

FLOOD PROTECTION PLANNING STUDY  
SCHOOLHOUSE DITCH



FINAL REPORT

THE CITY OF VIDOR  
and the  
TEXAS WATER DEVELOPMENT BOARD

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## **EXECUTIVE SUMMARY**

### **Introduction**

In July 2006, The City of Vidor commissioned the development of a Flood Protection Planning Study for the Schoolhouse Ditch watershed. The objective of the study is to provide the City with a strategy to address goals for flood prevention. The primary goal identified is to prevent the recurring structure flooding in the Schoolhouse Ditch Watershed. Secondary goals include the prevention of street flooding, the reduction of water surface elevations during flooding events to allow the contributing drainage systems to work efficiently, and to provide the City with maintenance access to the ditch.

This report details the hydrologic and hydraulic analysis of the Schoolhouse Ditch and the Schoolhouse Ditch Watershed and provides proposed flood protection alternatives. Additionally, this report provides information regarding the associated budgetary cost estimates, calculation of project benefit to cost ratios, and environmental considerations for the proposed alternative recommendations.

### **Analysis**

Peak flows were determined using the U.S. Army Corps of Engineers HEC-HMS software. The HEC-HMS flows, along with field survey data, were utilized in the HEC-RAS modeling software to determine the water surface elevations of Schoolhouse Ditch for the 10-, 25-, 50-, 100-, and 500-year rainfall events for existing conditions and proposed alternative designs.

Cost estimating for the proposed alternative designs was developed using engineering estimates and information from knowledge of current construction costs. Calculation of the benefit to cost analyses was performed using FEMA accepted methods. The environmental review of proposed construction was based on the most current environmental rules and regulations for activities in jurisdictional waters.

### **Conclusions and Recommendations**

Based on the analysis conducted, the causes of overbank flooding in Schoolhouse Ditch is caused by inadequately sized ditch crossings, inconsistent longitudinal ditch slopes, and inadequate ditch sizes. The undersized crossings and poor ditch configuration lack the capacity to convey flows generated from large rainfall events. In general, solutions presented herein, include upgrading and increasing all ditch crossings upstream of Alamo Road and upgrade ditch

characteristics in identified areas along the Schoolhouse Ditch to improve the flood carrying capacity of the ditch and lower the water surface elevations. Three flood protection alternatives designed to provide the necessary capacities are outlined within this report.

# Section 1

## Introduction

### 1.1 General

The City of Vidor is concerned about the increasing threat of flooding and associated structure damages in the Schoolhouse Ditch watershed. Schoolhouse Ditch is a major drainage waterway for the City with the watershed comprising approximately ¼ of the total City area. Schoolhouse Ditch flows through the central and southern portions of the City. Rainfall events that exceed the capacity of the channel produce flood problems for many homes, businesses, and streets in the City.

The City of Vidor entered into an agreement with Carroll & Blackman, Inc. to conduct a Flood Protection Planning Study of Schoolhouse Ditch. This report summarizes the procedures used to analyze the existing flood problems and the recommendations of flood protection measures.

### 1.2 Objective and Scope

The objective of the study is to provide the City with a comprehensive review of the Schoolhouse Ditch and its associated watershed and to develop a strategy to address flood prevention. The primary goal is to prevent recurring structure flooding in the 100 year flood plain. The secondary goals of the study included the development of strategies to prevent street flooding and resultant wake flooding of structures, provide sufficient freeboard in the Schoolhouse Ditch to allow the sub-basin drainage systems to work properly, and provide the City with access to the ditch to properly maintain the ditch.

The study was developed by performing the following tasks:

1. Data Collection,
2. Hydrologic Analysis,
3. Hydraulic Analysis,
4. Development of flood protection alternatives,
5. Review of Environmental Issues
6. Economic Analysis,
7. Public Meetings,
8. Report Preparation.

Discussions of the detailed analysis methodologies, flood protection alternatives, study

results, and recommended improvements are described in the following sections of this report.

### **1.3 Watershed Description**

The City of Vidor is located in Orange County in the southeast corner of Texas near the Texas-Louisiana border. Vidor has a population of approximately 11,440 (2000 census). Existing development in Vidor consists primarily of single family residential neighborhoods with commercial development throughout the city, though primarily along the F.M. 105 corridor. The Schoolhouse Ditch watershed totals approximately 2.8 square miles. The northern portion of the watershed is mostly urban with the southern portion mostly suburban/rural. The watershed runs generally in the north to south direction. The Schoolhouse Ditch main channel is approximately 3 miles in length and includes 19 total street, railroad, and canal structures crossings. The ditch discharges into a marsh area adjacent to the Neches River (See Appendix A for the Watershed Basin Map).

#### **1.3.1 Topography**

Although the topography of the Schoolhouse Ditch watershed is relatively flat with a slope of approximately 0.11% toward the south, it generally has a greater slope than other similar streams in Southeast Texas. Ground elevations vary from approximately 22 feet above mean sea level (M.S.L.) in the northern part of the watershed and vary to approximately 5 feet above M.S.L. at the discharge into the marsh area. These elevations were obtained from the United States Geological Survey (USGS) 7.5-minute quadrangle maps and are based upon the USC&GS 1959 datum.

#### **1.3.2 Soil Characteristics**

The soils found within the Schoolhouse Ditch watershed consist of two major groups. The Orcadia-Urban land association is the most prevalent group in the northern section of the watershed. It is a silty loam and silty clay loam soil. A second soil group within the study area is the Vamont clay association which is a clayey soil. Due to the low permeability characteristics of all of the soil groups within the watershed and the consequent reduced infiltration of rainfall into the soil, high runoff volumes can be anticipated.

### **1.3.3 Climate**

The climate of Orange County is characteristic to both the tropical and temperate zones. The average yearly maximum temperature in Vidor, Texas is 82 degrees F. The lowest and highest monthly averages occur in January (39° F) and August (91.7° F) respectively. Average annual rainfall is 57.9 inches, which is evenly distributed throughout the year. Although the average monthly rainfall is not excessive, concentrated rainfall of short duration from extreme meteorological storm events has been recorded.

### **1.4 History of Flooding**

Historically, structures in the Schoolhouse Ditch watershed have been inundated many times by flooding due to severe rainfall events, which have occurred as recently as October 2006. Records indicate that a storm event in October 2006 produced rainfall amounts of approximately 10 inches in a 24-hour period that equates approximately to a 25-year storm. Many of the more severe floods that have occurred are a result of prolonged or successive storms that produce heavy rainfall, such as the storm event in October 2006 or Hurricane Rita in September 2005. However, intense localized thunderstorms are common throughout the year and flooding may occur at any time. Evaluation of the National Flood Insurance Paid Claims database for the City of Vidor indicates there have been at least seven major floods and several small events that have caused considerable damage within the study area in the past 29 years. Property losses within that timeframe for the watershed are in excess of several million dollars.

### **1.5 General Areas of Recurring Flooding**

One of the most serious problem areas for recurring structure and street flooding within the Schoolhouse Ditch watershed is the area located in the Vidor High and Vidor Elementary School area along Orange Street in between Woodlawn and Haley Streets. Repeated storm events have caused millions of dollars in damage to the Vidor High School, Vidor Elementary, and the Vidor ISD AIM Training Center. In addition, even small rain events create problems for the school properties. These schools are adjacent to each other and are located in the central portion of the study area. On many occasions, school children have waded through or been carried through floodwaters to access the school (See Appendix F for photos of past flooding events in the school area.)

Residential flooding in the school area is also a major problem during storm events. Many of the homes on Melrose, Clairmont, and Roselawn Streets frequently flood due to severe rainfall events. Flooding of residential structures in the school area has also occurred on Orange, Reynolds, and Stephenson Streets. The general area of flooding in the school area is identified as Area I on the attached flooding location map found in Appendix A.

Also noted on the map is a small area identified as Area II that is located north of the KCS railroad. Residential and business structures along with the inundation of Railroad Street are recurring.

Another area that continues to experience street and structure flooding is the Greenforest subdivision located north of IH-10 at the upper end of the watershed noted as Area III on the attached General Flood Location Map. In July 2005, a 5-1/2" rainfall caused all roads in the subdivision to be inundated as seen in the photos in Appendix F. This subdivision also experienced street and structure flooding in the October 2006 10" rain event and during many other rain events over the past years.

In all areas discussed above, it has been noted that when the streets are inundated, many of the homes in the study experience "wake flooding". "Wake Flooding" occurs when resultant waves created from passing vehicles on the inundated streets cause, otherwise, non-flooded structures to become flooded structures. In summary, many flood events have been documented which have resulted in recurring street and structure flooding.

## **1.6 Information Collection**

The information collected for this study was obtained through several means. An extensive surveying effort was completed for approximately 3 miles of Schoolhouse Ditch. The surveying data included 76 channel cross sections, 19 bridges/culverts surveyed, and finished floor elevations were determined for 34 homes that have had previous flooding problems. Soil characteristics were determined using the soil surveys and soil maps from the United States Department of Agriculture Natural Resources Conservation Service. Current land use patterns were determined from using the latest aerial photography of the study area. Beyond the extensive physical survey and mapping data that was collected for the hydrologic and hydraulic modeling, meetings and

discussions with project stakeholders and citizens provided valuable information in the data collection and alternative development process. Summaries of the three public meetings are as follows:

1<sup>st</sup> Public Meeting, August 31, 2006 – Presentation by Carroll & Blackman, Inc. about the study and all that it involves (i.e. data collection, modeling, improvement analysis, cost estimates, etc). Public comments included concerns about debris from Hurricane Rita in September 2005.

2<sup>nd</sup> Public Meeting, May 31, 2007 – Public comments included concerns about fallen trees still in the ditch due to Hurricane Rita and flooding from the October 2006 storm event. A citizen asked about the viability of sending water down the Highway 90 ditch from the Schoolhouse watershed to the Tiger Creek watershed. The citizens wanted to be informed and updated on the availability of possible grant funds for ditch improvements.

3<sup>rd</sup> Public Meeting, April 7, 2008 – An overall review of the study was presented to the public focusing mostly on the alternatives developed. A few questions were asked by local citizens. The main concern by one of the citizens was that he believes there are some major blockages (e.g. fallen trees, man-made levees, etc.) at the most downstream end of Schoolhouse Ditch preventing it from discharging freely into the marsh area. This needs to be looked into before any further improvements are made to Schoolhouse Ditch.

## Section 2

### Existing Conditions Analysis

#### 2.1 General

In the development of a flood protection plan, it is necessary to establish the existing flooding potential of the watershed under investigation. The existing watershed conditions are used to determine where and to what extent flood control measures are needed. This phase of the analysis provides a base line for comparison between existing and proposed flood control improvements. The following sections describe the models and methods utilized to establish the flooding potential throughout the Schoolhouse Ditch watershed. Sources of the base data and procedures utilized to construct the hydrologic and hydraulic models are addressed.

#### 2.2 Hydrology

Hydrology is the study of the precipitation-runoff relationship within a drainage area or more specifically the determination of the amount of runoff associated with a defined rainfall event over a set area. The Corps of Engineers' HEC-Hydrologic Modeling System (HEC-HMS) computer program was used to develop a hydrologic model to simulate the precipitation-runoff relationship within the Schoolhouse Ditch watershed. The basic parameters required to develop the hydrologic model and compute the peak discharge rates are drainage area, basin characteristics, rainfall, and infiltration loss rates. The procedure utilized to develop each parameter is described in the following sections of this report. See Table 2.1 for a list of model input parameters used to develop the hydrologic model.

##### 2.2.1 Drainage Area

The Schoolhouse Ditch watershed encompasses an area of approximately 2.8 square miles or 1,800 acres. This watershed was divided into 9 sub-basins ranging in size from 0.13 square miles to 0.66 square miles. The drainage basins and sub-basins are delineated on Watershed Basin and Sub-Basin maps provided in Appendix A. The drainage areas and sub-basins were delineated utilizing topographic data from U.S.G.S. 7.5-minute quadrangle maps adjusted with 2003 aerial photographs, DEMs, and information collected from the field.

**Table 2-1****Hydrologic Model Parameters for the Schoolhouse Ditch Sub-Basins**

Sub-Basin	Drainage Area (Sq. Mi.)	Initial Abstraction (In.)	Curve Number	Impervious % *	Time of Concentration (hours)	Storage Coefficient (hours)
1	0.14	1	87	0	1.2	1.8
2	0.18	1	86	0	0.6	1
3	0.34	1	87	0	1.4	2.2
4	0.21	1	86	0	1.2	1.9
5	0.24	1	84	0	1.3	2
6	0.66	1	82	0	1.5	2.4
7	0.13	1	83	0	0.8	1.3
8	0.21	1	81	0	1.7	2.7
9	0.65	1	84	0	3.6	5.8

\* The level of impervious cover was factored into the determination of the Curve Number for existing conditions.

### 2.2.2 Basin Characteristics

To develop flood hydrographs, or a graph of the time related runoff, certain basin characteristics were required to be defined. The characteristics required are determined by the modeling methodology used. The Clark Synthetic Unit Hydrograph Method was used for the Schoolhouse Ditch HEC-HMS model.

The two parameters required in the derivation of Clark unit hydrograph are time of concentration ( $T_c$ ) and Clark storage coefficient ( $R$ ). The time of concentration primarily affects the peak flow of the unit hydrograph while the storage coefficient primarily affects the shape of the hydrograph. Both time of concentration and storage coefficient are a function of topography and basin characteristics that can be estimated from available maps and topographic data. The existing land uses were verified by aerial photos and from U.S.G.S. quadrangle maps. The time of concentration is a function of the length and type of flow path that the runoff takes within a drainage sub-area. It is assumed that the time necessary for runoff to travel from the most hydraulically distant point to

the outlet of the drainage sub-area is equal to the time of concentration. The Clark time of concentration and storage coefficient were estimated using the Fort Bend County, Texas hydrologic methodology as follows:

$$T_c = \frac{48.64 \left( \frac{L}{\sqrt{S}} \right)^{0.57} N^{0.8} \log S_0}{S_0^{0.11} 10^I}$$

$$R = \frac{128 \left( \frac{L}{\sqrt{S}} \right)^{0.57} N^{0.8}}{S_0^{0.11} 10^I} - T_c$$

in which:

L = length of the longest watercourse within the drainage area (mi),

S = average slope along the longest watercourse (ft/mi),

N = Manning's weighted roughness coefficient along the longest watercourse,

S<sub>0</sub> = average basin slope of land draining overland into the watercourse (ft/mi),

I = percentage of impervious cover in the watershed, expressed as a fraction.

### 2.2.3 Rainfall Analysis

The 10-, 25-, 50-, 100-, and 500-year flood events were used to analyze the existing flooding potential of the Schoolhouse Ditch watershed. These events have a 10, 4, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any one year. Although the recurrence interval represents the long term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The design rainfall used in the analysis was obtained from the National Weather Service Publication *Technical Paper No. 40* and from the National Oceanic and Atmospheric (NOAA) Technical Memorandum *Hydro-35*. See Table 2-1 for a list of the rainfall amounts used for this study.

**Table 2-2**

## Rainfall Depth / Duration for the Schoolhouse Study Area

Return Period (years)	Point Rainfall Depths (inches) for Schoolhouse Ditch Study Area							
	5-min	15-min	1-hour	2-hour	3-hour	6-hours	12-hour	24-hour
10-Year	0.69	1.52	2.28	4.40	4.80	6.10	7.50	8.80
25-Year	0.77	1.72	3.81	5.00	5.65	7.00	8.60	10.20
50-Year	0.84	1.87	4.23	5.53	6.30	8.00	9.90	11.80
100-Year	0.90	2.03	4.65	6.20	7.00	8.80	11.00	13.00
500-Year	1.64	3.19	5.64	7.44	8.40	10.56	13.20	15.60

The data required to derive the rainfall hyetograph (distribution of rainfall over time) for the design frequency storm was obtained from Technical Paper 40 and entered into HEC-HMS. The program then simulated a symmetrically distributed rainfall pattern around the peak rainfall value and generated a design hyetograph with quarter hour intervals.

### 2.2.4 Infiltration Loss Rates

Infiltration loss is the quantity of rainfall expected to be absorbed into the soil throughout the duration of the storm. The Soil Conservation Service (SCS) Curve Number Loss method was used to determine the infiltration loss rates for the Schoolhouse Ditch watershed.

The Soil Conservation Service (now the Natural Resource Conservation Service), of the U.S. Department of Agriculture, has instituted a soil classification system for use in soil survey maps across the country. Based on experimentation and experience, the agency has related the drainage characteristics of soil groups to a Curve Number (CN). The SCS provides information on relating soil group type to the curve number as a function of soil cover, land use type and antecedent moisture conditions. The primary land use within the northern section of the

watershed is single family residential neighborhoods with commercial developments scattered throughout the city along the major transportation corridors. In the southern section of the watershed, undeveloped woodlands and rural/suburban neighborhoods are more prevalent with very little commercial development. Based on those factors, curve numbers ranging from 81 to 87 were used for the Schoolhouse Ditch watershed.

### **2.2.5 Peak Discharge Computation**

The U.S. Army Corps of Engineer's HEC-HMS computer program was used to develop the flood hydrograph for existing conditions at various discharge points throughout the Schoolhouse Ditch watershed. For several return intervals, hydrographs were computed for each individual sub-area and were combined and routed through the water course network to calculate the flood hydrographs at downstream discharge points.

The runoff amounts from the initial model were deemed unrealistically large based on previous experience with average runoff rates in Southeast Texas for similar land use areas. It was determined that the hydrologic model did not produce accurate runoff results when the sub-basins were delineated into such relatively small areas. Therefore, the entire 1,805 acre watershed was modeled as a single sub-basin to determine the total runoff amount for the watershed. Runoff flows for intermediate points were calculated by utilizing an equation that interpolated the HEC-HMS generated flows. The equation is based on the logarithmic relationship between flow and area, reflecting the reality that more runoff in terms of flow per unit area is generated from small areas than large ones. The relationship has been used and checked based on the area-runoff curves in Harris County, which has very similar topography to the Orange County area. This step was necessary because the HEC-HMS modeling program reports abnormally large runoff values if the sub-basins are delineated too minutely. The interpolation equation used is as follows:

$$\log Q_1 / \log A_1 = \log Q_2 / \log A_2 = \log Q_t / \log A_t$$

where: Q = flow rate

A = area

## **2.3 Hydraulics**

The hydraulic analysis of the Schoolhouse Ditch watershed was accomplished by calculating the water surface profile along the ditch. The water surface profiles were prepared using the U.S. Army Corps of Engineers' Hydraulic Engineering Center - River Analysis System (HEC-RAS). The program utilizes field survey data supplemented with topographic map data, HEC-HMS generated flow data, and structure data to compute flood elevations along the Schoolhouse Ditch. These flood profiles are presented in Appendix B. Physical data describing the flow characteristics of the ditch along with the computed flood flows were modeled to establish the water surface profiles. The following paragraphs describe the data required to calculate the water surface profiles and the results presented in the final section.

### **2.3.1 Surveys of Bridges and Structures**

Channel or culvert invert and top of bridge elevations were collected along with culvert dimensions of each crossing. Dimensions were measured in the field to an accuracy of  $\pm 0.1$  foot. Data was collected on 19 ditch crossing structures.

### **2.3.2 Cross Sections**

Stream cross sections were obtained along the entire 3 miles of ditch and were taken utilizing field survey methods to an accuracy of  $\pm 1/10$ th of a foot. Field measurements included the establishment of elevations throughout the watershed tied to the NAD 83 datum.

### **2.3.3 Roughness Coefficients**

Manning's "n" for the Schoolhouse Ditch watershed were estimated from field inspection, photos, and aerial photographs. Roughness values for the channel areas were estimated to be approximately 0.03 to 0.04, while the roughness values for the overbank areas were estimated as an average of 0.05. The roughness values for culverts varied between 0.011 and 0.026. The estimated "n" values appear to be representative of the flow characteristics of the watershed, as compared to current flood plain studies on drainage ways of similar characteristics.

#### **2.3.4 Other**

In the development of the hydraulic models used to compute water surface profiles, it was necessary to supplement field data with topographic maps to simulate the overbank areas adjacent to the watercourse being studied. The maps used to supplement the survey data were the U.S.G.S. 7.5-minute quadrangle maps and corresponding DEMs.

#### **2.4 Calibration of Models**

There was no gauged precipitation or stream gauge data available for the Schoolhouse Ditch watershed in order to calibrate the models. Model calibration was accomplished based on the rainfall event of October 25, 2006. This event occurred during the course of this study and provided observed water level information at numerous stream crossings within the watershed. The water surface elevations from the Existing Conditions HEC-RAS model were compared to the observed water levels from the October 25, 2006 storm and were found to be accurate within 1.25' at all locations, with an average difference of 0.55', which was determined to be acceptable. There have been numerous storm events in the past few years for which rainfall amounts could be obtained from meteorologists. However, observed high water marks at crossings were not obtained during any of these storms. The October 25, 2006 storm is the only storm event for which reliable data was available.

## Section 3

### Development of Flood Protection Alternatives

#### 3.1 General

The key steps in developing this flood protection planning study are outlined as follows: Identify the study goals; Develop information for the existing watershed conditions which are described extensively in Section 2 of this document; Develop future watershed condition information; Analyze a range of possible flood protection alternatives; and Develop an implementation plan by choosing the best alternatives to address the goals of the study. The following sections describe these steps.

#### 3.2 Identification of Goals

Primary and secondary project goals have been developed as a result of this study. Goals for this project were arrived at thorough discussions with City of Vidor personnel, project stakeholders, and discussions with citizens. The project goals are as follows:

##### Primary Goal

- Eliminate recurring structure flooding in the 100 year flood plain;

##### Secondary Goals

- Eliminate street flooding and thereby eliminate wake flooding for the 100 year storm event;
- Provide freeboard in the ditch to allow drainage systems conveying storm water to Schoolhouse ditch to work as efficiently as possible; and
- Provide access along the ditch to allow for proper maintenance and cleaning of the ditch.

#### 3.3 Future Watershed Conditions

To design drainage improvements to convey the 100-year future conditions runoff and address the above listed study goals, a future conditions HEC-HMS model was prepared. The development of the future conditions HEC-HMS model involved modifying the existing conditions model to reflect future development. It was assumed that development would occur along the major transportation corridors where land was available, and that in 20 years these areas would have reached approximately 15% build-

out. For this study, the future watershed conditions model had negligible increases in runoff over the existing model. Therefore, all runoff values in this report correspond to the existing watershed runoff conditions, even if referred to as future conditions values or improved values.

### **3.4 Analysis of Flood Protection Measures**

After developing the existing conditions models, the next step was the evaluation of flood control alternatives. As stated in Section 1.2, the main goal of the study was to remove all structures from the 100-year flood plain by increasing the flood carrying capacity and lowering the water surface profile of Schoolhouse Ditch. Other goals included eliminating street inundation during large rainfall events and providing enough freeboard in Schoolhouse Ditch to allow other drainage systems that discharge into Schoolhouse Ditch to function properly. These goals were considered when choosing flood protection options for Schoolhouse Ditch. The flood protection options, which were considered for this study, are classified into two categories: (1) Structural Measures and (2) Non-Structural Measures.

#### **3.4.1 Structural Measures**

Structural measures are actions taken to physically alter sections of a watercourse to prevent or reduce flooding in the watershed. Structural measures include crossing improvements, channel improvements, detention/retention, dams, levees, diversions, and pump stations. The structural measures considered for this study are discussed in the following sections.

##### **3.4.1.1 Crossing Improvements**

Bridges and culverts span waterways to convey vehicular traffic on the roadway while also allowing the channel to convey stream flows. Crossings with cross-sectional areas that are inadequate to handle the stream flows in a large storm event tend to result in flooding upstream of the property and may result in overtopping of the crossing. Crossing improvements consist of enlargement by either adding to or replacing an existing roadway, railroad or other stream crossing with pipe or box culverts or bridges. This measure results in more efficient crossings which do not create excessive head losses and which also promote more

efficient flow within the channel system. Enlargement of the bridges and culverts of Schoolhouse Ditch was considered in order to reduce upstream flooding and improve the hydraulic capacity of the structures.

#### **3.4.1.2 Channel Improvements**

Channel improvements (channelization) consist of widening, deepening, and/or straightening of a channel to improve its conveyance. Increasing stream capacity decreases water surface elevations, however, it also increases downstream flood flows due to reduction of overbank storage and time of concentration. In most cases, channelization involves minor rectification of channel bottoms, flow line grades and side slopes. The channel cross sections were modified within HEC-RAS. An initial size was determined by using the 50-year storm flow values and calculating a normal depth flow condition that would convey the flows within the channel banks. The new cross sections were then modeled with the 100-year storm flow values to check the conveyance capability of that storm size.

### **3.4.2 Non-Structural Measures**

Non-structural measures are the management techniques intended to decrease flooding and reduce flood damage within the watershed. Non-structural measures may include no action, developmental regulations, watershed management, debris removal, greenbelt alternatives, and acquisition. The following sections describe the non-structural measures considered for this study.

#### **3.4.2.1 Developmental Regulations**

The City of Vidor's current ordinances related to development and prevention of flooding include subdivision ordinances and a flood plain management ordinance. The subdivision ordinance appears to adequately address the design and construction of storm water conveyance structures and platting requirements for subdivisions in the

100-year flood plain. During the development of this document the City was reviewed by representative of FEMA. During the review it was noted that the Flood Plain Management Ordinance should be updated to conform to current state guidelines for flood plain management. The City has committed to this activity.

During the ordinance review it was also noted that the City did not have an ordinance addressing drainage design or a plan review process for commercial construction. The City of Vidor understands the importance of this issue and has begun discussions related to the development of a commercial development ordinance and is also committed to its implementation.

#### **3.4.2.2 Debris Removal**

Obstructions to flow due to the accumulation of trash, dead or fallen trees, brush, and other debris in the ditch or at culverts and bridges can have significant impacts on water surface levels upstream of the crossings and significantly affect the flood carrying capacity of the waterway. The accumulated debris can also cause physical damage to the ditch crossings. The removal of debris can reduce flood damage and potential hazards.

The City of Vidor currently inspects accessible areas of the ditch and ditch crossings on the Schoolhouse Ditch for debris accumulation as needed and prior to and following major storm events.

### **3.5 Improvement Options**

To determine the most feasible options for flood relief, several combinations of improvements were analyzed for Schoolhouse Ditch. These improvement options were then put into alternative groupings to achieve the objectives described in Section 1.2. The following sections describe the three alternatives developed to increase the flood carrying capacity of Schoolhouse Ditch. Hydraulic Profiles of the three alternatives are provided in Appendix B.

### 3.5.1 Alternative A

The main cause of flooding in the Schoolhouse Ditch watershed is due to the high water surface elevations caused by the inadequately sized ditch crossings in the waterway. Every crossing structure upstream of Alamo Road is incapable of conveying the flows for large storm events. Therefore, Alternative A proposes to upgrade all crossings from Walden Road north to Lamar Street. See Table 3-1 for a list of all proposed crossing improvements. The implementation of this alternative will only address the primary objective of removing repeatedly flooded structures (not including streets and one verified residence in the Greenforest subdivision area) out of the 100-year flood plain. The estimated construction cost of Alternative A is \$2,478,651. Detailed construction cost estimates are presented in Appendix C. It should be noted that costs for crossing improvements do not include costs for the upgrade of the I-10 crossing. This crossing is being upgraded by TXDOT as part of the major reconstruction of I-10 in the Vidor area.

**Table 3-1  
Proposed Crossing Improvements**

Crossing Name	River Station	Existing Description	Proposed Description
East Courtland Street	174+10	1 - 6' x 5' Box Culvert	1 - 8' x 8' Box Culvert*
Unnamed Crossing	170+85	1 - 8' Pipe Culvert	1 - 5' Pipe Culvert*
East Bolivar Street	165+41	1 - 8' x 5' Box Culvert	1 - 8' x 5' Box Culvert*
East Railroad Street	156+25	1 - 10' x 6' Box Culvert	1 - 20' x 5' Crownspan
Railroad Crossing	155+12	2 - 4' x 6' Box Culverts, 1 - 4' Pipe Culvert	Bridge
Highway 90	154+44	1 - 6' x 6' Box Culvert, 1 - 4' x 6' Box Culvert	1 - 20' x 5' Crownspan
Orange Street	144+50	1 - 8' x 5' Box Culvert	2 - 10' x 6' Box Culverts
F.M. 105	120+15	1 - 9' x 8' Box Culvert	2 - 8' x 8' Box Culverts*
Taylor Street	113+49	1 - 9' Pipe Culvert	3 - 8' x 8' Box Culverts
East Lindbergh Street	108+03	1 - 8' Pipe Culvert	3 - 8' x 8' Box Culverts
Walden Street	103+21	1 - 8' Pipe Culvert	3 - 8' x 8' Box Culverts

\* Added to existing description

**Table 3-2**  
**Water Surface Elevation Improvements**  
**Alternative A**

Crossing Name	100 Year Storm Water Surface Elevations (ft)		
	Pre-Improvements	Post-Improvements	WSE Decrease
East Courtland Street	21.19	20.40	0.79
Unnamed Crossing	21.18	20.12	1.06
East Bolivar Street	20.19	19.60	0.59
East Railroad Street	20.10	19.29	0.81
Railroad Crossing	20.11	19.09	1.02
Highway 90	19.59	19.05	0.54
Orange Street	18.73	18.27	0.46
F.M. 105	18.66	17.78	0.88
Taylor Street	18.25	17.26	0.99
East Lindbergh Street	18.21	16.84	1.37
Walden Street	18.19	16.65	1.54

### 3.5.2 Alternative B

In addition to the undersized structure crossings, inadequate channel size, slope, and shape are contributing factors to the high water surface elevations in Schoolhouse Ditch. Alternative B includes all improvements from Alternative A along with channel improvements in certain sections of the ditch. The proposed channelization from Alamo Street to Orange Street includes shaping the ditch to provide for 3:1 side slopes and a uniform bottom slope. Currently, the bottom slope of Schoolhouse Ditch is very inconsistent. From Orange Street to IH-10, only minimal channel improvements are proposed for Alternative B. Minimal channel improvements would consist of providing a uniform bottom slope for the ditch, with no widening or side slope improvements. In addition to the channel modifications, the establishment of permanent easements or rights-of-way on both

sides of the ditch is proposed for Alternative B. The additional improvements proposed in Alternative B address the secondary objectives of eliminating street flooding (with the exception of Green Forest Subdivision where street inundation will still exist) and it provides a maintainable ditch for the City of Vidor. Currently, some reaches of Schoolhouse Ditch can not be maintained due to steep side slopes and lack of maintenance easements or rights-of-way. The estimated construction cost of Alternative B is \$4,856,651.

**Table 3-3**  
**Water Surface Elevation Improvements**  
**Alternative B**

Crossing Name	100 Year Storm Water Surface Elevations (ft)		
	Pre-Improvements	Post-Improvements	WSE Decrease
East Courtland Street	21.19	20.20	0.99
Unnamed Crossing	21.18	19.93	1.25
East Bolivar Street	20.19	19.44	0.75
East Railroad Street	20.10	19.05	1.05
Railroad Crossing	20.11	18.84	1.27
Highway 90	19.59	18.78	0.81
Orange Street	18.73	17.68	1.05
F.M. 105	18.66	16.71	1.95
Taylor Street	18.25	15.96	2.29
East Lindbergh Street	18.21	15.57	2.64
Walden Street	18.19	15.04	3.15

### 3.5.3 Alternative C

Alternative C includes all crossing improvements and acquisition of proposed rights-of-way from Alternatives A and B. Major channel modifications are also included in Alternative C. The proposed channelization from Alamo Street to Orange Street includes a bottom width widened to 20', shaping the ditch to

provide 3:1 side slopes, and a uniform bottom slope. The proposed channel improvements from Orange Street to IH-10 include a uniform bottom slope and either 3:1 side slopes *or* vertical block walls. The increased carrying capacity of Schoolhouse Ditch due to these proposed improvements will result in a lower water surface elevation thus achieving all of the primary and secondary objectives of this study. All structures and streets within the watershed will be removed from overbank flooding. The ditch will be able to be cleaned and maintained by the City of Vidor. The resultant freeboard in the ditch due to the lower water surface elevations will allow other drainage systems (e.g. City storm sewers and VISD campus drainage) to drain more efficiently into Schoolhouse Ditch. The estimated construction cost of Alternative C is \$8,609,151.

**Table 3-4**  
**Water Surface Elevation Improvements**  
**Alternative C**

Crossing Name	100 Year Storm Water Surface Elevations (ft)		
	Pre-Improvements	Post-Improvements	WSE Decrease
East Courtland Street	21.19	19.49	1.70
Unnamed Crossing	21.18	19.25	1.93
East Bolivar Street	20.19	18.65	1.54
East Railroad Street	20.10	18.25	1.85
Railroad Crossing	20.11	18.04	2.07
Highway 90	19.59	18.00	1.59
Orange Street	18.73	17.08	1.65
F.M. 105	18.66	15.70	2.96
Taylor Street	18.25	14.99	3.26
East Lindbergh Street	18.21	14.57	3.64
Walden Street	18.19	14.03	4.16

It should be noted that during review of the study area it was determined that the Vidor High and Elementary School campuses on in the study area appear to have internal drainage problems that should be addressed by the school district. Studying the internal drainage systems on the school campuses was beyond the scope of this study.

### **3.6 Construction Level Design Consideration**

The proposed ditch crossing and channel configuration designs presented in this study should be recognized as planning level designs. Actual construction level designs of structures and channel improvement may vary from the sizes and configurations presented and utilized in the proposed model. Modifications can and should be made on a project to project basis to best fit the construction level design constraints. Construction level designs should, however, still provide the desired water surface profiles represented in the study models.

### **3.7 Environmental Considerations**

Horizon Environmental Services, Inc. provided a review of the general jurisdictional determination and permitting requirements for the flood protection alternatives presented in this study. Based on the areas to be impacted by the proposed flood relief alternatives, Horizon evaluated the sites for potential wetlands and other “waters of the U.S.” subject to jurisdiction under Section 404 of the Clean Water Act and regulated by the U.S. Army Corps of Engineers (USACE). The process revealed that for the culvert replacement and channelization proposed in Alternative C, approximately 2.17 acres would be subject to jurisdiction under Section 404.

A detailed jurisdictional delineation and impact analysis will be required to identify the extent of impacts of the proposed improvements with regards to the level of USACE permitting and mitigation requirements. The estimated costs for the environmental delineation and analyses are included in the cost estimates provided in Appendix C. The jurisdictional review letter compiled by Horizon Environmental Services, Inc. is presented in Appendix E.

### 3.8 Benefit-Cost Analysis

For each flood protection alternative listed in Section 3.4, a detailed benefit-cost analysis was performed by Jeffrey S. Ward & Associates, Inc. (JSW). The analysis used the FEMA Full-Data Riverine Flood Benefit-Cost Analysis software. JSW analyzed the pre- and post-improvement flood flows and water surface elevations for the various storm events relative to the elevation of structures in the study area and calculated the avoided damages. The calculated damages were compared to the estimated project costs to determine the benefit-cost ratios.

Benefit-cost Ratios (B/C Ratios) are typically utilized to evaluate study plan Alternatives with regard to grant review processes. Evaluating agencies tend to look at projects with higher B/C Ratio as being more cost effective. However, the decision to ultimately implement flood protection plan project lies with the entity considering flood protection projects. The complete discussion of the Benefit-Cost calculations and results are included in Appendix D. Table 3-2 is a summary of the benefit-cost ratios.

**Table 3-2**  
**Benefit-Cost Ratios of the Improvement Alternatives**

Alternative	Estimated Cost	Avoided Damages	Benefit-Cost Ratio
A	\$2,478,651	\$2,610,827	1.05
B	\$4,856,651	\$2,638,163	0.54
C	\$8,609,151	\$2,641,688	0.31

## Section 4

### Conclusions and Recommendations

#### 4.1 Conclusions

The main causes of overbank flooding in Schoolhouse Ditch are due to undersized crossing structures and undersized or poorly graded or shaped ditch sections. To address the primary goal of the study, which is to prevent recurring flooding of structures in the 100-year flood plain, all crossings upstream of Alamo Road should be improved or replaced. To address secondary goals of the study which include street flooding, providing freeboard for efficient contributing drainage systems and the provision of channel easements or rights-of-way, channel improvements would be required. Channel improvements and acquisition of easements or rights-of-way would provide a reduced water surface profile and allow for the maintainance of the ditch on a regular basis.

#### 4.2 Recommendations

The flood protection alternatives listed in Section 3.5 address different objectives of this study. Although Alternative C achieves all objectives of this study, the estimated cost of the alternative does not provide a favorable benefit-to-cost ratio. Alternative A, on the other hand, achieves the primary objective of removing all structures from the overbank flooding of the 100-year storm with the exception of one residence in the Greenforest Subdivision and also has a benefit-cost ratio greater than 1. It is recommended that the City of Vidor, at a minimum, proceed with the implementation of the proposed improvements outlined in Alternative A. It is also recommended that the City of Vidor continue to work toward implementation all of the proposed improvements described in Alternative C and in the General Watershed Recommendations outlined in Section 4.3 below, as funds become available.

#### 4.3 General Watershed Recommendations

The recommendations made in Section 4.2 are proposed to increase the flood carrying capacity of Schoolhouse Ditch. In addition to those recommendations, this section addresses other concerns and upgrades needed within the watershed. The following recommendations address other issues that are not directly related to the Schoolhouse Ditch overbank flooding of structures in the City of Vidor.

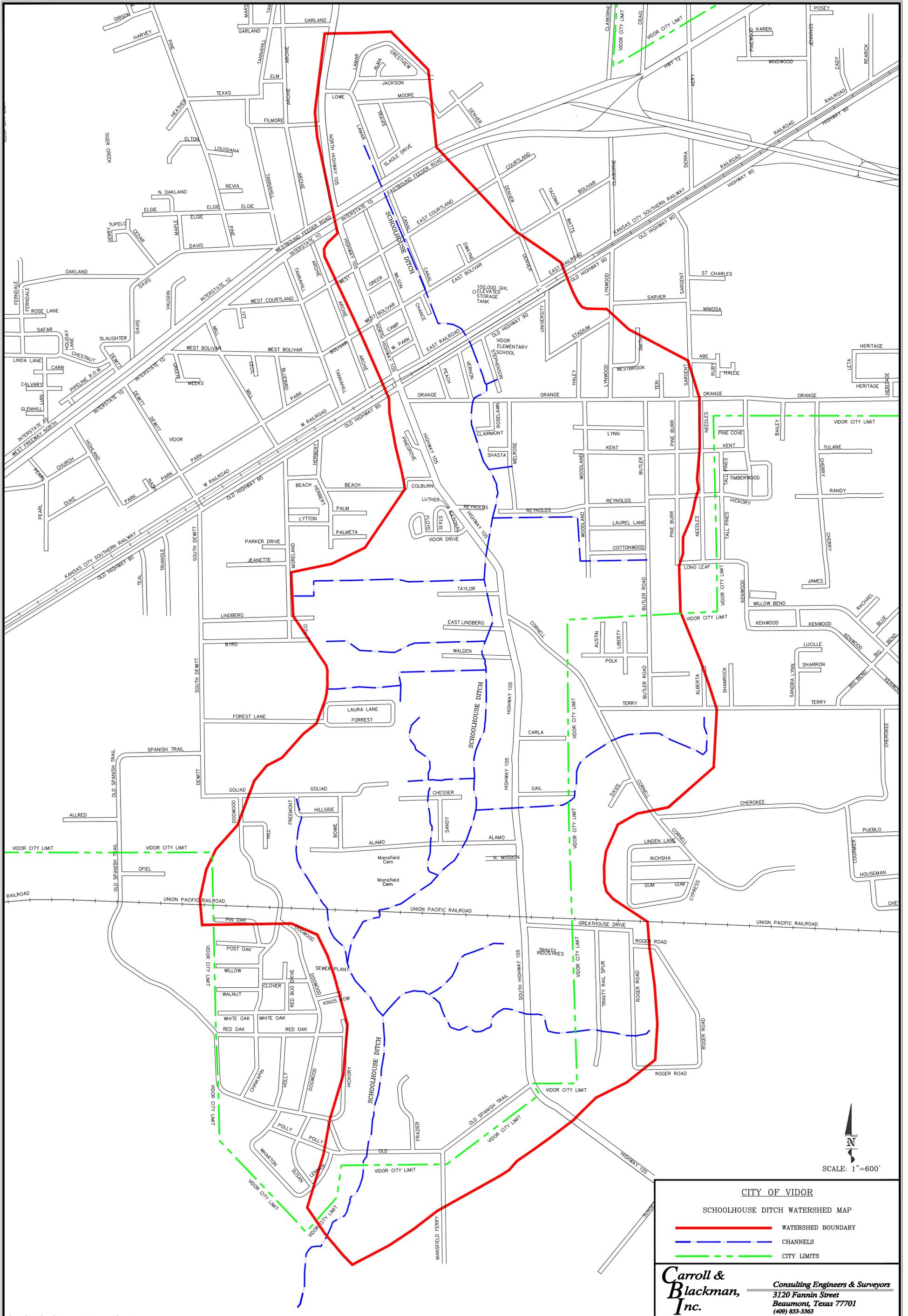
- Repair erosion under the Alamo Street bridge to prevent damage of the bridge and it's

supporting structures;

- Replace the culvert crossing at Old Spanish Trail – This structure is at the lower end of the watershed and was not determined to be factor in the flooding in the school area or other areas of concern. However, the structure is undersized for the 25-, 50- and 100-year storms and overtopping of the road at this crossing occurs regularly. The structure is comprised of 4 steel round pipes and routinely gets clogged with vegetation and debris during flooding;
- Obtain easements for all lateral outfalls discharging into Schoolhouse Ditch;
- Make recommendations for lateral culvert crossings under F.M. 105 to TxDOT with regards to future F.M. 105 construction work;
- Develop ordinance for commercial development within the City of Vidor; and
- Develop maintenance schedule for Schoolhouse Ditch and all laterals.

