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May 7, 2008

Mr. Ron Bottoms
City Manager
City of La Porte
604 W. Fairmont Parkway
La Porte, Texas 77571

RE: City of La Porte, Texas
City-Wide Drainage Study
Draft Study Letter Report #2
Klotz Associates Project No. 0127.008.000

Dear Mr. Bottoms:

Klotz Associates was authorized to proceed with a City-Wide Drainage Study (CWDS) for the City of La Porte on January 28, 2008. Klotz Associates is pleased to submit this draft letter Report #2 for the completion of Tasks 2.1 through 2.3 of Phase 2 as prescribed in the contracted Scope of Work. Report #1 was submitted to the City and is dated March 10, 2008 and addressed five quick fix areas that were originally proposed by City staff. The information from Report #1 was presented to the Flooding and Drainage Committee in public forum on Monday evening, March 17, 2008.

I. Purpose

The purpose of this phase of the City Wide Drainage Study is to provide a quantitative based description of existing and anticipated drainage and flooding problems selected for detailed focus in Phase 1, to propose short-term solutions to problems and address long term drainage solutions.

This report summarizes the findings from hydrologic and hydraulic data collected for storms analyzed within the study area. This included the acquisition of available hydrologic and hydraulic models or studies that were deemed useful to the CWDS as described in the scope of services. The data collected was used to perform the following tasks: 1) develop a comprehensive description of the existing flooding conditions, 2) identify problems of the community, 3) develop short term remedies to the problems identified and 4) develop long term remedies for the City. The following is a detailed explanation of the results of Phase 2 of the study. The hydrologic models analyze the amount of rainfall and the distribution of that rainfall within a watershed. The tools used to model the hydrologic conditions are either the HEC-HMS program or the HEC-1 program. The hydraulic models analyze how the water will behave and how deep the

water may be along each channel reach of the watershed. The tools used to model the hydraulic conditions are either the HEC-RAS program or the HEC-2 program. These programs were created by the USACOE.

II. Study Area

The study area is the same area as was used for Phase 1. (Exhibits 1 and 2)

III. Data Collected

Phase 2 of the CWDS for The City of La Porte focused on the collection and analysis of hydrologic and hydraulic data for the study area. Part of the hydrologic information included GIS data from HCFCD showing the catchments (drainage areas) of the studied channels (Exhibits 4-6). The remaining information collected, hydraulic and hydrologic models are discussed under the section titled Existing Hydraulic Models and Recommended Models and Survey.

IV. Analysis of Flooding Conditions

The CWDS calls for the consideration of both existing and anticipated flooding conditions. It also requires that short term solutions to already identified drainage problems be discussed in conjunction with recommended long term solutions that will provide relief from reoccurring local floods. As part of this phase of the CWDS, the existing conditions will be discussed first, followed by the recommended short term improvements and finally the long term solutions for anticipated problem areas in the City of La Porte.

i. Existing Conditions

The City of La Porte consists of three major watersheds; the Clear Creek watershed, the Armand Bayou watershed and the San Jacinto/Galveston Bay watershed. These watersheds drain in a south or southeasterly direction eventually towards Galveston Bay. These three watersheds are shown on Exhibit 3.

The Armand Bayou Watershed drains into the Clear Creek Watershed. The western section of the City falls into this watershed and drains most of its residential areas. There are several homes in this watershed with severe flood damage and repetitive losses. A review of the hydraulic model shows that the FEMA water surface elevations are within the banks of the channel throughout most of the watershed except in the Glen Meadows Subdivision and the

Brookglen Subdivision (see Exhibit 8). This map shows stream locations, FEMA flood plains and locations of flooded structures.

The Clear Creek (also called Clear Creek Second Outlet) watershed drains into Clear Lake and eventually outfalls into Galveston Bay. The central and southern sections of the city fall in the Clear Creek watershed which has been studied by FEMA. When FEMA studies a watershed they normally create a hydrologic and or hydraulic model for the watershed to use in their mapping of the floodplains. Although a portion of the channel has been modeled, the study does not include the section that lies in La Porte that is considered important to the drainage patterns of the city specifically channels A104-00-00 and A104-07-00 (see Exhibit 9). This map shows stream locations, FEMA flood plains and locations of flooded structures.

The San Jacinto/Galveston Bay Watershed drains into Galveston Bay and encompasses the eastern side of La Porte which is mostly residential. This area has also experienced structural flooding. The San Jacinto/Galveston Bay Watershed has been partially studied by FEMA in the Tropical Storm Allison Recovery Program (TSARP). However, Unit F216-00-00 was the only channel in the watershed that was modeled. The City has plans to construct a linear detention pond for F216-00-00 to help reduce flooding in the area (see Exhibit 7). This map shows stream locations, FEMA flood plains and locations of flooded structures.

ii. Existing Hydraulic Models

Hydrologic models (HEC-HMS) and hydraulic models (HEC-RAS) based upon data used in the Tropical Storm Allison Recovery Program (TSARP) were provided in a digital format by Harris County Flood Control District (HCFCD) and were incorporated into this project. The HEC-HMS and HEC-RAS models for specific channels within the Clear Creek Watershed, the Armand Bayou Watershed, and the Galveston Bay Watershed were evaluated. The output from the HEC-RAS and HEC-HMS models are included in Appendices A and B. While all of the following channels had existing condition models or some version of that, some of the models either do not reflect the current conditions or do not include segments within La Porte city limits. The channels with existing condition models are summarized below along with a listing of changes that we feel are necessary to adequately evaluate the watershed (Exhibit 10). <u>The watersheds will be described beginning on the west side of La Porte and continuing to the east side:</u>

- Armand Bayou Watershed (See Exhibits 5, 8 & 18)
  - B112-00-00
    - B112-00-00 (Willow Spring Bayou) is a combination of a natural channel and a manmade ditch, approximately 25578 feet /4.84 miles long, that outfall into Armand Bayou. 5410 feet/ 1.02 miles lie inside the City limits and are included in the model. <u>There are FEMA models that will be used for this analysis.</u>
  - B112-02-00
    - B112-02-00 is a manmade ditch that that was originally designed to outfall into B112-00-00 but now has been redirected to B109-03-00 which outfalls into B109-00-00. It is recommended that this segment of B112-02-00 be transferred to the model for B109-03-00 to reflect the fact that the channel now flows into B109-03-00. The ditch is approximately 14993 feet/ 2.83 miles long. There are FEMA models for this channel but they will require some modifications to reflect current conditions. <u>There are FEMA models that will be used for this analysis.</u>
  - B112-02-00 (east/west segment between B112-02-00 and B109-03-00)
    - This manmade ditch was once part of B112-02-00 but it has been cut off. <u>There are FEMA models that will be used for this analysis.</u>
  - B109-00-00
    - B109-00-00 is a combination of a natural channel and a manmade ditch approximately 19189 feet/ 3.63 miles long that outfalls into Armand Bayou. 6602 feet/ 1.25 miles lie inside the City limits. There is a FEMA Model that can be used for this analysis but will have to be revised to reflect current conditions. <u>There are FEMA models that will be used for this analysis.</u>
  - B109-03-00
    - B109-03-00 is a 1779 feet/ 0.34 mile long manmade ditch that connects B109-00-00 and B112-02-00 channels to each other. The interconnection is still in place but B112-02-00 is now part of B109-00-00 and actually drains to B109-00-00. <u>There are FEMA models for that will be used for this analysis.</u>
  - B106-00-00
    - B106-00-00 (Big Island Slough) is a natural channel that is approximately 39761 feet/ 7.53 miles long and outfalls to Armand Bayou. 17718 feet/ 3.35 miles lies inside the City limits. It serves as a major drainage for the City. The channel is in good condition and well maintained (see Appendix C). <u>There are FEMA models that will be used for this analysis.</u>

- Clear Creek Watershed (See Exhibit 19)
  - A104-07-00
    - A104-07-00 is a manmade ditch approximately 23186 feet/ 4.39 miles long that outfalls into A104-00-00. 4573 feet/ 0.87 miles lie of are within the City limits. This channel does have a FEMA model but it does not extend into the City. A model will need to be created to analyze the areas of interest. We recommend that additional survey and modeling be completed for this channel.
  - A104-00-00
    - A104-00-00 (Taylor Bayou) is a natural channel that is approximately 6877 feet/ 1.30 miles lying with in the La Porte City limits and outfalls to A100-00-00 (Clear Creek) but has a diversion outfall into Bayport Channel. This channel does have a FEMA model but it does not extend into the City. A model will need to be created to analyze the areas of interest. We recommend that additional survey and modeling be completed for this channel.

- San Jacinto/Galveston Bay Watershed (See Exhibit 17)
  - F216-00-00
    - (Little Cedar Bayou) is a natural channel that is approximately 18854 feet/ 3.57 miles long and outfalls into Galveston Bay. This natural channel has 3 tributaries and drains the majority of the City. The channel is scheduled for improvements in the near future by the City which include the construction of a linear detention pond on residential land that is currently being purchased, according to "*Preliminary Analysis for F216-00-00 Linear Detention*" dated November 2004 by Binkley & Barfield, Inc. Consulting Engineers. There are FEMA models that will be used for this analysis.

iii. ***Recommended Models and Survey***

During the data collection process, it was found that several HCFCD identified channels that did not have existing hydraulic (HEC-RAS) models. Because these channels will influence the drainage patterns in the City, it is recommended that models be created for these channels. A topographic and elevation survey along each channel will also be required in order to model the current conditions along the channel. Exhibits 6, 7 and 8 show the channels and the list below describes the data needed to create the model.

- Armand Bayou Watershed (See Exhibit 18)
  - B106-02-00
    - B106-02-00 is a manmade ditch that is approximately 4893 feet/ 0.92 miles long and outfalls into B106-00-00. This ditch drains residential areas that have several repetitive losses. There are no models for this channel. We recommend that a survey and a model be completed for this channel.
  - B106-05-00
    - B106-05-00 is a manmade ditch that is approximately 4445 feet/ 0.84 miles that outfalls into B106-00-00. We recommend that a survey and a model be completed for this channel.
  - B106-06-00
    - B106-06-00 is a manmade ditch that is approximately 3095 feet/ 0.57 miles that outfalls into B106-00-00. We recommend that a survey and a model be completed for this channel.
- San Jacinto/Galveston Bay Watershed (See Exhibit 17)
  - F101-00-00
    - F101-00-00 is a natural channel that is approximately 15752 feet/ 2.98 miles long and outfalls into Lower San Jacinto Bay. This natural ditch been improved to handle a growing industrial area and large lot developments. There are HEC 1 and HEC 2 models that should be updated to reflect current conditions. We recommend that the existing model be revised to reflect current conditions for this channel.
  - F101-01-00
    - F101-01-00 is a manmade channel that is approximately 6067 feet/ 1.15 miles long and outfalls into F101-00-00. This manmade channel drains part of SH 225, SH 149 and some industrial sections. There are no current models available for this channel. We do not recommend surveying for this tributary.
  - F101-03-00
    - F101-03-00 is manmade roadside ditch that is approximately 10269 feet/ 1.95 miles long and outfalls into F101-00-00. This manmade roadside ditch drains rural residential lots that are 1 to 5 acres in size. There are no current models available for this ditch. We recommend that a survey and a model be completed for this channel.

- F101-06-00
  - F101-06-00 is a manmade ditch that is approximately 7537 feet/ 1.42 miles and outfalls into F101-00-00. This manmade ditch drains rural residential lots. There are no current models available for this ditch. We recommend that a survey and a model be completed for this channel.
- F101-06-02
  - F101-06-02 is a manmade ditch that is approximately 909 feet/ 0.17 miles long and outfalls into F101-06-00. The City recently constructed this ditch to help direct the flow to F101-06-00 more efficiently. We recommend that a survey and a model be completed for this channel.
- F101-06-03
  - F101-06-03 is a manmade ditch that is approximately 731 feet/ 0.14 miles long and outfalls into F101-06-00. This manmade ditch has the same purpose of F101-06-02. We recommend that a survey and a model be completed for this channel.
- F101-07-00
  - F101-07-00 is a manmade ditch that is approximately 1480 feet/ 0.28 miles long that outfalls into F101-00-00. This manmade ditch drains industrial areas and SH 255. We recommend that a survey and a model be completed for this channel.
- F101-08-00
  - F101-08-00 is a manmade ditch that is approximately 1965 feet/ 0.37 miles long and outfalls into F101-00-00. This manmade ditch runs parallel to F101-07-00. We recommend that a survey and a model be completed for this channel.

- Clear Creek Watershed (See Exhibit 19)
  - A104-07-01
    - A104-07-01 is a manmade ditch that is approximately 3050 feet/0.58 miles long and drains Sens Road. We will use the information from the Sens Road Widening and Detention Pond project for our analysis and will supplement the data with limited survey. We recommend that limited survey be performed for this channel.
  - A104-10-00
    - A104-10-00 (Boggy Gully) is a natural channel that is approximately 1515 feet/ 0.29 miles long and outfalls to the Bayport Channel. The channel drains the most southern section of the City which is predominantly residential. We recommend that some survey be performed for this channel.

- A104-10-02
  - A104-10-02 is a manmade ditch that is approximately 1610 feet/ 0.31 miles long and outfalls into A104-10-00. This ditch drains portions of both La Porte and Shoreacres. There is no model available for this ditch however the city has noted that several culvert and box culverts improvements were made to this channel several years ago. An updated model would be necessary to reflect the effect of these changes accurately. We recommend that a survey and a model be completed for this channel.
- A104-12-01
  - A104-12-01 is a natural channel that is approximately 6495 feet/ 1.23 miles long and outfalls into A104-00-00 (Taylor Bayou). It drains a golf course and a residential area that was recently constructed. While the city believes there should have been a study prepared for this channel showing the effects of the development, no model was found for the channel to date. We recommend that a survey and a model be completed for this channel, unless an existing condition model can be found.
- A104-12-00
  - A104-12-00 is a natural channel that is approximately 1076 feet/ 0.20 miles long and outfalls to A104-12-01. This ditch drains a small residential area and an undeveloped area. There is no model available for this channel. We recommend that a survey and a model be completed for this channel.

- San Jacinto/Galveston Bay Watershed
  - F216-01-00
    - F216-01-00 is a manmade ditch that is 6043 feet/ 1.45 miles long and outfalls into F216-00-00. This manmade ditch drains residential areas and a school. Based on input from the city, the lower reach of this channel, from Fairmont parkway to Little Cedar Bayou, was enclosed with box culverts in the 1980's by Harris County Precinct 2. No hydraulic model was found that reflects these changes. We recommend that a survey and a model be completed for this channel, unless an existing condition model can be found.
  - F216-02-00
    - F216-02-00 is a manmade ditch that is 332 feet/ 0.06 miles long and outfalls into F216-00-00. This manmade ditch drains a road and a few homes. A model will not be created for this ditch.
  - F216-04-00
    - F216-04-00 is a manmade ditch that is 1788 feet/ 034 miles long and outfalls into F216-00-00. This manmade ditch drains industrial areas

from Fairmont Parkway. The city has installed large culverts adjacent to the wastewater treatment plant (WWTP) to protect against slope failure and is planning to install additional culverts south of the WWTP as part of a plant expansion project. All of these changes have not been documented in a hydraulic model available through HCFCD. We recommend that a survey and a model be completed for this channel.

- F212-00-00
  - F212-00-00 (Deer Creek) is a natural channel that is approximately 9736 feet/ 1.84 miles long and outfalls into Galveston Bay. This natural channel drains mostly residential neighborhoods. The performance of the channel is also affected by the tide in Galveston Bay. We recommend that a survey and a model be completed for this channel.
- F210-00-000
  - F210-00-00 is a combination of a natural channel and a manmade ditch that is approximately 9359 feet/ 1.77 miles long and outfalls into Galveston Bay. The hydraulic performance of the channel is affected by the tide of the bay. Although this channel is outside of the City limits, it drains industrial and residential areas in La Porte. We do not recommend any survey or modeling for this channel since it is not considered to affect the City's drainage.
- F300-00-00
  - F300-00-00 is the Bayport Channel that outfalls into Galveston Bay. There are no models available.

V. Observations and Recommended Improvements

The initial evaluation of the models show that the repetitive losses experienced in the area are the result of 1) the lack of overland sheet flow paths for the extreme event, 2) undersized channels and bridge crossings and 3) man-made obstructions to the predominant flow pattern. The multiple losses during tropical storms Erin and Allison can be attributed to any combination of these three issues. According to the HCFCD Immediate Report for Tropical Storm Erin dated August 16, 2007, Erin had an exceedance probability between the 25 year and 100 year storm for the 1 hour duration and an exceedance probability between the 100 year and 500 year storm for the 3 hour duration. Tropical Storm Allison had an exceedance probability of the 500 year storm, as stated in the RMS report on Tropical Storm Allison dated June, 2001. Table 1 is a summary of the various sources of data showing how many homes flooded by subdivision or area and by the storm event either Allison or Erin.

In the Armand Bayou watershed, areas such as the Brookglen, Creekmont, Fairmont Park West, Fairmont Park East and the Glen Meadows subdivisions, all experienced repeated flooding. The HEC-RAS model for unit B106-00-00 reveals that there is insufficient capacity in the drainage channels. 100-year water surface elevations in unit B106-00-00 exceed the channel high banks, meaning that the water is high enough to reach into the nearby property during extreme events. It appears that channel B106-00-00 is well maintained and therefore poor conveyance due to a high Manning's roughness coefficient was ruled out (See Appendix C for photographs of channel). It is more likely that the high water surface elevations are due to the geometry of the channel which does not provide a large enough cross sectional area for the contributing flow. Another area with insufficient capacity is the bridge crossing downstream of the residential area. The bridge produces large head losses at the crossing (see HEC-RAS output) which indicates that it cannot convey the 100 year peak flows. Other areas of concern are the areas where the 100 year event is contained within the channel but local flooding still occurs. This is due to the lack of storm sewer capacity and an extreme event overland flow path. Unit B109-00-00 on the other hand seems to have enough capacity to convey the 100 year storm without overtopping the high bank of the channel. This takes into account the upstream effect of unit B112-02-00 which was diverted to discharge into B109-00-00 through unit B109-03-00. This was constructed City in response to repeated flooding along B112-02-00.

i. Short Term Drainage Projects Remaining from Report #1

Since Letter Report, Phase 1 was completed the City immediately began construction on two of the short term drainage projects on Driftwood Street and Catlett Street. Improvements to Driftwood included two overland sheet flow flumes, draining to B106-02-00 and to the nearby detention pond. On Catlett, the end of the road was lowered an overland sheet flow path was constructed off of Catlett and Roseberry Streets to B106-00-00. These two projects have been completed and will help to reduce street ponding that occurs when storm sewers reach their maximum capacity. Photos of these two improvement projects are included in Appendix D. The remaining three short term projects along with any recommended changes are discussed below.

a. <u>Willow Creek Drive/ Creekmont Park Overflow Path</u>

Willow Creek Drive is a residential roadway running parallel to a City park, Creekmont Park. The local area near the park has experienced flooding that is considered the result of elevated trails and poor local drainage in the park. The City is considering constructing a storm sewer system to North H Street or the Big Island Slough in order to help convey

the storm water from the extreme event. Klotz Associates is preparing a hydraulic analysis of the option the rerouting the existing storm sewer system to the system of H Street, and will report the findings in a separate letter.

b. Fleetwood Drive Outfall Pipe Upsizing

Fleetwood Drive is located in the same vicinity as Driftwood Drive and the streets adjacent to Fleetwood experience significant street ponding and flooding. The repetitive loss map shows that the flooded structures are generally in the middle portion of the subdivision. We understand from discussions with City staff that the storm sewers in this area were inspected and found to be clean. The City is considering replacing the outfall pipe from Fleetwood Drive with a large diameter pipe. Klotz Associates recommends that the City first consider analyzing the result of constructing an overflow path between the lots of houses located near the outfall point. There are other possible solutions for this area that will be addressed in the long term drainage solutions portion section of this report.

c. Glen Meadows Subdivision Interceptor Inlet

Glen Meadows is a residential subdivision located north of Spencer Highway. It is an area that has experienced repeated losses during floods. It is recommended that the use of overflow paths be investigated first before pipe replacement. Overflow paths that provide a sheet flow path between homes, where easements or ROW is available, or where homeowners will work with the City are usually more economical to construct that pipe replacements. The City is considering replacing the existing outfall pipes with larger diameter pipes in this area. The tailwater effect on the subdivision's storm sewer should be evaluated and compared to the potential of an overflow flow path or pipe replacement.

ii. Subdivision Issues

Because the majority of flood damage occurred in residential areas, the CWDS addresses these issues with a separate set of recommended improvements for each of the affected neighborhoods. It should be noted that many of the subdivisions do not have sufficient extreme event conveyance paths to convey the flows out to the receiving stream or channel. As a result of this a few houses are located in the recommended flow path and may be considered for a buy out. Should the City use this option, it would have to consider the possibility of matching costs to pay

for these property acquisitions. These issues may be resolved through the use of several different options that are briefly described below. A conceptual estimate of the variables and costs for each option can be found in Tables 2-5. These cost estimates are based on using a contractor to construct the improvements. If city staff can build the improvements then significant costs can probably be saved.

a. Brookglen Subdivision

The Brookglen Subdivision has many homes that have been severely damaged and that experienced flooding during Tropical Storms Allison and Erin. The area is drained by a storm sewer system with no clear sheet flow path. Outfall into B112-02-00 is through pipes that vary in size from 24 inch to 30 inch. Flows pond in the cul-de-sac or streets located north or south of B112-02-00. For significant storm events, an overland sheet flow path is recommended as probably the least costly to create an unobstructed route to B112-02-00. In order to construct the flow path, it may be necessary to acquire additional right of way through the buy out of the two adjacent properties as shown in Exhibit 11. One option is to route a new storm sewer over city property along Bandridge. If the overland flow route is not feasible then it is recommended that the current outfall pipe along with additional inlets be upsized to accommodate a higher intensity storm event up to the 100 year event. Exhibit 11 shows the location of the proposed replacement improvements. Note that the house on the south side of B112-02-00 on Gladwyne at the ditch is currently for sale. A photo showing a proposed sheet flow path at Gladwyne is included on Exhibit 11. It is important to note that these recommendations may involve property buy outs if there is insufficient land for the improvements. These improvements may result in the need for mitigation downstream of the outfall. Mitigation, if needed, could include channel modifications, a weir or detention pond to reduce downstream flows. Exhibit 16 shows examples of sheet flow paths.

b. Creekmont Subdivision

Creekmont Subdivision is another area of severe flooding during Tropical Storm Erin. The homes in this area also have a storm sewer system with no sheet flow path. Flows tend to pond in the low areas of the subdivision, at the Stone Creek and Heather Spring intersection. It is recommended that an overland sheet flow path be considered to allow the extreme event to drain to B106-00-00 as possibly the least costly option. It is recommended that the City increase the size of the storm sewer outfall

and add more inlets if the overland flow path is not readily obtainable. See Exhibit 12 for an illustration of the recommended improvements. Jacking or boring of the pipe is an alternative to open cutting the placement of the pipe. These improvements may also required property buyouts if the land is not available. Improvements made in this subdivision may also be subject to mitigation of any downstream effects to the existing channel. There may be sanitary sewer utility conflicts with underground construction at this location that would impact the construction costs. Survey data will be needed to determine if conflicts exist.

c. Glen Meadows Subdivision

Glen Meadows Subdivision is a subdivision that has experienced repeated flooding at the intersection of Valley Brook and Creekview (Exhibit 13). This subdivision is drained by a storm sewer and does not have a sheet flow path for the extreme event. It is recommended that the City first consider adding an overland flow path at this location and then consider increasing the size of the outfall pipe and add more inlets if the overland flow path is not readily obtainable. Another consideration would be the construction of a new storm sewer to begin at the intersection of Creekview and Valley Brook and routing the new storm sewer south to Spencer Road and then west to the ditch, essentially around the homes. Property buy outs are a possibility if the existing right of way is insufficient. Because this option may increase flows entering the channel, downstream mitigation may have to be considered.

d. Fairmont Park East Subdivision

Fairmont Park East Subdivision is an area that has experienced multiple cases of water ponding in the streets and structural flooding. Much of the local flooding is due to water ponding along the streets east and west of Fleetwood and Driftwood Streets. It is recommended that the City construct a sheet flow path as shown in Exhibit 14 which will guide water from the low points towards the drainage channel. Another recommendation is to consider the reconstruction of Fleetwood with a larger storm sewer system or so that the street is lower than the lateral streets and is designed to convey water out of the subdivision. It is important to note that Fleetwood will have to be designed to slope towards the outfall in order to provide the sheet flow path. Along with these

improvements, proper mitigation of increased flows into the channel may be needed.

e. Fairmont Park West Subdivision

We understand that Fairmont Park West Subdivision is an area that experienced significant structural flooding during Tropical Storm Erin. We are still trying to obtain specifics on the location and number of structures flooded within this subdivision. The homes in this area seem to have an undersized storm sewer system with no sheet flow path. Flows tend to pond in the low areas of the subdivision, making it necessary to provide an overland sheet flow path for extreme events. It may be recommended that the City increase the size of the storm sewer outfall and add more inlets if the overland flow path is not readily obtainable once we know the location of the flooded properties. Once we obtain the locations of the flooded properties. Another option is to jack and bore the pipes to avoid having to acquire additional right of way. These improvements may also required property buyouts if the land is not available. Improvements made in this subdivision may also be subject to mitigation of any downstream effects to the existing channel.

f. Driftwood Detention Pond

Driftwood detention pond has several possibilities to serve the residents of Fairmont Park East Subdivision however two options are likely to serve the City best in terms of cost effectiveness and improved drainage. The first recommendation is to consider increasing the volume in the Driftwood detention pond and pump minimal storm water volumes into the B106-02-00 channel, west of the pond when the ditch tailwater goes down. This will allow the City to add more detention volume while maintaining or reducing the flows into B106-02-00. Another recommended improvement is to construct a parallel 60 inch storm sewer system along Driftwood that will augment the existing conveyance to the detention pond. See Exhibit 15 for an illustration of these recommended improvements. These improvements will probably not require the purchase of additional property since the work will take place within existing City of La Porte right of way but utility adjustments will be needed. There may however, be the need for mitigation of any increases in downstream flows if detention is not added.

iii. Long Term Drainage Solutions

After an initial review of the existing models and LiDAR data, long term projects were identified to address the ongoing flooding problems in the City. This section provides a summary of each project and analysis needed based on the data that we have to date. Once we update the models or create new models from the surveying more recommendations may be developed.

a. Modifications to Unit B106-00-00

Based on the HEC-RAS model and a site visit the channel geometry does not appear to provide enough capacity to convey the 100 year peak flows. It is recommended that further analysis be performed to determine whether the channel cross section can be altered to prevent further flooding. Two possible alterative modifications include 1) widening the channel and 2) raising the channel high banks.

b. Modifications to B106-00-00 Bridge Crossing

The bridge crossing B106-00-00 downstream of the subdivisions experiencing severe flooding does not provide enough capacity for upstream flows to be conveyed within the banks of the channel. It is recommended that a HEC-RAS analysis be performed to determine the most efficient bridge layout that will lower water surface elevations at the bridge and upstream.

c. Upgrade the Storm Sewer System

Because the majority of the existing storm sewers in the flooded areas were constructed using small storms (2 year or 3 year events), the systems do not effectively convey the larger events such as the 25-, 50- or 100-year storm. It is recommended that an analysis be performed for the existing storm sewers to determine whether or not larger pipes, the additional of more inlets and or the addition of sheet flow swales will effectively reduce structural flooding or significant street ponding.

d. Provide Overland Sheet Flow Paths

Most if not all of the areas experiencing severe flooding did not have a clear overland sheet flow path for the extreme event. Many of the subdivisions did not have cascaded streets that would allow for the larger

intensity storm flows to be conveyed towards the outfall point. It is recommended that the City add overland flow paths to the heavily flooded areas through the use of swales at area low points, such as at unit B106-00-00, and that the City require future developments to include cascading roadways and sheet flow paths.

e. Fairmont Park East Subdivision

Fairmont Park East Subdivision is an area that has experienced multiple cases of water ponding in the streets and structural flooding. While short term project has been identified a long term project could be the construction of a new or parallel additional storm sewer system with many or inlets sized to handle a much higher intensity storm event. This storm sewer system would be very expensive and but would only require minimal work to the Fleetwood Street. Another approach would be the reconstruction of Fleetwood Street to allow it to serve as a conveyor of upstream flows cascading downstream with the addition of a sheet flow path. This project is much more expensive and would require not only a complete removal and replacement of Fleetwood Street along with some lateral street reconstruction. See cost estimates for these two alternatives in Table 5. These two alternatives do not appear to be cost effective.

f. Property Buy Outs

In some cases it may be necessary to buy the property in the flood prone areas in order to prevent any further structural damage. The City may be required to provide funds, probably though matching funds, to acquire the property. While this should not be the primary means of resolving the drainage issues in La Porte, it should be considered as an option.

