	385.33	0.27
Reach-1	2929	10YR	3300.00	482.21	495.87	489.80	496.27	0.001229	5.12	653.27	396.86	0.29
Reach-1	2929	25YR	4100.00	482.21	496.77	490.63	497.30	0.001407	5.81	717.64	439.08	0.31
Reach-1	2929	50YR	4200.00	482.21	496.86	490.74	497.40	0.001437	5.90	723.72	440.05	0.32
Reach-1	2929	100YR	4400.00	482.21	497.07	490.93	497.64	0.001479	6.06	738.48	447.99	0.32
Reach-1	2929	500YR	4900.00	482.21	497.56	491.41	498.20	0.001581	6.45	773.45	479.25	0.33
Reach-1	2887	1YR	2000.00	483.71	493.79	489.62	494.22	0.002096	5.30	395.58	375.18	0.35
Reach-1	2887	2YR	2300.00	483.71	494.25	490.07	494.74	0.002207	5.67	432.62	385.36	0.36
Reach-1	2887	5YR	2900.00	483.71	495.02	490.90	495.63	0.002441	6.36	496.56	408.11	0.39
Reach-1	2887	10YR	3300.00	483.71	495.49	491.42	496.17	0.002578	6.78	535.69	417.76	0.40
Reach-1	2887	25YR	4100.00	483.71	496.36	492.38	497.18	0.002788	7.51	610.61	432.94	0.43
Reach-1	2887	50YR	4200.00	483.71	496.44	492.49	497.28	0.002839	7.62	617.45	436.04	0.43
Reach-1	2887	100YR	4400.00	483.71	496.64	492.70	497.52	0.002884	7.78	635.41	442.57	0.44
Reach-1	2887	500YR	4900.00	483.71	497.12	493.43	498.08	0.002991	8.18	679.18	455.98	0.45
Reach-1	2848	1YR	2000.00	483.71	493.87	488.85	494.04	0.000813	3.34	602.71	370.21	0.22
Reach-1	2848	2YR	2300.00	483.71	494.34	489.22	494.54	0.000867	3.59	645.01	380.95	0.23
Reach-1	2848	5YR	2900.00	483.71	495.14	489.93	495.40	0.000975	4.08	717.43	394.85	0.25
Reach-1	2848	10YR	3300.00	483.71	495.62	490.37	495.92	0.001042	4.38	761.26	402.48	0.26
Reach-1	2848	25YR	4100.00	483.71	496.52	491.68	496.89	0.001155	4.92	843.82	415.34	0.28
Reach-1	2848	50YR	4200.00	483.71	496.60	491.68	496.99	0.001178	5.00	851.39	416.45	0.28
Reach-1	2848	100YR	4400.00	483.71	496.81	491.19	497.21	0.001203	5.12	870.62	419.37	0.29
Reach-1	2848	500YR	4900.00	483.71	497.30	491.63	497.75	0.001266	5.43	916.71	427.14	0.30
Reach-1	2827		Culvert									
Reach-1	2776	1YR	2000.00	483.01	492.07	488.17	492.45	0.001848	4.98	424.19	156.34	0.33
Reach-1	2776	2YR	2300.00	483.01	492.53	488.61	492.95	0.001937	5.32	462.01	197.39	0.34
Reach-1	2776	5YR	2900.00	483.01	493.30	489.38	493.83	0.002130	5.95	527.10	256.71	0.36
Reach-1	2776	10YR	3300.00	483.01	493.74	489.80	494.34	0.002266	6.36	564.88	291.33	0.38
Reach-1	2776	25YR	4100.00	483.01	494.54	490.62	495.27	0.002516	7.10	633.60	322.89	0.41

HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	2776	50YR	4200.00	483.01	494.63	490.72	495.38	0.002544	7.19	641.76	325.35	0.41
Reach-1	2776	100YR	4400.00	483.01	494.81	490.92	495.59	0.002602	7.36	657.67	329.53	0.41
Reach-1	2776	500YR	4900.00	483.01	495.21	491.58	496.09	0.002765	7.79	693.71	334.99	0.43
Reach-1	2743	1YR	2000.00	484.31	491.56	489.71	492.25	0.006076	6.67	300.09	98.61	0.57
Reach-1	2743	2YR	2300.00	484.31	492.01	490.13	492.76	0.005930	6.92	335.41	131.78	0.57
Reach-1	2743	5YR	2900.00	484.31	492.77	490.89	493.62	0.005718	7.42	398.31	164.92	0.57
Reach-1	2743	10YR	3300.00	484.31	493.20	491.36	494.13	0.005663	7.78	434.49	211.10	0.57
Reach-1	2743	25YR	4100.00	484.31	493.95	492.14	495.04	0.005697	8.47	499.06	232.70	0.59
Reach-1	2743	50YR	4200.00	484.31	494.03	492.23	495.15	0.005704	8.55	506.68	233.64	0.59
Reach-1	2743	100YR	4400.00	484.31	494.20	492.40	495.36	0.005730	8.71	521.38	235.45	0.59
Reach-1	2743	500YR	4900.00	484.31	494.56	492.76	495.84	0.005928	9.17	552.86	239.29	0.61
Reach-1	2430	1YR	2000.00	481.85	490.43		490.89	0.002978	5.46	367.67	72.50	0.41
Reach-1	2430	2YR	2300.00	481.85	490.87		491.39	0.003046	5.80	403.73	100.95	0.42
Reach-1	2430	5YR	2900.00	481.85	491.67		492.27	0.003055	6.31	502.33	134.91	0.43
Reach-1	2430	10YR	3300.00	481.85	492.13		492.77	0.003035	6.57	567.25	144.26	0.43
Reach-1	2430	25YR	4100.00	481.85	492.98		493.67	0.002930	6.95	694.91	153.30	0.43
Reach-1	2430	50YR	4200.00	481.85	493.08		493.78	0.002912	6.99	710.57	153.96	0.43
Reach-1	2430	100YR	4400.00	481.85	493.28	489.97	493.98	0.002888	7.07	740.58	155.24	0.43
Reach-1	2430	500YR	4900.00	481.85	493.65	490.40	494.40	0.002972	7.37	798.13	157.66	0.44
Reach-1	2079	1YR	2000.00	482.26	486.91	486.91	488.58	0.020451	10.36	192.97	58.03	1.00
Reach-1	2079	2YR	2300.00	482.26	487.29	487.29	489.06	0.019905	10.68	215.33	60.60	1.00
Reach-1	2079	5YR	2900.00	482.26	487.96	487.96	489.93	0.019290	11.27	257.26	65.14	1.00
Reach-1	2079	10YR	3300.00	482.26	488.37	488.37	490.46	0.018855	11.59	284.77	67.95	1.00
Reach-1	2079	25YR	4100.00	482.26	489.11	489.11	491.41	0.018306	12.18	336.69	73.09	1.00
Reach-1	2079	50YR	4200.00	482.26	489.18	489.18	491.52	0.018288	12.28	342.14	76.48	1.00
Reach-1	2079	100YR	4400.00	482.26	489.35	489.35	491.74	0.018019	12.42	354.56	91.94	1.00
Reach-1	2079	500YR	4900.00	482.26	489.96	489.96	492.25	0.014816	12.19	415.37	225.43	0.92
Reach-1	2022	1YR	2000.00	482.07	485.90	485.90	487.39	0.002323	9.79	204.36	68.69	1.00
Reach-1	2022	2YR	2300.00	482.07	486.22	486.22	487.82	0.002285	10.15	226.67	71.24	1.00
Reach-1	2022	5YR	2900.00	482.07	486.82	486.82	488.60	0.002190	10.70	270.92	76.06	1.00
Reach-1	2022	10YR	3300.00	482.07	487.19	487.19	489.08	0.002147	11.04	299.04	78.97	1.00
Reach-1	2022	25YR	4100.00	482.07	487.86	487.86	489.94	0.002068	11.59	353.83	84.35	1.00
Reach-1	2022	50YR	4200.00	482.07	487.92	487.92	490.04	0.002074	11.68	359.62	84.90	1.00
Reach-1	2022	100YR	4400.00	482.07	488.07	488.07	490.24	0.002068	11.82	372.17	86.08	1.00
Reach-1	2022	500YR	4900.00	482.07	488.43	488.43	490.72	0.002043	12.13	403.85	88.98	1.00
Reach-1	1995	1YR	2000.00	482.00	485.73	485.73	487.20	0.043992	9.73	205.55	70.20	1.00
Reach-1	1995	2YR	2300.00	482.00	486.05	486.05	487.63	0.042908	10.06	228.58	72.81	1.00
Reach-1	1995	5YR	2900.00	482.00	486.64	486.64	488.40	0.041290	10.64	272.64	77.55	1.00
Reach-1	1995	10YR	3300.00	482.00	487.00	487.00	488.87	0.040349	10.96	301.15	80.47	1.00
Reach-1	1995	25YR	4100.00	482.00	487.65	487.65	489.72	0.039057	11.53	355.47	85.76	1.00
Reach-1	1995	50YR	4200.00	482.00	487.72	487.72	489.82	0.039060	11.61	361.62	86.34	1.00
Reach-1	1995	100YR	4400.00	482.00	487.88	487.88	490.02	0.038625	11.72	375.34	87.62	1.00
Reach-1	1995	500YR	4900.00	482.00	488.25	488.25	490.49	0.038021	12.02	407.69	165.39	1.00
Reach-1	1953	1YR	2000.00	476.50	484.99	480.36	485.19	0.002305	3.60	556.04	90.96	0.26
Reach-1	1953	2YR	2400.00	476.50	485.75	480.80	485.98	0.002379	3.83	626.87	95.52	0.26
Reach-1	1953	5YR	3000.00	476.50	486.77	481.41	487.04	0.002460	4.12	727.78	101.66	0.27
Reach-1	1953	10YR	3300.00	476.50	487.20	481.69	487.49	0.002533	4.28	771.71	104.23	0.28
Reach-1	1953	25YR	4100.00	476.50	488.07	482.40	488.42	0.002858	4.74	864.94	201.05	0.30
Reach-1	1953	50YR	4300.00	476.50	488.25	482.55	488.62	0.002958	4.86	884.28	215.80	0.30
Reach-1	1953	100YR	4500.00	476.50	488.42	482.72	488.81	0.003057	4.98	903.25	224.57	0.31
Reach-1	1953	500YR	4900.00	476.50	488.74	483.03	489.16	0.003260	5.22	938.86	244.56	0.32
Reach-1	1892	1YR	2000.00	476.50	484.97	479.97	485.11	0.000463	2.98	671.07	111.75	0.21
Reach-1	1892	2YR	2400.00	476.50	485.73	480.38	485.89	0.000476	3.16	758.61	117.85	0.22
Reach-1	1892	5YR	3000.00	476.50	486.76	480.93	486.94	0.000492	3.39	884.29	126.84	0.23
Reach-1	1892	10YR	3300.00	476.50	487.19	481.18	487.38	0.000510	3.51	939.54	131.26	0.23
Reach-1	1892	25YR	4100.00	476.50	488.07	481.82	488.30	0.000580	3.87	1059.28	316.17	0.25
Reach-1	1892	50YR	4300.00	476.50	488.24	481.96	488.49	0.000590	3.97	1085.47	354.02	0.25
Reach-1	1892	100YR	4500.00	476.50	488.42	482.10	488.67	0.000600	4.06	1112.35	390.55	0.26



HEC-RAS Plan: VAL\_Ult River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	1892	500YR	4900.00	476.50	488.74	482.39	489.02	0.000622	4.24	1166.62	522.30	0.26
Reach-1	1804		Bridge									
Reach-1	1722	1YR	2000.00	474.65	484.79	479.46	484.94	0.000391	3.11	699.94	149.76	0.20
Reach-1	1722	2YR	2400.00	474.65	485.53	479.91	485.69	0.000418	3.36	777.20	154.69	0.21
Reach-1	1722	5YR	3000.00	474.65	486.51	480.56	486.71	0.000442	3.69	884.68	165.42	0.22
Reach-1	1722	10YR	3300.00	474.65	486.91	480.84	487.13	0.000458	3.87	931.65	171.28	0.23
Reach-1	1722	25YR	4100.00	474.65	487.69	481.50	487.97	0.000529	4.40	1031.36	374.45	0.25
Reach-1	1722	50YR	4300.00	474.65	487.84	481.66	488.14	0.000552	4.54	1051.13	375.21	0.25
Reach-1	1722	100YR	4500.00	474.65	487.99	481.80	488.30	0.000574	4.68	1070.14	375.94	0.26
Reach-1	1722	500YR	4900.00	474.65	488.25	482.08	488.60	0.000622	4.95	1104.44	378.49	0.27
Reach-1	1721		Lat Struct									
Reach-1	1696	1YR	2000.00	473.53	484.48	481.09	484.85	0.003037	4.84	413.00	77.78	0.37
Reach-1	1696	2YR	2400.00	473.53	485.19	481.60	485.60	0.003104	5.11	470.08	83.14	0.38
Reach-1	1696	5YR	3000.00	473.53	486.15	482.30	486.60	0.003161	5.42	553.09	90.64	0.39
Reach-1	1696	10YR	3300.00	473.53	486.53	482.63	487.02	0.003251	5.61	588.51	93.75	0.39
Reach-1	1696	25YR	4099.81	473.53	487.24	483.40	487.84	0.003639	6.24	659.18	238.18	0.42
Reach-1	1696	50YR	4297.23	473.53	487.37	483.55	488.01	0.003752	6.42	675.69	266.22	0.43
Reach-1	1696	100YR	4491.91	473.53	487.49	483.73	488.16	0.003853	6.58	692.78	274.95	0.44
Reach-1	1696	500YR	4874.26	473.53	487.72	484.05	488.45	0.004067	6.91	723.77	292.80	0.45
Reach-1	1320	1YR	2000.00	472.20	483.90		484.12	0.001214	3.72	539.89	81.20	0.24
Reach-1	1320	2YR	2400.00	472.20	484.58		484.83	0.001290	4.07	602.27	101.21	0.26
Reach-1	1320	5YR	2998.78	472.20	485.51		485.82	0.001348	4.48	722.74	153.07	0.27
Reach-1	1320	10YR	3264.26	472.20	485.89		486.22	0.001353	4.62	783.22	161.94	0.27
Reach-1	1320	25YR	3864.83	472.20	486.59		486.95	0.001412	4.95	902.94	177.87	0.28
Reach-1	1320	50YR	3992.69	472.20	486.72		487.09	0.001429	5.03	925.80	179.94	0.28
Reach-1	1320	100YR	4117.53	472.20	486.85		487.23	0.001442	5.09	948.69	181.99	0.28
Reach-1	1320	500YR	4347.94	472.20	487.07		487.47	0.001466	5.21	990.30	186.99	0.28
Reach-1	1065	1YR	2000.00	472.15	482.40		483.43	0.006317	8.24	259.93	57.63	0.52
Reach-1	1065	2YR	2400.00	472.15	482.70	480.32	484.06	0.007890	9.44	281.03	86.30	0.58
Reach-1	1065	5YR	2998.78	472.15	483.08	481.41	484.92	0.010232	11.09	321.10	117.29	0.67
Reach-1	1065	10YR	3264.26	472.15	483.25	481.94	485.29	0.011147	11.72	340.83	120.95	0.70
Reach-1	1065	25YR	3864.83	472.15	483.92	483.92	486.01	0.010901	12.18	425.98	134.12	0.70
Reach-1	1065	50YR	3992.69	472.15	484.07	484.07	486.14	0.010705	12.20	446.94	137.30	0.70
Reach-1	1065	100YR	4117.53	472.15	484.18	484.18	486.27	0.010724	12.31	462.33	139.59	0.70
Reach-1	1065	500YR	4347.94	472.15	484.38	484.38	486.50	0.010779	12.51	489.96	144.01	0.70
Reach-1	934	1YR	2000.00	473.37	481.82	479.54	482.46	0.005433	6.81	435.31	505.54	0.49
Reach-1	934	2YR	2400.00	473.37	482.07	480.17	482.82	0.006336	7.55	492.01	519.31	0.53
Reach-1	934	5YR	2998.78	473.37	482.35	481.99	483.29	0.007772	8.61	563.24	570.03	0.59
Reach-1	934	10YR	3264.26	473.37	482.45	482.21	483.50	0.008583	9.14	590.47	591.49	0.62
Reach-1	934	25YR	3864.83	473.37	482.65	482.34	483.95	0.010398	10.26	653.00	618.69	0.69
Reach-1	934	50YR	3992.69	473.37	482.70	482.34	484.03	0.010673	10.44	666.79	624.81	0.70
Reach-1	934	100YR	4117.53	473.37	482.90	482.90	484.10	0.009501	10.05	732.76	646.98	0.66
Reach-1	934	500YR	4347.94	473.37	483.13	483.13	484.25	0.008882	9.92	808.25	655.87	0.64
Reach-1	708	1YR	2000.00	473.11	481.35	478.27	481.58	0.002003	4.28	768.60	773.08	0.31
Reach-1	708	2YR	2400.00	473.11	481.63	478.85	481.85	0.002002	4.41	944.08	825.72	0.31
Reach-1	708	5YR	2998.78	473.11	481.97	479.62	482.18	0.002001	4.56	1169.10	860.25	0.31
Reach-1	708	10YR	3264.26	473.11	482.10	480.15	482.31	0.002003	4.63	1258.31	871.30	0.31
Reach-1	708	25YR	3864.83	473.11	482.39	481.50	482.59	0.001999	4.75	1453.58	893.52	0.31
Reach-1	708	50YR	3992.69	473.11	482.44	481.54	482.65	0.002000	4.78	1493.46	899.40	0.31
Reach-1	708	100YR	4117.53	473.11	482.50	481.56	482.71	0.002002	4.80	1533.03	910.59	0.31
Reach-1	708	500YR	4347.94	473.11	482.60	481.65	482.81	0.002001	4.85	1604.99	919.56	0.31