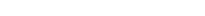
APPENDIX A

WATERSHED MAP  
SUB-BASIN MAP  
GENERAL FLOODING AREAS MAP  
PROPOSED IMPROVEMENTS

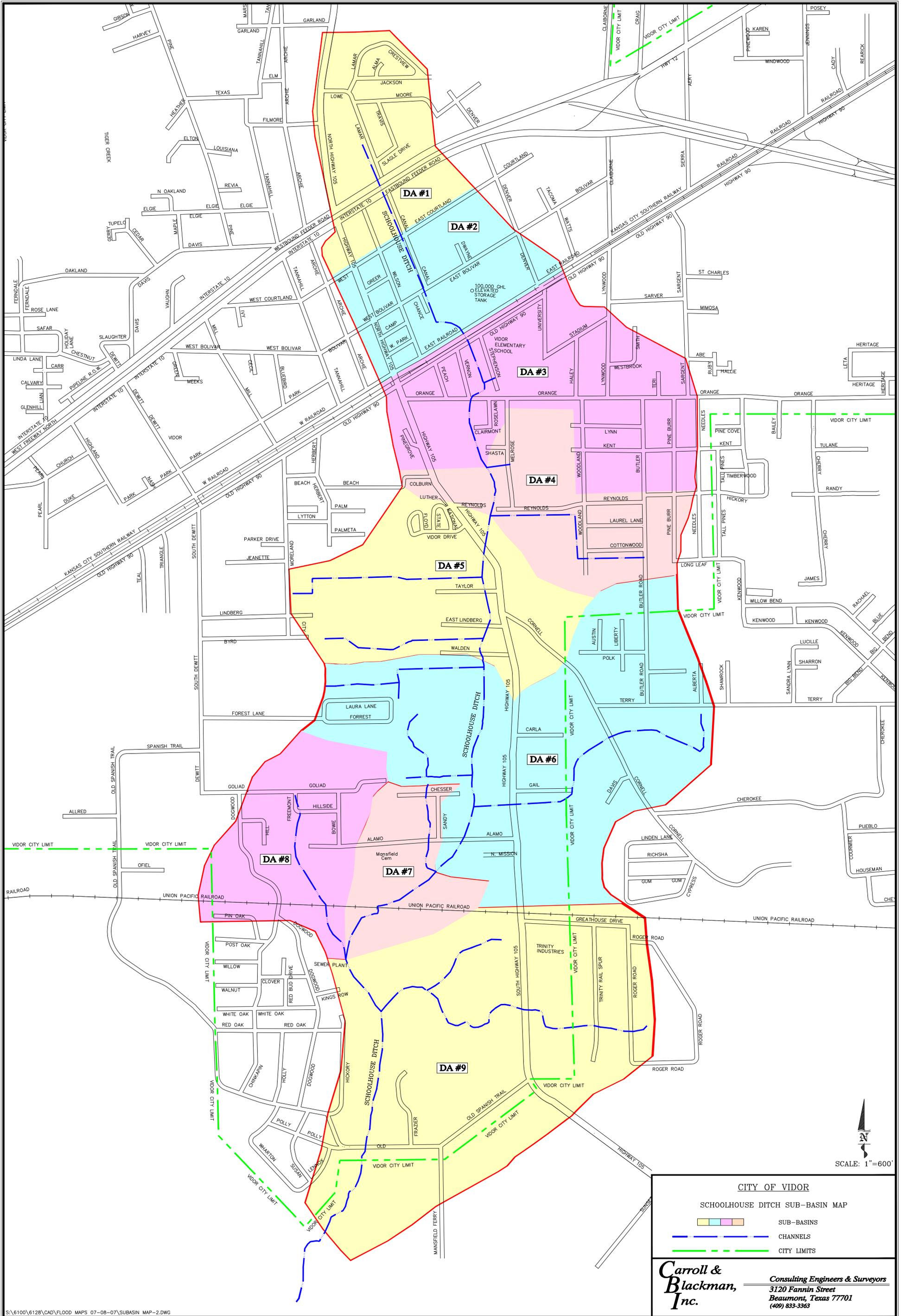


  
 SCALE: 1"=600'

**CITY OF VIDOR**  
SCHOOLHOUSE DITCH WATERSHED MAP

	WATERSHED BOUNDARY
	CHANNELS
	CITY LIMITS

**Carroll & Blackman, Inc.**  
 Consulting Engineers & Surveyors  
 3120 Fannin Street  
 Beaumont, Texas 77701  
 (409) 833-3363

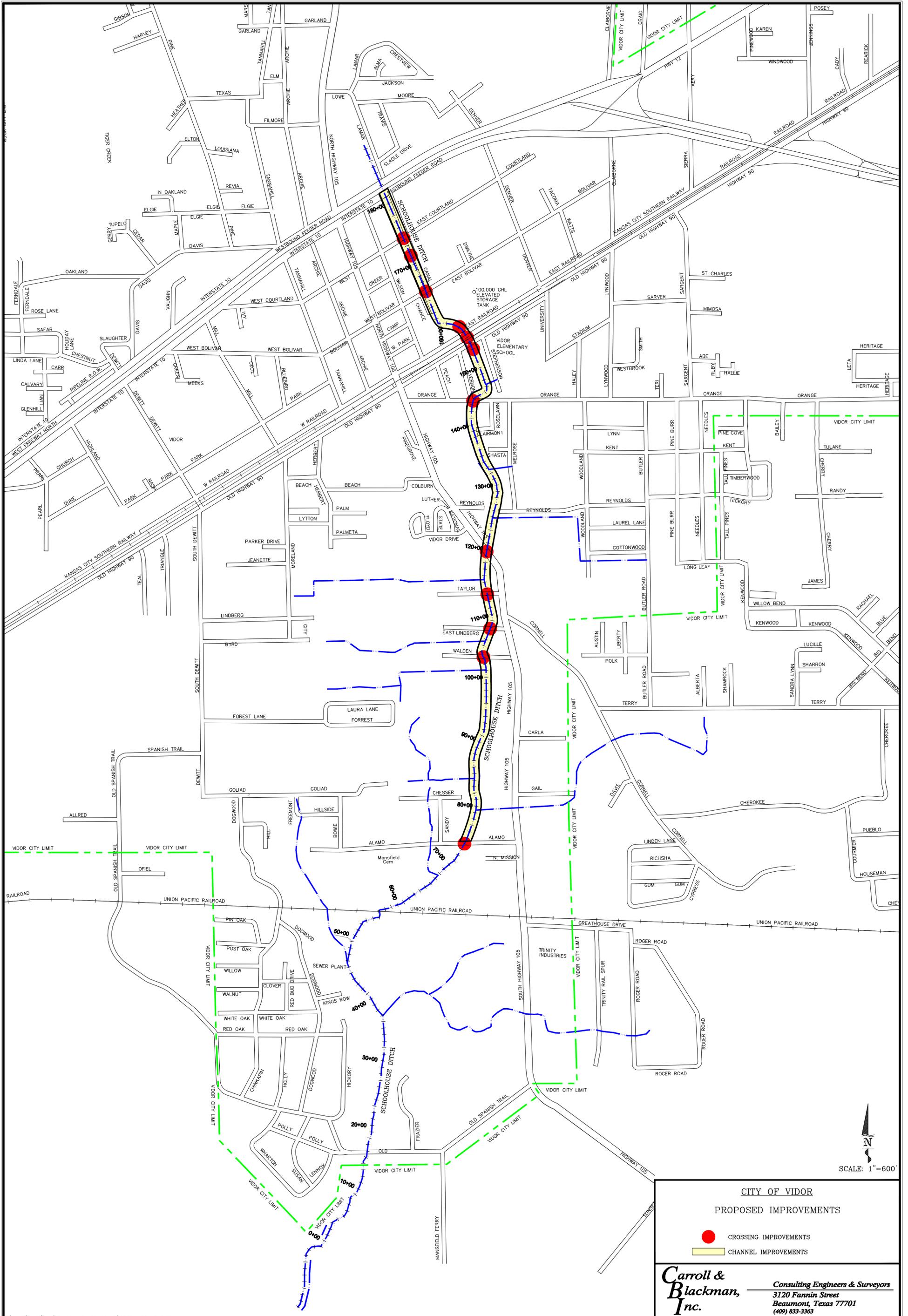


**CITY OF VIDOR**  
SCHOOLHOUSE DITCH SUB-BASIN MAP

<span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; background-color: yellow;"></span>	SUB-BASINS
<span style="display: inline-block; width: 15px; border-bottom: 1px dashed blue;"></span>	CHANNELS
<span style="display: inline-block; width: 15px; border-bottom: 1px dashed green;"></span>	CITY LIMITS

**Carroll & Blackman, Inc.**  
Consulting Engineers & Surveyors  
3120 Fannin Street  
Beaumont, Texas 77701  
(409) 833-3363





SCALE: 1"=600'

**CITY OF VIDOR**  
PROPOSED IMPROVEMENTS

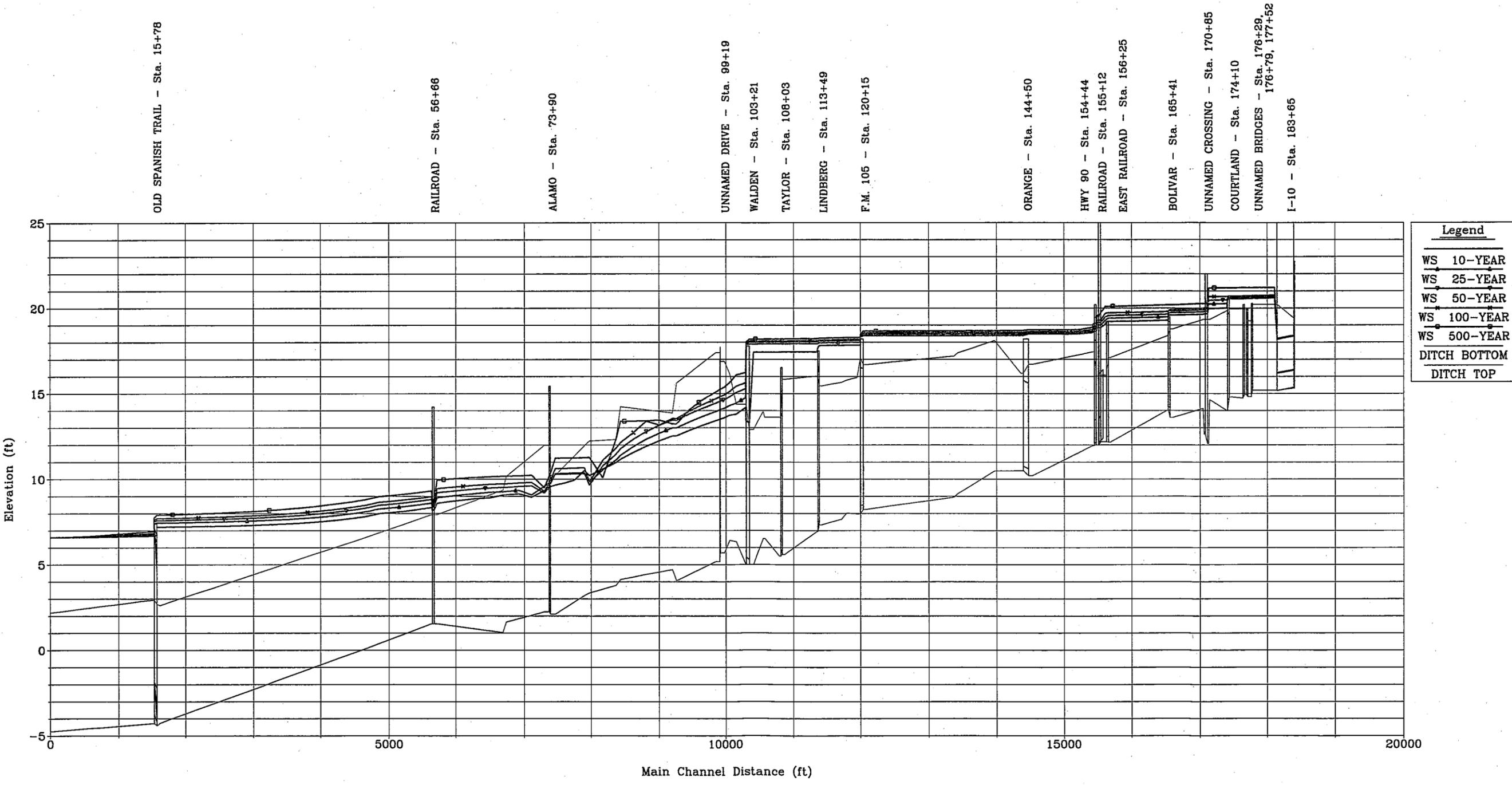
- CROSSING IMPROVEMENTS
- CHANNEL IMPROVEMENTS

**Carroll & Blackman, Inc.**  
Consulting Engineers & Surveyors  
3120 Fannin Street  
Beaumont, Texas 77701  
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APPENDIX B

WATER SURFACE PROFILES AND TABLES

# Schoolhouse Ditch Existing Conditions



OLD SPANISH TRAIL - Sta. 15+78

RAILROAD - Sta. 56+66

ALAMO - Sta. 73+90

UNNAMED DRIVE - Sta. 99+19

WALDEN - Sta. 103+21

TAYLOR - Sta. 108+03

LINDBERG - Sta. 113+49

F.M. 105 - Sta. 120+15

ORANGE - Sta. 144+50

HWY 90 - Sta. 154+44

RAILROAD - Sta. 155+12

EAST RAILROAD - Sta. 156+25

BOLIVAR - Sta. 165+41

UNNAMED CROSSING - Sta. 170+85

COURTLAND - Sta. 174+10

UNNAMED BRIDGES - Sta. 176+29,  
176+78, 177+52

I-10 - Sta. 183+65

Elevation (ft)

Main Channel Distance (ft)

HEC-RAS Plan: ExCon River: School House Ditt Reach: 2

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
2	18377	10	152.00	15.30	21.26	17.09	21.26	0.000017	0.50	762.66	570.12	0.04
2	18377	25	171.00	15.30	21.49	17.18	21.49	0.000015	0.48	895.12	590.68	0.04
2	18377	50	188.00	15.30	21.71	17.26	21.71	0.000012	0.45	1029.27	610.80	0.03
2	18377	100	202.00	15.30	21.93	17.32	21.93	0.000010	0.42	1163.90	631.74	0.03
2	18377	500	231.00	15.30	22.75	17.44	22.75	0.000005	0.31	1715.64	706.82	0.02
2	18365		Culvert									
2	18078	10	152.00	15.19	20.59	16.44	20.60	0.000041	0.79	518.95	716.85	0.06
2	18078	25	171.00	15.19	20.64	16.53	20.65	0.000046	0.84	555.09	726.71	0.07
2	18078	50	188.00	15.19	20.69	16.60	20.70	0.000050	0.89	588.85	735.81	0.07
2	18078	100	202.00	15.19	20.75	16.67	20.76	0.000051	0.90	632.10	747.29	0.07
2	18078	500	231.00	15.19	21.21	16.79	21.21	0.000025	0.67	995.29	820.21	0.05
2	17925.*	10	152.00	15.19	20.59	16.57	20.59	0.000043	0.81	510.32	714.38	0.06
2	17925.*	25	171.00	15.19	20.64	16.67	20.64	0.000049	0.86	545.71	723.91	0.07
2	17925.*	50	188.00	15.19	20.68	16.74	20.69	0.000053	0.91	578.85	732.72	0.07
2	17925.*	100	202.00	15.19	20.74	16.80	20.75	0.000054	0.92	621.86	744.00	0.07
2	17925.*	500	231.00	15.19	21.20	16.92	21.21	0.000026	0.68	986.86	816.95	0.05
2	17772	10	152.00	15.19	20.58	16.72	20.59	0.000046	0.82	501.54	710.85	0.07
2	17772	25	171.00	15.19	20.63	16.80	20.64	0.000052	0.88	536.09	720.08	0.07
2	17772	50	188.00	15.19	20.67	16.88	20.68	0.000057	0.93	568.55	728.65	0.07
2	17772	100	202.00	15.19	20.73	16.94	20.74	0.000057	0.94	611.27	739.78	0.07
2	17772	500	231.00	15.19	21.20	17.06	21.20	0.000027	0.69	978.03	813.30	0.05
2	17752		Bridge									
2	17715	10	152.00	14.82	20.57	16.22	20.57	0.000037	0.76	624.54	823.66	0.06
2	17715	25	171.00	14.82	20.62	16.33	20.62	0.000041	0.81	664.80	825.70	0.06
2	17715	50	188.00	14.82	20.66	16.42	20.67	0.000044	0.84	702.40	827.60	0.06
2	17715	100	202.00	14.82	20.72	16.49	20.73	0.000043	0.85	752.22	830.11	0.06
2	17715	500	231.00	14.82	21.20	16.64	21.20	0.000020	0.60	1150.64	839.18	0.04
2	17679		Bridge									
2	17655	10	152.00	14.93	20.56	16.70	20.57	0.000049	0.85	569.73	831.76	0.07
2	17655	25	171.00	14.93	20.61	16.81	20.61	0.000054	0.89	610.03	834.51	0.07
2	17655	50	188.00	14.93	20.65	16.90	20.66	0.000058	0.93	647.85	837.08	0.07
2	17655	100	202.00	14.93	20.71	16.97	20.72	0.000056	0.92	698.67	840.52	0.07
2	17655	500	231.00	14.93	21.19	17.13	21.20	0.000023	0.63	1103.59	841.98	0.05
2	17629		Bridge									
2	17600	10	152.00	14.74	20.55		20.55	0.000047	0.84	564.90	825.81	0.06
2	17600	25	171.00	14.74	20.60		20.60	0.000052	0.88	605.11	828.10	0.07
2	17600	50	188.00	14.74	20.64		20.65	0.000055	0.92	643.00	830.25	0.07
2	17600	100	202.00	14.74	20.70		20.71	0.000054	0.92	694.33	833.16	0.07
2	17600	500	231.00	14.74	21.19		21.19	0.000023	0.63	1102.88	839.17	0.05
2	17454	10	152.00	14.80	20.54	16.26	20.55	0.000046	0.83	560.45	820.66	0.06
2	17454	25	171.00	14.80	20.59	16.36	20.60	0.000051	0.88	599.71	822.48	0.07
2	17454	50	188.00	14.80	20.63	16.46	20.64	0.000055	0.92	636.94	824.21	0.07
2	17454	100	202.00	14.80	20.70	16.53	20.70	0.000054	0.92	688.06	826.58	0.07
2	17454	500	231.00	14.80	21.19	16.68	21.19	0.000022	0.63	1099.34	841.57	0.05
2	17410		Culvert									
2	17380	10	159.00	14.00	20.01		20.04	0.000134	1.39	177.37	800.34	0.12
2	17380	25	184.00	14.00	20.27		20.29	0.000098	1.24	386.87	809.86	0.10
2	17380	50	207.00	14.00	20.48		20.50	0.000071	1.08	561.29	817.70	0.09
2	17380	100	226.00	14.00	20.68		20.69	0.000051	0.95	724.82	824.98	0.08
2	17380	500	264.00	14.00	21.18		21.19	0.000024	0.69	1143.28	841.15	0.05
2	17247.5*	10	159.00	14.32	19.99		20.02	0.000137	1.41	146.97	186.16	0.12
2	17247.5*	25	184.00	14.32	20.25		20.27	0.000108	1.30	351.97	806.69	0.11
2	17247.5*	50	207.00	14.32	20.47		20.49	0.000077	1.13	529.63	812.38	0.09
2	17247.5*	100	226.00	14.32	20.67		20.68	0.000055	0.99	694.74	817.64	0.08
2	17247.5*	500	264.00	14.32	21.18		21.18	0.000025	0.71	1111.98	830.78	0.05
2	17115	10	159.00	14.64	19.98		20.00	0.000118	1.31	144.50	107.86	0.11
2	17115	25	184.00	14.64	20.24		20.26	0.000103	1.27	328.21	804.44	0.10
2	17115	50	207.00	14.64	20.46		20.48	0.000076	1.12	507.94	809.25	0.09
2	17115	100	226.00	14.64	20.67		20.68	0.000055	0.98	674.59	813.37	0.08
2	17115	500	264.00	14.64	21.18		21.18	0.000026	0.71	1092.37	823.60	0.05

HEC-RAS Plan: ExCon River: School House Dit Reach: 2 (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
2	17100	10	159.00	12.07	19.99	13.39	20.00	0.000039	0.90	201.66	109.01	0.06
2	17100	25	184.00	12.07	20.24	13.52	20.26	0.000040	0.92	389.00	804.90	0.06
2	17100	50	207.00	12.07	20.46	13.64	20.47	0.000035	0.89	565.90	809.30	0.06
2	17100	100	226.00	12.07	20.67	13.74	20.68	0.000029	0.82	731.21	813.38	0.05
2	17100	500	264.00	12.07	21.18	13.91	21.18	0.000017	0.66	1148.18	823.59	0.04
2	17085		Culvert									
2	17035	10	159.00	12.63	19.65		19.67	0.000052	1.00	190.97	130.25	0.07
2	17035	25	184.00	12.63	19.80		19.82	0.000062	1.11	213.35	160.96	0.08
2	17035	50	207.00	12.63	19.91		19.93	0.000072	1.21	231.37	181.96	0.09
2	17035	100	226.00	12.63	20.00		20.03	0.000087	1.34	250.01	800.03	0.09
2	17035	500	264.00	12.63	20.28		20.30	0.000077	1.30	472.17	805.58	0.09
2	17020	10	159.00	14.14	19.64		19.66	0.000108	1.28	154.14	127.94	0.10
2	17020	25	184.00	14.14	19.79		19.82	0.000125	1.41	175.92	158.35	0.11
2	17020	50	207.00	14.14	19.90		19.93	0.000142	1.52	193.40	179.05	0.12
2	17020	100	226.00	14.14	19.99		20.03	0.000154	1.60	211.24	197.96	0.13
2	17020	500	264.00	14.14	20.27		20.30	0.000135	1.55	428.48	805.37	0.12
2	16873.6*	10	159.00	13.96	19.62		19.65	0.000118	1.33	156.82	137.70	0.11
2	16873.6*	25	184.00	13.96	19.77		19.80	0.000135	1.45	179.31	162.55	0.12
2	16873.6*	50	207.00	13.96	19.87		19.91	0.000153	1.57	196.57	179.30	0.13
2	16873.6*	100	226.00	13.96	19.97		20.00	0.000165	1.65	214.02	194.77	0.13
2	16873.6*	500	264.00	13.96	20.24		20.28	0.000151	1.64	406.61	793.44	0.13
2	16727.3*	10	159.00	13.78	19.60		19.63	0.000118	1.33	164.35	144.23	0.11
2	16727.3*	25	184.00	13.78	19.75		19.78	0.000134	1.45	187.20	165.41	0.12
2	16727.3*	50	207.00	13.78	19.85		19.88	0.000151	1.56	204.19	179.54	0.13
2	16727.3*	100	226.00	13.78	19.94		19.98	0.000162	1.64	221.28	192.72	0.13
2	16727.3*	500	264.00	13.78	20.22		20.25	0.000158	1.68	390.42	783.42	0.13
2	16581	10	159.00	13.60	19.59	15.65	19.61	0.000107	1.28	176.16	148.47	0.11
2	16581	25	184.00	13.60	19.73	15.81	19.76	0.000122	1.40	199.11	166.73	0.12
2	16581	50	207.00	13.60	19.83	15.93	19.86	0.000138	1.51	215.71	178.79	0.12
2	16581	100	226.00	13.60	19.92	16.03	19.96	0.000148	1.59	232.38	190.12	0.13
2	16581	500	264.00	13.60	20.19	16.23	20.23	0.000155	1.69	381.51	776.66	0.13
2	16541		Culvert									
2	16516	10	159.00	14.05	19.29		19.32	0.000132	1.35	150.86	120.92	0.12
2	16516	25	184.00	14.05	19.49		19.52	0.000142	1.45	176.67	142.71	0.13
2	16516	50	207.00	14.05	19.65		19.68	0.000150	1.52	200.90	160.50	0.13
2	16516	100	226.00	14.05	19.80		19.84	0.000149	1.56	227.64	178.07	0.13
2	16516	500	264.00	14.05	20.19		20.23	0.000137	1.58	389.42	689.81	0.13
2	16343.*	10	159.00	13.67	19.27		19.29	0.000108	1.27	170.04	129.47	0.11
2	16343.*	25	184.00	13.67	19.47		19.49	0.000117	1.37	197.05	148.33	0.11
2	16343.*	50	207.00	13.67	19.62		19.65	0.000125	1.44	221.81	163.72	0.12
2	16343.*	100	226.00	13.67	19.78		19.81	0.000125	1.48	248.88	179.04	0.12
2	16343.*	500	264.00	13.67	20.17		20.20	0.000123	1.55	401.81	701.36	0.12
2	16170.*	10	159.00	13.29	19.26		19.28	0.000090	1.20	190.18	136.44	0.10
2	16170.*	25	184.00	13.29	19.45		19.47	0.000098	1.29	218.16	153.09	0.11
2	16170.*	50	207.00	13.29	19.61		19.63	0.000105	1.37	243.35	166.67	0.11
2	16170.*	100	226.00	13.29	19.76		19.79	0.000106	1.40	270.73	180.27	0.11
2	16170.*	500	264.00	13.29	20.15		20.18	0.000112	1.52	415.60	717.15	0.12
2	15997.*	10	159.00	12.92	19.24		19.26	0.000076	1.14	210.37	141.88	0.09
2	15997.*	25	184.00	12.92	19.44		19.46	0.000083	1.23	239.05	156.81	0.10
2	15997.*	50	207.00	12.92	19.59		19.61	0.000090	1.30	264.55	168.99	0.10
2	15997.*	100	226.00	12.92	19.75		19.77	0.000091	1.34	292.15	181.24	0.10
2	15997.*	500	264.00	12.92	20.13		20.16	0.000104	1.50	430.75	757.49	0.11
2	15824.*	10	159.00	12.54	19.23		19.25	0.000064	1.08	231.08	146.20	0.08
2	15824.*	25	184.00	12.54	19.42		19.44	0.000071	1.17	260.29	159.68	0.09
2	15824.*	50	207.00	12.54	19.58		19.60	0.000077	1.24	285.98	170.65	0.09
2	15824.*	100	226.00	12.54	19.74		19.76	0.000079	1.28	313.71	181.76	0.09
2	15824.*	500	264.00	12.54	20.12		20.14	0.000096	1.47	448.65	800.00	0.11
2	15651	10	159.00	12.16	19.22	14.08	19.24	0.000055	1.03	252.06	149.84	0.08
2	15651	25	184.00	12.16	19.41	14.25	19.43	0.000062	1.11	281.70	162.13	0.08
2	15651	50	207.00	12.16	19.57	14.41	19.59	0.000067	1.18	307.54	172.13	0.09
2	15651	100	226.00	12.16	19.73	14.53	19.74	0.000069	1.22	335.37	182.28	0.09
2	15651	500	264.00	12.16	20.10	14.76	20.13	0.000089	1.44	469.49	800.00	0.10

HEC-RAS Plan: ExCon River: School House Dit Reach: 2 (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
2	15625		Culvert									
2	15584	10	159.00	12.20	19.07	13.70	19.08	0.000023	0.71	348.70	156.22	0.05
2	15584	25	184.00	12.20	19.30	13.84	19.30	0.000025	0.77	384.94	166.81	0.06
2	15584	50	207.00	12.20	19.50	13.96	19.51	0.000027	0.81	420.64	176.62	0.06
2	15584	100	226.00	12.20	19.70	14.05	19.71	0.000027	0.84	456.50	185.95	0.06
2	15584	500	264.00	12.20	20.11	14.23	20.12	0.000037	1.01	602.37	800.00	0.07
2	15512		Culvert									
2	15460	10	159.00	12.00	18.84	13.26	18.85	0.000024	0.73	324.21	145.05	0.05
2	15460	25	184.00	12.00	19.00	13.39	19.01	0.000028	0.81	348.14	152.69	0.06
2	15460	50	207.00	12.00	19.15	13.49	19.16	0.000032	0.87	370.81	159.58	0.06
2	15460	100	226.00	12.00	19.30	13.58	19.31	0.000034	0.91	394.74	166.55	0.06
2	15460	500	264.00	12.00	19.59	13.75	19.60	0.000037	0.98	446.17	180.62	0.07
2	15444		Culvert									
2	15405	10	159.00	11.97	18.66		18.67	0.000070	1.10	167.13	84.46	0.09
2	15405	25	184.00	11.97	18.75		18.78	0.000087	1.24	175.98	93.03	0.10
2	15405	50	207.00	11.97	18.84		18.86	0.000103	1.36	183.89	100.06	0.11
2	15405	100	226.00	11.97	18.93		18.96	0.000114	1.45	193.30	107.84	0.11
2	15405	500	264.00	11.97	19.10		19.14	0.000135	1.62	213.09	122.60	0.12
2	15393	10	300.00	11.97	18.57		18.66	0.000477	2.55	136.03	76.73	0.23
2	15393	25	351.00	11.97	18.64		18.76	0.000609	2.92	141.78	82.92	0.26
2	15393	50	398.00	11.97	18.69		18.85	0.000743	3.25	146.31	87.49	0.28
2	15393	100	438.00	11.97	18.76		18.94	0.000842	3.50	152.42	93.30	0.30
2	15393	500	520.00	11.97	18.88		19.11	0.001054	3.99	164.35	103.71	0.34
2	15215.8*	10	300.00	11.62	18.51		18.59	0.000330	2.26	167.88	117.09	0.19
2	15215.8*	25	351.00	11.62	18.57		18.67	0.000427	2.59	174.68	124.43	0.22
2	15215.8*	50	398.00	11.62	18.60		18.73	0.000530	2.90	179.30	129.18	0.24
2	15215.8*	100	438.00	11.62	18.66		18.80	0.000608	3.13	186.64	136.38	0.26
2	15215.8*	500	520.00	11.62	18.75		18.94	0.000780	3.60	199.97	148.57	0.30
2	15038.6*	10	300.00	11.27	18.49		18.53	0.000198	1.85	321.50	491.66	0.15
2	15038.6*	25	351.00	11.27	18.54		18.60	0.000248	2.09	347.77	496.14	0.17
2	15038.6*	50	398.00	11.27	18.57		18.64	0.000300	2.31	364.05	498.89	0.18
2	15038.6*	100	438.00	11.27	18.63		18.70	0.000329	2.44	392.59	503.69	0.19
2	15038.6*	500	520.00	11.27	18.73		18.81	0.000390	2.69	442.39	511.95	0.21
2	14861.4*	10	300.00	10.91	18.50		18.50	0.000058	1.08	711.69	538.53	0.08
2	14861.4*	25	351.00	10.91	18.55		18.56	0.000072	1.19	741.22	541.60	0.09
2	14861.4*	50	398.00	10.91	18.58		18.60	0.000088	1.32	759.84	543.53	0.10
2	14861.4*	100	438.00	10.91	18.64		18.66	0.000097	1.39	790.94	546.74	0.11
2	14861.4*	500	520.00	10.91	18.74		18.76	0.000117	1.55	844.79	552.25	0.12
2	14684.2*	10	300.00	10.56	18.49		18.50	0.000020	0.65	1119.45	563.60	0.05
2	14684.2*	25	351.00	10.56	18.55		18.55	0.000025	0.74	1150.10	565.89	0.05
2	14684.2*	50	398.00	10.56	18.58		18.59	0.000031	0.82	1169.34	567.33	0.06
2	14684.2*	100	438.00	10.56	18.64		18.64	0.000035	0.88	1201.53	569.71	0.06
2	14684.2*	500	520.00	10.56	18.74		18.74	0.000044	0.99	1257.02	573.81	0.07
2	14507	10	300.00	10.21	18.49	12.77	18.49	0.000008	0.44	1539.53	580.23	0.03
2	14507	25	351.00	10.21	18.55	13.01	18.55	0.000011	0.50	1570.89	582.05	0.04
2	14507	50	398.00	10.21	18.58	13.21	18.58	0.000013	0.56	1590.48	583.19	0.04
2	14507	100	438.00	10.21	18.64	13.39	18.64	0.000015	0.60	1623.39	585.09	0.04
2	14507	500	520.00	10.21	18.73	13.71	18.74	0.000020	0.69	1679.98	588.35	0.05
2	14450		Culvert									
2	14339	10	300.00	10.50	18.40	13.01	18.41	0.000008	0.43	1528.64	591.41	0.03
2	14339	25	351.00	10.50	18.50	13.23	18.50	0.000010	0.48	1584.41	595.69	0.04
2	14339	50	398.00	10.50	18.54	13.42	18.55	0.000012	0.54	1611.94	597.79	0.04
2	14339	100	438.00	10.50	18.60	13.57	18.60	0.000014	0.58	1642.60	600.13	0.04
2	14339	500	520.00	10.50	18.69	13.86	18.69	0.000018	0.68	1699.88	604.46	0.05
2	14140.5*	10	300.00	10.49	18.40	13.36	18.40	0.000009	0.42	1599.92	712.85	0.03
2	14140.5*	25	351.00	10.49	18.50	13.59	18.50	0.000011	0.47	1667.27	726.49	0.04
2	14140.5*	50	398.00	10.49	18.54	13.78	18.54	0.000013	0.53	1700.62	733.15	0.04
2	14140.5*	100	438.00	10.49	18.59	13.93	18.59	0.000015	0.57	1738.08	740.56	0.04
2	14140.5*	500	520.00	10.49	18.69	14.23	18.69	0.000019	0.64	1808.60	754.31	0.05
2	13942	10	300.00	10.49	18.40	13.70	18.40	0.000007	0.36	1888.04	819.44	0.03
2	13942	25	351.00	10.49	18.49	13.92	18.50	0.000009	0.40	1964.56	820.62	0.03

HEC-RAS Plan: ExCon River: School House Dit Reach: 2 (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
2	13942	50	398.00	10.49	18.54	14.11	18.54	0.000011	0.44	2001.79	821.20	0.03
2	13942	100	438.00	10.49	18.59	14.27	18.59	0.000012	0.47	2043.33	821.84	0.04
2	13942	500	520.00	10.49	18.68	14.57	18.69	0.000015	0.54	2120.46	823.03	0.04
2	13758.*	10	300.00	10.05	18.40	13.44	18.40	0.000008	0.34	2011.64	820.87	0.03
2	13758.*	25	351.00	10.05	18.49	13.68	18.49	0.000007	0.38	2088.08	821.96	0.03
2	13758.*	50	398.00	10.05	18.54	13.88	18.54	0.000009	0.42	2125.12	822.49	0.03
2	13758.*	100	438.00	10.05	18.59	14.05	18.59	0.000010	0.45	2166.52	823.08	0.03
2	13758.*	500	520.00	10.05	18.68	14.35	18.68	0.000013	0.51	2243.33	824.18	0.04
2	13574.*	10	300.00	9.60	18.40	13.19	18.40	0.000005	0.32	2135.22	821.98	0.02
2	13574.*	25	351.00	9.60	18.49	13.43	18.49	0.000006	0.36	2211.58	823.01	0.03
2	13574.*	50	398.00	9.60	18.54	13.64	18.54	0.000008	0.40	2248.45	823.50	0.03
2	13574.*	100	438.00	9.60	18.59	13.82	18.59	0.000009	0.43	2289.73	824.05	0.03
2	13574.*	500	520.00	9.60	18.68	14.14	18.68	0.000011	0.49	2366.26	825.07	0.04
2	13390	10	300.00	9.16	18.40	12.91	18.40	0.000004	0.30	2259.20	822.87	0.02
2	13390	25	351.00	9.16	18.49	13.18	18.49	0.000005	0.34	2335.48	823.84	0.03
2	13390	50	398.00	9.16	18.54	13.41	18.54	0.000006	0.38	2372.20	824.30	0.03
2	13390	100	438.00	9.16	18.59	13.58	18.59	0.000007	0.41	2413.37	824.82	0.03
2	13390	500	520.00	9.16	18.68	13.94	18.68	0.000010	0.47	2489.64	825.78	0.03
2	13339	10	300.00	8.96	18.40	12.60	18.40	0.000005	0.32	2187.75	824.16	0.02
2	13339	25	351.00	8.96	18.49	12.88	18.49	0.000006	0.36	2264.09	825.10	0.03
2	13339	50	398.00	8.96	18.54	13.11	18.54	0.000007	0.40	2300.80	825.56	0.03
2	13339	100	438.00	8.96	18.59	13.29	18.59	0.000008	0.43	2341.99	826.06	0.03
2	13339	500	520.00	8.96	18.68	13.65	18.68	0.000010	0.49	2418.27	827.01	0.03
2	13240.1	10	384.00	8.90	18.40	12.97	18.40	0.000007	0.39	2260.16	823.65	0.03
2	13240.1	25	451.00	8.90	18.49	13.29	18.49	0.000009	0.44	2336.28	824.55	0.03
2	13240.1	50	514.00	8.90	18.53	13.56	18.54	0.000011	0.48	2372.75	824.98	0.04
2	13240.1	100	567.00	8.90	18.58	13.78	18.59	0.000012	0.53	2413.73	825.46	0.04
2	13240.1	500	678.00	8.90	18.68	14.19	18.68	0.000016	0.61	2489.55	826.36	0.04
2	13042.4*	10	384.00	8.79	18.40	12.84	18.40	0.000008	0.36	2404.76	824.59	0.03
2	13042.4*	25	451.00	8.79	18.49	13.15	18.49	0.000007	0.41	2480.72	825.47	0.03
2	13042.4*	50	514.00	8.79	18.53	13.43	18.53	0.000009	0.46	2516.93	825.89	0.03
2	13042.4*	100	567.00	8.79	18.58	13.65	18.58	0.000010	0.50	2557.72	826.36	0.04
2	13042.4*	500	678.00	8.79	18.67	14.06	18.67	0.000014	0.57	2633.09	827.23	0.04
2	12844.7*	10	384.00	8.68	18.40	12.70	18.40	0.000005	0.34	2549.60	825.51	0.02
2	12844.7*	25	451.00	8.68	18.49	13.02	18.49	0.000006	0.38	2625.43	826.38	0.03
2	12844.7*	50	514.00	8.68	18.53	13.29	18.53	0.000008	0.43	2661.44	826.79	0.03
2	12844.7*	100	567.00	8.68	18.58	13.51	18.58	0.000009	0.46	2702.07	827.25	0.03
2	12844.7*	500	678.00	8.68	18.67	13.94	18.67	0.000012	0.54	2777.06	828.11	0.04
2	12647.*	10	384.00	8.57	18.39	12.55	18.40	0.000004	0.31	2695.14	826.31	0.02
2	12647.*	25	451.00	8.57	18.49	12.87	18.49	0.000005	0.35	2770.87	827.17	0.02
2	12647.*	50	514.00	8.57	18.53	13.15	18.53	0.000006	0.40	2806.70	827.57	0.03
2	12647.*	100	567.00	8.57	18.58	13.37	18.58	0.000007	0.43	2847.19	828.03	0.03
2	12647.*	500	678.00	8.57	18.67	13.80	18.67	0.000010	0.50	2921.85	828.87	0.03
2	12449.3	10	500.00	8.46	18.39	12.95	18.39	0.000006	0.38	2840.25	827.10	0.03
2	12449.3	25	590.00	8.46	18.48	13.33	18.49	0.000007	0.43	2915.76	827.94	0.03
2	12449.3	50	675.00	8.46	18.53	13.66	18.53	0.000009	0.49	2951.28	828.34	0.03
2	12449.3	100	748.00	8.46	18.58	13.92	18.58	0.000011	0.53	2991.51	828.79	0.04
2	12449.3	500	900.00	8.46	18.67	14.43	18.67	0.000015	0.62	3065.57	829.61	0.04
2	12251.6*	10	500.00	8.35	18.39	12.80	18.39	0.000006	0.39	2795.94	825.81	0.03
2	12251.6*	25	590.00	8.35	18.48	13.19	18.48	0.000008	0.45	2871.06	826.64	0.03
2	12251.6*	50	675.00	8.35	18.53	13.52	18.53	0.000010	0.51	2906.18	827.03	0.03
2	12251.6*	100	748.00	8.35	18.57	13.78	18.58	0.000012	0.55	2946.06	827.47	0.04
2	12251.6*	500	900.00	8.35	18.66	14.31	18.66	0.000015	0.64	3019.35	828.29	0.04
2	12054	10	500.00	8.24	18.39	12.66	18.39	0.000006	0.41	2752.20	824.49	0.03
2	12054	25	590.00	8.24	18.48	13.04	18.48	0.000008	0.46	2826.89	825.32	0.03
2	12054	50	675.00	8.24	18.52	13.38	18.52	0.000010	0.52	2861.61	825.70	0.03
2	12054	100	748.00	8.24	18.57	13.65	18.57	0.000012	0.57	2901.13	826.14	0.04
2	12054	500	900.00	8.24	18.66	14.17	18.66	0.000016	0.67	2973.62	826.93	0.04
2	12025	10	500.00	8.24	18.39	12.06	18.39	0.000006	0.40	2779.16	825.60	0.03
2	12025	25	590.00	8.24	18.48	12.43	18.48	0.000008	0.46	2853.92	826.43	0.03
2	12025	50	675.00	8.24	18.52	12.76	18.52	0.000010	0.52	2888.63	826.82	0.03
2	12025	100	748.00	8.24	18.57	13.03	18.57	0.000012	0.56	2928.16	827.26	0.04
2	12025	500	900.00	8.24	18.66	13.54	18.66	0.000016	0.66	3000.65	828.06	0.04

HEC-RAS Plan: ExCon River: School House Dit Reach: 2 (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
2	12015		Culvert									
2	11970	10	500.00	7.98	17.84	11.40	17.84	0.000009	0.50	2345.98	818.93	0.03
2	11970	25	590.00	7.98	18.01	11.71	18.01	0.000011	0.55	2483.86	820.39	0.04
2	11970	50	675.00	7.98	18.12	11.99	18.12	0.000013	0.60	2572.87	821.33	0.04
2	11970	100	748.00	7.98	18.18	12.22	18.18	0.000015	0.65	2622.79	821.85	0.04
2	11970	500	900.00	7.98	18.29	12.66	18.30	0.000020	0.75	2718.88	822.86	0.05
2	11918	10	500.00	7.98	17.84	11.60	17.84	0.000006	0.41	2669.57	822.66	0.03
2	11918	25	590.00	7.98	18.01	11.91	18.01	0.000008	0.46	2808.04	824.11	0.03
2	11918	50	675.00	7.98	18.12	12.19	18.12	0.000009	0.51	2897.42	825.04	0.03
2	11918	100	748.00	7.98	18.18	12.41	18.18	0.000011	0.55	2947.54	825.57	0.04
2	11918	500	900.00	7.98	18.29	12.85	18.30	0.000014	0.64	3044.00	826.57	0.04
2	11764	10	500.00	8.03	17.84	11.60	17.84	0.000012	0.56	2185.86	840.98	0.04
2	11764	25	590.00	8.03	18.00	11.95	18.01	0.000014	0.61	2327.28	844.20	0.04
2	11764	50	675.00	8.03	18.11	12.25	18.12	0.000017	0.67	2418.55	846.27	0.04
2	11764	100	748.00	8.03	18.17	12.50	18.18	0.000019	0.72	2469.59	847.43	0.05
2	11764	500	900.00	8.03	18.29	12.98	18.29	0.000025	0.83	2567.84	849.65	0.05
2	11680	10	500.00	7.66	17.83	11.67	17.84	0.000050	1.11	1012.92	798.64	0.07
2	11680	25	590.00	7.66	17.99	12.06	18.00	0.000059	1.21	1083.48	805.23	0.08
2	11680	50	675.00	7.66	18.10	12.39	18.11	0.000069	1.32	1128.55	809.42	0.09
2	11680	100	748.00	7.66	18.16	12.66	18.17	0.000080	1.43	1153.28	811.72	0.09
2	11680	500	900.00	7.66	18.27	13.18	18.29	0.000104	1.64	1200.63	816.12	0.11
2	11531.5*	10	500.00	7.50	17.82		17.83	0.000027	0.87	1543.92	814.57	0.06
2	11531.5*	25	590.00	7.50	17.99		18.00	0.000031	0.94	1679.38	816.61	0.06
2	11531.5*	50	675.00	7.50	18.10		18.10	0.000035	1.01	1765.78	817.90	0.07
2	11531.5*	100	748.00	7.50	18.15		18.16	0.000041	1.09	1813.05	818.61	0.07
2	11531.5*	500	900.00	7.50	18.26		18.27	0.000052	1.24	1903.49	819.97	0.08
2	11383	10	500.00	7.34	17.82	11.05	17.83	0.000025	0.88	1392.25	586.72	0.06
2	11383	25	590.00	7.34	17.98	11.42	17.99	0.000029	0.97	1490.10	599.54	0.06
2	11383	50	675.00	7.34	18.09	11.71	18.10	0.000035	1.07	1553.17	607.67	0.07
2	11383	100	748.00	7.34	18.15	11.95	18.16	0.000040	1.16	1587.64	612.06	0.07
2	11383	500	900.00	7.34	18.25	12.44	18.27	0.000056	1.38	1661.31	782.52	0.09
2	11349		Culvert									
2	11319	10	500.00	6.96	17.45		17.46	0.000037	1.02	1153.05	573.73	0.07
2	11319	25	590.00	6.96	17.93		17.94	0.000031	0.97	1438.42	608.57	0.06
2	11319	50	675.00	6.96	18.04		18.05	0.000038	1.09	1521.29	610.74	0.07
2	11319	100	748.00	6.96	18.10		18.11	0.000044	1.18	1565.68	611.48	0.08
2	11319	500	900.00	6.96	18.22		18.23	0.000056	1.34	1664.05	613.14	0.08
2	11158.6*	10	500.00	6.51	17.44		17.45	0.000029	0.93	1284.98	595.65	0.06
2	11158.6*	25	590.00	6.51	17.93		17.93	0.000026	0.90	1633.79	612.13	0.06
2	11158.6*	50	675.00	6.51	18.04		18.05	0.000030	0.98	1725.54	613.55	0.06
2	11158.6*	100	748.00	6.51	18.09		18.10	0.000034	1.06	1769.57	614.23	0.07
2	11158.6*	500	900.00	6.51	18.21		18.22	0.000044	1.21	1867.22	615.73	0.07
2	10998.3*	10	500.00	6.05	17.44		17.45	0.000025	0.86	1444.12	608.89	0.05
2	10998.3*	25	590.00	6.05	17.93		17.93	0.000020	0.81	1837.01	614.79	0.05
2	10998.3*	50	675.00	6.05	18.04		18.04	0.000023	0.88	1928.68	616.11	0.05
2	10998.3*	100	748.00	6.05	18.09		18.10	0.000027	0.95	1972.44	616.73	0.06
2	10998.3*	500	900.00	6.05	18.21		18.22	0.000035	1.09	2069.53	618.11	0.07
2	10838	10	500.00	5.60	17.44	9.74	17.44	0.000019	0.76	1647.65	611.77	0.05
2	10838	25	590.00	5.60	17.92	10.07	17.93	0.000016	0.72	2041.98	617.09	0.04
2	10838	50	675.00	5.60	18.04	10.38	18.04	0.000019	0.79	2133.60	618.32	0.05
2	10838	100	748.00	5.60	18.09	10.65	18.09	0.000022	0.86	2177.14	618.90	0.05
2	10838	500	900.00	5.60	18.21	11.14	18.21	0.000028	0.98	2273.77	620.20	0.06
2	10803		Culvert									
2	10760	10	500.00	5.50	17.43		17.44	0.000013	0.71	1624.57	587.64	0.04
2	10760	25	590.00	5.50	17.92		17.92	0.000013	0.71	1924.49	658.26	0.04
2	10760	50	675.00	5.50	18.02		18.03	0.000015	0.79	1994.62	676.10	0.04
2	10760	100	748.00	5.50	18.09		18.09	0.000018	0.86	2037.50	686.77	0.05
2	10760	500	900.00	5.50	18.20		18.21	0.000024	1.00	2115.65	705.81	0.05
2	10651.5*	10	500.00	6.02	17.43		17.44	0.000014	0.72	1610.12	587.78	0.04
2	10651.5*	25	590.00	6.02	17.92		17.92	0.000013	0.72	1910.15	658.40	0.04
2	10651.5*	50	675.00	6.02	18.02		18.03	0.000016	0.80	1980.10	676.20	0.04
2	10651.5*	100	748.00	6.02	18.09		18.09	0.000019	0.87	2022.79	686.83	0.05

HEC-RAS Plan: ExCon River: School House Dlt Reach: 2 (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
2	10651.5*	500	900.00	6.02	18.20		18.20	0.000025	1.01	2100.47	705.77	0.05
2	10543	10	500.00	6.53	17.43		17.44	0.000015	0.72	1597.10	587.86	0.04
2	10543	25	590.00	6.53	17.92		17.92	0.000014	0.73	1897.23	658.48	0.04
2	10543	50	675.00	6.53	18.02		18.03	0.000017	0.80	1966.98	676.24	0.04
2	10543	100	748.00	6.53	18.08		18.09	0.000020	0.87	2009.47	686.84	0.05
2	10543	500	900.00	6.53	18.19		18.20	0.000026	1.01	2086.67	705.68	0.06
2	10521	10	500.00	6.52	17.43		17.44	0.000021	0.78	1449.81	584.87	0.05
2	10521	25	590.00	6.52	17.92		17.92	0.000019	0.77	1744.68	643.28	0.05
2	10521	50	675.00	6.52	18.02		18.02	0.000022	0.85	1812.79	662.05	0.05
2	10521	100	748.00	6.52	18.08		18.09	0.000026	0.92	1854.28	673.24	0.06
2	10521	500	900.00	6.52	18.19		18.20	0.000034	1.07	1929.76	693.11	0.07
2	10385	10	500.00	5.00	17.43	9.81	17.43	0.000016	0.74	1760.37	810.92	0.04
2	10385	25	590.00	5.00	17.91	10.24	17.92	0.000014	0.71	2154.99	816.42	0.04
2	10385	50	675.00	5.00	18.02	10.61	18.02	0.000016	0.78	2240.09	817.60	0.05
2	10385	100	748.00	5.00	18.08	10.89	18.08	0.000019	0.84	2290.76	818.30	0.05
2	10385	500	900.00	5.00	18.19	11.42	18.20	0.000024	0.97	2380.87	819.55	0.06
2	10321		Culvert									
2	10270	10	500.00	5.00	14.19	9.53	14.31	0.000423	2.75	181.97	152.75	0.21
2	10270	25	590.00	5.00	14.77	9.89	14.85	0.000311	2.48	362.46	200.22	0.18
2	10270	50	675.00	5.00	15.29	10.20	15.36	0.000251	2.37	483.12	261.13	0.17
2	10270	100	748.00	5.00	15.63	10.45	15.69	0.000226	2.32	581.77	351.86	0.16
2	10270	500	900.00	5.00	16.24	10.93	16.28	0.000181	2.21	886.00	627.03	0.15
2	10156	10	730.00	6.35	13.79		14.16	0.001721	4.97	181.02	116.57	0.43
2	10156	25	870.00	6.35	14.43		14.73	0.001384	4.68	273.81	171.13	0.39
2	10156	50	1002.00	6.35	15.06		15.27	0.000947	4.20	397.61	233.88	0.33
2	10156	100	1117.00	6.35	15.43		15.62	0.000798	4.04	496.58	322.64	0.30
2	10156	500	1358.00	6.35	16.10		16.23	0.000572	3.69	803.01	589.61	0.26
2	10061	10	730.00	6.43	13.74	10.52	14.01	0.001015	4.21	173.34	151.89	0.34
2	10061	25	870.00	6.43	14.31	10.93	14.62	0.001060	4.48	194.03	177.97	0.35
2	10061	50	1002.00	6.43	14.82	11.28	15.16	0.001084	4.69	213.51	231.37	0.35
2	10061	100	1117.00	6.43	15.13	11.56	15.51	0.001162	4.96	225.42	354.94	0.37
2	10061	500	1358.00	6.43	15.64	12.13	16.11	0.001354	5.52	246.11	570.54	0.40
2	9979	10	730.00	5.70	13.59	10.49	13.92	0.001181	4.58	159.50	188.50	0.36
2	9979	25	870.00	5.70	14.14	10.90	14.52	0.001259	4.92	177.01	243.61	0.37
2	9979	50	1002.00	5.70	14.64	11.27	15.06	0.001310	5.18	193.40	399.18	0.38
2	9979	100	1117.00	5.70	14.92	11.56	15.39	0.001428	5.51	202.86	508.28	0.40
2	9979	500	1358.00	5.70	15.38	12.15	15.98	0.001723	6.22	218.49	544.21	0.44
2	9919		Bridge									
2	9847	10	730.00	5.18	13.41	10.17	13.75	0.001250	4.68	155.85	508.02	0.37
2	9847	25	870.00	5.18	13.95	10.64	14.34	0.001347	5.04	172.69	571.83	0.38
2	9847	50	1002.00	5.18	14.44	11.04	14.88	0.001409	5.31	188.70	696.48	0.39
2	9847	100	1117.00	5.18	14.70	11.36	15.19	0.001551	5.66	197.43	762.43	0.41
2	9847	500	1358.00	5.18	15.09	12.00	15.73	0.001919	6.44	211.02	846.47	0.46
2	9650.66*	10	730.00	4.81	13.15	10.06	13.50	0.001332	4.75	153.57	468.64	0.38
2	9650.66*	25	870.00	4.81	13.66	10.53	14.07	0.001440	5.12	170.04	518.33	0.40
2	9650.66*	50	1002.00	4.81	14.14	10.92	14.59	0.001503	5.39	185.96	566.19	0.41
2	9650.66*	100	1117.00	4.81	14.36	11.25	14.87	0.001679	5.77	193.54	617.59	0.43
2	9650.66*	500	1358.00	4.81	14.63	11.87	15.32	0.002179	6.68	203.17	681.57	0.49
2	9454.33*	10	730.00	4.43	12.86	9.94	13.22	0.001453	4.83	151.03	438.28	0.39
2	9454.33*	25	870.00	4.43	13.35	10.41	13.77	0.001576	5.21	167.05	479.90	0.41
2	9454.33*	50	1002.00	4.43	13.81	10.81	14.28	0.001639	5.48	182.95	518.78	0.42
2	9454.33*	100	1117.00	4.43	13.98	11.13	14.52	0.001871	5.91	188.85	532.79	0.45
2	9454.33*	500	1358.00	4.43	14.07	11.75	14.85	0.002644	7.07	192.05	540.29	0.54
2	9258	10	730.00	4.06	12.54	9.83	12.92	0.001637	4.95	147.52	408.39	0.41
2	9258	25	870.00	4.06	13.00	10.30	13.44	0.001784	5.34	162.90	443.95	0.43
2	9258	50	1002.00	4.06	13.45	10.69	13.94	0.001845	5.60	178.81	478.99	0.44
2	9258	100	1117.00	4.06	13.54	11.01	14.12	0.002183	6.13	182.13	486.10	0.48
2	9258	500	1358.00	4.06	13.22	11.62	14.21	0.003830	7.95	170.82	461.59	0.64
2	9198	10	730.00	4.71	12.53	9.98	12.80	0.001209	4.20	173.63	407.37	0.36
2	9198	25	870.00	4.71	13.00	10.32	13.31	0.001272	4.51	193.06	446.77	0.37
2	9198	50	1002.00	4.71	13.46	10.63	13.80	0.001280	4.71	212.96	485.63	0.38
2	9198	100	1117.00	4.71	13.55	10.87	13.96	0.001505	5.14	217.19	493.71	0.41