VI. Conclusion

The costs for the various short term drainage projects are listed in Tables 2 through 5. We recommend that the City first work with the identified property owners to determine if an economical sheet flow path and project could be agreed upon with the land owner or in some cases with other nearby property owners who could also provide a relief route. If a route is available then some if not all of the sheet flow path projects could be considered to be constructed by City staff if the staff are available. This approach could save the City significant construction dollars and could provide an important relief for significant storm event flows. We are entering the storm season and these sheet flow paths could be very helpful to local drainage. Care will be needed to carefully design and construct these sheet flow routes to provide

conveyance of flows and to minimize costs while protecting the property owners. If the sheet flow paths prove to be too hard to acquire for one or more of the locations then we recommend the next least costly alternative which varies by location.

As required in Tasks 2.1 through 2.3 of the scope for this CWDS, a preliminary evaluation of the existing hydraulic and hydrologic data for the City of La Porte area was performed. Areas of concern were identified that required drainage improvements including: roadway regrading, pipe upgrades, extreme event flow paths, bridge reconstruction and channel widening. HCFCD channel that were not studied but were considered critical to this CWDS were also identified as needing to be surveyed and modeled. The next phase of the study will be to create the missing models and determine their effect on drainage in La Porte.

Storm sewer drainage systems are a vital drainage element in much of La Porte. Many subdivisions are completely drained by storm sewers and inlets and most of these do not have relief routes for overflowing conditions. Some streets use a combination of street sheet flow and storm sewer systems such as some areas east of SH 146. Many areas of town have road side ditch drainage systems. We recommend that the City continue its maintenance program on the surface drainage elements and consider video taping all or most of the storm sewer systems where structural flooding has occurred or when unusual street ponding is observed if it does not currently video tape all of the areas. It would be good to develop a documented regular inspection of the storm sewer systems and of long culverts and to post the findings of this data at visible sites at the city and on its web site. The City may want to consider ways to encourage its residents to keep debris or other materials from entering the storm sewer system to reduce their chances of flooding due to debris in the system.

We are available to discuss the report with you at your convenience should you have any questions regarding our findings. We look forward to moving into the next phase of this study.

Sincerely,

Gary L. Struzick, P.E., CFM
Vice President

5-7-08

STATE OF TEXAS
GARY LEE STRUZICK
64413
REGISTERED PROFESSIONAL ENGINEER

GLS:ng

Attachments

cc: Mr. Steve Gillett, City of La Porte
Mr. John Joerns, City of La Porte
Mr. Rodney Slaton, City of La Porte

List of Exhibits

Exhibit 1	Vicinity Map
Exhibit 2	Aerial Map
Exhibit 3	Watershed Map
Exhibit 4	San Jacinto & Galveston Bay Catchments
Exhibit 5	Armand Bayou Catchments
Exhibit 6	Clear Creek Catchments
Exhibit 7	San Jacinto & Galveston Bay Floodplain Map
Exhibit 8	Armand Bayou Floodplain Map
Exhibit 9	Clear Creek Floodplain Map
Exhibit 10	Available Hydraulic Models Map
Exhibit 11	Brookglen Subdivision
Exhibit 12	Creekmont Subdivision
Exhibit 13	Glen Meadows Subdivision
Exhibit 14	Fairmont Park East Subdivision
Exhibit 15	Driftwood Detention Pond
Exhibit 16	Sheet Flow Overland Path Photos
Exhibit 17	San Jacinto & Galveston Bay Hydraulic Models w Cross Sections Map
Exhibit 18	Armand Bayou Cross Hydraulic Models w Cross Sections Map
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List of Appendices

Appendix A	HEC RAs Output
Appendix B	HEC-HMS Output
Appendix C	Representative Photographs
Appendix D	Photographs of recently constructed improvements (Catlett and Driftwood)

TABLE 1 - STRUCTURAL DAMAGE

	Subdivision Name							
	Brookglen	**Creekmont**	**Glen Meadows**	**Fairmont Park**	**Fairmont Park West**	**Fairmont Park East**	**Old La Porte**	**City of La Porte**
Tropical Storm Allison	37	0	2	0	To Be Determined	0	3	76
Tropical Storm Erin	19	44	32	9	"	20	5	159
Severely Damage Homes	30	0	0	0	"	0	0	23
Repetitive Losses	96	9	11	5	"	3	4	200
HCFCD Erin	37	21	49	15	"	8	52	203

TABLE 2
CONCEPTUAL COST ESTIMATE
BROOKGLEN SUBDIVISION

OPTION	DESCRIPTION	UNIT	UNIT COST	AMOUNT	TOTAL COST
1	Upgrade Storm Sewer to 48" @ Gladwyne	LF	$ 210.00	400	$ 84,000.00
2	Upgrade Storm Sewer to 48" @ Bandridge	LF	$ 210.00	600	$ 126,000.00
3	Concrete Flume	SY	$ 40.00	540	$ 21,600.00
4	Excavation	CY	$ 10.00	180	$ 1,800.00
5	Property Buy Outs (House) **	EA	$ 135,000.00	2	$ 270,000.00

** Average Value per House 2 SAMPLES

Cost does not include easement costs if required

TABLE 3
CONCEPTUAL COST ESTIMATE
CREEKMONT SUBDIVISION

OPTION	DESCRIPTION	UNIT	UNIT COST	AMOUNT	TOTAL COST
1	Upgrade Storm Sewer to 48"	LF	$ 210.00	250	$ 52,500.00
2	Concrete Flume	SY	$ 40.00	1,111	$ 44,440.00
3	Excavation	CY	$ 10.00	370	$ 3,700.00
4	Property Buy Outs (House) **	EA	$ 135,000.00	2	$ 270,000.00

** Average Value per House 2 SAMPLES

Cost does not include easement costs if required

TABLE 4
CONCEPTUAL COST ESTIMATE
GLEN MEADOWS SUBDIVISION

OPTION	DESCRIPTION	UNIT	UNIT COST	AMOUNT	TOTAL COST
1	Upgrade Storm Sewer to 48"	LF	$ 210.00	180	$ 37,800.00
2	Concrete Flume	SY	$ 40.00	800	$ 32,000.00
3	Excavation	CY	$ 10.00	270	$ 2,700.00
4	Construct New 48" Stm Swr	SY	$ 210.00	400	$ 84,000.00
5	Property Buy Outs (House) **	EA	$ 135,000.00	2	$ 270,000.00

** Average Value per House 2 SAMPLES

Cost does not include easement costs if required

TABLE 5
CONCEPTUAL COST ESTIMATE
FAIRMONT PARK EAST SUBDIVISION

OPTION	DESCRIPTION	UNIT	UNIT COST	AMOUNT	TOTAL COST
1	Concrete Flume	SY	$ 40.00	540	$ 21,600.00
2	Excavation	CY	$ 5.00	180	$ 900.00
Reconstruct Roadway up to Linwood Street					
3	Upgrade Storm Sewer to 72"	LF	$ 330.00	2,100	$ 693,000.00
	Upgrade Storm Sewer on Side Streets to 48"	LF	$ 210.00	4,200	$ 882,000.00
	Inlets	EA	$ 2,000.00	26	$ 52,000.00
	Concrete Pavement	SY	$ 40.00	19,600	$ 784,000.00
	Water, Sanitary and Private Utility Relocation	LF	$ 30.00	2,100	$ 63,000.00
Reconstruct Roadway up to Main Street					
4	Upgrade Storm Sewer to 72"	LF	$ 330.00	3,300	$ 1,089,000.00
	Upgrade Storm Sewer on Side Streets to 48"	LF	$ 210.00	6,600	$ 1,386,000.00
	Concrete Pavement	SY	$ 40.00	30,800	$ 1,232,000.00
	Inlets	EA	$ 2,000.00	44	$ 88,000.00
	Water, Sanitary and Private Utility Relocation	LF	$ 30.00	3,300	$ 99,000.00
5	Construct New Parallel 60" Stm Swr at Outfall	SY	$ 220.00	120	$ 26,400.00
6	Property Buy Outs (House) **	EA	$ 135,000.00	1	$ 135,000.00
7	Detention pond excavation	CY	$ 8.00	1,613	$ 12,904.00

** Average Value per House 2 SAMPLES

Cost does not include easement costs if required

klotz associates

VICINITY MAP

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY

KLOTZ PROJ. NO.: 0127.008.000	EXHIBIT
SCALE: 1" = 40000 '	1
DATE: APRIL 2008	

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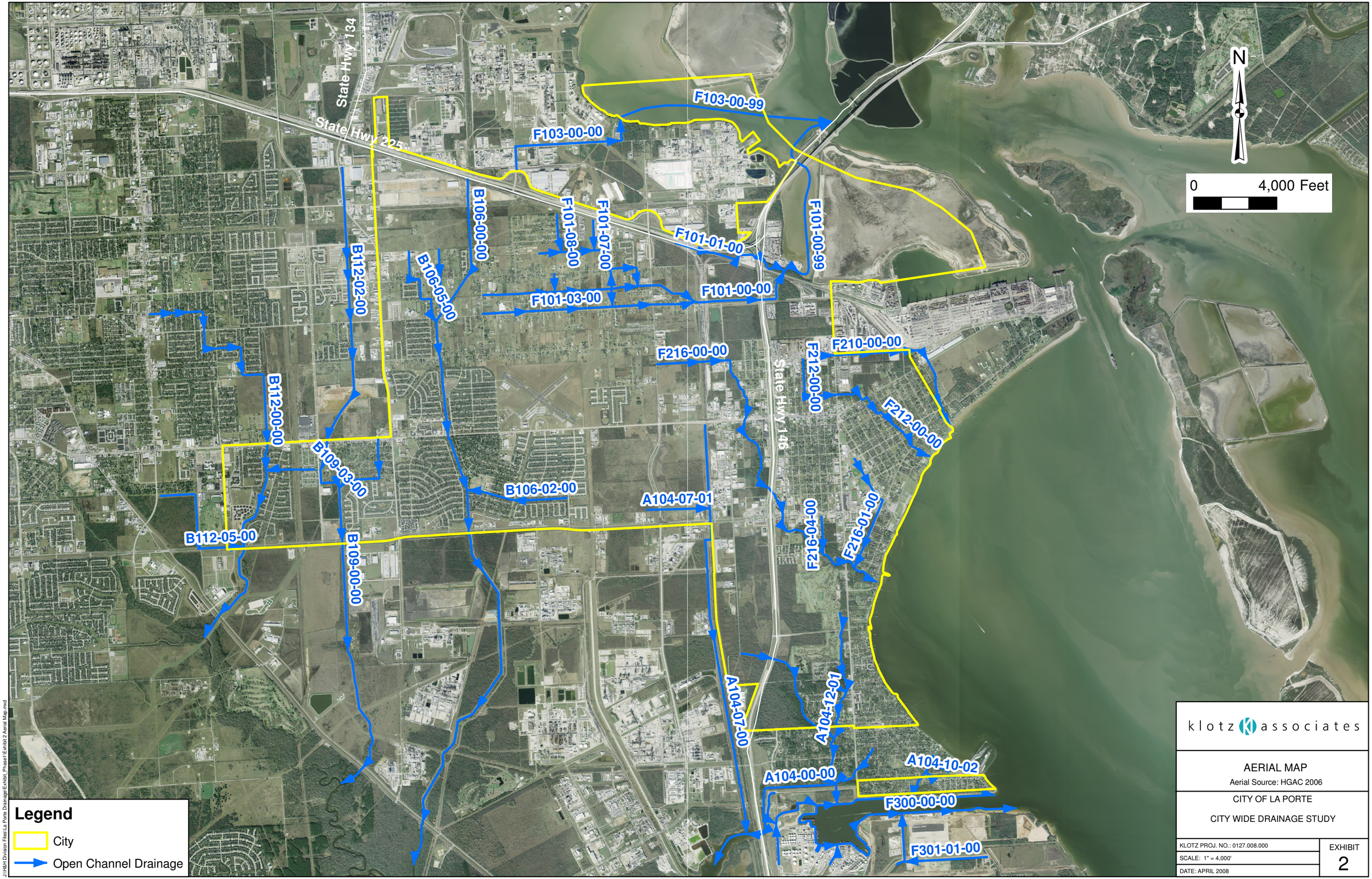

klotz associates

AERIAL MAP

Aerial Source: HGAC 2006

CITY OF LA PORTE

CITY WIDE DRAINAGE STUDY

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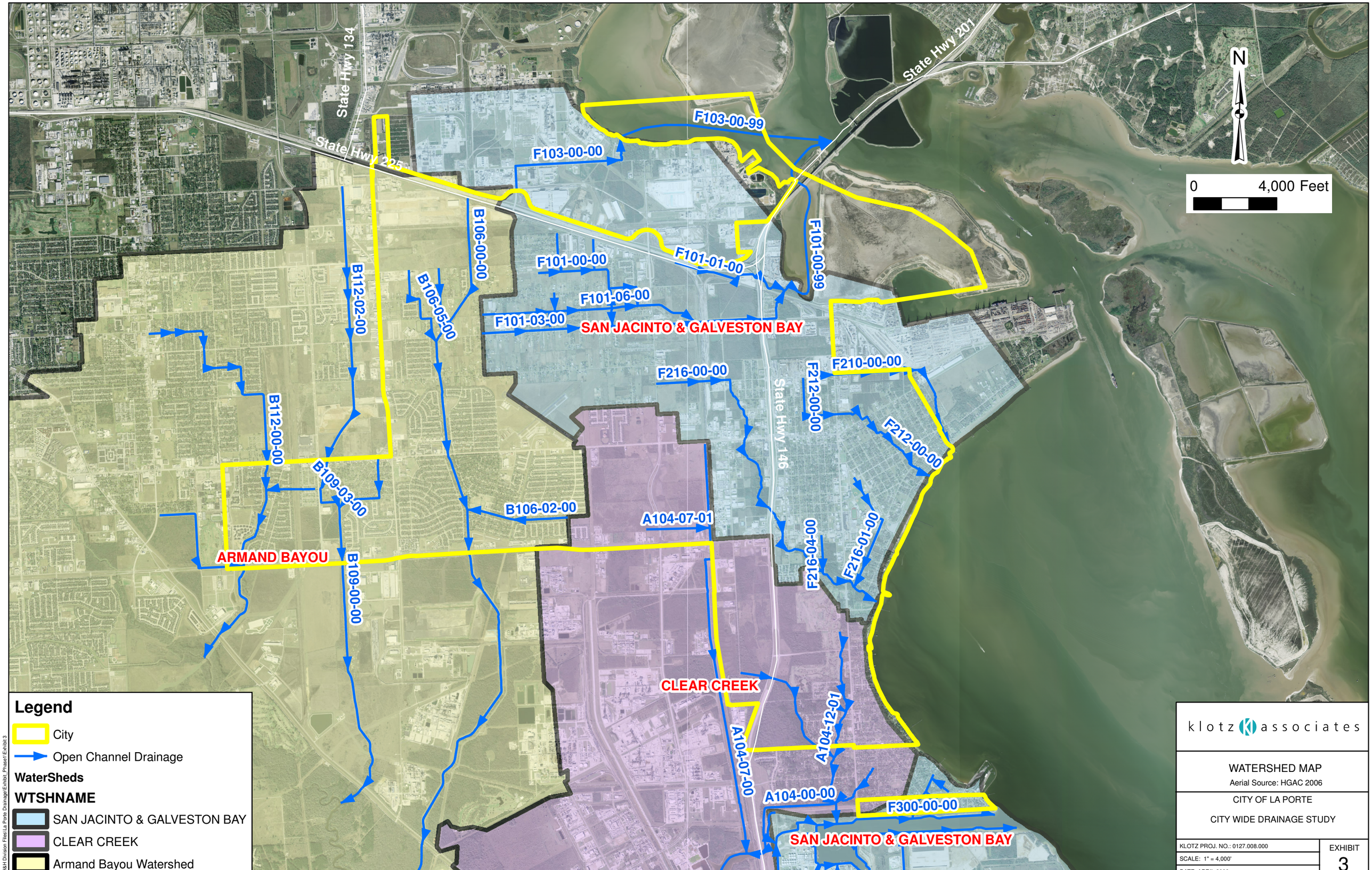
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Open Channel Drainage
WaterSheds
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SAN JACINTO & GALVESTON BAY
CLEAR CREEK
Armand Bayou Watershed
klotz associates
WATERSHED MAP
Aerial Source: HGAC 2006
CITY OF LA PORTE
CITY WIDE DRAINAGE STUDY
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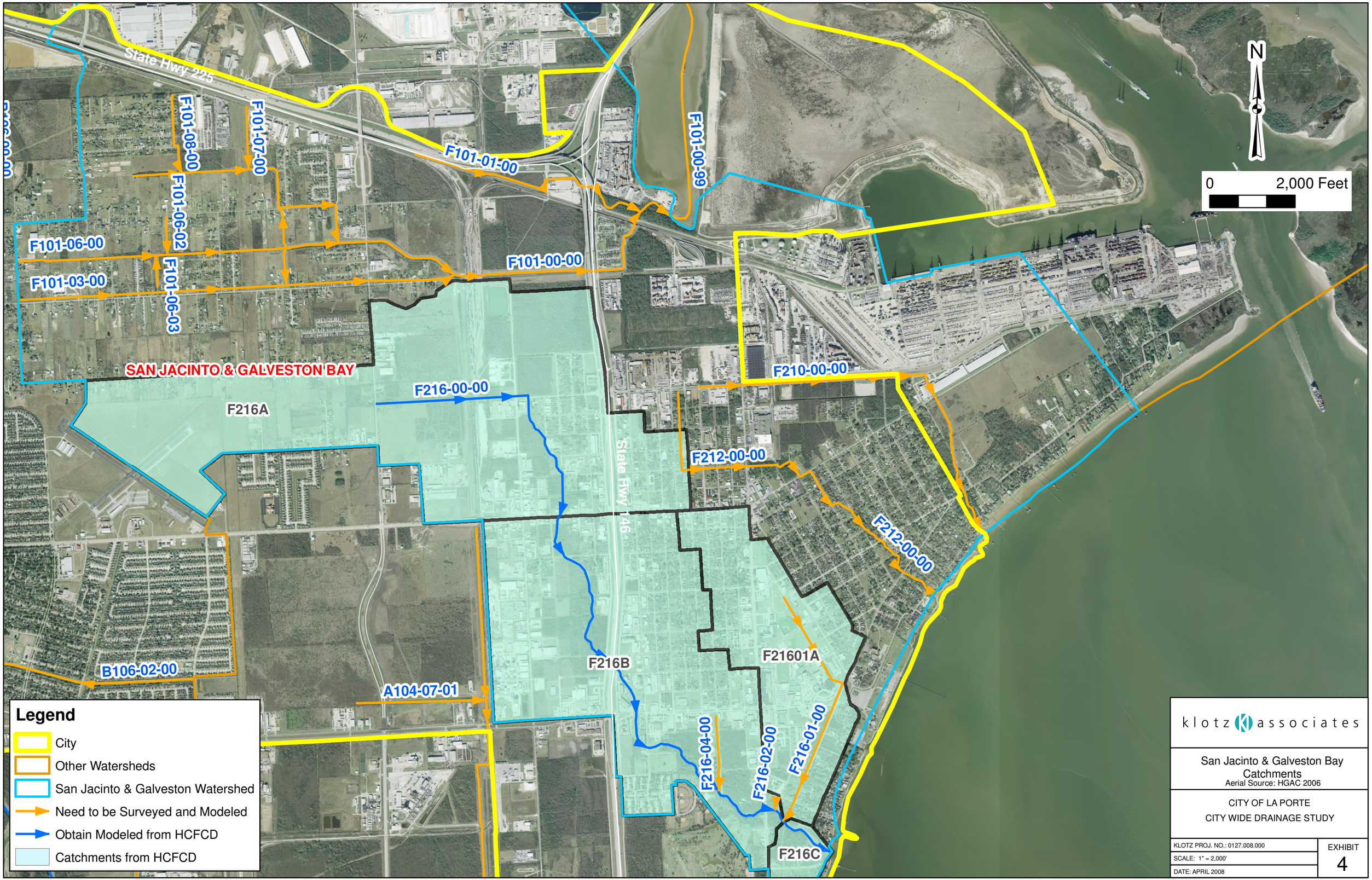
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Other Watersheds
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Catchments from HCFCD
klotz associates
San Jacinto & Galveston Bay Catchments
Aerial Source: HGAC 2006
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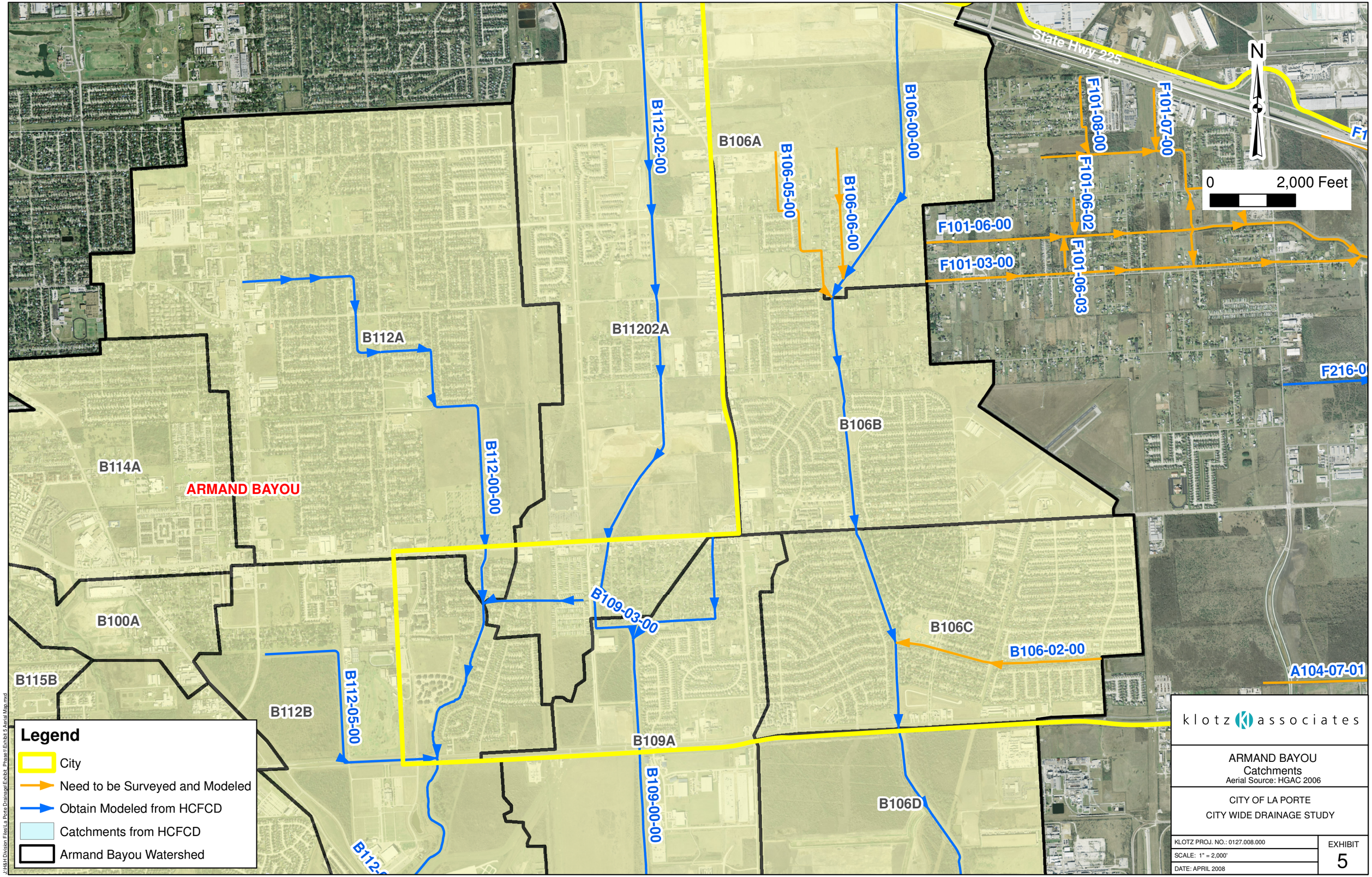
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City
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Catchments from HCFCD
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klotz associates
ARMAND BAYOU
Catchments
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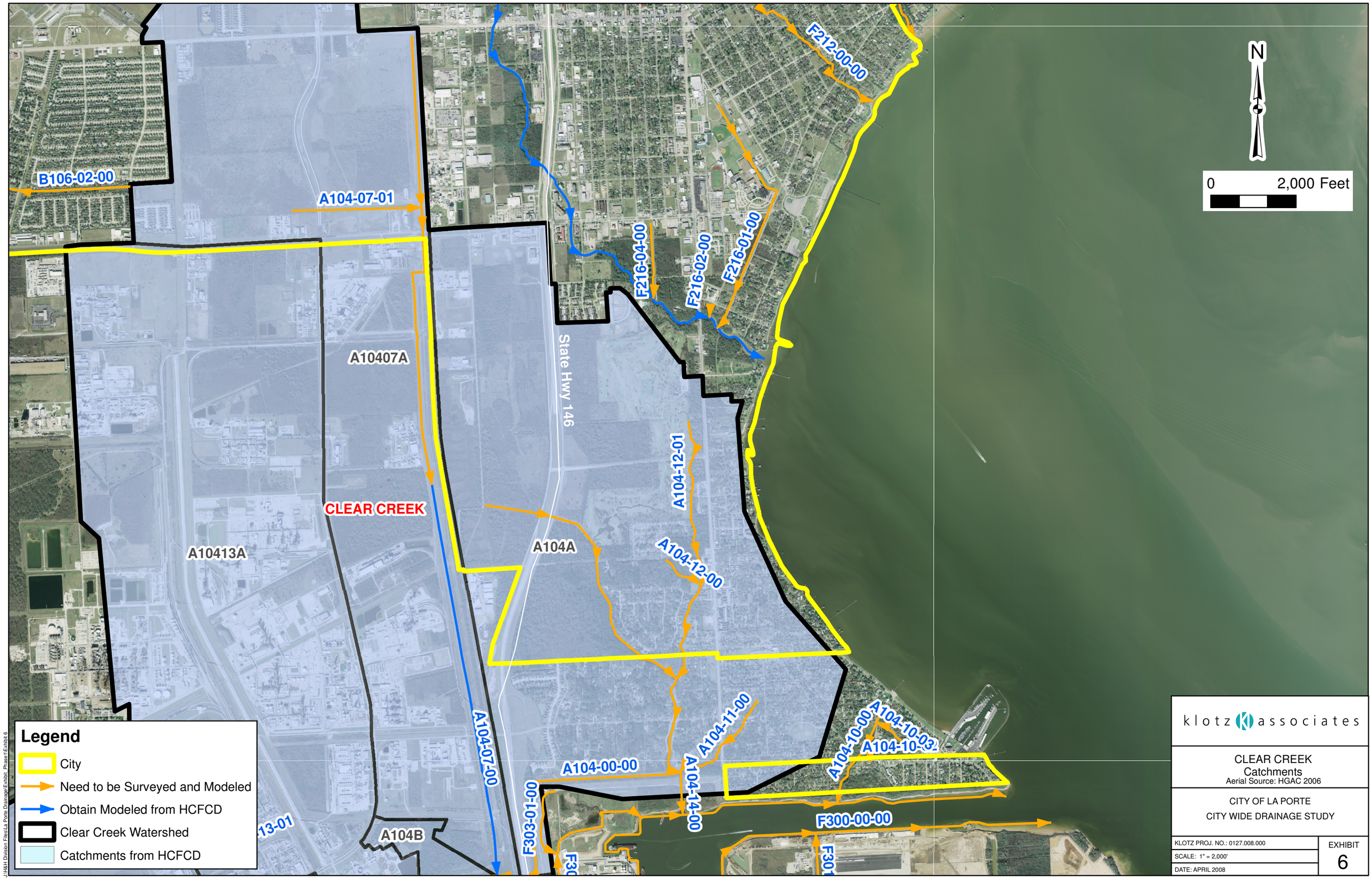
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Catchments from HCFCD
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Catchments
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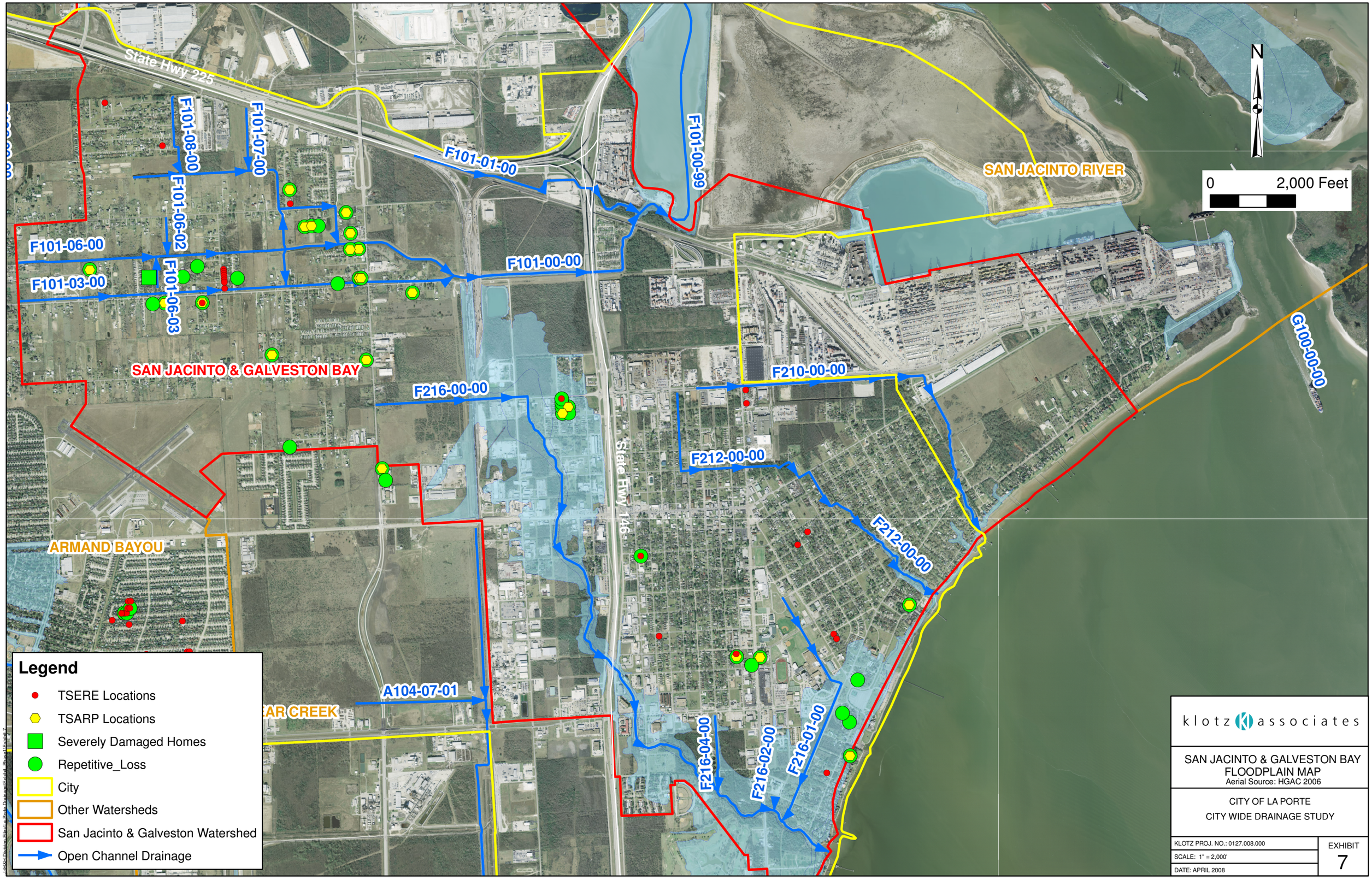
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TSERE Locations
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Severely Damaged Homes
Repetitive_Loss
City
Other Watersheds
San Jacinto & Galveston Watershed
Open Channel Drainage
klotz associates
SAN JACINTO & GALVESTON BAY
FLOODPLAIN MAP
Aerial Source: HGAC 2006
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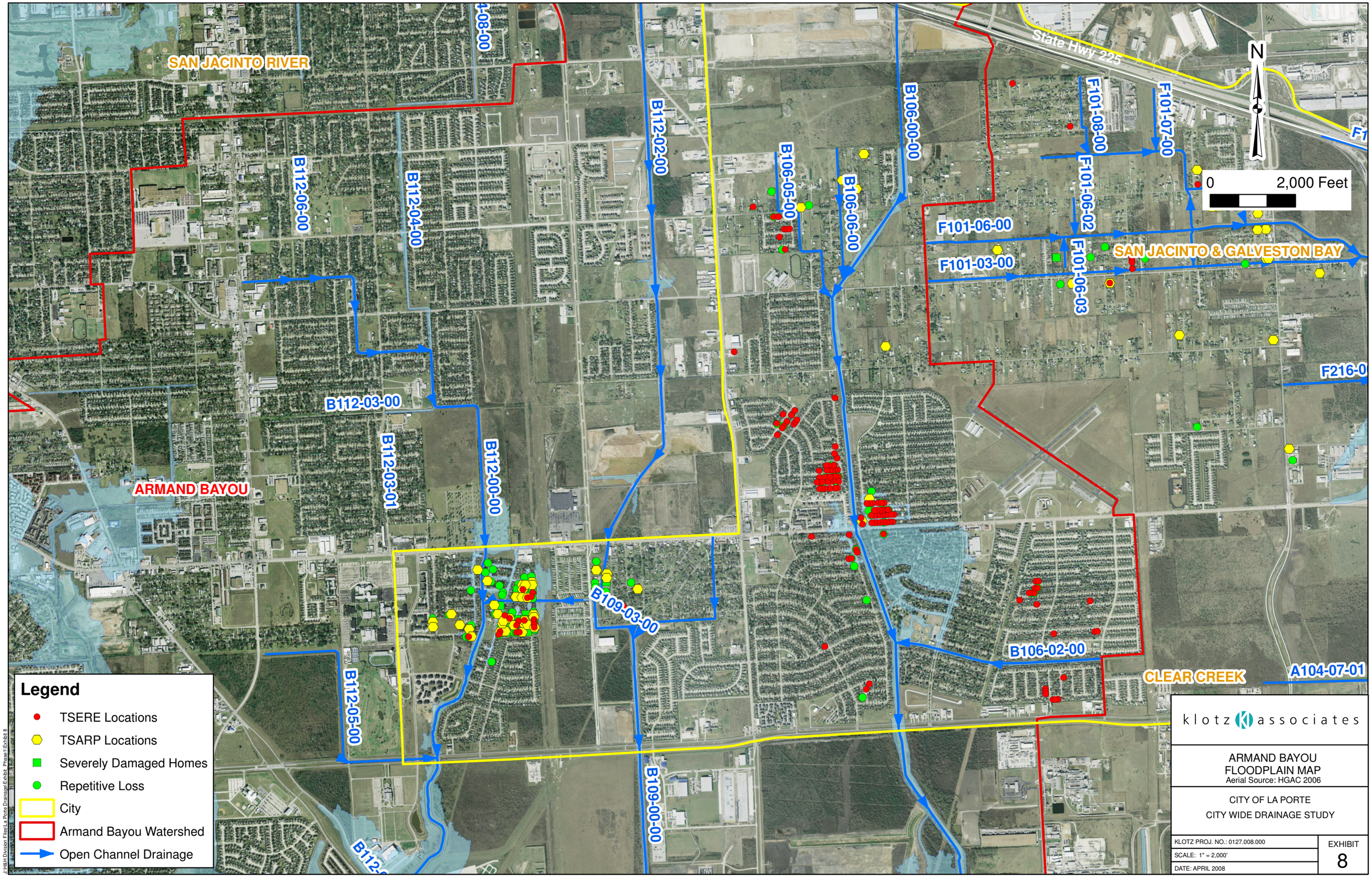
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Severely Damaged Homes
Repetitive Loss
City
Armand Bayou Watershed
Open Channel Drainage
klotz associates
ARMAND BAYOU
FLOODPLAIN MAP
Aerial Source: HGAC 2006
CITY OF LA PORTE
CITY WIDE DRAINAGE STUDY
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DATE: APRIL 2008
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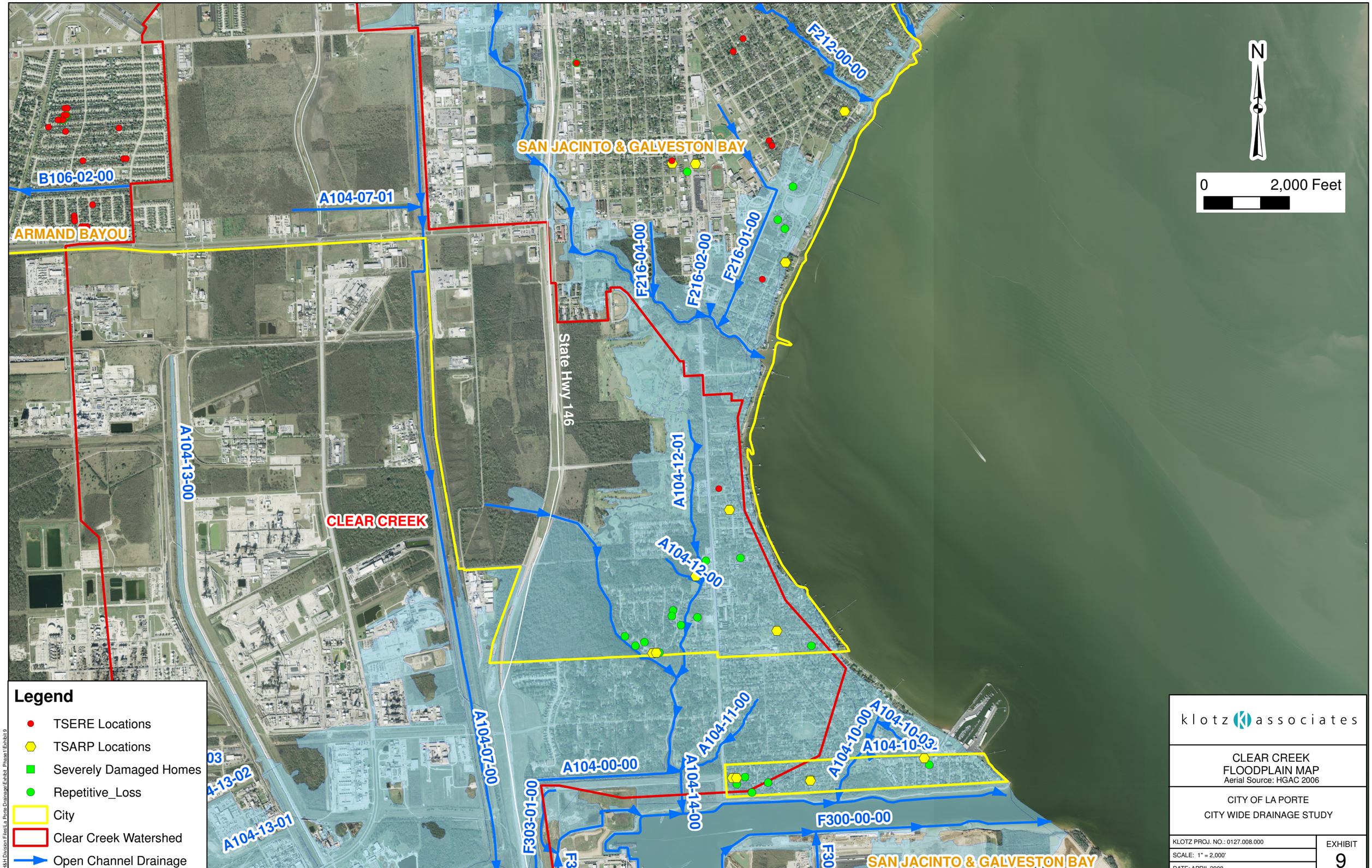
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Legend
TSERE Locations
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Severely Damaged Homes
Repetitive_Loss
City
Clear Creek Watershed
Open Channel Drainage
klotz associates
CLEAR CREEK
FLOODPLAIN MAP
Aerial Source: HGAC 2006
CITY OF LA PORTE
CITY WIDE DRAINAGE STUDY
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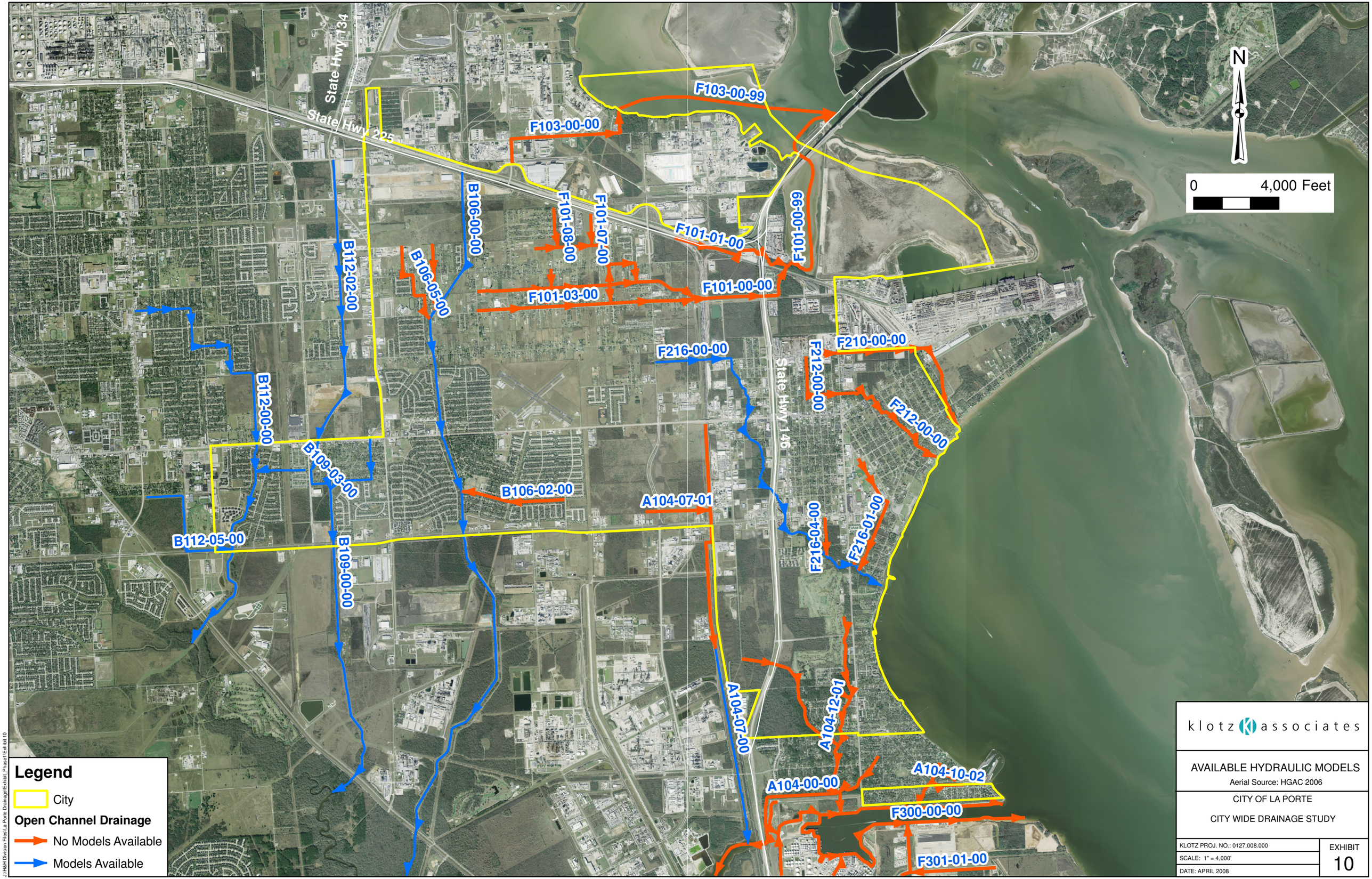