HEC-RAS Plan: VT1\_Ult River: VT1 Reach: Reach1

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
Reach1	2135	1YR	225.00	586.70	589.23	589.23	590.18	0.003057	7.83	28.72	15.24	1.01
Reach1	2135	2YR	275.00	586.70	589.52	589.52	590.58	0.002989	8.25	33.34	15.98	1.01
Reach1	2135	5YR	375.00	586.70	590.05	590.05	591.28	0.002887	8.91	42.08	17.30	1.01
Reach1	2135	10YR	425.00	586.70	590.31	590.30	591.60	0.002775	9.11	46.68	17.95	1.00
Reach1	2135	25YR	500.00	586.70	590.98	590.63	592.09	0.001982	8.44	59.26	19.61	0.86
Reach1	2135	50YR	600.00	586.70	591.48	591.04	592.64	0.001847	8.65	69.40	20.85	0.84
Reach1	2135	100YR	650.00	586.70	591.73	591.23	592.91	0.001771	8.70	74.73	21.48	0.82
Reach1	2135	500YR	900.00	586.70	592.98	592.09	594.15	0.001423	8.68	103.68	25.20	0.75
Reach1	2122	1YR	225.00	586.80	589.10	589.10	590.08	0.003134	7.95	28.32	14.60	1.01
Reach1	2122	2YR	275.00	586.80	589.40	589.40	590.50	0.003064	8.38	32.81	15.21	1.01
Reach1	2122	5YR	375.00	586.80	589.94	589.94	591.22	0.002969	9.09	41.26	16.28	1.01
Reach1	2122	10YR	425.00	586.80	590.18	590.18	591.55	0.002931	9.38	45.29	16.77	1.01
Reach1	2122	25YR	500.00	586.80	590.54	590.54	592.01	0.002845	9.73	51.40	17.48	1.00
Reach1	2122	50YR	600.00	586.80	590.95	590.95	592.57	0.002831	10.22	58.70	18.30	1.01
Reach1	2122	100YR	650.00	586.80	591.15	591.15	592.84	0.002794	10.40	62.48	18.71	1.00
Reach1	2122	500YR	900.00	586.80	592.00	592.00	594.04	0.002559	11.45	79.47	21.70	0.99
Reach1	1899	1YR	225.00	585.65	587.95	587.95	588.93	0.003137	7.95	28.31	14.60	1.01
Reach1	1899	2YR	275.00	585.65	588.27	588.25	589.35	0.002999	8.32	33.06	15.24	1.00
Reach1	1899	5YR	375.00	585.65	589.25	589.25	590.16	0.001842	7.67	48.88	17.19	0.80
Reach1	1899	10YR	425.00	585.65	589.61	589.61	590.53	0.001682	7.69	55.23	17.91	0.77
Reach1	1899	25YR	500.00	585.65	589.81	589.81	590.93	0.001951	8.50	58.86	18.31	0.84
Reach1	1899	50YR	600.00	585.65	589.97	589.80	591.43	0.002440	9.69	61.93	18.65	0.94
Reach1	1899	100YR	650.00	585.65	590.15	590.00	591.69	0.002474	9.96	65.28	19.01	0.95
Reach1	1899	500YR	900.00	585.65	590.85	590.85	592.89	0.002561	11.46	79.48	21.78	0.99
Reach1	1683	1YR	225.00	584.97	587.36	587.27	588.26	0.002767	7.61	29.57	14.77	0.95
Reach1	1683	2YR	275.00	584.97	588.00	588.00	588.75	0.001818	6.98	39.41	16.05	0.79
Reach1	1683	5YR	375.00	584.97	589.15	589.15	589.77	0.001075	6.32	59.31	18.36	0.62
Reach1	1683	10YR	425.00	584.97	589.53	589.53	590.17	0.001000	6.40	66.40	19.46	0.60
Reach1	1683	25YR	500.00	584.97	589.72	589.72	590.51	0.001165	7.15	70.14	20.88	0.66
Reach1	1683	50YR	600.00	584.97	589.83	589.83	590.91	0.001510	8.31	72.66	21.94	0.75
Reach1	1683	100YR	650.00	584.97	590.02	590.02	591.16	0.001515	8.59	76.78	23.32	0.76
Reach1	1683	500YR	900.00	584.97	590.21	590.18	592.20	0.002464	11.32	81.57	24.76	0.98
Reach1	1682		Lat Struct									
Reach1	1547	1YR	225.00	584.54	587.17	587.17	587.88	0.001976	6.77	33.24	15.26	0.81
Reach1	1547	2YR	275.00	584.54	587.92	587.92	588.49	0.001233	6.08	45.22	16.76	0.65
Reach1	1547	5YR	375.00	584.54	589.12	589.12	589.61	0.000763	5.61	66.81	19.37	0.53
Reach1	1547	10YR	425.00	584.54	589.51	589.51	590.02	0.000693	5.73	74.59	21.11	0.51
Reach1	1547	25YR	500.00	584.54	589.69	589.69	590.33	0.000824	6.44	78.50	21.93	0.56
Reach1	1547	50YR	600.00	584.54	589.79	589.79	590.68	0.001088	7.53	80.86	22.41	0.65
Reach1	1547	100YR	650.00	584.54	589.98	589.98	590.93	0.001105	7.81	85.07	23.25	0.66
Reach1	1547	500YR	900.00	584.54	590.12	589.74	591.82	0.001901	10.47	88.43	23.89	0.87
Reach1	1456	1YR	225.00	584.25	587.10	586.55	587.69	0.001493	6.14	36.67	15.71	0.71
Reach1	1456	2YR	275.00	584.25	587.89	586.86	588.37	0.000949	5.54	49.64	17.28	0.58
Reach1	1456	5YR	375.00	584.25	589.11	587.41	589.53	0.000591	5.20	73.10	23.45	0.47
Reach1	1456	10YR	425.00	584.25	589.50	587.65	589.94	0.000546	5.33	82.70	26.20	0.46
Reach1	1456	25YR	500.00	584.25	589.68	587.99	590.24	0.000653	6.00	88.12	35.73	0.51
Reach1	1456	50YR	600.00	584.25	589.79	588.40	590.55	0.000866	7.02	91.54	39.15	0.59
Reach1	1456	100YR	650.00	584.25	589.98	588.62	590.80	0.000881	7.28	98.15	46.19	0.59
Reach1	1456	500YR	900.00	584.25	590.13	589.48	591.59	0.001513	9.75	104.27	57.86	0.78
Reach1	1367	1YR	225.00	583.79	587.14	587.14	587.53	0.000854	5.04	44.67	16.69	0.54
Reach1	1367	2YR	275.00	583.79	587.91	587.91	588.26	0.000609	4.73	58.20	18.24	0.47
Reach1	1367	5YR	375.00	583.79	589.13	589.13	589.46	0.000398	4.62	81.83	20.59	0.39
Reach1	1367	10YR	425.00	583.79	589.52	589.52	589.87	0.000382	4.79	90.22	22.58	0.39
Reach1	1367	25YR	500.00	583.79	589.70	589.70	590.16	0.000463	5.42	94.54	23.55	0.43
Reach1	1367	50YR	600.00	583.79	589.82	589.82	590.44	0.000616	6.35	97.29	24.18	0.50
Reach1	1367	100YR	650.00	583.79	590.01	590.01	590.69	0.000636	6.62	102.03	25.26	0.51
Reach1	1367	500YR	900.00	583.79	590.19	590.19	591.40	0.001085	8.84	106.71	26.28	0.67

HEC-RAS Plan: VT1\_Ult River: VT1 Reach: Reach1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach1	1183	1YR	225.00	582.96	587.12		587.34	0.000395	3.82	58.84	18.31	0.38
Reach1	1183	2YR	275.00	582.96	587.90		588.12	0.000297	3.74	73.96	20.59	0.33
Reach1	1183	5YR	375.00	582.96	589.12		589.35	0.000219	3.86	101.35	25.07	0.30
Reach1	1183	10YR	425.00	582.96	589.52		589.77	0.000219	4.05	111.56	27.13	0.30
Reach1	1183	25YR	500.00	582.96	589.70		590.03	0.000271	4.60	116.76	28.12	0.34
Reach1	1183	50YR	600.00	582.96	589.82		590.27	0.000364	5.41	120.06	28.76	0.40
Reach1	1183	100YR	650.00	582.96	590.01		590.51	0.000382	5.66	125.75	30.81	0.41
Reach1	1183	500YR	900.00	582.96	590.20		591.09	0.000660	7.60	132.02	36.21	0.54
Reach1	1146	1YR	325.00	582.71	587.13		587.30	0.000235	3.25	100.06	29.26	0.31
Reach1	1146	2YR	425.00	582.71	587.90		588.09	0.000216	3.44	123.56	31.40	0.30
Reach1	1146	5YR	600.00	582.71	589.12		589.34	0.000177	3.72	163.40	33.94	0.29
Reach1	1146	10YR	700.00	582.71	589.51		589.76	0.000190	4.04	176.61	34.74	0.30
Reach1	1146	25YR	800.00	582.71	589.70		590.01	0.000221	4.46	183.83	44.74	0.33
Reach1	1146	50YR	900.00	582.71	589.84		590.21	0.000258	4.90	190.64	51.60	0.35
Reach1	1146	100YR	1050.00	582.71	590.01		590.48	0.000320	5.55	199.50	54.71	0.40
Reach1	1146	500YR	1500.00	582.71	590.10		591.04	0.000620	7.81	204.58	56.38	0.55
Reach1	1145		Lat Struct									
Reach1	1130	1YR	325.00	582.85	587.11	585.03	587.29	0.000269	3.41	95.27	28.77	0.33
Reach1	1130	2YR	425.00	582.85	587.88	585.43	588.08	0.000249	3.59	118.45	31.13	0.32
Reach1	1130	5YR	599.18	582.85	589.11	586.02	589.33	0.000195	3.82	161.67	40.88	0.30
Reach1	1130	10YR	692.09	582.85	589.50	586.30	589.76	0.000202	4.09	178.34	49.75	0.31
Reach1	1130	25YR	779.49	582.85	589.70	586.56	590.01	0.000226	4.44	193.36	104.10	0.33
Reach1	1130	50YR	867.36	582.85	589.84	586.80	590.20	0.000256	4.80	210.97	146.04	0.35
Reach1	1130	100YR	1001.80	582.85	590.02	587.15	590.46	0.000306	5.35	233.82	167.63	0.39
Reach1	1130	500YR	1442.87	582.85	590.13	588.13	591.00	0.000595	7.55	247.42	172.47	0.54
Reach1	1115		Culvert									
Reach1	1074	1YR	325.00	582.50	585.75		586.09	0.000674	4.69	69.36	26.24	0.51
Reach1	1074	2YR	425.00	582.50	586.24		586.65	0.000697	5.14	82.67	27.72	0.52
Reach1	1074	5YR	599.18	582.50	586.92		587.46	0.000756	5.86	102.29	29.77	0.56
Reach1	1074	10YR	692.09	582.50	587.25		587.84	0.000777	6.17	112.22	30.75	0.57
Reach1	1074	25YR	779.49	582.50	587.50		588.16	0.000816	6.49	120.02	31.51	0.59
Reach1	1074	50YR	867.36	582.50	587.73		588.45	0.000835	6.82	127.37	33.50	0.60
Reach1	1074	100YR	1001.80	582.50	588.02		588.86	0.000879	7.34	137.49	34.80	0.62
Reach1	1074	500YR	1442.87	582.50	588.74	587.71	590.01	0.001092	9.06	163.88	39.63	0.71
Reach1	1053	1YR	325.00	582.41	585.80	584.42	586.00	0.000411	3.59	90.59	36.87	0.40
Reach1	1053	2YR	425.00	582.41	586.32	584.77	586.55	0.000407	3.85	110.28	39.95	0.41
Reach1	1053	5YR	599.18	582.41	587.04	585.29	587.32	0.000406	4.27	140.45	43.66	0.42
Reach1	1053	10YR	692.09	582.41	587.38	585.53	587.69	0.000386	4.45	155.58	44.11	0.42
Reach1	1053	25YR	779.49	582.41	587.65	585.74	587.99	0.000385	4.67	167.42	44.46	0.42
Reach1	1053	50YR	867.36	582.41	587.89	585.94	588.26	0.000389	4.88	178.23	44.78	0.43
Reach1	1053	100YR	1001.80	582.41	588.21	586.24	588.64	0.000402	5.22	192.88	45.20	0.44
Reach1	1053	500YR	1442.87	582.41	589.05	587.06	589.67	0.000468	6.33	230.96	92.24	0.49
Reach1	1026	1YR	325.00	582.14	585.59		585.96	0.005955	4.87	66.68	29.12	0.57
Reach1	1026	2YR	425.00	582.14	586.08		586.50	0.006330	5.20	81.76	32.54	0.58
Reach1	1026	5YR	599.18	582.14	586.77		587.27	0.006936	5.64	106.16	38.12	0.60
Reach1	1026	10YR	692.09	582.14	587.12		587.64	0.006939	5.77	119.98	40.94	0.59
Reach1	1026	25YR	779.49	582.14	587.39		587.94	0.007199	5.95	131.11	43.36	0.60
Reach1	1026	50YR	867.36	582.14	587.63		588.21	0.007441	6.11	141.92	45.65	0.61
Reach1	1026	100YR	1001.80	582.14	587.96		588.59	0.007737	6.36	157.55	48.82	0.62
Reach1	1026	500YR	1442.87	582.14	588.83		589.62	0.007336	7.16	206.74	67.43	0.63
Reach1	836	1YR	325.00	581.20	584.72		584.96	0.004368	3.86	84.10	40.78	0.47
Reach1	836	2YR	425.00	581.20	585.23		585.48	0.004192	4.01	106.02	45.44	0.46
Reach1	836	5YR	599.18	581.20	585.96		586.24	0.003882	4.26	140.66	50.26	0.45
Reach1	836	10YR	692.09	581.20	586.37		586.65	0.003546	4.27	161.97	52.98	0.43
Reach1	836	25YR	779.49	581.20	586.60		586.91	0.003687	4.47	174.47	54.51	0.44
Reach1	836	50YR	867.36	581.20	586.81		587.15	0.003856	4.67	185.85	55.87	0.45
Reach1	836	100YR	1001.80	581.20	587.06		587.45	0.004237	5.00	200.47	57.87	0.47