HEC-RAS Plan: ExCon River: School House Dit Reach: 2 (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
2	9198	500	1358.00	4.71	13.23	11.36	13.93	0.002680	6.68	203.28	466.90	0.54
2	9007.75*	10	730.00	4.57	12.25	9.78	12.56	0.001365	4.44	164.25	409.27	0.38
2	9007.75*	25	870.00	4.57	12.69	10.14	13.05	0.001457	4.78	182.10	449.77	0.40
2	9007.75*	50	1002.00	4.57	13.15	10.46	13.54	0.001467	4.98	201.21	491.32	0.40
2	9007.75*	100	1117.00	4.57	13.17	10.72	13.64	0.001805	5.53	201.97	492.94	0.45
2	9007.75*	500	1358.00	4.57	13.46	11.24	13.55	0.000554	3.14	739.73	531.84	0.25
2	8817.5*	10	730.00	4.43	11.93	9.50	12.28	0.001553	4.73	154.38	447.76	0.41
2	8817.5*	25	870.00	4.43	12.34	9.92	12.74	0.001708	5.12	169.90	515.72	0.43
2	8817.5*	50	1002.00	4.43	12.79	10.24	13.23	0.001735	5.34	187.77	590.22	0.44
2	8817.5*	100	1117.00	4.43	13.39	10.52	13.42	0.000218	1.99	1102.46	685.10	0.16
2	8817.5*	500	1358.00	4.43	13.41	11.06	13.46	0.000316	2.40	1112.27	688.52	0.19
2	8627.25*	10	730.00	4.28	11.57	9.23	11.96	0.001711	5.03	145.19	517.59	0.43
2	8627.25*	25	870.00	4.28	11.91	9.65	12.39	0.002001	5.54	157.01	566.88	0.46
2	8627.25*	50	1002.00	4.28	12.34	10.01	12.86	0.002094	5.80	172.62	630.08	0.48
2	8627.25*	100	1117.00	4.28	12.72	10.30	13.27	0.002109	5.95	187.61	687.45	0.48
2	8627.25*	500	1358.00	4.28	13.40	10.84	13.41	0.000120	1.50	1677.28	748.02	0.12
2	8437	10	730.00	4.14	11.17	8.95	11.61	0.001946	5.33	137.00	568.84	0.45
2	8437	25	870.00	4.14	11.40	9.37	11.96	0.002396	6.02	144.45	593.92	0.51
2	8437	50	1002.00	4.14	11.78	9.74	12.41	0.002538	6.38	157.04	635.05	0.52
2	8437	100	1117.00	4.14	12.15	10.04	12.82	0.002559	6.58	169.74	665.99	0.53
2	8437	500	1358.00	4.14	13.39	10.62	13.40	0.000047	0.96	2318.75	754.67	0.07
2	8369	10	730.00	3.79	10.97	8.83	11.47	0.002137	5.63	129.62	561.14	0.47
2	8369	25	870.00	3.79	11.13	9.27	11.78	0.002764	6.48	134.16	571.99	0.54
2	8369	50	1002.00	3.79	11.46	9.64	12.21	0.003000	6.94	144.44	599.89	0.57
2	8369	100	1117.00	3.79	11.81	9.95	12.61	0.003061	7.19	155.35	628.49	0.58
2	8369	500	1358.00	3.79	12.32	10.56	13.29	0.003427	7.89	172.13	667.62	0.61
2	8173.5*	10	730.00	3.57	10.59	8.39	11.06	0.002002	5.48	133.21	706.57	0.46
2	8173.5*	25	870.00	3.57	10.55	8.82	11.22	0.002917	6.59	131.96	701.21	0.56
2	8173.5*	50	1002.00	3.57	10.78	9.19	11.59	0.003356	7.21	139.05	731.41	0.60
2	8173.5*	100	1117.00	3.57	11.10	9.50	11.97	0.003444	7.49	149.21	773.53	0.61
2	8173.5*	500	1358.00	3.57	10.09	10.09	12.13	0.009567	11.48	118.32	641.12	1.00
2	7978	10	730.00	3.35	10.22	7.98	10.66	0.001924	5.33	136.98	785.16	0.45
2	7978	25	870.00	3.35	9.84	8.40	10.59	0.003488	6.95	125.18	765.85	0.60
2	7978	50	1002.00	3.35	9.66	8.77	10.75	0.005217	8.37	119.77	756.71	0.74
2	7978	100	1117.00	3.35	9.85	9.07	11.08	0.005734	8.91	125.31	766.06	0.77
2	7978	500	1358.00	3.35	11.27	9.65	11.28	0.000105	1.37	1690.70	825.38	0.11
2	7901	10	730.00	3.19	10.51	8.57	10.52	0.000060	0.93	1377.17	793.07	0.08
2	7901	25	870.00	3.19	10.34	9.03	10.35	0.000103	1.19	1301.24	788.86	0.10
2	7901	50	1002.00	3.19	10.39	9.42	10.40	0.000130	1.34	1321.53	789.99	0.12
2	7901	100	1117.00	3.19	10.67	9.75	10.68	0.000121	1.34	1446.20	796.88	0.11
2	7901	500	1358.00	3.19	11.26	10.14	11.28	0.000106	1.33	1704.40	808.44	0.11
2	7755.*	10	730.00	2.83	9.97	7.84	10.45	0.002085	5.55	131.41	769.53	0.47
2	7755.*	25	870.00	2.83	10.32	8.27	10.33	0.000098	1.25	1303.72	784.88	0.10
2	7755.*	50	1002.00	2.83	10.37	8.64	10.38	0.000125	1.41	1322.28	786.10	0.12
2	7755.*	100	1117.00	2.83	10.65	8.95	10.67	0.000116	1.41	1448.04	794.32	0.11
2	7755.*	500	1358.00	2.83	11.25	9.54	11.26	0.000102	1.40	1707.67	808.12	0.11
2	7609.*	10	730.00	2.47	9.79	7.11	10.16	0.001461	4.88	149.50	686.07	0.40
2	7609.*	25	870.00	2.47	10.31	7.54	10.32	0.000093	1.29	1306.78	734.49	0.10
2	7609.*	50	1002.00	2.47	10.35	7.90	10.36	0.000119	1.46	1323.60	737.34	0.11
2	7609.*	100	1117.00	2.47	10.64	8.21	10.65	0.000111	1.46	1450.16	757.12	0.11
2	7609.*	500	1358.00	2.47	11.24	8.78	11.25	0.000052	1.06	2631.97	800.09	0.08
2	7463	10	730.00	2.11	9.66	6.43	9.96	0.001075	4.35	167.76	646.66	0.34
2	7463	25	870.00	2.11	10.30	6.85	10.31	0.000055	1.03	1842.18	699.21	0.08
2	7463	50	1002.00	2.11	10.34	7.22	10.35	0.000069	1.17	1867.88	700.35	0.09
2	7463	100	1117.00	2.11	10.63	7.51	10.64	0.000063	1.15	2073.22	709.43	0.08
2	7463	500	1358.00	2.11	11.23	8.10	11.24	0.000053	1.13	2508.25	728.28	0.08
2	7390		Bridge									
2	7298	10	730.00	2.24	9.34	7.08	9.72	0.001753	4.98	146.50	563.20	0.43
2	7298	25	870.00	2.24	9.59	7.49	10.07	0.002115	5.59	155.60	582.48	0.48
2	7298	50	1002.00	2.24	9.20	7.85	9.98	0.003616	7.07	141.69	552.79	0.62
2	7298	100	1117.00	2.24	9.31	8.13	10.22	0.004191	7.68	145.39	580.80	0.67
2	7298	500	1358.00	2.24	9.50	8.67	10.73	0.005468	8.92	152.23	575.40	0.77

HEC-RAS Plan: ExCon River: School House Dit Reach: 2 (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
2	7109.66*	10	730.00	2.04	8.96	6.86	9.38	0.001897	5.17	141.19	647.09	0.45
2	7109.66*	25	870.00	2.04	9.08	7.27	9.64	0.002490	5.99	145.35	680.10	0.52
2	7109.66*	50	1002.00	2.04	9.62	7.61	9.64	0.000224	1.90	1113.76	711.20	0.16
2	7109.66*	100	1117.00	2.04	9.82	7.90	9.85	0.000216	1.91	1213.69	725.88	0.16
2	7109.66*	500	1358.00	2.04	10.24	8.44	10.26	0.000198	1.92	1419.43	751.29	0.15
2	6921.33*	10	730.00	1.85	9.14	6.67	9.17	0.000215	1.89	926.16	796.46	0.16
2	6921.33*	25	870.00	1.85	9.35	7.08	9.38	0.000224	1.97	1039.42	819.24	0.16
2	6921.33*	50	1002.00	1.85	9.58	7.44	9.60	0.000217	1.99	1164.09	844.07	0.16
2	6921.33*	100	1117.00	1.85	9.78	7.72	9.81	0.000206	1.98	1278.57	862.76	0.15
2	6921.33*	500	1358.00	1.85	10.20	8.27	10.23	0.000184	1.95	1513.30	898.88	0.15
2	6733	10	778.00	1.65	9.09	7.53	9.12	0.000258	2.12	921.12	916.82	0.17
2	6733	25	928.00	1.65	9.30	7.71	9.33	0.000279	2.25	1039.37	955.92	0.18
2	6733	50	1071.00	1.65	9.52	7.85	9.56	0.000270	2.26	1179.39	982.53	0.18
2	6733	100	1194.00	1.65	9.73	7.95	9.76	0.000249	2.20	1309.82	988.23	0.17
2	6733	500	1455.00	1.65	10.19	8.14	10.20	0.000092	1.39	2532.12	1000.00	0.10
2	6683	10	778.00	1.04	9.07	5.91	9.11	0.000277	2.11	773.86	789.52	0.18
2	6683	25	928.00	1.04	9.27	6.40	9.31	0.000301	2.23	858.90	796.83	0.18
2	6683	50	1071.00	1.04	9.53	6.82	9.54	0.000129	1.51	1664.36	800.00	0.12
2	6683	100	1194.00	1.04	9.74	7.14	9.75	0.000120	1.50	1832.07	800.00	0.12
2	6683	500	1455.00	1.04	10.18	7.74	10.19	0.000104	1.48	2187.27	800.00	0.11
2	6490.4*	10	778.00	1.14	8.92	5.93	9.03	0.000596	3.04	497.09	756.40	0.26
2	6490.4*	25	928.00	1.14	9.23	6.39	9.26	0.000214	1.89	1223.23	801.00	0.16
2	6490.4*	50	1071.00	1.14	9.49	6.77	9.51	0.000189	1.84	1427.93	810.00	0.15
2	6490.4*	100	1194.00	1.14	9.70	7.08	9.72	0.000170	1.80	1601.09	810.00	0.14
2	6490.4*	500	1455.00	1.14	10.15	7.66	10.17	0.000139	1.72	1966.16	810.00	0.13
2	6297.8*	10	778.00	1.24	8.88	5.92	8.92	0.000341	2.30	796.56	687.50	0.20
2	6297.8*	25	928.00	1.24	9.17	6.36	9.21	0.000290	2.21	1004.40	721.38	0.18
2	6297.8*	50	1071.00	1.24	9.43	6.73	9.47	0.000265	2.15	1196.69	751.36	0.17
2	6297.8*	100	1194.00	1.24	9.65	7.02	9.68	0.000229	2.10	1364.37	776.56	0.17
2	6297.8*	500	1455.00	1.24	10.11	7.58	10.14	0.000184	2.00	1734.06	820.00	0.15
2	6105.2*	10	778.00	1.35	8.79	5.91	8.85	0.000411	2.52	644.12	548.15	0.22
2	6105.2*	25	928.00	1.35	9.09	6.32	9.15	0.000356	2.45	840.45	648.41	0.20
2	6105.2*	50	1071.00	1.35	9.36	6.67	9.41	0.000312	2.38	1019.96	678.26	0.19
2	6105.2*	100	1194.00	1.35	9.59	6.96	9.63	0.000280	2.33	1176.46	703.26	0.18
2	6105.2*	500	1455.00	1.35	10.06	7.50	10.10	0.000223	2.21	1521.45	755.43	0.17
2	5912.6*	10	778.00	1.45	8.70	5.88	8.77	0.000432	2.60	621.82	452.63	0.22
2	5912.6*	25	928.00	1.45	9.02	6.28	9.08	0.000383	2.54	766.33	459.55	0.21
2	5912.6*	50	1071.00	1.45	9.29	6.61	9.35	0.000346	2.51	904.11	561.26	0.20
2	5912.6*	100	1194.00	1.45	9.52	6.88	9.58	0.000314	2.47	1042.17	627.13	0.19
2	5912.6*	500	1455.00	1.45	10.01	7.41	10.05	0.000253	2.35	1362.90	686.94	0.18
2	5720	10	778.00	1.55	8.60	5.84	8.68	0.000462	2.70	594.48	459.12	0.23
2	5720	25	928.00	1.55	8.93	6.22	9.00	0.000400	2.61	747.52	467.47	0.22
2	5720	50	1071.00	1.55	9.22	6.55	9.28	0.000358	2.55	882.27	469.60	0.21
2	5720	100	1194.00	1.55	9.46	6.81	9.51	0.000326	2.51	994.85	481.28	0.20
2	5720	500	1455.00	1.55	9.96	8.22	10.00	0.000268	2.42	1260.89	592.75	0.18
2	5666		Bridge									
2	5640	10	778.00	1.55	8.35	5.84	8.47	0.000695	3.20	479.03	452.73	0.28
2	5640	25	928.00	1.55	8.61	6.22	8.72	0.000647	3.20	598.67	459.35	0.27
2	5640	50	1071.00	1.55	8.83	6.55	8.93	0.000623	3.22	697.43	464.75	0.27
2	5640	100	1194.00	1.55	9.00	6.81	9.10	0.000606	3.24	776.94	469.05	0.27
2	5640	500	1455.00	1.55	9.32	8.22	9.42	0.000578	3.28	929.46	469.81	0.26
2	5444.*	10	778.00	1.26	8.23		8.34	0.000598	3.05	505.91	452.79	0.26
2	5444.*	25	928.00	1.26	8.50		8.60	0.000559	3.05	628.70	459.13	0.26
2	5444.*	50	1071.00	1.26	8.72		8.81	0.000542	3.08	728.68	463.82	0.25
2	5444.*	100	1194.00	1.26	8.89		8.98	0.000530	3.11	808.91	467.48	0.25
2	5444.*	500	1455.00	1.26	9.22		9.31	0.000510	3.17	984.21	492.95	0.25
2	5248.*	10	778.00	0.97	8.14		8.23	0.000496	2.86	544.10	453.76	0.24
2	5248.*	25	928.00	0.97	8.41		8.50	0.000470	2.87	668.97	458.93	0.24
2	5248.*	50	1071.00	0.97	8.63		8.71	0.000460	2.92	769.32	462.87	0.23
2	5248.*	100	1194.00	0.97	8.80		8.88	0.000453	2.96	850.07	475.55	0.23
2	5248.*	500	1455.00	0.97	9.13		9.21	0.000440	3.05	1014.24	519.91	0.23
2	5052.*	10	778.00	0.68	8.06		8.14	0.000410	2.68	585.78	453.90	0.22
2	5052.*	25	928.00	0.68	8.33		8.41	0.000393	2.71	711.66	458.32	0.22

HEC-RAS Plan: ExCon River: School House Dlt Reach: 2 (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
2	5052.*	50	1071.00	0.68	8.55		8.63	0.000389	2.77	813.42	480.47	0.22
2	5052.*	100	1194.00	0.68	8.73		8.80	0.000385	2.82	898.61	501.65	0.22
2	5052.*	500	1455.00	0.68	9.06		9.13	0.000380	2.92	1070.60	537.85	0.22
2	4856.*	10	778.00	0.39	8.00		8.06	0.000332	2.49	636.84	453.73	0.20
2	4856.*	25	928.00	0.39	8.27		8.34	0.000322	2.54	765.51	479.36	0.20
2	4856.*	50	1071.00	0.39	8.49		8.56	0.000323	2.62	872.14	502.71	0.20
2	4856.*	100	1194.00	0.39	8.66		8.73	0.000323	2.67	960.86	520.52	0.20
2	4856.*	500	1455.00	0.39	8.99		9.06	0.000323	2.78	1138.09	550.19	0.20
2	4660	10	1111.00	0.10	7.82		7.96	0.000642	3.53	638.26	461.64	0.28
2	4660	25	1334.00	0.10	8.10		8.24	0.000633	3.64	771.09	487.97	0.28
2	4660	50	1547.00	0.10	8.32		8.46	0.000646	3.77	877.47	508.07	0.28
2	4660	100	1733.00	0.10	8.49		8.63	0.000658	3.88	965.27	524.08	0.29
2	4660	500	2128.00	0.10	8.81		8.96	0.000675	4.09	1140.18	549.11	0.29
2	4470.*	10	1111.00	-0.17	7.72		7.85	0.000562	3.40	669.24	475.36	0.26
2	4470.*	25	1334.00	-0.17	8.00		8.12	0.000561	3.51	805.34	498.75	0.26
2	4470.*	50	1547.00	-0.17	8.21		8.34	0.000580	3.67	911.61	516.28	0.27
2	4470.*	100	1733.00	-0.17	8.37		8.51	0.000596	3.79	998.90	530.24	0.28
2	4470.*	500	2128.00	-0.17	8.69		8.83	0.000621	4.01	1172.25	550.97	0.28
2	4280.*	10	1111.00	-0.44	7.63		7.74	0.000480	3.23	714.24	487.24	0.24
2	4280.*	25	1334.00	-0.44	7.91		8.02	0.000486	3.36	852.41	508.16	0.25
2	4280.*	50	1547.00	-0.44	8.11		8.23	0.000510	3.52	957.79	523.55	0.25
2	4280.*	100	1733.00	-0.44	8.27		8.40	0.000529	3.66	1044.00	535.82	0.26
2	4280.*	500	2128.00	-0.44	8.59		8.72	0.000562	3.89	1214.55	552.31	0.27
2	4090.*	10	1111.00	-0.72	7.55		7.66	0.000408	3.07	764.28	497.15	0.23
2	4090.*	25	1334.00	-0.72	7.83		7.93	0.000419	3.21	903.46	515.86	0.23
2	4090.*	50	1547.00	-0.72	8.03		8.14	0.000447	3.38	1007.24	529.38	0.24
2	4090.*	100	1733.00	-0.72	8.19		8.30	0.000469	3.52	1091.82	539.32	0.25
2	4090.*	500	2128.00	-0.72	8.49		8.61	0.000507	3.78	1258.80	553.88	0.26
2	3900.*	10	1111.00	-0.99	7.49		7.58	0.000343	2.89	823.27	506.13	0.21
2	3900.*	25	1334.00	-0.99	7.76		7.86	0.000359	3.05	962.86	523.07	0.21
2	3900.*	50	1547.00	-0.99	7.96		8.05	0.000388	3.23	1064.79	534.64	0.22
2	3900.*	100	1733.00	-0.99	8.11		8.21	0.000411	3.38	1147.45	542.51	0.23
2	3900.*	500	2128.00	-0.99	8.41		8.52	0.000453	3.66	1310.36	555.31	0.25
2	3710.*	10	1111.00	-1.26	7.44		7.52	0.000287	2.72	889.95	514.00	0.19
2	3710.*	25	1334.00	-1.26	7.71		7.79	0.000304	2.88	1029.45	529.45	0.20
2	3710.*	50	1547.00	-1.26	7.90		7.98	0.000333	3.07	1129.21	538.46	0.21
2	3710.*	100	1733.00	-1.26	8.04		8.14	0.000357	3.23	1209.79	545.24	0.22
2	3710.*	500	2128.00	-1.26	8.33		8.44	0.000402	3.52	1366.34	556.69	0.23
2	3520.*	10	1111.00	-1.53	7.40		7.47	0.000239	2.56	961.17	520.98	0.18
2	3520.*	25	1334.00	-1.53	7.66		7.73	0.000258	2.72	1100.14	533.40	0.18
2	3520.*	50	1547.00	-1.53	7.84		7.92	0.000286	2.92	1197.51	541.50	0.19
2	3520.*	100	1733.00	-1.53	7.99		8.07	0.000310	3.08	1275.92	547.26	0.20
2	3520.*	500	2128.00	-1.53	8.27		8.36	0.000356	3.38	1429.87	557.57	0.22
2	3330.*	10	1111.00	-1.80	7.37		7.42	0.000199	2.40	1037.78	526.35	0.16
2	3330.*	25	1334.00	-1.80	7.62		7.69	0.000218	2.57	1175.82	537.17	0.17
2	3330.*	50	1547.00	-1.80	7.80		7.87	0.000245	2.77	1270.94	544.49	0.18
2	3330.*	100	1733.00	-1.80	7.94		8.01	0.000268	2.93	1347.26	549.29	0.19
2	3330.*	500	2128.00	-1.80	8.21		8.30	0.000313	3.25	1496.75	558.58	0.21
2	3140.*	10	1111.00	-2.08	7.34		7.38	0.000167	2.25	1117.05	530.50	0.15
2	3140.*	25	1334.00	-2.08	7.59		7.65	0.000185	2.43	1254.07	540.53	0.16
2	3140.*	50	1547.00	-2.08	7.76		7.82	0.000211	2.63	1347.07	546.72	0.17
2	3140.*	100	1733.00	-2.08	7.90		7.96	0.000232	2.79	1421.38	551.09	0.18
2	3140.*	500	2128.00	-2.08	8.16		8.24	0.000276	3.11	1566.55	559.53	0.19
2	2950.*	10	1111.00	-2.35	7.31		7.35	0.000140	2.12	1197.84	534.06	0.14
2	2950.*	25	1334.00	-2.35	7.56		7.61	0.000158	2.30	1333.80	543.35	0.15
2	2950.*	50	1547.00	-2.35	7.73		7.78	0.000181	2.50	1424.76	548.57	0.16
2	2950.*	100	1733.00	-2.35	7.86		7.92	0.000202	2.66	1497.16	552.55	0.17
2	2950.*	500	2128.00	-2.35	8.12		8.19	0.000243	2.99	1638.17	560.23	0.18
2	2760.*	10	1111.00	-2.62	7.29		7.33	0.000118	1.99	1283.96	536.86	0.13
2	2760.*	25	1334.00	-2.62	7.54		7.58	0.000134	2.17	1418.82	545.23	0.14
2	2760.*	50	1547.00	-2.62	7.70		7.75	0.000156	2.37	1507.83	549.88	0.15
2	2760.*	100	1733.00	-2.62	7.83		7.88	0.000175	2.53	1578.42	553.55	0.15
2	2760.*	500	2128.00	-2.62	8.08		8.14	0.000214	2.86	1715.49	560.59	0.17

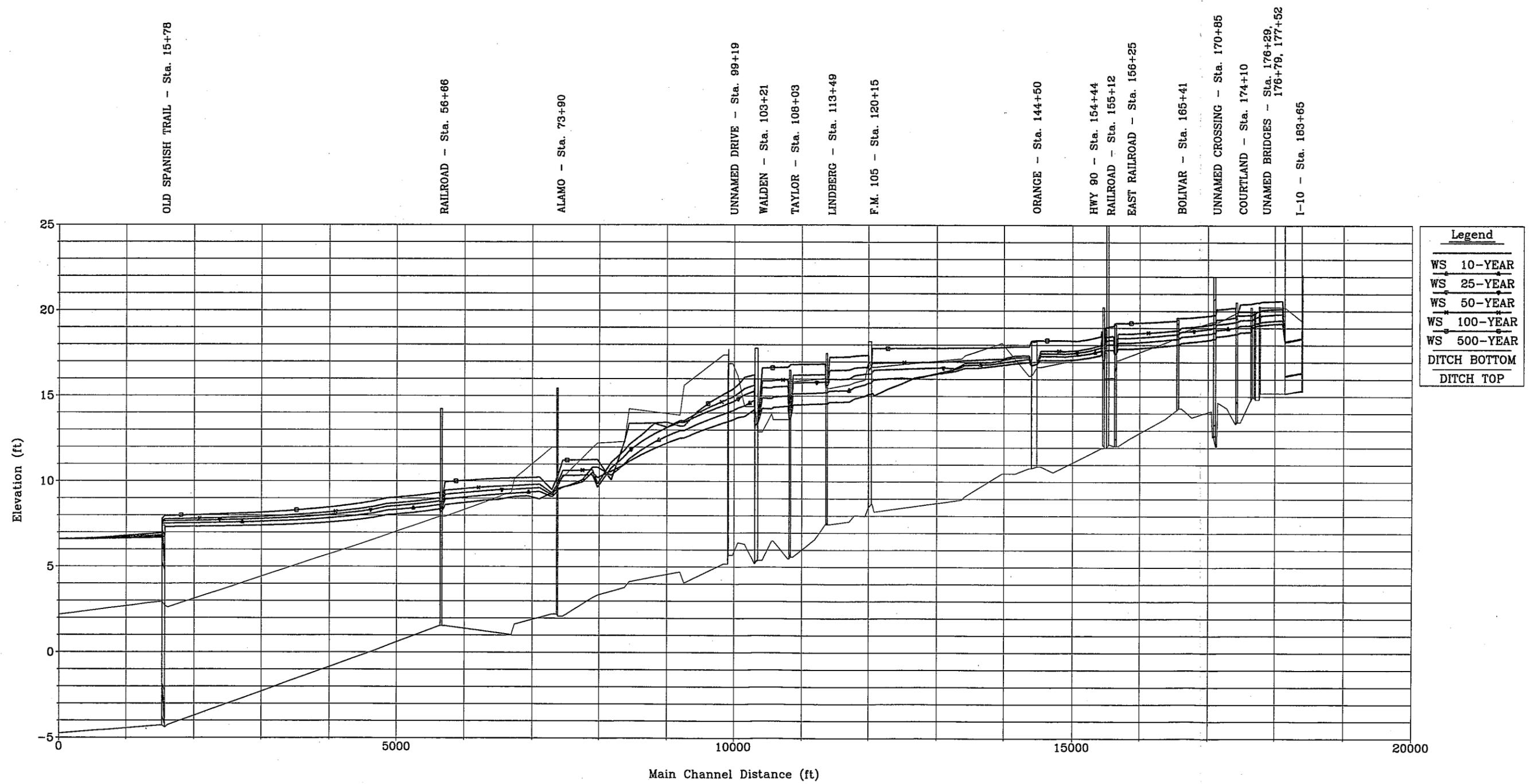
HEC-RAS Plan: ExCon River: School House Dit Reach: 2 (Continued)

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
2	2570.*	10	1111.00	-2.89	7.27		7.31	0.000100	1.88	1367.87	539.56	0.12
2	2570.*	25	1334.00	-2.89	7.52		7.56	0.000116	2.06	1501.71	546.93	0.13
2	2570.*	50	1547.00	-2.89	7.68		7.72	0.000135	2.25	1588.95	551.24	0.14
2	2570.*	100	1733.00	-2.89	7.80		7.85	0.000153	2.42	1657.90	554.63	0.15
2	2570.*	500	2128.00	-2.89	8.04		8.10	0.000189	2.74	1791.32	561.12	0.16
2	2380.*	10	1111.00	-3.16	7.26		7.29	0.000085	1.77	1454.95	541.80	0.11
2	2380.*	25	1334.00	-3.16	7.50		7.53	0.000100	1.95	1587.76	548.24	0.12
2	2380.*	50	1547.00	-3.16	7.66		7.70	0.000118	2.15	1673.37	552.25	0.13
2	2380.*	100	1733.00	-3.16	7.78		7.82	0.000134	2.31	1740.79	555.38	0.14
2	2380.*	500	2128.00	-3.16	8.01		8.07	0.000168	2.63	1870.81	561.37	0.15
2	2190.*	10	1111.00	-3.43	7.25		7.27	0.000073	1.68	1543.04	543.41	0.10
2	2190.*	25	1334.00	-3.43	7.49		7.52	0.000086	1.85	1674.83	549.31	0.11
2	2190.*	50	1547.00	-3.43	7.64		7.67	0.000103	2.04	1758.95	553.04	0.12
2	2190.*	100	1733.00	-3.43	7.76		7.80	0.000117	2.20	1824.96	555.95	0.13
2	2190.*	500	2128.00	-3.43	7.99		8.03	0.000149	2.52	1951.82	561.51	0.14
2	2000.*	10	1111.00	-3.71	7.24		7.26	0.000063	1.59	1631.08	544.46	0.09
2	2000.*	25	1334.00	-3.71	7.48		7.50	0.000075	1.76	1761.88	550.05	0.10
2	2000.*	50	1547.00	-3.71	7.63		7.65	0.000090	1.95	1844.61	553.57	0.11
2	2000.*	100	1733.00	-3.71	7.74		7.78	0.000103	2.11	1909.31	556.30	0.12
2	2000.*	500	2128.00	-3.71	7.96		8.01	0.000132	2.42	2033.23	561.49	0.14
2	1810.*	10	1111.00	-3.98	7.23		7.25	0.000055	1.51	1720.46	545.38	0.09
2	1810.*	25	1334.00	-3.98	7.46		7.49	0.000066	1.68	1850.34	550.68	0.10
2	1810.*	50	1547.00	-3.98	7.61		7.64	0.000079	1.86	1931.81	553.98	0.11
2	1810.*	100	1733.00	-3.98	7.73		7.76	0.000091	2.02	1995.33	556.54	0.11
2	1810.*	500	2128.00	-3.98	7.94		7.98	0.000118	2.33	2116.54	561.39	0.13
2	1620	10	1111.00	-4.25	7.22		7.23	0.000048	1.44	1808.90	546.07	0.08
2	1620	25	1334.00	-4.25	7.45		7.47	0.000058	1.61	1937.92	551.11	0.09
2	1620	50	1547.00	-4.25	7.60		7.62	0.000070	1.79	2018.23	554.22	0.10
2	1620	100	1733.00	-4.25	7.71		7.74	0.000081	1.94	2080.65	556.63	0.11
2	1620	500	2128.00	-4.25	7.92		7.96	0.000106	2.24	2199.34	561.18	0.12
2	1580	10	1111.00	-4.40	7.22	-1.37	7.23	0.000031	1.22	1938.32	546.41	0.06
2	1580	25	1334.00	-4.40	7.45	-1.01	7.47	0.000038	1.38	2067.25	551.53	0.07
2	1580	50	1547.00	-4.40	7.60	-0.69	7.62	0.000047	1.54	2147.45	554.64	0.08
2	1580	100	1733.00	-4.40	7.71	-0.43	7.74	0.000055	1.68	2209.75	557.04	0.09
2	1580	500	2128.00	-4.40	7.92	0.10	7.96	0.000073	1.96	2328.13	561.57	0.10
2	1578		Culvert									
2	1535	10	1111.00	-4.28	6.70		6.73	0.000065	1.64	1334.98	520.76	0.09
2	1535	25	1334.00	-4.28	6.74		6.79	0.000091	1.94	1357.78	522.35	0.11
2	1535	50	1547.00	-4.28	6.79		6.85	0.000118	2.22	1383.86	524.16	0.13
2	1535	100	1733.00	-4.28	6.84		6.91	0.000143	2.45	1408.43	525.86	0.14
2	1535	500	2128.00	-4.28	6.95		7.05	0.000198	2.91	1468.33	529.99	0.17
2	1505	10	1111.00	-4.28	6.70		6.73	0.000069	1.68	1316.74	520.63	0.10
2	1505	25	1334.00	-4.28	6.74		6.78	0.000096	1.99	1338.82	522.17	0.12
2	1505	50	1547.00	-4.28	6.79		6.85	0.000124	2.27	1364.15	523.93	0.13
2	1505	100	1733.00	-4.28	6.83		6.90	0.000151	2.51	1388.02	525.59	0.15
2	1505	500	2128.00	-4.28	6.94		7.04	0.000210	2.99	1446.36	529.61	0.17
2	1316.87*	10	1111.00	-4.34	6.68		6.72	0.000074	1.74	1295.88	539.23	0.10
2	1316.87*	25	1334.00	-4.34	6.72		6.77	0.000104	2.07	1315.17	540.74	0.12
2	1316.87*	50	1547.00	-4.34	6.76		6.82	0.000136	2.37	1337.35	542.46	0.14
2	1316.87*	100	1733.00	-4.34	6.80		6.87	0.000165	2.62	1358.42	544.09	0.15
2	1316.87*	500	2128.00	-4.34	6.89		7.00	0.000232	3.13	1410.32	548.08	0.18
2	1128.75*	10	1111.00	-4.40	6.66		6.70	0.000079	1.80	1289.83	564.71	0.11
2	1128.75*	25	1334.00	-4.40	6.69		6.75	0.000112	2.14	1306.07	566.13	0.13
2	1128.75*	50	1547.00	-4.40	6.73		6.79	0.000146	2.45	1324.74	567.76	0.14
2	1128.75*	100	1733.00	-4.40	6.76		6.84	0.000179	2.72	1342.67	569.32	0.16
2	1128.75*	500	2128.00	-4.40	6.84		6.95	0.000254	3.26	1387.29	573.19	0.19
2	940.625*	10	1111.00	-4.46	6.65		6.69	0.000083	1.84	1300.06	599.84	0.11
2	940.625*	25	1334.00	-4.46	6.67		6.72	0.000118	2.20	1312.97	600.98	0.13
2	940.625*	50	1547.00	-4.46	6.69		6.76	0.000156	2.53	1327.68	602.46	0.15
2	940.625*	100	1733.00	-4.46	6.72		6.80	0.000192	2.81	1341.97	604.88	0.17
2	940.625*	500	2128.00	-4.46	6.78		6.90	0.000276	3.38	1378.02	610.96	0.20
2	752.5*	10	1111.00	-4.52	6.63		6.67	0.000086	1.87	1353.49	680.40	0.11
2	752.5*	25	1334.00	-4.52	6.65		6.70	0.000123	2.24	1363.20	682.02	0.13

HEC-RAS Plan: ExCon River: School House Dit Reach: 2 (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
2	752.5*	50	1547.00	-4.52	6.66		6.73	0.000163	2.58	1374.03	683.83	0.15
2	752.5*	100	1733.00	-4.52	6.68		6.77	0.000202	2.87	1384.83	685.63	0.17
2	752.5*	500	2128.00	-4.52	6.72		6.85	0.000294	3.48	1412.50	690.21	0.20
2	564.375*	10	1111.00	-4.57	6.62		6.65	0.000083	1.83	1485.36	783.77	0.11
2	564.375*	25	1334.00	-4.57	6.63		6.68	0.000118	2.20	1491.71	784.82	0.13
2	564.375*	50	1547.00	-4.57	6.64		6.70	0.000158	2.54	1498.93	786.00	0.15
2	564.375*	100	1733.00	-4.57	6.64		6.73	0.000196	2.83	1506.18	787.19	0.17
2	564.375*	500	2128.00	-4.57	6.67		6.79	0.000289	3.45	1525.17	790.30	0.20
2	376.25*	10	1111.00	-4.63	6.61		6.64	0.000069	1.67	1683.99	812.96	0.10
2	376.25*	25	1334.00	-4.63	6.61		6.65	0.000099	2.01	1687.71	813.06	0.12
2	376.25*	50	1547.00	-4.63	6.62		6.67	0.000132	2.32	1691.92	813.17	0.14
2	376.25*	100	1733.00	-4.63	6.63		6.69	0.000165	2.60	1696.16	813.28	0.15
2	376.25*	500	2128.00	-4.63	6.64		6.73	0.000245	3.17	1706.96	813.57	0.19
2	188.125*	10	1111.00	-4.69	6.60		6.62	0.000053	1.48	1899.60	817.37	0.09
2	188.125*	25	1334.00	-4.69	6.61		6.63	0.000077	1.77	1901.28	817.37	0.10
2	188.125*	50	1547.00	-4.69	6.61		6.64	0.000103	2.05	1903.19	817.37	0.12
2	188.125*	100	1733.00	-4.69	6.61		6.65	0.000129	2.30	1905.10	817.37	0.14
2	188.125*	500	2128.00	-4.69	6.62		6.68	0.000193	2.81	1909.96	817.37	0.17
2	0	10	1111.00	-4.75	6.60	0.28	6.61	0.000040	1.28	2121.29	819.85	0.08
2	0	25	1334.00	-4.75	6.60	0.72	6.62	0.000058	1.54	2121.29	819.85	0.09
2	0	50	1547.00	-4.75	6.60	1.09	6.62	0.000078	1.79	2121.29	819.85	0.11
2	0	100	1733.00	-4.75	6.60	1.41	6.63	0.000098	2.00	2121.29	819.85	0.12
2	0	500	2128.00	-4.75	6.60	2.00	6.64	0.000147	2.46	2121.29	819.85	0.14

# Schoolhouse Ditch Alternative "A"



HEC-RAS Plan: Prop-16 River: School House Dit Reach: 2

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
2	18377	10	152.00	15.30	19.90	17.09	19.94	0.000258	1.60	111.07	101.83	0.14
2	18377	25	171.00	15.30	20.28	17.18	20.31	0.000174	1.40	250.06	469.35	0.12
2	18377	50	188.00	15.30	20.84	17.26	20.85	0.000060	0.89	530.92	532.24	0.07
2	18377	100	202.00	15.30	21.31	17.32	21.32	0.000027	0.64	792.85	574.87	0.05
2	18377	500	231.00	15.30	22.13	17.44	22.13	0.000010	0.43	1291.18	650.47	0.03
2	18365		Culvert									
2	18078	10	152.00	15.19	19.27	16.44	19.31	0.000237	1.60	95.23	24.95	0.14
2	18078	25	171.00	15.19	19.46	16.53	19.51	0.000259	1.71	100.02	28.39	0.15
2	18078	50	188.00	15.19	19.82	16.60	19.87	0.000234	1.71	120.34	84.01	0.14
2	18078	100	202.00	15.19	20.13	16.67	20.18	0.000203	1.66	167.53	594.38	0.14
2	18078	500	231.00	15.19	20.58	16.79	20.60	0.000097	1.21	511.05	714.68	0.09
2	17925.*	10	152.00	15.19	19.23	16.57	19.27	0.000270	1.67	90.92	24.94	0.15
2	17925.*	25	171.00	15.19	19.42	16.67	19.46	0.000295	1.79	95.57	24.99	0.16
2	17925.*	50	188.00	15.19	19.78	16.74	19.83	0.000263	1.78	113.67	77.48	0.15
2	17925.*	100	202.00	15.19	20.10	16.80	20.14	0.000229	1.73	155.59	569.27	0.14
2	17925.*	500	231.00	15.19	20.57	16.92	20.58	0.000105	1.25	495.41	710.33	0.10
2	17772	10	152.00	15.19	19.18	16.72	19.23	0.000313	1.76	86.40	24.92	0.17
2	17772	25	171.00	15.19	19.36	16.80	19.42	0.000340	1.88	90.94	24.98	0.17
2	17772	50	188.00	15.19	19.73	16.88	19.79	0.000300	1.87	106.83	70.06	0.16
2	17772	100	202.00	15.19	20.05	16.94	20.10	0.000260	1.82	142.71	544.35	0.15
2	17772	500	231.00	15.19	20.55	17.06	20.57	0.000115	1.30	478.75	704.69	0.10
2	17762		Bridge									
2	17715	10	152.00	14.82	19.15	16.22	19.20	0.000340	1.90	79.97	20.29	0.17
2	17715	25	171.00	14.82	19.30	16.33	19.37	0.000383	2.06	83.41	32.38	0.18
2	17715	50	188.00	14.82	19.66	16.42	19.72	0.000334	2.04	110.76	118.96	0.17
2	17715	100	202.00	14.82	19.98	16.49	20.03	0.000272	1.92	160.22	194.54	0.16
2	17715	500	231.00	14.82	20.50	16.64	20.52	0.000101	1.25	571.15	820.95	0.10
2	17679		Bridge									
2	17655	10	152.00	14.93	19.08	16.70	19.15	0.000512	2.22	68.62	19.98	0.21
2	17655	25	171.00	14.93	19.21	16.81	19.30	0.000578	2.40	71.36	20.09	0.22
2	17655	50	188.00	14.93	19.56	16.91	19.65	0.000530	2.40	78.85	33.76	0.22
2	17655	100	202.00	14.93	19.85	16.98	19.94	0.000473	2.36	96.47	85.16	0.20
2	17655	500	231.00	14.93	20.48	17.13	20.50	0.000145	1.43	503.32	827.22	0.12
2	17629		Bridge									
2	17600	10	152.00	14.74	18.76		18.84	0.000525	2.22	68.50	19.77	0.21
2	17600	25	171.00	14.74	19.16		19.23	0.000485	2.24	76.32	20.07	0.20
2	17600	50	188.00	14.74	19.48		19.56	0.000460	2.27	82.96	21.17	0.20
2	17600	100	202.00	14.74	19.77		19.84	0.000427	2.27	95.69	69.74	0.19
2	17600	500	231.00	14.74	20.42		20.44	0.000158	1.51	457.59	819.66	0.12
2	17454	10	152.00	13.50	18.75	14.76	18.79	0.000170	1.48	102.65	20.15	0.12
2	17454	25	171.00	13.50	19.15	14.85	19.18	0.000174	1.55	110.57	20.24	0.12
2	17454	50	188.00	13.50	19.47	14.94	19.51	0.000178	1.60	117.22	20.32	0.12
2	17454	100	202.00	13.50	19.75	15.01	19.79	0.000176	1.64	129.38	67.69	0.12
2	17454	500	231.00	13.50	20.40	15.15	20.42	0.000095	1.28	479.49	815.39	0.09
2	17410		Culvert									
2	17380	10	159.00	13.40	18.65		18.68	0.000136	1.38	115.14	24.83	0.11
2	17380	25	184.00	13.40	19.04		19.07	0.000143	1.47	127.05	43.49	0.12
2	17380	50	207.00	13.40	19.36		19.40	0.000146	1.54	144.85	67.35	0.12
2	17380	100	226.00	13.40	19.63		19.67	0.000146	1.58	165.60	87.29	0.12
2	17380	500	264.00	13.40	20.21		20.24	0.000117	1.51	374.39	807.50	0.11
2	17247.5*	10	159.00	14.32	18.57		18.65	0.000528	2.24	71.04	23.34	0.23
2	17247.5*	25	184.00	14.32	18.95		19.04	0.000502	2.29	80.20	24.27	0.22
2	17247.5*	50	207.00	14.32	19.27		19.36	0.000488	2.35	88.09	25.04	0.22
2	17247.5*	100	226.00	14.32	19.54		19.63	0.000472	2.38	94.97	31.42	0.22
2	17247.5*	500	264.00	14.32	20.14		20.21	0.000315	2.15	261.66	803.88	0.18
2	17115	10	159.00	14.64	18.51		18.58	0.000479	2.14	74.37	23.46	0.21
2	17115	25	184.00	14.64	18.90		18.97	0.000460	2.20	83.62	24.31	0.21
2	17115	50	207.00	14.64	19.22		19.30	0.000451	2.26	91.55	25.01	0.21
2	17115	100	226.00	14.64	19.49		19.57	0.000433	2.30	99.74	44.25	0.21
2	17115	500	264.00	14.64	20.10		20.17	0.000335	2.19	209.94	748.61	0.18

HEC-RAS Plan: Prop-16 River: School House Dit Reach: 2 (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
2	17100	10	159.00	12.07	18.54	13.55	18.56	0.000099	1.25	127.01	24.28	0.10
2	17100	25	184.00	12.07	18.93	13.69	18.95	0.000108	1.35	136.53	24.83	0.10
2	17100	50	207.00	12.07	19.25	13.82	19.28	0.000117	1.43	144.59	25.30	0.11
2	17100	100	226.00	12.07	19.52	13.92	19.55	0.000122	1.49	153.46	48.26	0.11
2	17100	500	264.00	12.07	20.12	14.12	20.15	0.000114	1.52	279.17	757.39	0.11
2	17085		Culvert									
2	17035	10	159.00	12.63	18.36		18.39	0.000138	1.41	113.03	24.44	0.12
2	17035	25	184.00	12.63	18.72		18.75	0.000151	1.51	121.79	25.03	0.12
2	17035	50	207.00	12.63	19.00		19.04	0.000160	1.60	131.42	43.85	0.13
2	17035	100	226.00	12.63	19.24		19.28	0.000165	1.68	143.80	60.84	0.13
2	17035	500	264.00	12.63	19.76		19.80	0.000155	1.71	196.43	151.82	0.13
2	17020	10	159.00	14.14	18.32		18.39	0.000393	2.00	79.46	23.96	0.19
2	17020	25	184.00	14.14	18.68		18.74	0.000393	2.09	88.05	24.73	0.20
2	17020	50	207.00	14.14	18.96		19.03	0.000394	2.17	96.89	40.83	0.20
2	17020	100	226.00	14.14	19.20		19.27	0.000386	2.22	108.58	57.91	0.20
2	17020	500	264.00	14.14	19.73		19.80	0.000321	2.19	158.71	145.26	0.18
2	16873.6*	10	159.00	13.96	18.25		18.32	0.000457	2.11	75.45	24.25	0.21
2	16873.6*	25	184.00	13.96	18.61		18.68	0.000448	2.19	84.18	25.06	0.21
2	16873.6*	50	207.00	13.96	18.89		18.97	0.000440	2.26	93.66	42.59	0.21
2	16873.6*	100	226.00	13.96	19.13		19.21	0.000425	2.30	105.75	58.44	0.21
2	16873.6*	500	264.00	13.96	19.68		19.75	0.000334	2.23	161.03	146.82	0.19
2	16727.3*	10	159.00	13.78	18.18		18.25	0.000479	2.14	74.30	24.52	0.22
2	16727.3*	25	184.00	13.78	18.54		18.62	0.000464	2.21	83.22	27.12	0.22
2	16727.3*	50	207.00	13.78	18.83		18.91	0.000451	2.28	93.53	44.58	0.21
2	16727.3*	100	226.00	13.78	19.07		19.15	0.000428	2.31	106.55	67.59	0.21
2	16727.3*	500	264.00	13.78	19.63		19.70	0.000325	2.21	166.79	147.84	0.19
2	16581	10	159.00	14.30	18.14	15.57	18.19	0.000340	1.87	84.99	25.31	0.18
2	16581	25	184.00	14.30	18.49	15.69	18.55	0.000336	1.95	94.38	30.99	0.18
2	16581	50	207.00	14.30	18.78	15.81	18.85	0.000333	2.03	105.65	47.30	0.18
2	16581	100	226.00	14.30	19.03	15.89	19.09	0.000318	2.06	121.03	78.07	0.18
2	16581	500	264.00	14.30	19.60	16.06	19.65	0.000249	1.99	185.79	149.46	0.16
2	16541		Culvert									
2	16516	10	159.00	14.20	18.02		18.07	0.000314	1.78	89.24	27.67	0.17
2	16516	25	184.00	14.20	18.37		18.42	0.000313	1.86	98.83	28.45	0.18
2	16516	50	207.00	14.20	18.64		18.70	0.000311	1.94	108.56	48.42	0.18
2	16516	100	226.00	14.20	18.87		18.93	0.000299	1.98	122.75	74.17	0.18
2	16516	500	264.00	14.20	19.43		19.49	0.000237	1.92	182.12	136.80	0.16
2	16343.*	10	159.00	13.67	17.95		18.01	0.000415	1.99	79.87	26.65	0.20
2	16343.*	25	184.00	13.67	18.29		18.36	0.000405	2.06	89.73	34.84	0.20
2	16343.*	50	207.00	13.67	18.57		18.64	0.000386	2.13	102.82	61.02	0.20
2	16343.*	100	226.00	13.67	18.80		18.87	0.000361	2.15	119.96	83.95	0.20
2	16343.*	500	264.00	13.67	19.38		19.44	0.000264	2.02	185.32	140.45	0.17
2	16170.*	10	159.00	13.29	17.89		17.94	0.000358	1.91	83.34	26.44	0.19
2	16170.*	25	184.00	13.29	18.23		18.29	0.000345	1.98	95.55	48.00	0.19
2	16170.*	50	207.00	13.29	18.51		18.57	0.000330	2.04	112.21	71.94	0.19
2	16170.*	100	226.00	13.29	18.75		18.81	0.000308	2.06	132.05	92.71	0.18
2	16170.*	500	264.00	13.29	19.35		19.40	0.000225	1.93	202.90	144.24	0.16
2	15997.*	10	159.00	12.92	17.83		17.88	0.000310	1.83	87.51	33.48	0.18
2	15997.*	25	184.00	12.92	18.18		18.23	0.000296	1.91	103.34	59.01	0.17
2	15997.*	50	207.00	12.92	18.46		18.52	0.000284	1.96	122.96	80.82	0.17
2	15997.*	100	226.00	12.92	18.70		18.76	0.000265	1.97	145.08	99.87	0.17
2	15997.*	500	264.00	12.92	19.31		19.36	0.000194	1.84	220.62	147.39	0.15
2	15824.*	10	159.00	12.54	17.78		17.83	0.000266	1.76	93.32	43.95	0.16
2	15824.*	25	184.00	12.54	18.13		18.19	0.000255	1.83	113.02	68.63	0.16
2	15824.*	50	207.00	12.54	18.42		18.47	0.000245	1.88	135.25	88.60	0.16
2	15824.*	100	226.00	12.54	18.67		18.72	0.000229	1.89	159.41	106.10	0.16
2	15824.*	500	264.00	12.54	19.29		19.33	0.000168	1.76	239.04	149.99	0.14
2	15651	10	159.00	12.10	17.79	13.30	17.80	0.000066	1.06	158.38	62.03	0.08
2	15651	25	184.00	12.10	18.14	13.42	18.16	0.000069	1.13	183.92	83.85	0.09
2	15651	50	207.00	12.10	18.42	13.52	18.44	0.000071	1.19	210.11	101.46	0.09
2	15651	100	226.00	12.10	18.67	13.60	18.69	0.000071	1.22	237.13	116.88	0.09
2	15651	500	264.00	12.10	19.29	13.75	19.31	0.000061	1.21	321.48	155.47	0.08