klotz associates

AVAILABLE HYDRAULIC MODELS

Aerial Source: HGAC 2006

CITY OF LA PORTE

CITY WIDE DRAINAGE STUDY

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SCALE: 1" = 4,000'	
DATE: APRIL 2008	

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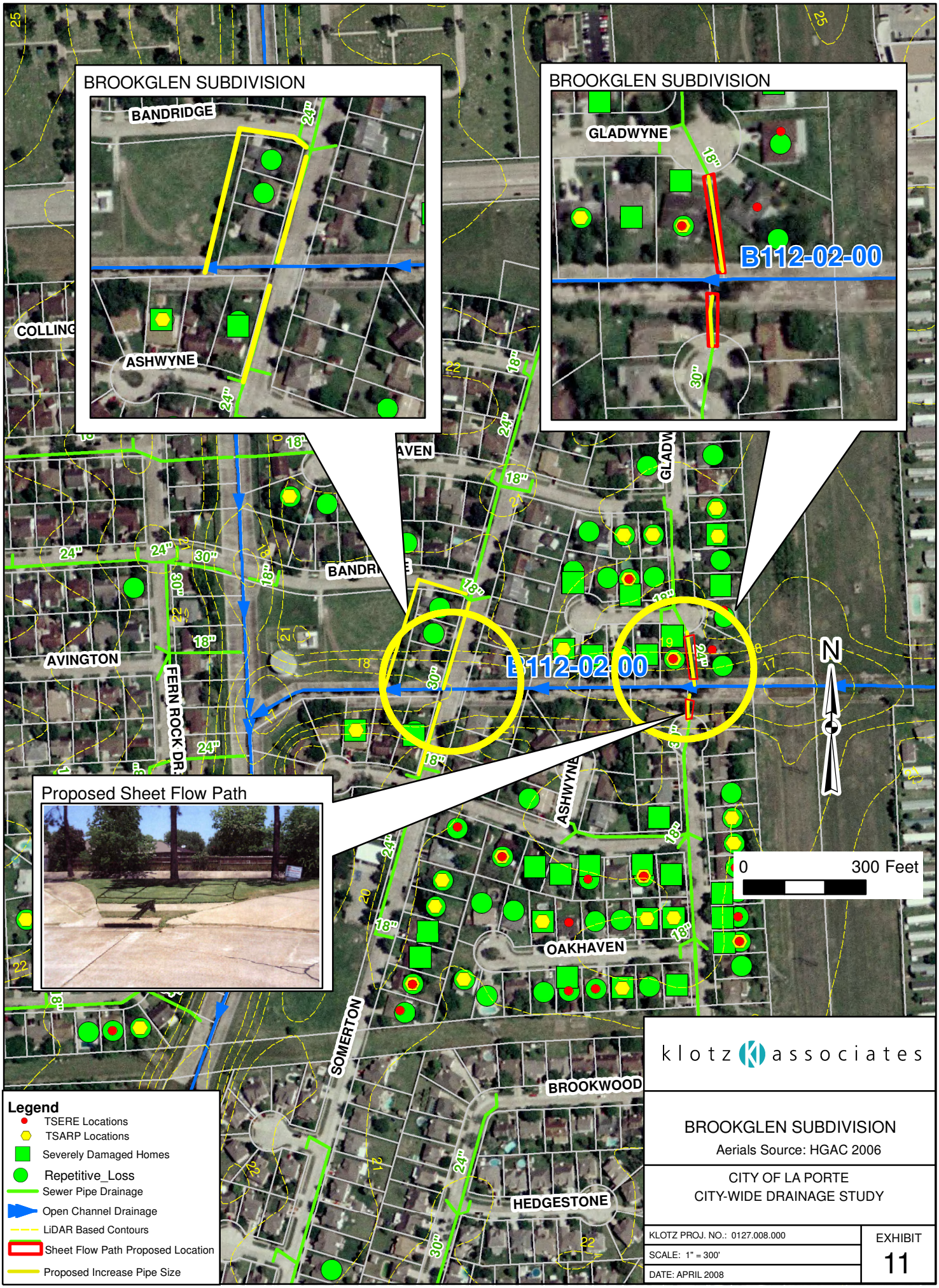

klotz associates

BROOKGLEN SUBDIVISION

Aerials Source: HGAC 2006

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY

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DATE: APRIL 2008

EXHIBIT 11

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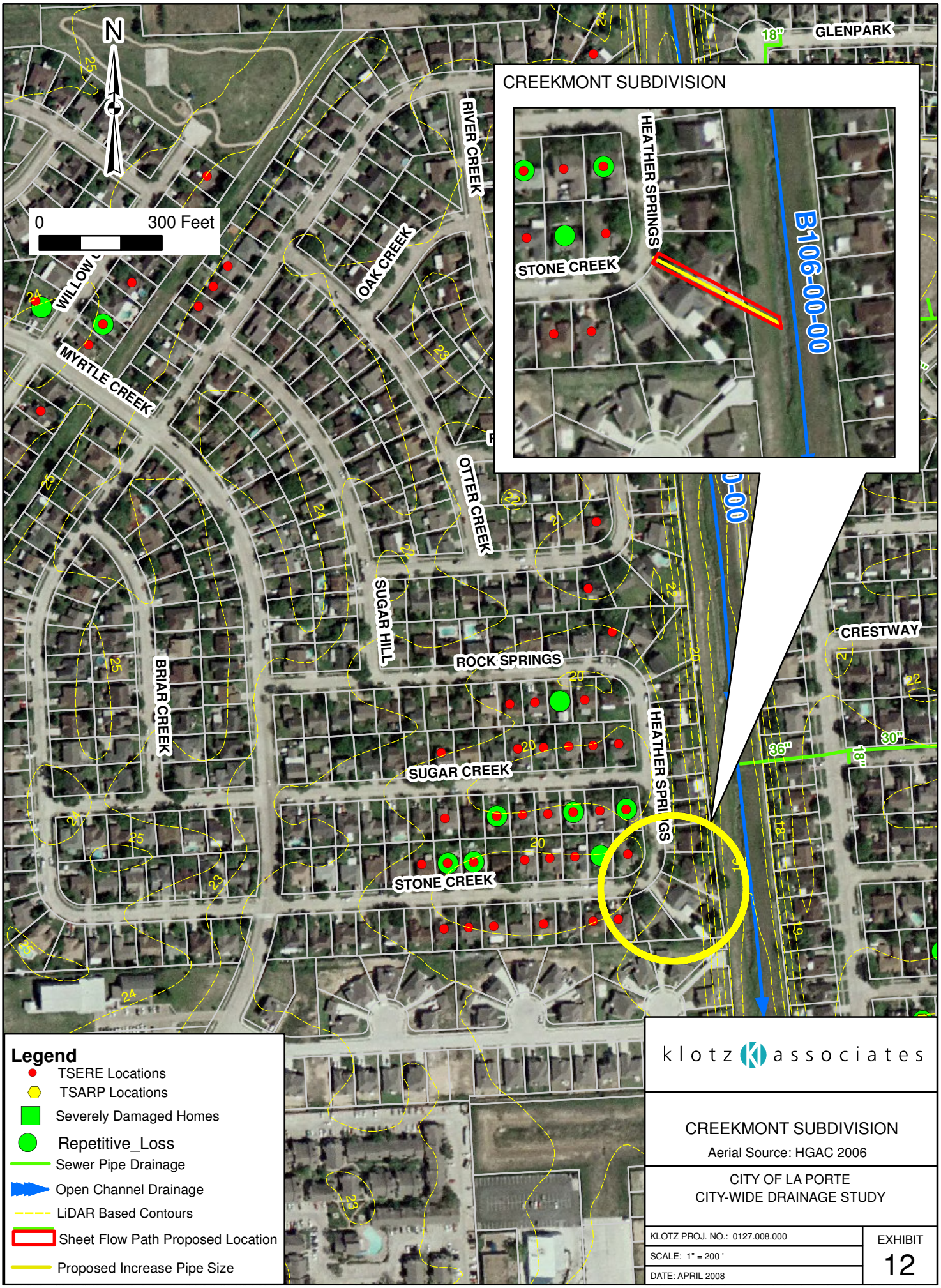

klotz associates

CREEKMONT SUBDIVISION

Aerial Source: HGAC 2006

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY

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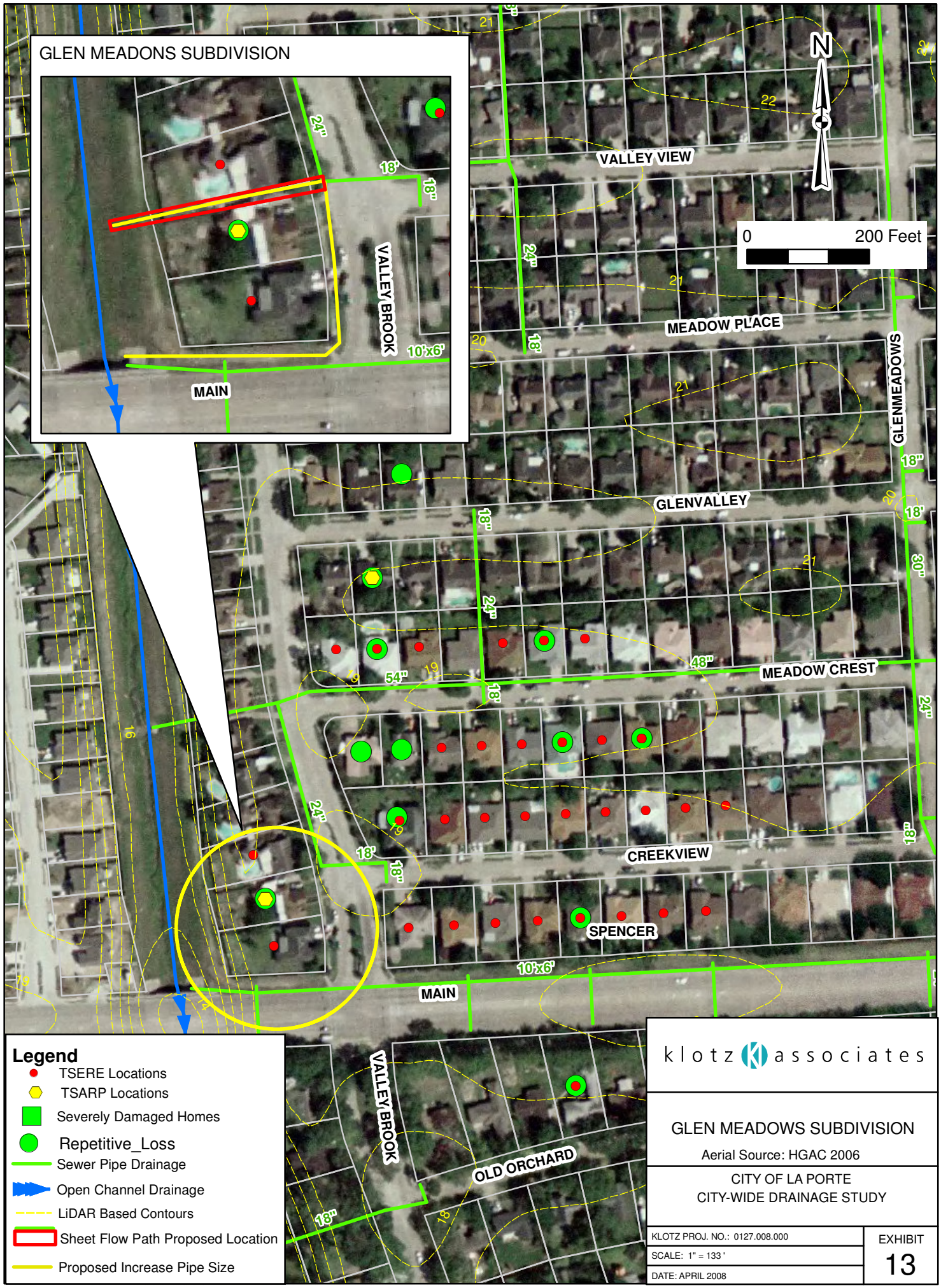

klotz associates

GLEN MEADOWS SUBDIVISION

Aerial Source: HGAC 2006

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY

KLOTZ PROJ. NO.: 0127.008.000

SCALE: 1" = 133 '