HEC-RAS Plan: VT1\_Ult River: VT1 Reach: Reach1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach1	836	500YR	1442.87	581.20	587.91		588.42	0.004812	5.71	254.46	84.27	0.51
Reach1	638	1YR	325.00	580.46	583.81		584.05	0.004817	3.90	83.29	39.34	0.47
Reach1	638	2YR	425.00	580.46	584.43		584.66	0.004055	3.91	108.74	43.81	0.44
Reach1	638	5YR	599.18	580.46	585.22		585.48	0.003758	4.11	145.85	50.04	0.42
Reach1	638	10YR	692.09	580.46	585.72		585.97	0.003265	4.02	172.05	54.03	0.40
Reach1	638	25YR	779.49	580.46	585.91		586.19	0.003570	4.28	182.19	55.50	0.42
Reach1	638	50YR	867.36	580.46	586.05		586.37	0.003957	4.56	190.12	56.62	0.44
Reach1	638	100YR	1001.80	580.46	586.15		586.56	0.004886	5.11	195.90	57.44	0.49
Reach1	638	500YR	1442.87	580.46	586.57		587.23	0.007477	6.53	220.88	61.12	0.61
Reach1	351	1YR	325.00	578.71	583.06	581.27	583.18	0.001942	2.75	118.13	45.77	0.30
Reach1	351	2YR	425.00	578.71	583.81	581.59	583.93	0.001626	2.76	154.17	50.93	0.28
Reach1	351	5YR	549.18	578.71	584.72	581.94	584.83	0.001306	2.70	203.30	84.16	0.25
Reach1	351	10YR	642.09	578.71	585.30	582.17	585.41	0.001107	2.70	239.77	155.40	0.24
Reach1	351	25YR	679.49	578.71	585.66	582.25	585.73	0.000676	2.21	336.52	174.38	0.19
Reach1	351	50YR	717.36	578.71	585.85	582.33	585.91	0.000577	2.10	370.40	175.67	0.17
Reach1	351	100YR	751.80	578.71	586.00	582.42	586.05	0.000523	2.04	395.75	176.63	0.17
Reach1	351	500YR	1042.87	578.71	586.53	583.00	586.60	0.000515	2.16	491.64	180.56	0.17
Reach1	350		Lat Struct									
Reach1	235	1YR	325.00	578.58	582.75	581.16	582.90	0.002982	3.12	104.24	46.07	0.37
Reach1	235	2YR	425.00	578.58	583.58	581.52	583.71	0.002155	2.91	145.93	54.29	0.31
Reach1	235	5YR	549.18	578.58	584.56	581.87	584.67	0.001399	2.69	204.62	102.55	0.26
Reach1	235	10YR	642.09	578.58	585.18	582.16	585.29	0.001057	2.62	247.84	161.90	0.23
Reach1	235	25YR	679.49	578.58	585.54	582.27	585.64	0.000874	2.52	272.89	165.57	0.21
Reach1	235	50YR	717.36	578.58	585.73	582.36	585.83	0.000835	2.54	286.45	179.61	0.21
Reach1	235	100YR	751.80	578.58	585.87	582.45	585.97	0.000823	2.57	296.41	197.68	0.21
Reach1	235	500YR	1042.87	578.58	586.35	583.06	586.51	0.001123	3.21	329.82	210.32	0.25
Reach1	214	1YR	325.00	578.44	582.71	580.92	582.88	0.000312	3.34	97.44	35.63	0.36
Reach1	214	2YR	425.00	578.44	583.52	581.30	583.69	0.000230	3.34	129.22	42.53	0.32
Reach1	214	5YR	549.18	578.44	584.48	581.72	584.66	0.000167	3.35	175.25	76.73	0.28
Reach1	214	10YR	642.09	578.44	585.09	582.01	585.27	0.000146	3.41	211.37	131.50	0.27
Reach1	214	25YR	679.49	578.44	585.45	582.09	585.62	0.000128	3.35	234.01	160.25	0.25
Reach1	214	50YR	717.36	578.44	585.64	582.22	585.82	0.000126	3.40	245.98	162.98	0.25
Reach1	214	100YR	751.80	578.44	585.78	582.32	585.96	0.000127	3.47	254.69	164.96	0.26
Reach1	214	500YR	1042.87	578.44	586.27	583.00	586.50	0.000153	4.02	434.90	213.33	0.29
Reach1	180	1YR	325.00	578.34	582.70	580.48	582.87	0.000415	3.23	100.58	29.59	0.31
Reach1	180	2YR	425.00	578.34	583.50	580.86	583.68	0.000375	3.40	125.25	32.80	0.30
Reach1	180	5YR	549.18	578.34	584.45	581.29	584.64	0.000306	3.53	160.21	41.57	0.28
Reach1	180	10YR	642.09	578.34	585.05	581.58	585.26	0.000282	3.67	190.32	76.20	0.28
Reach1	180	25YR	679.49	578.34	585.41	581.69	585.61	0.000252	3.61	221.85	98.86	0.26
Reach1	180	50YR	717.36	578.34	585.60	581.80	585.80	0.000250	3.67	241.67	125.74	0.26
Reach1	180	100YR	751.80	578.34	585.73	581.90	585.95	0.000254	3.76	261.53	173.74	0.27
Reach1	180	500YR	1042.87	578.34	586.12	582.67	586.45	0.000377	4.77	331.22	183.64	0.33
Reach1	145		Culvert									
Reach1	110	1YR	325.00	577.98	581.84		582.06	0.001457	3.78	85.97	28.07	0.38
Reach1	110	2YR	425.00	577.98	582.47		582.73	0.001434	4.07	104.46	29.98	0.38
Reach1	110	5YR	549.18	577.98	583.28		583.56	0.001260	4.24	129.81	34.18	0.37
Reach1	110	10YR	642.09	577.98	583.70		584.02	0.001238	4.49	145.08	37.79	0.37
Reach1	110	25YR	679.49	577.98	584.17		584.45	0.000994	4.29	163.92	44.72	0.34
Reach1	110	50YR	717.36	577.98	584.50		584.77	0.000888	4.23	179.15	48.61	0.32
Reach1	110	100YR	751.80	577.98	584.78		585.05	0.000811	4.19	198.95	91.87	0.31
Reach1	110	500YR	1042.87	577.98	585.32		585.69	0.001043	5.05	273.33	199.50	0.36
Reach1	86	1YR	325.00	577.85	581.80	580.33	582.02	0.001734	3.77	86.31	33.70	0.41
Reach1	86	2YR	425.00	577.85	582.45	580.71	582.68	0.001524	3.88	109.47	37.31	0.40
Reach1	86	5YR	549.18	577.85	583.27	581.13	583.51	0.001123	3.92	141.10	39.84	0.36
Reach1	86	10YR	642.09	577.85	583.70	581.41	583.96	0.001069	4.11	158.50	41.04	0.35
Reach1	86	25YR	679.49	577.85	584.17	581.51	584.41	0.000838	3.91	178.20	43.28	0.32

HEC-RAS Plan: VT1\_Ult River: VT1 Reach: Reach1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach1	86	50YR	717.36	577.85	584.50	581.62	584.73	0.000741	3.85	192.84	45.44	0.30
Reach1	86	100YR	751.80	577.85	584.79	581.71	585.01	0.000671	3.80	206.63	53.49	0.29
Reach1	86	500YR	1042.87	577.85	585.31	582.39	585.65	0.000921	4.74	249.18	123.72	0.35

HEC-RAS Plan: UTV\_Ult River: UTV Reach: Reach1

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
Reach1	2624	1YR	20.00	550.10	550.53	550.53	550.68	0.045388	3.07	6.52	22.58	1.01
Reach1	2624	2YR	30.00	550.10	550.63	550.63	550.80	0.043328	3.33	9.00	26.63	1.01
Reach1	2624	5YR	40.00	550.10	550.71	550.71	550.91	0.041458	3.56	11.23	29.07	1.01
Reach1	2624	10YR	50.00	550.10	550.78	550.78	551.00	0.039366	3.71	13.47	31.55	1.00
Reach1	2624	25YR	70.00	550.10	550.90	550.90	551.15	0.038244	4.01	17.46	35.65	1.01
Reach1	2624	50YR	80.00	550.10	550.96	550.96	551.22	0.037414	4.12	19.43	37.51	1.01
Reach1	2624	100YR	100.00	550.10	551.05	551.05	551.34	0.036514	4.34	23.05	40.56	1.01
Reach1	2624	500YR	150.00	550.10	551.25	551.25	551.60	0.031782	4.71	32.43	51.70	0.98
Reach1	2369	1YR	20.00	545.42	548.31		548.32	0.000073	0.39	51.14	31.19	0.05
Reach1	2369	2YR	30.00	545.42	548.48		548.49	0.000120	0.53	56.61	33.25	0.07
Reach1	2369	5YR	40.00	545.42	548.59		548.59	0.000176	0.67	60.16	34.60	0.09
Reach1	2369	10YR	50.00	545.42	548.65		548.66	0.000245	0.81	62.50	35.47	0.10
Reach1	2369	25YR	70.00	545.42	548.85		548.86	0.000350	1.03	69.61	37.98	0.12
Reach1	2369	50YR	80.00	545.42	548.91		548.93	0.000412	1.14	72.13	38.83	0.13
Reach1	2369	100YR	100.00	545.42	549.02		549.05	0.000545	1.35	76.50	40.27	0.15
Reach1	2369	500YR	150.00	545.42	549.27		549.33	0.000861	1.82	87.24	45.91	0.20
Reach1	2348	1YR	20.00	545.22	548.31	546.01	548.31	0.000072	0.40	49.99	31.65	0.05
Reach1	2348	2YR	30.00	545.22	548.48	546.18	548.48	0.000119	0.55	55.60	35.23	0.07
Reach1	2348	5YR	40.00	545.22	548.58	546.32	548.59	0.000176	0.69	59.38	38.07	0.09
Reach1	2348	10YR	50.00	545.22	548.65	546.44	548.66	0.000246	0.84	61.91	39.85	0.10
Reach1	2348	25YR	70.00	545.22	548.84	546.66	548.86	0.000352	1.06	70.99	55.60	0.12
Reach1	2348	50YR	80.00	545.22	548.90	546.75	548.92	0.000413	1.17	74.49	57.90	0.13
Reach1	2348	100YR	100.00	545.22	549.01	546.92	549.04	0.000541	1.38	80.55	61.63	0.16
Reach1	2348	500YR	150.00	545.22	549.26	547.26	549.31	0.000828	1.82	95.40	80.91	0.19
Reach1	2320		Culvert									
Reach1	2289	1YR	20.00	545.04	545.99	545.83	546.11	0.015554	2.72	7.36	13.56	0.65
Reach1	2289	2YR	30.00	545.04	546.14	545.98	546.29	0.017961	3.18	9.44	15.31	0.71
Reach1	2289	5YR	40.00	545.04	546.25	546.11	546.44	0.020386	3.58	11.16	16.63	0.77
Reach1	2289	10YR	50.00	545.04	546.29	546.22	546.56	0.026207	4.17	12.00	17.22	0.88
Reach1	2289	25YR	70.00	545.04	546.47	546.41	546.80	0.027089	4.62	15.14	19.04	0.91
Reach1	2289	50YR	80.00	545.04	546.55	546.49	546.90	0.027008	4.79	16.71	19.89	0.92
Reach1	2289	100YR	100.00	545.04	546.69	546.63	547.09	0.027452	5.11	19.55	21.34	0.94
Reach1	2289	500YR	150.00	545.04	546.99	546.96	547.48	0.029027	5.63	26.66	26.32	0.99
Reach1	2275	1YR	20.00	544.98	545.56	545.56	545.75	0.042524	3.48	5.74	15.60	1.01
Reach1	2275	2YR	30.00	544.98	545.68	545.68	545.91	0.039407	3.86	7.76	17.06	1.01
Reach1	2275	5YR	40.00	544.98	545.80	545.79	546.06	0.035880	4.09	9.78	18.40	0.99
Reach1	2275	10YR	50.00	544.98	545.99		546.20	0.021892	3.68	13.59	20.64	0.80
Reach1	2275	25YR	70.00	544.98	546.24		546.45	0.016554	3.68	19.00	23.34	0.72
Reach1	2275	50YR	80.00	544.98	546.34		546.55	0.015416	3.73	21.43	24.45	0.70
Reach1	2275	100YR	100.00	544.98	546.48		546.73	0.015493	3.98	25.10	26.06	0.72
Reach1	2275	500YR	150.00	544.98	546.78		547.09	0.015973	4.50	33.32	29.45	0.75
Reach1	2127	1YR	20.00	543.04	544.08	543.68	544.12	0.004357	1.62	12.35	19.13	0.36
Reach1	2127	2YR	30.00	543.04	544.27	543.81	544.32	0.004545	1.85	16.25	21.32	0.37
Reach1	2127	5YR	40.00	543.04	544.43	543.92	544.49	0.004699	2.03	19.75	23.12	0.39
Reach1	2127	10YR	50.00	543.04	544.46		544.56	0.006506	2.42	20.63	23.55	0.46
Reach1	2127	25YR	70.00	543.04	544.60		544.73	0.008388	2.93	23.88	24.78	0.53
Reach1	2127	50YR	80.00	543.04	544.66		544.82	0.009075	3.14	25.51	25.35	0.55
Reach1	2127	100YR	100.00	543.04	544.84		545.01	0.008825	3.32	30.13	26.91	0.55
Reach1	2127	500YR	150.00	543.04	545.24		545.45	0.007928	3.59	41.73	30.48	0.54
Reach1	1997	1YR	20.00	542.06	542.62	542.62	542.82	0.040566	3.61	5.54	13.77	1.00
Reach1	1997	2YR	30.00	542.06	542.75	542.75	543.00	0.038539	4.00	7.51	15.39	1.01
Reach1	1997	5YR	40.00	542.06	542.87	542.87	543.15	0.036434	4.25	9.40	16.80	1.00
Reach1	1997	10YR	50.00	542.06	543.21		543.36	0.013735	3.17	15.76	21.02	0.65
Reach1	1997	25YR	70.00	542.06	543.65		543.76	0.006703	2.65	26.39	26.88	0.47
Reach1	1997	50YR	80.00	542.06	543.91		544.00	0.004481	2.36	33.87	30.34	0.39
Reach1	1997	100YR	100.00	542.06	544.14		544.24	0.004134	2.43	41.23	33.40	0.38
Reach1	1997	500YR	150.00	542.06	544.86		544.93	0.002127	2.22	68.49	45.45	0.29
Reach1	1692	1YR	300.00	537.24	539.90		540.15	0.006331	4.02	82.39	63.26	0.51
Reach1	1692	2YR	375.00	537.24	540.14		540.42	0.006473	4.39	98.10	70.92	0.53
Reach1	1692	5YR	500.00	537.24	540.44		540.80	0.006929	4.97	120.90	77.92	0.56