HEC-RAS Plan: Prop-16 River: School House Dit Reach: 2 (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
2	15625		Culvert									
2	15584	10	159.00	12.10	17.72		17.73	0.000046	0.88	212.57	95.77	0.07
2	15584	25	184.00	12.10	18.04		18.05	0.000047	0.93	245.91	110.52	0.07
2	15584	50	207.00	12.10	18.29		18.31	0.000049	0.98	275.41	122.10	0.08
2	15584	100	226.00	12.10	18.51		18.53	0.000049	1.01	303.39	132.15	0.08
2	15584	500	264.00	12.10	19.09		19.11	0.000042	1.01	387.56	158.58	0.07
2	15520	10	159.00	12.20	17.71	13.42	17.73	0.000049	0.90	209.50	95.61	0.07
2	15520	25	184.00	12.20	18.04	13.53	18.05	0.000050	0.95	242.78	110.36	0.08
2	15520	50	207.00	12.20	18.29	13.63	18.30	0.000051	0.99	272.24	121.94	0.08
2	15520	100	226.00	12.20	18.51	13.71	18.52	0.000051	1.02	300.19	131.99	0.08
2	15520	500	264.00	12.20	19.09	13.87	19.10	0.000044	1.02	384.34	158.44	0.07
2	15512		Bridge									
2	15460	10	159.00	12.00	17.70	13.07	17.71	0.000039	0.84	222.36	95.09	0.07
2	15460	25	184.00	12.00	18.02	13.18	18.03	0.000041	0.89	254.92	109.61	0.07
2	15460	50	207.00	12.00	18.27	13.27	18.28	0.000043	0.94	283.53	120.94	0.07
2	15460	100	226.00	12.00	18.48	13.34	18.50	0.000043	0.97	310.60	130.76	0.07
2	15460	500	264.00	12.00	19.05	13.49	19.06	0.000039	0.98	392.17	156.66	0.07
2	15444		Culvert									
2	15405	10	159.00	11.97	17.63		17.64	0.000056	0.96	165.82	40.56	0.08
2	15405	25	184.00	11.97	17.92		17.93	0.000062	1.05	179.01	50.36	0.08
2	15405	50	207.00	11.97	18.13		18.15	0.000069	1.13	190.83	57.75	0.09
2	15405	100	226.00	11.97	18.32		18.34	0.000073	1.18	202.27	64.09	0.09
2	15405	500	264.00	11.97	18.83		18.85	0.000072	1.24	243.90	103.29	0.09
2	15393	10	300.00	11.97	17.41		17.62	0.001423	3.69	81.27	26.98	0.37
2	15393	25	351.00	11.97	17.66		17.91	0.001622	3.97	89.07	34.97	0.39
2	15393	50	398.00	11.97	17.84		18.12	0.001647	4.25	96.06	41.43	0.41
2	15393	100	438.00	11.97	18.01		18.31	0.001716	4.45	103.25	47.15	0.42
2	15393	500	520.00	11.97	18.51		18.82	0.001510	4.49	132.12	72.23	0.40
2	15215.8*	10	300.00	11.62	17.25		17.41	0.000861	3.13	95.81	27.70	0.30
2	15215.8*	25	351.00	11.62	17.50		17.68	0.000959	3.42	103.56	38.24	0.32
2	15215.8*	50	398.00	11.62	17.66		17.87	0.001073	3.70	110.53	46.60	0.34
2	15215.8*	100	438.00	11.62	17.81		18.05	0.001145	3.91	118.13	54.28	0.35
2	15215.8*	500	520.00	11.62	18.34		18.58	0.001019	3.96	155.53	95.22	0.33
2	15038.6*	10	300.00	11.27	17.16		17.28	0.000637	2.67	112.25	29.62	0.24
2	15038.6*	25	351.00	11.27	17.39		17.53	0.000616	2.95	121.54	51.80	0.25
2	15038.6*	50	398.00	11.27	17.54		17.70	0.000705	3.22	130.43	66.42	0.27
2	15038.6*	100	438.00	11.27	17.69		17.86	0.000764	3.41	140.87	80.24	0.29
2	15038.6*	500	520.00	11.27	18.24		18.42	0.000689	3.47	218.45	346.12	0.28
2	14861.4*	10	300.00	10.91	17.11		17.19	0.000349	2.31	135.63	115.54	0.19
2	14861.4*	25	351.00	10.91	17.33		17.43	0.000395	2.52	180.06	288.21	0.20
2	14861.4*	50	398.00	10.91	17.49		17.59	0.000429	2.67	233.42	407.36	0.21
2	14861.4*	100	438.00	10.91	17.64		17.74	0.000414	2.67	298.03	408.69	0.21
2	14861.4*	500	520.00	10.91	18.27		18.31	0.000210	2.05	608.10	525.85	0.15
2	14684.2*	10	300.00	10.56	17.11		17.14	0.000137	1.53	415.81	444.06	0.12
2	14684.2*	25	351.00	10.56	17.35		17.37	0.000127	1.52	526.05	485.61	0.12
2	14684.2*	50	398.00	10.56	17.50		17.53	0.000127	1.54	604.68	513.19	0.12
2	14684.2*	100	438.00	10.56	17.66		17.68	0.000120	1.52	686.82	528.47	0.11
2	14684.2*	500	520.00	10.56	18.27		18.28	0.000070	1.24	1016.91	554.20	0.09
2	14507	10	300.00	10.90	17.11	12.67	17.12	0.000046	0.91	746.40	515.18	0.07
2	14507	25	351.00	10.90	17.35	12.86	17.35	0.000046	0.93	845.66	539.87	0.07
2	14507	50	398.00	10.90	17.50	13.02	17.51	0.000045	0.93	1000.19	546.80	0.07
2	14507	100	438.00	10.90	17.66	13.16	17.67	0.000044	0.94	1085.94	552.08	0.07
2	14507	500	520.00	10.90	18.27	13.43	18.27	0.000030	0.83	1428.20	572.64	0.06
2	14450		Culvert									
2	14339	10	300.00	10.80	16.99	12.53	16.99	0.000042	0.87	738.54	513.42	0.07
2	14339	25	351.00	10.80	17.17	12.70	17.18	0.000044	0.90	860.99	535.22	0.07
2	14339	50	398.00	10.80	17.28	12.87	17.28	0.000048	0.97	917.42	540.00	0.07
2	14339	100	438.00	10.80	17.38	13.00	17.39	0.000051	1.00	975.29	544.87	0.08
2	14339	500	520.00	10.80	17.91	13.25	17.92	0.000037	0.91	1269.83	568.98	0.07
2	14140.5*	10	300.00	10.49	16.92	13.13	16.97	0.000240	1.90	158.11	524.06	0.16
2	14140.5*	25	351.00	10.49	17.08	13.33	17.15	0.000295	2.14	164.35	552.72	0.18

HEC-RAS Plan: Prop-16 River: School House Dlt Reach: 2 (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
2	14140.5*	50	398.00	10.49	17.26	13.50	17.27	0.000072	1.08	787.20	578.68	0.09
2	14140.5*	100	438.00	10.49	17.37	13.63	17.38	0.000067	1.06	952.72	589.93	0.09
2	14140.5*	500	520.00	10.49	17.90	13.90	17.91	0.000045	0.93	1277.72	640.25	0.07
2	13942	10	300.00	10.49	16.81	13.70	16.90	0.000472	2.42	124.13	600.15	0.22
2	13942	25	351.00	10.49	16.96	13.92	17.07	0.000582	2.72	128.90	639.40	0.25
2	13942	50	398.00	10.49	17.09	14.11	17.23	0.000681	2.98	133.45	676.27	0.27
2	13942	100	438.00	10.49	17.17	14.27	17.33	0.000778	3.21	136.31	699.17	0.28
2	13942	500	520.00	10.49	17.86	14.57	17.89	0.000207	1.78	640.20	805.71	0.15
2	13758.*	10	300.00	10.05	16.73	13.44	16.82	0.000442	2.39	125.66	649.82	0.22
2	13758.*	25	351.00	10.05	16.85	13.68	16.97	0.000556	2.71	129.69	687.59	0.24
2	13758.*	50	398.00	10.05	16.97	13.88	17.10	0.000660	2.98	133.54	723.20	0.26
2	13758.*	100	438.00	10.05	17.16	14.05	17.21	0.000325	2.13	444.66	782.88	0.19
2	13758.*	500	520.00	10.05	17.84	14.35	17.86	0.000150	1.56	731.52	813.23	0.13
2	13574.*	10	300.00	9.60	16.65	13.19	16.74	0.000420	2.36	127.28	716.63	0.21
2	13574.*	25	351.00	9.60	16.84	13.43	16.88	0.000249	1.86	408.80	774.97	0.16
2	13574.*	50	398.00	9.60	16.97	13.64	17.00	0.000254	1.90	462.16	783.78	0.17
2	13574.*	100	438.00	9.60	17.12	13.82	17.16	0.000232	1.85	528.97	790.94	0.16
2	13574.*	500	520.00	9.60	17.84	14.14	17.84	0.000032	0.74	1675.23	815.80	0.06
2	13390	10	300.00	9.16	16.65	12.91	16.67	0.000171	1.54	430.66	778.32	0.13
2	13390	25	351.00	9.16	16.81	13.18	16.83	0.000173	1.58	498.91	784.29	0.14
2	13390	50	398.00	9.16	16.94	13.41	16.96	0.000178	1.63	551.77	790.45	0.14
2	13390	100	438.00	9.16	17.10	13.58	17.12	0.000165	1.59	619.35	798.30	0.13
2	13390	500	520.00	9.16	17.83	13.94	17.84	0.000026	0.69	1795.22	816.99	0.05
2	13339	10	300.00	8.96	16.57	12.60	16.66	0.000369	2.28	131.35	760.40	0.20
2	13339	25	351.00	8.96	16.71	12.88	16.81	0.000464	2.59	135.59	775.51	0.22
2	13339	50	398.00	8.96	16.81	13.11	16.94	0.000562	2.87	138.71	786.49	0.24
2	13339	100	438.00	8.96	17.08	13.29	17.11	0.000198	1.75	561.96	805.58	0.15
2	13339	500	520.00	8.96	17.83	13.65	17.83	0.000029	0.74	1721.75	818.36	0.06
2	13240.1	10	384.00	8.90	16.46	12.97	16.60	0.000629	2.98	129.02	756.55	0.26
2	13240.1	25	451.00	8.90	16.56	13.29	16.74	0.000815	3.41	132.07	767.38	0.29
2	13240.1	50	514.00	8.90	16.62	13.56	16.85	0.001021	3.84	133.84	773.62	0.33
2	13240.1	100	567.00	8.90	17.05	13.78	17.08	0.000275	2.07	618.52	805.59	0.17
2	13240.1	500	678.00	8.90	17.83	14.19	17.83	0.000044	0.92	1790.78	818.09	0.07
2	13042.4*	10	384.00	8.79	16.33	12.84	16.48	0.000641	3.02	127.23	758.58	0.26
2	13042.4*	25	451.00	8.79	16.39	13.15	16.58	0.000855	3.50	128.84	764.25	0.30
2	13042.4*	50	514.00	8.79	16.67	13.43	16.70	0.000257	1.97	597.89	789.73	0.16
2	13042.4*	100	567.00	8.79	17.01	13.65	17.03	0.000181	1.71	744.62	808.36	0.14
2	13042.4*	500	678.00	8.79	17.82	14.06	17.82	0.000036	0.84	1929.83	819.06	0.06
2	12844.7*	10	384.00	8.68	16.20	12.70	16.35	0.000656	3.07	125.25	758.71	0.26
2	12844.7*	25	451.00	8.68	16.20	13.02	16.40	0.000905	3.60	125.28	758.82	0.31
2	12844.7*	50	514.00	8.68	16.64	13.29	16.66	0.000165	1.60	725.37	791.74	0.13
2	12844.7*	100	567.00	8.68	16.99	13.51	17.00	0.000121	1.42	875.37	811.29	0.11
2	12844.7*	500	678.00	8.68	17.81	13.94	17.82	0.000029	0.77	2070.12	820.01	0.06
2	12647.*	10	384.00	8.57	16.07	12.55	16.22	0.000671	3.11	123.45	758.07	0.26
2	12647.*	25	451.00	8.57	16.00	12.87	16.22	0.000961	3.70	121.74	751.97	0.31
2	12647.*	50	514.00	8.57	16.62	13.15	16.63	0.000108	1.32	857.22	794.64	0.11
2	12647.*	100	567.00	8.57	16.98	13.37	16.99	0.000048	0.91	1537.25	813.13	0.07
2	12647.*	500	678.00	8.57	17.81	13.80	17.81	0.000023	0.70	2211.96	820.84	0.05
2	12449.3	10	500.00	8.46	15.72	12.95	16.01	0.001324	4.31	115.95	697.65	0.37
2	12449.3	25	590.00	8.46	16.07	13.33	16.09	0.000199	1.72	768.32	768.64	0.14
2	12449.3	50	675.00	8.46	16.59	13.66	16.60	0.000127	1.45	987.34	797.42	0.12
2	12449.3	100	748.00	8.46	16.97	13.92	16.98	0.000063	1.06	1671.83	813.94	0.08
2	12449.3	500	900.00	8.46	17.80	14.43	17.80	0.000033	0.85	2351.96	821.63	0.06
2	12251.6*	10	500.00	8.35	15.41	12.80	15.73	0.001516	4.56	109.65	515.02	0.39
2	12251.6*	25	590.00	8.35	16.02	13.19	16.05	0.000243	1.93	704.13	763.91	0.16
2	12251.6*	50	675.00	8.35	16.56	13.52	16.58	0.000147	1.58	930.90	797.75	0.12
2	12251.6*	100	748.00	8.35	16.96	13.78	16.96	0.000069	1.13	1618.90	812.62	0.09
2	12251.6*	500	900.00	8.35	17.79	14.31	17.80	0.000035	0.89	2303.56	820.32	0.06
2	12054	10	500.00	8.24	15.02	12.66	15.40	0.001812	4.90	102.07	285.79	0.42
2	12054	25	590.00	8.24	15.96	13.04	15.99	0.000306	2.18	634.33	760.12	0.18
2	12054	50	675.00	8.24	16.52	13.38	16.54	0.000172	1.73	872.51	797.97	0.13
2	12054	100	748.00	8.24	16.94	13.65	16.95	0.000076	1.21	1565.47	811.26	0.09
2	12054	500	900.00	8.24	17.79	14.17	17.79	0.000038	0.93	2255.41	818.98	0.07

HEC-RAS Plan: Prop-16 River: School House Dit Reach: 2 (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
2	12025	10	500.00	8.70	15.20	10.74	15.29	0.000316	2.47	202.61	337.86	0.17
2	12025	25	590.00	8.70	15.87	10.98	15.98	0.000327	2.63	224.37	737.59	0.18
2	12025	50	675.00	8.70	16.41	11.19	16.53	0.000344	2.79	241.91	784.84	0.18
2	12025	100	748.00	8.70	16.94	11.37	16.95	0.000050	1.11	1672.75	812.28	0.07
2	12025	500	900.00	8.70	17.78	11.71	17.79	0.000029	0.90	2384.54	820.04	0.05
2	12015		Culvert									
2	11970	10	500.00	8.50	15.11	10.53	15.20	0.000272	2.34	213.59	319.75	0.17
2	11970	25	590.00	8.50	15.77	10.77	15.87	0.000282	2.50	236.44	696.35	0.17
2	11970	50	675.00	8.50	16.29	10.98	16.40	0.000297	2.65	254.85	750.49	0.17
2	11970	100	748.00	8.50	16.67	11.15	16.79	0.000314	2.79	288.17	778.32	0.18
2	11970	500	900.00	8.50	17.38	11.50	17.39	0.000042	1.06	2035.87	815.00	0.07
2	11918	10	500.00	7.98	15.00	11.60	15.17	0.000682	3.32	150.47	368.83	0.27
2	11918	25	590.00	7.98	15.65	11.91	15.84	0.000655	3.42	172.36	663.56	0.27
2	11918	50	675.00	7.98	16.29	12.19	16.38	0.000376	2.74	488.22	788.45	0.21
2	11918	100	748.00	7.98	16.69	12.41	16.75	0.000270	2.42	659.00	801.31	0.18
2	11918	500	900.00	7.98	17.39	12.85	17.39	0.000032	0.89	2296.84	816.74	0.06
2	11764	10	500.00	8.03	14.84	11.60	15.05	0.000877	3.68	135.84	179.59	0.30
2	11764	25	590.00	8.03	15.50	11.95	15.72	0.000835	3.77	156.35	544.88	0.30
2	11764	50	675.00	8.03	16.20	12.25	16.31	0.000470	3.01	448.45	765.97	0.23
2	11764	100	748.00	8.03	16.64	12.50	16.71	0.000314	2.58	636.29	786.51	0.19
2	11764	500	900.00	8.03	17.34	12.98	17.38	0.000193	2.12	939.78	819.00	0.15
2	11680	10	500.00	7.66	14.66	11.67	14.95	0.001263	4.34	115.34	24.80	0.35
2	11680	25	590.00	7.66	15.32	12.06	15.63	0.001219	4.46	132.17	127.69	0.35
2	11680	50	675.00	7.66	16.00	12.39	16.24	0.000938	4.14	258.71	625.62	0.31
2	11680	100	748.00	7.66	16.53	12.66	16.87	0.000580	3.41	468.48	747.24	0.25
2	11680	500	900.00	7.66	17.29	13.18	17.35	0.000301	2.61	787.65	777.50	0.18
2	11531.5*	10	500.00	7.58	14.64	14.79	14.79	0.000518	3.12	160.44	28.91	0.23
2	11531.5*	25	590.00	7.58	15.30	15.47	15.47	0.000525	3.28	183.60	88.34	0.24
2	11531.5*	50	675.00	7.58	15.98	16.12	16.12	0.000430	3.12	348.18	404.83	0.22
2	11531.5*	100	748.00	7.58	16.51	16.69	16.69	0.000289	2.66	596.60	571.15	0.18
2	11531.5*	500	900.00	7.58	17.28	17.32	17.32	0.000152	2.08	1133.71	807.87	0.13
2	11383	10	500.00	7.50	14.64	9.63	14.72	0.000260	2.34	214.24	37.32	0.16
2	11383	25	590.00	7.50	15.30	9.87	15.39	0.000267	2.49	254.63	162.39	0.16
2	11383	50	675.00	7.50	15.98	10.09	16.06	0.000210	2.34	502.50	471.68	0.15
2	11383	100	748.00	7.50	16.50	10.27	16.55	0.000152	2.08	752.48	493.67	0.13
2	11383	500	900.00	7.50	17.28	10.63	17.30	0.000102	1.81	1146.29	543.54	0.10
2	11349		Culvert									
2	11319	10	500.00	7.50	14.55	14.63	14.63	0.000226	2.21	226.23	36.15	0.16
2	11319	25	590.00	7.50	15.20	15.29	15.29	0.000237	2.36	249.82	36.89	0.16
2	11319	50	675.00	7.50	15.82	15.91	15.91	0.000221	2.38	393.18	426.32	0.16
2	11319	100	748.00	7.50	16.26	16.33	16.33	0.000183	2.25	595.28	484.86	0.14
2	11319	500	900.00	7.50	16.87	16.92	16.92	0.000143	2.09	907.59	532.18	0.13
2	11158.6*	10	500.00	6.60	14.53	14.59	14.59	0.000178	2.05	243.76	34.15	0.14
2	11158.6*	25	590.00	6.60	15.17	15.25	15.25	0.000191	2.20	297.36	195.56	0.14
2	11158.6*	50	675.00	6.60	15.80	15.87	15.87	0.000170	2.15	495.85	418.24	0.13
2	11158.6*	100	748.00	6.60	16.25	16.30	16.30	0.000140	2.02	705.40	510.18	0.12
2	11158.6*	500	900.00	6.60	16.86	16.90	16.90	0.000112	1.89	1032.69	554.03	0.11
2	10998.3*	10	500.00	6.10	14.50	14.57	14.57	0.000170	2.03	249.04	71.51	0.13
2	10998.3*	25	590.00	6.10	15.15	15.22	15.22	0.000175	2.13	362.32	270.48	0.13
2	10998.3*	50	675.00	6.10	15.79	15.84	15.84	0.000148	2.02	589.29	411.80	0.12
2	10998.3*	100	748.00	6.10	16.23	16.27	16.27	0.000120	1.87	808.63	532.08	0.11
2	10998.3*	500	900.00	6.10	16.85	16.88	16.88	0.000095	1.74	1150.57	575.17	0.10
2	10838	10	500.00	5.60	14.48	7.83	14.54	0.000162	1.99	283.62	167.12	0.12
2	10838	25	590.00	5.60	15.13	8.09	15.19	0.000158	2.03	441.03	316.02	0.12
2	10838	50	675.00	5.60	15.77	8.32	15.82	0.000127	1.87	693.55	467.15	0.11
2	10838	100	748.00	5.60	16.22	8.52	16.25	0.000103	1.72	921.28	545.37	0.10
2	10838	500	900.00	5.60	16.84	8.89	16.86	0.000082	1.59	1276.94	595.94	0.09
2	10803		Culvert									
2	10760	10	500.00	5.50	14.41	14.45	14.45	0.000119	1.77	371.11	188.19	0.11
2	10760	25	590.00	5.50	15.01	15.05	15.05	0.000118	1.83	504.49	288.30	0.11
2	10760	50	675.00	5.50	15.58	15.62	15.62	0.000104	1.79	719.95	447.45	0.10
2	10760	100	748.00	5.50	15.96	16.00	16.00	0.000090	1.72	895.19	467.34	0.10

HEC-RAS Plan: Prop-16 River: School House Dit Reach: 2 (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
2	10760	500	900.00	5.50	16.69		16.71	0.000070	1.58	1247.61	504.98	0.09
2	10651.5*	10	500.00	6.02	14.37		14.44	0.000182	2.08	324.21	185.72	0.14
2	10651.5*	25	590.00	6.02	14.98		15.04	0.000169	2.10	455.72	278.90	0.13
2	10651.5*	50	675.00	6.02	15.56		15.61	0.000140	2.01	669.18	445.61	0.12
2	10651.5*	100	748.00	6.02	15.94		15.98	0.000117	1.89	846.63	466.53	0.11
2	10651.5*	500	900.00	6.02	16.68		16.70	0.000084	1.69	1201.78	504.61	0.10
2	10543	10	500.00	6.53	14.34		14.41	0.000238	2.28	300.17	182.59	0.16
2	10543	25	590.00	6.53	14.95		15.02	0.000213	2.25	429.86	269.65	0.15
2	10543	50	675.00	6.53	15.53		15.59	0.000171	2.12	641.69	445.11	0.14
2	10543	100	748.00	6.53	15.93		15.97	0.000137	1.97	821.56	465.73	0.12
2	10543	500	900.00	6.53	16.67		16.69	0.000094	1.73	1179.32	504.25	0.10
2	10521	10	500.00	6.52	14.25		14.40	0.000635	3.06	169.35	81.17	0.26
2	10521	25	590.00	6.52	14.87		15.00	0.000554	3.02	256.15	217.47	0.25
2	10521	50	675.00	6.52	15.48		15.58	0.000379	2.70	457.59	439.81	0.21
2	10521	100	748.00	6.52	15.90		15.96	0.000267	2.39	648.20	470.21	0.18
2	10521	500	900.00	6.52	16.65		16.69	0.000153	1.96	1020.73	519.74	0.14
2	10385	10	500.00	5.40	14.28	7.54	14.34	0.000137	1.89	308.45	155.91	0.11
2	10385	25	590.00	5.40	14.89	7.78	14.94	0.000134	1.96	460.79	345.49	0.11
2	10385	50	675.00	5.40	15.49	8.00	15.54	0.000112	1.88	715.70	480.15	0.10
2	10385	100	748.00	5.40	15.90	8.19	15.93	0.000094	1.76	914.26	496.90	0.10
2	10385	500	900.00	5.40	16.65	8.55	16.67	0.000071	1.60	1310.18	568.40	0.08
2	10321		Culvert									
2	10270	10	500.00	5.20	14.20	7.32	14.24	0.000102	1.65	303.47	154.43	0.10
2	10270	25	590.00	5.20	14.76	7.56	14.80	0.000097	1.67	479.05	198.79	0.10
2	10270	50	675.00	5.20	15.29	7.77	15.33	0.000092	1.69	602.00	261.06	0.10
2	10270	100	748.00	5.20	15.63	7.95	15.67	0.000091	1.72	700.58	351.50	0.10
2	10270	500	900.00	5.20	16.23	8.30	16.27	0.000086	1.75	1003.36	626.13	0.10
2	10156	10	730.00	6.35	13.79		14.16	0.001720	4.97	181.04	116.59	0.43
2	10156	25	870.00	6.35	14.42		14.72	0.001402	4.71	271.72	170.74	0.39
2	10156	50	1002.00	6.35	15.06		15.27	0.000947	4.20	397.62	233.66	0.33
2	10156	100	1117.00	6.35	15.43		15.62	0.000798	4.04	496.58	322.65	0.30
2	10156	500	1358.00	6.35	16.10		16.23	0.000572	3.69	803.01	589.61	0.26
2	10061	10	730.00	6.43	13.74	10.52	14.01	0.001015	4.21	173.35	151.90	0.34
2	10061	25	870.00	6.43	14.30	10.93	14.61	0.001066	4.49	193.63	177.48	0.35
2	10061	50	1002.00	6.43	14.82	11.28	15.16	0.001084	4.69	213.51	231.39	0.35
2	10061	100	1117.00	6.43	15.13	11.56	15.51	0.001162	4.96	225.42	354.96	0.37
2	10061	500	1358.00	6.43	15.64	12.13	16.11	0.001354	5.52	246.11	570.54	0.40
2	9979	10	730.00	5.70	13.59	10.49	13.92	0.001181	4.58	159.51	188.52	0.36
2	9979	25	870.00	5.70	14.13	10.90	14.51	0.001267	4.93	176.63	242.45	0.37
2	9979	50	1002.00	5.70	14.64	11.27	15.06	0.001310	5.18	193.40	399.20	0.38
2	9979	100	1117.00	5.70	14.92	11.56	15.39	0.001428	5.51	202.87	508.28	0.40
2	9979	500	1358.00	5.70	15.38	12.15	15.98	0.001723	6.22	218.49	544.21	0.44
2	9919		Bridge									
2	9847	10	730.00	5.18	13.41	10.17	13.75	0.001249	4.68	155.86	508.05	0.37
2	9847	25	870.00	5.18	13.94	10.64	14.33	0.001356	5.05	172.27	568.50	0.38
2	9847	50	1002.00	5.18	14.44	11.04	14.88	0.001409	5.31	188.70	696.50	0.39
2	9847	100	1117.00	5.18	14.70	11.36	15.19	0.001551	5.66	197.43	762.44	0.41
2	9847	500	1358.00	5.18	15.09	12.00	15.73	0.001919	6.44	211.02	846.47	0.46
2	9650.66*	10	730.00	4.81	13.15	10.06	13.50	0.001331	4.75	153.58	468.67	0.38
2	9650.66*	25	870.00	4.81	13.65	10.53	14.06	0.001452	5.13	169.52	516.90	0.40
2	9650.66*	50	1002.00	4.81	14.14	10.92	14.59	0.001503	5.39	185.96	566.21	0.41
2	9650.66*	100	1117.00	4.81	14.36	11.25	14.87	0.001679	5.77	193.54	617.59	0.43
2	9650.66*	500	1358.00	4.81	14.63	11.87	15.32	0.002179	6.68	203.17	681.57	0.49
2	9454.33*	10	730.00	4.43	12.86	9.94	13.22	0.001452	4.83	151.04	436.31	0.39
2	9454.33*	25	870.00	4.43	13.33	10.41	13.76	0.001592	5.23	166.40	478.18	0.41
2	9454.33*	50	1002.00	4.43	13.81	10.81	14.28	0.001639	5.48	182.95	518.79	0.42
2	9454.33*	100	1117.00	4.43	13.98	11.13	14.52	0.001871	5.91	188.86	532.79	0.45
2	9454.33*	500	1358.00	4.43	14.07	11.75	14.85	0.002644	7.07	192.05	540.29	0.54
2	9258	10	730.00	4.06	12.54	9.83	12.92	0.001637	4.95	147.53	408.43	0.41
2	9258	25	870.00	4.06	12.97	10.30	13.42	0.001809	5.37	162.05	442.04	0.44
2	9258	50	1002.00	4.06	13.45	10.69	13.94	0.001845	5.60	178.82	479.00	0.44
2	9258	100	1117.00	4.06	13.54	11.01	14.12	0.002183	6.13	182.14	486.11	0.48



HEC-RAS Plan: Prop-16 River: School House Dit Reach: 2 (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
2	7298	10	730.00	2.24	9.34	7.08	9.73	0.001747	4.98	146.68	563.58	0.43
2	7298	25	870.00	2.24	9.09	7.49	9.71	0.002937	6.31	137.85	544.38	0.56
2	7298	50	1002.00	2.24	9.21	7.85	9.98	0.003599	7.06	141.93	553.31	0.62
2	7298	100	1117.00	2.24	9.31	8.13	10.23	0.004171	7.67	145.64	561.34	0.67
2	7298	500	1358.00	2.24	9.50	8.67	10.74	0.005446	8.91	152.47	575.90	0.76
2	7109.66*	10	730.00	2.04	8.97	6.86	9.38	0.001888	5.16	141.43	647.84	0.45
2	7109.66*	25	870.00	2.04	9.40	7.27	9.42	0.000226	1.85	1007.04	695.40	0.16
2	7109.66*	50	1002.00	2.04	9.63	7.61	9.65	0.000222	1.89	1116.64	711.62	0.16
2	7109.66*	100	1117.00	2.04	9.83	7.90	9.85	0.000215	1.90	1216.47	726.22	0.16
2	7109.66*	500	1358.00	2.04	10.24	8.44	10.27	0.000197	1.91	1421.59	751.56	0.15
2	6921.33*	10	730.00	1.85	9.15	6.67	9.18	0.000213	1.88	929.91	797.22	0.15
2	6921.33*	25	870.00	1.85	9.36	7.08	9.38	0.000222	1.97	1042.83	819.93	0.16
2	6921.33*	50	1002.00	1.85	9.58	7.44	9.61	0.000215	1.98	1167.56	844.75	0.16
2	6921.33*	100	1117.00	1.85	9.79	7.72	9.81	0.000204	1.97	1281.88	863.27	0.15
2	6921.33*	500	1358.00	1.85	10.21	8.27	10.23	0.000184	1.95	1515.85	899.27	0.15
2	6733	10	778.00	1.65	9.10	7.53	9.13	0.000256	2.12	925.31	918.24	0.17
2	6733	25	928.00	1.65	9.30	7.71	9.34	0.000276	2.24	1043.40	957.22	0.18
2	6733	50	1071.00	1.65	9.53	7.85	9.56	0.000267	2.25	1183.60	982.72	0.18
2	6733	100	1194.00	1.65	9.74	7.95	9.77	0.000247	2.20	1313.78	988.40	0.17
2	6733	500	1455.00	1.65	10.19	8.14	10.20	0.000091	1.39	2536.77	1000.00	0.10
2	6683	10	778.00	1.04	9.08	5.91	9.12	0.000274	2.10	777.09	789.80	0.17
2	6683	25	928.00	1.04	9.28	6.40	9.32	0.000298	2.23	861.82	797.08	0.18
2	6683	50	1071.00	1.04	9.53	6.82	9.55	0.000128	1.50	1689.75	800.00	0.12
2	6683	100	1194.00	1.04	9.74	7.14	9.76	0.000119	1.50	1837.15	800.00	0.12
2	6683	500	1455.00	1.04	10.19	7.74	10.20	0.000104	1.47	2191.03	800.00	0.11
2	6490.4*	10	778.00	1.14	8.93	5.93	9.04	0.000588	3.02	500.74	757.99	0.26
2	6490.4*	25	928.00	1.14	9.24	6.39	9.27	0.000212	1.88	1229.15	801.88	0.16
2	6490.4*	50	1071.00	1.14	9.50	6.77	9.52	0.000187	1.84	1433.76	810.00	0.15
2	6490.4*	100	1194.00	1.14	9.71	7.08	9.73	0.000169	1.79	1606.50	810.00	0.14
2	6490.4*	500	1455.00	1.14	10.16	7.66	10.17	0.000138	1.72	1970.10	810.00	0.13
2	6297.8*	10	778.00	1.24	8.89	5.92	8.93	0.000335	2.28	803.97	688.74	0.19
2	6297.8*	25	928.00	1.24	9.18	6.36	9.22	0.000286	2.20	1010.38	722.33	0.18
2	6297.8*	50	1071.00	1.24	9.44	6.73	9.47	0.000252	2.14	1202.60	752.26	0.17
2	6297.8*	100	1194.00	1.24	9.66	7.02	9.69	0.000227	2.10	1369.96	777.39	0.16
2	6297.8*	500	1455.00	1.24	10.12	7.58	10.14	0.000183	1.99	1738.27	820.00	0.15
2	6105.2*	10	778.00	1.35	8.80	5.91	8.86	0.000403	2.50	649.67	558.44	0.21
2	6105.2*	25	928.00	1.35	9.10	6.32	9.16	0.000351	2.43	846.58	649.45	0.20
2	6105.2*	50	1071.00	1.35	9.37	6.67	9.42	0.000308	2.37	1025.89	679.23	0.19
2	6105.2*	100	1194.00	1.35	9.60	6.96	9.64	0.000277	2.32	1182.00	704.12	0.18
2	6105.2*	500	1455.00	1.35	10.07	7.50	10.10	0.000222	2.20	1525.57	756.04	0.17
2	5912.6*	10	778.00	1.45	8.71	5.88	8.78	0.000422	2.57	628.39	453.06	0.22
2	5912.6*	25	928.00	1.45	9.03	6.28	9.09	0.000378	2.53	771.23	459.57	0.21
2	5912.6*	50	1071.00	1.45	9.30	6.61	9.36	0.000341	2.49	909.55	564.01	0.20
2	5912.6*	100	1194.00	1.45	9.53	6.88	9.58	0.000311	2.45	1047.57	629.57	0.19
2	5912.6*	500	1455.00	1.45	10.02	7.41	10.06	0.000251	2.35	1366.90	687.55	0.18
2	5720	10	778.00	1.55	8.62	5.84	8.70	0.000449	2.67	602.42	459.56	0.23
2	5720	25	928.00	1.55	8.95	6.22	9.01	0.000393	2.60	753.20	467.77	0.22
2	5720	50	1071.00	1.55	9.23	6.55	9.29	0.000352	2.54	887.33	469.62	0.21
2	5720	100	1194.00	1.55	9.47	6.81	9.52	0.000322	2.49	999.36	483.39	0.20
2	5720	500	1455.00	1.55	9.96	8.22	10.01	0.000267	2.42	1264.56	594.14	0.18
2	5686		Bridge									
2	5640	10	778.00	1.55	8.37	5.84	8.49	0.000671	3.16	488.61	453.26	0.28
2	5640	25	928.00	1.55	8.63	6.22	8.74	0.000632	3.17	605.81	459.75	0.27
2	5640	50	1071.00	1.55	8.84	6.55	8.94	0.000610	3.19	704.16	465.12	0.27
2	5640	100	1194.00	1.55	9.01	6.81	9.11	0.000595	3.21	783.18	469.16	0.27
2	5640	500	1455.00	1.55	9.33	8.22	9.43	0.000571	3.26	934.33	469.84	0.26
2	5444.*	10	778.00	1.26	8.26		8.36	0.000572	2.99	517.71	453.48	0.26
2	5444.*	25	928.00	1.26	8.52		8.62	0.000543	3.01	637.28	459.54	0.25
2	5444.*	50	1071.00	1.26	8.74		8.83	0.000529	3.05	736.60	464.18	0.25
2	5444.*	100	1194.00	1.26	8.91		9.00	0.000519	3.08	816.17	467.67	0.25
2	5444.*	500	1455.00	1.26	9.23		9.32	0.000503	3.15	970.08	494.94	0.25
2	5248.*	10	778.00	0.97	8.17		8.26	0.000474	2.80	557.95	454.45	0.24
2	5248.*	25	928.00	0.97	8.43		8.52	0.000455	2.84	678.84	459.32	0.23

HEC-RAS Plan: Prop-16 River: School House Dit Reach: 2 (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
2	5248.*	50	1071.00	0.97	8.65		8.73	0.000448	2.89	778.34	463.22	0.23
2	5248.*	100	1194.00	0.97	8.82		8.90	0.000443	2.93	858.46	477.92	0.23
2	5248.*	500	1455.00	0.97	9.15		9.22	0.000433	3.03	1021.19	521.70	0.23
2	5052.*	10	778.00	0.68	8.09		8.17	0.000389	2.62	601.41	454.45	0.21
2	5052.*	25	928.00	0.68	8.36		8.43	0.000380	2.67	722.67	458.71	0.21
2	5052.*	50	1071.00	0.68	8.57		8.65	0.000378	2.74	823.83	463.16	0.21
2	5052.*	100	1194.00	0.68	8.75		8.82	0.000376	2.80	908.43	503.78	0.22
2	5052.*	500	1455.00	0.68	9.07		9.14	0.000373	2.90	1078.50	539.45	0.22
2	4856.*	10	778.00	0.39	8.03		8.10	0.000315	2.43	653.94	454.26	0.19
2	4856.*	25	928.00	0.39	8.30		8.36	0.000311	2.50	778.07	482.17	0.19
2	4856.*	50	1071.00	0.39	8.51		8.58	0.000313	2.58	883.98	505.24	0.20
2	4856.*	100	1194.00	0.39	8.68		8.75	0.000314	2.64	971.91	522.52	0.20
2	4856.*	500	1455.00	0.39	9.01		9.07	0.000317	2.76	1146.80	551.40	0.20
2	4660	10	1111.00	0.10	7.87		8.00	0.000599	3.43	661.40	466.34	0.27
2	4660	25	1334.00	0.10	8.14		8.27	0.000605	3.57	787.70	491.16	0.27
2	4660	50	1547.00	0.10	8.35		8.48	0.000622	3.72	892.87	510.91	0.28
2	4660	100	1733.00	0.10	8.51		8.65	0.000636	3.83	979.52	526.47	0.28
2	4660	500	2128.00	0.10	8.83		8.97	0.000660	4.05	1151.19	550.42	0.29
2	4470.*	10	1111.00	-0.17	7.78		7.90	0.000520	3.29	697.07	480.23	0.25
2	4470.*	25	1334.00	-0.17	8.04		8.16	0.000533	3.44	825.04	502.04	0.26
2	4470.*	50	1547.00	-0.17	8.24		8.37	0.000556	3.60	929.77	519.21	0.26
2	4470.*	100	1733.00	-0.17	8.40		8.53	0.000574	3.73	1015.62	532.83	0.27
2	4470.*	500	2128.00	-0.17	8.72		8.85	0.000605	3.96	1185.03	552.31	0.28
2	4280.*	10	1111.00	-0.44	7.69		7.80	0.000441	3.12	746.44	492.20	0.23
2	4280.*	25	1334.00	-0.44	7.95		8.06	0.000460	3.29	875.03	511.50	0.24
2	4280.*	50	1547.00	-0.44	8.15		8.26	0.000487	3.46	978.58	526.54	0.25
2	4280.*	100	1733.00	-0.44	8.31		8.43	0.000508	3.59	1063.13	537.86	0.26
2	4280.*	500	2128.00	-0.44	8.61		8.74	0.000546	3.85	1229.07	553.68	0.27
2	4090.*	10	1111.00	-0.72	7.63		7.72	0.000372	2.96	800.46	502.08	0.22
2	4090.*	25	1334.00	-0.72	7.88		7.98	0.000396	3.13	928.75	519.18	0.22
2	4090.*	50	1547.00	-0.72	8.07		8.18	0.000425	3.32	1030.48	532.36	0.23
2	4090.*	100	1733.00	-0.72	8.23		8.33	0.000448	3.46	1113.18	541.32	0.24
2	4090.*	500	2128.00	-0.72	8.52		8.64	0.000491	3.73	1275.02	555.26	0.25
2	3900.*	10	1111.00	-0.99	7.57		7.65	0.000312	2.78	862.96	511.00	0.20
2	3900.*	25	1334.00	-0.99	7.82		7.90	0.000337	2.97	990.55	526.37	0.21
2	3900.*	50	1547.00	-0.99	8.00		8.10	0.000368	3.16	1090.26	537.10	0.22
2	3900.*	100	1733.00	-0.99	8.15		8.25	0.000392	3.32	1170.86	544.37	0.23
2	3900.*	500	2128.00	-0.99	8.44		8.55	0.000439	3.61	1328.17	556.69	0.24
2	3710.*	10	1111.00	-1.26	7.52		7.59	0.000260	2.61	932.67	518.78	0.18
2	3710.*	25	1334.00	-1.26	7.77		7.84	0.000266	2.81	1059.23	532.18	0.19
2	3710.*	50	1547.00	-1.26	7.95		8.03	0.000316	3.01	1156.60	540.90	0.20
2	3710.*	100	1733.00	-1.26	8.09		8.18	0.000340	3.17	1235.02	547.08	0.21
2	3710.*	500	2128.00	-1.26	8.37		8.47	0.000388	3.47	1387.60	558.07	0.23
2	3520.*	10	1111.00	-1.53	7.49		7.55	0.000217	2.46	1006.48	525.63	0.17
2	3520.*	25	1334.00	-1.53	7.72		7.79	0.000242	2.65	1131.63	536.04	0.18
2	3520.*	50	1547.00	-1.53	7.90		7.97	0.000271	2.86	1226.56	543.90	0.19
2	3520.*	100	1733.00	-1.53	8.04		8.12	0.000295	3.02	1302.74	549.07	0.20
2	3520.*	500	2128.00	-1.53	8.30		8.40	0.000343	3.34	1450.44	558.93	0.22
2	3330.*	10	1111.00	-1.80	7.45		7.51	0.000181	2.30	1085.18	530.09	0.15
2	3330.*	25	1334.00	-1.80	7.69		7.74	0.000205	2.51	1208.78	539.72	0.16
2	3330.*	50	1547.00	-1.80	7.86		7.92	0.000232	2.71	1301.44	546.41	0.18
2	3330.*	100	1733.00	-1.80	7.99		8.06	0.000255	2.88	1375.46	551.06	0.19
2	3330.*	500	2128.00	-1.80	8.25		8.33	0.000302	3.20	1518.48	559.91	0.20
2	3140.*	10	1111.00	-2.08	7.43		7.47	0.000151	2.16	1166.18	534.12	0.14
2	3140.*	25	1334.00	-2.08	7.66		7.71	0.000174	2.37	1288.28	543.00	0.15
2	3140.*	50	1547.00	-2.08	7.82		7.88	0.000199	2.57	1378.79	546.59	0.16
2	3140.*	100	1733.00	-2.08	7.95		8.01	0.000221	2.74	1450.77	552.81	0.17
2	3140.*	500	2128.00	-2.08	8.20		8.28	0.000266	3.07	1589.31	560.84	0.19
2	2950.*	10	1111.00	-2.35	7.41		7.44	0.000128	2.04	1248.42	537.53	0.13
2	2950.*	25	1334.00	-2.35	7.63		7.67	0.000148	2.24	1369.07	545.48	0.14
2	2950.*	50	1547.00	-2.35	7.79		7.84	0.000172	2.44	1457.51	550.37	0.15
2	2950.*	100	1733.00	-2.35	7.92		7.97	0.000192	2.61	1527.58	554.22	0.16
2	2950.*	500	2128.00	-2.35	8.16		8.23	0.000235	2.94	1661.83	561.51	0.18

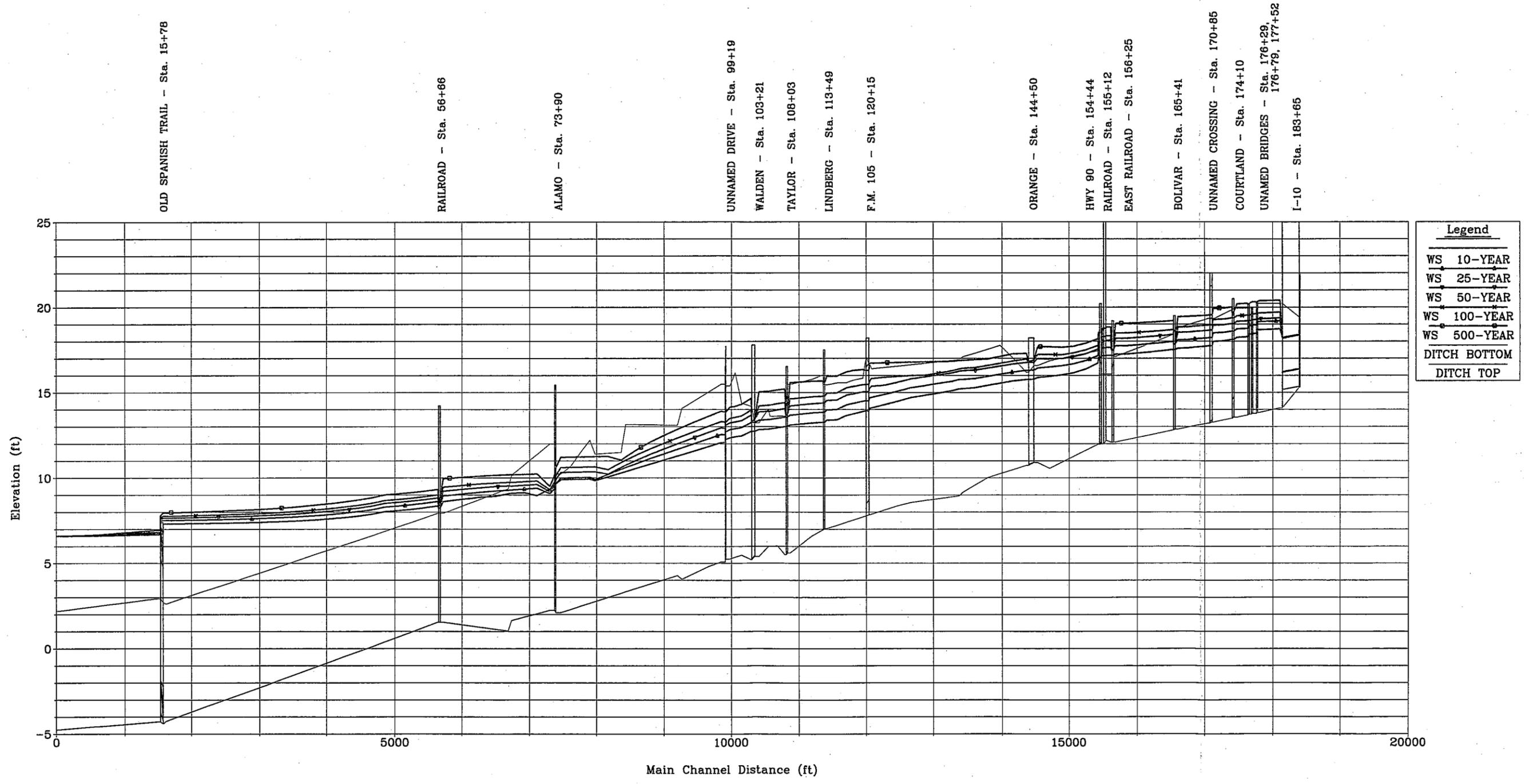
HEC-RAS Plan: Prop-16 River: School House Dit Reach: 2 (Continued)