DATE: APRIL 2008

EXHIBIT 13

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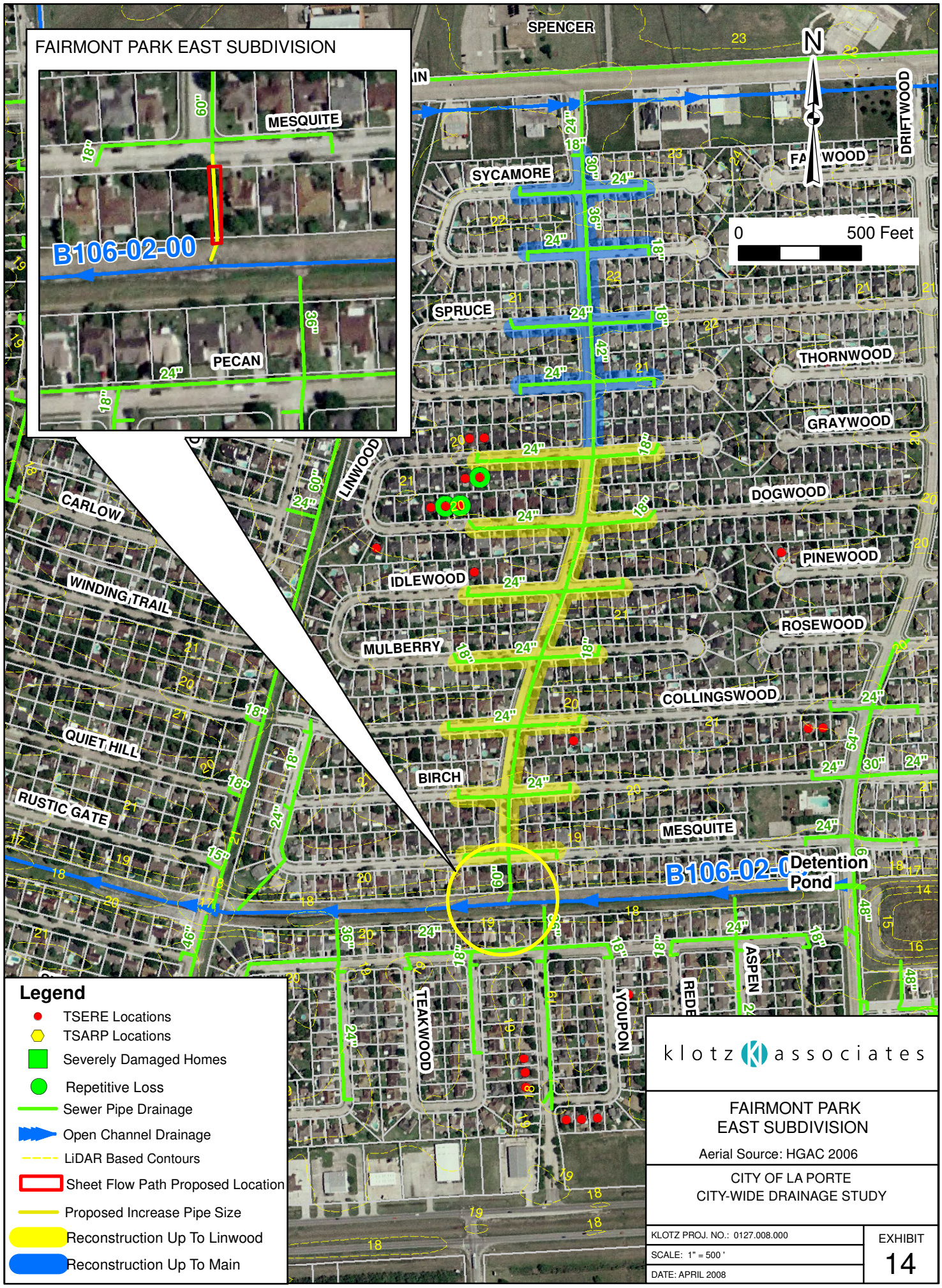

klotz associates

FAIRMONT PARK
EAST SUBDIVISION

Aerial Source: HGAC 2006

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY

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DATE: APRIL 2008	

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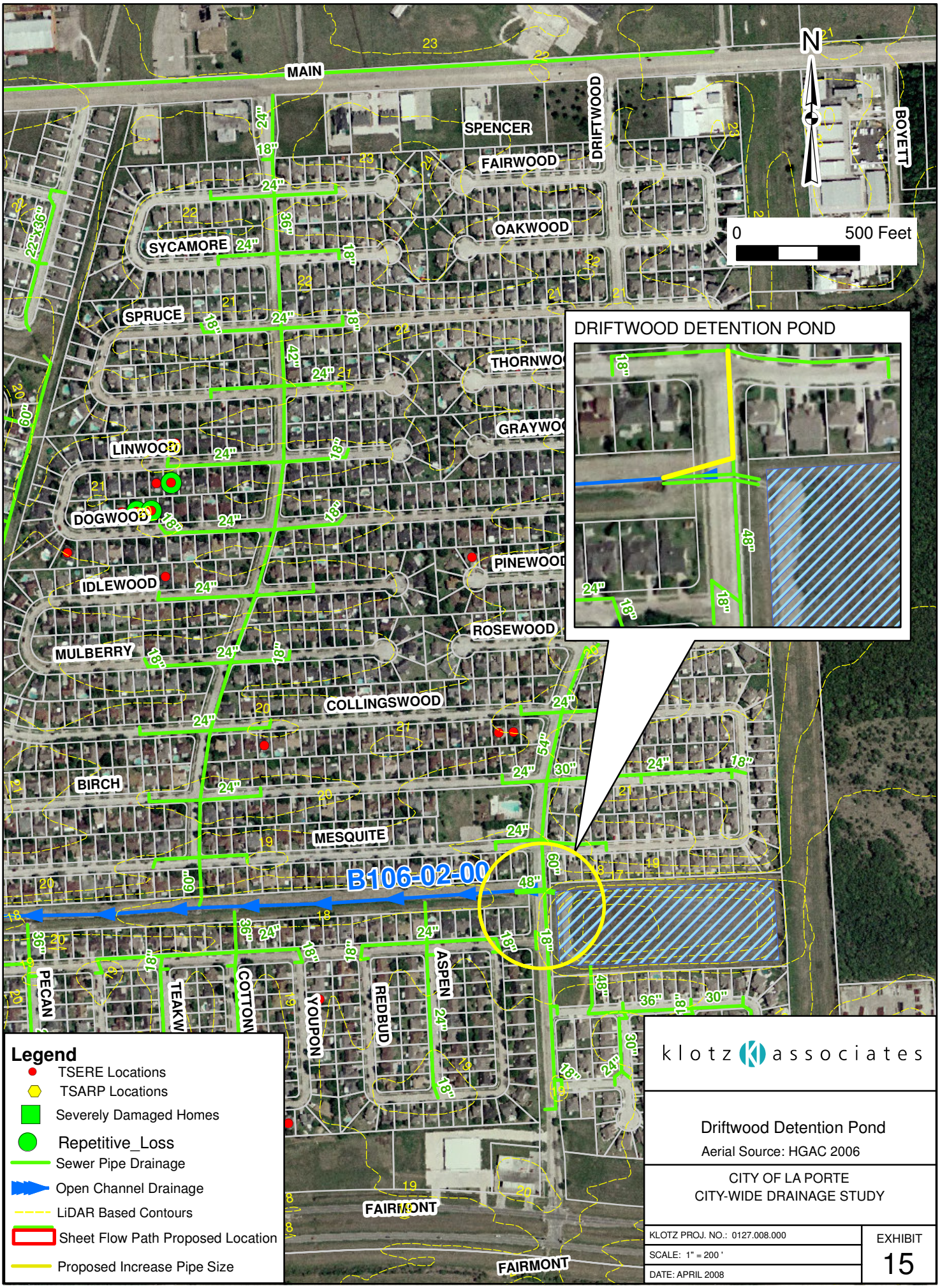

klotz associates

Driftwood Detention Pond

Aerial Source: HGAC 2006

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY

KLOTZ PROJ. NO.: 0127.008.000

SCALE: 1" = 200 '

DATE: APRIL 2008

EXHIBIT
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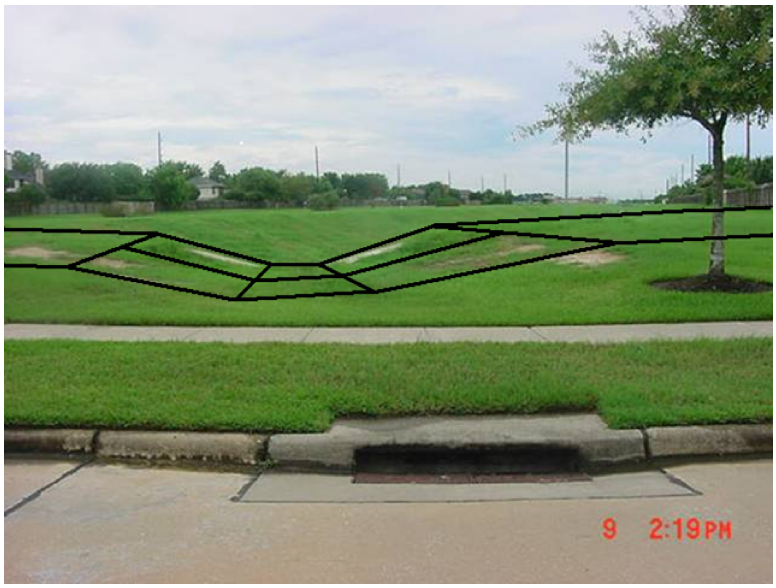

Street Sheet Flow Path

Sheet FLow Path Between Homes

klotz associates

SHEET FLOW PATHS

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY

KLOTZ PROJ. NO.: 0127.008.000	EXHIBIT
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DATE: APRIL 2008	

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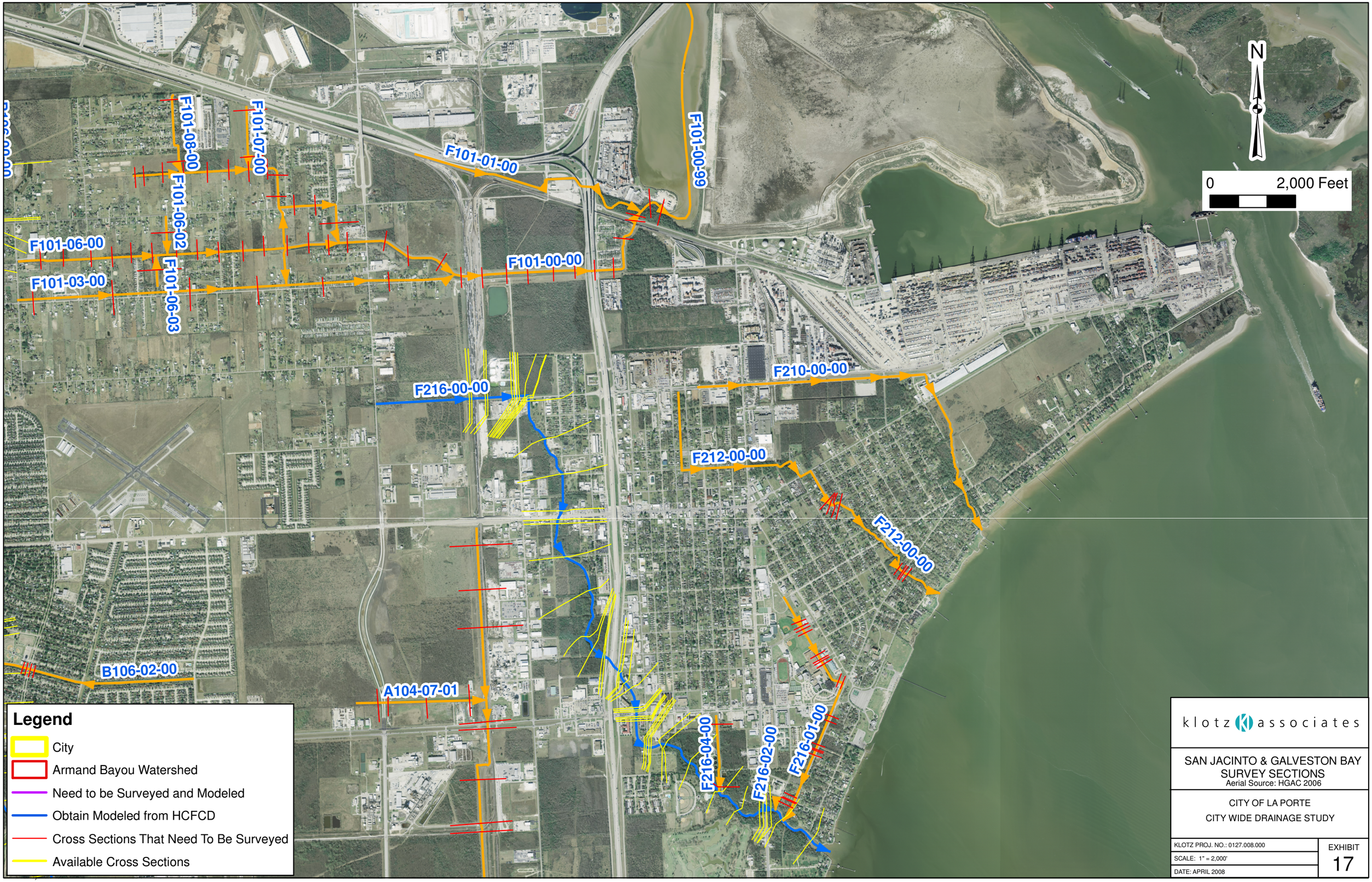


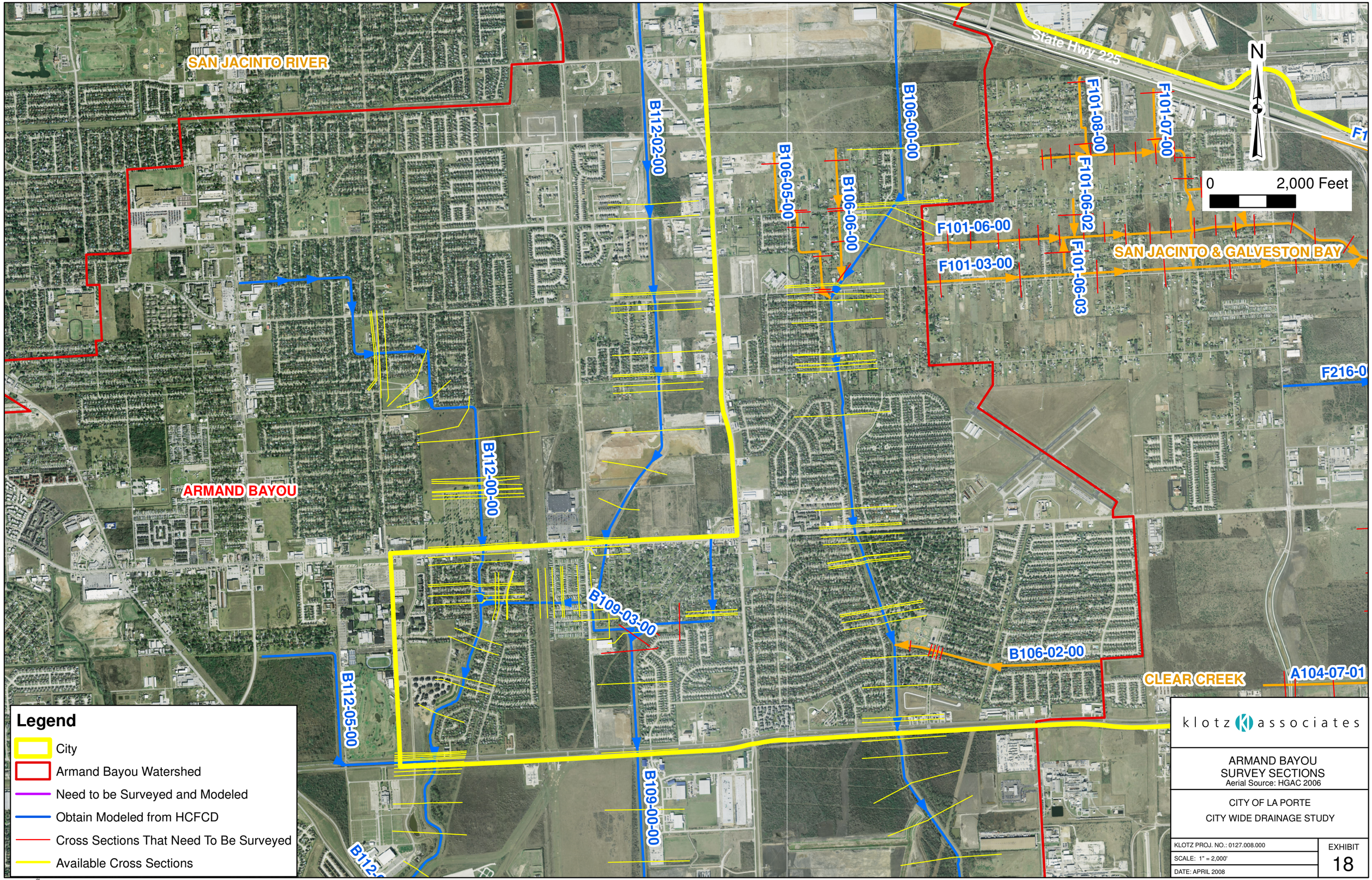
klotz associates

SAN JACINTO & GALVESTON BAY
SURVEY SECTIONS
Aerial Source: HGAC 2006

CITY OF LA PORTE
CITY WIDE DRAINAGE STUDY

KLOTZ PROJ. NO.: 0127.008.000	EXHIBIT
SCALE: 1" = 2,000'	17
DATE: APRIL 2008	

J:\H&H Division Files\La Porte Drainage\Exhibit_Phase1\Exhibit 17

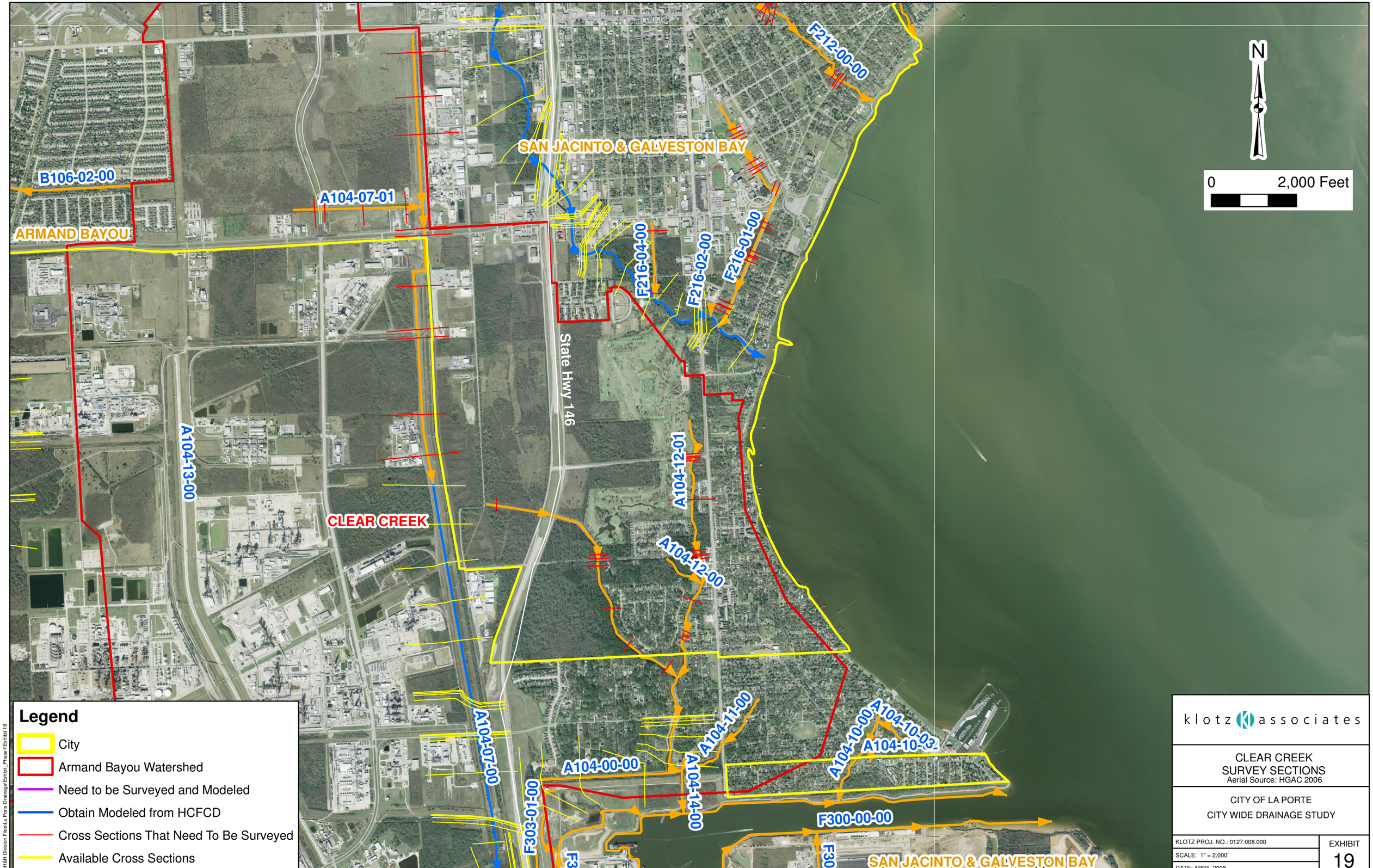


klotz associates

ARMAND BAYOU
SURVEY SECTIONS
Aerial Source: HGAC 2006

CITY OF LA PORTE
CITY WIDE DRAINAGE STUDY

KLOTZ PROJ. NO.: 0127.008.000	EXHIBIT
SCALE: 1" = 2,000'	18
DATE: APRIL 2008	



J:\H&H Division Files\La Porte Drainage\Exhibit_Phase1\Exhibit 19

klotz associates

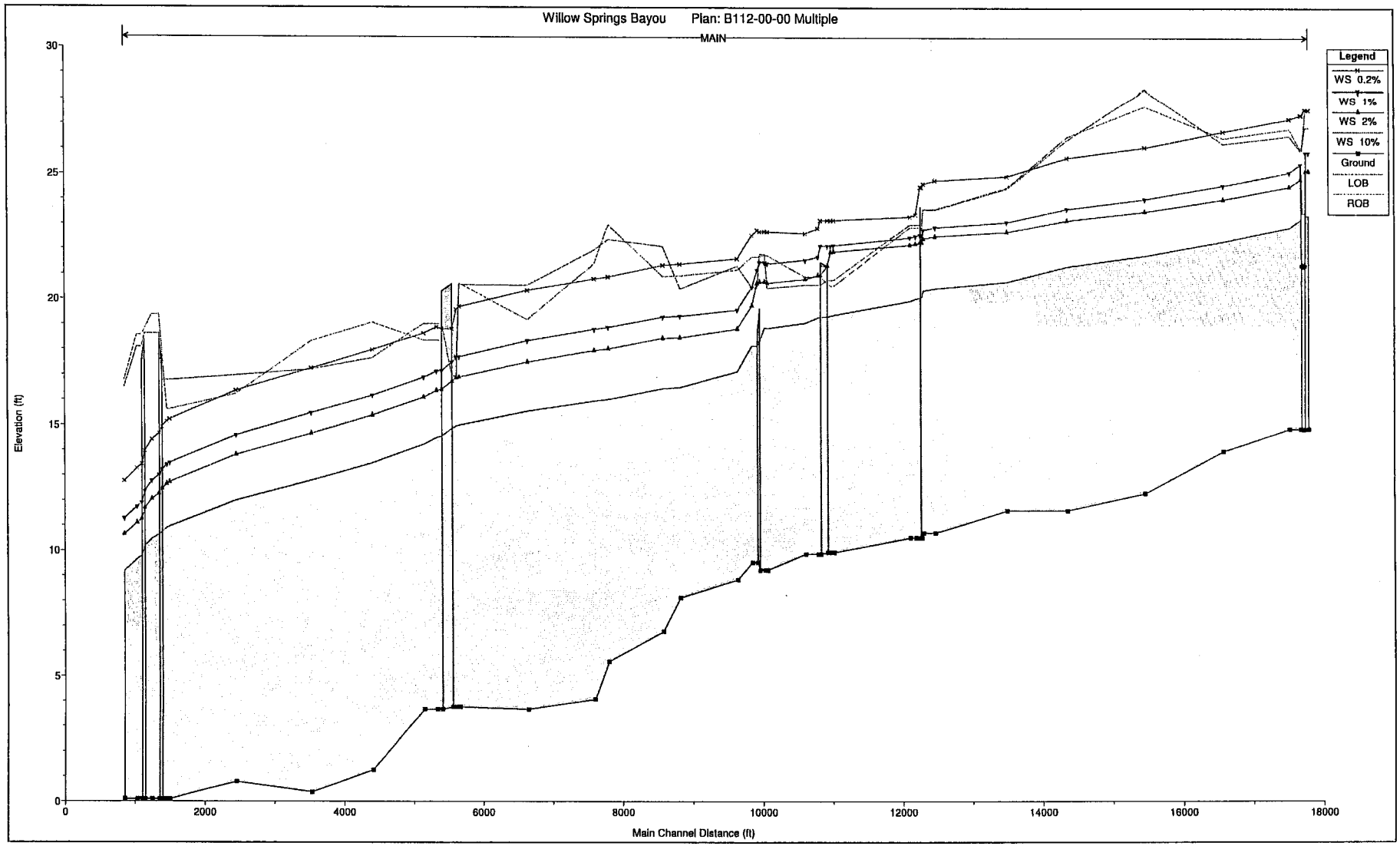
CLEAR CREEK
SURVEY SECTIONS
Aerial Source: HGAC 2006

CITY OF LA PORTE
CITY WIDE DRAINAGE STUDY

KLOTZ PROJ. NO.: 0127.008.000	EXHIBIT
SCALE: 1" = 2,000'	19
DATE: APRIL 2008	

Appendix A
HEC-RAS Output

Willow Spring Bayou
B112-00-00


Willow Springs Bayou Plan: B112-00-00 Multiple
MAIN
Legend
WS 0.2%
WS 1%
WS 2%
WS 10%
Ground
LOB
ROB
Elevation (ft)
Main Channel Distance (ft)
0
5
10
15
20
25
30
0
2000
4000
6000
8000
10000
12000
14000
16000
18000

HEC-RAS Plan: B112 Mult River: B112-00-00 Reach: MAIN

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	17790.53	664.00	14.85	23.35	17.17	23.40	0.000030	1.81	366.57	54.35	0.12
MAIN	17790.53	964.00	14.85	25.16	17.78	25.22	0.000032	2.05	469.48	59.71	0.13
MAIN	17790.53	1120.00	14.85	25.88	18.07	25.96	0.000034	2.18	513.61	61.87	0.13
MAIN	17790.53	1569.00	14.85	27.60	18.83	27.69	0.000038	2.51	733.57	912.34	0.14
MAIN	17750.52	664.00	14.84	23.36	16.88	23.40	0.000024	1.68	395.91	54.64	0.11
MAIN	17750.52	964.00	14.84	25.16	17.44	25.22	0.000027	1.93	499.22	59.86	0.12
MAIN	17750.52	1120.00	14.84	25.89	17.71	25.95	0.000029	2.06	543.44	61.96	0.12
MAIN	17750.52	1569.00	14.84	27.60	18.42	27.69	0.000033	2.39	799.39	1290.11	0.13
MAIN	17717.18	Culvert									
MAIN	17677.84	709.00	14.85	23.21	16.97	23.26	0.000027	1.77	399.52	56.13	0.12
MAIN	17677.84	1030.00	14.85	24.82	17.55	24.89	0.000035	2.08	495.12	65.26	0.13
MAIN	17677.84	1197.00	14.85	25.42	17.83	25.50	0.000040	2.23	535.82	156.89	0.14
MAIN	17677.84	1676.00	14.85	27.38	18.54	27.43	0.000026	2.01	4300.01	4244.07	0.12
MAIN	17517.84	1046.00	14.85	22.89	19.11	23.18	0.000329	4.31	242.71	55.83	0.36
MAIN	17517.84	1519.00	14.85	24.51	20.86	24.81	0.000301	4.38	346.69	235.04	0.36
MAIN	17517.84	1766.00	14.85	25.10	21.30	25.41	0.000304	4.49	393.59	532.95	0.37
MAIN	17517.84	2473.00	14.85	27.22	22.36	27.39	0.000164	3.47	2242.10	1206.95	0.28
MAIN	16576.1	1216.00	13.96	22.33	20.41	22.78	0.000538	5.38	226.03	54.29	0.46
MAIN	16576.1	1766.00	13.96	24.01	21.24	24.48	0.000399	5.47	323.11	60.82	0.42
MAIN	16576.1	2053.00	13.96	24.56	21.62	25.08	0.000404	5.75	357.14	62.95	0.43
MAIN	16576.1	2875.00	13.96	26.72	22.63	27.15	0.000348	5.34	930.33	778.76	0.40
MAIN	15461.55	1413.00	12.28	21.76		22.23	0.000447	5.46	258.85	52.28	0.43
MAIN	15461.55	2052.00	12.28	23.52		24.04	0.000376	5.76	356.27	58.44	0.41
MAIN	15461.55	2385.00	12.28	24.02		24.62	0.000404	6.18	385.91	60.19	0.43
MAIN	15461.55	3340.00	12.28	26.09		26.72	0.000380	6.39	522.32	75.39	0.43
MAIN	14353.43	1458.00	11.60	21.32		21.75	0.000400	5.23	278.98	55.50	0.41
MAIN	14353.43	2116.00	11.60	23.17		23.64	0.000325	5.46	387.60	61.94	0.38
MAIN	14353.43	2460.00	11.60	23.64		24.18	0.000357	5.90	416.87	63.56	0.41
MAIN	14353.43	3445.00	11.60	25.68		26.19	0.000551	5.76	598.40	142.27	0.49
MAIN	13493.31	1522.00	11.60	20.71	18.79	21.31	0.000632	6.20	245.68	53.37	0.51
MAIN	13493.31	2210.00	11.60	22.71	19.76	23.30	0.000440	6.15	359.57	60.34	0.44
MAIN	13493.31	2569.00	11.60	23.11	20.21	23.81	0.000493	6.69	383.84	61.73	0.47
MAIN	13493.31	3597.00	11.60	24.95	21.37	25.74	0.000433	7.16	510.02	732.19	0.46
MAIN	12467.17	1522.00	10.70	20.45	16.58	20.79	0.000227	4.69	324.43	54.19	0.34
MAIN	12467.17	2210.00	10.70	22.53	17.68	22.91	0.000201	4.97	445.09	61.84	0.33
MAIN	12467.17	2569.00	10.70	22.90	18.18	23.36	0.000236	5.49	468.18	63.20	0.36
MAIN	12467.17	3597.00	10.70	24.76	19.46	25.34	0.000225	6.07	648.04	1150.47	0.36
MAIN	12298.35	1594.00	10.70	20.36	16.70	20.74	0.000259	4.99	319.56	53.86	0.36
MAIN	12298.35	2314.00	10.70	22.44	17.83	22.87	0.000228	5.26	439.65	61.52	0.35
MAIN	12298.35	2690.00	10.70	22.79	18.34	23.32	0.000270	5.83	461.31	62.80	0.38
MAIN	12298.35	3767.00	10.70	24.64	19.66	25.28	0.000259	6.46	626.66	1094.81	0.38
MAIN	12278.35	1594.00	10.51	20.11	17.95	20.68	0.000579	6.08	262.12	54.52	0.49
MAIN	12278.35	2314.00	10.51	22.28	18.97	22.83	0.000390	5.93	390.03	63.01	0.42
MAIN	12278.35	2690.00	10.51	22.60	19.44	23.27	0.000457	6.56	410.18	64.24	0.46
MAIN	12278.35	3767.00	10.51	24.50	20.65	25.25	0.000373	6.97	648.14	1128.54	0.43
MAIN	12233.54	Bridge									
MAIN	12188.72	1594.00	10.51	20.03	17.96	20.63	0.000605	6.17	258.23	54.25	0.50
MAIN	12188.72	2314.00	10.51	22.23	18.97	22.79	0.000400	5.98	386.73	62.80	0.42
MAIN	12188.72	2690.00	10.51	22.54	19.44	23.22	0.000469	6.62	406.38	64.01	0.46
MAIN	12188.72	3767.00	10.51	23.40	20.65	24.43	0.000615	8.14	474.19	358.66	0.54
MAIN	12108.71	1594.00	10.51	19.95	17.95	20.56	0.000637	6.29	253.56	53.91	0.51
MAIN	12108.71	2314.00	10.51	22.19	18.97	22.75	0.000408	6.03	383.98	62.63	0.43
MAIN	12108.71	2690.00	10.51	22.48	19.44	23.18	0.000481	6.68	402.83	63.79	0.47
MAIN	12108.71	3767.00	10.51	23.32	20.64	24.37	0.000640	8.24	464.70	574.83	0.55
MAIN	11014.28	1617.00	9.93	19.39	17.16	19.90	0.000522	5.74	281.63	60.24	0.47
MAIN	11014.28	2348.00	9.93	21.91	18.14	22.34	0.000268	5.26	467.81	668.90	0.36
MAIN	11014.28	2730.00	9.93	22.15	18.60	22.69	0.000321	5.90	490.08	756.10	0.39
MAIN	11014.28	3822.00	9.93	23.17	19.75	23.70	0.000304	6.28	1591.56	1794.85	0.39