HEC-RAS Plan: UTV\_Ult River: UTV Reach: Reach1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach1	1692	10YR	600.00	537.24	540.67	540.04	541.07	0.007108	5.34	139.00	82.97	0.58
Reach1	1692	25YR	750.00	537.24	540.93		541.41	0.007648	5.90	161.86	88.25	0.61
Reach1	1692	50YR	850.00	537.24	541.08		541.62	0.008110	6.27	175.00	91.25	0.63
Reach1	1692	100YR	950.00	537.24	541.23		541.82	0.008392	6.59	189.10	94.81	0.65
Reach1	1692	500YR	1350.00	537.24	541.74		542.51	0.009518	7.73	239.16	105.41	0.71
Reach1	1410	1YR	300.00	534.55	536.74	536.74	537.24	0.019274	5.89	58.25	61.01	0.86
Reach1	1410	2YR	375.00	534.55	536.91	536.91	537.47	0.019232	6.33	69.06	66.87	0.87
Reach1	1410	5YR	500.00	534.55	537.19	537.19	537.80	0.017926	6.78	89.35	80.36	0.86
Reach1	1410	10YR	600.00	534.55	537.36	537.36	538.03	0.017810	7.16	104.00	88.20	0.87
Reach1	1410	25YR	750.00	534.55	537.62	537.62	538.32	0.016784	7.52	128.94	103.82	0.87
Reach1	1410	50YR	850.00	534.55	537.79	537.79	538.50	0.015760	7.64	147.73	114.82	0.85
Reach1	1410	100YR	950.00	534.55	537.93	537.93	538.66	0.015509	7.85	163.97	122.99	0.85
Reach1	1410	500YR	1350.00	534.55	538.38	538.38	539.19	0.014883	8.54	224.93	142.92	0.85
Reach1	1374	1YR	300.00	525.59	528.38	528.38	529.39	0.032593	8.06	37.24	18.79	1.01
Reach1	1374	2YR	375.00	525.59	528.73	528.73	529.86	0.031520	8.52	43.99	19.74	1.01
Reach1	1374	5YR	500.00	525.59	529.26	529.26	530.55	0.030009	9.13	54.76	21.15	1.00
Reach1	1374	10YR	600.00	525.59	529.80	529.61	531.06	0.024884	9.01	66.59	22.60	0.93
Reach1	1374	25YR	750.00	525.59	530.92		531.92	0.014984	8.01	93.69	25.53	0.74
Reach1	1374	50YR	850.00	525.59	531.26		532.33	0.015027	8.30	102.39	26.36	0.74
Reach1	1374	100YR	950.00	525.59	531.60		532.73	0.014781	8.51	111.59	27.20	0.74
Reach1	1374	500YR	1350.00	525.59	532.63		534.06	0.015694	9.58	140.86	29.72	0.78
Reach1	1328	1YR	300.00	522.77	527.84		528.23	0.007738	5.02	59.70	18.46	0.49
Reach1	1328	2YR	375.00	522.77	528.34		528.80	0.008069	5.42	69.21	19.61	0.51
Reach1	1328	5YR	500.00	522.77	529.06		529.61	0.008492	5.97	83.77	21.15	0.53
Reach1	1328	10YR	600.00	522.77	529.65		530.25	0.008244	6.20	96.78	22.43	0.53
Reach1	1328	25YR	750.00	522.77	530.77		531.35	0.006684	6.08	123.32	24.90	0.48
Reach1	1328	50YR	850.00	522.77	531.08		531.74	0.007279	6.48	131.14	25.62	0.51
Reach1	1328	100YR	950.00	522.77	531.41		532.13	0.007699	6.81	139.54	26.36	0.52
Reach1	1328	500YR	1350.00	522.77	532.34		533.38	0.009710	8.17	165.32	29.05	0.60
Reach1	1241	1YR	300.00	522.48	526.30		527.14	0.021392	7.34	40.85	16.19	0.82
Reach1	1241	2YR	375.00	522.48	526.81		527.70	0.020033	7.59	49.39	17.64	0.80
Reach1	1241	5YR	500.00	522.48	527.69		528.58	0.016241	7.56	66.17	20.19	0.74
Reach1	1241	10YR	600.00	522.48	528.68		529.41	0.011115	6.87	87.37	23.02	0.62
Reach1	1241	25YR	750.00	522.48	530.22		530.77	0.006512	5.93	126.45	27.65	0.49
Reach1	1241	50YR	850.00	522.48	530.47		531.10	0.007272	6.37	133.35	28.42	0.52
Reach1	1241	100YR	950.00	522.48	530.75		531.45	0.007770	6.71	141.49	29.31	0.54
Reach1	1241	500YR	1350.00	522.48	531.35		532.46	0.011328	8.45	159.84	31.44	0.66
Reach1	1118	1YR	300.00	520.23	525.40	523.82	525.72	0.006028	4.51	66.49	21.67	0.45
Reach1	1118	2YR	375.00	520.23	526.00	524.20	526.34	0.005717	4.69	80.03	23.59	0.45
Reach1	1118	5YR	500.00	520.23	527.15	524.77	527.47	0.004404	4.58	109.28	27.28	0.40
Reach1	1118	10YR	600.00	520.23	528.35	525.17	528.62	0.003058	4.15	144.73	31.85	0.34
Reach1	1118	25YR	750.00	520.23	530.09	525.72	530.30	0.001702	3.63	216.52	57.28	0.27
Reach1	1118	50YR	850.00	520.23	530.33	526.04	530.57	0.001889	3.93	230.65	60.12	0.28
Reach1	1118	100YR	950.00	520.23	530.62	526.35	530.89	0.001990	4.16	248.42	63.16	0.29
Reach1	1118	500YR	1350.00	520.23	531.21	527.42	531.63	0.002887	5.32	287.08	82.41	0.36
Reach1	899	1YR	325.00	519.68	524.33	522.43	524.58	0.004393	4.02	80.78	24.88	0.39
Reach1	899	2YR	400.00	519.68	525.08	522.79	525.32	0.003698	3.99	100.16	27.28	0.37
Reach1	899	5YR	550.00	519.68	526.47	523.40	526.70	0.002750	3.89	141.27	31.77	0.33
Reach1	899	10YR	650.00	519.68	527.96	523.77	528.13	0.001563	3.40	192.57	39.82	0.25
Reach1	899	25YR	800.00	519.68	529.89	524.26	530.03	0.000827	3.02	305.84	93.94	0.19
Reach1	899	50YR	900.00	519.68	530.11	524.56	530.27	0.000934	3.27	327.59	102.82	0.21
Reach1	899	100YR	1050.00	519.68	530.36	524.98	530.55	0.001116	3.65	353.55	108.37	0.23
Reach1	899	500YR	1500.00	519.68	530.78	526.07	531.12	0.001815	4.82	402.03	122.17	0.29
Reach1	857	1YR	325.00	518.61	524.25	521.52	524.40	0.002423	3.19	101.72	28.33	0.30
Reach1	857	2YR	400.00	518.61	525.00	521.88	525.16	0.002150	3.22	124.32	31.28	0.28
Reach1	857	5YR	550.00	518.61	526.42	522.52	526.58	0.001666	3.21	171.59	35.53	0.26
Reach1	857	10YR	650.00	518.61	527.93	522.89	528.06	0.000948	2.83	239.68	64.08	0.20
Reach1	857	25YR	800.00	518.61	529.90	523.41	529.97	0.000451	2.35	510.89	217.02	0.15
Reach1	857	50YR	900.00	518.61	530.12	523.71	530.20	0.000497	2.51	561.21	237.34	0.15
Reach1	857	100YR	1050.00	518.61	530.37	524.14	530.47	0.000572	2.75	622.31	245.38	0.17
Reach1	857	500YR	1500.00	518.61	530.82	525.22	530.98	0.000873	3.51	736.59	264.75	0.21

HEC-RAS Plan: UTV\_Ult River: UTV Reach: Reach1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach1	807		Culvert									
Reach1	766	1YR	325.00	511.05	518.10	513.96	518.19	0.001044	2.43	133.62	27.48	0.19
Reach1	766	2YR	400.00	511.05	518.70	514.28	518.81	0.001110	2.66	150.53	29.25	0.20
Reach1	766	5YR	550.00	511.05	519.66	514.87	519.81	0.001277	3.08	178.34	32.02	0.22
Reach1	766	10YR	650.00	511.05	520.19	515.21	520.36	0.001396	3.35	194.07	33.52	0.23
Reach1	766	25YR	800.00	511.05	520.91	515.71	521.11	0.001652	3.60	222.32	35.60	0.25
Reach1	766	50YR	900.00	511.05	521.33	516.02	521.55	0.001752	3.79	237.62	36.83	0.26
Reach1	766	100YR	1050.00	511.05	521.91	516.46	522.17	0.001884	4.04	259.67	38.52	0.27
Reach1	766	500YR	1500.00	511.05	523.40	517.68	523.74	0.002205	4.68	320.26	42.88	0.30
Reach1	735	1YR	325.00	510.41	517.16	516.40	517.90	0.019960	6.94	46.84	16.33	0.72
Reach1	735	2YR	400.00	510.41	517.79	516.85	518.54	0.017077	6.93	57.73	18.09	0.68
Reach1	735	5YR	550.00	510.41	518.66	517.62	519.51	0.016092	7.38	74.53	20.51	0.68
Reach1	735	10YR	650.00	510.41	519.08	518.06	520.03	0.016536	7.79	83.46	21.71	0.70
Reach1	735	25YR	800.00	510.41	519.66	518.62	520.73	0.016961	8.30	96.42	23.37	0.72
Reach1	735	50YR	900.00	510.41	519.99	518.96	521.15	0.017334	8.62	104.37	24.33	0.73
Reach1	735	100YR	1050.00	510.41	520.46	519.44	521.73	0.017752	9.05	115.97	25.68	0.75
Reach1	735	500YR	1500.00	510.41	521.57	520.69	523.20	0.019274	10.24	146.53	28.91	0.80
Reach1	472	1YR	325.00	508.20	511.76		512.53	0.020895	7.05	46.12	19.41	0.81
Reach1	472	2YR	400.00	508.20	511.90	511.74	512.94	0.026941	8.19	48.86	19.84	0.92
Reach1	472	5YR	550.00	508.20	512.36	512.36	513.74	0.030949	9.41	58.45	21.28	1.00
Reach1	472	10YR	650.00	508.20	512.73	512.73	514.21	0.030304	9.78	66.49	22.44	1.00
Reach1	472	25YR	800.00	508.20	513.21	513.21	514.86	0.029927	10.30	77.70	23.97	1.01
Reach1	472	50YR	900.00	508.20	513.52	513.52	515.25	0.029413	10.55	85.27	24.98	1.01
Reach1	472	100YR	1050.00	508.20	513.95	513.95	515.80	0.028934	10.92	96.19	26.43	1.01
Reach1	472	500YR	1500.00	508.20	515.10	515.10	517.18	0.027227	11.56	129.70	31.28	1.00
Reach1	335	1YR	325.00	507.04	510.71		510.98	0.005952	4.40	102.41	93.34	0.46
Reach1	335	2YR	400.00	507.04	511.04		511.30	0.005271	4.46	133.57	96.68	0.44
Reach1	335	5YR	550.00	507.04	511.61		511.85	0.004407	4.55	190.68	102.88	0.42
Reach1	335	10YR	650.00	507.04	511.93		512.17	0.004078	4.63	224.66	104.91	0.41
Reach1	335	25YR	800.00	507.04	512.37		512.61	0.003791	4.78	270.94	107.73	0.40
Reach1	335	50YR	900.00	507.04	512.64		512.88	0.003652	4.88	300.10	109.48	0.40
Reach1	335	100YR	1050.00	507.04	513.02		513.27	0.003467	5.01	342.66	111.91	0.39
Reach1	335	500YR	1500.00	507.04	513.66		514.00	0.004126	5.91	414.89	114.31	0.43
Reach1	164	1YR	325.00	504.77	508.68	508.26	509.31	0.018100	6.36	51.14	24.11	0.77
Reach1	164	2YR	400.00	504.77	508.99	508.59	509.70	0.019250	6.79	58.87	53.83	0.80
Reach1	164	5YR	550.00	504.77	509.44	509.17	510.36	0.021368	7.67	72.19	87.43	0.86
Reach1	164	10YR	650.00	504.77	509.64	509.54	510.72	0.022870	8.35	80.48	119.92	0.90
Reach1	164	25YR	800.00	504.77	509.97	509.97	511.22	0.022980	9.04	94.60	145.65	0.92
Reach1	164	50YR	900.00	504.77	510.19	510.19	511.52	0.022439	9.37	104.49	207.63	0.92
Reach1	164	100YR	1050.00	504.77	510.49	510.49	511.95	0.022186	9.88	117.91	262.52	0.93
Reach1	164	500YR	1500.00	504.77	511.70	511.70	512.80	0.012811	9.14	242.51	365.63	0.74
Reach1	35	1YR	325.00	504.17	506.83	506.35	507.30	0.013020	5.57	61.65	38.91	0.67
Reach1	35	2YR	400.00	504.17	507.09	506.63	507.64	0.013024	6.02	74.22	53.16	0.68
Reach1	35	5YR	550.00	504.17	507.53	507.18	508.18	0.013022	6.72	103.66	107.17	0.70
Reach1	35	10YR	650.00	504.17	507.76	507.59	508.46	0.013006	7.08	122.58	141.96	0.71
Reach1	35	25YR	800.00	504.17	508.06	507.84	508.83	0.013019	7.54	152.86	238.96	0.72
Reach1	35	50YR	900.00	504.17	508.23	508.17	509.02	0.013008	7.79	172.20	248.05	0.73
Reach1	35	100YR	1050.00	504.17	508.47	508.44	509.30	0.013002	8.13	201.81	267.97	0.74
Reach1	35	500YR	1500.00	504.17	509.04	509.00	509.95	0.013003	8.93	281.72	302.29	0.75



HEC-RAS Plan: VAL\_FW River: ValleyView Reach: Reach-1

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Reach-1	20850	100YR	590.14		590.96	48.17		900.00			20.47	96.43	
Reach-1	20850	FW	590.14	0.00	590.96	48.17		900.00		33.26	20.47	96.43	81.43
Reach-1	20692	100YR	589.09		589.49	56.57		900.00			73.50	146.96	
Reach-1	20692	FW	589.09	0.00	589.49	56.56		900.00		82.41	73.50	146.96	138.98
Reach-1	20510	100YR	588.48		588.75	57.98		900.00			115.23	187.48	
Reach-1	20510	FW	588.48	0.00	588.75	57.97		900.00		121.78	115.23	187.48	179.76
Reach-1	20433	100YR	588.26		588.52	62.39		900.00			105.95	184.10	
Reach-1	20433	FW	588.26	0.00	588.52	62.38		900.00		112.08	105.95	184.10	174.47
Reach-1	20427	100YR	588.24		588.50	62.55		900.00			105.14	183.66	
Reach-1	20427	FW	588.24	0.00	588.50	62.53		900.00		111.44	105.14	183.66	173.98
Reach-1	20152	100YR	586.85		587.35	62.28		1300.00			78.28	148.29	
Reach-1	20152	FW	586.85	0.00	587.35	62.28		1300.00		82.54	78.28	148.29	144.82
Reach-1	19851	100YR	585.64		585.98	77.88	0.00	1300.00			331.77	409.42	
Reach-1	19851	FW	585.65	0.00	585.98	77.88	0.00	1300.00		331.34	331.77	409.42	409.22
Reach-1	19608	100YR	584.79		585.15	72.48	0.34	1299.45	0.21		404.36	467.25	
Reach-1	19608	FW	584.79	0.00	585.15	72.71	0.35	1299.43	0.22	393.46	404.36	467.25	468.11
Reach-1	19174	100YR	582.76		583.45	78.63	0.20	2099.24	0.57		362.59	433.62	
Reach-1	19174	FW	583.11	0.35	583.70	77.49	0.89	2096.61	2.50	360.12	362.59	433.62	437.61
Reach-1	19084	100YR	582.35		583.06	99.44		2094.35	5.65		372.35	444.16	
Reach-1	19084	FW	582.84	0.49	583.40	89.81		2077.21	22.79	374.12	372.35	444.16	463.93
Reach-1	19058	100YR	582.30		583.03	147.05	3.43	2075.65	20.92		371.50	424.23	
Reach-1	19058	FW	582.79	0.49	583.38	118.71	6.12	2045.70	48.18	364.19	371.50	424.23	482.90
Reach-1	19041	100YR	581.84		582.92	204.27	14.87	2043.76	41.38		375.67	416.39	
Reach-1	19041	FW	582.51	0.66	583.31	128.00	26.94	1989.80	83.26	349.40	375.67	416.39	477.40
Reach-1	19016		Culvert										
Reach-1	18989	100YR	580.71		581.69	88.89	0.26	2099.00	0.74		309.61	360.24	
Reach-1	18989	FW	580.80	0.09	581.74	93.28	0.37	2097.70	1.93	307.52	309.61	360.24	400.80
Reach-1	18971	100YR	580.72		581.65	71.36	0.60	1998.11	1.30		333.79	393.56	
Reach-1	18971	FW	580.81	0.09	581.70	71.35	0.82	1997.34	1.84	330.37	333.79	393.56	401.72
Reach-1	18941	100YR	580.69		581.59	69.78		2000.00			346.77	417.33	
Reach-1	18941	FW	580.78	0.10	581.64	69.79		2000.00		347.29	346.77	417.33	417.08
Reach-1	18542	100YR	579.61		580.02	132.46	70.20	1928.70	1.10		340.93	424.14	
Reach-1	18542	FW	579.61	0.00	580.06	94.49		1998.82	1.18	340.93	340.93	424.14	435.42
Reach-1	18218	100YR	578.02		578.87	136.17	68.48	2922.24	9.28		415.25	494.25	
Reach-1	18218	FW	578.06	0.04	578.89	125.80	74.47	2914.78	10.75	380.77	415.25	494.25	506.57
Reach-1	18099	100YR	577.43		578.34	121.11	43.50	2951.16	5.34		307.88	387.29	
Reach-1	18099	FW	577.52	0.09	578.39	119.26	52.31	2940.97	6.72	273.50	307.88	387.29	392.76
Reach-1	17954	100YR	576.80		577.70	121.42	32.63	2938.04	29.33		278.12	350.76	
Reach-1	17954	FW	576.98	0.18	577.80	117.24	47.44	2916.35	36.21	248.30	278.12	350.76	365.54
Reach-1	17800	100YR	576.67		577.36	126.05	8.17	2991.83			131.63	238.11	
Reach-1	17800	FW	576.86	0.19	577.49	121.98	13.53	2986.47		106.80	131.63	238.11	228.78
Reach-1	17740	100YR	576.57		577.32	204.25	48.47	2931.63	19.90		206.01	267.99	
Reach-1	17740	FW	576.76	0.19	577.46	166.00	59.92	2915.23	24.86	131.70	206.01	267.99	297.70
Reach-1	17720	100YR	575.97		577.17	207.50	57.03	2887.84	55.13		487.46	535.71	
Reach-1	17720	FW	576.31	0.34	577.34	182.10	89.50	2836.98	73.52	396.40	487.46	535.71	578.50
Reach-1	17689		Culvert										
Reach-1	17655	100YR	574.02		576.38	83.01	1.28	2995.26	3.46		463.57	511.77	
Reach-1	17655	FW	574.02	0.00	576.38	83.01	1.29	2995.21	3.50	456.99	463.57	511.77	540.00
Reach-1	17648	100YR	574.38		575.28	111.26	1.78	2386.92	11.31		461.51	514.02	
Reach-1	17648	FW	574.44	0.06	575.32	65.58	1.60	2392.17	6.23	457.42	461.51	514.02	523.00