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
2	2760.*	10	1111.00	-2.62	7.39		7.42	0.000107	1.92	1335.72	540.21	0.12
2	2760.*	25	1334.00	-2.62	7.61		7.65	0.000127	2.12	1454.93	547.12	0.13
2	2760.*	50	1547.00	-2.62	7.76		7.81	0.000148	2.32	1541.44	551.63	0.14
2	2760.*	100	1733.00	-2.62	7.89		7.94	0.000167	2.48	1609.70	555.16	0.15
2	2760.*	500	2128.00	-2.62	8.12		8.18	0.000206	2.82	1739.92	561.84	0.17
2	2570.*	10	1111.00	-2.89	7.37		7.40	0.000092	1.81	1420.65	542.79	0.11
2	2570.*	25	1334.00	-2.89	7.59		7.62	0.000109	2.01	1538.54	548.75	0.12
2	2570.*	50	1547.00	-2.89	7.74		7.78	0.000128	2.21	1623.30	552.93	0.13
2	2570.*	100	1733.00	-2.89	7.86		7.91	0.000146	2.37	1689.93	556.19	0.14
2	2570.*	500	2128.00	-2.89	8.09		8.14	0.000183	2.70	1816.44	562.33	0.16
2	2380.*	10	1111.00	-3.16	7.36		7.38	0.000078	1.71	1508.57	544.51	0.10
2	2380.*	25	1334.00	-3.16	7.57		7.60	0.000094	1.91	1625.19	550.00	0.11
2	2380.*	50	1547.00	-3.16	7.72		7.76	0.000112	2.10	1708.34	553.87	0.12
2	2380.*	100	1733.00	-3.16	7.84		7.88	0.000127	2.26	1773.45	556.89	0.13
2	2380.*	500	2128.00	-3.16	8.06		8.11	0.000162	2.59	1896.50	562.55	0.15
2	2190.*	10	1111.00	-3.43	7.35		7.37	0.000067	1.62	1597.34	545.85	0.10
2	2190.*	25	1334.00	-3.43	7.56		7.58	0.000082	1.81	1712.77	551.00	0.11
2	2190.*	50	1547.00	-3.43	7.71		7.74	0.000098	2.00	1794.45	554.61	0.12
2	2190.*	100	1733.00	-3.43	7.82		7.86	0.000112	2.16	1858.16	557.41	0.13
2	2190.*	500	2128.00	-3.43	8.03		8.08	0.000144	2.49	1978.02	562.65	0.14
2	2000.*	10	1111.00	-3.71	7.34		7.36	0.000058	1.54	1685.92	546.81	0.09
2	2000.*	25	1334.00	-3.71	7.54		7.57	0.000071	1.73	1800.23	551.69	0.10
2	2000.*	50	1547.00	-3.71	7.69		7.72	0.000086	1.91	1880.55	555.09	0.11
2	2000.*	100	1733.00	-3.71	7.80		7.83	0.000099	2.07	1942.97	557.71	0.12
2	2000.*	500	2128.00	-3.71	8.01		8.05	0.000128	2.39	2059.86	562.60	0.13
2	1810.*	10	1111.00	-3.98	7.33		7.34	0.000051	1.46	1775.76	547.64	0.08
2	1810.*	25	1334.00	-3.98	7.53		7.55	0.000062	1.65	1889.05	552.25	0.09
2	1810.*	50	1547.00	-3.98	7.68		7.70	0.000075	1.83	1968.13	555.44	0.10
2	1810.*	100	1733.00	-3.98	7.79		7.82	0.000087	1.98	2029.38	557.90	0.11
2	1810.*	500	2128.00	-3.98	7.99		8.03	0.000114	2.30	2143.54	562.46	0.13
2	1620	10	1111.00	-4.25	7.32		7.34	0.000044	1.39	1864.60	548.25	0.08
2	1620	25	1334.00	-4.25	7.52		7.54	0.000055	1.57	1976.93	552.62	0.09
2	1620	50	1547.00	-4.25	7.67		7.69	0.000067	1.75	2054.86	555.64	0.10
2	1620	100	1733.00	-4.25	7.77		7.80	0.000078	1.90	2115.03	557.95	0.10
2	1620	500	2128.00	-4.25	7.97		8.01	0.000102	2.21	2226.67	562.22	0.12
2	1580	10	1111.00	-4.40	7.32	-1.37	7.33	0.000029	1.19	1994.00	548.68	0.06
2	1580	25	1334.00	-4.40	7.52	-1.01	7.54	0.000037	1.35	2106.25	553.04	0.07
2	1580	50	1547.00	-4.40	7.66	-0.69	7.68	0.000045	1.51	2184.08	556.05	0.08
2	1580	100	1733.00	-4.40	7.77	-0.43	7.80	0.000053	1.65	2244.13	558.36	0.09
2	1580	500	2128.00	-4.40	7.97	0.10	8.00	0.000071	1.93	2355.46	562.61	0.10
2	1578		Culvert									
2	1535	10	1111.00	-4.28	6.70		6.73	0.000065	1.64	1334.98	520.76	0.09
2	1535	25	1334.00	-4.28	6.74		6.79	0.000091	1.94	1357.78	522.35	0.11
2	1535	50	1547.00	-4.28	6.79		6.85	0.000118	2.22	1383.86	524.16	0.13
2	1535	100	1733.00	-4.28	6.84		6.91	0.000143	2.46	1408.43	525.86	0.14
2	1535	500	2128.00	-4.28	6.95		7.05	0.000198	2.91	1468.33	529.99	0.17
2	1505	10	1111.00	-4.28	6.70		6.73	0.000069	1.68	1316.74	520.63	0.10
2	1505	25	1334.00	-4.28	6.74		6.78	0.000096	1.99	1338.82	522.17	0.12
2	1505	50	1547.00	-4.28	6.79		6.85	0.000124	2.27	1364.15	523.93	0.13
2	1505	100	1733.00	-4.28	6.83		6.90	0.000151	2.51	1388.02	525.59	0.15
2	1505	500	2128.00	-4.28	6.94		7.04	0.000210	2.99	1446.36	529.61	0.17
2	1316.87*	10	1111.00	-4.34	6.68		6.72	0.000074	1.74	1295.88	539.23	0.10
2	1316.87*	25	1334.00	-4.34	6.72		6.77	0.000104	2.07	1315.17	540.74	0.12
2	1316.87*	50	1547.00	-4.34	6.76		6.82	0.000136	2.37	1337.35	542.46	0.14
2	1316.87*	100	1733.00	-4.34	6.80		6.87	0.000165	2.62	1358.42	544.09	0.15
2	1316.87*	500	2128.00	-4.34	6.89		7.00	0.000232	3.13	1410.32	548.08	0.18
2	1128.75*	10	1111.00	-4.40	6.66		6.70	0.000079	1.80	1289.83	564.71	0.11
2	1128.75*	25	1334.00	-4.40	6.69		6.75	0.000112	2.14	1306.07	566.13	0.13
2	1128.75*	50	1547.00	-4.40	6.73		6.79	0.000146	2.45	1324.74	567.76	0.14
2	1128.75*	100	1733.00	-4.40	6.76		6.84	0.000179	2.72	1342.67	569.32	0.16
2	1128.75*	500	2128.00	-4.40	6.84		6.95	0.000254	3.28	1387.29	573.19	0.19
2	940.625*	10	1111.00	-4.46	6.65		6.69	0.000083	1.84	1300.06	599.84	0.11
2	940.625*	25	1334.00	-4.46	6.67		6.72	0.000118	2.20	1312.97	600.98	0.13

HEC-RAS Plan: Prop-16 River: School House Dit Reach: 2 (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
2	940.625*	50	1547.00	-4.46	6.69		6.78	0.000156	2.53	1327.68	602.46	0.15
2	940.625*	100	1733.00	-4.46	6.72		6.80	0.000192	2.81	1341.97	604.88	0.17
2	940.625*	500	2128.00	-4.46	6.78		6.90	0.000276	3.38	1378.02	610.96	0.20
2	752.5*	10	1111.00	-4.52	6.63		6.67	0.000086	1.87	1353.49	680.40	0.11
2	752.5*	25	1334.00	-4.52	6.65		6.70	0.000123	2.24	1363.20	682.02	0.13
2	752.5*	50	1547.00	-4.52	6.66		6.73	0.000163	2.58	1374.03	683.83	0.15
2	752.5*	100	1733.00	-4.52	6.68		6.77	0.000202	2.87	1384.83	685.63	0.17
2	752.5*	500	2128.00	-4.52	6.72		6.85	0.000294	3.48	1412.50	690.21	0.20
2	564.375*	10	1111.00	-4.57	6.62		6.65	0.000083	1.83	1485.36	783.77	0.11
2	564.375*	25	1334.00	-4.57	6.63		6.68	0.000118	2.20	1491.71	784.82	0.13
2	564.375*	50	1547.00	-4.57	6.64		6.70	0.000158	2.54	1498.93	786.00	0.15
2	564.375*	100	1733.00	-4.57	6.64		6.73	0.000196	2.83	1506.18	787.19	0.17
2	564.375*	500	2128.00	-4.57	6.67		6.79	0.000289	3.45	1525.17	790.30	0.20
2	376.25*	10	1111.00	-4.63	6.61		6.64	0.000069	1.67	1683.99	812.96	0.10
2	376.25*	25	1334.00	-4.63	6.61		6.65	0.000099	2.01	1687.71	813.06	0.12
2	376.25*	50	1547.00	-4.63	6.62		6.67	0.000132	2.32	1691.92	813.17	0.14
2	376.25*	100	1733.00	-4.63	6.63		6.69	0.000165	2.60	1696.16	813.28	0.15
2	376.25*	500	2128.00	-4.63	6.64		6.73	0.000245	3.17	1706.96	813.57	0.19
2	188.125*	10	1111.00	-4.69	6.60		6.62	0.000053	1.48	1899.60	817.37	0.09
2	188.125*	25	1334.00	-4.69	6.61		6.63	0.000077	1.77	1901.28	817.37	0.10
2	188.125*	50	1547.00	-4.69	6.61		6.64	0.000103	2.05	1903.19	817.37	0.12
2	188.125*	100	1733.00	-4.69	6.61		6.65	0.000129	2.30	1905.10	817.37	0.14
2	188.125*	500	2128.00	-4.69	6.62		6.68	0.000193	2.81	1909.96	817.37	0.17
2	0	10	1111.00	-4.75	6.60	0.28	6.61	0.000040	1.28	2121.29	819.85	0.08
2	0	25	1334.00	-4.75	6.60	0.72	6.62	0.000058	1.54	2121.29	819.85	0.09
2	0	50	1547.00	-4.75	6.60	1.09	6.62	0.000078	1.79	2121.29	819.85	0.11
2	0	100	1733.00	-4.75	6.60	1.41	6.63	0.000098	2.00	2121.29	819.85	0.12
2	0	500	2128.00	-4.75	6.60	2.00	6.64	0.000147	2.48	2121.29	819.85	0.14

# Schoolhouse Ditch Alternative "B"



OLD SPANISH TRAIL - Sta. 15+78

RAILROAD - Sta. 56+66

ALAMO - Sta. 73+90

UNNAMED DRIVE - Sta. 99+19

WALDEN - Sta. 103+21

TAYLOR - Sta. 108+03

LINDBERG - Sta. 113+49

F.M. 105 - Sta. 120+15

ORANGE - Sta. 144+50

HWY 90 - Sta. 154+44

RAILROAD - Sta. 155+12

EAST RAILROAD - Sta. 156+25

BOLIVAR - Sta. 165+41

UNNAMED CROSSING - Sta. 170+85

COURTLAND - Sta. 174+10

UNNAMED BRIDGES - Sta. 176+29,  
176+79, 177+52

I-10 - Sta. 183+66

Legend	
WS	10-YEAR
WS	25-YEAR
WS	50-YEAR
WS	100-YEAR
WS	500-YEAR
DITCH BOTTOM	
DITCH TOP	

HEC-RAS Plan: Prop-17 River: School House Dit Reach: 2

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
2	18377	10	152.00	15.30	19.35	17.09	19.41	0.000440	1.91	79.68	24.00	0.18
2	18377	25	171.00	15.30	20.00	17.18	20.05	0.000304	1.77	123.86	430.13	0.16
2	18377	50	188.00	15.30	20.37	17.26	20.40	0.000172	1.41	292.43	481.80	0.12
2	18377	100	202.00	15.30	20.89	17.32	20.90	0.000062	0.91	558.39	536.87	0.07
2	18377	500	231.00	15.30	21.96	17.44	21.96	0.000013	0.48	1180.63	634.37	0.03
2	18365		Culvert									
2	18078	10	152.00	14.10	18.74	15.49	18.77	0.000185	1.48	102.51	24.77	0.13
2	18078	25	171.00	14.10	19.20	15.60	19.24	0.000171	1.50	114.13	24.92	0.12
2	18078	50	188.00	14.10	19.37	15.69	19.41	0.000185	1.59	118.35	24.98	0.13
2	18078	100	202.00	14.10	19.72	15.76	19.76	0.000171	1.59	132.84	67.59	0.12
2	18078	500	231.00	14.10	20.41	15.90	20.43	0.000099	1.30	411.81	680.86	0.10
2	17925.*	10	152.00	13.96	18.71	15.49	18.74	0.000179	1.49	102.23	24.70	0.13
2	17925.*	25	171.00	13.96	19.18	15.59	19.21	0.000165	1.50	113.89	24.93	0.12
2	17925.*	50	188.00	13.96	19.34	15.67	19.38	0.000179	1.59	118.05	25.01	0.13
2	17925.*	100	202.00	13.96	19.69	15.73	19.73	0.000166	1.59	131.55	63.62	0.12
2	17925.*	500	231.00	13.96	20.39	15.86	20.42	0.000098	1.32	400.87	677.18	0.10
2	17772	10	152.00	13.83	18.68	15.35	18.72	0.000164	1.42	107.06	24.86	0.12
2	17772	25	171.00	13.83	19.16	15.44	19.19	0.000152	1.44	118.82	24.98	0.12
2	17772	50	188.00	13.83	19.32	15.52	19.36	0.000166	1.53	122.94	25.03	0.12
2	17772	100	202.00	13.83	19.67	15.58	19.70	0.000155	1.53	135.65	60.15	0.12
2	17772	500	231.00	13.83	20.38	15.71	20.40	0.000095	1.29	396.68	672.72	0.09
2	17752		Bridge									
2	17715	10	152.00	13.78	18.47	15.10	18.51	0.000259	1.74	87.56	19.94	0.15
2	17715	25	171.00	13.78	18.96	15.21	19.01	0.000241	1.75	97.44	20.20	0.14
2	17715	50	188.00	13.78	19.28	15.30	19.33	0.000241	1.81	104.12	27.98	0.14
2	17715	100	202.00	13.78	19.63	15.37	19.68	0.000219	1.80	127.88	110.28	0.14
2	17715	500	231.00	13.78	20.32	15.52	20.34	0.000114	1.40	445.06	813.42	0.10
2	17679		Bridge									
2	17655	10	152.00	13.73	18.44	15.50	18.50	0.000342	1.93	78.56	19.69	0.17
2	17655	25	171.00	13.73	18.92	15.61	18.98	0.000311	1.94	86.14	19.98	0.16
2	17655	50	188.00	13.73	19.24	15.71	19.30	0.000308	1.99	94.49	20.17	0.16
2	17655	100	202.00	13.73	19.57	15.78	19.63	0.000290	1.99	102.03	36.31	0.16
2	17655	500	231.00	13.73	20.29	15.93	20.32	0.000160	1.60	371.40	816.53	0.12
2	17629		Bridge									
2	17600	10	152.00	13.68	18.27		18.33	0.000347	1.93	78.81	19.61	0.17
2	17600	25	171.00	13.68	18.76		18.82	0.000315	1.93	88.40	19.89	0.16
2	17600	50	188.00	13.68	19.20		19.26	0.000290	1.93	97.27	20.16	0.16
2	17600	100	202.00	13.68	19.53		19.59	0.000276	1.94	104.15	29.22	0.15
2	17600	500	231.00	13.68	20.22		20.26	0.000180	1.69	317.22	810.39	0.12
2	17454	10	152.00	13.56	18.24	14.82	18.29	0.000238	1.67	91.22	20.03	0.14
2	17454	25	171.00	13.56	18.73	14.91	18.78	0.000225	1.69	101.02	20.14	0.13
2	17454	50	188.00	13.56	19.18	15.00	19.22	0.000213	1.71	110.00	20.25	0.13
2	17454	100	202.00	13.56	19.51	15.07	19.55	0.000208	1.73	116.74	24.66	0.13
2	17454	500	231.00	13.56	20.20	15.21	20.23	0.000150	1.57	313.27	807.62	0.11
2	17410		Culvert									
2	17380	10	159.00	13.50	18.11		18.15	0.000206	1.59	99.69	24.20	0.14
2	17380	25	184.00	13.50	18.60		18.64	0.000199	1.65	111.63	24.75	0.14
2	17380	50	207.00	13.50	19.05		19.09	0.000189	1.68	125.21	44.15	0.13
2	17380	100	226.00	13.50	19.38		19.42	0.000181	1.71	143.68	68.51	0.13
2	17380	500	264.00	13.50	20.02		20.06	0.000165	1.74	220.76	800.62	0.13
2	17247.5*	10	159.00	13.39	18.03		18.11	0.000515	2.25	70.58	22.05	0.22
2	17247.5*	25	184.00	13.39	18.52		18.60	0.000458	2.25	81.76	23.24	0.21
2	17247.5*	50	207.00	13.39	18.98		19.05	0.000413	2.24	92.49	24.32	0.20
2	17247.5*	100	226.00	13.39	19.31		19.38	0.000390	2.25	100.64	25.12	0.20
2	17247.5*	500	264.00	13.39	19.96		20.03	0.000317	2.20	149.02	182.86	0.18
2	17115	10	159.00	13.28	18.00		18.05	0.000266	1.77	89.96	23.09	0.16
2	17115	25	184.00	13.28	18.50		18.55	0.000253	1.81	101.61	23.93	0.15
2	17115	50	207.00	13.28	18.95		19.00	0.000240	1.84	112.61	24.71	0.15
2	17115	100	226.00	13.28	19.28		19.34	0.000235	1.87	120.87	25.27	0.15
2	17115	500	264.00	13.28	19.94		19.99	0.000209	1.89	160.52	102.67	0.14

HEC-RAS Plan: Prop-17 River: School House Dit Reach: 2 (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
2	17100	10	159.00	13.27	18.00	14.74	18.05	0.000265	1.77	90.07	23.08	0.16
2	17100	25	184.00	13.27	18.50	14.89	18.55	0.000252	1.81	101.72	23.93	0.15
2	17100	50	207.00	13.27	18.95	15.01	19.00	0.000239	1.84	112.73	24.70	0.15
2	17100	100	226.00	13.27	19.28	15.11	19.33	0.000234	1.87	120.99	25.27	0.15
2	17100	500	264.00	13.27	19.93	15.31	19.99	0.000208	1.89	160.40	102.26	0.14
2	17085		Culvert									
2	17035	10	159.00	13.22	17.74		17.79	0.000300	1.84	86.33	23.19	0.17
2	17035	25	184.00	13.22	18.22		18.27	0.000284	1.88	97.64	24.06	0.16
2	17035	50	207.00	13.22	18.65		18.71	0.000269	1.91	108.23	24.84	0.16
2	17035	100	226.00	13.22	18.96		19.02	0.000262	1.95	117.59	40.73	0.16
2	17035	500	264.00	13.22	19.54		19.60	0.000235	1.97	155.99	108.15	0.15
2	17020	10	159.00	13.21	17.73		17.79	0.000328	1.90	83.74	23.15	0.18
2	17020	25	184.00	13.21	18.21		18.27	0.000307	1.94	95.04	24.03	0.17
2	17020	50	207.00	13.21	18.65		18.71	0.000288	1.96	105.64	24.83	0.17
2	17020	100	226.00	13.21	18.95		19.01	0.000279	1.99	114.89	40.21	0.17
2	17020	500	264.00	13.21	19.53		19.60	0.000248	2.01	152.90	106.87	0.16
2	16873.6*	10	159.00	13.09	17.67		17.73	0.000400	2.04	77.84	23.45	0.20
2	16873.6*	25	184.00	13.09	18.16		18.22	0.000360	2.06	89.44	24.38	0.19
2	16873.6*	50	207.00	13.09	18.59		18.66	0.000329	2.06	100.31	25.22	0.18
2	16873.6*	100	226.00	13.09	18.90		18.97	0.000312	2.09	110.55	43.21	0.18
2	16873.6*	500	264.00	13.09	19.49		19.56	0.000264	2.08	153.41	116.36	0.17
2	16727.3*	10	159.00	12.97	17.60		17.67	0.000436	2.10	75.65	23.49	0.21
2	16727.3*	25	184.00	12.97	18.10		18.17	0.000387	2.10	87.47	24.55	0.20
2	16727.3*	50	207.00	12.97	18.54		18.61	0.000349	2.10	98.62	27.34	0.19
2	16727.3*	100	226.00	12.97	18.85		18.92	0.000326	2.11	110.10	46.20	0.18
2	16727.3*	500	264.00	12.97	19.45		19.52	0.000265	2.08	158.46	122.68	0.17
2	16581	10	159.00	12.85	17.59	14.12	17.62	0.000184	1.53	103.84	24.83	0.13
2	16581	25	184.00	12.85	18.08	14.25	18.12	0.000178	1.58	116.24	25.44	0.13
2	16581	50	207.00	12.85	18.53	14.36	18.57	0.000171	1.62	128.11	32.65	0.13
2	16581	100	226.00	12.85	18.84	14.45	18.88	0.000167	1.66	141.23	54.37	0.13
2	16581	500	264.00	12.85	19.44	14.63	19.48	0.000148	1.68	196.76	129.94	0.12
2	16541		Culvert									
2	16516	10	159.00	12.80	17.52		17.55	0.000169	1.46	108.61	27.06	0.13
2	16516	25	184.00	12.80	17.99		18.03	0.000164	1.51	121.62	27.87	0.13
2	16516	50	207.00	12.80	18.40		18.44	0.000160	1.55	133.26	28.68	0.13
2	16516	100	226.00	12.80	18.68		18.72	0.000157	1.60	144.36	53.64	0.13
2	16516	500	264.00	12.80	19.22		19.26	0.000146	1.65	188.46	112.66	0.12
2	16343.*	10	159.00	12.66	17.44		17.50	0.000394	1.98	80.22	24.88	0.19
2	16343.*	25	184.00	12.66	17.92		17.98	0.000359	1.99	92.52	26.55	0.19
2	16343.*	50	207.00	12.66	18.34		18.40	0.000326	1.99	104.80	38.88	0.18
2	16343.*	100	226.00	12.66	18.62		18.69	0.000301	2.01	119.90	66.63	0.18
2	16343.*	500	264.00	12.66	19.16		19.22	0.000248	1.99	170.10	119.07	0.16
2	16170.*	10	159.00	12.52	17.38		17.44	0.000386	1.98	80.38	24.53	0.19
2	16170.*	25	184.00	12.52	17.86		17.92	0.000351	1.99	92.64	26.13	0.19
2	16170.*	50	207.00	12.52	18.28		18.34	0.000310	1.99	108.17	52.53	0.18
2	16170.*	100	226.00	12.52	18.57		18.63	0.000283	1.99	127.12	77.63	0.17
2	16170.*	500	264.00	12.52	19.12		19.18	0.000230	1.95	182.99	125.11	0.16
2	15997.*	10	159.00	12.38	17.31		17.37	0.000380	1.98	80.34	24.09	0.19
2	15997.*	25	184.00	12.38	17.80		17.86	0.000343	1.99	93.12	32.22	0.18
2	15997.*	50	207.00	12.38	18.23		18.29	0.000295	1.98	113.20	63.10	0.17
2	15997.*	100	226.00	12.38	18.53		18.59	0.000267	1.98	135.34	86.17	0.17
2	15997.*	500	264.00	12.38	19.09		19.14	0.000213	1.91	195.96	129.82	0.16
2	15824.*	10	159.00	12.24	17.24		17.30	0.000374	1.98	80.38	23.60	0.19
2	15824.*	25	184.00	12.24	17.74		17.80	0.000331	1.99	95.05	40.91	0.18
2	15824.*	50	207.00	12.24	18.18		18.24	0.000279	1.96	119.96	72.04	0.17
2	15824.*	100	226.00	12.24	18.48		18.54	0.000251	1.95	144.95	93.36	0.16
2	15824.*	500	264.00	12.24	19.06		19.10	0.000198	1.87	209.79	133.67	0.15
2	15651	10	159.00	12.10	17.24	13.30	17.26	0.000097	1.20	133.31	33.90	0.10
2	15651	25	184.00	12.10	17.74	13.42	17.76	0.000091	1.24	155.63	59.21	0.10
2	15651	50	207.00	12.10	18.18	13.52	18.21	0.000084	1.26	187.90	86.75	0.10
2	15651	100	226.00	12.10	18.48	13.60	18.51	0.000081	1.28	216.94	105.57	0.09
2	15651	500	264.00	12.10	19.05	13.75	19.08	0.000072	1.29	287.17	141.05	0.09

HEC-RAS Plan: Prop-17 River: School House Dlt Reach: 2 (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
2	15625											
		Culvert										
2	15584	10	159.00	12.10	17.17		17.19	0.000074	1.03	167.39	71.05	0.09
2	15584	25	184.00	12.10	17.65		17.66	0.000086	1.04	206.16	92.66	0.09
2	15584	50	207.00	12.10	18.06		18.08	0.000059	1.05	248.18	111.46	0.08
2	15584	100	226.00	12.10	18.33		18.35	0.000056	1.06	280.46	123.97	0.08
2	15584	500	264.00	12.10	18.84		18.86	0.000051	1.08	348.92	147.04	0.08
2	15520	10	159.00	12.20	17.17	13.42	17.19	0.000079	1.05	164.26	70.79	0.09
2	15520	25	184.00	12.20	17.64	13.53	17.66	0.000069	1.06	202.97	92.44	0.09
2	15520	50	207.00	12.20	18.06	13.63	18.07	0.000062	1.06	244.96	111.26	0.08
2	15520	100	226.00	12.20	18.33	13.71	18.35	0.000059	1.07	277.21	123.78	0.08
2	15520	500	264.00	12.20	18.84	13.87	18.85	0.000053	1.09	345.64	146.87	0.08
2	15512											
		Bridge										
2	15460	10	159.00	12.00	17.15	13.07	17.17	0.000061	0.96	176.95	69.97	0.08
2	15460	25	184.00	12.00	17.62	13.18	17.63	0.000056	0.99	214.52	91.24	0.08
2	15460	50	207.00	12.00	18.02	13.27	18.04	0.000052	1.00	255.07	109.67	0.08
2	15460	100	226.00	12.00	18.29	13.34	18.30	0.000050	1.02	285.93	121.84	0.08
2	15460	500	264.00	12.00	18.78	13.49	18.79	0.000048	1.05	350.85	144.12	0.08
2	15444											
		Culvert										
2	15405	10	159.00	11.97	17.08		17.10	0.000080	1.08	146.63	33.59	0.09
2	15405	25	184.00	11.97	17.52		17.54	0.000081	1.14	161.60	36.87	0.09
2	15405	50	207.00	11.97	17.89		17.91	0.000080	1.19	177.70	49.48	0.09
2	15405	100	226.00	11.97	18.13		18.15	0.000082	1.23	190.49	57.55	0.09
2	15405	500	264.00	11.97	18.55		18.59	0.000086	1.32	218.82	80.85	0.10
2	15393	10	300.00	11.97	16.72		17.08	0.002728	4.71	63.70	23.95	0.51
2	15393	25	351.00	11.97	17.16		17.50	0.002441	4.70	74.69	25.89	0.49
2	15393	50	398.00	11.97	17.53		17.88	0.002218	4.70	84.85	30.40	0.47
2	15393	100	438.00	11.97	17.75		18.11	0.002170	4.82	92.48	38.25	0.47
2	15393	500	520.00	11.97	18.15		18.54	0.002125	5.05	110.25	52.13	0.47
2	15215.8*	10	300.00	11.62	16.37		16.64	0.001913	4.15	72.34	25.29	0.43
2	15215.8*	25	351.00	11.62	16.86		17.12	0.001648	4.12	85.10	26.63	0.41
2	15215.8*	50	398.00	11.62	17.27		17.53	0.001502	4.14	96.12	27.73	0.39
2	15215.8*	100	438.00	11.62	17.49		17.77	0.001499	4.27	103.41	38.04	0.39
2	15215.8*	500	520.00	11.62	17.88		18.20	0.001516	4.54	122.30	58.06	0.40
2	15038.6*	10	300.00	11.27	16.15		16.35	0.001209	3.54	84.72	26.20	0.35
2	15038.6*	25	351.00	11.27	16.68		16.87	0.001063	3.56	98.69	27.25	0.33
2	15038.6*	50	398.00	11.27	17.10		17.30	0.000993	3.61	110.32	28.08	0.32
2	15038.6*	100	438.00	11.27	17.32		17.54	0.001015	3.75	118.03	44.72	0.33
2	15038.6*	500	520.00	11.27	17.71		17.96	0.001056	4.02	142.87	82.63	0.34
2	14861.4*	10	300.00	10.91	16.02		16.16	0.000756	3.01	99.69	26.90	0.28
2	14861.4*	25	351.00	10.91	16.56		16.71	0.000695	3.07	114.35	27.74	0.27
2	14861.4*	50	398.00	10.91	16.99		17.14	0.000670	3.15	126.31	28.42	0.26
2	14861.4*	100	438.00	10.91	17.21		17.38	0.000687	3.28	150.77	188.11	0.27
2	14861.4*	500	520.00	10.91	17.65		17.79	0.000576	3.15	301.61	408.77	0.25
2	14684.2*	10	300.00	10.56	15.94		16.05	0.000488	2.58	116.33	27.44	0.22
2	14684.2*	25	351.00	10.56	16.49		16.60	0.000446	2.61	173.57	277.64	0.21
2	14684.2*	50	398.00	10.56	16.97		17.04	0.000300	2.24	356.86	420.16	0.18
2	14684.2*	100	438.00	10.56	17.23		17.27	0.000241	2.06	468.21	464.27	0.16
2	14684.2*	500	520.00	10.56	17.68		17.71	0.000166	1.79	695.17	529.14	0.13
2	14507	10	300.00	10.90	15.88	12.67	15.95	0.000511	2.17	138.39	378.63	0.20
2	14507	25	351.00	10.90	16.43	12.86	16.51	0.000481	2.18	161.30	442.41	0.20
2	14507	50	398.00	10.90	16.98	13.03	16.99	0.000102	1.07	719.86	510.29	0.09
2	14507	100	438.00	10.90	17.23	13.16	17.24	0.000086	1.01	826.11	536.76	0.09
2	14507	500	520.00	10.90	17.68	13.45	17.68	0.000060	0.90	1126.03	552.65	0.07
2	14450											
		Culvert										
2	14339	10	300.00	10.74	15.76	12.50	15.83	0.000315	2.06	145.76	361.36	0.18
2	14339	25	351.00	10.74	16.30	12.69	16.33	0.000164	1.57	451.93	415.91	0.13
2	14339	50	398.00	10.74	16.77	12.84	16.78	0.000101	1.31	647.11	472.29	0.11
2	14339	100	438.00	10.74	16.96	12.97	16.97	0.000093	1.29	726.24	507.66	0.10
2	14339	500	520.00	10.74	17.29	13.22	17.30	0.000082	1.25	922.28	540.36	0.10
2	14140.5*	10	300.00	10.49	15.68	12.56	15.75	0.000559	2.09	143.32	298.14	0.19
2	14140.5*	25	351.00	10.49	16.20	12.75	16.27	0.000538	2.14	163.69	407.61	0.19

HEC-RAS Plan: Prop-17 River: School House Dlt Reach: 2 (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
2	14140.5*	50	398.00	10.49	16.67	12.92	16.74	0.000515	2.18	182.89	487.45	0.18
2	14140.5*	100	438.00	10.49	16.84	13.05	16.93	0.000561	2.30	190.45	518.00	0.19
2	14140.5*	500	520.00	10.49	17.27	13.31	17.28	0.000124	1.13	824.87	579.07	0.09
2	13942	10	300.00	10.25	15.54	12.48	15.62	0.000692	2.25	133.28	222.43	0.21
2	13942	25	351.00	10.25	16.07	12.68	16.15	0.000656	2.29	153.23	443.96	0.20
2	13942	50	398.00	10.25	16.54	12.86	16.63	0.000620	2.31	172.25	535.38	0.20
2	13942	100	438.00	10.25	16.71	13.01	16.80	0.000676	2.44	179.21	581.47	0.21
2	13942	500	520.00	10.25	17.11	13.29	17.22	0.000751	2.65	196.22	691.00	0.22
2	13758.*	10	300.00	10.02	15.41	12.33	15.49	0.000702	2.26	132.84	189.19	0.21
2	13758.*	25	351.00	10.02	15.95	12.55	16.03	0.000662	2.29	153.09	456.03	0.20
2	13758.*	50	398.00	10.02	16.43	12.72	16.51	0.000622	2.31	172.46	566.18	0.20
2	13758.*	100	438.00	10.02	16.59	12.87	16.68	0.000683	2.45	178.98	614.74	0.21
2	13758.*	500	520.00	10.02	16.97	13.15	17.08	0.000765	2.66	195.39	733.72	0.22
2	13574.*	10	300.00	9.60	15.28	12.17	15.36	0.000716	2.27	132.45	164.96	0.21
2	13574.*	25	351.00	9.60	15.83	12.38	15.91	0.000670	2.29	153.05	469.63	0.20
2	13574.*	50	398.00	9.60	16.31	12.58	16.40	0.000625	2.30	172.83	606.46	0.20
2	13574.*	100	438.00	9.60	16.46	12.72	16.55	0.000692	2.45	178.86	657.93	0.21
2	13574.*	500	520.00	9.60	16.92	13.01	16.96	0.000369	1.85	507.31	792.31	0.15
2	13390	10	300.00	9.16	15.22	11.89	15.28	0.000265	2.06	145.39	190.84	0.18
2	13390	25	351.00	9.16	15.76	12.11	15.83	0.000243	2.14	163.95	495.85	0.17
2	13390	50	398.00	9.16	16.27	12.29	16.32	0.000239	1.81	356.55	692.57	0.15
2	13390	100	438.00	9.16	16.42	12.44	16.47	0.000240	1.85	410.91	744.16	0.15
2	13390	500	520.00	9.16	16.88	12.72	16.92	0.000176	1.68	603.47	799.00	0.13
2	13339	10	300.00	8.96	15.21	11.72	15.26	0.000469	1.89	158.40	48.50	0.18
2	13339	25	351.00	8.96	15.76	11.94	15.81	0.000435	1.91	183.62	429.49	0.17
2	13339	50	398.00	8.96	16.24	12.12	16.30	0.000405	1.92	207.54	743.84	0.17
2	13339	100	438.00	8.96	16.38	12.27	16.45	0.000449	2.04	214.67	759.82	0.18
2	13339	500	520.00	8.96	16.88	12.55	16.90	0.000245	1.57	574.49	806.28	0.13
2	13240.1	10	384.00	8.90	15.11	11.98	15.20	0.000764	2.42	158.79	44.45	0.23
2	13240.1	25	451.00	8.90	15.66	12.22	15.75	0.000713	2.45	184.23	403.71	0.22
2	13240.1	50	514.00	8.90	16.15	12.44	16.25	0.000670	2.47	208.36	743.77	0.21
2	13240.1	100	567.00	8.90	16.28	12.61	16.39	0.000752	2.64	214.86	758.00	0.23
2	13240.1	500	678.00	8.90	16.83	12.94	16.87	0.000350	1.89	631.37	806.45	0.16
2	13042.4*	10	384.00	8.79	14.97	11.77	15.05	0.000720	2.36	162.50	77.72	0.22
2	13042.4*	25	451.00	8.79	15.53	12.02	15.62	0.000669	2.39	188.79	440.82	0.21
2	13042.4*	50	514.00	8.79	16.03	12.23	16.12	0.000627	2.41	213.71	748.58	0.21
2	13042.4*	100	567.00	8.79	16.14	12.40	16.24	0.000711	2.58	219.43	760.52	0.22
2	13042.4*	500	678.00	8.79	16.82	12.73	16.83	0.000126	1.16	1224.69	809.47	0.09
2	12844.7*	10	384.00	8.68	14.83	11.56	14.91	0.000672	2.30	166.89	154.51	0.21
2	12844.7*	25	451.00	8.68	15.40	11.81	15.49	0.000623	2.32	194.07	453.87	0.21
2	12844.7*	50	514.00	8.68	15.91	12.02	16.00	0.000582	2.34	219.81	753.20	0.20
2	12844.7*	100	567.00	8.68	16.00	12.19	16.10	0.000669	2.52	224.72	763.12	0.22
2	12844.7*	500	678.00	8.68	16.80	12.51	16.80	0.000093	1.01	1361.21	810.40	0.08
2	12647.*	10	384.00	8.57	14.71	11.35	14.78	0.000625	2.24	171.56	235.77	0.21
2	12647.*	25	451.00	8.57	15.29	11.59	15.37	0.000578	2.26	199.60	439.10	0.20
2	12647.*	50	514.00	8.57	15.80	11.80	15.88	0.000540	2.27	226.11	756.53	0.19
2	12647.*	100	567.00	8.57	15.99	11.97	16.01	0.000203	1.42	709.59	772.74	0.12
2	12647.*	500	678.00	8.57	16.78	12.29	16.79	0.000069	0.89	1500.83	811.26	0.07
2	12449.3	10	500.00	8.38	14.49	11.51	14.62	0.001037	2.89	172.97	270.63	0.26
2	12449.3	25	590.00	8.38	15.08	11.80	15.21	0.000963	2.93	201.63	403.12	0.26
2	12449.3	50	675.00	8.38	15.60	12.04	15.74	0.000904	2.95	228.70	652.19	0.25
2	12449.3	100	748.00	8.38	15.95	12.23	15.97	0.000236	1.56	839.14	773.94	0.13
2	12449.3	500	900.00	8.38	16.76	12.61	16.77	0.000091	1.05	1639.68	812.03	0.08
2	12251.6*	10	500.00	8.13	14.29	11.26	14.41	0.001000	2.85	175.32	185.98	0.26
2	12251.6*	25	590.00	8.13	14.90	11.54	15.02	0.000923	2.88	204.93	323.65	0.25
2	12251.6*	50	675.00	8.13	15.43	11.79	15.56	0.000862	2.90	232.86	557.77	0.25
2	12251.6*	100	748.00	8.13	15.89	11.98	15.92	0.000266	1.68	781.27	771.15	0.14
2	12251.6*	500	900.00	8.13	16.74	12.37	16.75	0.000097	1.10	1590.50	810.67	0.08
2	12054	10	500.00	7.89	14.10	11.02	14.22	0.000967	2.82	177.59	135.83	0.26
2	12054	25	590.00	7.89	14.72	11.30	14.84	0.000885	2.83	208.21	244.10	0.25
2	12054	50	675.00	7.89	15.36	11.55	15.42	0.000449	2.12	525.47	478.37	0.18
2	12054	100	748.00	7.89	15.83	11.75	15.86	0.000300	1.81	720.27	767.96	0.15
2	12054	500	900.00	7.89	16.72	12.13	16.73	0.000103	1.16	1541.12	809.28	0.09

HEC-RAS Plan: Prop-17 River: School House Dlt Reach: 2 (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
2	12025	10	500.00	7.85	14.08	10.39	14.20	0.000465	2.82	177.15	128.10	0.21
2	12025	25	590.00	7.85	14.68	10.63	14.82	0.000475	3.00	196.64	211.32	0.21
2	12025	50	675.00	7.85	15.24	10.84	15.39	0.000481	3.15	214.61	370.88	0.22
2	12025	100	748.00	7.85	15.67	11.02	15.84	0.000492	3.27	228.56	656.38	0.22
2	12025	500	900.00	7.85	16.71	11.37	16.73	0.000092	1.50	1501.17	810.20	0.09
2	12015		Culvert									
2	11970	10	500.00	7.78	13.93	10.25	14.05	0.000433	2.75	181.88	131.08	0.21
2	11970	25	590.00	7.78	14.52	10.49	14.65	0.000443	2.92	201.92	226.93	0.21
2	11970	50	675.00	7.78	15.06	10.70	15.21	0.000448	3.06	220.52	311.49	0.21
2	11970	100	748.00	7.78	15.48	10.87	15.63	0.000457	3.18	234.92	525.56	0.22
2	11970	500	900.00	7.78	16.30	11.22	16.48	0.000473	3.41	263.87	751.05	0.22
2	11918	10	500.00	7.72	13.89	10.85	14.01	0.000993	2.84	175.80	287.94	0.26
2	11918	25	590.00	7.72	14.49	11.13	14.62	0.000920	2.88	205.21	374.00	0.25
2	11918	50	675.00	7.72	15.04	11.37	15.17	0.000851	2.88	233.99	391.47	0.24
2	11918	100	748.00	7.72	15.46	11.58	15.59	0.000814	2.91	257.29	564.56	0.24
2	11918	500	900.00	7.72	16.35	11.95	16.42	0.000445	2.34	624.41	804.13	0.18
2	11764	10	500.00	7.52	13.74	10.65	13.86	0.000958	2.81	178.21	47.31	0.25
2	11764	25	590.00	7.52	14.35	10.93	14.48	0.000883	2.83	208.41	50.99	0.25
2	11764	50	675.00	7.52	14.92	11.18	15.04	0.000814	2.84	237.98	229.12	0.24
2	11764	100	748.00	7.52	15.34	11.38	15.47	0.000777	2.86	261.79	458.28	0.23
2	11764	500	900.00	7.52	16.28	11.76	16.35	0.000438	2.34	613.04	785.48	0.18
2	11680	10	500.00	7.42	13.66	10.55	13.78	0.000944	2.79	179.23	47.44	0.25
2	11680	25	590.00	7.42	14.28	10.83	14.40	0.000867	2.81	209.85	51.17	0.24
2	11680	50	675.00	7.42	14.85	11.08	14.97	0.000798	2.81	239.85	54.57	0.24
2	11680	100	748.00	7.42	15.28	11.27	15.40	0.000761	2.83	263.93	122.86	0.23
2	11680	500	900.00	7.42	16.21	11.66	16.31	0.000532	2.59	492.43	753.45	0.20
2	11531.5*	10	500.00	7.23	13.40		13.63	0.000930	3.86	129.69	26.63	0.31
2	11531.5*	25	590.00	7.23	14.01		14.26	0.000926	4.03	146.22	27.84	0.31
2	11531.5*	50	675.00	7.23	14.56		14.83	0.000912	4.17	161.95	28.78	0.31
2	11531.5*	100	748.00	7.23	14.98		15.26	0.000917	4.30	174.10	29.48	0.31
2	11531.5*	500	900.00	7.23	15.96		16.20	0.000740	4.13	342.11	392.46	0.28
2	11383	10	500.00	7.05	13.39	9.45	13.51	0.000433	2.79	179.50	31.25	0.20
2	11383	25	590.00	7.05	13.99	9.69	14.13	0.000449	2.97	198.56	31.58	0.21
2	11383	50	675.00	7.05	14.55	9.91	14.70	0.000458	3.12	216.31	34.13	0.21
2	11383	100	748.00	7.05	14.97	10.09	15.13	0.000465	3.25	233.90	49.86	0.21
2	11383	500	900.00	7.05	15.96	10.46	16.10	0.000361	3.10	497.29	470.75	0.19
2	11349		Culvert									
2	11319	10	500.00	6.97	13.26		13.37	0.000395	2.68	186.45	34.65	0.20
2	11319	25	590.00	6.97	13.84		13.97	0.000405	2.85	207.00	35.33	0.21
2	11319	50	675.00	6.97	14.38		14.52	0.000410	2.98	226.23	35.95	0.21
2	11319	100	748.00	6.97	14.78		14.93	0.000420	3.11	240.76	36.41	0.21
2	11319	500	900.00	6.97	15.67		15.83	0.000405	3.23	342.59	337.20	0.21
2	11158.6*	10	500.00	6.60	13.21		13.29	0.000440	2.24	223.36	48.65	0.18
2	11158.6*	25	590.00	6.60	13.80		13.89	0.000466	2.33	253.11	52.19	0.19
2	11158.6*	50	675.00	6.60	14.35		14.44	0.000477	2.39	282.38	55.45	0.19
2	11158.6*	100	748.00	6.60	14.75		14.84	0.000491	2.45	305.31	57.67	0.19
2	11158.6*	500	900.00	6.60	15.66		15.74	0.000425	2.34	517.09	412.87	0.17
2	10998.3*	10	500.00	6.10	13.15		13.22	0.000407	2.12	235.34	49.49	0.17
2	10998.3*	25	590.00	6.10	13.74		13.81	0.000434	2.22	265.36	53.01	0.18
2	10998.3*	50	675.00	6.10	14.28		14.36	0.000447	2.29	294.96	56.26	0.18
2	10998.3*	100	748.00	6.10	14.68		14.77	0.000458	2.34	332.94	159.24	0.18
2	10998.3*	500	900.00	6.10	15.61		15.68	0.000359	2.13	611.34	432.67	0.16
2	10838	10	500.00	5.60	13.09	7.83	13.16	0.000378	2.02	247.33	50.34	0.16
2	10838	25	590.00	5.60	13.67	8.09	13.74	0.000406	2.13	277.61	53.82	0.16
2	10838	50	675.00	5.60	14.21	8.32	14.29	0.000418	2.19	315.33	123.61	0.17
2	10838	100	748.00	5.60	14.62	8.52	14.69	0.000414	2.21	387.98	229.04	0.16
2	10838	500	900.00	5.60	15.57	8.91	15.62	0.000293	1.92	712.83	454.07	0.14
2	10803		Culvert									
2	10760	10	500.00	5.50	13.00		13.06	0.000335	1.97	254.18	50.39	0.15
2	10760	25	590.00	5.50	13.56		13.63	0.000367	2.08	284.19	94.09	0.16
2	10760	50	675.00	5.50	14.05		14.12	0.000359	2.13	357.45	171.67	0.16
2	10760	100	748.00	5.50	14.40		14.47	0.000350	2.15	422.87	201.04	0.16

HEC-RAS Plan: Prop-17 River: School House Dit Reach: 2 (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
2	10760	500	900.00	5.50	15.20		15.26	0.000298	2.08	627.95	350.84	0.15
2	10651.5*	10	500.00	6.02	12.94		13.02	0.000514	2.26	220.90	50.83	0.19
2	10651.5*	25	590.00	6.02	13.49		13.58	0.000536	2.36	250.00	54.16	0.19
2	10651.5*	50	675.00	6.02	13.99		14.07	0.000509	2.39	317.28	166.90	0.19
2	10651.5*	100	748.00	6.02	14.34		14.42	0.000480	2.38	381.90	196.68	0.18
2	10651.5*	500	900.00	6.02	15.15		15.22	0.000390	2.25	583.62	338.50	0.16
2	10543	10	500.00	6.00	12.86		12.96	0.000494	2.48	201.56	41.62	0.20
2	10543	25	590.00	6.00	13.41		13.52	0.000525	2.63	224.76	43.27	0.20
2	10543	50	675.00	6.00	13.90		14.01	0.000511	2.70	277.47	147.43	0.20
2	10543	100	748.00	6.00	14.26		14.37	0.000485	2.73	335.10	176.16	0.20
2	10543	500	900.00	6.00	15.08		15.18	0.000385	2.64	517.94	311.66	0.18
2	10521	10	500.00	5.97	12.86		12.95	0.000500	2.37	211.33	51.35	0.21
2	10521	25	590.00	5.97	13.41		13.50	0.000521	2.45	240.45	54.64	0.21
2	10521	50	675.00	5.97	13.90		14.00	0.000532	2.52	268.01	57.59	0.21
2	10521	100	748.00	5.97	14.25		14.36	0.000536	2.59	292.59	93.59	0.21
2	10521	500	900.00	5.97	15.07		15.17	0.000460	2.55	440.12	293.69	0.19
2	10385	10	500.00	5.40	12.82	7.53	12.88	0.000359	1.94	257.83	52.14	0.15
2	10385	25	590.00	5.40	13.37	7.78	13.43	0.000383	2.05	287.57	60.70	0.16
2	10385	50	675.00	5.40	13.86	8.01	13.93	0.000386	2.14	322.31	81.09	0.16
2	10385	100	748.00	5.40	14.21	8.19	14.29	0.000386	2.21	356.29	133.96	0.16
2	10385	500	900.00	5.40	15.04	8.55	15.11	0.000310	2.17	574.11	392.21	0.15
2	10321		Culvert									
2	10270	10	500.00	5.20	12.73	7.31	12.78	0.000212	1.83	273.12	52.40	0.14
2	10270	25	590.00	5.20	13.25	7.56	13.31	0.000235	1.96	301.18	90.48	0.15
2	10270	50	675.00	5.20	13.68	7.77	13.75	0.000255	2.07	325.90	129.51	0.15
2	10270	100	748.00	5.20	13.98	7.95	14.06	0.000276	2.18	343.65	156.51	0.16
2	10270	500	900.00	5.20	14.67	8.31	14.73	0.000248	2.16	520.79	190.36	0.15
2	10156	10	730.00	5.48	12.47		12.69	0.001133	3.82	191.32	41.92	0.31
2	10156	25	870.00	5.48	12.95		13.21	0.001255	4.10	212.58	54.10	0.33
2	10156	50	1002.00	5.48	13.35		13.64	0.001349	4.33	241.90	90.72	0.34
2	10156	100	1117.00	5.48	13.63		13.94	0.001441	4.53	270.27	115.60	0.35
2	10156	500	1358.00	5.48	14.32		14.63	0.001404	4.61	371.43	177.95	0.34
2	10061	10	730.00	5.36	12.41	9.07	12.60	0.000706	3.49	209.30	105.01	0.28
2	10061	25	870.00	5.36	12.89	9.41	13.11	0.000763	3.76	231.19	127.19	0.30
2	10061	50	1002.00	5.36	13.28	9.72	13.53	0.000815	4.01	250.12	145.69	0.31
2	10061	100	1117.00	5.36	13.55	9.97	13.83	0.000883	4.25	262.97	157.91	0.32
2	10061	500	1358.00	5.36	14.19	10.45	14.52	0.000949	4.59	295.54	187.83	0.34
2	9979	10	730.00	5.25	12.35	9.05	12.52	0.001140	3.28	222.30	145.38	0.28
2	9979	25	870.00	5.25	12.83	9.41	13.02	0.001212	3.51	248.07	163.18	0.29
2	9979	50	1002.00	5.25	13.23	9.73	13.44	0.001278	3.70	270.63	179.78	0.30
2	9979	100	1117.00	5.25	13.49	9.97	13.72	0.001373	3.91	285.94	206.81	0.31
2	9979	500	1358.00	5.25	14.14	10.45	14.41	0.001440	4.17	325.70	273.90	0.32
2	9919		Bridge									
2	9847	10	730.00	5.09	12.07	8.90	12.25	0.001229	3.38	216.06	360.24	0.29
2	9847	25	870.00	5.09	12.54	9.26	12.75	0.001306	3.61	241.17	423.70	0.30
2	9847	50	1002.00	5.09	12.94	9.57	13.16	0.001377	3.81	263.07	476.45	0.31
2	9847	100	1117.00	5.09	13.30	9.81	13.54	0.001397	3.93	284.10	525.16	0.32
2	9847	500	1358.00	5.09	13.91	10.29	14.18	0.001493	4.23	321.27	591.68	0.33
2	9650.66*	10	730.00	4.81	11.83	8.65	12.01	0.001221	3.37	216.59	354.06	0.29
2	9650.66*	25	870.00	4.81	12.29	9.00	12.49	0.001312	3.61	240.75	403.41	0.30
2	9650.66*	50	1002.00	4.81	12.66	9.31	12.89	0.001397	3.83	261.64	444.19	0.31
2	9650.66*	100	1117.00	4.81	13.02	9.56	13.26	0.001420	3.96	282.34	483.07	0.32
2	9650.66*	500	1358.00	4.81	13.60	10.04	13.89	0.001534	4.27	317.90	542.82	0.33
2	9454.33*	10	730.00	4.43	11.59	8.40	11.77	0.001217	3.37	216.88	347.45	0.29
2	9454.33*	25	870.00	4.43	12.03	8.76	12.23	0.001325	3.63	239.86	387.12	0.30
2	9454.33*	50	1002.00	4.43	12.38	9.07	12.61	0.001427	3.86	259.53	419.61	0.32
2	9454.33*	100	1117.00	4.43	12.73	9.32	12.98	0.001454	3.99	279.81	451.90	0.32
2	9454.33*	500	1358.00	4.43	13.29	9.80	13.58	0.001593	4.33	313.42	502.98	0.34
2	9258	10	730.00	4.06	11.36	8.14	11.53	0.001203	3.35	217.77	340.08	0.29
2	9258	25	870.00	4.06	11.76	8.50	11.97	0.001331	3.63	239.42	372.63	0.31
2	9258	50	1002.00	4.06	12.09	8.81	12.33	0.001455	3.89	257.64	398.91	0.32
2	9258	100	1117.00	4.06	12.44	9.06	12.69	0.001487	4.03	277.44	426.48	0.33