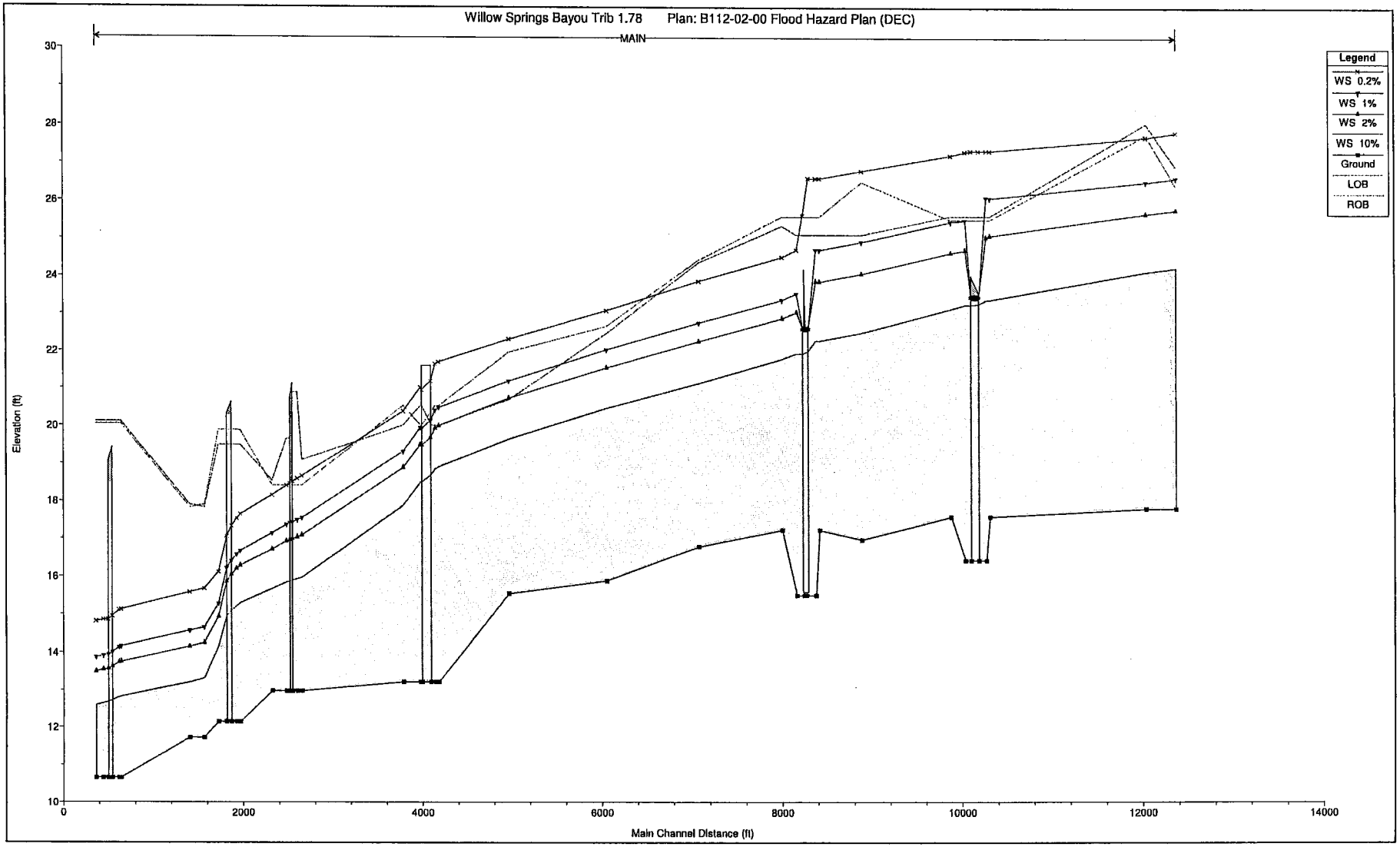
HEC-RAS Plan: B112 Mult River: B112-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	10974.1	1617.00	9.93	19.36	17.16	19.88	0.000531	5.78	280.00	60.12	0.47
MAIN	10974.1	2348.00	9.93	21.89	18.14	22.32	0.000271	5.28	466.12	711.01	0.36
MAIN	10974.1	2730.00	9.93	22.14	18.60	22.68	0.000324	5.91	488.51	784.44	0.40
MAIN	10974.1	3822.00	9.93	23.17	19.75	23.66	0.000293	6.16	1689.44	1782.16	0.38
MAIN	10883.27	Bridge									
MAIN	10792.43	1617.00	9.86	19.29	17.18	19.74	0.000501	5.42	298.30	70.13	0.46
MAIN	10792.43	2348.00	9.86	20.98	18.10	21.45	0.000380	5.51	430.60	160.98	0.42
MAIN	10792.43	2730.00	9.86	21.71	18.53	22.20	0.000333	5.63	499.09	726.03	0.40
MAIN	10792.43	3822.00	9.86	22.85	19.59	23.46	0.000342	6.39	1256.17	1359.22	0.42
MAIN	10610.83	1675.00	9.86	19.07	17.26	19.62	0.000622	5.91	283.32	68.67	0.51
MAIN	10610.83	2432.00	9.86	20.82	18.20	21.35	0.000449	5.88	416.70	174.71	0.46
MAIN	10610.83	2827.00	9.86	21.57	18.63	22.12	0.000385	5.96	522.02	288.22	0.43
MAIN	10610.83	3959.00	9.86	22.64	19.71	23.35	0.000411	6.87	1209.11	1859.62	0.46
MAIN	10067.4	1675.00	9.23	18.86	16.46	19.30	0.000438	5.32	314.78	68.22	0.44
MAIN	10067.4	2432.00	9.23	20.66	17.41	21.12	0.000340	5.44	447.55	729.61	0.40
MAIN	10067.4	2827.00	9.23	21.43	17.85	21.91	0.000310	5.56	526.03	1210.63	0.39
MAIN	10067.4	3959.00	9.23	22.71	18.97	23.08	0.000229	5.37	4155.51	2785.84	0.34
MAIN	10027.4	1675.00	9.23	18.89	16.21	19.23	0.000322	4.70	356.61	74.41	0.38
MAIN	10027.4	2432.00	9.23	20.70	17.06	21.07	0.000253	4.86	500.20	673.59	0.36
MAIN	10027.4	2827.00	9.23	21.48	17.47	21.85	0.000234	4.90	577.26	1113.06	0.37
MAIN	10027.4	3959.00	9.23	22.72	18.50	23.03	0.000194	4.79	3971.63	2780.28	0.33
MAIN	9938	Bridge									
MAIN	9849.865	1675.00	9.53	18.16	16.11	18.61	0.000486	5.39	310.78	71.13	0.45
MAIN	9849.865	2432.00	9.53	19.76	16.96	20.26	0.000393	5.64	430.97	551.29	0.43
MAIN	9849.865	2827.00	9.53	20.49	17.36	21.01	0.000367	5.77	489.57	1128.43	0.42
MAIN	9849.865	3959.00	9.53	22.56	18.40	22.82	0.000162	4.60	5362.25	2730.79	0.29
MAIN	9638.195	1860.00	8.84	17.14	16.46	18.25	0.001500	8.46	219.94	59.28	0.77
MAIN	9638.195	2781.00	8.84	18.83	17.57	19.94	0.001074	8.46	328.84	201.05	0.69
MAIN	9638.195	3264.00	8.84	19.59	18.08	20.71	0.000964	8.52	383.15	285.87	0.66
MAIN	9638.195	4659.00	8.84	21.62	19.36	22.56	0.000938	7.87	1010.02	2534.36	0.66
MAIN	8821.352	1955.00	8.12	16.50	14.93	17.21	0.000781	6.75	289.57	68.13	0.58
MAIN	8821.352	2922.00	8.12	18.47	16.03	19.16	0.000540	6.67	438.27	91.16	0.54
MAIN	8821.352	3429.00	8.12	19.33	16.54	19.99	0.000468	6.50	527.83	136.65	0.54
MAIN	8821.352	4875.00	8.12	21.40	17.81	21.90	0.000345	5.71	1350.51	1155.15	0.45
MAIN	8577.462	1955.00	6.79	16.46	11.20	16.62	0.000460	3.26	600.54	98.93	0.23
MAIN	8577.462	2922.00	6.79	18.44	12.29	18.64	0.000465	3.54	826.12	121.24	0.24
MAIN	8577.462	3429.00	6.79	19.30	12.81	19.51	0.000502	3.67	934.20	137.45	0.25
MAIN	8577.462	4875.00	6.79	21.36	14.08	21.58	0.000514	3.79	1451.58	1271.84	0.25
MAIN	7798.68	1974.00	5.58	16.03	11.56	16.22	0.000598	3.49	565.75	101.92	0.26
MAIN	7798.68	2951.00	5.58	18.03	12.62	18.25	0.000542	3.75	786.19	117.78	0.26
MAIN	7798.68	3462.00	5.58	18.87	13.09	19.11	0.000524	3.90	887.72	122.29	0.26
MAIN	7798.68	4919.00	5.58	20.89	14.27	21.17	0.000509	4.30	1144.52	495.14	0.26
MAIN	7597.597	2069.00	4.07	15.96	9.73	16.11	0.000349	3.08	672.56	97.19	0.21
MAIN	7597.597	3091.00	4.07	17.95	10.92	18.15	0.000377	3.52	878.88	110.00	0.22
MAIN	7597.597	3625.00	4.07	18.80	11.46	19.01	0.000393	3.72	973.84	115.42	0.23
MAIN	7597.597	5131.00	4.07	20.80	12.77	21.08	0.000435	4.21	1218.25	364.38	0.24
MAIN	6639.987	2170.00	3.67	15.55	10.16	15.73	0.000459	3.38	641.47	99.11	0.23
MAIN	6639.987	3242.00	3.67	17.50	11.35	17.73	0.000510	3.80	853.00	119.87	0.25
MAIN	6639.987	3800.00	3.67	18.33	11.87	18.58	0.000518	3.98	955.84	127.12	0.26
MAIN	6639.987	5359.00	3.67	20.34	13.12	20.63	0.000505	4.34	1315.36	260.95	0.26
MAIN	5658.061	2224.00	3.76	14.99		15.21	0.000604	3.74	594.21	97.08	0.27
MAIN	5658.061	3323.00	3.76	16.90		17.17	0.000635	4.18	795.68	114.55	0.28
MAIN	5658.061	3895.00	3.76	17.70		18.00	0.000676	4.36	892.82	126.39	0.29
MAIN	5658.061	5481.00	3.76	19.69		20.00	0.000896	4.42	1243.34	238.77	0.32
MAIN	5616.164	2224.00	3.76	14.96	9.89	15.18	0.000611	3.76	591.49	96.82	0.27
MAIN	5616.164	3323.00	3.76	16.87	11.13	17.14	0.000642	4.19	792.27	114.28	0.28
MAIN	5616.164	3895.00	3.76	17.67	11.68	17.97	0.000632	4.40	886.61	125.89	0.28
MAIN	5616.164	5481.00	3.76	19.58	13.01	19.95	0.000577	4.88	1209.72	197.45	0.28

HEC-RAS Plan: B112 Mult River: B112-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	5475	Bridge									
MAIN	5334.138	2224.00	3.66	14.50		14.78	0.000964	4.26	521.74	99.52	0.33
MAIN	5334.138	3323.00	3.66	16.37		16.69	0.000938	4.51	737.22	127.21	0.33
MAIN	5334.138	3895.00	3.66	17.14		17.47	0.000900	4.66	836.71	133.37	0.33
MAIN	5334.138	5481.00	3.66	18.88		19.28	0.000851	5.07	1085.33	163.42	0.33
MAIN	5148.595	2305.00	3.66	14.23		14.57	0.001144	4.65	495.99	94.38	0.36
MAIN	5148.595	3444.00	3.66	16.11		16.48	0.001145	4.89	703.62	124.56	0.36
MAIN	5148.595	4035.00	3.66	16.88		17.27	0.001087	5.03	802.70	131.30	0.36
MAIN	5148.595	5663.00	3.66	18.63		19.09	0.001008	5.42	1046.16	153.96	0.35
MAIN	4410.717	2406.00	1.24	13.48		13.77	0.000975	4.34	554.77	103.53	0.33
MAIN	4410.717	3594.00	1.24	15.38		15.72	0.000919	4.62	777.15	126.32	0.33
MAIN	4410.717	4209.00	1.24	16.17		16.53	0.000886	4.79	879.49	132.18	0.33
MAIN	4410.717	5888.00	1.24	17.97		18.39	0.000850	5.22	1136.48	185.45	0.33
MAIN	3531.853	2535.00	0.35	12.79		13.04	0.000670	4.01	631.66	99.77	0.28
MAIN	3531.853	3787.00	0.35	14.66		14.97	0.000757	4.50	840.88	123.01	0.30
MAIN	3531.853	4433.00	0.35	15.46		15.80	0.000764	4.71	942.03	129.87	0.31
MAIN	3531.853	6175.00	0.35	17.25		17.67	0.000790	5.19	1188.91	146.62	0.32
MAIN	2454.362	2661.00	0.78	11.99		12.26	0.000789	4.14	643.44	111.33	0.30
MAIN	2454.362	3973.00	0.78	13.81		14.14	0.000798	4.62	860.55	127.25	0.31
MAIN	2454.362	4650.00	0.78	14.59		14.96	0.000806	4.83	962.78	134.10	0.32
MAIN	2454.362	6452.00	0.78	16.36		16.80	0.000827	5.32	1214.95	173.94	0.33
MAIN	1503.073	2661.00	0.09	10.96		11.33	0.001233	4.90	543.18	101.71	0.37
MAIN	1503.073	3973.00	0.09	12.72		13.16	0.001422	5.34	743.77	125.82	0.39
MAIN	1503.073	4650.00	0.09	13.49		13.96	0.001448	5.51	843.48	132.36	0.38
MAIN	1503.073	6452.00	0.09	15.22		15.77	0.001530	5.95	1084.87	146.99	0.39
MAIN	1462.72	2661.00	0.09	10.90	7.10	11.28	0.001267	4.96	536.91	100.78	0.38
MAIN	1462.72	3973.00	0.09	12.64	8.44	13.10	0.001464	5.41	734.62	125.20	0.39
MAIN	1462.72	4650.00	0.09	13.42	9.03	13.90	0.001489	5.58	833.73	131.73	0.39
MAIN	1462.72	6452.00	0.09	15.14	10.48	15.70	0.001570	6.01	1073.42	146.33	0.39
MAIN	1354.8	Bridge									
MAIN	1246.85	2741.00	0.09	10.45	7.19	10.93	0.001512	5.58	490.85	87.57	0.42
MAIN	1246.85	4092.00	0.09	12.04	8.55	12.68	0.001786	6.41	638.62	101.24	0.45
MAIN	1246.85	4788.00	0.09	12.77	9.15	13.47	0.001952	6.68	716.40	109.73	0.46
MAIN	1246.85	6628.00	0.09	14.42	10.47	15.25	0.002160	7.30	907.42	122.14	0.47
MAIN	1141.6	Bridge									
MAIN	1036.333	2741.00	0.09	9.64		10.20	0.001876	5.95	460.37	87.88	0.46
MAIN	1036.333	4092.00	0.09	11.09		11.83	0.002012	6.90	592.70	95.14	0.49
MAIN	1036.333	4788.00	0.09	11.74		12.57	0.002044	7.31	655.16	98.33	0.50
MAIN	1036.333	6628.00	0.09	13.27		14.28	0.002206	8.07	821.47	115.81	0.53
MAIN	854.41	2741.00	0.09	9.19	7.05	9.80	0.002320	6.28	436.35	90.55	0.50
MAIN	854.41	4092.00	0.09	10.63	8.23	11.42	0.002324	7.14	572.77	97.68	0.52
MAIN	854.41	4788.00	0.09	11.28	8.74	12.16	0.002322	7.52	636.92	100.34	0.53
MAIN	854.41	6628.00	0.09	12.77	9.93	13.84	0.002325	8.33	795.82	114.52	0.56

Willow Spring Bayou Tributary 1.78
B112-02-00


Willow Springs Bayou Trib 1.78 Plan: B112-02-00 Flood Hazard Plan (DEC)
MAIN
Legend
WS 0.2%
WS 1%
WS 2%
WS 10%
Ground
LOB
ROB
Elevation (ft)
30
28
26
24
22
20
18
16
14
12
10
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

HEC-RAS Plan: FH-B11 202 River: B112-02-00 Reach: MAIN

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	12371.38	428.00	17.81	24.20	20.58	24.26	0.000342	2.05	208.73	54.68	0.18
MAIN	12371.38	658.00	17.81	25.73	21.25	25.81	0.000325	2.16	304.62	71.39	0.18
MAIN	12371.38	778.00	17.81	26.59	21.55	26.65	0.000314	2.09	372.98	93.89	0.18
MAIN	12371.38	1138.00	17.81	27.79	22.33	27.87	0.000295	2.32	514.88	142.43	0.18
MAIN	12040.68	428.00	17.81	24.09	20.41	24.16	0.000310	1.99	215.13	54.74	0.18
MAIN	12040.68	658.00	17.81	25.63	21.05	25.71	0.000281	2.14	307.24	115.91	0.17
MAIN	12040.68	778.00	17.81	26.49	21.34	26.56	0.000247	2.13	365.19	159.29	0.17
MAIN	12040.68	1138.00	17.81	27.68	22.11	27.77	0.000295	2.51	454.69	1374.31	0.18
MAIN	10310.7	439.00	17.59	23.36		23.45	0.000597	2.39	183.97	58.95	0.24
MAIN	10310.7	674.00	17.59	25.07		25.15	0.000379	2.28	296.14	72.24	0.20
MAIN	10310.7	797.00	17.59	26.06		26.13	0.000255	2.10	494.65	495.21	0.17
MAIN	10310.7	1166.00	17.59	27.32		27.37	0.000155	1.91	1717.85	1895.90	0.14
MAIN	10270.69	439.00	16.43	23.35	18.40	23.42	0.000167	2.14	204.93	63.29	0.14
MAIN	10270.69	674.00	16.43	25.02	19.02	25.13	0.000190	2.64	255.00	72.82	0.16
MAIN	10270.69	797.00	16.43	26.07	19.32	26.10	0.000085	1.50	612.71	366.40	0.10
MAIN	10270.69	1166.00	16.43	27.32	20.13	27.36	0.000079	1.62	1772.96	1922.21	0.10
MAIN	10153.84	Culvert									
MAIN	10036.99	439.00	16.43	23.23	18.18	23.28	0.000133	1.91	230.08	62.60	0.13
MAIN	10036.99	674.00	16.43	24.68	18.76	24.77	0.000164	2.41	279.40	70.89	0.15
MAIN	10036.99	797.00	16.43	25.47	19.03	25.57	0.000169	2.60	306.15	75.38	0.15
MAIN	10036.99	1166.00	16.43	27.29	19.78	27.35	0.000109	1.89	647.53	861.22	0.12
MAIN	9876.995	464.00	17.59	23.11	20.91	23.23	0.000832	2.73	169.94	57.07	0.28
MAIN	9876.995	713.00	17.59	24.61	21.54	24.72	0.000581	2.70	263.95	68.69	0.24
MAIN	9876.995	843.00	17.59	25.43	21.80	25.53	0.000468	2.61	322.72	75.04	0.22
MAIN	9876.995	1232.00	17.59	27.20	22.47	27.31	0.000310	2.66	511.90	669.79	0.19
MAIN	8886.015	483.00	16.98	22.48	19.59	22.57	0.000485	2.34	206.24	58.17	0.22
MAIN	8886.015	742.00	16.98	24.05	20.22	24.14	0.000580	2.43	304.92	67.80	0.20
MAIN	8886.015	878.00	16.98	24.90	20.50	24.99	0.000655	2.41	364.65	73.02	0.19
MAIN	8886.015	1283.00	16.98	26.79	21.20	26.88	0.000682	2.42	615.78	1317.63	0.17
MAIN	8416.211	483.00	17.24	22.27	19.55	22.34	0.000464	2.22	217.85	64.92	0.21
MAIN	8416.211	742.00	17.24	23.84	20.13	23.92	0.000340	2.26	327.91	74.73	0.19
MAIN	8416.211	878.00	17.24	24.69	20.39	24.76	0.000285	2.23	393.18	79.99	0.18
MAIN	8416.211	1283.00	17.24	26.59	21.04	26.67	0.000203	2.28	694.98	1570.06	0.16
MAIN	8376.077	483.00	15.50	22.27	17.52	22.31	0.000151	1.57	307.73	64.96	0.13
MAIN	8376.077	742.00	15.50	23.85	18.13	23.90	0.000155	1.78	417.75	74.77	0.13
MAIN	8376.077	878.00	15.50	24.69	18.41	24.74	0.000147	1.82	482.98	80.02	0.13
MAIN	8376.077	1283.00	15.50	26.59	19.15	26.65	0.000129	1.99	694.14	1250.86	0.13
MAIN	8269.67	Culvert									
MAIN	8163.272	487.00	15.50	21.92	17.30	21.96	0.000169	1.63	298.66	62.78	0.13
MAIN	8163.272	749.00	15.50	23.02	17.88	23.09	0.000221	2.02	371.46	69.63	0.15
MAIN	8163.272	886.00	15.50	23.52	18.15	23.59	0.000242	2.18	406.72	72.71	0.16
MAIN	8163.272	1294.00	15.50	24.69	18.86	24.80	0.000301	2.61	496.55	80.04	0.18
MAIN	8000.722	513.00	17.24	21.78		21.90	0.000815	2.75	186.69	61.56	0.28
MAIN	8000.722	788.00	17.24	22.86		23.00	0.000764	3.07	256.69	68.07	0.28
MAIN	8000.722	932.00	17.24	23.35		23.51	0.000749	3.21	290.63	71.01	0.28
MAIN	8000.722	1363.00	17.24	24.50		24.70	0.000770	3.62	376.22	77.94	0.29
MAIN	7077.212	543.00	16.80	21.13	18.82	21.22	0.000623	2.52	215.77	66.20	0.25
MAIN	7077.212	835.00	16.80	22.24	19.35	22.37	0.000603	2.85	293.25	72.72	0.25
MAIN	7077.212	987.00	16.80	22.74	19.59	22.88	0.000599	2.99	330.17	75.63	0.25
MAIN	7077.212	1443.00	16.80	23.85	20.22	24.04	0.000654	3.45	417.84	82.12	0.27
MAIN	6054.307	577.00	15.88	20.45	18.08	20.56	0.000683	2.59	222.88	66.12	0.25
MAIN	6054.307	887.00	15.88	21.54	18.65	21.68	0.000753	2.98	297.35	71.06	0.26
MAIN	6054.307	1049.00	15.88	22.02	18.91	22.18	0.000794	3.16	332.29	79.01	0.26
MAIN	6054.307	1533.00	15.88	23.07	19.57	23.27	0.000870	3.66	474.72	186.12	0.28
MAIN	4966.483	605.00	15.54	19.65	17.55	19.77	0.000777	2.75	220.02	70.05	0.27
MAIN	4966.483	929.00	15.54	20.72	18.11	20.87	0.000734	3.12	297.73	78.20	0.28
MAIN	4966.483	1098.00	15.54	21.19	18.35	21.36	0.000715	3.29	344.04	184.67	0.28
MAIN	4966.483	1606.00	15.54	22.30	19.00	22.47	0.000588	3.43	762.50	433.24	0.26