HEC-RAS Plan: VAL\_FW River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Reach-1	17608	100YR	574.55		575.13	106.57	1.15	2974.30	24.55		421.08	500.86	
Reach-1	17608	FW	574.59	0.04	575.18	80.37	0.27	2999.73		420.49	421.08	500.86	500.86
Reach-1	17420	100YR	574.07		574.52	65.28		3000.00	0.00		525.18	591.16	
Reach-1	17420	FW	574.12	0.06	574.57	65.21		3000.00		525.95	525.18	591.16	591.16
Reach-1	17217	100YR	573.74		574.04	266.87	135.42	2835.24	29.34		507.46	600.98	
Reach-1	17217	FW	573.73	0.00	574.08	128.60		2969.28	30.72	507.46	507.46	600.98	636.06
Reach-1	17038	100YR	573.70		573.80	320.30	21.82	2838.86	139.32		582.07	726.90	
Reach-1	17038	FW	573.70	0.00	573.82	186.53		2938.54	61.46	582.07	582.07	726.90	768.60
Reach-1	16808	100YR	573.26		573.58	160.77	27.93	2255.62	216.45		576.83	632.32	
Reach-1	16808	FW	573.26	0.00	573.58	130.76	21.55	2266.66	211.80	559.40	576.83	632.32	690.16
Reach-1	16735	100YR	573.33		573.49	121.69	7.98	2472.54	19.49		573.00	651.00	
Reach-1	16735	FW	573.33	0.00	573.49	110.20		2482.61	17.39	573.00	573.00	651.00	683.20
Reach-1	16537				Culvert								
Reach-1	16333	100YR	564.07		566.31	46.22		2500.00			94.99	142.79	
Reach-1	16333	FW	564.06	-0.01	566.31	46.20		2500.00		95.93	94.99	142.79	142.16
Reach-1	16314	100YR	563.59		565.70	50.47		2500.00			102.82	156.82	
Reach-1	16314	FW	563.83	0.24	565.72	50.48		2500.00		104.58	102.82	156.82	155.06
Reach-1	16226	100YR	563.36		565.36	50.70		2500.00			103.94	158.00	
Reach-1	16226	FW	563.90	0.54	565.49	50.70		2500.00		105.65	103.94	158.00	156.35
Reach-1	16151	100YR	563.24		565.19	50.83		2500.00			132.05	185.71	
Reach-1	16151	FW	563.86	0.61	565.36	50.82		2500.00		133.59	132.05	185.71	184.41
Reach-1	15948	100YR	563.50		564.70	53.15		2500.00			145.14	202.00	
Reach-1	15948	FW	564.02	0.52	565.02	54.36		2500.00	0.00	148.42	145.14	202.00	204.20
Reach-1	15751	100YR	563.58		564.46	56.83		2499.93	0.07		161.38	218.00	
Reach-1	15751	FW	564.08	0.50	564.83	54.48		2500.00		163.52	161.38	218.00	218.00
Reach-1	15650	100YR	563.74		564.32	158.25	0.03	2327.24	172.73		157.37	212.42	
Reach-1	15650	FW	564.11	0.37	564.76	55.56	0.08	2499.92		156.86	157.37	212.42	212.42
Reach-1	15590	100YR	563.71		564.30	132.59		2384.17	115.83		146.46	204.50	
Reach-1	15590	FW	564.11	0.41	564.72	55.78		2500.00		148.72	146.46	204.50	204.50
Reach-1	15500	100YR	563.72		564.25	191.87		2442.57	57.43		231.79	290.11	
Reach-1	15500	FW	564.15	0.44	564.67	56.98		2500.00		233.13	231.79	290.11	290.11
Reach-1	15320	100YR	562.41		564.04	96.75		4089.07	10.93		218.70	275.58	
Reach-1	15320	FW	563.16	0.76	564.50	63.08		4096.56	3.44	218.82	218.70	275.58	281.90
Reach-1	15250	100YR	562.43		563.95	101.68	0.27	4017.42	82.31		238.94	295.06	
Reach-1	15250	FW	563.12	0.69	564.46	61.56		4096.19	3.81	238.94	238.94	295.06	300.50
Reach-1	15150	100YR	562.50		563.81	105.43	0.68	4081.41	17.91		170.93	227.93	
Reach-1	15150	FW	563.22	0.72	564.33	64.87		4095.24	4.76	170.93	170.93	227.93	235.80
Reach-1	15052	100YR	562.48		563.73	165.94	7.79	4057.81	34.41		271.00	328.00	
Reach-1	15052	FW	563.20	0.73	564.26	76.80		4068.82	31.18	271.00	271.00	328.00	347.80
Reach-1	14945	100YR	562.62		563.60	165.86	36.95	4010.01	53.03		297.53	355.50	
Reach-1	14945	FW	563.27	0.66	564.17	66.30	0.00	4093.17	6.83	297.50	297.53	355.50	363.80
Reach-1	14794	100YR	562.70		563.48	189.81	170.74	3924.92	4.35		398.05	454.49	
Reach-1	14794	FW	563.31	0.61	564.09	63.80	8.03	4087.18	4.79	394.40	398.05	454.49	458.20
Reach-1	14696	100YR	562.73		563.43	270.00	203.70	3845.13	51.17		451.50	507.28	
Reach-1	14696	FW	563.31	0.58	564.05	71.60	2.63	4072.85	24.52	449.90	451.50	507.28	521.50
Reach-1	14608	100YR	562.71		563.41	123.40	31.47	4015.67	52.86		532.90	590.90	
Reach-1	14608	FW	563.36	0.65	564.01	66.40	12.29	4084.83	2.88	526.50	532.90	590.90	592.90
Reach-1	14525	100YR	562.70		563.38	151.21	19.01	4034.69	46.30		492.49	550.37	
Reach-1	14525	FW	563.37	0.67	563.98	78.90	9.16	4057.89	32.95	487.80	492.49	550.37	566.70

HEC-RAS Plan: VAL\_FW River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Width Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Reach-1	14418	100YR	562.80		563.31	197.62	225.88	3802.34	71.78		540.72	598.46	
Reach-1	14418	FW	563.40	0.60	563.94	86.00	39.19	4018.29	42.52	529.50	540.72	598.46	615.50
Reach-1	14348	100YR	562.71		563.29	133.23	18.62	4033.06	48.32		633.12	692.55	
Reach-1	14348	FW	563.40	0.69	563.92	82.40	1.34	4053.96	44.71	631.90	633.12	692.55	714.30
Reach-1	14266	100YR	562.06		563.21	221.63	192.38	3835.35	72.27		686.47	720.65	
Reach-1	14266	FW	562.68	0.62	563.84	72.70	82.77	3969.07	48.16	665.70	686.47	720.65	738.40
Reach-1	14200	100YR	562.13		563.13	197.38	294.97	3711.08	93.95		771.61	805.79	
Reach-1	14200	FW	562.76	0.62	563.76	106.60	158.68	3838.84	102.48	738.40	771.61	805.79	845.00
Reach-1	14153	100YR	562.00		563.09	295.00	658.93	3179.23	261.85		767.99	794.15	
Reach-1	14153	FW	562.59	0.59	563.71	190.00	500.53	3307.80	291.67	680.00	767.99	794.15	870.00
Reach-1	14116		Culvert										
Reach-1	14080	100YR	561.76		562.31	396.69	887.16	2489.69	723.16		646.34	671.66	
Reach-1	14080	FW	561.76	0.00	562.31	396.69	885.16	2493.99	720.85	360.00	646.34	671.66	800.00
Reach-1	14055	100YR	560.17		561.92	298.71	273.26	3524.11	602.62		682.21	707.53	
Reach-1	14055	FW	560.17	0.00	561.93	298.71	272.83	3523.99	603.18	401.00	682.21	707.53	801.00
Reach-1	13977	100YR	559.50		561.53	244.78	73.94	3795.65	530.41		739.82	773.78	
Reach-1	13977	FW	559.49	0.00	561.53	233.20	73.44	3797.06	529.50	586.00	739.82	773.78	896.00
Reach-1	13920	100YR	558.84		560.65	284.14	81.32	3616.73	701.95		651.02	685.62	
Reach-1	13920	FW	558.84	0.00	560.65	283.60	80.96	3616.08	702.96	536.40	651.02	685.62	820.00
Reach-1	13858	100YR	557.69		560.03	169.52	30.62	4053.18	316.20		346.23	384.03	
Reach-1	13858	FW	557.70	0.01	560.03	165.34	31.17	4050.23	318.60	305.13	346.23	384.03	548.74
Reach-1	13639	100YR	556.61		559.05	177.90	0.18	4145.84	253.98		173.50	212.90	
Reach-1	13639	FW	556.83	0.22	559.06	176.82	0.28	4095.98	303.73	172.57	173.50	212.90	404.78
Reach-1	13542	100YR	557.03		558.66	269.90	2.67	3516.59	880.74		183.50	219.60	
Reach-1	13542	FW	557.03	0.00	558.79	242.61	2.79	3604.81	792.40	177.87	183.50	219.60	666.00
Reach-1	13412	100YR	556.36		557.87	265.15	2.40	3448.34	949.26		205.70	241.30	
Reach-1	13412	FW	556.56	0.20	557.97	240.61	2.98	3416.68	980.34	201.77	205.70	241.30	700.00
Reach-1	13015	100YR	556.21		556.92	269.48	856.33	2947.76	595.91		325.37	360.67	
Reach-1	13015	FW	556.36	0.14	557.66	148.40	409.45	3681.07	309.49	187.00	325.37	360.67	477.00
Reach-1	12963	100YR	556.18		556.90	267.73	664.24	3142.12	593.64		330.59	366.59	
Reach-1	12963	FW	556.62	0.45	557.51	162.82	452.93	3470.89	476.18	185.00	330.59	366.59	488.00
Reach-1	12857	100YR	556.24		556.82	244.63	755.35	2969.37	675.29		436.11	471.89	
Reach-1	12857	FW	556.25	0.01	557.44	136.69	395.03	3802.93	202.04	295.00	436.11	471.89	575.60
Reach-1	12750	100YR	556.15		556.79	266.62	803.35	3157.07	439.57		356.00	392.00	
Reach-1	12750	FW	556.19	0.04	557.40	119.84	328.92	3930.76	140.32	260.00	356.00	392.00	450.00
Reach-1	12700	100YR	555.93		556.75	281.48	873.82	3184.59	341.59		360.62	393.10	
Reach-1	12700	FW	555.93	0.00	557.35	116.26	361.25	3830.88	207.87	308.00	360.62	393.10	424.26
Reach-1	12638	100YR	554.15		556.56	143.00	185.04	4175.82	39.14		366.43	399.57	
Reach-1	12638	FW	554.94	0.79	557.22	48.00	57.32	4313.55	29.13	357.00	366.43	399.57	405.00
Reach-1	12598	100YR	554.56		556.04	155.00	167.89	4182.31	49.80		324.07	363.93	
Reach-1	12598	FW	555.33	0.77	556.74	70.00	58.89	4309.85	31.26	305.00	324.07	363.93	375.00
Reach-1	12572	100YR	554.82		555.74	235.00	193.02	4142.65	64.33		289.59	337.41	
Reach-1	12572	FW	555.57	0.75	556.46	90.00	83.98	4285.50	30.52	260.00	289.59	337.41	350.00
Reach-1	12554 BR U	100YR	554.82		555.74	235.00	832.57	2981.01	585.32		289.59	337.41	
Reach-1	12554 BR U	FW	555.57	0.75	556.46	90.00	434.70	3774.67	190.49	260.00	289.59	337.41	350.00
Reach-1	12554 BR D	100YR	554.82		555.74	200.00	832.91	2980.79	585.20		258.59	306.41	
Reach-1	12554 BR D	FW	555.24	0.42	556.43	105.00	435.12	3774.39	190.35	220.00	258.59	306.41	325.00
Reach-1	12527	100YR	554.62		555.56	200.00	125.55	4176.28	98.17		258.59	306.41	
Reach-1	12527	FW	554.73	0.12	555.72	105.00	74.37	4283.30	42.33	220.00	258.59	306.41	325.00
Reach-1	12496	100YR	551.46		554.81	124.66	50.20	4224.24	25.56		222.01	256.55	

HEC-RAS Plan: VAL\_FW River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Reach-1	12496	FW	551.81	0.34	555.03	40.00	10.06	4286.69	3.25	218.00	222.01	256.55	258.00
Reach-1	12154	100YR	551.41		553.52	145.00	231.21	3982.44	86.35		308.35	344.19	
Reach-1	12154	FW	552.39	0.97	554.29	75.70	70.25	4115.86	113.88	294.30	308.35	344.19	370.00
Reach-1	11926	100YR	551.89		553.12	138.02	63.60	3807.28	429.12		289.16	325.16	
Reach-1	11926	FW	552.64	0.76	554.00	70.70	34.10	4117.15	148.75	279.30	289.16	325.16	350.00
Reach-1	11876	100YR	550.83		552.99	104.17	159.31	4054.97	85.72		249.41	282.10	
Reach-1	11876	FW	551.84	1.00	553.91	42.00	12.71	4256.23	31.06	246.00	249.41	282.10	288.00
Reach-1	11830	100YR	551.35		552.42	134.02	190.07	4020.70	89.24		276.05	312.05	
Reach-1	11830	FW	552.34	0.99	553.36	79.92	33.59	4147.47	118.93	267.10	276.05	312.05	347.02
Reach-1	11793		Culvert										
Reach-1	11746	100YR	550.97		552.04	142.24	35.61	4022.04	242.36		271.00	307.00	
Reach-1	11746	FW	551.25	0.27	552.40	71.01	33.78	4180.94	85.28	260.19	271.00	307.00	331.20
Reach-1	11705	100YR	549.50		551.68	160.93	25.44	4120.16	154.40		232.50	266.50	
Reach-1	11705	FW	550.05	0.55	552.10	79.58	26.82	4183.11	90.06	224.22	232.50	266.50	303.80
Reach-1	11601	100YR	550.10		551.33	278.81	327.25	3743.76	228.99		176.49	210.49	
Reach-1	11601	FW	550.38	0.28	551.87	128.20	52.20	4052.22	195.58	166.00	176.49	210.49	294.20
Reach-1	11525	100YR	549.24		551.20	236.23	290.85	3906.33	102.82		212.20	238.20	
Reach-1	11525	FW	550.14	0.90	551.80	152.67	257.81	3865.53	176.66	177.90	212.20	238.20	344.20
Reach-1	11507	100YR	549.36		551.02	197.00	360.91	3616.98	322.10		243.00	268.00	
Reach-1	11507	FW	550.36	1.00	551.54	197.00	455.57	3383.95	460.48	170.00	243.00	268.00	367.00
Reach-1	11478		Culvert										
Reach-1	11453	100YR	547.81		550.32	198.52	103.44	3864.92	331.64		249.80	274.80	
Reach-1	11453	FW	548.81	1.00	551.25	67.50	109.79	4047.06	143.15	230.50	249.80	274.80	298.00
Reach-1	11413	100YR	548.01		549.90	175.16	67.29	3893.77	438.93		114.64	148.64	
Reach-1	11413	FW	548.86	0.85	551.07	46.00	27.01	4339.95	33.04	109.00	114.64	148.64	155.00
Reach-1	11339	100YR	548.05		549.74	154.16	41.57	3860.77	497.66		276.00	309.97	
Reach-1	11339	FW	549.00	0.95	550.87	57.00	38.66	4244.10	117.24	268.00	276.00	309.97	325.00
Reach-1	11176	100YR	548.27		549.41	129.00	287.42	3543.83	568.75		232.38	265.62	
Reach-1	11176	FW	549.04	0.77	550.62	58.00	105.50	4136.96	157.55	222.00	232.38	265.62	280.00
Reach-1	11167	100YR	548.28		549.40	131.00	297.40	3588.31	514.30		231.34	265.00	
Reach-1	11167	FW	549.07	0.79	550.59	56.00	65.10	4169.21	165.69	224.00	231.34	265.00	280.00
Reach-1	11111	100YR	548.08		549.34	124.50	364.03	3797.84	238.13		303.13	337.63	
Reach-1	11111	FW	549.05	0.98	550.54	51.00	42.27	4238.84	118.89	298.00	303.13	337.63	349.00
Reach-1	11002	100YR	548.03		549.24	94.30	348.47	3859.85	191.68		270.40	304.90	
Reach-1	11002	FW	549.03	1.00	550.43	46.00	36.88	4293.44	69.68	266.00	270.40	304.90	312.00
Reach-1	10924	100YR	548.18		549.10	129.00	439.08	3711.56	249.36		343.00	377.50	
Reach-1	10924	FW	549.16	0.98	550.31	54.00	68.90	4199.25	131.85	336.00	343.00	377.50	390.00
Reach-1	10906	100YR	548.18		549.08	137.30	338.53	3753.52	307.95		338.86	373.36	
Reach-1	10906	FW	549.15	0.98	550.29	50.00	82.11	4255.61	62.28	330.00	338.86	373.36	380.00
Reach-1	10866 BR U	100YR	548.18		549.08	85.68	407.09	3734.54	263.68		338.86	373.36	
Reach-1	10866 BR U	FW	549.15	0.98	550.29	50.00	89.48	4226.24	82.80	330.00	338.86	373.36	380.00
Reach-1	10866 BR D	100YR	548.18		548.86	108.39	409.77	3734.20	261.34		327.00	361.50	
Reach-1	10866 BR D	FW	549.15	0.98	550.29	48.84	92.36	4225.87	80.29	320.75	327.00	361.50	369.59
Reach-1	10829	100YR	542.83		546.64	48.85	7.58	4384.28	8.14		327.00	361.50	
Reach-1	10829	FW	542.86	0.03	546.64	48.84	7.94	4383.46	8.60	320.75	327.00	361.50	369.59
Reach-1	10799	100YR	542.60		546.42	57.50	6.42	4385.86	7.72		241.49	275.99	
Reach-1	10799	FW	542.63	0.02	546.42	52.00	7.12	4384.09	8.79	233.00	241.49	275.99	285.00
Reach-1	10616	100YR	542.10		545.69	70.44	19.60	4338.83	41.58		52.60	86.58	
Reach-1	10616	FW	542.12	0.01	545.69	69.22	20.60	4337.79	41.61	40.00	52.60	86.58	109.22