HEC-RAS Plan: Prop-17 River: School House Dit Reach: 2 (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
2	7298	10	730.00	2.24	9.34	7.08	9.73	0.001747	4.98	146.68	563.58	0.43
2	7298	25	870.00	2.24	9.09	7.49	9.71	0.002936	6.31	137.86	544.40	0.56
2	7298	50	1002.00	2.24	9.21	7.85	9.98	0.003599	7.08	141.94	553.33	0.62
2	7298	100	1117.00	2.24	9.31	8.13	10.23	0.004171	7.67	145.64	561.34	0.67
2	7298	500	1358.00	2.24	9.50	8.67	10.74	0.005445	8.91	152.47	575.91	0.76
2	7109.66*	10	730.00	2.04	8.97	6.86	9.38	0.001888	5.16	141.43	647.83	0.45
2	7109.66*	25	870.00	2.04	9.40	7.27	9.43	0.000226	1.85	1007.17	695.42	0.16
2	7109.66*	50	1002.00	2.04	9.63	7.61	9.65	0.000222	1.89	1116.75	711.64	0.16
2	7109.66*	100	1117.00	2.04	9.83	7.90	9.85	0.000215	1.90	1216.47	728.22	0.16
2	7109.66*	500	1358.00	2.04	10.24	8.44	10.27	0.000197	1.91	1421.63	751.56	0.15
2	6921.33*	10	730.00	1.85	9.15	6.67	9.18	0.000213	1.88	929.86	797.21	0.15
2	6921.33*	25	870.00	1.85	9.36	7.08	9.38	0.000222	1.97	1042.99	819.96	0.16
2	6921.33*	50	1002.00	1.85	9.58	7.44	9.61	0.000215	1.98	1167.69	844.78	0.16
2	6921.33*	100	1117.00	1.85	9.79	7.72	9.81	0.000204	1.97	1281.88	863.26	0.15
2	6921.33*	500	1358.00	1.85	10.21	8.27	10.23	0.000184	1.95	1515.89	899.28	0.15
2	6733	10	778.00	1.65	9.10	7.53	9.13	0.000256	2.12	925.26	918.22	0.17
2	6733	25	928.00	1.65	9.30	7.71	9.34	0.000276	2.24	1043.59	957.28	0.18
2	6733	50	1071.00	1.65	9.53	7.85	9.56	0.000267	2.25	1183.76	982.73	0.18
2	6733	100	1194.00	1.65	9.74	7.95	9.77	0.000247	2.20	1313.77	988.40	0.17
2	6733	500	1455.00	1.65	10.19	8.14	10.20	0.000091	1.39	2536.84	1000.00	0.10
2	6683	10	778.00	1.04	9.08	5.91	9.12	0.000274	2.10	777.04	789.79	0.17
2	6683	25	928.00	1.04	9.28	6.40	9.32	0.000298	2.23	861.96	797.09	0.18
2	6683	50	1071.00	1.04	9.53	6.82	9.55	0.000128	1.50	1669.96	800.00	0.12
2	6683	100	1194.00	1.04	9.74	7.14	9.76	0.000119	1.50	1837.14	800.00	0.12
2	6683	500	1455.00	1.04	10.19	7.74	10.20	0.000104	1.47	2191.08	800.00	0.11
2	6490.4*	10	778.00	1.14	8.93	5.93	9.04	0.000588	3.02	500.69	757.97	0.26
2	6490.4*	25	928.00	1.14	9.24	6.39	9.27	0.000212	1.88	1229.43	801.93	0.16
2	6490.4*	50	1071.00	1.14	9.50	6.77	9.52	0.000187	1.84	1433.98	810.00	0.15
2	6490.4*	100	1194.00	1.14	9.71	7.08	9.73	0.000169	1.79	1606.50	810.00	0.14
2	6490.4*	500	1455.00	1.14	10.16	7.66	10.17	0.000138	1.72	1970.17	810.00	0.13
2	6297.8*	10	778.00	1.24	8.89	5.92	8.93	0.000335	2.28	803.87	688.72	0.19
2	6297.8*	25	928.00	1.24	9.18	6.36	9.22	0.000286	2.20	1010.67	722.37	0.18
2	6297.8*	50	1071.00	1.24	9.44	6.73	9.47	0.000252	2.14	1202.83	752.30	0.17
2	6297.8*	100	1194.00	1.24	9.66	7.02	9.69	0.000227	2.10	1369.95	777.38	0.16
2	6297.8*	500	1455.00	1.24	10.12	7.58	10.14	0.000183	1.99	1738.34	820.00	0.15
2	6105.2*	10	778.00	1.35	8.80	5.91	8.86	0.000403	2.50	649.60	558.30	0.21
2	6105.2*	25	928.00	1.35	9.10	6.32	9.16	0.000350	2.43	846.87	649.50	0.20
2	6105.2*	50	1071.00	1.35	9.37	6.67	9.42	0.000308	2.37	1026.12	679.26	0.19
2	6105.2*	100	1194.00	1.35	9.60	6.96	9.64	0.000277	2.32	1181.99	704.12	0.18
2	6105.2*	500	1455.00	1.35	10.07	7.50	10.10	0.000222	2.20	1525.64	756.04	0.17
2	5912.6*	10	778.00	1.45	8.71	5.88	8.78	0.000422	2.57	628.30	453.05	0.22
2	5912.6*	25	928.00	1.45	9.03	6.28	9.09	0.000377	2.53	771.46	459.57	0.21
2	5912.6*	50	1071.00	1.45	9.30	6.61	9.36	0.000341	2.49	909.76	564.11	0.20
2	5912.6*	100	1194.00	1.45	9.53	6.88	9.58	0.000311	2.45	1047.56	629.57	0.19
2	5912.6*	500	1455.00	1.45	10.02	7.41	10.06	0.000251	2.35	1366.96	687.56	0.18
2	5720	10	778.00	1.55	8.62	5.84	8.70	0.000449	2.67	602.31	459.55	0.23
2	5720	25	928.00	1.55	8.95	6.22	9.01	0.000393	2.59	753.47	467.79	0.22
2	5720	50	1071.00	1.55	9.23	6.55	9.29	0.000352	2.54	887.52	469.63	0.21
2	5720	100	1194.00	1.55	9.47	6.81	9.52	0.000323	2.49	999.35	483.39	0.20
2	5720	500	1455.00	1.55	9.96	8.22	10.01	0.000267	2.42	1264.62	594.17	0.18
2	5666		Bridge									
2	5640	10	778.00	1.55	8.37	5.84	8.49	0.000672	3.16	488.47	453.26	0.28
2	5640	25	928.00	1.55	8.63	6.22	8.74	0.000631	3.16	606.15	459.77	0.27
2	5640	50	1071.00	1.55	8.84	6.55	8.94	0.000609	3.19	704.41	465.13	0.27
2	5640	100	1194.00	1.55	9.01	6.81	9.11	0.000595	3.21	783.17	469.16	0.27
2	5640	500	1455.00	1.55	9.33	8.22	9.43	0.000571	3.26	934.41	469.84	0.26
2	5444.*	10	778.00	1.26	8.26		8.36	0.000573	3.00	517.55	453.47	0.26
2	5444.*	25	928.00	1.26	8.52		8.62	0.000543	3.01	637.68	459.56	0.25
2	5444.*	50	1071.00	1.26	8.74		8.83	0.000529	3.05	736.90	464.20	0.25
2	5444.*	100	1194.00	1.26	8.91		9.00	0.000519	3.08	816.16	467.67	0.25
2	5444.*	500	1455.00	1.26	9.23		9.32	0.000502	3.15	970.17	494.97	0.25
2	5248.*	10	778.00	0.97	8.17		8.26	0.000474	2.80	557.76	454.44	0.24
2	5248.*	25	928.00	0.97	8.43		8.52	0.000454	2.83	679.30	459.33	0.23

HEC-RAS Plan: Prop-17 River: School House Dlt Reach: 2 (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
2	5248.*	50	1071.00	0.97	8.65		8.73	0.000448	2.89	778.68	463.24	0.23
2	5248.*	100	1194.00	0.97	8.82		8.90	0.000443	2.93	858.45	477.92	0.23
2	5248.*	500	1455.00	0.97	9.15		9.23	0.000433	3.03	1021.30	521.73	0.23
2	5052.*	10	778.00	0.68	8.09		8.17	0.000390	2.62	601.20	454.44	0.21
2	5052.*	25	928.00	0.68	8.36		8.43	0.000379	2.67	723.18	458.73	0.21
2	5052.*	50	1071.00	0.68	8.57		8.65	0.000377	2.74	824.22	483.26	0.21
2	5052.*	100	1194.00	0.68	8.75		8.82	0.000376	2.80	908.41	503.78	0.22
2	5052.*	500	1455.00	0.68	9.07		9.14	0.000373	2.90	1078.62	539.48	0.22
2	4856.*	10	778.00	0.39	8.03		8.10	0.000315	2.43	653.71	454.25	0.19
2	4856.*	25	928.00	0.39	8.30		8.36	0.000310	2.50	778.66	482.30	0.19
2	4856.*	50	1071.00	0.39	8.51		8.58	0.000313	2.58	884.42	505.34	0.20
2	4856.*	100	1194.00	0.39	8.88		8.75	0.000314	2.64	971.89	522.52	0.20
2	4856.*	500	1455.00	0.39	9.01		9.07	0.000317	2.76	1146.94	551.42	0.20
2	4660	10	1111.00	0.10	7.87		8.00	0.000599	3.43	661.09	466.27	0.27
2	4660	25	1334.00	0.10	8.14		8.27	0.000604	3.57	788.47	491.31	0.27
2	4660	50	1547.00	0.10	8.35		8.48	0.000622	3.71	893.45	511.02	0.28
2	4660	100	1733.00	0.10	8.51		8.65	0.000636	3.83	979.49	526.47	0.28
2	4660	500	2128.00	0.10	8.83		8.97	0.000660	4.05	1151.36	550.45	0.29
2	4470.*	10	1111.00	-0.17	7.77		7.89	0.000520	3.29	696.70	480.17	0.25
2	4470.*	25	1334.00	-0.17	8.04		8.16	0.000532	3.44	825.95	502.19	0.26
2	4470.*	50	1547.00	-0.17	8.24		8.37	0.000555	3.60	930.45	519.32	0.26
2	4470.*	100	1733.00	-0.17	8.40		8.53	0.000574	3.73	1015.59	532.82	0.27
2	4470.*	500	2128.00	-0.17	8.72		8.85	0.000605	3.96	1185.23	552.33	0.28
2	4280.*	10	1111.00	-0.44	7.69		7.80	0.000441	3.12	746.01	492.13	0.23
2	4280.*	25	1334.00	-0.44	7.95		8.06	0.000459	3.28	876.06	511.66	0.24
2	4280.*	50	1547.00	-0.44	8.15		8.27	0.000486	3.46	979.35	526.65	0.25
2	4280.*	100	1733.00	-0.44	8.31		8.43	0.000508	3.59	1063.09	537.88	0.26
2	4280.*	500	2128.00	-0.44	8.81		8.74	0.000546	3.85	1229.29	553.71	0.27
2	4090.*	10	1111.00	-0.72	7.63		7.72	0.000373	2.96	799.98	502.01	0.22
2	4090.*	25	1334.00	-0.72	7.88		7.98	0.000395	3.13	929.90	519.33	0.22
2	4090.*	50	1547.00	-0.72	8.07		8.18	0.000424	3.31	1031.34	532.47	0.23
2	4090.*	100	1733.00	-0.72	8.23		8.33	0.000448	3.46	1113.14	541.31	0.24
2	4090.*	500	2128.00	-0.72	8.52		8.64	0.000491	3.73	1275.27	555.28	0.25
2	3900.*	10	1111.00	-0.99	7.57		7.65	0.000313	2.79	862.45	510.94	0.20
2	3900.*	25	1334.00	-0.99	7.82		7.90	0.000337	2.97	991.81	526.52	0.21
2	3900.*	50	1547.00	-0.99	8.01		8.10	0.000367	3.16	1091.20	537.20	0.22
2	3900.*	100	1733.00	-0.99	8.15		8.25	0.000392	3.32	1170.82	544.37	0.23
2	3900.*	500	2128.00	-0.99	8.44		8.55	0.000438	3.61	1328.44	556.71	0.24
2	3710.*	10	1111.00	-1.26	7.52		7.59	0.000261	2.62	932.12	518.72	0.18
2	3710.*	25	1334.00	-1.26	7.77		7.84	0.000285	2.81	1060.58	532.30	0.19
2	3710.*	50	1547.00	-1.26	7.95		8.03	0.000315	3.00	1157.61	540.99	0.20
2	3710.*	100	1733.00	-1.26	8.09		8.18	0.000340	3.17	1234.98	547.08	0.21
2	3710.*	500	2128.00	-1.26	8.37		8.47	0.000388	3.47	1387.89	558.09	0.23
2	3520.*	10	1111.00	-1.53	7.49		7.55	0.000217	2.46	1005.90	525.57	0.17
2	3520.*	25	1334.00	-1.53	7.72		7.79	0.000241	2.65	1133.05	536.16	0.18
2	3520.*	50	1547.00	-1.53	7.90		7.97	0.000271	2.85	1227.63	543.98	0.19
2	3520.*	100	1733.00	-1.53	8.04		8.12	0.000295	3.02	1302.69	549.06	0.20
2	3520.*	500	2128.00	-1.53	8.30		8.40	0.000343	3.34	1450.75	558.95	0.22
2	3330.*	10	1111.00	-1.80	7.45		7.50	0.000181	2.30	1084.57	530.04	0.15
2	3330.*	25	1334.00	-1.80	7.69		7.75	0.000204	2.50	1210.26	539.83	0.16
2	3330.*	50	1547.00	-1.80	7.86		7.92	0.000232	2.71	1302.55	546.48	0.18
2	3330.*	100	1733.00	-1.80	7.99		8.06	0.000255	2.88	1375.41	551.05	0.19
2	3330.*	500	2128.00	-1.80	8.25		8.33	0.000302	3.20	1518.81	559.93	0.20
2	3140.*	10	1111.00	-2.08	7.43		7.47	0.000152	2.16	1165.55	534.07	0.14
2	3140.*	25	1334.00	-2.08	7.66		7.71	0.000173	2.36	1289.82	543.11	0.15
2	3140.*	50	1547.00	-2.08	7.82		7.88	0.000199	2.57	1379.95	548.66	0.16
2	3140.*	100	1733.00	-2.08	7.95		8.01	0.000221	2.74	1450.72	552.81	0.17
2	3140.*	500	2128.00	-2.08	8.20		8.28	0.000266	3.07	1589.65	560.86	0.19
2	2950.*	10	1111.00	-2.35	7.41		7.44	0.000128	2.04	1247.77	537.49	0.13
2	2950.*	25	1334.00	-2.35	7.63		7.68	0.000148	2.24	1370.65	545.57	0.14
2	2950.*	50	1547.00	-2.35	7.79		7.84	0.000171	2.44	1458.71	550.44	0.15
2	2950.*	100	1733.00	-2.35	7.92		7.97	0.000192	2.61	1527.53	554.21	0.16
2	2950.*	500	2128.00	-2.35	8.16		8.23	0.000235	2.94	1662.19	561.53	0.18

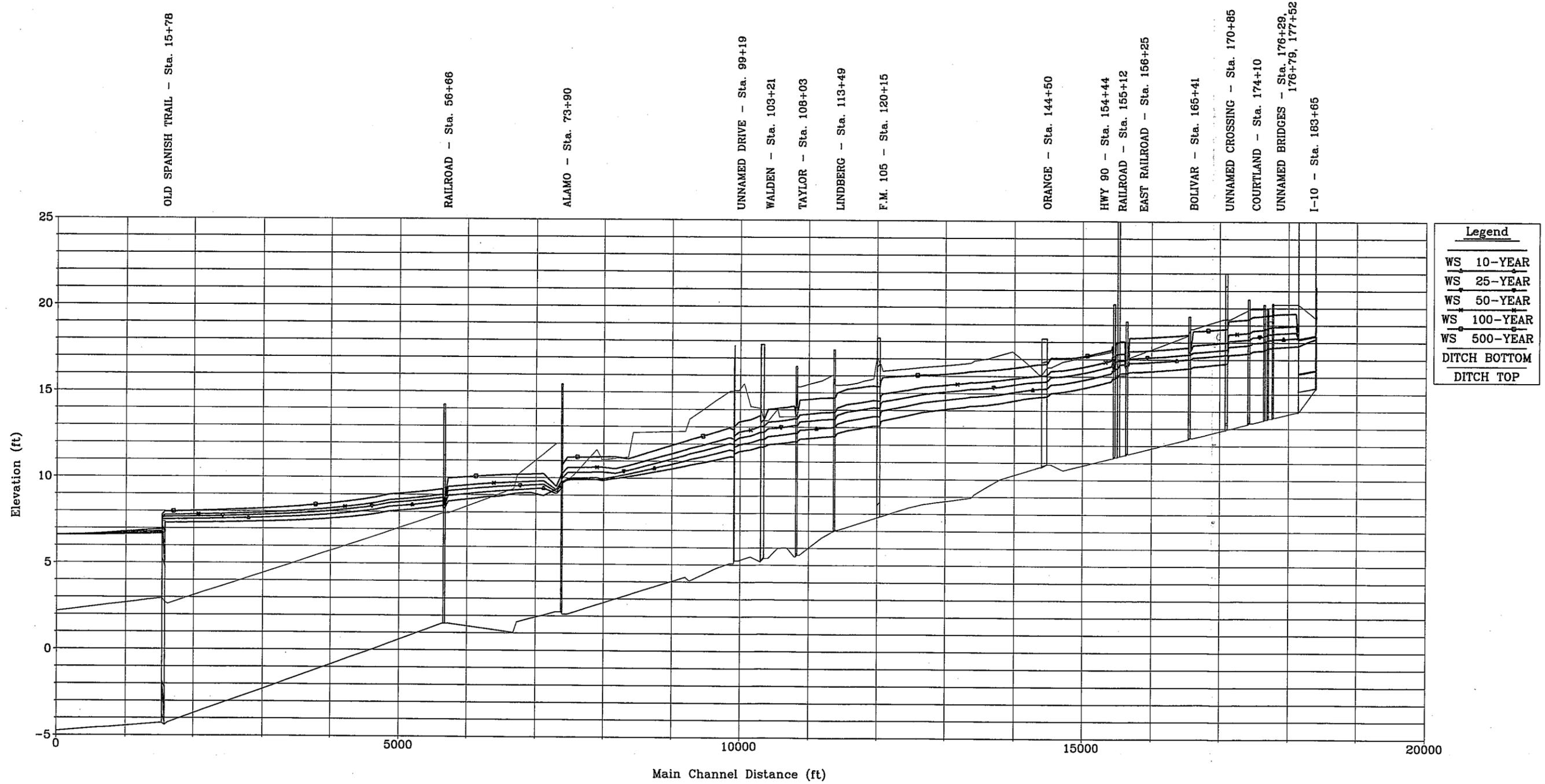
HEC-RAS Plan: Prop-17 River: School House Dit Reach: 2 (Continued)

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
2	2760.*	10	1111.00	-2.62	7.39		7.42	0.000108	1.92	1335.05	540.17	0.12
2	2760.*	25	1334.00	-2.62	7.61		7.65	0.000126	2.11	1456.55	547.21	0.13
2	2760.*	50	1547.00	-2.62	7.77		7.81	0.000147	2.32	1542.66	551.69	0.14
2	2760.*	100	1733.00	-2.62	7.89		7.94	0.000167	2.48	1609.64	555.16	0.15
2	2760.*	500	2128.00	-2.62	8.12		8.18	0.000206	2.82	1740.29	561.86	0.17
2	2570.*	10	1111.00	-2.89	7.37		7.40	0.000092	1.81	1419.97	542.74	0.11
2	2570.*	25	1334.00	-2.89	7.59		7.62	0.000109	2.01	1540.19	548.84	0.12
2	2570.*	50	1547.00	-2.89	7.74		7.78	0.000128	2.20	1624.56	552.99	0.13
2	2570.*	100	1733.00	-2.89	7.86		7.91	0.000146	2.37	1689.87	556.19	0.14
2	2570.*	500	2128.00	-2.89	8.09		8.14	0.000183	2.70	1816.82	562.35	0.16
2	2380.*	10	1111.00	-3.16	7.36		7.38	0.000078	1.71	1507.89	544.48	0.10
2	2380.*	25	1334.00	-3.16	7.57		7.60	0.000094	1.90	1626.87	550.08	0.11
2	2380.*	50	1547.00	-3.16	7.72		7.76	0.000111	2.10	1709.62	553.93	0.12
2	2380.*	100	1733.00	-3.16	7.84		7.88	0.000127	2.26	1773.40	556.89	0.13
2	2380.*	500	2128.00	-3.16	8.06		8.11	0.000162	2.59	1896.89	562.56	0.15
2	2190.*	10	1111.00	-3.43	7.35		7.37	0.000067	1.62	1596.64	545.82	0.10
2	2190.*	25	1334.00	-3.43	7.56		7.59	0.000081	1.81	1714.47	551.07	0.11
2	2190.*	50	1547.00	-3.43	7.71		7.74	0.000097	2.00	1795.74	554.67	0.12
2	2190.*	100	1733.00	-3.43	7.82		7.86	0.000112	2.16	1858.11	557.41	0.13
2	2190.*	500	2128.00	-3.43	8.03		8.08	0.000144	2.49	1978.42	562.67	0.14
2	2000.*	10	1111.00	-3.71	7.34		7.35	0.000058	1.54	1685.22	546.78	0.09
2	2000.*	25	1334.00	-3.71	7.55		7.57	0.000071	1.72	1801.95	551.76	0.10
2	2000.*	50	1547.00	-3.71	7.69		7.72	0.000085	1.91	1881.86	555.14	0.11
2	2000.*	100	1733.00	-3.71	7.80		7.83	0.000099	2.07	1942.92	557.71	0.12
2	2000.*	500	2128.00	-3.71	8.01		8.05	0.000128	2.39	2060.27	562.62	0.13
2	1810.*	10	1111.00	-3.98	7.33		7.34	0.000051	1.46	1775.05	547.61	0.08
2	1810.*	25	1334.00	-3.98	7.54		7.56	0.000062	1.64	1890.79	552.32	0.09
2	1810.*	50	1547.00	-3.98	7.68		7.70	0.000076	1.83	1969.45	555.50	0.10
2	1810.*	100	1733.00	-3.98	7.79		7.82	0.000087	1.98	2029.32	557.90	0.11
2	1810.*	500	2128.00	-3.98	7.99		8.03	0.000114	2.30	2143.96	562.48	0.13
2	1620	10	1111.00	-4.25	7.32		7.33	0.000044	1.39	1863.89	548.23	0.08
2	1620	25	1334.00	-4.25	7.53		7.55	0.000055	1.57	1978.68	552.69	0.09
2	1620	50	1547.00	-4.25	7.67		7.69	0.000067	1.75	2056.20	555.69	0.10
2	1620	100	1733.00	-4.25	7.77		7.80	0.000078	1.90	2114.97	557.95	0.10
2	1620	500	2128.00	-4.25	7.97		8.01	0.000102	2.21	2227.09	562.23	0.12
2	1580	10	1111.00	-4.40	7.32	-1.37	7.33	0.000029	1.19	1993.28	548.65	0.06
2	1580	25	1334.00	-4.40	7.53	-1.01	7.54	0.000037	1.35	2108.00	553.11	0.07
2	1580	50	1547.00	-4.40	7.67	-0.69	7.69	0.000045	1.51	2185.41	556.10	0.08
2	1580	100	1733.00	-4.40	7.77	-0.43	7.80	0.000053	1.65	2244.07	558.35	0.09
2	1580	500	2128.00	-4.40	7.97	0.10	8.00	0.000071	1.93	2355.88	562.63	0.10
2	1578		Culvert									
2	1535	10	1111.00	-4.28	6.70		6.73	0.000065	1.64	1334.98	520.76	0.09
2	1535	25	1334.00	-4.28	6.74		6.79	0.000091	1.94	1357.78	522.35	0.11
2	1535	50	1547.00	-4.28	6.79		6.85	0.000118	2.22	1383.86	524.16	0.13
2	1535	100	1733.00	-4.28	6.84		6.91	0.000143	2.45	1408.43	525.86	0.14
2	1535	500	2128.00	-4.28	6.95		7.05	0.000198	2.91	1468.33	529.99	0.17
2	1505	10	1111.00	-4.28	6.70		6.73	0.000069	1.68	1316.74	520.63	0.10
2	1505	25	1334.00	-4.28	6.74		6.78	0.000096	1.99	1338.82	522.17	0.12
2	1505	50	1547.00	-4.28	6.79		6.85	0.000124	2.27	1364.15	523.93	0.13
2	1505	100	1733.00	-4.28	6.83		6.90	0.000151	2.51	1388.02	525.59	0.15
2	1505	500	2128.00	-4.28	6.94		7.04	0.000210	2.99	1446.36	529.61	0.17
2	1316.87*	10	1111.00	-4.34	6.68		6.72	0.000074	1.74	1295.88	539.23	0.10
2	1316.87*	25	1334.00	-4.34	6.72		6.77	0.000104	2.07	1315.17	540.74	0.12
2	1316.87*	50	1547.00	-4.34	6.76		6.82	0.000136	2.37	1337.35	542.46	0.14
2	1316.87*	100	1733.00	-4.34	6.80		6.87	0.000165	2.62	1358.42	544.09	0.15
2	1316.87*	500	2128.00	-4.34	6.89		7.00	0.000232	3.13	1410.32	548.08	0.18
2	1128.75*	10	1111.00	-4.40	6.66		6.70	0.000079	1.80	1289.83	564.71	0.11
2	1128.75*	25	1334.00	-4.40	6.69		6.75	0.000112	2.14	1306.07	566.13	0.13
2	1128.75*	50	1547.00	-4.40	6.73		6.79	0.000146	2.45	1324.74	567.76	0.14
2	1128.75*	100	1733.00	-4.40	6.76		6.84	0.000179	2.72	1342.67	569.32	0.16
2	1128.75*	500	2128.00	-4.40	6.84		6.95	0.000254	3.26	1387.29	573.19	0.19
2	940.625*	10	1111.00	-4.46	6.65		6.69	0.000083	1.84	1300.06	599.84	0.11
2	940.625*	25	1334.00	-4.46	6.67		6.72	0.000118	2.20	1312.97	600.98	0.13

HEC-RAS Plan: Prop-17 River: School House Dit Reach: 2 (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
2	940.625*	50	1547.00	-4.46	6.69		6.76	0.000156	2.53	1327.68	602.46	0.15
2	940.625*	100	1733.00	-4.46	6.72		6.80	0.000192	2.81	1341.97	604.88	0.17
2	940.625*	500	2128.00	-4.46	6.78		6.90	0.000276	3.38	1378.02	610.96	0.20
2	752.5*	10	1111.00	-4.52	6.63		6.67	0.000086	1.87	1353.49	680.40	0.11
2	752.5*	25	1334.00	-4.52	6.65		6.70	0.000123	2.24	1363.20	682.02	0.13
2	752.5*	50	1547.00	-4.52	6.66		6.73	0.000163	2.58	1374.03	683.83	0.15
2	752.5*	100	1733.00	-4.52	6.68		6.77	0.000202	2.87	1384.83	685.63	0.17
2	752.5*	500	2128.00	-4.52	6.72		6.85	0.000294	3.48	1412.50	690.21	0.20
2	564.375*	10	1111.00	-4.57	6.62		6.65	0.000083	1.83	1485.36	783.77	0.11
2	564.375*	25	1334.00	-4.57	6.63		6.68	0.000118	2.20	1491.71	784.82	0.13
2	564.375*	50	1547.00	-4.57	6.64		6.70	0.000158	2.54	1498.93	786.00	0.15
2	564.375*	100	1733.00	-4.57	6.64		6.73	0.000196	2.83	1506.18	787.19	0.17
2	564.375*	500	2128.00	-4.57	6.67		6.79	0.000289	3.45	1525.17	790.30	0.20
2	376.25*	10	1111.00	-4.63	6.61		6.64	0.000069	1.67	1683.99	812.96	0.10
2	376.25*	25	1334.00	-4.63	6.61		6.65	0.000099	2.01	1687.71	813.06	0.12
2	376.25*	50	1547.00	-4.63	6.62		6.67	0.000132	2.32	1691.92	813.17	0.14
2	376.25*	100	1733.00	-4.63	6.63		6.69	0.000165	2.60	1696.16	813.28	0.15
2	376.25*	500	2128.00	-4.63	6.64		6.73	0.000245	3.17	1706.96	813.57	0.19
2	188.125*	10	1111.00	-4.69	6.60		6.62	0.000053	1.48	1899.60	817.37	0.09
2	188.125*	25	1334.00	-4.69	6.61		6.63	0.000077	1.77	1901.28	817.37	0.10
2	188.125*	50	1547.00	-4.69	6.61		6.64	0.000103	2.05	1903.19	817.37	0.12
2	188.125*	100	1733.00	-4.69	6.61		6.65	0.000129	2.30	1905.10	817.37	0.14
2	188.125*	500	2128.00	-4.69	6.62		6.68	0.000193	2.81	1909.96	817.37	0.17
2	0	10	1111.00	-4.75	6.60	0.28	6.61	0.000040	1.28	2121.29	819.85	0.08
2	0	25	1334.00	-4.75	6.60	0.72	6.62	0.000058	1.54	2121.29	819.85	0.09
2	0	50	1547.00	-4.75	6.60	1.09	6.62	0.000078	1.79	2121.29	819.85	0.11
2	0	100	1733.00	-4.75	6.60	1.41	6.63	0.000098	2.00	2121.29	819.85	0.12
2	0	500	2128.00	-4.75	6.60	2.01	6.64	0.000147	2.46	2121.29	819.85	0.14

# Schoolhouse Ditch Alternative "C"



HEC-RAS Plan: Prop-15 River: School House Dit Reach: 2

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
2	18377	10	152.00	15.30	18.38	17.10	18.49	0.001283	2.70	56.37	24.00	0.31
2	18377	25	171.00	15.30	19.02	17.18	19.11	0.000766	2.38	71.80	24.00	0.24
2	18377	50	188.00	15.30	19.54	17.26	19.62	0.000565	2.23	85.30	42.32	0.21
2	18377	100	202.00	15.30	20.10	17.32	20.15	0.000360	1.95	165.05	443.31	0.17
2	18377	500	231.00	15.30	21.23	17.44	21.24	0.000042	0.78	746.79	567.60	0.06
2	18365		Culvert									
2	18078	10	152.00	13.95	17.80	15.09	17.84	0.000293	1.70	89.21	24.45	0.16
2	18078	25	171.00	13.95	18.26	15.18	18.31	0.000259	1.70	100.57	24.61	0.15
2	18078	50	188.00	13.95	18.59	15.26	18.64	0.000248	1.73	108.68	24.72	0.15
2	18078	100	202.00	13.95	18.97	15.33	19.02	0.000224	1.71	118.10	24.84	0.14
2	18078	500	231.00	13.95	19.69	15.45	19.74	0.000191	1.69	140.90	63.64	0.13
2	17925.*	10	152.00	13.80	17.75	15.02	17.80	0.000290	1.72	88.61	24.23	0.16
2	17925.*	25	171.00	13.80	18.22	15.12	18.27	0.000255	1.71	100.01	24.46	0.15
2	17925.*	50	188.00	13.80	18.55	15.21	18.60	0.000245	1.74	108.12	24.62	0.15
2	17925.*	100	202.00	13.80	18.94	15.27	18.98	0.000221	1.72	117.61	24.81	0.14
2	17925.*	500	231.00	13.80	19.66	15.41	19.71	0.000188	1.70	139.49	59.17	0.13
2	17772	10	152.00	13.65	17.72	14.89	17.76	0.000249	1.61	94.20	24.60	0.15
2	17772	25	171.00	13.65	18.19	14.98	18.23	0.000222	1.62	105.87	24.73	0.14
2	17772	50	188.00	13.65	18.52	15.06	18.56	0.000215	1.65	114.09	24.81	0.14
2	17772	100	202.00	13.65	18.91	15.12	18.95	0.000195	1.63	123.71	24.92	0.13
2	17772	500	231.00	13.65	19.64	15.24	19.68	0.000169	1.63	144.92	55.38	0.12
2	17752		Bridge									
2	17715	10	152.00	13.59	17.69	14.80	17.74	0.000338	1.86	81.93	20.02	0.16
2	17715	25	171.00	13.59	18.16	14.90	18.21	0.000310	1.87	91.43	20.07	0.15
2	17715	50	188.00	13.59	18.49	14.99	18.55	0.000306	1.92	98.08	20.11	0.15
2	17715	100	202.00	13.59	18.88	15.05	18.93	0.000283	1.91	105.89	20.16	0.15
2	17715	500	231.00	13.59	19.60	15.19	19.65	0.000245	1.90	134.70	103.00	0.14
2	17679		Bridge									
2	17655	10	152.00	13.53	17.60	14.74	17.66	0.000344	1.86	81.50	20.01	0.16
2	17655	25	171.00	13.53	18.08	14.84	18.14	0.000315	1.88	91.03	20.01	0.16
2	17655	50	188.00	13.53	18.41	14.92	18.47	0.000310	1.92	97.68	20.02	0.15
2	17655	100	202.00	13.53	18.80	14.99	18.86	0.000287	1.92	105.48	20.07	0.15
2	17655	500	231.00	13.53	19.56	15.13	19.61	0.000254	1.91	121.23	33.69	0.14
2	17629		Bridge									
2	17600	10	152.00	13.48	17.53		17.59	0.000349	1.87	81.11	20.01	0.16
2	17600	25	171.00	13.48	18.01		18.07	0.000319	1.89	90.63	20.01	0.16
2	17600	50	188.00	13.48	18.35		18.40	0.000313	1.93	97.35	20.04	0.15
2	17600	100	202.00	13.48	18.74		18.79	0.000289	1.92	105.20	20.08	0.15
2	17600	500	231.00	13.48	19.53		19.58	0.000252	1.91	121.35	28.71	0.14
2	17454	10	152.00	13.33	17.49	14.54	17.54	0.000324	1.83	83.15	20.00	0.16
2	17454	25	171.00	13.33	17.97	14.64	18.02	0.000298	1.84	92.75	20.00	0.15
2	17454	50	188.00	13.33	18.30	14.73	18.36	0.000294	1.89	99.48	20.03	0.15
2	17454	100	202.00	13.33	18.70	14.79	18.75	0.000272	1.88	107.40	20.13	0.14
2	17454	500	231.00	13.33	19.49	14.93	19.55	0.000239	1.87	123.52	22.76	0.13
2	17410		Culvert									
2	17380	10	159.00	13.26	17.36		17.41	0.000302	1.79	88.92	23.35	0.16
2	17380	25	184.00	13.26	17.84		17.89	0.000285	1.84	100.25	23.89	0.16
2	17380	50	207.00	13.26	18.17		18.23	0.000289	1.91	108.21	24.27	0.16
2	17380	100	226.00	13.26	18.56		18.62	0.000270	1.92	117.71	24.70	0.16
2	17380	500	264.00	13.26	19.33		19.39	0.000229	1.91	147.85	65.19	0.14
2	17247.5*	10	159.00	13.12	17.31		17.37	0.000346	1.88	84.62	21.29	0.17
2	17247.5*	25	184.00	13.12	17.79		17.85	0.000331	1.94	94.93	21.63	0.16
2	17247.5*	50	207.00	13.12	18.12		18.19	0.000343	2.03	102.13	22.26	0.17
2	17247.5*	100	226.00	13.12	18.51		18.58	0.000326	2.04	110.99	23.20	0.16
2	17247.5*	500	264.00	13.12	19.29		19.35	0.000292	2.03	129.73	25.07	0.16
2	17115	10	159.00	12.99	17.27		17.32	0.000295	1.79	88.67	21.84	0.16
2	17115	25	184.00	12.99	17.76		17.81	0.000287	1.85	99.40	22.66	0.16
2	17115	50	207.00	12.99	18.08		18.14	0.000296	1.94	106.92	23.22	0.16
2	17115	100	226.00	12.99	18.48		18.53	0.000280	1.95	116.16	23.89	0.16
2	17115	500	264.00	12.99	19.26		19.32	0.000250	1.95	135.33	25.23	0.15

HEC-RAS Plan: Prop-15 River: School House Dit Reach: 2 (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
2	17100	10	159.00	12.98	17.27	14.23	17.32	0.000294	1.79	88.79	21.83	0.16
2	17100	25	184.00	12.98	17.75	14.36	17.81	0.000286	1.85	99.52	22.66	0.16
2	17100	50	207.00	12.98	18.08	14.47	18.14	0.000295	1.93	107.03	23.22	0.16
2	17100	100	226.00	12.98	18.47	14.56	18.53	0.000279	1.94	116.27	23.89	0.16
2	17100	500	264.00	12.98	19.25	14.73	19.31	0.000249	1.95	135.45	25.22	0.15
2	17085		Culvert									
2	17035	10	159.00	12.91	16.75		16.82	0.000402	1.99	79.87	21.80	0.18
2	17035	25	184.00	12.91	17.27		17.33	0.000367	2.02	91.17	22.33	0.18
2	17035	50	207.00	12.91	17.57		17.64	0.000379	2.11	97.96	22.68	0.18
2	17035	100	226.00	12.91	17.98		18.05	0.000347	2.10	107.59	23.63	0.17
2	17035	500	264.00	12.91	18.77		18.84	0.000300	2.08	126.77	27.12	0.16
2	17020	10	159.00	12.90	16.75		16.81	0.000407	2.00	79.60	21.74	0.18
2	17020	25	184.00	12.90	17.26		17.33	0.000371	2.02	90.88	22.28	0.18
2	17020	50	207.00	12.90	17.56		17.63	0.000383	2.12	97.65	22.83	0.18
2	17020	100	226.00	12.90	17.98		18.05	0.000351	2.11	107.28	23.59	0.17
2	17020	500	264.00	12.90	18.76		18.83	0.000303	2.09	126.45	26.77	0.16
2	16873.6*	10	159.00	12.75	16.69		16.75	0.000407	1.99	80.04	21.56	0.18
2	16873.6*	25	184.00	12.75	17.21		17.27	0.000372	2.01	91.50	22.56	0.18
2	16873.6*	50	207.00	12.75	17.51		17.58	0.000385	2.11	98.32	23.13	0.18
2	16873.6*	100	226.00	12.75	17.93		17.99	0.000350	2.09	108.20	23.94	0.17
2	16873.6*	500	264.00	12.75	18.72		18.79	0.000298	2.07	128.11	31.33	0.16
2	16727.3*	10	159.00	12.60	16.63		16.69	0.000390	1.96	81.29	21.37	0.18
2	16727.3*	25	184.00	12.60	17.16		17.22	0.000360	1.98	92.80	22.51	0.17
2	16727.3*	50	207.00	12.60	17.45		17.52	0.000374	2.08	99.57	23.15	0.18
2	16727.3*	100	226.00	12.60	17.88		17.94	0.000341	2.06	109.60	24.07	0.17
2	16727.3*	500	264.00	12.60	18.68		18.74	0.000290	2.04	130.46	35.72	0.16
2	16581	10	159.00	12.46	16.59	13.70	16.64	0.000302	1.79	88.76	23.60	0.16
2	16581	25	184.00	12.46	17.12	13.83	17.17	0.000274	1.81	101.41	24.25	0.16
2	16581	50	207.00	12.46	17.41	13.94	17.47	0.000284	1.91	108.62	24.62	0.16
2	16581	100	226.00	12.46	17.84	14.02	17.90	0.000258	1.89	119.29	25.15	0.15
2	16581	500	264.00	12.46	18.65	14.19	18.70	0.000220	1.88	141.72	39.73	0.14
2	16541		Culvert									
2	16516	10	159.00	12.39	16.49		16.54	0.000266	1.69	94.12	25.37	0.15
2	16516	25	184.00	12.39	17.02		17.06	0.000242	1.71	107.63	26.25	0.15
2	16516	50	207.00	12.39	17.30		17.35	0.000253	1.80	115.10	26.72	0.15
2	16516	100	226.00	12.39	17.70		17.75	0.000232	1.79	125.97	27.40	0.15
2	16516	500	264.00	12.39	18.44		18.49	0.000206	1.80	146.63	30.61	0.14
2	16343.*	10	159.00	12.22	16.43		16.48	0.000338	1.86	85.47	21.77	0.17
2	16343.*	25	184.00	12.22	16.96		17.01	0.000320	1.89	97.23	23.19	0.16
2	16343.*	50	207.00	12.22	17.24		17.30	0.000341	1.99	103.81	24.16	0.17
2	16343.*	100	226.00	12.22	17.64		17.70	0.000319	1.98	113.90	25.57	0.17
2	16343.*	500	264.00	12.22	18.38		18.44	0.000278	1.97	135.42	43.45	0.16
2	16170.*	10	159.00	12.05	16.38		16.43	0.000310	1.81	87.95	21.77	0.16
2	16170.*	25	184.00	12.05	16.91		16.96	0.000295	1.85	99.71	22.99	0.16
2	16170.*	50	207.00	12.05	17.18		17.24	0.000317	1.95	106.14	23.89	0.16
2	16170.*	100	226.00	12.05	17.59		17.65	0.000298	1.95	116.19	25.24	0.16
2	16170.*	500	264.00	12.05	18.34		18.40	0.000255	1.94	141.81	57.46	0.15
2	15997.*	10	159.00	11.87	16.33		16.38	0.000283	1.76	90.55	21.64	0.15
2	15997.*	25	184.00	11.87	16.86		16.91	0.000271	1.80	102.24	22.67	0.15
2	15997.*	50	207.00	11.87	17.13		17.19	0.000294	1.91	108.48	23.52	0.16
2	15997.*	100	226.00	11.87	17.54		17.60	0.000279	1.91	118.44	24.82	0.15
2	15997.*	500	264.00	11.87	18.30		18.35	0.000234	1.90	150.13	68.43	0.14
2	15824.*	10	159.00	11.70	16.28		16.33	0.000261	1.71	92.86	21.42	0.14
2	15824.*	25	184.00	11.70	16.82		16.86	0.000253	1.76	104.42	22.31	0.14
2	15824.*	50	207.00	11.70	17.08		17.14	0.000277	1.87	110.47	23.11	0.15
2	15824.*	100	226.00	11.70	17.50		17.55	0.000262	1.88	120.61	28.88	0.15
2	15824.*	500	264.00	11.70	18.26		18.32	0.000215	1.86	159.84	77.69	0.14
2	15651	10	159.00	11.53	16.26	12.77	16.29	0.000144	1.36	117.22	28.33	0.12
2	15651	25	184.00	11.53	16.80	12.88	16.83	0.000135	1.39	132.56	29.02	0.11
2	15651	50	207.00	11.53	17.06	12.98	17.10	0.000144	1.48	140.31	29.37	0.12
2	15651	100	226.00	11.53	17.48	13.07	17.51	0.000132	1.48	154.89	42.95	0.11
2	15651	500	264.00	11.53	18.25	13.22	18.28	0.000108	1.47	206.58	91.02	0.11