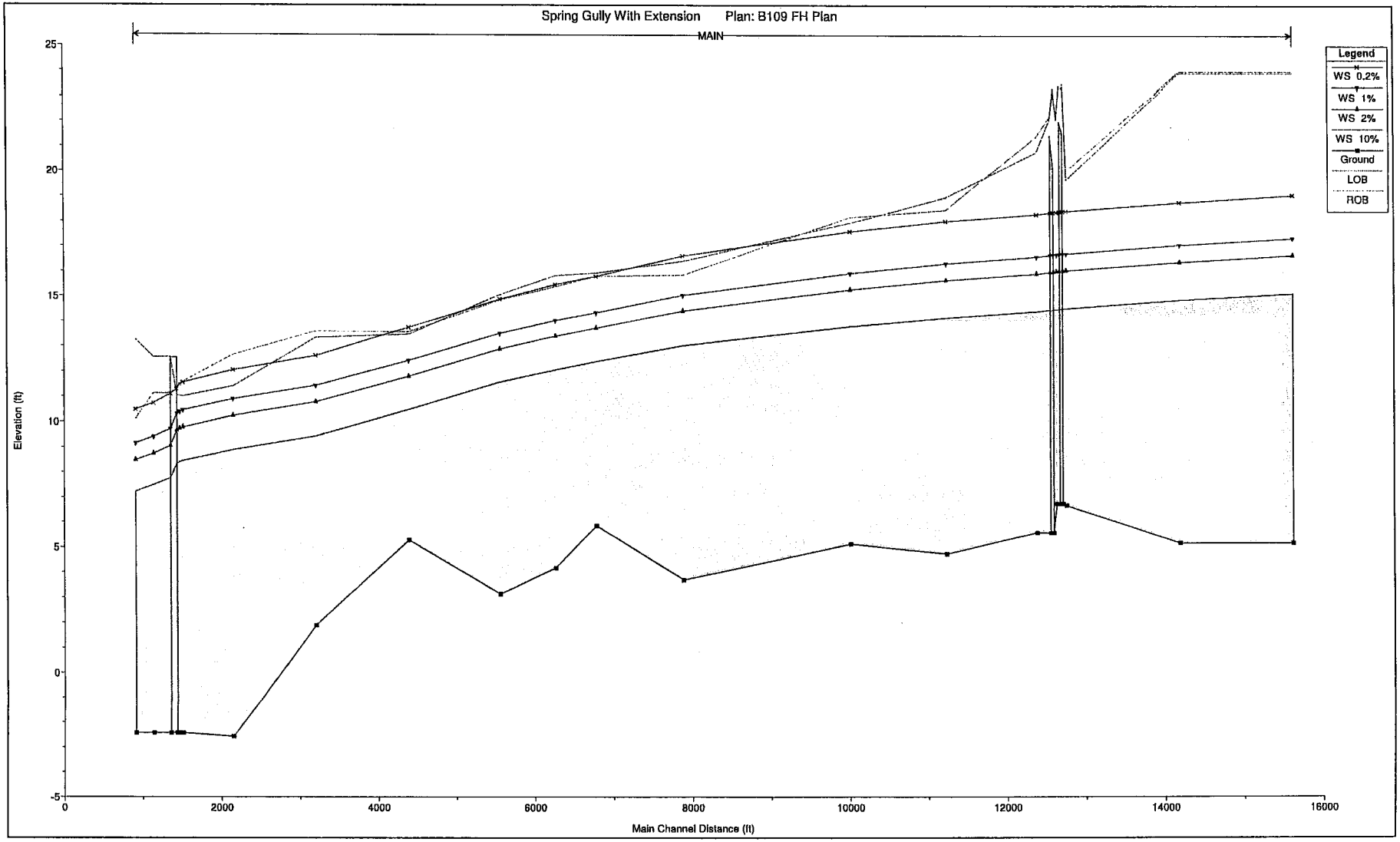
HEC-RAS Plan: FH-B11202 River: B112-02-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	4183.356	605.00	13.21	18.91		19.07	0.001035	3.21	188.35	58.55	0.32
MAIN	4183.356	929.00	13.21	19.99		20.19	0.001045	3.63	256.01	68.81	0.33
MAIN	4183.356	1098.00	13.21	20.47		20.69	0.001014	3.80	291.09	75.78	0.33
MAIN	4183.356	1606.00	13.21	21.69		21.93	0.000810	4.03	605.52	424.82	0.30
MAIN	4143.355	617.00	13.21	18.85	16.69	19.02	0.001132	3.34	184.91	58.11	0.33
MAIN	4143.355	947.00	13.21	19.92	17.41	20.14	0.001136	3.76	251.86	66.19	0.34
MAIN	4143.355	1121.00	13.21	20.40	17.73	20.65	0.001108	3.95	284.11	95.67	0.34
MAIN	4143.355	1638.00	13.21	21.64	18.53	21.89	0.000869	4.14	582.99	405.58	0.31
MAIN	4059.7	Bridge									
MAIN	3976.066	617.00	13.21	18.50	16.70	18.72	0.001550	3.73	165.21	55.51	0.38
MAIN	3976.066	947.00	13.21	19.50	17.41	19.78	0.001559	4.22	224.52	63.02	0.39
MAIN	3976.066	1121.00	13.21	19.94	17.73	20.25	0.001571	4.43	253.06	66.32	0.40
MAIN	3976.066	1638.00	13.21	21.01	18.53	21.40	0.001514	5.03	330.92	86.34	0.41
MAIN	3784.424	657.00	13.21	17.88	16.79	18.26	0.003277	4.97	132.23	50.85	0.54
MAIN	3784.424	1009.00	13.21	18.88		19.33	0.002938	5.40	186.93	58.37	0.53
MAIN	3784.424	1194.00	13.21	19.31		19.80	0.002870	5.61	212.88	61.62	0.53
MAIN	3784.424	1745.00	13.21	20.37		20.96	0.002755	6.19	281.77	68.26	0.54
MAIN	2653.601	81.00	12.97	15.96	14.46	16.00	0.000540	1.55	52.16	29.45	0.21
MAIN	2653.601	195.00	12.97	17.09	15.15	17.16	0.000704	2.18	89.53	37.00	0.25
MAIN	2653.601	259.00	12.97	17.55	15.44	17.64	0.000758	2.42	107.12	53.61	0.26
MAIN	2653.601	456.00	12.97	18.66	16.17	18.79	0.000828	2.93	155.72	430.58	0.28
MAIN	2601.681	86.00	12.97	15.93	14.49	15.97	0.000647	1.69	51.02	29.18	0.22
MAIN	2601.681	202.00	12.97	17.04	15.18	17.12	0.000792	2.30	87.66	36.34	0.26
MAIN	2601.681	268.00	12.97	17.49	15.48	17.59	0.000844	2.56	104.57	38.67	0.27
MAIN	2601.681	470.00	12.97	18.59	16.22	18.74	0.000923	3.13	150.54	47.82	0.30
MAIN	2541.7	Bridge									
MAIN	2481.7	86.00	12.97	15.84	14.49	15.89	0.000748	1.78	48.42	28.57	0.24
MAIN	2481.7	202.00	12.97	16.93	15.18	17.02	0.000909	2.42	83.62	35.87	0.28
MAIN	2481.7	268.00	12.97	17.37	15.48	17.48	0.000968	2.68	100.08	38.48	0.29
MAIN	2481.7	470.00	12.97	18.41	16.22	18.57	0.001105	3.28	143.13	44.61	0.32
MAIN	2321.654	93.00	12.97	15.66		15.73	0.001178	2.14	43.53	27.38	0.30
MAIN	2321.654	213.00	12.97	16.71		16.84	0.001312	2.80	76.15	34.54	0.33
MAIN	2321.654	281.00	12.97	17.14		17.29	0.001415	3.07	91.62	38.32	0.35
MAIN	2321.654	489.00	12.97	18.15		18.35	0.001572	3.62	135.15	47.75	0.38
MAIN	1966.901	93.00	12.14	15.28		15.34	0.000993	1.96	47.51	30.04	0.27
MAIN	1966.901	213.00	12.14	16.28		16.39	0.001196	2.59	82.17	39.19	0.32
MAIN	1966.901	281.00	12.14	16.67		16.80	0.001281	2.86	98.28	42.58	0.33
MAIN	1966.901	489.00	12.14	17.64		17.82	0.001397	3.41	143.42	50.91	0.36
MAIN	1926.803	103.00	12.14	15.21	14.08	15.29	0.001379	2.27	45.35	29.35	0.32
MAIN	1926.803	229.00	12.14	16.19	14.82	16.32	0.001553	2.91	78.71	38.42	0.36
MAIN	1926.803	300.00	12.14	16.58	15.13	16.74	0.001638	3.18	94.20	41.75	0.37
MAIN	1926.803	517.00	12.14	17.53	15.87	17.75	0.001738	3.75	137.86	49.96	0.40
MAIN	1827.1	Bridge									
MAIN	1727.347	103.00	12.14	14.16	14.08	14.58	0.012637	5.21	19.78	19.42	0.91
MAIN	1727.347	229.00	12.14	14.93	14.82	15.51	0.011290	6.10	37.53	26.71	0.91
MAIN	1727.347	300.00	12.14	15.27	15.13	15.90	0.010535	6.36	47.16	29.93	0.89
MAIN	1727.347	517.00	12.14	16.11	15.87	16.84	0.008732	6.83	75.72	37.51	0.85
MAIN	1566.873	103.00	11.72	13.31		13.37	0.000283	2.04	50.52	36.72	0.31
MAIN	1566.873	229.00	11.72	14.24		14.35	0.000271	2.63	86.99	41.52	0.32
MAIN	1566.873	300.00	11.72	14.65		14.78	0.000270	2.87	104.57	43.64	0.33
MAIN	1566.873	517.00	11.72	15.67		15.85	0.000273	3.41	151.56	48.87	0.34
MAIN	1405.496	120.00	11.72	13.21		13.31	0.000480	2.56	46.96	36.22	0.40
MAIN	1405.496	254.00	11.72	14.15		14.29	0.000381	3.05	83.21	41.05	0.38
MAIN	1405.496	329.00	11.72	14.56		14.73	0.000364	3.27	100.60	43.17	0.38
MAIN	1405.496	559.00	11.72	15.57		15.80	0.000349	3.81	146.83	48.37	0.39
MAIN	641.317	126.00	10.65	12.83		12.95	0.000449	2.84	44.40	27.51	0.39
MAIN	641.317	264.00	10.65	13.75		13.96	0.000498	3.65	72.30	32.97	0.43
MAIN	641.317	341.00	10.65	14.15		14.39	0.000513	3.97	85.95	35.34	0.45

HEC-RAS Plan: FH-B11202 River: B112-02-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	641.317	576.00	10.65	15.12		15.46	0.000544	4.68	123.01	41.08	0.48
MAIN	621.038	126.00	10.65	12.82	11.94	12.94	0.000459	2.86	44.08	27.44	0.40
MAIN	621.038	264.00	10.65	13.74	12.60	13.95	0.000506	3.67	71.86	32.89	0.44
MAIN	621.038	341.00	10.65	14.13	12.91	14.38	0.000521	3.99	85.45	35.26	0.45
MAIN	621.038	576.00	10.65	15.10	13.66	15.45	0.000552	4.71	122.38	40.99	0.48
MAIN	532.5	Bridge									
MAIN	444.025	126.00	10.65	12.65	11.93	12.80	0.000606	3.11	40.45	27.37	0.45
MAIN	444.025	264.00	10.65	13.53	12.59	13.77	0.000636	3.93	67.14	33.05	0.49
MAIN	444.025	341.00	10.65	13.92	12.89	14.20	0.000645	4.25	80.30	35.51	0.50
MAIN	444.025	576.00	10.65	14.85	13.63	15.23	0.000662	4.95	116.26	41.51	0.52
MAIN	364.024	126.00	10.65	12.60	11.92	12.75	0.000638	3.13	40.20	28.14	0.46
MAIN	364.024	264.00	10.65	13.49	12.56	13.72	0.000638	3.89	67.92	34.30	0.49
MAIN	364.024	341.00	10.65	13.87	12.85	14.14	0.000638	4.18	81.65	36.98	0.50
MAIN	364.024	576.00	10.65	14.81	13.58	15.17	0.000639	4.82	119.40	43.49	0.51

Spring Gully
B109-00-00


Spring Gully With Extension Plan: B109 FH Plan
MAIN
Legend
WS 0.2%
WS 1%
WS 2%
WS 10%
Ground
LOB
ROB
Elevation (ft)
25
20
15
10
5
0
-5
0
2000
4000
6000
8000
10000
12000
14000
16000
Main Channel Distance (ft)

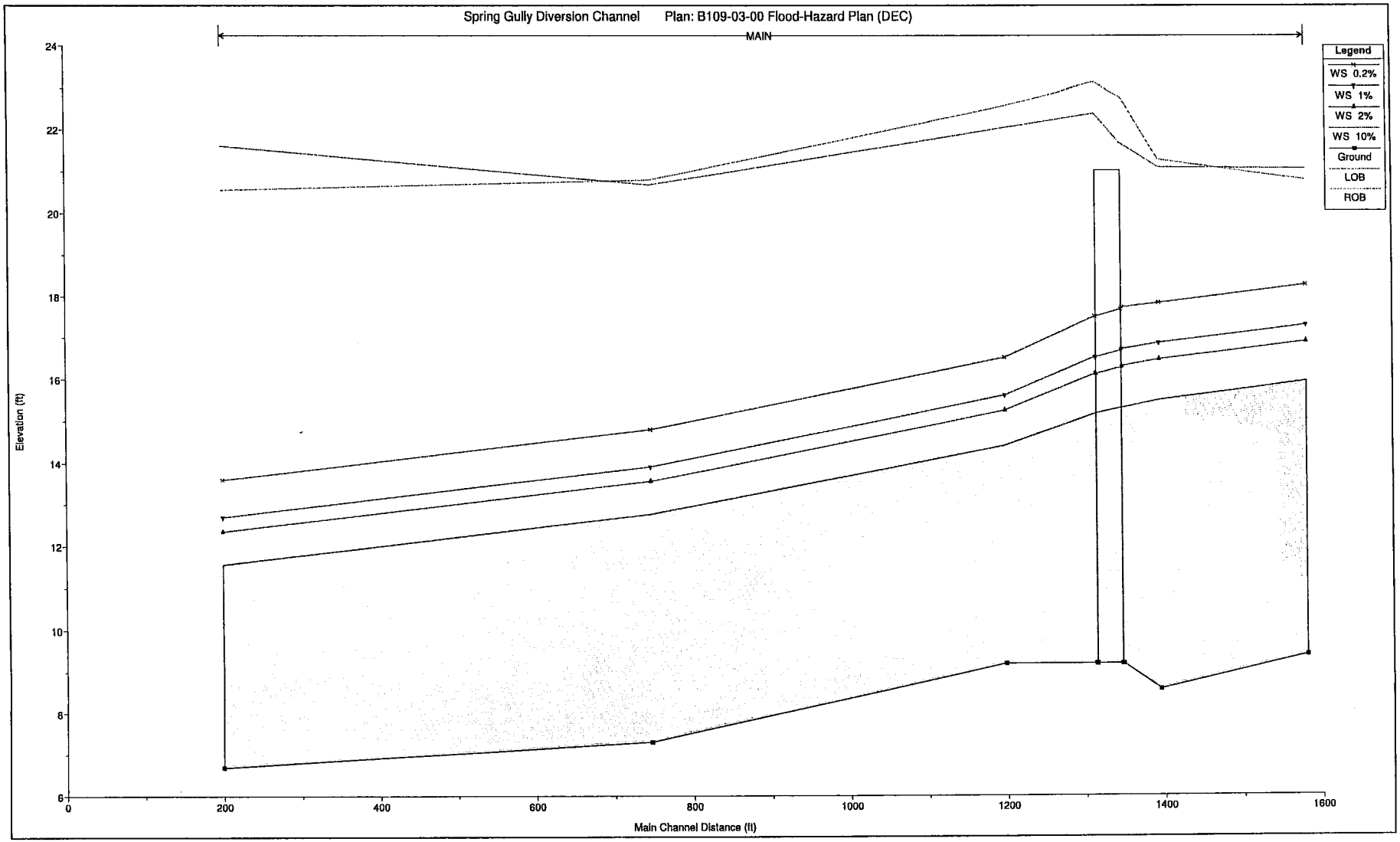
HEC-RAS Plan: B109 FH Plan River: B109-00-00 Reach: MAIN

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	15361.83	748.00	5.15	15.13		15.18	0.000165	1.82	411.14	74.22	0.14
MAIN	15361.83	1082.00	5.15	16.66		16.73	0.000172	2.03	532.09	84.01	0.14
MAIN	15361.83	1253.00	5.15	17.34		17.41	0.000175	2.12	590.49	88.48	0.14
MAIN	15361.83	1757.00	5.15	19.06		19.14	0.000181	2.34	752.09	99.81	0.15
MAIN	14185.83	748.00	5.15	14.88		14.93	0.000187	1.91	392.33	72.59	0.14
MAIN	14185.83	1082.00	5.15	16.39		16.46	0.000193	2.12	509.89	82.25	0.15
MAIN	14185.83	1253.00	5.15	17.07		17.14	0.000195	2.21	566.76	86.69	0.15
MAIN	14185.83	1757.00	5.15	18.78		18.87	0.000199	2.43	724.53	97.97	0.16
MAIN	12753.51	762.00	6.67	14.53		14.61	0.000282	2.19	347.69	71.74	0.18
MAIN	12753.51	1104.00	6.67	16.05		16.14	0.000272	2.38	464.77	82.46	0.18
MAIN	12753.51	1278.00	6.67	16.73		16.82	0.000267	2.45	521.97	87.22	0.18
MAIN	12753.51	1794.00	6.67	18.44		18.54	0.000257	2.63	681.51	99.29	0.18
MAIN	12708.5	762.00	6.73	14.53	9.93	14.59	0.000251	2.04	373.01	78.77	0.17
MAIN	12708.5	1104.00	6.73	16.04	10.59	16.12	0.000237	2.20	501.45	90.42	0.16
MAIN	12708.5	1278.00	6.73	16.72	10.89	16.80	0.000231	2.27	564.16	95.59	0.16
MAIN	12708.5	1794.00	6.73	18.43	11.65	18.52	0.000220	2.43	738.81	108.71	0.16
MAIN	12686.5	Bridge									
MAIN	12664.99	762.00	6.73	14.50	9.93	14.57	0.000254	2.05	371.13	78.58	0.17
MAIN	12664.99	1104.00	6.73	16.02	10.59	16.10	0.000239	2.21	499.25	90.23	0.17
MAIN	12664.99	1278.00	6.73	16.69	10.89	16.77	0.000233	2.27	561.82	95.40	0.17
MAIN	12664.99	1794.00	6.73	18.40	11.65	18.50	0.000222	2.44	736.17	108.52	0.16
MAIN	12630.5	762.00	6.73	14.49		14.56	0.000256	2.06	370.51	78.52	0.17
MAIN	12630.5	1104.00	6.73	16.01		16.09	0.000240	2.21	498.52	90.17	0.17
MAIN	12630.5	1278.00	6.73	16.69		16.77	0.000234	2.28	561.05	95.34	0.17
MAIN	12630.5	1794.00	6.73	18.40		18.49	0.000223	2.44	735.26	108.46	0.17
MAIN	12589.5	762.00	5.57	14.49	9.72	14.55	0.000231	2.02	377.00	75.30	0.16
MAIN	12589.5	1104.00	5.57	16.00	10.35	16.08	0.000225	2.21	498.84	85.27	0.16
MAIN	12589.5	1278.00	5.57	16.68	10.65	16.76	0.000223	2.29	557.82	89.71	0.16
MAIN	12589.5	1794.00	5.57	18.39	11.41	18.48	0.000219	2.49	720.78	100.95	0.16
MAIN	12570.5	Bridge									
MAIN	12548.47	762.00	5.57	14.47	9.71	14.54	0.000233	2.03	375.94	75.20	0.16
MAIN	12548.47	1104.00	5.57	15.99	10.36	16.07	0.000227	2.22	497.66	85.18	0.16
MAIN	12548.47	1278.00	5.57	16.66	10.64	16.74	0.000224	2.30	556.51	89.61	0.16
MAIN	12548.47	1794.00	5.57	18.37	11.41	18.46	0.000221	2.50	718.87	100.82	0.16
MAIN	12378.41	806.00	5.57	14.42		14.49	0.000268	2.17	371.86	74.85	0.17
MAIN	12378.41	1172.00	5.57	15.93		16.02	0.000263	2.38	492.87	84.81	0.17
MAIN	12378.41	1359.00	5.57	16.61		16.70	0.000260	2.46	551.39	89.23	0.17
MAIN	12378.41	1914.00	5.57	18.31		18.42	0.000257	2.69	712.81	100.43	0.18
MAIN	11226.29	855.00	4.73	14.15	8.63	14.22	0.000202	2.01	424.39	76.96	0.15
MAIN	11226.29	1249.00	4.73	15.66	9.37	15.74	0.000218	2.28	548.37	87.44	0.16
MAIN	11226.29	1451.00	4.73	16.33	9.70	16.42	0.000223	2.38	608.54	92.10	0.16
MAIN	11226.29	2049.00	4.73	18.03	10.58	18.14	0.000233	2.64	775.41	164.95	0.17
MAIN	10008.53	948.00	5.12	13.81	8.98	13.91	0.000336	2.52	376.34	70.89	0.19
MAIN	10008.53	1395.00	5.12	15.28	9.78	15.41	0.000364	2.86	487.96	80.80	0.21
MAIN	10008.53	1625.00	5.12	15.94	10.15	16.08	0.000372	3.00	542.54	85.23	0.21
MAIN	10008.53	2308.00	5.12	17.60	11.10	17.77	0.000390	3.33	695.84	1456.65	0.22
MAIN	7885.309	989.00	3.69	13.03	8.36	13.14	0.000383	2.67	370.43	70.77	0.21
MAIN	7885.309	1459.00	3.69	14.42	9.20	14.56	0.000433	3.07	474.97	80.73	0.22
MAIN	7885.309	1701.00	3.69	15.05	9.58	15.21	0.000449	3.23	527.38	85.55	0.23
MAIN	7885.309	2420.00	3.69	16.62	10.58	16.81	0.000540	3.52	768.86	1175.66	0.25
MAIN	6782.414	1009.00	5.85	12.39		12.57	0.000794	3.39	297.72	69.83	0.29
MAIN	6782.414	1490.00	5.85	13.72		13.94	0.000771	3.76	395.78	77.24	0.29
MAIN	6782.414	1739.00	5.85	14.34		14.58	0.000757	3.91	444.58	80.67	0.29
MAIN	6782.414	2475.00	5.85	15.80	11.39	16.09	0.000773	4.36	567.92	88.76	0.30
MAIN	6265.668	1037.00	4.17	12.07		12.21	0.000550	3.00	345.26	73.07	0.24
MAIN	6265.668	1534.00	4.17	13.40		13.59	0.000571	3.43	446.78	79.23	0.25
MAIN	6265.668	1791.00	4.17	14.02		14.23	0.000575	3.61	496.78	82.09	0.26
MAIN	6265.668	2552.00	4.17	15.46		15.72	0.000618	4.11	642.91	166.74	0.27

HEC-RAS Plan: B109 EH Plan River: B109-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	5555.517	1085.00	3.12	11.59	8.35	11.76	0.000721	3.38	321.13	89.55	0.28
MAIN	5555.517	1609.00	3.12	12.89		13.12	0.000755	3.87	415.42	75.48	0.29
MAIN	5555.517	1880.00	3.12	13.50		13.76	0.000758	4.07	462.45	78.27	0.29
MAIN	5555.517	2683.00	3.12	14.87		15.21	0.000835	4.67	575.65	134.26	0.32
MAIN	4390.373	1136.00	5.27	10.48		10.71	0.001184	3.87	293.87	75.97	0.35
MAIN	4390.373	1689.00	5.27	11.80		12.08	0.001091	4.24	398.45	84.09	0.34
MAIN	4390.373	1976.00	5.27	12.43		12.72	0.001052	4.36	453.23	89.21	0.34
MAIN	4390.373	2825.00	5.27	13.74		14.11	0.001084	4.88	598.16	160.65	0.35
MAIN	3202.213	1183.00	1.89	9.42		9.59	0.000673	3.32	356.46	75.98	0.27
MAIN	3202.213	1763.00	1.89	10.78		11.01	0.000685	3.81	463.28	80.95	0.28
MAIN	3202.213	2064.00	1.89	11.44		11.68	0.000680	3.99	517.04	83.34	0.28
MAIN	3202.213	2956.00	1.89	12.61		12.97	0.000829	4.78	617.78	87.65	0.32
MAIN	2149.827	1214.00	-2.58	8.88	4.40	8.99	0.000434	2.58	470.71	127.04	0.21
MAIN	2149.827	1813.00	-2.58	10.23	5.23	10.36	0.000491	2.90	625.64	270.20	0.23
MAIN	2149.827	2124.00	-2.58	10.90	5.61	11.03	0.000490	2.97	715.30	341.06	0.23
MAIN	2149.827	3043.00	-2.58	12.05	6.56	12.20	0.000519	3.20	1368.49	476.88	0.24
MAIN	1512.023	1240.00	-2.44	8.46		8.58	0.001146	2.87	432.17	112.91	0.26
MAIN	1512.023	1855.00	-2.44	9.77		9.92	0.001136	3.08	602.65	141.44	0.26
MAIN	1512.023	2174.00	-2.44	10.44		10.59	0.001201	3.07	708.13	174.86	0.27
MAIN	1512.023	3118.00	-2.44	11.55		11.73	0.001226	3.39	933.65	250.04	0.28
MAIN	1471.984	1240.00	-2.44	8.41	4.01	8.54	0.001177	2.91	426.46	111.33	0.26
MAIN	1471.984	1855.00	-2.44	9.72	5.19	9.87	0.001125	3.12	594.08	136.34	0.26
MAIN	1471.984	2174.00	-2.44	10.39	5.66	10.54	0.000970	3.18	684.54	188.80	0.25
MAIN	1471.984	3118.00	-2.44	11.49	6.78	11.67	0.001464	3.46	912.93	516.32	0.30
MAIN	1305.022	Bridge									
MAIN	1138.06	1240.00	-2.44	7.47	3.90	7.63	0.001180	3.14	395.41	92.05	0.27
MAIN	1138.06	1855.00	-2.44	8.74	4.80	8.93	0.001272	3.56	520.52	106.06	0.28
MAIN	1138.06	2174.00	-2.44	9.40	5.19	9.61	0.001271	3.66	594.50	116.73	0.29
MAIN	1138.06	3118.00	-2.44	10.73	6.19	10.99	0.001302	4.10	760.70	146.02	0.30
MAIN	911.819	1240.00	-2.44	7.21	4.07	7.35	0.001201	2.94	422.22	110.59	0.26
MAIN	911.819	1855.00	-2.44	8.48	4.85	8.64	0.001201	3.23	573.82	130.55	0.27
MAIN	911.819	2174.00	-2.44	9.14	5.20	9.30	0.001201	3.26	666.75	150.22	0.27
MAIN	911.819	3118.00	-2.44	10.47	6.08	10.66	0.001202	3.51	889.49	190.63	0.28

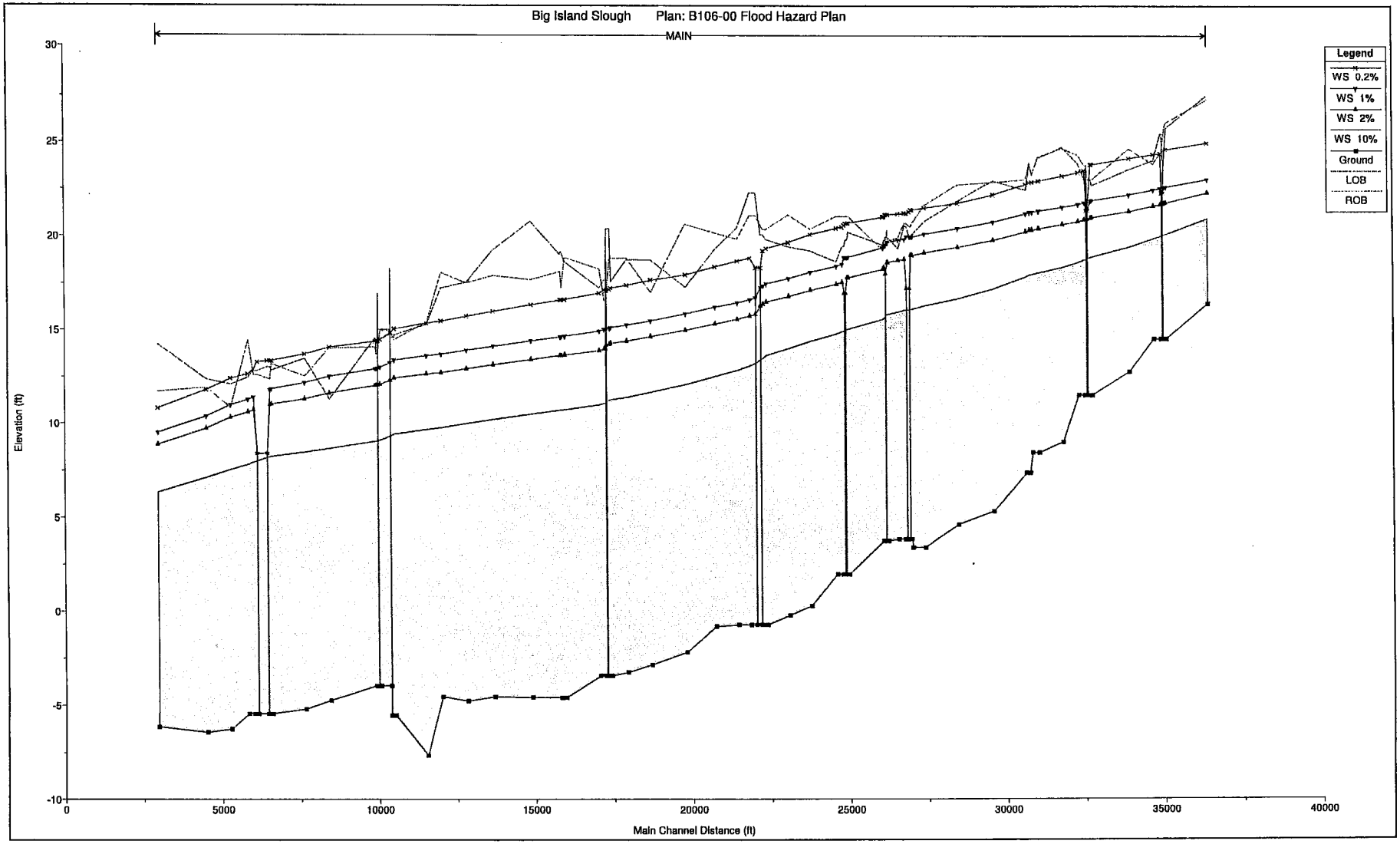
Spring Gully Diversion
B109-03-00


Spring Gully Diversion Channel Plan: B109-03-00 Flood-Hazard Plan (DEC)
MAIN
Legend
WS 0.2%
WS 1%
WS 2%
WS 10%
Ground
LOB
ROB
Elevation (ft)
24
22
20
18
16
14
12
10
8
6
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)