HEC-RAS Plan: VAL\_FW River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Width Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Reach-1	10408	100YR	540.73		544.05	96.95	32.62	4260.90	106.49		97.96	131.64	
Reach-1	10408	FW	540.76	0.03	544.04	90.00	34.59	4254.59	110.82	80.00	97.96	131.64	170.00
Reach-1	10244	100YR	540.52		543.29	92.79	82.44	4230.06	87.50		111.84	144.85	
Reach-1	10244	FW	540.53	0.02	543.28	87.27	85.03	4222.57	92.40	84.80	111.84	144.85	172.07
Reach-1	10043	100YR	541.25		542.29	289.74	332.70	3483.22	584.08		163.13	196.03	
Reach-1	10043	FW	541.26	0.01	542.29	287.12	338.93	3483.52	577.56	79.88	163.13	196.03	367.00
Reach-1	9990	100YR	541.36		542.21	242.07	317.28	3410.75	671.98		157.88	191.12	
Reach-1	9990	FW	541.36	0.00	542.22	239.69	322.81	3418.29	658.90	69.31	157.88	191.12	309.00
Reach-1	9976	100YR	541.47		542.11	240.41	183.35	3791.97	424.69		150.87	198.41	
Reach-1	9976	FW	541.48	0.00	542.11	230.00	191.52	3793.80	414.68	70.00	150.87	198.41	300.00
Reach-1	9952 BR U	100YR	541.47		542.10	233.28	841.58	2687.06	660.14		150.87	198.41	
Reach-1	9952 BR U	FW	541.48	0.00	542.10	230.00	784.58	2769.28	716.73	70.00	150.87	198.41	300.00
Reach-1	9952 BR D	100YR	541.20		542.10	166.66	840.13	2685.56	663.09		115.53	161.11	
Reach-1	9952 BR D	FW	541.20	0.00	542.10	148.83	783.11	2767.77	719.71	60.00	115.53	161.11	208.83
Reach-1	9920	100YR	541.20		542.04	166.66	155.03	4095.99	148.98		115.53	161.11	
Reach-1	9920	FW	541.20	0.00	542.04	148.83	164.92	4093.53	141.55	60.00	115.53	161.11	208.83
Reach-1	9896	100YR	537.48		541.18	109.23	62.11	4407.94	29.95		95.80	125.80	
Reach-1	9896	FW	537.48	0.00	541.18	93.61	62.36	4406.97	30.67	64.00	95.80	125.80	157.61
Reach-1	9836	100YR	536.49		539.79	119.79	224.39	4206.26	69.34		80.60	110.40	
Reach-1	9836	FW	536.52	0.03	539.79	114.54	228.84	4199.03	72.13	25.00	80.60	110.40	139.54
Reach-1	9826	100YR	536.50		539.70	129.73	284.42	4065.53	150.06		103.00	131.00	
Reach-1	9826	FW	536.52	0.02	539.69	126.14	288.54	4059.42	152.04	44.00	103.00	131.00	170.14
Reach-1	9726	100YR	536.06		538.71	204.72	268.09	3895.70	336.21		85.50	113.49	
Reach-1	9726	FW	536.08	0.02	538.71	204.20	270.67	3891.65	337.68	26.87	85.50	113.49	231.07
Reach-1	9716	100YR	535.99		538.65	205.10	223.88	3980.87	295.26		79.58	109.42	
Reach-1	9716	FW	536.02	0.03	538.65	204.55	227.18	3974.13	298.70	25.11	79.58	109.42	229.66
Reach-1	9666	100YR	535.57		538.25	197.10	72.16	3951.37	476.47		82.50	112.50	
Reach-1	9666	FW	535.58	0.01	538.25	193.87	75.14	3949.76	475.10	57.00	82.50	112.50	250.87
Reach-1	9359	100YR	532.99		535.55	202.18	297.56	3821.42	381.03		199.20	229.20	
Reach-1	9359	FW	533.01	0.02	535.56	201.64	300.35	3820.70	378.95	125.40	199.20	229.20	327.04
Reach-1	9072	100YR	531.41		534.50	169.63	115.72	4097.50	286.79		163.54	193.54	
Reach-1	9072	FW	531.60	0.19	534.55	160.39	132.43	4092.55	275.02	98.41	163.54	193.54	258.80
Reach-1	8969	100YR	531.82		533.52	196.01	198.16	3602.15	699.69		185.70	213.73	
Reach-1	8969	FW	532.08	0.26	533.72	164.90	211.81	3617.45	670.73	140.00	185.70	213.73	304.90
Reach-1	8943	100YR	531.04		533.32	226.27	118.13	4177.58	204.29		207.50	240.75	
Reach-1	8943	FW	532.00	0.96	533.68	177.05	201.31	4011.14	287.55	140.15	207.50	240.75	317.20
Reach-1	8914 BR U	100YR	531.04		533.31	177.58	742.70	2463.79	1262.60		203.41	241.53	
Reach-1	8914 BR U	FW	532.00	0.96	533.68	177.05	891.23	2679.90	927.35	140.15	203.41	241.53	317.20
Reach-1	8914 BR D	100YR	531.04		533.26	222.51	742.70	2463.79	1262.60		187.14	225.08	
Reach-1	8914 BR D	FW	531.65	0.61	533.26	236.13	891.23	2679.90	927.35	81.25	187.14	225.08	357.25
Reach-1	8880	100YR	531.09		533.26	276.33	316.07	3981.52	202.41		191.10	221.10	
Reach-1	8880	FW	531.13	0.04	533.26	276.00	321.49	3967.94	210.57	81.25	191.10	221.10	357.25
Reach-1	8841	100YR	530.62		532.98	260.96	267.34	4077.62	155.05		198.50	228.50	
Reach-1	8841	FW	530.78	0.16	532.97	260.96	294.17	4019.12	186.71	75.99	198.50	228.50	336.95
Reach-1	8733	100YR	528.30		531.31	129.17	22.10	4030.38	447.53		185.75	215.50	
Reach-1	8733	FW	528.42	0.12	531.33	98.24	19.73	4017.18	463.09	173.26	185.75	215.50	271.50
Reach-1	8543	100YR	527.51		529.92	179.82	25.20	3956.53	518.27		188.80	218.80	
Reach-1	8543	FW	527.52	0.01	529.89	159.41	25.31	3937.58	537.12	173.59	188.80	218.80	333.00
Reach-1	8274	100YR	525.66		528.31	150.94	26.96	4072.47	400.57		218.50	248.50	
Reach-1	8274	FW	525.67	0.01	528.31	149.56	27.93	4069.45	402.62	182.30	218.50	248.50	331.86

HEC-RAS Plan: VAL\_FW River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Reach-1	8186	100YR	524.27		527.76	99.49	115.83	4352.19	31.98		197.20	227.20	
Reach-1	8186	FW	524.27	0.01	527.76	93.81	119.81	4349.01	31.18	148.30	197.20	227.20	242.11
Reach-1	7888	100YR	523.58		525.27	179.80	842.96	3601.68	55.36		224.93	254.93	
Reach-1	7888	FW	523.57	0.00	525.27	173.00	850.43	3598.29	51.29	98.00	224.93	254.93	271.00
Reach-1	7717	100YR	521.60		524.80	113.90	229.69	4152.74	117.56		193.20	223.20	
Reach-1	7717	FW	521.66	0.07	524.80	109.76	245.00	4141.89	113.12	137.00	193.20	223.20	246.76
Reach-1	7584	100YR	520.77		523.92	120.14	184.68	4198.92	116.39		254.00	284.00	
Reach-1	7584	FW	520.81	0.04	523.93	118.57	191.52	4197.31	111.17	190.00	254.00	284.00	308.57
Reach-1	7541	100YR	520.20		523.07	132.73	312.67	4050.42	136.90		267.40	297.96	
Reach-1	7541	FW	520.20	0.00	523.07	128.98	317.73	4053.70	128.57	195.00	267.40	297.96	323.98
Reach-1	7251	100YR	517.29		519.56	174.85	968.28	3511.61	20.10		227.92	257.08	
Reach-1	7251	FW	517.62	0.33	520.50	114.00	570.44	3902.35	27.20	150.00	227.92	257.08	264.00
Reach-1	7218	100YR	516.61		519.19	136.95	557.98	3939.98	2.04		232.71	267.00	
Reach-1	7218	FW	516.67	0.06	519.43	120.35	446.92	4050.78	2.30	150.00	232.71	267.00	270.35
Reach-1	7191	100YR	515.34		517.97	109.71	116.89	4375.36	7.75		237.40	272.40	
Reach-1	7191	FW	515.33	0.00	517.97	104.50	120.71	4379.29		167.90	237.40	272.40	272.40
Reach-1	7166	100YR	515.33		517.90	86.63	49.00	4437.55	13.45		397.80	432.80	
Reach-1	7166	FW	515.33	0.00	517.90	84.40	48.41	4436.65	14.94	354.40	397.80	432.80	438.80
Reach-1	7153	100YR	515.74		517.45	72.88	14.53	4484.89	0.59		396.79	444.86	
Reach-1	7153	FW	515.74	0.00	517.45	71.70	14.38	4485.15	0.47	374.30	396.79	444.86	446.00
Reach-1	7117 BR U	100YR	514.58		517.15	52.43	1.15	4498.85	0.00		396.79	444.86	
Reach-1	7117 BR U	FW	514.58	0.00	517.15	52.43	1.17	4498.83	0.00	374.30	396.79	444.86	446.00
Reach-1	7117 BR D	100YR	514.32		516.97	49.61	17.32	4476.01	6.67		451.27	491.84	
Reach-1	7117 BR D	FW	514.32	0.00	516.97	49.63	17.36	4475.96	6.69	439.97	451.27	491.84	497.61
Reach-1	7073	100YR	514.46		516.72	58.06	21.70	4473.06	5.24		451.27	491.84	
Reach-1	7073	FW	514.47	0.00	516.73	57.64	20.29	4474.30	5.41	439.97	451.27	491.84	497.61
Reach-1	7046	100YR	514.44		516.65	81.22	48.96	4351.12	199.92		444.92	485.51	
Reach-1	7046	FW	514.46	0.01	516.64	73.20	44.58	4339.96	215.46	430.80	444.92	485.51	504.00
Reach-1	6942	100YR	513.33		516.35	152.48	150.12	4444.25	5.63		428.62	463.62	
Reach-1	6942	FW	513.34	0.01	516.34	142.44	156.83	4437.32	5.85	325.00	428.62	463.62	467.44
Reach-1	6551	100YR	511.66		514.19	204.41	308.57	4281.35	10.09		253.70	288.70	
Reach-1	6551	FW	511.67	0.01	514.18	193.42	316.01	4273.75	10.25	101.00	253.70	288.70	294.42
Reach-1	6541	100YR	510.70		513.86	164.74	72.74	4519.96	7.30		254.00	289.00	
Reach-1	6541	FW	511.67	0.97	513.95	184.07	247.90	4338.34	13.77	110.63	254.00	289.00	294.70
Reach-1	6464	100YR	511.12		513.45	156.61	201.96	4283.17	14.88		198.00	233.00	
Reach-1	6464	FW	511.88	0.77	513.70	123.65	334.41	4143.26	22.34	117.60	198.00	233.00	241.25
Reach-1	6332	100YR	510.94		513.21	117.58	144.41	4337.70	17.90		278.75	313.75	
Reach-1	6332	FW	511.66	0.72	513.53	96.77	219.84	4254.44	25.72	225.20	278.75	313.75	321.97
Reach-1	5924	100YR	509.99		512.54	93.65	109.37	4718.82	71.81		190.16	223.60	
Reach-1	5924	FW	510.99	1.00	513.03	75.00	143.12	4648.88	108.00	170.00	190.16	223.60	245.00
Reach-1	5767	100YR	510.38		511.17	254.09	122.01	3428.11	1349.89		284.50	319.50	
Reach-1	5767	FW	511.07	0.69	512.38	80.00	177.89	4264.47	457.64	260.00	284.50	319.50	340.00
Reach-1	5671	100YR	510.30		511.11	258.06	105.17	3524.74	1170.10		310.80	345.80	
Reach-1	5671	FW	511.15	0.85	512.17	123.70	197.32	4015.13	587.55	261.40	310.80	345.80	385.10
Reach-1	5651	100YR	510.27		511.09	261.61	92.69	3697.39	1009.92		332.50	367.50	
Reach-1	5651	FW	511.20	0.93	512.10	134.40	177.63	4011.20	611.18	273.00	332.50	367.50	407.40
Reach-1	5612 BR U	100YR	510.27		511.09	261.61	778.01	2822.75	1198.02		332.50	367.50	
Reach-1	5612 BR U	FW	511.20	0.93	512.10	134.40	1018.66	3187.28	591.31	273.00	332.50	367.50	407.40
Reach-1	5612 BR D	100YR	510.27		511.09	265.93	778.29	2823.62	1196.88		353.00	393.00	
Reach-1	5612 BR D	FW	511.10	0.83	512.10	129.20	1018.94	3188.16	590.16	294.00	353.00	393.00	423.20

HEC-RAS Plan: VAL\_FW River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Reach-1	5554	100YR	508.91		510.24	231.17	130.35	4587.13	82.51		353.00	393.00	
Reach-1	5554	FW	509.89	0.98	510.99	129.20	166.82	4538.76	94.42	294.00	353.00	393.00	423.20
Reach-1	5509	100YR	508.93		510.18	267.50	299.53	4592.07	108.40		378.00	418.00	
Reach-1	5509	FW	509.82	0.89	510.97	114.80	215.57	4675.96	108.47	331.50	378.00	418.00	446.30
Reach-1	5272	100YR	509.38		509.91	381.70	1022.47	3704.85	272.67		432.89	472.89	
Reach-1	5272	FW	509.87	0.49	510.85	95.80	239.07	4686.73	74.21	392.30	432.89	472.89	488.10
Reach-1	5010	100YR	509.45		509.82	381.00	882.93	3409.53	707.54		288.00	328.00	
Reach-1	5010	FW	509.84	0.40	510.78	72.90	123.79	4709.81	166.41	272.30	288.00	328.00	345.20
Reach-1	4978	100YR	508.97		509.78	417.14	504.57	3913.99	581.44		414.39	452.05	
Reach-1	4978	FW	509.34	0.37	510.72	72.90	119.83	4786.09	94.08	397.00	414.39	452.05	469.90
Reach-1	4941	100YR	509.22		509.66	420.71	388.87	3646.04	965.09		305.00	345.00	
Reach-1	4941	FW	509.66	0.45	510.56	73.00	109.72	4720.37	169.91	290.00	305.00	345.00	363.00
Reach-1	4602	100YR	508.85		509.58	187.36	127.87	4359.24	312.88		362.00	402.00	
Reach-1	4602	FW	509.68	0.83	510.47	63.40	97.64	4637.04	65.32	348.90	362.00	402.00	412.30
Reach-1	4446	100YR	508.84		509.55	322.75	149.86	4401.28	248.86		491.54	531.54	
Reach-1	4446	FW	509.75	0.92	510.40	120.00	141.56	4432.39	226.05	455.00	491.54	531.54	575.00
Reach-1	4401	100YR	508.90		509.48	454.67	231.19	4124.71	444.10		540.99	580.99	
Reach-1	4401	FW	509.81	0.92	510.33	185.00	234.69	4124.04	441.27	470.00	540.99	580.99	655.00
Reach-1	4317		Culvert										
Reach-1	4217	100YR	509.17		509.26	553.90	213.21	4324.17	262.62		700.42	804.44	
Reach-1	4217	FW	509.47	0.29	509.57	138.00	45.33	4716.17	38.50	680.00	700.42	804.44	818.00
Reach-1	4176	100YR	509.16		509.25	566.30	212.00	4254.47	333.53		497.12	594.98	
Reach-1	4176	FW	509.44	0.28	509.56	125.00	28.93	4725.02	46.05	485.00	497.12	594.98	610.00
Reach-1	3924	100YR	509.17		509.20	569.51	2249.49	1935.89	614.62		396.29	459.55	
Reach-1	3924	FW	509.23	0.06	509.47	102.70	199.18	4347.60	253.22	379.10	396.29	459.55	481.80
Reach-1	3681	100YR	509.16		509.18	573.10	2763.78	1505.39	530.84		551.15	613.38	
Reach-1	3681	FW	509.18	0.01	509.34	127.32	657.89	3958.77	183.34	507.58	551.15	613.38	634.90
Reach-1	3430	100YR	509.16		509.17	626.02	3070.86	978.16	750.98		520.28	573.67	
Reach-1	3430	FW	509.21	0.05	509.26	217.20	1363.35	2271.71	1164.94	443.00	520.28	573.67	660.20
Reach-1	3178	100YR	509.14		509.16	298.43	2299.46	1619.60	480.94		455.43	512.70	
Reach-1	3178	FW	509.18	0.04	509.23	180.40	1073.35	2649.86	676.79	395.10	455.43	512.70	575.50
Reach-1	3106	100YR	509.10		509.15	184.30	780.92	2378.36	1240.72		456.96	507.80	
Reach-1	3106	FW	509.11	0.01	509.21	118.80	218.27	3167.49	1014.24	437.00	456.96	507.80	555.80
Reach-1	3061	100YR	509.00		509.12	72.90		4104.24	295.76		598.19	664.54	
Reach-1	3061	FW	509.07	0.07	509.20	72.90		4195.33	204.67	601.97	598.19	664.54	674.87
Reach-1	3008		Culvert										
Reach-1	2954	100YR	496.68		498.14	43.00		4400.00			446.94	516.33	
Reach-1	2954	FW	496.75	0.07	498.20	43.00		4400.00		460.90	446.94	516.33	503.90
Reach-1	2929	100YR	497.07		497.64	70.90		4361.37	38.63		459.20	524.87	
Reach-1	2929	FW	497.12	0.05	497.69	68.72		4379.32	20.68	459.98	459.20	524.87	528.70
Reach-1	2887	100YR	496.64		497.52	90.04	292.34	4073.17	34.50		414.63	467.30	
Reach-1	2887	FW	496.67	0.03	497.57	81.00	270.12	4109.79	20.09	389.60	414.63	467.30	470.60
Reach-1	2848	100YR	496.81		497.21	93.09	33.63	4362.54	3.84		373.55	459.84	
Reach-1	2848	FW	496.84	0.04	497.25	89.74	20.15	4379.85		370.10	373.55	459.84	459.84
Reach-1	2827		Culvert										
Reach-1	2776	100YR	494.81		495.59	88.65	326.88	4009.46	63.66		355.71	411.44	
Reach-1	2776	FW	494.89	0.08	495.75	71.30	186.76	4182.25	30.98	343.00	355.71	411.44	414.30
Reach-1	2743	100YR	494.20		495.36	87.88	100.17	4285.62	14.21		312.41	385.81	
Reach-1	2743	FW	494.33	0.13	495.53	74.09		4398.10	1.90	312.41	312.41	385.81	386.50