HEC-RAS Plan: Prop-15 River: School House Dlt Reach: 2 (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
2	15625											
			Culvert									
2	15584	10	159.00	11.46	16.20		16.22	0.000111	1.15	138.66	39.80	0.10
2	15584	25	184.00	11.46	16.71		16.73	0.000098	1.16	161.77	50.82	0.10
2	15584	50	207.00	11.46	16.95		16.97	0.000103	1.24	174.99	60.78	0.10
2	15584	100	226.00	11.46	17.34		17.36	0.000091	1.23	202.09	78.54	0.10
2	15584	500	264.00	11.46	18.05		18.07	0.000073	1.20	269.02	110.81	0.09
2	15520	10	159.00	11.40	16.19	12.55	16.21	0.000115	1.17	136.59	39.58	0.11
2	15520	25	184.00	11.40	16.70	12.66	16.73	0.000101	1.18	159.65	50.66	0.10
2	15520	50	207.00	11.40	16.94	12.75	16.97	0.000106	1.25	172.78	60.45	0.11
2	15520	100	226.00	11.40	17.33	12.83	17.36	0.000093	1.24	199.81	78.24	0.10
2	15520	500	264.00	11.40	18.04	12.97	18.06	0.000074	1.22	266.68	110.57	0.09
2	15512											
			Bridge									
2	15460	10	159.00	11.34	15.97	12.41	15.99	0.000110	1.16	137.49	36.60	0.11
2	15460	25	184.00	11.34	16.47	12.51	16.50	0.000099	1.18	157.98	45.68	0.10
2	15460	50	207.00	11.34	16.93	12.60	16.95	0.000089	1.19	181.28	59.73	0.10
2	15460	100	226.00	11.34	17.31	12.68	17.33	0.000080	1.19	207.23	77.05	0.09
2	15460	500	264.00	11.34	18.00	12.82	18.02	0.000066	1.18	271.85	108.79	0.09
2	15444											
			Culvert									
2	15405	10	159.00	11.28	15.90		15.92	0.000126	1.27	125.55	31.44	0.11
2	15405	25	184.00	11.28	16.38		16.41	0.000120	1.31	140.97	32.34	0.11
2	15405	50	207.00	11.28	16.80		16.83	0.000116	1.34	154.82	33.12	0.11
2	15405	100	226.00	11.28	17.15		17.18	0.000112	1.36	166.56	33.77	0.11
2	15405	500	264.00	11.28	17.79		17.82	0.000106	1.40	190.15	45.96	0.11
2	15393	10	300.00	11.27	15.73		15.90	0.001040	3.37	89.14	20.35	0.28
2	15393	25	351.00	11.27	16.19		16.38	0.001092	3.55	98.83	21.63	0.29
2	15393	50	398.00	11.27	16.60		16.81	0.001133	3.68	108.03	23.42	0.30
2	15393	100	438.00	11.27	16.94		17.16	0.001146	3.77	116.29	24.93	0.31
2	15393	500	520.00	11.27	17.55		17.79	0.001159	3.93	132.55	31.04	0.31
2	15215.8*	10	300.00	11.09	15.54		15.71	0.001064	3.31	90.57	23.05	0.29
2	15215.8*	25	351.00	11.09	16.01		16.19	0.001064	3.46	101.50	24.31	0.30
2	15215.8*	50	398.00	11.09	16.41		16.61	0.001052	3.56	111.64	25.41	0.30
2	15215.8*	100	438.00	11.09	16.76		16.96	0.001033	3.63	120.54	26.35	0.30
2	15215.8*	500	520.00	11.09	17.37		17.59	0.001015	3.79	137.37	31.89	0.30
2	15038.6*	10	300.00	10.91	15.37		15.53	0.000966	3.19	94.08	24.65	0.29
2	15038.6*	25	351.00	10.91	15.84		16.01	0.000945	3.32	105.77	25.58	0.29
2	15038.6*	50	398.00	10.91	16.25		16.43	0.000923	3.42	116.47	26.40	0.29
2	15038.6*	100	438.00	10.91	16.60		16.79	0.000898	3.48	125.78	27.09	0.28
2	15038.6*	500	520.00	10.91	17.22		17.42	0.000880	3.64	143.08	34.51	0.29
2	14861.4*	10	300.00	10.74	15.22		15.37	0.000833	3.04	98.77	25.64	0.27
2	14861.4*	25	351.00	10.74	15.69		15.85	0.000812	3.16	110.99	26.38	0.27
2	14861.4*	50	398.00	10.74	16.11		16.27	0.000792	3.26	122.10	27.03	0.27
2	14861.4*	100	438.00	10.74	16.46		16.63	0.000772	3.33	131.73	27.59	0.27
2	14861.4*	500	520.00	10.74	17.08		17.27	0.000759	3.48	152.73	113.20	0.27
2	14684.2*	10	300.00	10.56	15.10		15.23	0.000693	2.86	104.78	26.34	0.25
2	14684.2*	25	351.00	10.56	15.57		15.71	0.000680	2.99	117.39	26.96	0.25
2	14684.2*	50	398.00	10.56	15.99		16.14	0.000668	3.09	128.80	27.50	0.25
2	14684.2*	100	438.00	10.56	16.35		16.50	0.000646	3.14	152.52	173.49	0.25
2	14684.2*	500	520.00	10.56	17.06		17.15	0.000390	2.60	405.62	435.57	0.20
2	14507	10	300.00	10.90	15.02	12.58	15.10	0.000634	2.22	134.83	44.71	0.23
2	14507	25	351.00	10.90	15.51	12.77	15.59	0.000541	2.23	157.21	220.28	0.21
2	14507	50	398.00	10.90	15.94	12.92	16.02	0.000468	2.25	177.06	393.46	0.20
2	14507	100	438.00	10.90	16.31	13.04	16.39	0.000419	2.26	193.89	432.41	0.19
2	14507	500	520.00	10.90	17.08	13.27	17.09	0.000114	1.22	802.22	526.28	0.10
2	14450											
			Culvert									
2	14339	10	300.00	10.74	14.80	12.30	14.88	0.000422	2.26	132.82	40.20	0.21
2	14339	25	351.00	10.74	15.27	12.46	15.35	0.000390	2.34	150.12	81.65	0.21
2	14339	50	398.00	10.74	15.68	12.60	15.77	0.000368	2.40	165.52	320.77	0.20
2	14339	100	438.00	10.74	16.03	12.72	16.13	0.000349	2.45	178.73	409.89	0.20
2	14339	500	520.00	10.74	16.70	12.95	16.72	0.000170	1.55	648.76	458.94	0.12
2	14140.5*	10	300.00	10.49	14.70	12.15	14.78	0.000685	2.13	140.85	42.52	0.20
2	14140.5*	25	351.00	10.49	15.18	12.31	15.25	0.000611	2.18	160.72	44.28	0.20

HEC-RAS Plan: Prop-15 River: School House Dit Reach: 2 (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
2	14140.5*	50	398.00	10.49	15.60	12.46	15.68	0.000560	2.23	178.35	261.63	0.19
2	14140.5*	100	438.00	10.49	15.96	12.58	16.04	0.000522	2.26	193.49	377.21	0.19
2	14140.5*	500	520.00	10.49	16.57	12.80	16.66	0.000488	2.37	219.74	479.62	0.18
2	13942	10	300.00	10.25	14.56	11.93	14.63	0.000752	2.14	140.08	42.07	0.21
2	13942	25	351.00	10.25	15.06	12.09	15.13	0.000660	2.18	161.07	44.19	0.20
2	13942	50	398.00	10.25	15.49	12.24	15.56	0.000597	2.22	179.67	196.48	0.19
2	13942	100	438.00	10.25	15.85	12.37	15.93	0.000550	2.24	195.68	414.46	0.19
2	13942	500	520.00	10.25	16.48	12.60	16.56	0.000509	2.33	223.31	526.79	0.18
2	13758.*	10	300.00	10.02	14.43	11.74	14.50	0.000723	2.12	141.54	42.21	0.20
2	13758.*	25	351.00	10.02	14.94	11.90	15.01	0.000627	2.15	163.09	44.46	0.19
2	13758.*	50	398.00	10.02	15.38	12.05	15.45	0.000567	2.19	182.06	177.68	0.19
2	13758.*	100	438.00	10.02	15.76	12.17	15.83	0.000522	2.21	198.35	409.85	0.18
2	13758.*	500	520.00	10.02	16.39	12.41	16.47	0.000485	2.30	226.19	562.71	0.18
2	13574.*	10	300.00	9.60	14.33	11.35	14.38	0.000497	1.87	160.76	48.37	0.17
2	13574.*	25	351.00	9.60	14.85	11.52	14.91	0.000430	1.90	184.48	51.53	0.17
2	13574.*	50	398.00	9.60	15.31	11.67	15.36	0.000390	1.94	204.84	194.90	0.16
2	13574.*	100	438.00	9.60	15.69	11.79	15.75	0.000361	1.97	222.05	416.84	0.16
2	13574.*	500	520.00	9.60	16.32	12.03	16.39	0.000340	2.07	250.75	628.48	0.16
2	13390	10	300.00	9.16	14.27	10.91	14.33	0.000200	1.91	156.92	50.66	0.16
2	13390	25	351.00	9.16	14.80	11.08	14.86	0.000191	2.01	174.84	53.62	0.16
2	13390	50	398.00	9.16	15.25	11.22	15.32	0.000186	2.09	190.20	219.78	0.16
2	13390	100	438.00	9.16	15.63	11.34	15.70	0.000180	2.16	203.18	433.29	0.16
2	13390	500	520.00	9.16	16.29	11.57	16.34	0.000218	1.86	420.86	704.51	0.14
2	13339	10	300.00	8.96	14.27	10.70	14.31	0.000311	1.57	190.79	51.85	0.14
2	13339	25	351.00	8.96	14.80	10.88	14.84	0.000285	1.60	219.02	55.03	0.14
2	13339	50	398.00	8.96	15.26	11.03	15.30	0.000257	1.63	243.55	87.45	0.14
2	13339	100	438.00	8.96	15.64	11.15	15.68	0.000237	1.66	264.28	352.14	0.13
2	13339	500	520.00	8.96	16.28	11.39	16.32	0.000223	1.74	298.70	780.49	0.13
2	13240.1	10	384.00	8.90	14.20	10.92	14.27	0.000514	2.02	190.45	51.82	0.19
2	13240.1	25	451.00	8.90	14.73	11.13	14.80	0.000477	2.06	218.79	55.01	0.18
2	13240.1	50	514.00	8.90	15.19	11.31	15.26	0.000433	2.11	243.53	57.75	0.18
2	13240.1	100	567.00	8.90	15.58	11.45	15.65	0.000401	2.14	264.43	350.96	0.17
2	13240.1	500	678.00	8.90	16.21	11.74	16.29	0.000381	2.27	298.86	763.29	0.17
2	13042.4*	10	384.00	8.79	14.10	10.82	14.17	0.000512	2.01	190.93	51.88	0.18
2	13042.4*	25	451.00	8.79	14.64	11.02	14.71	0.000478	2.05	219.74	55.11	0.18
2	13042.4*	50	514.00	8.79	15.11	11.20	15.17	0.000431	2.10	245.23	126.78	0.17
2	13042.4*	100	567.00	8.79	15.50	11.35	15.57	0.000396	2.13	266.72	424.69	0.17
2	13042.4*	500	678.00	8.79	16.14	11.62	16.22	0.000376	2.25	301.72	772.64	0.17
2	12844.7*	10	384.00	8.68	14.00	10.70	14.06	0.000511	2.01	191.43	51.94	0.18
2	12844.7*	25	451.00	8.68	14.55	10.91	14.61	0.000479	2.04	220.64	76.71	0.18
2	12844.7*	50	514.00	8.68	15.02	11.09	15.09	0.000429	2.08	246.95	226.12	0.17
2	12844.7*	100	567.00	8.68	15.42	11.23	15.49	0.000392	2.11	269.05	480.93	0.17
2	12844.7*	500	678.00	8.68	16.06	11.52	16.14	0.000371	2.23	304.65	779.74	0.17
2	12647.*	10	384.00	8.57	13.90	10.59	13.96	0.000510	2.00	191.91	51.99	0.18
2	12647.*	25	451.00	8.57	14.45	10.80	14.52	0.000476	2.04	221.50	179.52	0.18
2	12647.*	50	514.00	8.57	14.94	10.98	15.00	0.000427	2.07	248.58	307.32	0.17
2	12647.*	100	567.00	8.57	15.35	11.12	15.41	0.000388	2.09	271.29	493.93	0.17
2	12647.*	500	678.00	8.57	16.06	11.41	16.08	0.000168	1.42	810.97	782.75	0.11
2	12449.3	10	500.00	8.38	13.72	10.75	13.83	0.000861	2.60	192.40	52.05	0.24
2	12449.3	25	590.00	8.38	14.28	10.99	14.39	0.000809	2.65	222.35	234.00	0.23
2	12449.3	50	675.00	8.38	14.77	11.21	14.89	0.000733	2.70	250.22	345.09	0.23
2	12449.3	100	748.00	8.38	15.19	11.38	15.31	0.000668	2.73	273.61	418.99	0.22
2	12449.3	500	900.00	8.38	16.01	11.72	16.04	0.000214	1.63	939.26	784.17	0.12
2	12251.6*	10	500.00	8.13	13.56	10.50	13.66	0.000811	2.54	197.02	52.58	0.23
2	12251.6*	25	590.00	8.13	14.13	10.75	14.23	0.000760	2.59	227.84	161.10	0.23
2	12251.6*	50	675.00	8.13	14.64	10.96	14.75	0.000684	2.63	256.91	275.48	0.22
2	12251.6*	100	748.00	8.13	15.07	11.13	15.18	0.000621	2.66	281.30	372.52	0.21
2	12251.6*	500	900.00	8.13	15.96	11.47	15.99	0.000230	1.73	884.98	782.31	0.13
2	12054	10	500.00	7.89	13.41	10.26	13.50	0.000764	2.48	201.61	53.09	0.22
2	12054	25	590.00	7.89	13.98	10.50	14.08	0.000715	2.53	233.28	129.85	0.22
2	12054	50	675.00	7.89	14.51	10.72	14.61	0.000640	2.56	263.54	206.22	0.21
2	12054	100	748.00	7.89	14.95	10.89	15.06	0.000579	2.59	288.92	307.41	0.20
2	12054	500	900.00	7.89	15.91	11.23	15.95	0.000247	1.82	829.01	780.10	0.13

HEC-RAS Plan: Prop-15 River: School House Dit Reach: 2 (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
2	12025	10	500.00	7.85	13.33	10.11	13.48	0.000596	3.09	161.92	61.13	0.24
2	12025	25	590.00	7.85	13.89	10.35	14.06	0.000609	3.28	179.75	111.48	0.24
2	12025	50	675.00	7.85	14.40	10.57	14.59	0.000616	3.44	196.12	157.44	0.25
2	12025	100	748.00	7.85	14.83	10.74	15.03	0.000620	3.56	209.91	247.67	0.25
2	12025	500	900.00	7.85	15.70	11.09	15.92	0.000625	3.78	237.84	670.32	0.25
2	12015		Culvert									
2	11970	10	500.00	7.78	13.10	10.02	13.25	0.000612	3.10	161.22	33.20	0.25
2	11970	25	590.00	7.78	13.64	10.25	13.80	0.000621	3.29	179.23	70.22	0.25
2	11970	50	675.00	7.78	14.13	10.46	14.31	0.000625	3.45	195.87	166.14	0.25
2	11970	100	748.00	7.78	14.54	10.64	14.74	0.000626	3.56	209.98	230.89	0.25
2	11970	500	900.00	7.78	15.38	10.98	15.60	0.000624	3.77	238.74	457.86	0.25
2	11918	10	500.00	7.72	13.09	10.09	13.20	0.000803	2.58	194.05	86.37	0.24
2	11918	25	590.00	7.72	13.64	10.33	13.75	0.000762	2.64	223.67	254.88	0.23
2	11918	50	675.00	7.72	14.15	10.55	14.26	0.000721	2.67	252.38	343.64	0.23
2	11918	100	748.00	7.72	14.57	10.72	14.68	0.000683	2.69	277.67	386.49	0.22
2	11918	500	900.00	7.72	15.42	11.06	15.54	0.000559	2.73	329.57	547.81	0.21
2	11764	10	500.00	7.52	12.98	9.89	13.08	0.000739	2.52	198.53	52.75	0.23
2	11764	25	590.00	7.52	13.53	10.14	13.64	0.000703	2.58	228.77	56.08	0.23
2	11764	50	675.00	7.52	14.04	10.35	14.15	0.000666	2.62	258.12	59.14	0.22
2	11764	100	748.00	7.52	14.47	10.52	14.58	0.000634	2.63	284.01	61.71	0.22
2	11764	500	900.00	7.52	15.34	10.86	15.45	0.000531	2.65	338.98	466.93	0.20
2	11680	10	500.00	7.42	12.92	9.79	13.02	0.000703	2.49	200.71	53.00	0.23
2	11680	25	590.00	7.42	13.48	10.03	13.58	0.000670	2.55	231.26	56.35	0.22
2	11680	50	675.00	7.42	13.99	10.25	14.09	0.000636	2.59	260.92	59.43	0.22
2	11680	100	748.00	7.42	14.42	10.42	14.53	0.000605	2.61	287.10	62.01	0.21
2	11680	500	900.00	7.42	15.30	10.76	15.41	0.000522	2.62	343.60	152.20	0.20
2	11531.5*	10	500.00	7.23	12.82		12.91	0.000716	2.43	205.37	53.52	0.22
2	11531.5*	25	590.00	7.23	13.38		13.48	0.000702	2.50	236.41	56.89	0.22
2	11531.5*	50	675.00	7.23	13.90		14.00	0.000680	2.53	266.61	59.99	0.21
2	11531.5*	100	748.00	7.23	14.33		14.43	0.000658	2.55	293.27	62.60	0.21
2	11531.5*	500	900.00	7.23	15.22		15.32	0.000605	2.56	351.72	88.24	0.20
2	11383	10	500.00	7.05	12.66	9.29	12.81	0.000587	3.10	161.37	30.85	0.24
2	11383	25	590.00	7.05	13.20	9.54	13.37	0.000610	3.31	178.21	31.15	0.24
2	11383	50	675.00	7.05	13.70	9.76	13.89	0.000624	3.48	193.86	31.42	0.25
2	11383	100	748.00	7.05	14.12	9.94	14.33	0.000632	3.61	207.18	31.66	0.25
2	11383	500	900.00	7.05	14.99	10.30	15.22	0.000626	3.83	239.45	50.65	0.25
2	11349		Culvert									
2	11319	10	500.00	6.97	12.47		12.61	0.000561	3.03	164.86	33.74	0.24
2	11319	25	590.00	6.97	12.99		13.15	0.000579	3.23	182.47	34.34	0.25
2	11319	50	675.00	6.97	13.47		13.64	0.000588	3.39	199.02	34.89	0.25
2	11319	100	748.00	6.97	13.87		14.06	0.000591	3.51	213.22	35.36	0.25
2	11319	500	900.00	6.97	14.70		14.91	0.000586	3.70	243.05	36.32	0.25
2	11158.6*	10	500.00	6.60	12.43		12.51	0.000536	2.24	223.68	54.95	0.20
2	11158.6*	25	590.00	6.60	12.95		13.04	0.000551	2.33	253.29	58.10	0.20
2	11158.6*	50	675.00	6.60	13.44		13.53	0.000553	2.39	282.19	61.01	0.20
2	11158.6*	100	748.00	6.60	13.85		13.94	0.000548	2.43	307.79	63.47	0.19
2	11158.6*	500	900.00	6.60	14.70		14.79	0.000525	2.47	363.74	68.56	0.19
2	10998.3*	10	500.00	6.10	12.36		12.42	0.000437	2.02	247.49	57.56	0.17
2	10998.3*	25	590.00	6.10	12.88		12.95	0.000455	2.12	278.31	60.69	0.17
2	10998.3*	50	675.00	6.10	13.37		13.44	0.000461	2.19	308.42	63.59	0.18
2	10998.3*	100	748.00	6.10	13.78		13.85	0.000460	2.23	335.10	66.06	0.17
2	10998.3*	500	900.00	6.10	14.63		14.71	0.000444	2.28	403.38	153.53	0.17
2	10838	10	500.00	5.60	12.31	7.80	12.36	0.000352	1.82	273.98	60.23	0.15
2	10838	25	590.00	5.60	12.82	8.05	12.88	0.000372	1.93	306.02	63.34	0.15
2	10838	50	675.00	5.60	13.31	8.26	13.37	0.000381	2.00	337.34	66.24	0.16
2	10838	100	748.00	5.60	13.72	8.44	13.78	0.000383	2.05	365.09	68.71	0.16
2	10838	500	900.00	5.60	14.57	8.78	14.64	0.000365	2.08	475.34	233.00	0.15
2	10803		Culvert									
2	10760	10	500.00	5.50	12.16		12.21	0.000350	1.84	271.70	59.97	0.15
2	10760	25	590.00	5.50	12.65		12.71	0.000376	1.96	301.46	62.88	0.16
2	10760	50	675.00	5.50	13.10		13.16	0.000391	2.04	330.46	65.59	0.16
2	10760	100	748.00	5.50	13.48		13.55	0.000399	2.10	356.12	67.90	0.16

HEC-RAS Plan: Prop-15 River: School House Dit Reach: 2 (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
2	10760	500	900.00	5.50	14.22		14.29	0.000373	2.15	472.24	195.38	0.16
2	10651.5*	10	500.00	6.02	12.09		12.17	0.000518	2.15	232.13	56.43	0.19
2	10651.5*	25	590.00	6.02	12.57		12.65	0.000544	2.27	259.93	59.31	0.19
2	10651.5*	50	675.00	6.02	13.02		13.11	0.000556	2.35	287.19	62.01	0.19
2	10651.5*	100	748.00	6.02	13.41		13.50	0.000557	2.40	311.44	64.31	0.19
2	10651.5*	500	900.00	6.02	14.15		14.24	0.000509	2.43	417.81	188.39	0.19
2	10543	10	500.00	6.00	12.04		12.11	0.000469	2.08	240.68	56.26	0.18
2	10543	25	590.00	6.00	12.52		12.60	0.000500	2.20	268.20	59.12	0.18
2	10543	50	675.00	6.00	12.97		13.05	0.000516	2.29	295.28	61.81	0.18
2	10543	100	748.00	6.00	13.35		13.44	0.000521	2.34	319.41	64.11	0.18
2	10543	500	900.00	6.00	14.10		14.18	0.000488	2.39	415.59	175.42	0.18
2	10521	10	500.00	5.97	12.03		12.10	0.000451	2.16	231.28	56.36	0.19
2	10521	25	590.00	5.97	12.50		12.59	0.000480	2.28	258.81	59.21	0.19
2	10521	50	675.00	5.97	12.95		13.04	0.000494	2.36	285.92	61.90	0.19
2	10521	100	748.00	5.97	13.34		13.43	0.000499	2.41	310.09	64.20	0.19
2	10521	500	900.00	5.97	14.07		14.17	0.000504	2.51	359.21	73.53	0.19
2	10385	10	500.00	5.40	11.98	7.57	12.04	0.000380	1.87	267.78	59.52	0.16
2	10385	25	590.00	5.40	12.46	7.81	12.52	0.000409	1.99	296.61	62.36	0.16
2	10385	50	675.00	5.40	12.90	8.04	12.97	0.000426	2.08	325.01	65.03	0.16
2	10385	100	748.00	5.40	13.29	8.21	13.36	0.000432	2.14	350.33	67.33	0.16
2	10385	500	900.00	5.40	14.03	8.56	14.10	0.000422	2.24	409.60	95.42	0.16
2	10321		Culvert									
2	10270	10	500.00	5.20	11.84	7.20	11.89	0.000225	1.78	281.39	59.86	0.14
2	10270	25	590.00	5.20	12.28	7.42	12.33	0.000250	1.92	308.08	62.48	0.15
2	10270	50	675.00	5.20	12.69	7.62	12.75	0.000252	2.02	333.84	64.94	0.15
2	10270	100	748.00	5.20	13.04	7.78	13.11	0.000249	2.10	355.98	64.75	0.16
2	10270	500	900.00	5.20	13.66	8.10	13.74	0.000255	2.28	395.01	140.71	0.16
2	10156	10	730.00	5.48	11.68		11.82	0.000878	2.97	245.81	57.20	0.25
2	10156	25	870.00	5.48	12.09		12.25	0.000996	3.22	269.77	59.66	0.27
2	10156	50	1002.00	5.48	12.48		12.66	0.001073	3.41	293.77	62.02	0.28
2	10156	100	1117.00	5.48	12.83		13.02	0.001121	3.54	315.33	64.07	0.28
2	10156	500	1358.00	5.48	13.42		13.65	0.001227	3.81	370.15	119.13	0.29
2	10061	10	730.00	5.36	11.63	8.10	11.75	0.000460	2.81	259.84	84.48	0.23
2	10061	25	870.00	5.36	12.03	8.38	12.18	0.000516	3.07	283.57	104.09	0.25
2	10061	50	1002.00	5.36	12.42	8.63	12.59	0.000532	3.26	307.30	123.12	0.26
2	10061	100	1117.00	5.36	12.76	8.84	12.94	0.000532	3.41	327.97	139.66	0.26
2	10061	500	1358.00	5.36	13.35	9.25	13.57	0.000556	3.73	363.83	168.36	0.27
2	9979	10	730.00	5.25	11.56	8.21	11.70	0.000909	2.97	245.80	125.92	0.25
2	9979	25	870.00	5.25	11.96	8.52	12.12	0.001011	3.23	269.15	140.67	0.27
2	9979	50	1002.00	5.25	12.35	8.80	12.53	0.001068	3.42	293.00	155.17	0.28
2	9979	100	1117.00	5.25	12.69	9.03	12.88	0.001096	3.55	314.66	167.87	0.28
2	9979	500	1358.00	5.25	13.28	9.46	13.51	0.001184	3.84	353.83	194.99	0.30
2	9919		Bridge									
2	9847	10	730.00	5.09	11.28	8.05	11.43	0.000997	3.06	238.73	263.52	0.26
2	9847	25	870.00	5.09	11.67	8.36	11.84	0.001110	3.33	261.35	315.77	0.28
2	9847	50	1002.00	5.09	12.04	8.64	12.24	0.001176	3.53	284.13	366.40	0.29
2	9847	100	1117.00	5.09	12.38	8.87	12.59	0.001205	3.66	305.26	411.76	0.29
2	9847	500	1358.00	5.09	12.95	9.30	13.20	0.001306	3.96	342.59	488.58	0.31
2	9650.66*	10	730.00	4.81	11.09	7.77	11.23	0.000949	2.99	244.07	283.72	0.26
2	9650.66*	25	870.00	4.81	11.46	8.09	11.62	0.001074	3.28	265.46	323.35	0.27
2	9650.66*	50	1002.00	4.81	11.82	8.36	12.01	0.001149	3.49	287.50	362.73	0.29
2	9650.66*	100	1117.00	4.81	12.15	8.58	12.35	0.001183	3.62	308.33	398.70	0.29
2	9650.66*	500	1358.00	4.81	12.70	9.02	12.94	0.001300	3.94	344.30	458.36	0.31
2	9454.33*	10	730.00	4.43	10.93	7.39	11.05	0.000837	2.84	256.63	297.28	0.24
2	9454.33*	25	870.00	4.43	11.27	7.71	11.42	0.000967	3.14	276.97	328.43	0.26
2	9454.33*	50	1002.00	4.43	11.61	7.98	11.79	0.001049	3.36	298.45	360.23	0.27
2	9454.33*	100	1117.00	4.43	11.94	8.21	12.13	0.001088	3.50	319.15	389.92	0.28
2	9454.33*	500	1358.00	4.43	12.46	8.64	12.69	0.001200	3.84	354.09	438.17	0.30
2	9258	10	730.00	4.06	10.78	7.02	10.90	0.000736	2.70	270.06	305.91	0.23
2	9258	25	870.00	4.06	11.10	7.34	11.24	0.000868	3.01	289.27	331.00	0.25
2	9258	50	1002.00	4.06	11.43	7.61	11.59	0.000954	3.23	310.11	357.39	0.26
2	9258	100	1117.00	4.06	11.74	7.83	11.92	0.000975	3.38	330.70	382.79	0.26



HEC-RAS Plan: Prop-15 River: School House Dit Reach: 2 (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
2	7298	10	730.00	2.24	9.34	7.08	9.73	0.001747	4.98	146.68	563.58	0.43
2	7298	25	870.00	2.24	9.09	7.49	9.71	0.002937	6.31	137.85	544.38	0.56
2	7298	50	1002.00	2.24	9.21	7.85	9.98	0.003599	7.06	141.93	553.31	0.62
2	7298	100	1117.00	2.24	9.31	8.13	10.23	0.004171	7.67	145.64	561.34	0.67
2	7298	500	1358.00	2.24	9.50	8.67	10.74	0.005446	8.91	152.47	575.90	0.78
2	7109.66*	10	730.00	2.04	8.97	6.86	9.38	0.001888	5.16	141.43	647.84	0.45
2	7109.66*	25	870.00	2.04	9.40	7.27	9.42	0.002226	1.85	1007.04	695.40	0.16
2	7109.66*	50	1002.00	2.04	9.63	7.61	9.65	0.002222	1.89	1116.64	711.62	0.16
2	7109.66*	100	1117.00	2.04	9.83	7.90	9.85	0.00215	1.90	1216.47	726.22	0.16
2	7109.66*	500	1358.00	2.04	10.24	8.44	10.27	0.00197	1.91	1421.59	751.56	0.15
2	6921.33*	10	730.00	1.85	9.15	6.67	9.18	0.00213	1.88	929.91	797.22	0.15
2	6921.33*	25	870.00	1.85	9.36	7.08	9.38	0.002222	1.97	1042.83	819.93	0.16
2	6921.33*	50	1002.00	1.85	9.58	7.44	9.61	0.00215	1.98	1167.56	844.75	0.16
2	6921.33*	100	1117.00	1.85	9.79	7.72	9.81	0.00204	1.97	1281.88	863.27	0.15
2	6921.33*	500	1358.00	1.85	10.21	8.27	10.23	0.00184	1.95	1515.85	899.27	0.15
2	6733	10	778.00	1.65	9.10	7.53	9.13	0.00256	2.12	925.31	918.24	0.17
2	6733	25	928.00	1.65	9.30	7.71	9.34	0.00276	2.24	1043.40	957.22	0.18
2	6733	50	1071.00	1.65	9.53	7.85	9.56	0.00267	2.25	1183.60	982.72	0.18
2	6733	100	1194.00	1.65	9.74	7.95	9.77	0.00247	2.20	1313.78	988.40	0.17
2	6733	500	1455.00	1.65	10.19	8.14	10.20	0.00091	1.39	2536.77	1000.00	0.10
2	6683	10	778.00	1.04	9.08	5.91	9.12	0.00274	2.10	777.09	789.80	0.17
2	6683	25	928.00	1.04	9.28	6.40	9.32	0.00298	2.23	861.82	797.08	0.18
2	6683	50	1071.00	1.04	9.53	6.82	9.55	0.00128	1.50	1669.75	800.00	0.12
2	6683	100	1194.00	1.04	9.74	7.14	9.76	0.00119	1.50	1837.15	800.00	0.12
2	6683	500	1455.00	1.04	10.19	7.74	10.20	0.00104	1.47	2191.03	800.00	0.11
2	6490.4*	10	778.00	1.14	8.93	5.93	9.04	0.00588	3.02	500.74	757.99	0.26
2	6490.4*	25	928.00	1.14	9.24	6.39	9.27	0.00212	1.88	1229.15	801.88	0.16
2	6490.4*	50	1071.00	1.14	9.50	6.77	9.52	0.00187	1.84	1433.76	810.00	0.15
2	6490.4*	100	1194.00	1.14	9.71	7.08	9.73	0.00169	1.79	1606.50	810.00	0.14
2	6490.4*	500	1455.00	1.14	10.16	7.66	10.17	0.00138	1.72	1970.10	810.00	0.13
2	6297.8*	10	778.00	1.24	8.89	5.92	8.93	0.00335	2.28	803.97	688.74	0.19
2	6297.8*	25	928.00	1.24	9.18	6.36	9.22	0.00286	2.20	1010.38	722.33	0.18
2	6297.8*	50	1071.00	1.24	9.44	6.73	9.47	0.00252	2.14	1202.60	752.26	0.17
2	6297.8*	100	1194.00	1.24	9.66	7.02	9.69	0.00227	2.10	1369.96	777.39	0.16
2	6297.8*	500	1455.00	1.24	10.12	7.58	10.14	0.00183	1.99	1738.27	820.00	0.15
2	6105.2*	10	778.00	1.35	8.80	5.91	8.86	0.00403	2.50	649.67	558.44	0.21
2	6105.2*	25	928.00	1.35	9.10	6.32	9.16	0.00351	2.43	846.58	649.45	0.20
2	6105.2*	50	1071.00	1.35	9.37	6.67	9.42	0.00308	2.37	1025.89	679.23	0.19
2	6105.2*	100	1194.00	1.35	9.60	6.96	9.64	0.00277	2.32	1182.00	704.12	0.18
2	6105.2*	500	1455.00	1.35	10.07	7.50	10.10	0.00222	2.20	1525.57	756.04	0.17
2	5912.6*	10	778.00	1.45	8.71	5.88	8.78	0.00422	2.57	628.39	453.06	0.22
2	5912.6*	25	928.00	1.45	9.03	6.28	9.09	0.00378	2.53	771.23	459.57	0.21
2	5912.6*	50	1071.00	1.45	9.30	6.61	9.36	0.00341	2.49	909.55	584.01	0.20
2	5912.6*	100	1194.00	1.45	9.53	6.88	9.58	0.00311	2.45	1047.57	629.57	0.19
2	5912.6*	500	1455.00	1.45	10.02	7.41	10.06	0.00251	2.35	1366.90	687.55	0.18
2	5720	10	778.00	1.55	8.62	5.84	8.70	0.00449	2.67	602.42	459.56	0.23
2	5720	25	928.00	1.55	8.95	6.22	9.01	0.00393	2.60	753.20	467.77	0.22
2	5720	50	1071.00	1.55	9.23	6.55	9.29	0.00352	2.54	887.33	469.62	0.21
2	5720	100	1194.00	1.55	9.47	6.81	9.52	0.00322	2.49	999.36	483.39	0.20
2	5720	500	1455.00	1.55	9.96	8.22	10.01	0.00267	2.42	1264.56	594.14	0.18
2	5666		Bridge									
2	5640	10	778.00	1.55	8.37	5.84	8.49	0.00671	3.16	488.61	453.26	0.28
2	5640	25	928.00	1.55	8.63	6.22	8.74	0.00632	3.17	605.81	459.75	0.27
2	5640	50	1071.00	1.55	8.84	6.55	8.94	0.00610	3.19	704.16	465.12	0.27
2	5640	100	1194.00	1.55	9.01	6.81	9.11	0.00595	3.21	783.18	469.16	0.27
2	5640	500	1455.00	1.55	9.33	8.22	9.43	0.00571	3.26	934.33	469.84	0.26
2	5444.*	10	778.00	1.26	8.26		8.36	0.00572	2.99	517.71	453.48	0.26
2	5444.*	25	928.00	1.26	8.52		8.62	0.00543	3.01	637.28	459.54	0.25
2	5444.*	50	1071.00	1.26	8.74		8.83	0.00529	3.05	736.60	464.18	0.25
2	5444.*	100	1194.00	1.26	8.91		9.00	0.00519	3.08	816.17	467.67	0.25
2	5444.*	500	1455.00	1.26	9.23		9.32	0.00503	3.15	970.08	494.94	0.25
2	5248.*	10	778.00	0.97	8.17		8.26	0.00474	2.80	557.95	454.45	0.24
2	5248.*	25	928.00	0.97	8.43		8.52	0.00455	2.84	678.84	459.32	0.23

HEC-RAS Plan: Prop-15 River: School House Dit Reach: 2 (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
2	5248.*	50	1071.00	0.97	8.65		8.73	0.000448	2.89	778.34	463.22	0.23
2	5248.*	100	1194.00	0.97	8.82		8.90	0.000443	2.93	858.46	477.92	0.23
2	5248.*	500	1455.00	0.97	9.15		9.22	0.000433	3.03	1021.19	521.70	0.23
2	5052.*	10	778.00	0.68	8.09		8.17	0.000389	2.62	601.41	454.45	0.21
2	5052.*	25	928.00	0.68	8.36		8.43	0.000380	2.67	722.67	458.71	0.21
2	5052.*	50	1071.00	0.68	8.57		8.65	0.000378	2.74	823.83	483.16	0.21
2	5052.*	100	1194.00	0.68	8.75		8.82	0.000376	2.80	908.43	503.78	0.22
2	5052.*	500	1455.00	0.68	9.07		9.14	0.000373	2.90	1078.50	539.45	0.22
2	4856.*	10	778.00	0.39	8.03		8.10	0.000315	2.43	653.94	454.26	0.19
2	4856.*	25	928.00	0.39	8.30		8.36	0.000311	2.50	778.07	482.17	0.19
2	4856.*	50	1071.00	0.39	8.51		8.58	0.000313	2.58	883.98	505.24	0.20
2	4856.*	100	1194.00	0.39	8.68		8.75	0.000314	2.64	971.91	522.52	0.20
2	4856.*	500	1455.00	0.39	9.01		9.07	0.000317	2.76	1146.80	551.40	0.20
2	4660	10	1111.00	0.10	7.87		8.00	0.000599	3.43	661.40	466.34	0.27
2	4660	25	1334.00	0.10	8.14		8.27	0.000605	3.57	787.70	491.16	0.27
2	4660	50	1547.00	0.10	8.35		8.48	0.000622	3.72	892.87	510.91	0.28
2	4660	100	1733.00	0.10	8.51		8.65	0.000636	3.83	979.52	526.47	0.28
2	4660	500	2128.00	0.10	8.83		8.97	0.000660	4.05	1151.19	550.42	0.29
2	4470.*	10	1111.00	-0.17	7.78		7.90	0.000520	3.29	697.07	480.23	0.25
2	4470.*	25	1334.00	-0.17	8.04		8.16	0.000533	3.44	825.04	502.04	0.26
2	4470.*	50	1547.00	-0.17	8.24		8.37	0.000556	3.60	929.77	519.21	0.26
2	4470.*	100	1733.00	-0.17	8.40		8.53	0.000574	3.73	1015.62	532.83	0.27
2	4470.*	500	2128.00	-0.17	8.72		8.85	0.000605	3.96	1185.03	552.31	0.28
2	4280.*	10	1111.00	-0.44	7.69		7.80	0.000441	3.12	746.44	492.20	0.23
2	4280.*	25	1334.00	-0.44	7.95		8.06	0.000460	3.29	875.03	511.50	0.24
2	4280.*	50	1547.00	-0.44	8.15		8.26	0.000487	3.46	978.58	526.54	0.25
2	4280.*	100	1733.00	-0.44	8.31		8.43	0.000508	3.59	1063.13	537.86	0.26
2	4280.*	500	2128.00	-0.44	8.61		8.74	0.000546	3.85	1229.07	553.68	0.27
2	4090.*	10	1111.00	-0.72	7.63		7.72	0.000372	2.96	800.46	502.08	0.22
2	4090.*	25	1334.00	-0.72	7.88		7.98	0.000396	3.13	928.75	519.18	0.22
2	4090.*	50	1547.00	-0.72	8.07		8.18	0.000425	3.32	1030.48	532.36	0.23
2	4090.*	100	1733.00	-0.72	8.23		8.33	0.000448	3.46	1113.18	541.32	0.24
2	4090.*	500	2128.00	-0.72	8.52		8.64	0.000491	3.73	1275.02	555.26	0.25
2	3900.*	10	1111.00	-0.99	7.57		7.65	0.000312	2.78	862.96	511.00	0.20
2	3900.*	25	1334.00	-0.99	7.82		7.90	0.000337	2.97	990.55	528.37	0.21
2	3900.*	50	1547.00	-0.99	8.00		8.10	0.000368	3.16	1090.26	537.10	0.22
2	3900.*	100	1733.00	-0.99	8.15		8.25	0.000392	3.32	1170.86	544.37	0.23
2	3900.*	500	2128.00	-0.99	8.44		8.55	0.000439	3.61	1328.17	558.69	0.24
2	3710.*	10	1111.00	-1.26	7.52		7.59	0.000260	2.61	932.67	518.78	0.18
2	3710.*	25	1334.00	-1.26	7.77		7.84	0.000286	2.81	1059.23	532.18	0.19
2	3710.*	50	1547.00	-1.26	7.95		8.03	0.000316	3.01	1156.60	540.90	0.20
2	3710.*	100	1733.00	-1.26	8.09		8.18	0.000340	3.17	1235.02	547.08	0.21
2	3710.*	500	2128.00	-1.26	8.37		8.47	0.000388	3.47	1387.60	558.07	0.23
2	3520.*	10	1111.00	-1.53	7.49		7.55	0.000217	2.46	1006.48	525.63	0.17
2	3520.*	25	1334.00	-1.53	7.72		7.79	0.000242	2.65	1131.63	536.04	0.18
2	3520.*	50	1547.00	-1.53	7.90		7.97	0.000271	2.86	1226.56	543.90	0.19
2	3520.*	100	1733.00	-1.53	8.04		8.12	0.000295	3.02	1302.74	549.07	0.20
2	3520.*	500	2128.00	-1.53	8.30		8.40	0.000343	3.34	1450.44	558.93	0.22
2	3330.*	10	1111.00	-1.80	7.45		7.51	0.000181	2.30	1085.18	530.09	0.15
2	3330.*	25	1334.00	-1.80	7.69		7.74	0.000205	2.51	1208.78	539.72	0.16
2	3330.*	50	1547.00	-1.80	7.86		7.92	0.000232	2.71	1301.44	546.41	0.18
2	3330.*	100	1733.00	-1.80	7.99		8.06	0.000255	2.88	1375.46	551.06	0.19
2	3330.*	500	2128.00	-1.80	8.25		8.33	0.000302	3.20	1518.48	559.91	0.20
2	3140.*	10	1111.00	-2.08	7.43		7.47	0.000151	2.16	1166.18	534.12	0.14
2	3140.*	25	1334.00	-2.08	7.66		7.71	0.000174	2.37	1288.28	543.00	0.15
2	3140.*	50	1547.00	-2.08	7.82		7.88	0.000199	2.57	1378.79	548.59	0.16
2	3140.*	100	1733.00	-2.08	7.95		8.01	0.000221	2.74	1450.77	552.81	0.17
2	3140.*	500	2128.00	-2.08	8.20		8.28	0.000266	3.07	1589.31	560.84	0.19
2	2950.*	10	1111.00	-2.35	7.41		7.44	0.000128	2.04	1248.42	537.53	0.13
2	2950.*	25	1334.00	-2.35	7.63		7.67	0.000148	2.24	1369.07	545.48	0.14
2	2950.*	50	1547.00	-2.35	7.79		7.84	0.000172	2.44	1457.51	550.37	0.15
2	2950.*	100	1733.00	-2.35	7.92		7.97	0.000192	2.61	1527.58	554.22	0.16
2	2950.*	500	2128.00	-2.35	8.16		8.23	0.000235	2.94	1661.83	561.51	0.18

HEC-RAS Plan: Prop-15 River: School House Dit Reach: 2 (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
2	2760.*	10	1111.00	-2.62	7.39		7.42	0.000107	1.92	1335.72	540.21	0.12
2	2760.*	25	1334.00	-2.62	7.61		7.65	0.000127	2.12	1454.93	547.12	0.13
2	2760.*	50	1547.00	-2.62	7.76		7.81	0.000148	2.32	1541.44	551.63	0.14
2	2760.*	100	1733.00	-2.62	7.89		7.94	0.000167	2.48	1609.70	555.16	0.15
2	2760.*	500	2128.00	-2.62	8.12		8.18	0.000206	2.82	1739.92	561.84	0.17
2	2570.*	10	1111.00	-2.89	7.37		7.40	0.000092	1.81	1420.65	542.79	0.11
2	2570.*	25	1334.00	-2.89	7.59		7.62	0.000109	2.01	1538.54	548.75	0.12
2	2570.*	50	1547.00	-2.89	7.74		7.78	0.000128	2.21	1623.30	552.93	0.13
2	2570.*	100	1733.00	-2.89	7.86		7.91	0.000146	2.37	1689.93	556.19	0.14
2	2570.*	500	2128.00	-2.89	8.09		8.14	0.000183	2.70	1816.44	562.33	0.16
2	2380.*	10	1111.00	-3.16	7.36		7.38	0.000078	1.71	1508.57	544.51	0.10
2	2380.*	25	1334.00	-3.16	7.57		7.60	0.000094	1.91	1625.19	550.00	0.11
2	2380.*	50	1547.00	-3.16	7.72		7.76	0.000112	2.10	1708.34	553.87	0.12
2	2380.*	100	1733.00	-3.16	7.84		7.88	0.000127	2.26	1773.45	556.89	0.13
2	2380.*	500	2128.00	-3.16	8.06		8.11	0.000162	2.59	1896.50	562.55	0.15
2	2190.*	10	1111.00	-3.43	7.35		7.37	0.000067	1.62	1597.34	545.85	0.10
2	2190.*	25	1334.00	-3.43	7.56		7.58	0.000082	1.81	1712.77	551.00	0.11
2	2190.*	50	1547.00	-3.43	7.71		7.74	0.000098	2.00	1794.45	554.61	0.12
2	2190.*	100	1733.00	-3.43	7.82		7.86	0.000112	2.16	1858.16	557.41	0.13
2	2190.*	500	2128.00	-3.43	8.03		8.08	0.000144	2.49	1978.02	562.65	0.14
2	2000.*	10	1111.00	-3.71	7.34		7.36	0.000058	1.54	1685.92	546.81	0.09
2	2000.*	25	1334.00	-3.71	7.54		7.57	0.000071	1.73	1800.23	551.69	0.10
2	2000.*	50	1547.00	-3.71	7.69		7.72	0.000086	1.91	1880.55	555.09	0.11
2	2000.*	100	1733.00	-3.71	7.80		7.83	0.000099	2.07	1942.97	557.71	0.12
2	2000.*	500	2128.00	-3.71	8.01		8.05	0.000128	2.39	2059.86	562.60	0.13
2	1810.*	10	1111.00	-3.98	7.33		7.34	0.000051	1.46	1775.76	547.64	0.08
2	1810.*	25	1334.00	-3.98	7.53		7.55	0.000062	1.65	1889.05	552.25	0.09
2	1810.*	50	1547.00	-3.98	7.68		7.70	0.000075	1.83	1968.13	555.44	0.10
2	1810.*	100	1733.00	-3.98	7.79		7.82	0.000087	1.98	2029.38	557.90	0.11
2	1810.*	500	2128.00	-3.98	7.99		8.03	0.000114	2.30	2143.54	562.46	0.13
2	1620	10	1111.00	-4.25	7.32		7.34	0.000044	1.39	1864.60	548.25	0.08
2	1620	25	1334.00	-4.25	7.52		7.54	0.000055	1.57	1976.93	552.62	0.09
2	1620	50	1547.00	-4.25	7.67		7.69	0.000067	1.75	2054.86	555.64	0.10
2	1620	100	1733.00	-4.25	7.77		7.80	0.000078	1.90	2115.03	557.95	0.10
2	1620	500	2128.00	-4.25	7.97		8.01	0.000102	2.21	2226.67	562.22	0.12
2	1580	10	1111.00	-4.40	7.32	-1.37	7.33	0.000029	1.19	1994.00	548.68	0.06
2	1580	25	1334.00	-4.40	7.52	-1.01	7.54	0.000037	1.35	2106.25	553.04	0.07
2	1580	50	1547.00	-4.40	7.66	-0.69	7.68	0.000045	1.51	2184.08	556.05	0.08
2	1580	100	1733.00	-4.40	7.77	-0.43	7.80	0.000053	1.65	2244.13	558.36	0.09
2	1580	500	2128.00	-4.40	7.97	0.10	8.00	0.000071	1.93	2355.46	562.61	0.10
2	1578		Culvert									
2	1535	10	1111.00	-4.28	6.70		6.73	0.000065	1.64	1334.98	520.76	0.09
2	1535	25	1334.00	-4.28	6.74		6.79	0.000091	1.94	1357.78	522.35	0.11
2	1535	50	1547.00	-4.28	6.79		6.85	0.000118	2.22	1383.86	524.16	0.13
2	1535	100	1733.00	-4.28	6.84		6.91	0.000143	2.45	1408.43	525.86	0.14
2	1535	500	2128.00	-4.28	6.95		7.05	0.000198	2.91	1468.33	529.99	0.17
2	1505	10	1111.00	-4.28	6.70		6.73	0.000069	1.68	1316.74	520.63	0.10
2	1505	25	1334.00	-4.28	6.74		6.78	0.000096	1.99	1338.82	522.17	0.12
2	1505	50	1547.00	-4.28	6.79		6.85	0.000124	2.27	1364.15	523.93	0.13
2	1505	100	1733.00	-4.28	6.83		6.90	0.000151	2.51	1386.02	525.59	0.15
2	1505	500	2128.00	-4.28	6.94		7.04	0.000210	2.99	1446.36	529.61	0.17
2	1316.87*	10	1111.00	-4.34	6.68		6.72	0.000074	1.74	1295.88	539.23	0.10
2	1316.87*	25	1334.00	-4.34	6.72		6.77	0.000104	2.07	1315.17	540.74	0.12
2	1316.87*	50	1547.00	-4.34	6.76		6.82	0.000136	2.37	1337.35	542.46	0.14
2	1316.87*	100	1733.00	-4.34	6.80		6.87	0.000165	2.62	1358.42	544.09	0.15
2	1316.87*	500	2128.00	-4.34	6.89		7.00	0.000232	3.13	1410.32	548.08	0.18
2	1128.75*	10	1111.00	-4.40	6.66		6.70	0.000079	1.80	1289.83	564.71	0.11
2	1128.75*	25	1334.00	-4.40	6.69		6.75	0.000112	2.14	1306.07	566.13	0.13
2	1128.75*	50	1547.00	-4.40	6.73		6.79	0.000146	2.45	1324.74	567.76	0.14
2	1128.75*	100	1733.00	-4.40	6.76		6.84	0.000179	2.72	1342.67	569.32	0.16
2	1128.75*	500	2128.00	-4.40	6.84		6.95	0.000254	3.26	1387.29	573.19	0.19
2	940.625*	10	1111.00	-4.46	6.65		6.69	0.000083	1.84	1300.06	599.84	0.11
2	940.625*	25	1334.00	-4.46	6.67		6.72	0.000118	2.20	1312.97	600.98	0.13