HEC-RAS Plan: FH-B10903 River: B109-03-00 Reach: MAIN

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	1580.151	576.00	9.38	15.95		16.25	0.002321	4.35	132.26	39.63	0.42
MAIN	1580.151	815.00	9.38	16.90		17.25	0.002301	4.71	172.99	45.94	0.43
MAIN	1580.151	935.00	9.38	17.30		17.67	0.002319	4.87	191.83	48.79	0.43
MAIN	1580.151	1289.00	9.38	18.28		18.71	0.002391	5.31	242.75	55.75	0.45
MAIN	1393.763	576.00	8.56	15.49		15.79	0.002520	4.40	130.89	40.51	0.43
MAIN	1393.763	815.00	8.56	16.47		16.81	0.002415	4.69	173.76	47.68	0.43
MAIN	1393.763	935.00	8.56	16.87		17.23	0.002395	4.83	193.39	50.50	0.44
MAIN	1393.763	1289.00	8.56	17.83		18.26	0.002417	5.25	245.60	57.35	0.45
MAIN	1346.762	576.00	9.18	15.32	13.32	15.66	0.002820	4.68	123.01	38.00	0.46
MAIN	1346.762	815.00	9.18	16.31	14.15	16.68	0.002942	4.88	166.91	50.80	0.47
MAIN	1346.762	935.00	9.18	16.72	14.50	17.10	0.002901	4.94	189.12	56.18	0.47
MAIN	1346.762	1289.00	9.18	17.72	15.40	18.13	0.002765	5.12	251.96	69.16	0.47
MAIN	1329.763	Bridge									
MAIN	1312.762	576.00	9.18	15.18	13.33	15.55	0.003085	4.88	117.93	36.49	0.48
MAIN	1312.762	815.00	9.18	16.13	14.15	16.54	0.003330	5.16	157.97	48.47	0.50
MAIN	1312.762	935.00	9.18	16.53	14.50	16.95	0.003325	5.24	178.36	53.64	0.51
MAIN	1312.762	1289.00	9.18	17.51	15.40	17.97	0.003193	5.43	237.58	66.41	0.51
MAIN	1197.818	576.00	9.18	14.42		15.02	0.005649	6.24	92.33	30.91	0.64
MAIN	1197.818	815.00	9.18	15.25		15.96	0.005816	6.76	120.59	36.89	0.66
MAIN	1197.818	935.00	9.18	15.61		16.37	0.005864	6.95	134.44	39.78	0.67
MAIN	1197.818	1289.00	9.18	16.52		17.37	0.005880	7.42	173.65	47.02	0.68
MAIN	746.316	576.00	7.30	12.76		13.07	0.002615	4.47	128.83	41.85	0.45
MAIN	746.316	815.00	7.30	13.56		13.94	0.002715	4.97	164.13	46.80	0.47
MAIN	746.316	935.00	7.30	13.91		14.32	0.002747	5.17	180.88	48.98	0.47
MAIN	746.316	1289.00	7.30	14.81		15.30	0.002815	5.67	227.40	54.57	0.49
MAIN	199.25	576.00	6.69	11.55	9.90	11.78	0.002001	3.83	150.20	51.20	0.39
MAIN	199.25	815.00	6.69	12.34	10.42	12.62	0.002002	4.23	192.55	56.52	0.40
MAIN	199.25	935.00	6.69	12.69	10.65	12.99	0.002000	4.40	212.65	58.87	0.41
MAIN	199.25	1289.00	6.69	13.59	11.28	13.95	0.002001	4.80	268.29	64.94	0.42

Big Island Slough
B106-00-00


Big Island Slough Plan: B106-00 Flood Hazard Plan
MAIN
Legend
WS 0.2%
WS 1%
WS 2%
WS 10%
Ground
LOB
ROB
Elevation (ft)
30
25
20
15
10
5
0
-5
-10
0
5000
10000
15000
20000
25000
30000
35000
40000
Main Channel Distance (ft)

HEC-RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	36378.55	498.00	16.36	20.89		21.01	0.000864	2.75	180.97	62.32	0.28
MAIN	36378.55	733.00	16.36	22.25		22.37	0.000572	2.70	271.50	70.25	0.24
MAIN	36378.55	854.00	16.36	22.99		23.10	0.000463	2.63	324.87	74.52	0.22
MAIN	36378.55	1207.00	16.36	24.92		25.02	0.000306	2.52	479.50	85.72	0.19
MAIN	35071.34	508.00	14.49	20.07		20.14	0.000448	2.17	233.81	70.08	0.21
MAIN	35071.34	747.00	14.49	21.73		21.79	0.000288	2.07	361.33	83.51	0.18
MAIN	35071.34	871.00	14.49	22.57		22.63	0.000235	2.01	434.37	90.30	0.16
MAIN	35071.34	1230.00	14.49	24.58		24.64	0.000260	1.89	651.18	160.31	0.17
MAIN	35019.49	508.00	14.49	20.03	17.23	20.11	0.000460	2.19	231.50	69.81	0.21
MAIN	35019.49	747.00	14.49	21.70	17.77	21.77	0.000292	2.08	359.35	83.32	0.18
MAIN	35019.49	871.00	14.49	22.55	18.01	22.61	0.000238	2.01	432.52	90.14	0.16
MAIN	35019.49	1230.00	14.49	24.57	18.60	24.63	0.000183	1.93	682.65	247.89	0.15
MAIN	34959.15	Bridge									
MAIN	34898.81	508.00	14.49	19.96	17.23	20.03	0.000494	2.24	226.57	69.81	0.22
MAIN	34898.81	747.00	14.49	21.64	17.77	21.71	0.000304	2.10	356.56	84.17	0.18
MAIN	34898.81	871.00	14.49	22.49	18.01	22.55	0.000246	2.02	430.59	91.35	0.16
MAIN	34898.81	1230.00	14.49	24.38	18.60	24.44	0.000277	1.95	631.31	1226.86	0.17
MAIN	34675.54	527.00	14.49	19.82	17.28	19.91	0.000600	2.43	216.73	68.33	0.24
MAIN	34675.54	774.00	14.49	21.56	17.82	21.64	0.000344	2.22	348.52	82.78	0.19
MAIN	34675.54	903.00	14.49	22.42	18.07	22.49	0.000275	2.14	422.68	89.89	0.17
MAIN	34675.54	1275.00	14.49	24.32	18.67	24.39	0.000183	2.04	769.92	542.58	0.15
MAIN	33904.71	697.00	12.75	19.37	16.27	19.48	0.000519	2.58	269.78	69.28	0.23
MAIN	33904.71	1024.00	12.75	21.28	16.91	21.37	0.000337	2.48	413.46	81.53	0.19
MAIN	33904.71	1194.00	12.75	22.17	17.19	22.26	0.000320	2.44	489.84	95.16	0.19
MAIN	33904.71	1687.00	12.75	24.13	17.89	24.20	0.000376	2.14	896.87	724.25	0.20
MAIN	32723.5	703.00	11.49	18.88	15.08	18.96	0.000353	2.31	303.81	68.41	0.19
MAIN	32723.5	1033.00	11.49	20.95	15.76	21.03	0.000241	2.26	457.81	80.15	0.17
MAIN	32723.5	1205.00	11.49	21.87	16.05	21.94	0.000215	2.26	533.64	85.34	0.16
MAIN	32723.5	1702.00	11.49	23.80	16.76	23.87	0.000182	2.13	1340.49	1693.26	0.15
MAIN	32685.24	754.00	11.49	18.84	15.19	18.94	0.000414	2.50	301.57	68.22	0.21
MAIN	32685.24	1109.00	11.49	20.92	15.89	21.01	0.000282	2.44	455.32	79.97	0.18
MAIN	32685.24	1293.00	11.49	21.84	16.18	21.93	0.000250	2.43	531.47	85.19	0.17
MAIN	32685.24	1827.00	11.49	23.79	16.93	23.85	0.000253	2.19	1332.14	1683.50	0.17
MAIN	32585.4	Bridge									
MAIN	32485.56	807.00	11.49	18.72	15.31	18.84	0.000514	2.75	293.22	67.52	0.23
MAIN	32485.56	1187.00	11.49	20.84	16.02	20.95	0.000336	2.64	449.18	79.53	0.20
MAIN	32485.56	1385.00	11.49	21.74	16.32	21.85	0.000299	2.65	523.27	84.65	0.19
MAIN	32485.56	1956.00	11.49	23.47	17.09	23.59	0.000300	2.80	930.20	808.21	0.19
MAIN	32292.9	871.00	11.49	18.57	15.44	18.72	0.000661	3.08	283.19	66.68	0.26
MAIN	32292.9	1278.00	11.49	20.74	16.16	20.87	0.000409	2.90	441.30	78.97	0.22
MAIN	32292.9	1490.00	11.49	21.65	16.47	21.78	0.000361	2.89	515.66	84.13	0.21
MAIN	32292.9	2100.00	11.49	23.37	17.27	23.52	0.000391	3.12	672.93	302.02	0.22
MAIN	31793.46	974.00	9.02	18.33	13.97	18.44	0.000402	2.69	362.05	70.90	0.21
MAIN	31793.46	1425.00	9.02	20.58	14.80	20.69	0.000287	2.66	534.99	82.13	0.18
MAIN	31793.46	1661.00	9.02	21.51	15.17	21.62	0.000265	2.71	612.98	86.29	0.18
MAIN	31793.46	2336.00	9.02	23.19	16.06	23.33	0.000342	3.03	770.64	240.56	0.20
MAIN	31048.03	1007.00	8.46	18.04	13.32	18.15	0.000378	2.68	375.78	70.31	0.20
MAIN	31048.03	1472.00	8.46	20.37	14.18	20.48	0.000276	2.66	554.06	82.50	0.18
MAIN	31048.03	1716.00	8.46	21.31	14.56	21.43	0.000259	2.71	633.93	87.41	0.18
MAIN	31048.03	2411.00	8.46	22.93	15.53	23.08	0.000346	3.06	787.49	979.04	0.20
MAIN	31028.02	1007.00	8.46	18.03	13.32	18.14	0.000380	2.68	375.22	70.27	0.20
MAIN	31028.02	1472.00	8.46	20.37	14.18	20.48	0.000276	2.66	553.58	82.47	0.18
MAIN	31028.02	1716.00	8.46	21.31	14.57	21.42	0.000259	2.71	633.46	87.38	0.18
MAIN	31028.02	2411.00	8.46	22.92	15.53	23.07	0.000312	3.07	784.87	1008.75	0.20
MAIN	30827.98	1038.00	8.46	17.94	13.38	18.06	0.000424	2.81	368.74	69.79	0.22
MAIN	30827.98	1516.00	8.46	20.30	14.25	20.42	0.000301	2.77	548.02	82.11	0.19
MAIN	30827.98	1767.00	8.46	21.24	14.65	21.37	0.000282	2.81	627.88	87.04	0.18
MAIN	30827.98	2481.00	8.46	22.85	15.62	23.00	0.000355	3.16	784.83	767.70	0.21

HEC-RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	30747.98	1038.00	7.38	17.92	12.65	18.03	0.000342	2.59	400.15	72.56	0.19
MAIN	30747.98	1516.00	7.38	20.29	13.62	20.39	0.000255	2.58	588.36	86.48	0.17
MAIN	30747.98	1767.00	7.38	21.23	14.05	21.34	0.000241	2.63	672.77	92.04	0.17
MAIN	30747.98	2481.00	7.38	22.83	15.09	22.97	0.000360	2.93	847.66	790.66	0.21
MAIN	30627.31	1213.00	7.38	17.82		17.97	0.000491	3.09	393.10	71.98	0.23
MAIN	30627.31	1765.00	7.38	20.21		20.35	0.000358	3.04	581.37	85.99	0.21
MAIN	30627.31	2057.00	7.38	21.15		21.30	0.000337	3.09	665.44	91.56	0.20
MAIN	30627.31	2877.00	7.38	22.73		22.91	0.000427	3.44	887.70	218.01	0.23
MAIN	29590.01	1438.00	5.35	17.17	12.57	17.38	0.000675	3.62	397.24	72.17	0.27
MAIN	29590.01	2083.00	5.35	19.74	13.66	19.93	0.000466	3.43	606.49	90.64	0.23
MAIN	29590.01	2426.00	5.35	20.72	14.16	20.90	0.000436	3.47	698.14	123.81	0.23
MAIN	29590.01	3380.00	5.35	22.17	15.33	22.41	0.000541	3.98	849.36	581.10	0.26
MAIN	28463.24	1688.00	4.63	16.65	10.57	16.78	0.000341	2.89	583.14	90.56	0.20
MAIN	28463.24	2435.00	4.63	19.38	11.62	19.50	0.000257	2.84	857.47	110.81	0.18
MAIN	28463.24	2835.00	4.63	20.37	12.09	20.50	0.000251	2.92	971.04	211.87	0.18
MAIN	28463.24	3934.00	4.63	21.72	13.22	21.91	0.000318	3.46	1138.02	3397.87	0.20
MAIN	27399.88	1791.00	3.41	16.27	9.81	16.41	0.000364	2.97	603.21	94.36	0.21
MAIN	27399.88	2580.00	3.41	19.10	10.93	19.22	0.000269	2.84	908.30	551.69	0.18
MAIN	27399.88	3003.00	3.41	20.09	11.45	20.22	0.000274	2.90	1039.22	1191.60	0.19
MAIN	27399.88	4163.00	3.41	21.48	12.69	21.58	0.000259	2.76	4882.93	4143.01	0.18
MAIN	27004.57	1858.00	3.41	16.09	9.91	16.26	0.000391	3.23	575.06	83.03	0.22
MAIN	27004.57	2673.00	3.41	18.95	11.04	19.11	0.000296	3.20	834.96	173.19	0.19
MAIN	27004.57	3112.00	3.41	19.93	11.57	20.10	0.000301	3.33	934.99	1263.55	0.20
MAIN	27004.57	4309.00	3.41	21.36	12.82	21.48	0.000238	3.06	5243.11	3750.80	0.18
MAIN	26964.57	1858.00	3.85	16.08	9.85	16.22	0.000408	2.97	624.79	107.18	0.22
MAIN	26964.57	2673.00	3.85	18.96	10.97	19.08	0.000270	2.72	982.66	144.61	0.18
MAIN	26964.57	3112.00	3.85	19.95	11.49	20.06	0.000250	2.72	1303.78	988.69	0.18
MAIN	26964.57	4309.00	3.85	21.37	12.83	21.46	0.000188	2.62	4985.20	4060.14	0.16
MAIN	26863.5	Bridge									
MAIN	26762.42	1953.00	3.85	16.05	10.00	16.20	0.000458	3.15	620.57	106.71	0.23
MAIN	26762.42	2813.00	3.85	18.74	11.14	18.88	0.000324	2.95	952.47	189.55	0.20
MAIN	26762.42	3264.00	3.85	19.80	11.67	19.94	0.000322	2.94	1110.81	1054.36	0.20
MAIN	26762.42	4497.00	3.85	21.19	13.02	21.29	0.000318	2.75	4873.64	3839.86	0.20
MAIN	26562.23	1953.00	3.85	15.94	9.99	16.10	0.000480	3.21	609.24	105.42	0.23
MAIN	26562.23	2813.00	3.85	18.69	11.15	18.81	0.000308	2.88	1525.58	1019.26	0.19
MAIN	26562.23	3264.00	3.85	19.76	11.66	19.86	0.000249	2.67	2921.09	2433.82	0.18
MAIN	26562.23	4497.00	3.85	21.15	13.03	21.21	0.000160	2.40	7840.02	3597.20	0.15
MAIN	26226.91	1953.00	3.75	15.82	9.54	15.95	0.000334	2.94	664.97	99.71	0.20
MAIN	26226.91	2813.00	3.75	18.58	10.63	18.71	0.000281	2.89	974.07	1549.22	0.19
MAIN	26226.91	3264.00	3.75	19.64	11.13	19.77	0.000338	2.89	1136.24	2560.13	0.20
MAIN	26226.91	4497.00	3.75	21.11	12.30	21.16	0.000151	2.04	8862.65	3824.18	0.14
MAIN	26216.9	1979.00	3.75	15.81	9.58	15.95	0.000344	2.98	664.12	99.64	0.20
MAIN	26216.9	2850.00	3.75	18.57	10.67	18.70	0.000287	2.93	972.92	1756.53	0.19
MAIN	26216.9	3304.00	3.75	19.63	11.17	19.76	0.000339	2.93	1127.32	2590.96	0.20
MAIN	26216.9	4547.00	3.75	21.11	12.34	21.15	0.000161	1.85	9382.85	3844.67	0.14
MAIN	26166.84	Bridge									
MAIN	26116.78	1979.00	3.75	15.63	9.98	15.84	0.000594	3.69	535.98	86.69	0.26
MAIN	26116.78	2850.00	3.75	18.29	11.39	18.49	0.000475	3.58	795.55	953.96	0.24
MAIN	26116.78	3304.00	3.75	19.42	11.98	19.59	0.000390	3.39	1599.36	2129.79	0.22
MAIN	26116.78	4547.00	3.75	21.01	13.31	21.09	0.000196	2.71	7755.32	3383.47	0.16
MAIN	26075.36	2190.00	3.75	15.56	10.09	15.80	0.000646	3.96	552.86	86.04	0.28
MAIN	26075.36	3158.00	3.75	18.22	11.33	18.46	0.000548	3.88	813.43	625.05	0.26
MAIN	26075.36	3638.00	3.75	19.35	11.87	19.56	0.000624	3.70	1291.60	1813.62	0.27
MAIN	26075.36	4955.00	3.75	20.98	13.16	21.07	0.000279	2.89	6820.32	3245.81	0.19
MAIN	24973.02	2267.00	2.00	15.02	8.62	15.20	0.000411	3.35	677.28	96.45	0.22
MAIN	24973.02	3270.00	2.00	17.78	9.84	17.96	0.000330	3.37	970.16	468.66	0.21
MAIN	24973.02	3759.00	2.00	18.86	10.35	19.04	0.000318	3.42	1099.39	1276.69	0.20
MAIN	24973.02	5103.00	2.00	20.65	11.58	20.78	0.000252	3.11	5509.91	3562.58	0.18

HEC-RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	24933.01	2267.00	2.00	15.00	8.63	15.17	0.000415	3.36	674.78	96.26	0.22
MAIN	24933.01	3270.00	2.00	17.77	9.84	17.93	0.000337	3.37	969.16	390.85	0.21
MAIN	24933.01	3759.00	2.00	18.84	10.34	19.02	0.000363	3.40	1104.12	1407.71	0.21
MAIN	24933.01	5103.00	2.00	20.65	11.57	20.76	0.000257	3.03	5518.96	3388.45	0.18
MAIN	24855.82	Bridge									
MAIN	24778.62	2267.00	2.00	14.90	8.63	15.08	0.000431	3.41	664.95	95.52	0.23
MAIN	24778.62	3270.00	2.00	17.53	9.84	17.72	0.000362	3.47	941.53	333.63	0.21
MAIN	24778.62	3759.00	2.00	18.49	10.34	18.68	0.000362	3.56	1056.52	683.07	0.22
MAIN	24778.62	5103.00	2.00	20.45	11.57	20.59	0.000294	3.22	4774.40	2875.66	0.20
MAIN	24597.37	2448.00	2.00	14.76	8.87	14.98	0.000535	3.73	655.65	96.85	0.25
MAIN	24597.37	3533.00	2.00	17.42	10.12	17.63	0.000449	3.76	940.88	333.66	0.24
MAIN	24597.37	4042.00	2.00	18.38	10.62	18.60	0.000469	3.79	1066.88	866.42	0.24
MAIN	24597.37	5445.00	2.00	20.39	11.86	20.53	0.000297	3.31	5063.52	2730.11	0.20
MAIN	23766.16	2607.00	0.30	14.39	7.98	14.57	0.000411	3.44	757.30	103.53	0.22
MAIN	23766.16	3766.00	0.30	17.10	9.36	17.29	0.000348	3.55	1060.70	122.13	0.21
MAIN	23766.16	4292.00	0.30	18.05	9.87	18.26	0.000347	3.63	1181.99	205.14	0.21
MAIN	23766.16	5745.00	0.30	20.06	10.99	20.25	0.000381	3.54	3175.60	2476.84	0.22
MAIN	23079.37	2786.00	-0.20	14.00	7.84	14.24	0.000571	3.95	705.20	99.63	0.26
MAIN	23079.37	4026.00	-0.20	16.77	9.26	17.02	0.000456	4.00	1005.95	117.88	0.24
MAIN	23079.37	4570.00	-0.20	17.73	9.81	17.99	0.000437	4.07	1122.57	124.24	0.24
MAIN	23079.37	6077.00	-0.20	19.64	11.17	19.94	0.000496	4.39	1456.39	2408.79	0.26
MAIN	22360.17	2811.00	-0.71	13.63		13.85	0.000500	3.79	741.77	100.85	0.25
MAIN	22360.17	4064.00	-0.71	16.47		16.70	0.000395	3.88	1048.55	115.06	0.23
MAIN	22360.17	4610.00	-0.71	17.45		17.69	0.000381	3.96	1162.97	119.92	0.22
MAIN	22360.17	6124.00	-0.71	19.31		19.61	0.000410	4.39	1396.47	130.85	0.24
MAIN	22259.92	2923.00	-0.71	13.51	7.48	13.78	0.000591	4.22	693.47	90.16	0.27
MAIN	22259.92	4226.00	-0.71	16.36	8.81	16.65	0.000507	4.32	979.25	110.02	0.25
MAIN	22259.92	4783.00	-0.71	17.34	9.29	17.64	0.000492	4.39	1090.14	116.82	0.25
MAIN	22259.92	6329.00	-0.71	19.19	10.51	19.55	0.000522	4.80	1318.28	129.20	0.26
MAIN	22049.1	Bridge									
MAIN	21838.21	2985.00	-0.71	13.08	7.57	13.34	0.000733	4.11	727.10	117.45	0.29
MAIN	21838.21	4321.00	-0.71	15.71	8.98	15.97	0.000524	4.08	1058.21	133.96	0.26
MAIN	21838.21	4897.00	-0.71	16.59	9.53	16.86	0.000497	4.16	1178.32	139.47	0.25
MAIN	21838.21	6482.00	-0.71	18.81	11.14	19.09	0.000442	4.31	1502.38	1617.91	0.24
MAIN	21441.61	2985.00	-0.71	12.84	7.46	13.06	0.000572	3.77	792.63	122.40	0.26
MAIN	21441.61	4321.00	-0.71	15.55	8.68	15.77	0.000419	3.76	1148.17	140.56	0.23
MAIN	21441.61	4897.00	-0.71	16.43	9.16	16.66	0.000401	3.84	1275.67	146.66	0.23
MAIN	21441.61	6482.00	-0.71	18.64	10.28	18.89	0.000506	3.97	1633.32	1721.01	0.25
MAIN	20735.69	3040.00	-0.80	12.52	6.80	12.70	0.000426	3.42	888.45	127.17	0.23
MAIN	20735.69	4404.00	-0.80	15.31	7.97	15.50	0.000319	3.49	1261.05	139.87	0.20
MAIN	20735.69	4996.00	-0.80	16.20	8.62	16.40	0.000317	3.60	1388.03	209.36	0.21
MAIN	20735.69	6614.00	-0.80	18.34	9.53	18.55	0.000412	3.71	1782.88	5226.14	0.23
MAIN	19794.28	3106.00	-2.17	12.07	6.87	12.27	0.000497	3.57	866.96	128.19	0.24
MAIN	19794.28	4503.00	-2.17	14.97	8.05	15.16	0.000376	3.57	1261.52	143.30	0.21
MAIN	19794.28	5116.00	-2.17	15.84	8.49	16.05	0.000421	3.68	1389.11	1662.05	0.21
MAIN	19794.28	6774.00	-2.17	17.92	9.41	18.14	0.000483	3.81	2638.02	4919.94	0.20
MAIN	18685.77	3195.00	-2.85	11.65	5.08	11.81	0.000323	3.20	997.67	126.34	0.20
MAIN	18685.77	4638.00	-2.85	14.62	6.17	14.79	0.000278	3.30	1403.80	152.18	0.19
MAIN	18685.77	5279.00	-2.85	15.46	6.60	15.65	0.000295	3.43	1537.22	1056.81	0.20
MAIN	18685.77	6992.00	-2.85	17.65	7.65	17.73	0.000177	2.64	9734.02	5446.06	0.15
MAIN	17927.3	3195.00	-3.25	11.38	5.17	11.55	0.000356	3.29	970.88	149.28	0.21
MAIN	17927.3	4638.00	-3.25	14.39	6.20	14.56	0.000341	3.28	1413.15	231.48	0.21
MAIN	17927.3	5279.00	-3.25	15.23	6.61	15.41	0.000335	3.36	1568.87	738.79	0.21
MAIN	17927.3	6992.00	-3.25	17.36	7.62	17.54	0.000330	3.45	2025.76	4437.98	0.21
MAIN	17421.75	3195.00	-3.43	11.25	3.59	11.38	0.000259	2.87	1113.98	145.28	0.18
MAIN	17421.75	4638.00	-3.43	14.28	4.94	14.41	0.000218	2.91	1594.62	228.38	0.17
MAIN	17421.75	5279.00	-3.43	15.11	5.39	15.26	0.000224	3.02	1745.78	607.68	0.17
MAIN	17421.75	6992.00	-3.43	17.22	6.45	17.38	0.000262	3.22	2170.76	4154.10	0.19