HEC-RAS Plan: VAL\_FW River: ValleyView Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Reach-1	2430	100YR	493.28		493.98	155.24	99.98	3906.21	393.82		155.00	220.37	
Reach-1	2430	FW	493.30	0.02	494.08	108.90	26.76	4072.78	300.46	150.90	155.00	220.37	259.80
Reach-1	2079	100YR	489.35		491.74	75.81	0.32	4399.69			196.30	269.95	
Reach-1	2079	FW	489.35	0.01	491.74	75.81	0.34	4399.66		194.02	196.30	269.95	269.83
Reach-1	2022	100YR	488.07		490.24	86.08		4400.00			190.00	286.53	
Reach-1	2022	FW	488.08	0.01	490.24	86.07		4400.00		194.96	190.00	286.53	281.03
Reach-1	1995	100YR	487.88		490.02	87.62		4400.00			233.00	333.16	
Reach-1	1995	FW	487.88	0.00	490.02	87.60		4400.00		238.73	233.00	333.16	326.35
Reach-1	1953	100YR	488.42		488.81	111.54		4500.00			220.00	337.18	
Reach-1	1953	FW	488.50	0.08	488.88	111.77		4500.00		223.00	220.00	337.18	337.18
Reach-1	1892	100YR	488.42		488.67	162.74	0.11	4499.07	0.82		92.00	233.00	
Reach-1	1892	FW	488.49	0.08	488.74	141.00		4500.00		92.00	92.00	233.00	233.00
Reach-1	1804 BR U	100YR	488.05		488.55	76.10		4500.00			92.00	233.00	
Reach-1	1804 BR U	FW	488.13	0.08	488.62	76.10		4500.00		92.00	92.00	233.00	233.00
Reach-1	1804 BR D	100YR	487.95		488.43	76.10		4500.00			211.00	297.50	
Reach-1	1804 BR D	FW	488.03	0.08	488.51	76.10		4500.00		211.00	211.00	297.50	308.00
Reach-1	1722	100YR	487.99		488.30	130.70	17.90	4091.96	390.15		211.00	297.50	
Reach-1	1722	FW	488.04	0.05	488.41	97.00		4355.15	144.85	211.00	211.00	297.50	308.00
Reach-1	1721		Lat Struct										
Reach-1	1696	100YR	487.49		488.16	136.98	7.21	4483.92	0.78		172.11	269.00	
Reach-1	1696	FW	487.64	0.15	488.29	96.89		4491.91		172.11	172.11	269.00	269.00
Reach-1	1320	100YR	486.85		487.23	181.99	96.24	3852.08	169.22		69.59	144.00	
Reach-1	1320	FW	486.85	0.01	487.30	82.80	36.49	4081.04		61.20	69.59	144.00	144.00
Reach-1	1065	100YR	484.18		486.27	139.59	270.71	3618.12	228.71		142.82	173.45	
Reach-1	1065	FW	484.23	0.05	486.26	129.37	280.53	3592.32	244.67	95.63	142.82	173.45	225.00
Reach-1	934	100YR	482.90		484.10	331.53	10.54	3063.40	1043.60		149.35	192.13	
Reach-1	934	FW	483.49	0.58	484.24	328.30	11.58	2755.92	1350.03	146.70	149.35	192.13	475.00
Reach-1	708	100YR	482.50		482.71	705.93	279.22	2050.86	1787.45		170.74	229.51	
Reach-1	708	FW	483.50	1.00	483.58	676.40	376.05	1520.64	2220.84	63.60	170.74	229.51	740.00



HEC-RAS Plan: VT1\_FW River: VT1 Reach: Reach1

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Reach1	2135	100YR	591.73		592.91	21.48		650.00			73.66	101.42	
Reach1	2135	FW	591.73	0.00	592.91	21.48		650.00		76.42	73.66	101.42	97.90
Reach1	2122	100YR	591.15		592.84	18.71		650.00			75.50	94.50	
Reach1	2122	FW	591.15	0.00	592.84	18.65		650.00		75.68	75.50	94.50	94.33
Reach1	1899	100YR	590.15		591.69	18.99		650.00			49.50	68.50	
Reach1	1899	FW	590.66	0.51	591.83	19.01		650.00	0.00	49.50	49.50	68.50	68.51
Reach1	1683	100YR	590.01		591.16	23.28	0.17	649.56	0.26		86.25	105.25	
Reach1	1683	FW	590.61	0.61	591.47	23.33	0.87	647.90	1.23	83.96	86.25	105.25	107.29
Reach1	1682		Lat Struct										
Reach1	1547	100YR	589.97		590.92	23.22	0.33	649.10	0.57		74.32	93.32	
Reach1	1547	FW	590.60	0.63	591.32	23.25	0.94	647.44	1.62	72.26	74.32	93.32	95.51
Reach1	1456	100YR	589.97		590.79	36.42	1.25	645.10	3.64		94.31	113.31	
Reach1	1456	FW	590.60	0.63	591.23	24.03		642.90	7.10	94.31	94.31	113.31	118.34
Reach1	1367	100YR	590.00		590.68	25.22	0.29	648.16	1.55		64.00	83.00	
Reach1	1367	FW	590.61	0.61	591.16	19.58		649.52	0.48	64.00	64.00	83.00	83.58
Reach1	1183	100YR	590.01		590.50	30.59	0.94	644.09	4.97		75.50	94.50	
Reach1	1183	FW	590.60	0.59	591.02	19.41		649.65	0.35	75.50	75.50	94.50	94.91
Reach1	1146	100YR	590.00		590.48	54.58	1.63	1047.43	0.94		69.91	100.91	
Reach1	1146	FW	590.59	0.59	590.99	31.00		1050.00		69.91	69.91	100.91	100.91
Reach1	1145		Lat Struct										
Reach1	1130	100YR	590.01		590.45	129.79	4.32	989.57	7.91		70.01	101.01	
Reach1	1130	FW	590.60	0.59	590.98	31.00		1001.80		70.01	70.01	101.01	101.01
Reach1	1115		Culvert										
Reach1	1074	100YR	588.02		588.86	34.80	0.04	1001.36	0.40		121.25	152.75	
Reach1	1074	FW	588.09	0.07	588.90	34.75	0.06	1001.22	0.52	120.62	121.25	152.75	155.37
Reach1	1053	100YR	588.22		588.64	45.20	0.28	1001.45	0.07		120.25	163.75	
Reach1	1053	FW	588.28	0.07	588.69	43.50		1001.80		120.25	120.25	163.75	163.75
Reach1	1026	100YR	587.96		588.59	48.82	0.00	1001.80			57.90	107.40	
Reach1	1026	FW	588.05	0.09	588.64	48.55		1001.80		57.90	57.90	107.40	106.45
Reach1	836	100YR	587.06		587.45	57.87		1001.80			188.26	252.92	
Reach1	836	FW	587.34	0.28	587.67	57.88		1001.80		192.63	188.26	252.92	250.51
Reach1	638	100YR	586.15		586.56	57.44		1001.80			202.87	267.75	
Reach1	638	FW	586.75	0.60	587.05	57.44		1001.80		208.80	202.87	267.75	266.24
Reach1	351	100YR	586.00		586.05	176.63	184.06	567.74			210.00	269.64	
Reach1	351	FW	586.52	0.52	586.61	66.64	9.43	742.37		203.00	210.00	269.64	269.64
Reach1	350		Lat Struct										
Reach1	235	100YR	585.87		585.97	70.24	20.96	726.28	4.56		246.44	306.80	
Reach1	235	FW	586.45	0.58	586.53	66.64	0.99	743.93	6.89	246.00	246.44	306.80	312.64
Reach1	214	100YR	585.78		585.96	63.29	17.09	732.08	2.62		277.50	314.50	
Reach1	214	FW	586.38	0.60	586.52	63.29	21.07	726.57	4.16	260.00	277.50	314.50	323.29
Reach1	180	100YR	585.73		585.95	173.74	11.62	734.25	5.93		303.25	334.75	
Reach1	180	FW	586.34	0.61	586.51	83.28	14.26	727.06	10.48	266.00	303.25	334.75	349.28
Reach1	145		Culvert										
Reach1	110	100YR	584.78		585.05	91.87	4.79	741.04	5.97		352.25	383.75	
Reach1	110	FW	585.79	1.00	585.96	65.00	15.26	713.99	22.56	335.00	352.25	383.75	400.00

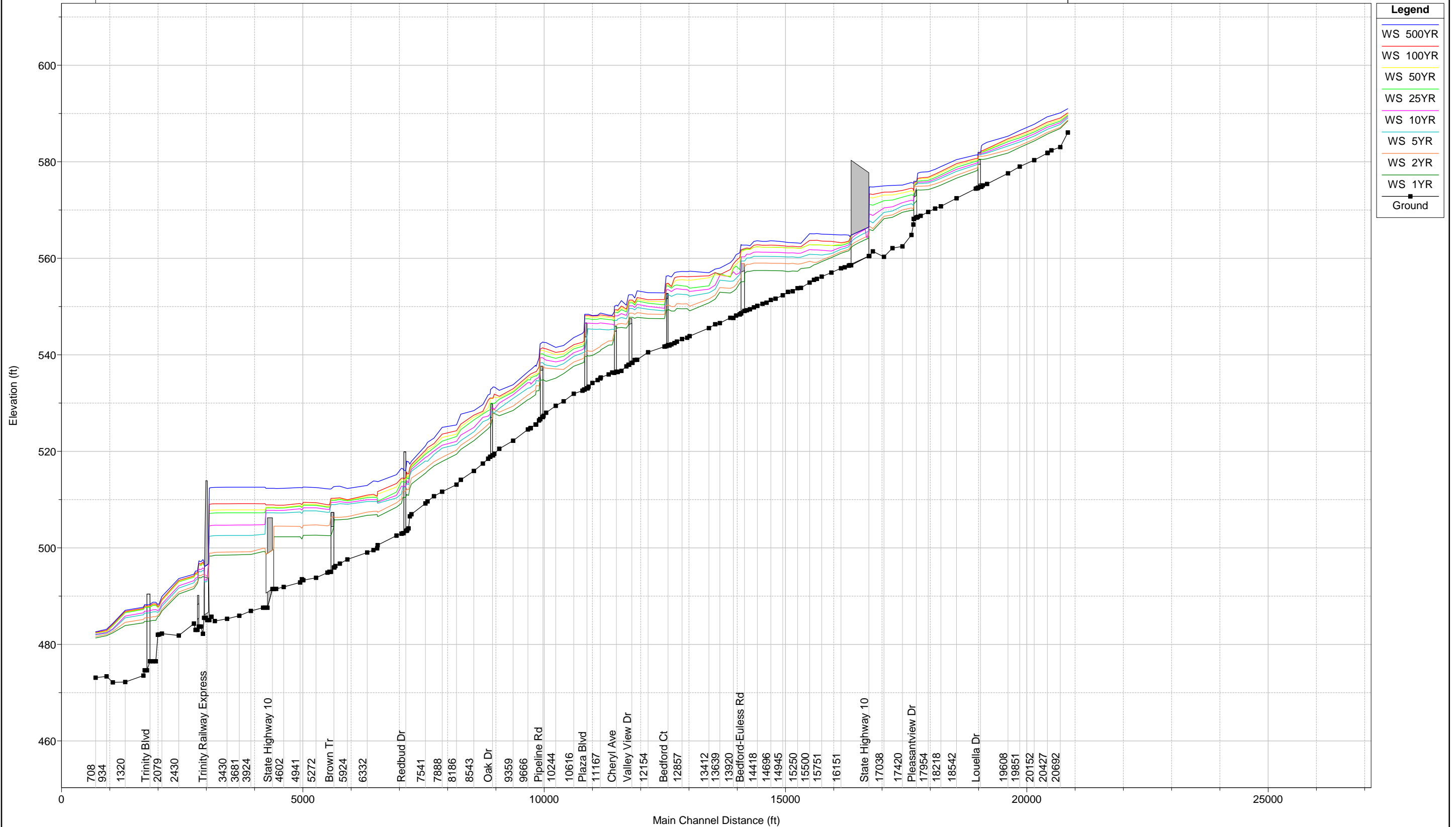
HEC-RAS Plan: VT1\_FW River: VT1 Reach: Reach1 (Continued)

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Reach1	86	100YR	584.79		585.01	53.49	5.28	744.92	1.60		381.50	418.50	
Reach1	86	FW	585.79	1.00	585.94	47.65	8.77	737.67	5.36	376.10	381.50	418.50	423.75

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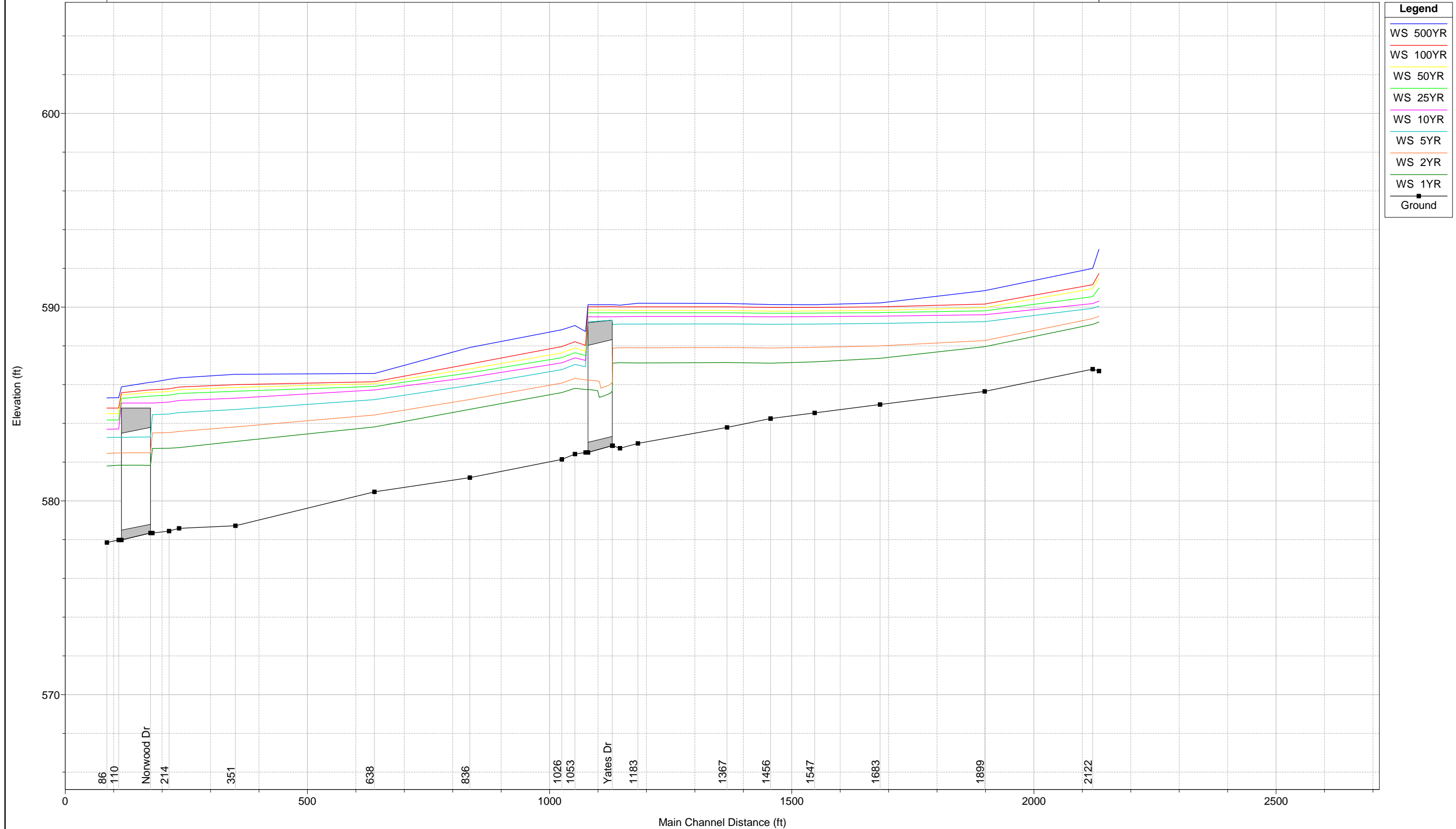
## **HEC-RAS Profiles**