HEC-RAS Plan: Prop-15 River: School House Dit Reach: 2 (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
2	940.625*	50	1547.00	-4.46	6.69		6.76	0.000156	2.53	1327.68	602.46	0.15
2	940.625*	100	1733.00	-4.46	6.72		6.80	0.000192	2.81	1341.97	604.88	0.17
2	940.625*	500	2128.00	-4.46	6.78		6.90	0.000276	3.38	1378.02	610.98	0.20
2	752.5*	10	1111.00	-4.52	6.63		6.67	0.000086	1.87	1353.49	680.40	0.11
2	752.5*	25	1334.00	-4.52	6.65		6.70	0.000123	2.24	1363.20	682.02	0.13
2	752.5*	50	1547.00	-4.52	6.66		6.73	0.000163	2.58	1374.03	683.83	0.15
2	752.5*	100	1733.00	-4.52	6.68		6.77	0.000202	2.87	1384.83	685.63	0.17
2	752.5*	500	2128.00	-4.52	6.72		6.85	0.000294	3.48	1412.50	690.21	0.20
2	564.375*	10	1111.00	-4.57	6.62		6.65	0.000083	1.83	1485.36	783.77	0.11
2	564.375*	25	1334.00	-4.57	6.63		6.68	0.000118	2.20	1491.71	784.82	0.13
2	564.375*	50	1547.00	-4.57	6.64		6.70	0.000158	2.54	1498.93	786.00	0.15
2	564.375*	100	1733.00	-4.57	6.64		6.73	0.000196	2.83	1506.18	787.19	0.17
2	564.375*	500	2128.00	-4.57	6.67		6.79	0.000289	3.45	1525.17	790.30	0.20
2	376.25*	10	1111.00	-4.63	6.61		6.64	0.000069	1.67	1683.99	812.96	0.10
2	376.25*	25	1334.00	-4.63	6.61		6.65	0.000099	2.01	1687.71	813.06	0.12
2	376.25*	50	1547.00	-4.63	6.62		6.67	0.000132	2.32	1691.92	813.17	0.14
2	376.25*	100	1733.00	-4.63	6.63		6.69	0.000165	2.60	1696.16	813.28	0.15
2	376.25*	500	2128.00	-4.63	6.64		6.73	0.000245	3.17	1706.96	813.57	0.19
2	188.125*	10	1111.00	-4.69	6.60		6.62	0.000053	1.48	1899.60	817.37	0.09
2	188.125*	25	1334.00	-4.69	6.61		6.63	0.000077	1.77	1901.28	817.37	0.10
2	188.125*	50	1547.00	-4.69	6.61		6.64	0.000103	2.05	1903.19	817.37	0.12
2	188.125*	100	1733.00	-4.69	6.61		6.65	0.000129	2.30	1905.10	817.37	0.14
2	188.125*	500	2128.00	-4.69	6.62		6.68	0.000193	2.81	1909.96	817.37	0.17
2	0	10	1111.00	-4.75	6.60	0.28	6.61	0.000040	1.28	2121.29	819.85	0.08
2	0	25	1334.00	-4.75	6.60	0.72	6.62	0.000058	1.54	2121.29	819.85	0.09
2	0	50	1547.00	-4.75	6.60	1.09	6.62	0.000078	1.79	2121.29	819.85	0.11
2	0	100	1733.00	-4.75	6.60	1.41	6.63	0.000098	2.00	2121.29	819.85	0.12
2	0	500	2128.00	-4.75	6.60	2.00	6.64	0.000147	2.46	2121.29	819.85	0.14

APPENDIX C

PRELIMINARY COST ESTIMATES

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: Walden Street Culvert Replacement  
Sta. 103+21

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$20,000	\$20,000
EXCAVATION	900	C.Y.	\$20	\$18,000
SEAL SLAB BEDDING	46	C.Y.	\$70	\$3,220
BOX CULVERT (8' x 8')	144	L.F.	\$800	\$115,200
CEMENT STABILIZED SAND	605	TONS	\$50	\$30,250
CONCRETE LINING	112	S.Y.	\$100	\$11,200
STRUCTURAL CONCRETE	12	C.Y.	\$600	\$7,200
ASPHALT	57	TONS	\$100	\$5,700
GUARDRAIL	140	L.F.	\$60	\$8,400

SUBTOTAL	\$219,170
CONTINGENCIES (15%)	\$32,876
TOTAL ESTIMATED CONSTRUCTION COSTS	\$252,046
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$40,000
TOTAL ESTIMATED COST	\$292,046

**Not Included in Estimates**

Utility Adjustments/Relocations  
Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: Lindberg Street Culvert Replacement  
Sta. 108+03

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$10,000	\$10,000
EXCAVATION	445	C.Y.	\$20	\$8,900
SEAL SLAB BEDDING	25	C.Y.	\$70	\$1,750
BOX CULVERT (8' x 8')	72	L.F.	\$800	\$57,600
CEMENT STABILIZED SAND	315	TONS	\$50	\$15,750
CONCRETE LINING	112	S.Y.	\$100	\$11,200
STRUCTURAL CONCRETE	12	C.Y.	\$600	\$7,200
ASPHALT	30	TONS	\$100	\$3,000
GUARDRAIL	140	L.F.	\$60	\$8,400

SUBTOTAL	\$123,800
CONTINGENCIES (15%)	\$18,570
TOTAL ESTIMATED CONSTRUCTION COSTS	\$142,370
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$40,000
TOTAL ESTIMATED COST	\$182,370

**Not Included in Estimates**

Utility Adjustments/Relocations  
Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: Taylor Street Culvert Replacement  
Sta. 113+49

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$15,000	\$15,000
EXCAVATION	445	C.Y.	\$20	\$8,900
SEAL SLAB BEDDING	25	C.Y.	\$90	\$2,250
BOX CULVERT (8' x 8')	72	L.F.	\$1,050	\$75,600
CEMENT STABILIZED SAND	315	TONS	\$72	\$22,680
CONCRETE LINING	112	S.Y.	\$100	\$11,200
STRUCTURAL CONCRETE	12	C.Y.	\$775	\$9,300
ASPHALT	30	TONS	\$100	\$3,000
GUARDRAIL	140	L.F.	\$75	\$10,500

SUBTOTAL	\$158,430
CONTINGENCIES (15%)	\$23,765
TOTAL ESTIMATED CONSTRUCTION COSTS	\$182,195
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$40,000
TOTAL ESTIMATED COST	\$222,195

**Not Included in Estimates**

Utility Adjustments/Relocations  
Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: F.M. 105 Culvert Replacement  
Sta. 121+05

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$15,000	\$15,000
EXCAVATION	850	C.Y.	\$20	\$17,000
SEAL SLAB BEDDING	50	C.Y.	\$70	\$3,500
BOX CULVERT (8' x 8')	96	L.F.	\$800	\$76,800
CEMENT STABILIZED SAND	605	TONS	\$50	\$30,250
CONCRETE LINING	112	S.Y.	\$100	\$11,200
STRUCTURAL CONCRETE	12	C.Y.	\$600	\$7,200
ASPHALT	60	TONS	\$100	\$6,000
GUARDRAIL	200	L.F.	\$60	\$12,000

SUBTOTAL	\$178,950
CONTINGENCIES (15%)	\$26,843
TOTAL ESTIMATED CONSTRUCTION COSTS	\$205,793
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$40,000
TOTAL ESTIMATED COST	\$245,793

**Not Included in Estimates**

Utility Adjustments/Relocations  
Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: Orange Street Culvert Replacement  
Sta. 144+50

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$20,000	\$20,000
EXCAVATION	780	C.Y.	\$20	\$15,600
SEAL SLAB BEDDING	52	C.Y.	\$70	\$3,640
BOX CULVERT (10' x 6')	144	L.F.	\$950	\$136,800
CEMENT STABILIZED SAND	500	TONS	\$50	\$25,000
CONCRETE LINING	90	S.Y.	\$100	\$9,000
STRUCTURAL CONCRETE	12	C.Y.	\$600	\$7,200
CONCRETE PAVEMENT	285	S.Y.	\$100	\$28,500
GUARDRAIL	110	L.F.	\$60	\$6,600

SUBTOTAL	\$252,340
CONTINGENCIES (15%)	\$37,851
TOTAL ESTIMATED CONSTRUCTION COSTS	\$290,191
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$40,000
TOTAL ESTIMATED COST	\$330,191

**Not Included in Estimates**

Utility Adjustments/Relocations  
Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: Highway 90 Culvert Replacement  
Sta. 154+44

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$10,000	\$10,000
EXCAVATION	220	C.Y.	\$20	\$4,400
CROWNSPAN CULVERT (20' x 5')	32	L.F.	\$1,700	\$54,400
CEMENT STABILIZED SAND	175	TONS	\$50	\$8,750
CONCRETE LINING	85	S.Y.	\$100	\$8,500
STRUCTURAL CONCRETE	8	C.Y.	\$600	\$4,800
ASPHALT	25	TONS	\$100	\$2,500
GUARDRAIL	100	L.F.	\$60	\$6,000

SUBTOTAL	\$99,350
CONTINGENCIES (15%)	\$14,903
TOTAL ESTIMATED CONSTRUCTION COSTS	\$114,253
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$40,000
TOTAL ESTIMATED COST	\$154,253

**Not Included in Estimates**

Utility Adjustments/Relocations  
Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: Railroad Crossing Replacement  
Sta. 155+12

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$40,000	\$40,000
EXCAVATION	625	C.Y.	\$20	\$12,500
REMOVE AND REPLACE BRIDGE	1	L.S.	\$250,000	\$250,000
CEMENT STABILIZED SAND	785	TONS	\$50	\$39,250
CONCRETE LINING	375	S.Y.	\$100	\$37,500
STRUCTURAL CONCRETE	27	C.Y.	\$600	\$16,200

SUBTOTAL	\$395,450
CONTINGENCIES (15%)	\$59,318
TOTAL ESTIMATED CONSTRUCTION COSTS	\$454,768
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$70,000
TOTAL ESTIMATED COST	\$524,768

**Not Included in Estimates**

Utility Adjustments/Relocations  
Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: East Railroad Street Culvert Replacement  
Sta. 156+25

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$10,000	\$10,000
EXCAVATION	220	C.Y.	\$20	\$4,400
CROWNSPAN CULVERT (20' x 5')	32	L.F.	\$1,700	\$54,400
CEMENT STABILIZED SAND	175	TONS	\$50	\$8,750
CONCRETE LINING	85	S.Y.	\$100	\$8,500
STRUCTURAL CONCRETE	8	C.Y.	\$600	\$4,800
ASPHALT	25	TONS	\$100	\$2,500
GUARDRAIL	100	L.F.	\$60	\$6,000

SUBTOTAL	\$99,350
CONTINGENCIES (15%)	\$14,903
TOTAL ESTIMATED CONSTRUCTION COSTS	\$114,253
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$40,000
TOTAL ESTIMATED COST	\$154,253

**Not Included in Estimates**

Utility Adjustments/Relocations  
Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: East Bolivar Street Culvert Replacement  
Sta. 165+41

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$10,000	\$10,000
EXCAVATION	215	C.Y.	\$20	\$4,300
SEAL SLAB BEDDING	15	C.Y.	\$70	\$1,050
BOX CULVERT (8' x 5')	24	L.F.	\$675	\$16,200
RESET EXISTING BOX CULVERT (8' X 5')	24	L.F.	\$200	\$4,800
CEMENT STABILIZED SAND	165	TONS	\$50	\$8,250
CONCRETE LINING	85	S.Y.	\$100	\$8,500
STRUCTURAL CONCRETE	8	C.Y.	\$600	\$4,800
ASPHALT	22	TONS	\$100	\$2,200
GUARDRAIL	100	L.F.	\$60	\$6,000

SUBTOTAL	\$66,100
CONTINGENCIES (15%)	\$9,915
TOTAL ESTIMATED CONSTRUCTION COSTS	\$76,015
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$40,000
TOTAL ESTIMATED COST	\$116,015

**Not Included in Estimates**

Utility Adjustments/Relocations  
Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: Unnamed Crossing Culvert Replacement  
Sta. 170+85

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$10,000	\$10,000
EXCAVATION	360	C.Y.	\$20	\$7,200
SEAL SLAB BEDDING	18	C.Y.	\$70	\$1,260
PIPE CULVERT (5')	24	L.F.	\$250	\$6,000
RESET EXISTING PIPE CULVERT (8')	24	L.F.	\$200	\$4,800
CEMENT STABILIZED SAND	575	TONS	\$50	\$28,750
CONCRETE LINING	85	S.Y.	\$100	\$8,500
STRUCTURAL CONCRETE	8	C.Y.	\$600	\$4,800
ASPHALT	37	TONS	\$100	\$3,700
GUARDRAIL	120	L.F.	\$60	\$7,200

SUBTOTAL	\$82,210
CONTINGENCIES (15%)	\$12,332
TOTAL ESTIMATED CONSTRUCTION COSTS	\$94,542
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$40,000
TOTAL ESTIMATED COST	\$134,542

**Not Included in Estimates**

Utility Adjustments/Relocations  
Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: East Courtland Street Culvert Replacement  
Sta. 174+10

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$10,000	\$10,000
EXCAVATION	140	C.Y.	\$20	\$2,800
SEAL SLAB BEDDING	15	C.Y.	\$70	\$1,050
BOX CULVERT (8' x 6')	24	L.F.	\$725	\$17,400
RESET EXISTING BOX CULVERT (6' X 5')	24	L.F.	\$250	\$6,000
CEMENT STABILIZED SAND	225	TONS	\$50	\$11,250
CONCRETE LINING	90	S.Y.	\$100	\$9,000
STRUCTURAL CONCRETE	10	C.Y.	\$600	\$6,000
ASPHALT	20	TONS	\$100	\$2,000
GUARDRAIL	100	L.F.	\$60	\$6,000

SUBTOTAL	\$71,500
CONTINGENCIES (15%)	\$10,725
TOTAL ESTIMATED CONSTRUCTION COSTS	\$82,225
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$40,000
TOTAL ESTIMATED COST	\$122,225

**Not Included in Estimates**

Utility Adjustments/Relocations  
Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: Schoolhouse Ditch Channel Improvements from Alamo Street to IH-10 (Alternative B)  
 3:1 Side Slopes and 0.12% bottom slope from Sta. 72+98 to Sta. 143+39  
 0.08% Bottom Slope from Sta. 145+07 to Sta. 180+78

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$100,000	\$100,000
CLEARING AND GRUBBING	15	ACRE	\$5,000	\$75,000
EXCAVATION	35,000	C.Y.	\$10	\$350,000
REM./REPLACE 18" SANITARY SEWER	7,000	L.F.	\$125	\$875,000
REMOVE AND REPLACE MANHOLES	20	EACH	\$6,000	\$120,000
KEY PROPERTY ACQUISITION (R.O.W.)	1	L.S.	\$300,000	\$300,000

SUBTOTAL	\$1,820,000
CONTINGENCIES (15%)	\$273,000
TOTAL ESTIMATED CONSTRUCTION COSTS	\$2,093,000
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$285,000
CROSSING IMPROVEMENTS (ALT. A)	\$2,478,651
TOTAL ESTIMATED COST	\$4,856,651

**Not Included in Estimates**

Utility Adjustments/Relocations  
 Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

**PRELIMINARY ENGINEERS ESTIMATE OF CONSTRUCTION COST  
CITY OF VIDOR**

PROJECT: Schoolhouse Ditch Channel Improvements from Alamo Street to IH-10 (Alternative C)  
 20' Bottom Width, 3:1 Side Slopes and 0.12% Bottom Slope from Sta. 72+98 to Sta. 143+39  
 20' Bottom Width, Vertical Side Slopes and 0.08% Bottom Slope from Sta. 145+07 to Sta. 180+78

ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
MOBILIZATION	1	L.S.	\$250,000	\$250,000
CLEARING AND GRUBBING	15	ACRE	\$5,000	\$75,000
EXCAVATION	67,000	C.Y.	\$10	\$670,000
BLOCK RETAINING WALL	35,000	S.F.	\$40	\$1,400,000
CONCRETE LINING	8,000	S.Y.	\$135	\$1,080,000
REM./REPLACE 18" SANITARY SEWER	7,000	L.F.	\$125	\$875,000
REMOVE AND REPLACE MANHOLES	20	EACH	\$6,000	\$120,000
KEY PROPERTY ACQUISITION (R.O.W.)	1	L.S.	\$300,000	\$300,000

SUBTOTAL	\$4,770,000
CONTINGENCIES (15%)	\$715,500
TOTAL ESTIMATED CONSTRUCTION COSTS	\$5,485,500
R.O.W. ACQUISITION, ENGINEERING, ADMINISTRATION	\$645,000
CROSSING IMPROVEMENTS (ALT. A)	\$2,478,651
TOTAL ESTIMATED COST	\$8,609,151

**Not Included in Estimates**

Utility Adjustments/Relocations  
 Pipeline Adjustment/Relocations

Estimated Unit Prices are for Contractor Bid Work in 2007 Dollars

APPENDIX D  
BENEFIT-COST ANALYSIS

# Technical Report on Benefit-Cost Analysis School House Ditch Project

This memorandum describes the methodology and data sources used in the benefit-cost analysis of the three proposed structural flood control alternates identified as part of the study of the School House Ditch Watershed. This benefit-cost analysis was conducted using the FEMA Full-Data Riverine Flood Benefit-Cost Analysis module (2006 version of the BCA Toolkit)

## Approach to the Benefit-Cost Analysis

Due to the fact that this is a structural flood control project, the analysis was done by performing four BCAs on each property. The first analysis for each property uses the pre-project flood profiles (existing condition). The next three analyses for each property used all the same building-specific information, with the flood profiles modified to reflect the changes in water surface elevations and discharges that were effected by each proposed alternative (post-project condition). The post-project risk determination (in dollars) was then subtracted from the pre-project risk to determine avoided losses (again expressed in present-day dollars). This figure was then divided by the project cost of each alternative to calculate the benefit-cost ratio. The results of this analysis are discussed in the paragraph immediately below.

A BCA performed using FEMA BCA software provides an estimate of the "benefits" and "costs" of a proposed flood hazard mitigation project. The benefits considered are avoided future damages and losses which are expected to accrue as a result of the mitigation project. In other words, benefits are the reduction in expected future damages and losses (i.e., the difference in expected future damages before and after the mitigation project). The costs considered are those necessary to implement the specific mitigation project under evaluation.

The benefits considered in the FEMA BCA Software include: avoided damages to the building and contents, avoided displacement costs, avoided rental and business income losses, and avoided loss of public/nonprofit services. The "benefits" calculated by the program are expected future benefits which are estimated over the useful lifetime of the mitigation project. To account for the time value of money, a net present value calculation is performed. This calculation is done automatically in the program, using the discount rate and project useful lifetime entered by the analyst.

The validity of a BCA performed using FEMA BCA software and the robustness of conclusions drawn depend entirely on the validity of the data used in the calculations. Calculations based on detailed, building-specific engineering analysis will be much more accurate (and correspondingly more useful) than calculations based largely on typical or default values of input parameters. For any FEMA BCA of a hazard mitigation project, basic information about the building/facility under evaluation is required, including: building type, size, replacement value, contents value, and various economic data about the use and function of the building. The module uses the building and contents data described above to derive building and contents estimated values. The other important data point is the first floor elevation data. This software then compares the Flood Hazard Data (Hydrology) data input into the model to determine the expected depth of water from various frequency events (based on probability of a given depth occurring). These depths are then tied to an associated FEMA provided Depth Damage Function to derive the anticipated dollar value of damage to building and contents at various depths. The Building Depth-Damage Function (DDF) indicates a building's vulnerability to flood damage by showing the expected levels of damage, both as a percentage of building replacement value and as dollars of damage for each flood depth. The Building DDF is the damage estimated to occur to a building at each flood depth.

The Building DDF estimates included in FEMA's BCA software are based on the building type selected and the Federal Insurance Administration (FIA) data. FIA data on hundreds of thousands of flood damage claims are categorized into six classes of structures (one story without basement; split level without basement; 2 story without basement; 1 or 2 story with basement; split level with basement; and mobile home). Note: for our analysis we used primarily one-story without basement. These FIA data are predominantly, but not entirely, for residential buildings. In conformance with the FIA depth-damage data, the depth-damage table runs from -2 to +8 feet or greater, with all depths relative to the FFE of the building. Damage data is included for depths below 0 feet because damage occurs at these flood levels for buildings with basements. The same process and data is used for the contents DDF.

When running multiple BCA scenarios using FEMA's BCA software, the reduction in water surface elevation from each alternative results in a reduction in estimated dollar value of damages. These various scenarios of damage reduction are compared with the cost to obtain these reductions in water surface elevation.

## Results of the Analysis

**Table 1. Summary of pre- and post-project risk, and damages avoided (benefits)**

Alternatives	Pre Project	Post Project	Damages Avoided
A	\$ 2,645,080	\$ 34,253	2,610,827.00
B	\$ 2,645,080	\$ 6,917	2,638,163.00
C	\$ 2,645,080	\$ 3,392	2,641,688.00

**Table 2. Summary of damages avoided (benefits), project cost and benefit-cost ratio**

Alternatives	Cost	Avoided Damages	B/C
A	\$ 2,478,651	\$ 2,610,827	1.05
B	\$ 4,856,651	\$ 2,638,163	0.54
C	\$ 8,609,151	\$ 2,641,688	0.31

## Flood Hazard Data (Hydrology)

Carroll and Blackman Engineering completed a detailed engineering study of the project area that was used to determine this mitigation alternatives and to develop the project costs.

The pre- and post-project water surface elevations (WSEs) and discharges (Qs) for the 10-, 50-, 100- and 500-year return frequencies were used verbatim in the pre- and post-project BCAs, as described above in the methodology section. For the actual WSEs and discharges identified for existing conditions and each alternative refer the Carroll and Blackman study. In addition, a licensed surveyor shot first floor elevations of each of the structures within the benefit area. Table 3 lists the FFEs for buildings within the project area.

**Table 3. Summary of First Floor Elevations**

<b>Address of Property</b>	<b>Description of Building</b>	<b>FFE</b>
280 Stephenson	Residential	19.8
320 Clairmont	Residential	18.44
330 Clairmont	Residential	18.09
340 Orange Street	Residential	18.76
500 Orange Street	Bus Barn (H.S.)	19
500 Orange Street	Year Book and Journalism (H.S.)	18.51
305 Reynolds	Residential	18.97
310 Clairmont	Residential	18.67
340 Melrose	Residential	17.86
345 East Railroad	Residential	19.73
350 Clairmont	Residential	17.98
350 Orange Street	Residential	19.37
360 Clairmont	Residential	17.81
375 Shasta	Residential	17.94
380 Melrose	Residential	17.66
387 Roselawn	Residential	18.6
400 East Railroad	Vidor Elementary School Building 1	21.1
400 East Railroad	Vidor Elementary School Gym	19.72
400 East Railroad	Vidor Elementary School Music Room	19.69
400 East Railroad	Vidor Elementary School Building 2	20
405 East Railroad	Residential	19.91
445 Reynolds	Residential	18.76
450 Melrose	Residential	17.73
450 Reynolds	Residential	19.19
470 Melrose	Residential	18.21
500 Orange Street	AIMS Building (H.S.)	18.55
500 Orange Street	VHS Auditorium	18.75
500 Orange Street	New Gym (H.S.)	23.1
500 Orange Street	VHS Band Hall(H.S.)	19.23
500 Orange Street	VHS Fourth Wing Building	18.98
500 Orange Street	VHS Old Gym (H.S.)	20.25
500 Orange Street	VHS Welding and Auto	19.45
500 Orange Street	VHS Field House	18.83
590 Wilson Street	Cinnamon Patch - Restaurant	21.53
865 Lamar Street	Residential	21.18

## Structure and Contents Depth-Damage Functions

### ***Structure Depth-Damage Functions for Residential Uses***

Structural damage functions for all residential buildings are FEMA Full-Data Riverine module defaults. Every structure in the sample is a one-story building with no basement, and this software selection and the associated damage function was used in every individual analysis.

### ***Structure Depth-Damage Functions for Non-Residential Uses***

Structural damage functions for all non-residential buildings were taken from a 1996 U.S. Army Corps of Engineers study entitled "Depth-Damage Relationships for Structures, Contents and Vehicles, and Content-to-Structure Value Ratios (CSVs) in support of the Jefferson and Orleans Flood Control Feasibility Studies" (hereinafter "the USACE report"). This report can be found at [http://www.mvn.usace.army.mil/pd/\\_docs/GEC\\_9238\\_085c\\_arc.pdf](http://www.mvn.usace.army.mil/pd/_docs/GEC_9238_085c_arc.pdf), citations are provided in this text, and where appropriate we have included copies of germane sections. The USACE report is based on consensus opinion of building experts. The tables in the report provide minimum, mean and maximum damage values for combinations of the structure types (listed immediately below) for both freshwater and saltwater inundation. The present BCA uses the freshwater condition in all cases, and *always uses the mean consensus damage function*.

The USACE report provides structural damage functions for a discreet set of building types, including the following.

- Masonry bearing wall structure
- Wood or steel frame structure
- Metal frame structure

As noted above, this project reduces flood risk to a mixture of residential and non-residential uses and structures. Structural damage functions are related to the type of building exposed to flooding. For this analysis, the analyst had access to detailed information about the uses taking place in individual structures, the size of the buildings, and the number of stories each comprises. The Central Appraisal District Records for Tax purposes were used to gather square footage and building construction type. Carroll and Blackman engineers provided details on building usage, construction type, and square footage of the commercial/public buildings that were not listed in CAD. The majority of non-residential buildings were part of the Vidor Elementary School and High School.

### ***Additional Notes on Structural Damage Functions***

1. The USACE damage functions extend to 15 feet above the reference elevation, whereas the FEMA software truncates this information into a bin called >8 feet of flood depth. For the present BCA the USACE damage function for the 9-foot flood level was used in the >8 FEMA damage function bin as a proxy for all floods above 8 feet.
2. The FEMA FD BCA software is partly based on assigning frequencies and damages to a series of flood depths that range from -2' to >8'. As noted in FEMA technical guidance for the software, each of the discreet flood depths actually represents a one-foot range around the whole-number depths, i.e. the 4' flood represents a range from 3'-6" to 4'-6". In the USACE report that is the basis of these non-residential damage functions, there is no mention as to whether a similar mathematical

structure is used for the Corps' curves. For the present analysis, an average of the zero-foot and 1-foot damage functions was used for the zero-foot damages in all cases. The primary reason for this is that nearly all the USACE functions indicate zero damages in a zero-foot flood, something that is clearly not the case with the FEMA +/- 6" methodology described above. Although there are no FEMA default damage functions for non-residential structures or contents, all of the residential default functions assign damages to the zero-foot level. In completing the present BCA we applied the same methodology to the non-residential structures and contents, using the average value as a proxy for the damage function. The remainder of the functions are verbatim from the USACE report. All the specific damage functions are provided in the master spreadsheet.

### ***Contents Depth-Damage Functions for Residential Uses***

Contents damage functions for all residential buildings are FEMA Full-Data Riverine module defaults.

### ***Contents Depth-Damage Functions for Non-Residential Uses***

Contents damage functions for all non-residential buildings were taken from the USACE report. This report can be found at [http://www.mvn.usace.army.mil/pd/\\_docs/GEC\\_9238\\_085c\\_arc.pdf](http://www.mvn.usace.army.mil/pd/_docs/GEC_9238_085c_arc.pdf), citations are provided in this text, and where appropriate we have included copies of germane sections. The USACE report is based on consensus opinion of experts. The tables in the report provide minimum, mean and maximum damage values for combinations of the contents types (listed immediately below) for both freshwater and saltwater inundation. The present BCA uses the freshwater condition in all cases, and *always uses the mean consensus depth-damage function*.

The USACE report provides depth-damage functions for a discreet set of building types, including those shown in Table 6 (there are additional functions in the report, but they are not shown here because they did not apply to the present BCA).

### ***Additional Notes on Structural Damage Functions***

1. In all cases the zero-foot damage function value was the average of the USACE figures for one-foot and zero-foot inundation. The rationale for this is provided in note #2 in the structural depth-damage function section above.

## **Structure and Contents Valuations**

### ***Structure Replacement Value Determinations for Non-Residential Structures***

For the purposes of this analysis, a conservative \$60 per square foot replacement cost value (RCV). If was used for all non-residential buildings. If this study results in an application being developed and submitted, the RCV will be determined as described below and B/Cs for each rerun.

The R.S. Means Square Foot Cost Guide on-line system will be used to determine the replacement value of each non-residential building. The R.S. Means system is a standard methodology that is widely used in the building industry to estimate the costs of constructing various kinds of buildings. It is based on a catalog of building uses (church, warehouse, office, etc.), which are in turn related to a set of typical structural types for each of the uses. The system takes into account the region where construction will take place, the type of

structure being built, use of union vs. non-union labor, the number of stories, the presence or absence of basements, and the size of the building. After entering these parameters, the system provides an overall estimated cost of building the structure, in present-day dollars. Reviews please note that all the R.S. Means reports for non-residential structures (except the small storage buildings, see text) are included in this application as separate attachments.

**Structure Replacement Value Determinations for Residential Structures**

For the residential structures we used Marshall and Swift dollar per square foot based on the type, size, and quality of construction. Tables from Marshall and Swift used to calculate residential replacement cost values are attached to the application for reference. The following is a table of the representative types and square footage ranges of the residential buildings evaluated in this study.

**Table 4. Marshall and Swift Data**

		Frame		Masonry							
Current Multiplier		0.94		0.95		March 2007 quarterly					
Local Multiplier		0.88		0.88							
Net Multiplier		0.8272		0.836							
Average Quality			Average Quality			Average Quality					
STUD FRAMED - One Story			STUD FRAMED - Two Story			STUD FRAMED - One and 1/2 Story					
	Pre- Multi	Post-Multi		Pre- Multi	Post-Multi		Pre- Multi	Post-Multi		Pre- Multi	Post-Multi
1000	\$ 73.41	\$60.72	1,200	\$ 66.56	\$55.06	1,200	\$ 64.86	\$53.65			
1200	\$ 70.96	\$58.70	1,400	\$ 64.49	\$53.35	1,400	\$ 63.97	\$52.92			
1300	\$ 69.91	\$57.83	1,500	\$ 63.59	\$52.60	1,500	\$ 63.16	\$52.25			
1500	\$ 68.06	\$56.30	1,700	\$ 61.99	\$51.28	1,700	\$ 61.72	\$51.05			
2000	\$ 64.51	\$53.36	2,200	\$ 58.81	\$48.65	2,200	\$ 58.88	\$48.71			
Masonry - One Story			Masonry - Two Story			Masonry - One and 1/2 Story					
	Pre- Multi	Post-Multi		Pre- Multi	Post-Multi		Pre- Multi	Post-Multi		Pre- Multi	Post-Multi
1000	\$ 78.75	\$65.84	1,200	\$ 73.83	\$61.72	1,200	\$ 70.54	\$58.97			
1200	\$ 75.93	\$63.48	1,400	\$ 71.01	\$59.36	1,400	\$ 69.41	\$58.03			
1300	\$ 74.72	\$62.47	1,500	\$ 69.78	\$58.34	1,500	\$ 68.41	\$57.19			
1500	\$ 72.61	\$60.70	1,700	\$ 67.61	\$56.52	1,700	\$ 66.57	\$55.65			
1800	\$ 70.00	\$58.52	2,000	\$ 64.89	\$54.25	2,000	\$ 64.31	\$53.76			
2000	\$ 68.54	\$57.30	2,200	\$ 63.34	\$52.95	2,200	\$ 63.02	\$52.68			
2100	\$ 67.87	\$56.74	2,300	\$ 62.64	\$52.37	2,300	\$ 62.44	\$52.20			
2400	\$ 66.08	\$55.24	2,500	\$ 61.33	\$51.27	2,500	\$ 61.35	\$51.29			

**Contents Replacement Value Determinations for Residential Structures**

For all residential structures in the project, the BCA used the FEMA default value of 30% of structure replacement value as a proxy for the value of contents.

**Contents Replacement Value Determinations for Non-Residential Structures**

There is no specific FEMA guidance on the value of contents for non-residential uses, so the present BCA relies up the USACE report cited above as the basis for this determination. The report provides a series of ratios that relate the value of contents to the value of non-residential structures. A copy of the table is provided immediately below, and can be found on page 47 of the USACE report.

**Table 5. USACE Structure-to-Contents Value Ratios**

Table 32. Typical Commercial Contents Values and CSVRs

Commercial Contents Category	Structure Value	Content Value	CSVr
Eating and Recreation	\$136,500	\$86,500	0.63
Groceries and Gas Stations	\$341,950	\$696,000	2.03
Multi-family Residences	\$48,500	\$14,000	0.29
Professional Businesses	\$185,630	\$216,300	1.17
Public and Semi-Public	\$622,838	\$370,700	0.56
Repair and Home Use	\$90,755	\$19,400	0.21
Retail and Personal Services	\$415,225	\$220,200	0.53
Warehouse and Contractor Services	\$248,928	\$355,500	1.43

Source: Expert Panel Meeting, New Orleans District USACE, April 1, 1996.

After the structure values were determined for all the non-residential uses in the proposed mitigation project (using the R.S. Means queries, described above), the ratios in the table above were used to determine the value of contents. Value calculations are shown in the master spreadsheet, which is attached to this application.

### Displacement Times and Values

In the FEMA BCA methodology, displacement times and values account for certain additional costs of flooding other than direct damages to structures and contents. These include renting alternative living or work space, extra commuting timing, storage, etc. Current FEMA guidance provides recommended values for these costs, and the FD software provides defaults for displacement times for residential uses. Because displacement times and costs for non-residential uses vary greatly depending on the type of operation, there is presently no specific guidance or default data available to use in the calculations. Because of this, for the present analysis we assumed zero displacement times and costs for non-residential uses. Although it would be possible to identify and document these values, there would still be considerable uncertainty in the estimates because this would require assumptions about whether specific operations (offices, warehouses, restaurants, etc.) would actually attempt to reopen in alternative spaces, or if they would simply close or wait for the original spaces to be reconstructed and then return. For businesses in particular this is potentially a significant area of avoided risk, so this part of the analysis should be considered lower-bound because it is not included.

For the *residential* uses, this BCA uses the FEMA standard displacement values in Table 6 below.

**Table 6. Data Values for Residential Displacement**

<b>Data</b>	<b>Value</b>
Displacement time	FEMA software default curves
Rental cost for alternative space	\$1.00 per square foot
Other monthly displacement costs	\$500
One-time displacement costs	\$500

For non-residential uses, the analysis assumes no risk related to displacement, therefore all fields are set at 0 or remain null in the BCAs.

## Project Costs

Project costs were estimated by Carroll and Blackman Engineering using a combination of industry standards, engineering judgment, prior experience, and actual updated quotes – whenever possible. The following table includes all estimated costs.

**Table 7. Project Cost Estimates**

<b>Alternatives</b>	<b>Cost</b>
<b>A</b>	\$ 2,478,651
<b>B</b>	\$ 4,856,651
<b>C</b>	\$ 8,609,151

## Project Life

A 50 year project life was used in this analysis, in accordance with standard FEMA guidance for structural flood control projects.

## Discount Rate – 7%

In accordance with current FEMA guidance, a discount rate of 7 percent was used for all analyses.

APPENDIX E

JURISDICTIONAL DETERMINATION LETTER



**Environmental Services, Inc.**

28 June 2007

Cody Croley  
Carroll & Blackman, Inc.  
3120 Fannin Street  
Beaumont, Texas 77701

**RE: General Jurisdictional Determination and Permitting Information  
Vidor Schoolhouse Ditch Improvements, City of Vidor, Jefferson County, Texas  
HJN 070009 WD**

Dear Cody:

The following provides the general jurisdictional determination and permitting requirements as determined during Horizon Environmental Services, Inc.'s (Horizon) pre-field literature investigation conducted on 13 June 2007 for the above-referenced site. Horizon evaluated the site for potential areas (wetlands and other "waters of the US") subject to jurisdiction under Section 404 of the Clean Water Act and regulated by the US Army Corps of Engineers (USACE). Jurisdictional areas and adjacent portions of the landscape may also fall under the regulation of Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), if USACE permitting is required.

The jurisdictional determination consisted of a pre-field literature review. Areas subject to jurisdiction under Section 404 of the Clean Water Act are commonly called "wetlands." However, "wetlands" are subsets of areas subject to jurisdiction and potential permitting constraints. The overall term used in the regulations is "waters of the US," which includes wetlands; most surface tributary streams with a defined channel; all major streams, rivers, and lakes; ponds hydrologically connected to other "waters of the US"; and, occasionally, artificial features such as ditches or abandoned borrow pits that may be hydrologically connected to other "waters of the US." Federal regulations define jurisdictional wetlands as areas within floodplains or contiguous with "waters of the US" that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support (and that under normal circumstances do support) a prevalence of vegetation typically adapted for life in saturated soil conditions (EPA, 40 CFR §230.3).

#### Pre-Field Evaluation

The literature evaluation included a review of the US Geological Survey (USGS) topographic map and color infrared aerial photography dated 2004 to evaluate the subject site for potential wetlands or other "waters of the US" that may require further assessment during the field investigation.

070009 Permitting letter.docx

#### **CORPORATE HEADQUARTERS**

1507 South IH 35 ★ Austin, Texas 78741 ★ 512.328.2430 ★ Fax 512.328.1804 ★ [www.horizon-esi.com](http://www.horizon-esi.com)  
**Certified WBE/DBE/HUB**

Surface elevation on the subject site ranges from approximately 15 to 20 feet above mean sea level (USGS, 1993 and 1994). The topographic map indicated a drainage channel on the subject site that flows in a north-to-south direction and drains into a mud flat of Meyer Bayou and eventually into Neches River. The topographic map also indicated 3 separate drainage channels branching off of the drainage channel within the subject site. No other potential wetlands or other "waters of the US" were noted on the subject site based upon a review of the topographic quadrangle map for the subject site.

Color infrared aerial photography of the subject site (dated 2004) was reviewed to identify areas within or adjacent to the project area that exhibit wetland signatures (light blue to dark blue) or upland signatures (light to dark red color). The 2004 aerial photography shows the drainage channel indicated on the topographic map traversing through residential subdivisions, residential and interstate roads, and heavy wooded areas. A maintained right-of-way along both sides of the drainage channel is visible on the 2004 aerial photography, signifying that the drainage channel within the subject site is maintained for flood control purposes. No other potential wetlands or other "waters of the US" were noted on the project area based upon a review of the infrared aerial photography.

#### Summary and Recommendations

The pre-field literature determination process revealed that the site contains areas subject to jurisdiction under Section 404 of the Clean Water Act. Based on our mapping effort and information from client AutoCAD files, approximately 2.17 acres (11,240 linear feet) of an existing flood control drainage channel is present on the site (Figure 1).

A detailed jurisdictional delineation and impact analysis will be required to identify the extent of impacts to those areas prior to permitting efforts. This delineation should be conducted according to the methodology prescribed by the 1987 USACE *Wetlands Delineation Manual* and USACE Regulatory Guidance Letter No. 05-05 (7 December 2005). This delineation should include a detailed field reconnaissance to gather necessary information as well as flag and/or stake jurisdictional areas (if applicable) for future survey. After completing the jurisdictional delineation, an impact analysis would need to be conducted to include a review of the proposed site development plans to determine the level of USACE permitting and mitigation requirements.

Proposed impacts involving the placement of fill within any jurisdictional areas identified on the subject site would require permitting actions with the USACE for project authorization. Two types of permits are available through the USACE, a nationwide permit (NWP) or an individual permit. The most efficient permitting process involves impacts to less than 0.5 acres of "waters of the US" and could be authorized under NWP for common development projects. Permitting efforts requiring impacts to jurisdictional "waters of the US" in excess of 0.5 acres require the individual permit, which includes more thorough investigations and application preparation as well as a public notice period. Triggering a 404 permit with the USACE may also necessitate a cultural resources survey under Section 106 of the National Historic Preservation Act, as well as a threatened or endangered species assessment.

Nationwide Permit (NWP) 31 authorizes the discharge of dredged or fill material resulting from activities associated with the maintenance of existing flood control facilities, including channels. Excavation of material for the improvements of the existing Vidor School Ditch would not require authorization under NWP; however, the placement of fill (improved culvert structures at road crossings) would trigger a 404 permit. The conditions of NWP 31 for maintenance of flood control facilities require that pre-construction notification (PCN) be provided to USACE prior to any regulated construction activities. PCN development includes a detail wetland delineation surveyed and sealed by a Registered Professional Land Surveyors, a detailed description of construction activities, and possibly development of an acceptable mitigation plan.

Please call me or Horizon Project Manager Shannon Dorsey if you have any questions or require additional information.

Sincerely,  
For Horizon Environmental Services, Inc.

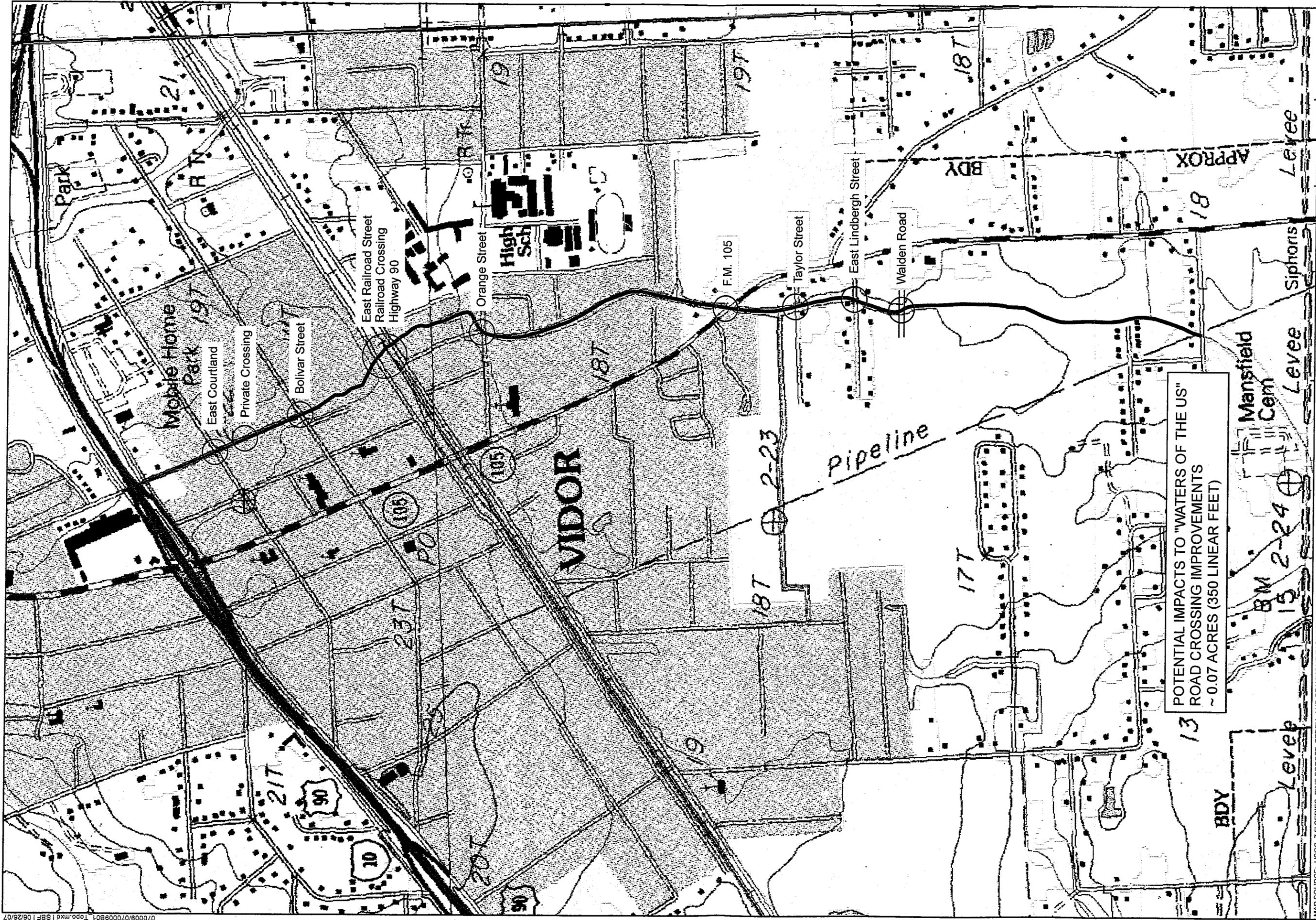


Scott Flesher  
Environmental Specialist

References

(USGS) US Geological Survey. 7.5-minute Series Pine Forest, Texas, Topographic Quadrangle Maps. 1993.

(USGS) US Geological Survey. 7.5-minute Series Beaumont , Texas, Topographic Quadrangle Maps. 1994.



070009/070009B01.Topo.mxd | SRF | 06/26/07

MAP SOURCE: USGS, 7.5 SERIES, PINE FOREST, TERRY, AND BEAUMONT EAST TEXAS QUADRANGLES, 1994.



Legend



Project Area

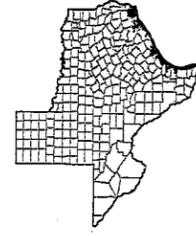


FIGURE 1

TOPOGRAPHIC MAP  
VIDOR SCHOOL DITCH IMPROVEMENTS  
VIDOR, JEFFERSON COUNTY, TEXAS

APPENDIX F  
PHOTOGRAPHS



**High School**



**High School**



**High School**



**High School**



**High School**



**Vidor Elementary**



**Vidor Elementary**



**Lamar Street - Greenforest Subdivision**



**Lamar Street - Greenforest Subdivision**



**Lamar Street - Greenforest Subdivision**



**Lamar Street - Greenforest Subdivision**

APPENDIX G

TWDB DRAFT REPORT COMMENTS

Draft Final Report Review

TWDB Contract No. 0604830591

City of Vidor

1. Section 1.6 Information Collections. -- Please provide additional detail concerning the level of data collection for the project, particularly cross-sections surveyed and number of bridge/culvert sections surveyed, as well as base maps, determination of current land use, soil characteristics, etc. There is limited information scattered in various sections of the report, but no detail within the section entitled "Information Collection". Also, as part of this section, please provide dates of public meetings held, and summary of meetings.

*To address this requirement, additional information was added to Section 1.6.*

2. Chapter 2--Please provide additional detail as to the model input data, perhaps a table of sub-basins and the various basin coefficients developed specific to each of the sub-basins, such as drainage area, slope, land use and impervious cover, curve number, etc.

*Table 2.1 was added to address this requirement.*

3. Section 2.2.5 Peak Discharge Computation -- Please provide additional discussion concerning the "interpolation equation" and provide a reference of the Harris County work deriving the equation used by this study. Please explain if there was determined to be a need to refine the runoff amounts through attempts at calibration or some other means?

*Additional discussion was added to Section 2.2.5 to explain the necessity of determining the runoff amounts using the interpolation equation. Unfortunately, a reference of the Harris County work could not be obtained.*

4. Section 2.4 Calibration of Models -- Please provide additional detail concerning data used for model calibration. Describe if gaged precipitation was available from within the study area, nearby, or not available. Describe the availability of stream gage data or surveyed high water marks and/or how many. Consider a table of "observed water levels" compared to model results to demonstrate model calibration. Also, if the storm of Oct. 25, 2006 was the only data available to be discussed in the section, please provide statements in the section as to the lack of available data for calibration purposes.

*Additional discussion was added to Section 2.4 to address these comments.*

5. Please provide a discussion or summary of the model results, both HEC-HMS and HEC-RAS, existing conditions and ultimate conditions (in addition, provide HEC-HMS model runs as an Appendix, such as done for HEC-RAS model in Appendix B). As a suggestion, a CD could be provided with each report which contains the models will be used.

*Tables 3.2, 3.3, and 3.4 were added to summarize the improved water surface elevations for Alternatives A, B, and C, respectively.*

6. There is a map provided as an appendix which indicates "Areas of General Flooding" with three specific areas labeled as Areas A, B and C. There is confusion associated with the alternatives you have evaluated, indicated as Alternative A, B and C. It does not appear that the alternatives are specific to the General Flooding Areas identified. Please consider using a different labeling nomenclature for either identifying the flooding areas or naming the alternatives being considered.

*The Areas of General Flooding have been renamed to Area I, Area II, and Area III.*

7. A graphic presentation using mapping would be beneficial to indicate the limits of flooding shown by model results of each of the alternatives being considered.

*It was decided that floodplain boundaries would not be generated as part of this study.*

8. Please provide additional detail to the Technical Report on Benefit-Cost Analysis. Describe the general methodologies of the FEMA B-C model utilized for the analysis. There are several sections which adequately describe data generated that is utilized as part of the evaluation and analysis, but please describe exactly how the model utilizes this information. Also, please provide additional detail within the section describing the "Approach to the Benefit-Cost Analysis" as to how the data is used in arriving at the analysis results.

*To address this requirement, a detailed section was added to the Technical Report on Benefit-Cost Analysis that details how the FEMA model works, and how the data generated in the Engineering report is utilized within the BCA software.*

9. It was noted in each of the construction cost estimates for the different alternatives being considered, that estimates did not include utility relocation or pipeline relocation costs. Please provide additional discussion to further explain the meaning and relative importance of the B-C ratios, how these ratios may be impacted by the estimated costs not considered, and how they might change as cost estimates are refined in the future.

*It is assumed that pipeline and utility relocation costs would be incurred by their respective owners, and not by the City of Vidor.*

10. An Application for Approval of Reclamation Project need not be filed with the Texas Commission on Environmental Quality for the referenced activity. It was determined that the recommended projects are located within communities that participate in the National Flood Insurance Program (NFIP), therefore any work would require permitting by the local jurisdiction by virtue of its participation in the NFIP, and in accordance with Section 16.236 (d) (3&4) of the Texas Water Code. If the City has not already done so, they should insure that the proposed construction is documented and permitted in accordance with their Flood Hazard Prevention Ordinance. Any changes to the current flood boundaries, post project implementation, should be submitted by the city to the Federal Emergency Management Agency to obtain a Letter of Map Revision (LOMR) for the affected panels of the appropriate Flood Insurance Rate Maps.
11. The Board may provide loans for flood control projects and to the implementation of flood plain management plans. The flood mitigation alternatives identified by the study are eligible for funding under the Board's financial

assistance programs. Application requirements and eligibility criteria is identified by Board rules specified in Section 363 of the Texas Administrative Code.