ValleyView Reach-1



1 in Horiz. = 2000 ft 1 in Vert. = 20 ft

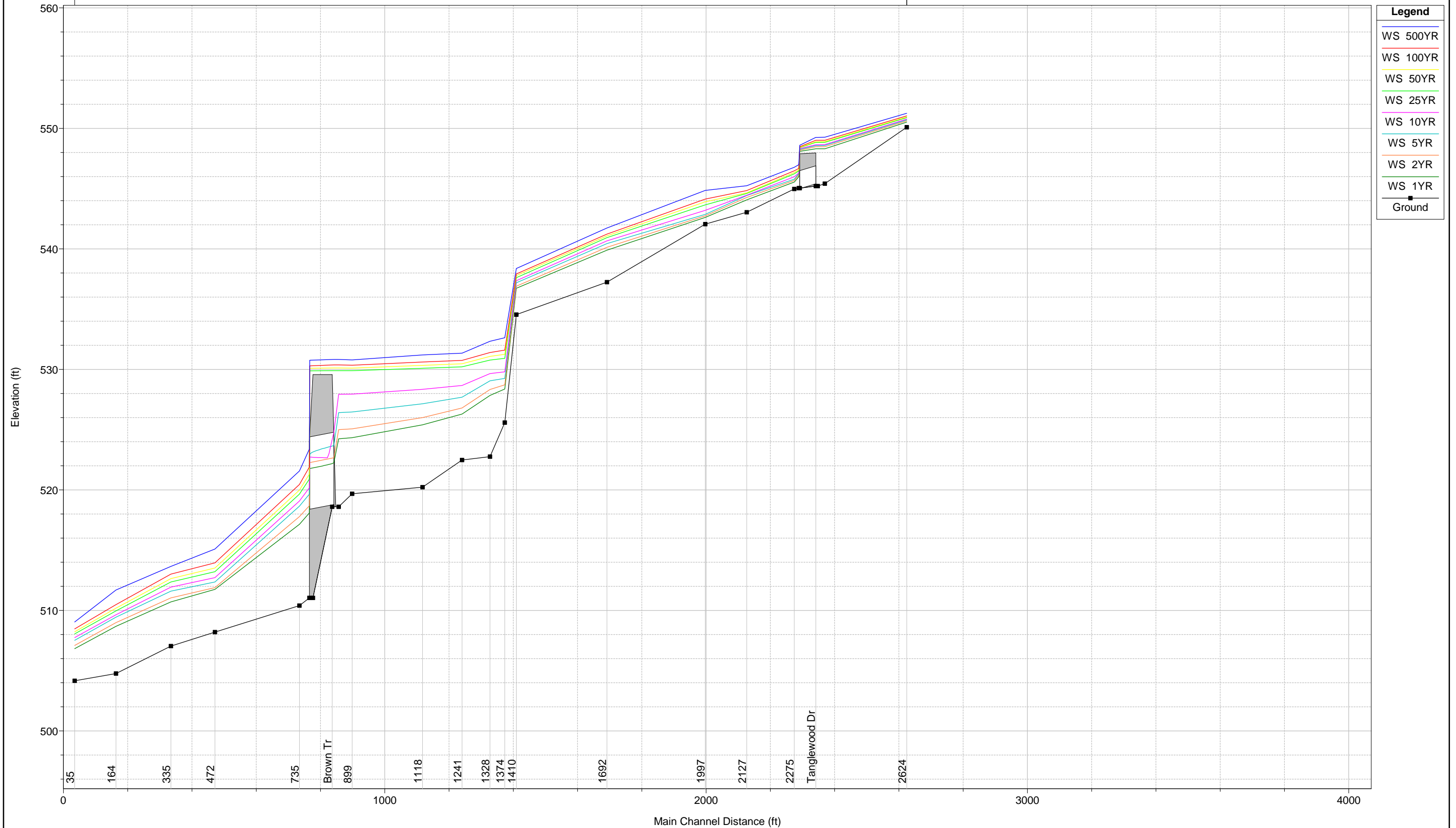
VT1 Reach1



1 in Horiz. = 200 ft 1 in Vert. = 5 ft

ValleyView\_Branch Plan: UTV\_Ultimate 8/9/2017

UTV Reach1



1 in Horiz. = 300 ft 1 in Vert. = 8 ft

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**Appendix E**  
**Cost Estimates**

**VALLEY VIEW BRANCH  
FLOOD PROTECTION PLANNING STUDY**

**Estimate of Probable Cost: Trinity Railway Express & State Highway 10 Culvert Improvements**

Category	Item Description	Quantity	Unit	Price <sup>1</sup>	Amount
Initial Costs	Mobilization (5% of Construction Subtotal)	1	LS	\$ 31,000	\$ 31,000
	Install 2-10x10 Concrete Box Culverts (Jack/Bor)	160	LF	\$ 2,500	\$ 400,000
	Headwall	2	EA	\$ 20,000	\$ 40,000
	Remove Concrete Channel	550	SY	\$ 30	\$ 16,500
	Pipe Removal/Box Culvert Repair	1	LS	\$ 5,000	\$ 5,000
	Misc. Concrete Channel Repair	1	LS	\$ 20,000	\$ 20,000
	SWPPP	1	LS	\$ 10,000	\$ 10,000
	<b>SUBTOTAL</b>				<b>\$ 523,000</b>
	25% Contingency				\$ 131,000
	<b>SUBTOTAL (Construction)</b>				<b>\$ 654,000</b>
	15% Engineering & Survey				\$ 98,100
<b>TOTAL PROJECT COST</b>				<b>\$ 750,000</b>	
<b>Optional 100-Year Property Buyout</b>					
Buyout	Properties within 100-Year	19	LS		\$ 329,000
	<b>SUBTOTAL</b>				<b>\$ 329,000</b>
	15% Market Adjustment/Purchase Price				\$ 378,000
	50% Closing/Relocation/Demolition Price				\$ 189,000
	<b>TOTAL COST</b>				<b>\$ 570,000</b>

<sup>1</sup> Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

This statement was prepared utilizing standard cost estimate practices. It is understood and agreed that this is an estimate only, and that Engineer shall not be liable to Owner or to a third party for any failure to accurately estimate the cost of the project, or any part thereof.



**VALLEY VIEW BRANCH  
FLOOD PROTECTION PLANNING STUDY**

**Estimate of Probable Cost: Regional Detention at Stream VVB-1 Confluence**

Category	Item Description	Quantity	Unit	Price <sup>1</sup>	Amount	
Initial Costs	Site Preparation/Mobilization	1	LS	\$ 85,000	\$ 85,000	
	Excavation	42,000	CY	\$ 20	\$ 840,000	
	Fill	1,500	CY	\$ 35	\$ 52,500	
	Fine Grading/Fertilizer/Seeding	22,000	SY	\$ 10	\$ 220,000	
	Administrative (Easements)	1	LS	\$ 30,000	\$ 30,000	
	Concrete Outlet Structure	1	LS	\$ 20,000	\$ 20,000	
	Offline Storage Outlet Structure	1	LS	\$ 10,000	\$ 10,000	
	Install 2-8'x5' Concrete Box Culverts (Norwood Dr.)	120	LF	\$ 500	\$ 60,000	
	Remove & Replace Existing Concrete Pavement	250	SY	\$ 90	\$ 22,500	
	SWPPP	1	LS	\$ 10,000	\$ 10,000	
		<b>SUBTOTAL</b>				<b>\$ 1,350,000</b>
		25% Contingency				\$ 338,000
		<b>SUBTOTAL (Construction)</b>				<b>\$ 1,688,000</b>
		15% Engineering & Survey				\$ 253,000
	<b>TOTAL PROJECT COST</b>				<b>\$ 1,940,000</b>	
	<b>Item Description</b>					
Maintenance	Full-Width Mowing (3 times/year)	5	AC	\$ 530	\$ 2,700	
	<b>SUBTOTAL</b>				<b>\$ 2,700</b>	
	25% Contingency				\$ 675	
	<b>ANNUAL MAINTENANCE COST</b>				<b>\$ 3,000</b>	

<sup>1</sup> Unit Price based on RS Means Manual, TxDOT bid items, and recent construction bids

This statement was prepared utilizing standard cost estimate practices. It is understood and agreed that this is an estimate only, and that Engineer shall not be liable to Owner or to a third party for any failure to accurately estimate the cost of the project, or any part thereof.

**VALLEY VIEW BRANCH  
FLOOD PROTECTION PLANNING STUDY**

**Estimate of Probable Cost: 10-Year Buyout Option**

<b>Category</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Amount<sup>1</sup></b>
Buyout	Properties within 10-Year Floodplain	74	LS	\$ 5,210,363
	<b>SUBTOTAL</b>			<b>\$ 5,210,000</b>
	15% Market Adjustment/Purchase Price			\$ 5,992,000
	50% Closing/Relocation/Demolition Price			\$ 2,996,000
	<b>TOTAL COST</b>			<b>\$ 8,990,000</b>

<sup>1</sup> 2016 Tarrant County Appraised Value

This statement was prepared utilizing standard cost estimate practices. It is understood and agreed that this is an estimate only, and that Engineer shall not be liable to Owner or to a third party for any failure to accurately estimate the cost of the project, or any part thereof.

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**Appendix F**  
**TWDB Review Comments**

# Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.  
Austin, TX 78711-3231, [www.twdb.texas.gov](http://www.twdb.texas.gov)  
Phone (512) 463-7847, Fax (512) 475-2053

Mr. Greg Dickens  
City of Hurst  
1505 Precinct Line Road  
Hurst, Texas 76054

RE: Flood Protection Grant Contract with the City of Hurst; Contract No.1548321879, Draft Report Comments Entitled "Valley View Branch Flood Protection Planning Study"

Dear Mr. Dickens:


Staff members of the Texas Water Development Board (TWDB) have completed a review of the draft report prepared under the above-referenced contract. ATTACHMENT 1 provides the comments resulting from this review. As stated in the TWDB contract, the City of Hurst (City) will consider revising the final report in response to comments from the Executive Administrator and other reviewers. In addition, the City will include a copy of the Executive Administrator's draft report comments in the Final Report.

The TWDB looks forward to receiving one (1) electronic copy of the entire Final Report in Portable Document Format (PDF) and six (6) bound double-sided copies. **Please further note, that in compliance with Texas Administrative Code Chapters 206 and 213 (related to Accessibility and Usability of State Web Sites), the digital copy of the final report must comply with the requirements and standards specified in statute. For more information, visit <http://www.sos.state.tx.us/tac/index.shtml>.** If you have any questions on accessibility, please contact David Carter with the Contract Administration Division at (512) 936-6079 or [David.Carter@twdb.texas.gov](mailto:David.Carter@twdb.texas.gov).

The City shall also submit one (1) electronic copy of any computer programs or models, and, if applicable, an operations manual developed under the terms of this Contract.

Please feel free to contact Mr. Ivan Ortiz of our Flood Mitigation Planning staff at (512) 463-6418 or [ivan.ortiz@twdb.texas.gov](mailto:ivan.ortiz@twdb.texas.gov) if you have any questions or need any further information.

Sincerely,

  
Robert E. Mace, Ph.D., P.G.  
Deputy Executive Administrator  
Water Science and Conservation

Date: 6/19/12

Attachment

c w/o att.: Mr. Ivan Ortiz, Flood Mitigation Planning

Our Mission	:	Board Members
To provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas	:	Bech Bruun, Chairman   Kathleen Jackson, Board Member   Peter Lake, Board Member
	:	Jeff Walker, Executive Administrator

## Attachment 1

### Draft Report Comments for Contract No. 1548321879 Valley View Branch Flood Protection Planning Study

#### General Draft Report Comments:

In general, the study follows standard methodologies and practice. Mitigation alternatives identified by the study may be eligible for funding under the Texas Water Development Board's financial assistance programs. Application requirements and eligibility criteria are identified by Texas Water Development Board rules specified in Section 363 of the Texas Administrative Code (TAC). The report would be appropriate for use in support of an application to the Board for financing the proposed improvements. All additional information required by Board rules, 31 TAC 363.401-404, as well as necessary information to make legal findings as required by Texas Water Code Chapter 17.771-776, would be required at the time of loan application.

Please conduct a final edit of the document for grammar, spelling, typographical errors, and inconsistent usage of acronyms and abbreviations. Please spell out all acronyms, with acronym in parenthesis, the first time they are used. Please include a list of acronyms used in the report after the Table of Contents. **Final edits were made to the report regarding grammar, spelling, typographical errors, and usage of acronyms and abbreviations. A list of acronyms was also included after the Table of Contents.**

#### Specific Draft Report Comments:

1. The draft report provided no discussion of how modeling accuracy was determined. Please, provide a discussion of any modeling calibration conducted or a reason why none was conducted. **No calibrations were conducted on the hydrologic or hydraulic analyses since no stream gage data or high water mark elevations were available. Section 3.5.4 was added for this discussion.**
2. Task 4, Conceptual Alternative Improvement Analysis, as provided in the scope of work in the contract, states that this task will be limited to a maximum of 5 projects based on those projects believed to provide the greatest benefit to cost. Also, Task 4.C.1, also under Conceptual Alternative Improvement Analysis, indicates that the study will evaluate potential improvements based on benefits to the City and cost of the improvements. Lastly, Task 4.C.3, again under Conceptual Alternative Improvement Analysis, includes the requirement for the consultants to obtain City input to prioritize recommended improvements based on benefits and costs and whether the improvements provide public or private benefits. The draft report did not appear to include any discussion of a benefit to cost analysis conducted for the alternatives considered for flood mitigation or any prioritization of projects based on benefit to cost analysis when considering City input. Please provide a discussion on the cost to benefit ratio considerations as required in the scope of work included in the contract. **A discussion of the benefits and costs of each conceptual alternative is included within Sections 4.3.1-4.3.3 of the report. Each conceptual alternative presented within the report, and several other variations not mentioned, were discussed with the City before selecting the final alternatives. It**

is our understanding that benefit to cost ratios were initially cut during scoping due to budget constraints; therefore, benefit to cost ratios were not listed in the scope of work or produced for this study.

3. It appears that only one regional detention, in the upper basin, was examined as an alternative. Please provide a discussion of how it was determined that only one detention alternative would be considered for the study. A regional detention facility was considered on the west side of Valley View Branch between SH 121 and Pleasantview Drive. It was determined this area was not as effective at reducing flooding downstream along Norwood Drive since most of the water diverting to Norwood Drive occurs upstream at Louella Drive and Pleasantview Drive. It was decided the regional detention at the confluence of Stream VVB-1 was a much better location to reduce the flooding along Norwood Drive than the detention upstream of SH 121. In addition, the land immediately upstream of SH 121 is owned by the Hurst-Euleless-Bedford Independent School District and would need to be purchased to proceed with the detention facility. No other regional detention facilities were considered due to lack of available land.

#### **Page Numbering, Exhibits, and Tables Comments:**

1. Page 22, Section 4.3.2, discusses regional detention and refers to Figure 4.1 (Culvert Improvements), however, it appears that it should be referring to Figure 4.2 (Regional Detention Facility). Please Review and update as necessary. **Corrected.**
2. Pages 25-26, include section numbering that is discontinuous (going from 4.5.2 to 5.5.4). Please review and update with correct numbering or include any content that may be missing. **Corrected.**

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**Appendix G**  
**Digital Data**