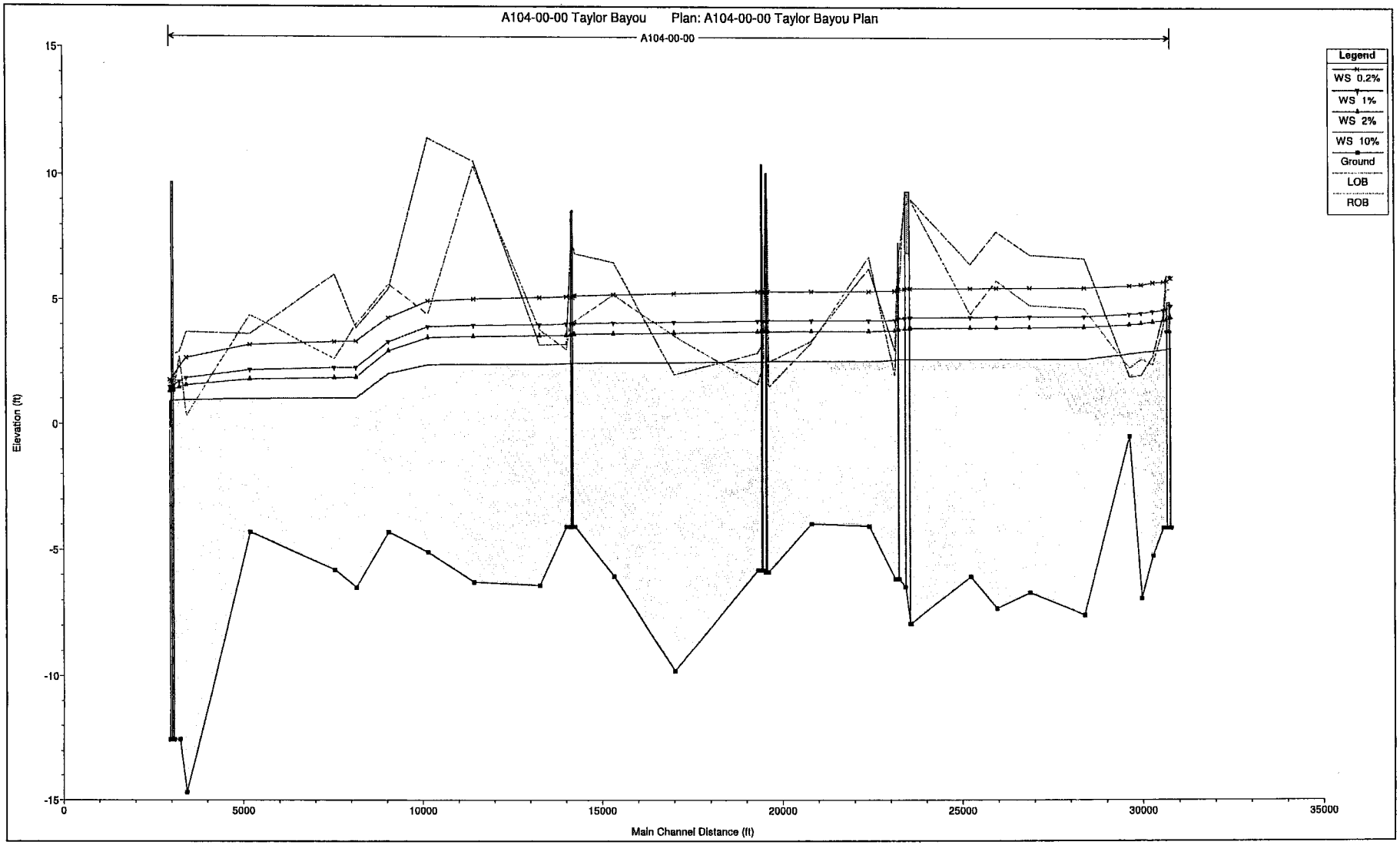
HEC-RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	17381.61	3195.00	-3.43	11.23	3.59	11.37	0.000256	2.99	1069.27	125.98	0.18
MAIN	17381.61	4638.00	-3.43	14.23	4.93	14.39	0.000220	3.15	1474.00	143.44	0.17
MAIN	17381.61	5279.00	-3.43	15.06	5.36	15.23	0.000229	3.31	1595.40	433.12	0.18
MAIN	17381.61	6992.00	-3.43	17.15	6.42	17.35	0.000269	3.62	1929.10	4674.98	0.19
MAIN	17298.1	Bridge									
MAIN	17214.6	3273.00	-3.43	11.06	3.71	11.20	0.000272	2.97	1100.99	137.99	0.19
MAIN	17214.6	4757.00	-3.43	13.96	5.03	14.11	0.000238	3.10	1534.82	163.54	0.18
MAIN	17214.6	5422.00	-3.43	15.00	5.47	15.15	0.000236	3.17	1709.84	668.12	0.18
MAIN	17214.6	7184.00	-3.43	17.12	6.52	17.21	0.000176	2.71	6328.61	2706.32	0.15
MAIN	17053.81	3273.00	-3.43	10.98	3.68	11.15	0.000304	3.23	1012.66	119.73	0.20
MAIN	17053.81	4757.00	-3.43	13.88	5.01	14.06	0.000283	3.40	1397.80	145.95	0.19
MAIN	17053.81	5422.00	-3.43	14.91	5.44	15.10	0.000320	3.48	1557.99	776.16	0.20
MAIN	17053.81	7184.00	-3.43	16.94	6.50	17.14	0.000384	3.59	2001.72	2870.73	0.22
MAIN	15961.79	3342.00	-4.58	10.73	1.83	10.85	0.000212	2.85	1173.28	130.82	0.17
MAIN	15961.79	4861.00	-4.58	13.64	3.28	13.79	0.000200	3.07	1584.28	151.13	0.17
MAIN	15961.79	5548.00	-4.58	14.65	3.82	14.80	0.000204	3.19	1739.59	318.17	0.17
MAIN	15961.79	7353.00	-4.58	16.61	5.03	16.80	0.000233	3.56	2067.59	2948.98	0.18
MAIN	15951.73	3342.00	-4.58	10.72	1.84	10.85	0.000213	2.85	1172.34	130.77	0.17
MAIN	15951.73	4861.00	-4.58	13.64	3.28	13.78	0.000201	3.07	1583.25	151.09	0.17
MAIN	15951.73	5548.00	-4.58	14.64	3.81	14.80	0.000204	3.19	1738.49	305.01	0.17
MAIN	15951.73	7353.00	-4.58	16.60	5.04	16.80	0.000233	3.56	2066.17	2940.97	0.18
MAIN	15851.44	3342.00	-4.58	10.70	1.84	10.83	0.000214	2.86	1170.01	130.65	0.17
MAIN	15851.44	4861.00	-4.58	13.62	3.28	13.77	0.000202	3.08	1580.72	150.97	0.17
MAIN	15851.44	5548.00	-4.58	14.62	3.81	14.78	0.000205	3.20	1735.79	158.43	0.17
MAIN	15851.44	7353.00	-4.58	16.58	5.04	16.78	0.000234	3.56	2062.72	2935.33	0.18
MAIN	15812.37	3342.00	-4.58	10.69	1.83	10.82	0.000215	2.86	1168.87	130.59	0.17
MAIN	15812.37	4861.00	-4.58	13.61	3.28	13.76	0.000202	3.08	1579.49	150.91	0.17
MAIN	15812.37	5548.00	-4.58	14.61	3.82	14.77	0.000205	3.20	1734.47	158.36	0.17
MAIN	15812.37	7353.00	-4.58	16.57	5.04	16.77	0.000234	3.57	2061.03	2880.57	0.18
MAIN	14880.77	3421.00	-4.57	10.48	1.72	10.62	0.000226	2.93	1167.10	128.15	0.17
MAIN	14880.77	4981.00	-4.57	13.41	3.23	13.56	0.000215	3.17	1571.10	148.23	0.17
MAIN	14880.77	5694.00	-4.57	14.40	3.73	14.57	0.000224	3.30	1723.46	157.69	0.18
MAIN	14880.77	7548.00	-4.57	16.32	4.92	16.53	0.000282	3.66	2061.34	2159.89	0.20
MAIN	13669.39	3478.00	-4.54	10.20	1.37	10.34	0.000231	3.00	1158.91	126.74	0.17
MAIN	13669.39	5067.00	-4.54	13.13	2.83	13.30	0.000221	3.25	1559.52	146.10	0.18
MAIN	13669.39	5798.00	-4.54	14.12	3.42	14.30	0.000227	3.40	1706.65	423.12	0.18
MAIN	13669.39	7688.00	-4.54	15.97	4.71	16.20	0.000262	3.84	2000.13	4348.48	0.20
MAIN	12815.75	3565.00	-4.77	9.97	1.21	10.13	0.000265	3.18	1121.29	123.11	0.19
MAIN	12815.75	5200.00	-4.77	12.92	2.53	13.10	0.000260	3.41	1524.98	149.45	0.19
MAIN	12815.75	5959.00	-4.77	13.90	3.17	14.09	0.000267	3.56	1675.11	157.10	0.19
MAIN	12815.75	7903.00	-4.77	15.71	4.57	15.96	0.000311	4.01	1973.06	4730.48	0.21
MAIN	12003.06	3565.00	-4.54	9.75	1.29	9.91	0.000288	3.17	1124.08	131.65	0.19
MAIN	12003.06	5200.00	-4.54	12.71	3.01	12.88	0.000260	3.37	1543.80	153.60	0.19
MAIN	12003.06	5959.00	-4.54	13.68	3.85	13.87	0.000267	3.51	1697.49	161.68	0.19
MAIN	12003.06	7903.00	-4.54	15.45	5.25	15.69	0.000340	3.94	2093.63	5246.74	0.22
MAIN	11534.3	3637.00	-7.65	9.67	-0.12	9.78	0.000188	2.71	1340.21	142.19	0.16
MAIN	11534.3	5309.00	-7.65	12.63	1.38	12.77	0.000175	2.99	1776.11	153.45	0.15
MAIN	11534.3	6093.00	-7.65	13.60	2.91	13.76	0.000192	3.16	1928.64	165.07	0.16
MAIN	11534.3	8082.00	-7.65	15.34	4.18	15.54	0.000269	3.58	2370.93	5378.57	0.20
MAIN	10505.78	3637.00	-5.56	9.43	1.04	9.57	0.000232	2.93	1242.92	143.76	0.18
MAIN	10505.78	5309.00	-5.56	12.42	2.38	12.57	0.000213	3.11	1705.12	695.15	0.17
MAIN	10505.78	6093.00	-5.56	13.38	2.92	13.54	0.000226	3.26	1871.18	2942.68	0.18
MAIN	10505.78	8082.00	-5.56	15.03	4.15	15.23	0.000332	3.61	2248.14	6233.74	0.21
MAIN	10495.47	3676.00	-5.56	9.43	1.08	9.56	0.000237	2.96	1242.00	143.71	0.18
MAIN	10495.47	5370.00	-5.56	12.41	2.42	12.57	0.000218	3.15	1703.93	653.05	0.17
MAIN	10495.47	6166.00	-5.56	13.37	2.97	13.54	0.000232	3.30	1869.76	2963.82	0.18
MAIN	10495.47	8181.00	-5.56	15.01	4.20	15.22	0.000337	3.66	2244.26	6259.78	0.21
MAIN	10272.1	Bridge									

HEC-RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	10048.67	3676.00	-3.96	9.12	1.11	9.26	0.000235	3.01	1221.73	135.95	0.18
MAIN	10048.67	5370.00	-3.96	12.07	2.37	12.24	0.000215	3.26	1645.74	729.93	0.17
MAIN	10048.67	6166.00	-3.96	12.99	2.90	13.18	0.000228	3.45	1787.32	1963.33	0.18
MAIN	10048.67	8181.00	-3.96	14.47	4.05	14.72	0.000315	4.02	2033.00	5877.89	0.21
MAIN	9989.7	Bridge									
MAIN	9930.678	3825.00	-3.96	9.06	1.23	9.21	0.000261	3.15	1214.12	136.36	0.19
MAIN	9930.678	5573.00	-3.96	12.02	2.52	12.19	0.000245	3.37	1700.10	214.47	0.18
MAIN	9930.678	6412.00	-3.96	12.92	3.05	13.12	0.000278	3.54	1913.97	2607.97	0.20
MAIN	9930.678	8483.00	-3.96	14.40	4.21	14.65	0.000331	4.02	2448.58	4840.84	0.22
MAIN	9890.046	3825.00	-3.96	9.05	1.23	9.20	0.000261	3.15	1212.52	135.93	0.19
MAIN	9890.046	5573.00	-3.96	12.00	2.52	12.18	0.000240	3.39	1669.07	993.43	0.18
MAIN	9890.046	6412.00	-3.96	12.90	3.06	13.10	0.000255	3.59	1856.59	2765.30	0.19
MAIN	9890.046	8483.00	-3.96	14.37	4.21	14.63	0.000334	4.13	2270.04	4680.95	0.22
MAIN	8433.446	3825.00	-4.73	8.68	1.02	8.83	0.000255	3.08	1240.48	141.82	0.18
MAIN	8433.446	5573.00	-4.73	11.61	2.28	11.74	0.000383	2.90	1988.16	564.40	0.21
MAIN	8433.446	6412.00	-4.73	12.52	2.89	12.64	0.000396	2.77	2909.46	1538.35	0.21
MAIN	8433.446	8483.00	-4.73	14.07	3.94	14.16	0.000243	2.51	6427.44	3113.24	0.17
MAIN	7639.533	3825.00	-5.22	8.48		8.62	0.000252	3.10	1234.34	138.49	0.18
MAIN	7639.533	5573.00	-5.22	11.28		11.46	0.000304	3.37	1654.58	189.59	0.20
MAIN	7639.533	6412.00	-5.22	12.16		12.35	0.000323	3.51	1828.30	206.57	0.21
MAIN	7639.533	8483.00	-5.22	13.68		13.90	0.000415	3.78	2704.35	1210.23	0.23
MAIN	6580.048	3825.00	-5.48	8.23		8.36	0.000243	2.81	1361.67	174.30	0.18
MAIN	6580.048	5573.00	-5.48	11.01		11.13	0.000281	2.79	1999.42	291.66	0.19
MAIN	6580.048	6412.00	-5.48	11.82		11.95	0.000414	2.81	2279.85	441.88	0.22
MAIN	6580.048	8483.00	-5.48	13.34		13.47	0.000352	2.79	3174.95	1234.27	0.21
MAIN	6533.497	3825.00	-5.48	8.21	0.26	8.34	0.000244	2.82	1358.09	173.62	0.18
MAIN	6533.497	5573.00	-5.48	10.98	1.36	11.12	0.000201	2.94	1894.47	306.55	0.17
MAIN	6533.497	6412.00	-5.48	11.77	1.86	11.93	0.000204	3.13	2050.51	487.17	0.17
MAIN	6533.497	8483.00	-5.48	13.34	3.02	13.44	0.000410	2.51	3494.56	1281.37	0.21
MAIN	6273.6	Bridge									
MAIN	6013.685	3825.00	-5.48	7.93	0.26	8.06	0.000431	2.87	1332.46	169.12	0.18
MAIN	6013.685	5573.00	-5.48	10.70	1.35	10.84	0.000386	3.02	1847.35	242.42	0.18
MAIN	6013.685	6412.00	-5.48	11.38	1.87	11.54	0.000418	3.23	1986.17	295.05	0.18
MAIN	6013.685	8483.00	-5.48	12.89	3.03	13.05	0.000921	3.25	2725.65	1220.88	0.25
MAIN	5837.123	3932.00	-5.48	7.81		7.97	0.000514	3.18	1238.30	152.92	0.20
MAIN	5837.123	5720.00	-5.48	10.59		10.76	0.000507	3.33	1722.66	221.70	0.20
MAIN	5837.123	6590.00	-5.48	11.25		11.45	0.000563	3.55	1892.79	293.42	0.21
MAIN	5837.123	8702.00	-5.48	12.64		12.89	0.000676	3.99	2434.54	604.82	0.23
MAIN	5280.757	3932.00	-6.28	7.53		7.69	0.000500	3.15	1248.27	152.44	0.19
MAIN	5280.757	5720.00	-6.28	10.30		10.41	0.000714	2.62	2184.72	468.68	0.21
MAIN	5280.757	6590.00	-6.28	10.98		11.09	0.000638	2.62	2513.47	501.35	0.21
MAIN	5280.757	8702.00	-6.28	12.40		12.51	0.000528	2.68	3320.13	709.95	0.19
MAIN	4511.779	3932.00	-6.45	7.12		7.28	0.000570	3.20	1227.87	162.95	0.21
MAIN	4511.779	5720.00	-6.45	9.71		9.88	0.000654	3.27	1748.66	250.60	0.22
MAIN	4511.779	6590.00	-6.45	10.37		10.55	0.000734	3.42	1924.68	281.12	0.23
MAIN	4511.779	8702.00	-6.45	11.78		11.99	0.000902	3.67	2371.73	365.70	0.25
MAIN	2969.15	3932.00	-6.17	6.37	-0.08	6.46	0.000459	2.47	1589.36	267.10	0.18
MAIN	2969.15	5720.00	-6.17	8.90	1.43	8.99	0.000461	2.33	2451.55	452.08	0.18
MAIN	2969.15	6590.00	-6.17	9.52	1.82	9.61	0.000461	2.41	2737.45	481.79	0.18
MAIN	2969.15	8702.00	-6.17	10.81	2.66	10.91	0.000461	2.56	3402.63	547.56	0.18

Taylor Bayou
A104-00-00


A104-00-00 Taylor Bayou Plan: A104-00-00 Taylor Bayou Plan
A104-00-00
Legend
WS 0.2%
WS 1%
WS 2%
WS 10%
Ground
LOB
ROB
Elevation (ft)
15
10
5
0
-5
-10
-15
0
5000
10000
15000
20000
25000
30000
35000
Main Channel Distance (ft)

HEC-RAS Plan: Plan 01 River: Taylor Bayou Reach: A104-00-00

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A104-00-00	30777.06	691.00	-4.11	3.05	-1.60	3.11	0.000220	1.92	360.34	103.51	0.14
A104-00-00	30777.06	1057.00	-4.11	4.29	-1.05	4.38	0.000328	2.41	438.21	171.13	0.17
A104-00-00	30777.06	1250.00	-4.11	4.75	-0.78	4.86	0.000407	2.64	473.16	204.45	0.19
A104-00-00	30777.06	1818.00	-4.11	5.86	-0.07	6.01	0.000541	3.13	744.03	557.70	0.22
A104-00-00	30756.12	691.00	-4.11	3.04	-1.60	3.10	0.000221	1.92	359.70	60.34	0.14
A104-00-00	30756.12	1057.00	-4.11	4.27	-1.05	4.36	0.000330	2.42	437.17	164.41	0.17
A104-00-00	30756.12	1250.00	-4.11	4.74	-0.78	4.85	0.000386	2.65	471.89	206.31	0.19
A104-00-00	30756.12	1818.00	-4.11	5.85	-0.07	5.99	0.000543	3.14	761.65	647.55	0.22
A104-00-00	30707	Bridge									
A104-00-00	30658.05	691.00	-4.11	3.01	-1.60	3.07	0.000225	1.93	357.78	60.28	0.14
A104-00-00	30658.05	1057.00	-4.11	4.19	-1.05	4.28	0.000336	2.45	431.53	69.01	0.17
A104-00-00	30658.05	1250.00	-4.11	4.61	-0.78	4.73	0.000410	2.71	462.07	76.52	0.19
A104-00-00	30658.05	1818.00	-4.11	5.73	-0.08	5.89	0.000581	3.21	735.95	662.12	0.23
A104-00-00	30576.68	720.00	-4.11	2.98	-1.55	3.04	0.000296	1.97	368.49	112.64	0.16
A104-00-00	30576.68	1101.00	-4.11	4.16	-0.99	4.24	0.000411	2.31	586.53	314.26	0.19
A104-00-00	30576.68	1301.00	-4.11	4.58	-0.72	4.67	0.000436	2.47	704.61	361.47	0.19
A104-00-00	30576.68	1893.00	-4.11	5.71	0.02	5.83	0.000438	2.83	1086.18	538.69	0.20
A104-00-00	30279.82	752.00	-5.23	2.94	-1.87	2.97	0.000115	1.33	681.15	511.67	0.10
A104-00-00	30279.82	1150.00	-5.23	4.10	-1.24	4.14	0.000120	1.55	1323.47	830.06	0.11
A104-00-00	30279.82	1359.00	-5.23	4.53	-0.97	4.57	0.000127	1.68	1618.88	987.09	0.11
A104-00-00	30279.82	1977.00	-5.23	5.68	-0.28	5.72	0.000133	1.90	2558.58	1239.54	0.12
A104-00-00	29964.24	786.00	-6.92	2.89	-2.80	2.92	0.000130	1.47	569.34	349.96	0.11
A104-00-00	29964.24	1203.00	-6.92	4.05	-2.04	4.10	0.000154	1.82	871.52	564.73	0.13
A104-00-00	29964.24	1421.00	-6.92	4.47	-1.70	4.53	0.000170	2.00	1034.13	725.82	0.13
A104-00-00	29964.24	2068.00	-6.92	5.59	-0.85	5.67	0.000197	2.37	1742.24	1262.00	0.15
A104-00-00	29636.51	786.00	-0.46	2.83	1.04	2.86	0.000394	1.44	576.28	421.29	0.17
A104-00-00	29636.51	1203.00	-0.46	4.00	1.34	4.03	0.000219	1.43	989.36	859.54	0.14
A104-00-00	29636.51	1421.00	-0.46	4.43	1.47	4.46	0.000204	1.49	1157.74	1017.15	0.13
A104-00-00	29636.51	2068.00	-0.46	5.56	1.89	5.60	0.000177	1.64	1698.90	1739.73	0.13
A104-00-00	28390.27	4.00	-7.58	2.60		2.60	0.000000	0.01	737.40	128.21	0.00
A104-00-00	28390.27	4.00	-7.58	3.89		3.89	0.000000	0.00	905.82	133.49	0.00
A104-00-00	28390.27	5.00	-7.58	4.33		4.33	0.000000	0.01	964.75	135.29	0.00
A104-00-00	28390.27	5.00	-7.58	5.48		5.48	0.000000	0.00	1234.56	508.63	0.00
A104-00-00	26874.7	8.00	-6.70	2.60		2.60	0.000000	0.01	682.00	132.20	0.00
A104-00-00	26874.7	11.00	-6.70	3.88		3.88	0.000000	0.01	854.61	137.86	0.00
A104-00-00	26874.7	12.00	-6.70	4.32		4.32	0.000000	0.01	915.49	139.80	0.00
A104-00-00	26874.7	15.00	-6.70	5.47		5.47	0.000000	0.01	1110.08	271.07	0.00
A104-00-00	25953.46	15.00	-7.33	2.60	-6.59	2.60	0.000000	0.02	750.42	371.36	0.00
A104-00-00	25953.46	22.00	-7.33	3.87	-6.47	3.87	0.000000	0.02	915.04	436.06	0.00
A104-00-00	25953.46	25.00	-7.33	4.31	-6.43	4.31	0.000000	0.03	972.98	457.12	0.00
A104-00-00	25953.46	33.00	-7.33	5.46	-6.32	5.46	0.000000	0.02	2371.75	857.66	0.00
A104-00-00	25230.51	63.00	-6.06	2.60		2.60	0.000001	0.11	567.04	111.85	0.01
A104-00-00	25230.51	108.00	-6.06	3.86		3.86	0.000001	0.15	711.56	117.52	0.01
A104-00-00	25230.51	132.00	-6.06	4.30		4.30	0.000001	0.17	763.55	119.55	0.01
A104-00-00	25230.51	206.00	-6.06	5.45		5.45	0.000002	0.23	917.30	149.87	0.01
A104-00-00	23573.98	65.00	-7.91	2.60		2.60	0.000000	0.05	1353.00	207.75	0.00
A104-00-00	23573.98	111.00	-7.91	3.85		3.85	0.000000	0.07	1620.40	218.59	0.00
A104-00-00	23573.98	136.00	-7.91	4.29		4.29	0.000000	0.08	1717.00	221.87	0.01
A104-00-00	23573.98	213.00	-7.91	5.44		5.44	0.000000	0.11	2029.27	422.52	0.01
A104-00-00	23543.96	73.00	-7.91	2.60	-6.82	2.60	0.000000	0.05	1352.92	207.75	0.00
A104-00-00	23543.96	126.00	-7.91	3.84	-6.55	3.84	0.000000	0.08	1618.40	218.52	0.01
A104-00-00	23543.96	155.00	-7.91	4.28	-6.43	4.28	0.000000	0.09	1714.98	221.80	0.01
A104-00-00	23543.96	246.00	-7.91	5.43	-6.13	5.43	0.000000	0.12	1975.89	230.43	0.01
A104-00-00	23478	Bridge									
A104-00-00	23413.87	84.00	-6.47	2.60	-5.77	2.60	0.000000	0.07	1214.95	207.63	0.01

HEC-RAS Plan: Plan 01 River: Taylor Bayou Reach: A104-00-00 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A104-00-00	23413.87	149.00	-6.47	3.81	-5.56	3.81	0.000000	0.10	1473.46	217.24	0.01
A104-00-00	23413.87	185.00	-6.47	4.25	-5.47	4.25	0.000001	0.12	1569.55	220.71	0.01
A104-00-00	23413.87	298.00	-6.47	5.41	-5.21	5.41	0.000001	0.16	1829.93	229.84	0.01
A104-00-00	23241.93	86.00	-6.15	2.60	-5.05	2.60	0.000001	0.16	535.35	356.73	0.01
A104-00-00	23241.93	153.00	-6.15	3.81	-4.76	3.81	0.000003	0.24	644.91	444.43	0.02
A104-00-00	23241.93	189.00	-6.15	4.24	-4.63	4.25	0.000003	0.28	684.94	466.54	0.02
A104-00-00	23241.93	306.00	-6.15	5.40	-4.25	5.40	0.000005	0.39	790.96	845.09	0.02
A104-00-00	23228	Bridge									
A104-00-00	23216.18	92.00	-6.15	2.60	-5.02	2.60	0.000002	0.17	535.35	356.72	0.01
A104-00-00	23216.18	166.00	-6.15	3.78	-4.71	3.78	0.000003	0.26	642.41	437.19	0.02
A104-00-00	23216.18	206.00	-6.15	4.22	-4.57	4.22	0.000004	0.30	682.45	455.90	0.02
A104-00-00	23216.18	336.00	-6.15	5.38	-4.17	5.38	0.000006	0.43	788.63	674.44	0.03
A104-00-00	23133.07	820.00	-6.15	2.56		2.59	0.000167	1.32	823.66	645.81	0.12
A104-00-00	23133.07	1290.00	-6.15	3.75		3.77	0.000134	1.39	1799.23	1019.78	0.11
A104-00-00	23133.07	1539.00	-6.15	4.19		4.21	0.000129	1.45	2277.23	1139.83	0.11
A104-00-00	23133.07	2291.00	-6.15	5.35		5.37	0.000114	1.55	3712.16	1342.36	0.11
A104-00-00	22407.37	820.00	-4.05	2.51	-2.98	2.52	0.000006	0.28	2927.64	1213.31	0.02
A104-00-00	22407.37	1290.00	-4.05	3.72	-2.72	3.72	0.000006	0.35	3709.74	1504.36	0.03
A104-00-00	22407.37	1539.00	-4.05	4.16	-2.60	4.16	0.000007	0.39	4050.74	1561.54	0.03
A104-00-00	22407.37	2291.00	-4.05	5.33	-2.29	5.33	0.000008	0.45	7510.60	1894.71	0.03
A104-00-00	20816.67	820.00	-3.95	2.51	-3.20	2.51	0.000004	0.23	3503.65	1298.40	0.02
A104-00-00	20816.67	1290.00	-3.95	3.72	-3.00	3.72	0.000005	0.29	4498.13	1934.83	0.02
A104-00-00	20816.67	1539.00	-3.95	4.16	-2.90	4.16	0.000005	0.32	4923.19	2004.30	0.02
A104-00-00	20816.67	2291.00	-3.95	5.32	-2.65	5.33	0.000005	0.37	9064.86	2283.72	0.02
A104-00-00	19618.56	820.00	-5.88	2.51		2.51	0.000002	0.21	4045.22	1136.10	0.02
A104-00-00	19618.56	1290.00	-5.88	3.72		3.72	0.000003	0.28	5555.87	1431.57	0.02
A104-00-00	19618.56	1539.00	-5.88	4.16		4.16	0.000003	0.31	6198.49	1494.21	0.02
A104-00-00	19618.56	2291.00	-5.88	5.32		5.33	0.000005	0.39	8323.26	2271.00	0.02
A104-00-00	19598.26	820.00	-5.88	2.51	-4.57	2.51	0.000002	0.22	3799.56	899.33	0.02
A104-00-00	19598.26	1290.00	-5.88	3.72	-4.29	3.72	0.000003	0.28	4556.50	1183.10	0.02
A104-00-00	19598.26	1539.00	-5.88	4.16	-4.17	4.16	0.000004	0.32	4835.02	1214.23	0.02
A104-00-00	19598.26	2291.00	-5.88	5.32	-3.86	5.32	0.000005	0.41	5575.90	1422.90	0.02
A104-00-00	19566	Bridge									
A104-00-00	19534.55	820.00	-5.88	2.50	-4.56	2.50	0.000002	0.22	3795.55	897.23	0.02
A104-00-00	19534.55	1290.00	-5.88	3.71	-4.29	3.71	0.000003	0.28	4552.90	1184.24	0.02
A104-00-00	19534.55	1539.00	-5.88	4.15	-4.17	4.15	0.000004	0.32	4831.81	1216.23	0.02
A104-00-00	19534.55	2291.00	-5.88	5.32	-3.87	5.32	0.000005	0.41	5572.95	1424.24	0.02
A104-00-00	19486.95	820.00	-5.80	2.50		2.50	0.000006	0.28	2922.99	829.72	0.02
A104-00-00	19486.95	1290.00	-5.80	3.71		3.71	0.000006	0.35	4206.10	1280.35	0.03
A104-00-00	19486.95	1539.00	-5.80	4.15		4.15	0.000007	0.39	4829.55	1582.53	0.03
A104-00-00	19486.95	2291.00	-5.80	5.32		5.32	0.000008	0.47	7759.10	3046.51	0.03
A104-00-00	19464.87	820.00	-5.80	2.50	-3.95	2.50	0.000005	0.29	2873.55	868.42	0.02
A104-00-00	19464.87	1290.00	-5.80	3.71	-3.58	3.71	0.000006	0.36	3612.50	1712.97	0.03
A104-00-00	19464.87	1539.00	-5.80	4.15	-3.42	4.15	0.000007	0.40	3882.68	2450.75	0.03
A104-00-00	19464.87	2291.00	-5.80	5.31	-3.01	5.32	0.000009	0.51	4594.66	2896.45	0.03
A104-00-00	19441	Bridge									
A104-00-00	19419.13	1751.00	-5.80	2.49	-3.29	2.50	0.000024	0.61	2872.69	868.23	0.05
A104-00-00	19419.13	2952.00	-5.80	3.70	-2.71	3.71	0.000033	0.83	3612.08	1042.24	0.06
A104-00-00	19419.13	3604.00	-5.80	4.14	-2.46	4.16	0.000040	0.94	3882.65	1204.46	0.06
A104-00-00	19419.13	5439.00	-5.80	5.31	-1.86	5.34	0.000052	1.21	4596.78	1944.64	0.08
A104-00-00	19325.73	1751.00	-5.80	2.49		2.49	0.000029	0.57	3091.62	865.17	0.05
A104-00-00	19325.73	2952.00	-5.80	3.70		3.71	0.000034	0.73	4594.21	1595.17	0.06
A104-00-00	19325.73	3604.00	-5.80	4.14		4.15	0.000038	0.81	5343.47	1798.74	0.06
A104-00-00	19325.73	5439.00	-5.80	5.31		5.33	0.000042	0.97	7932.87	2508.06	0.07

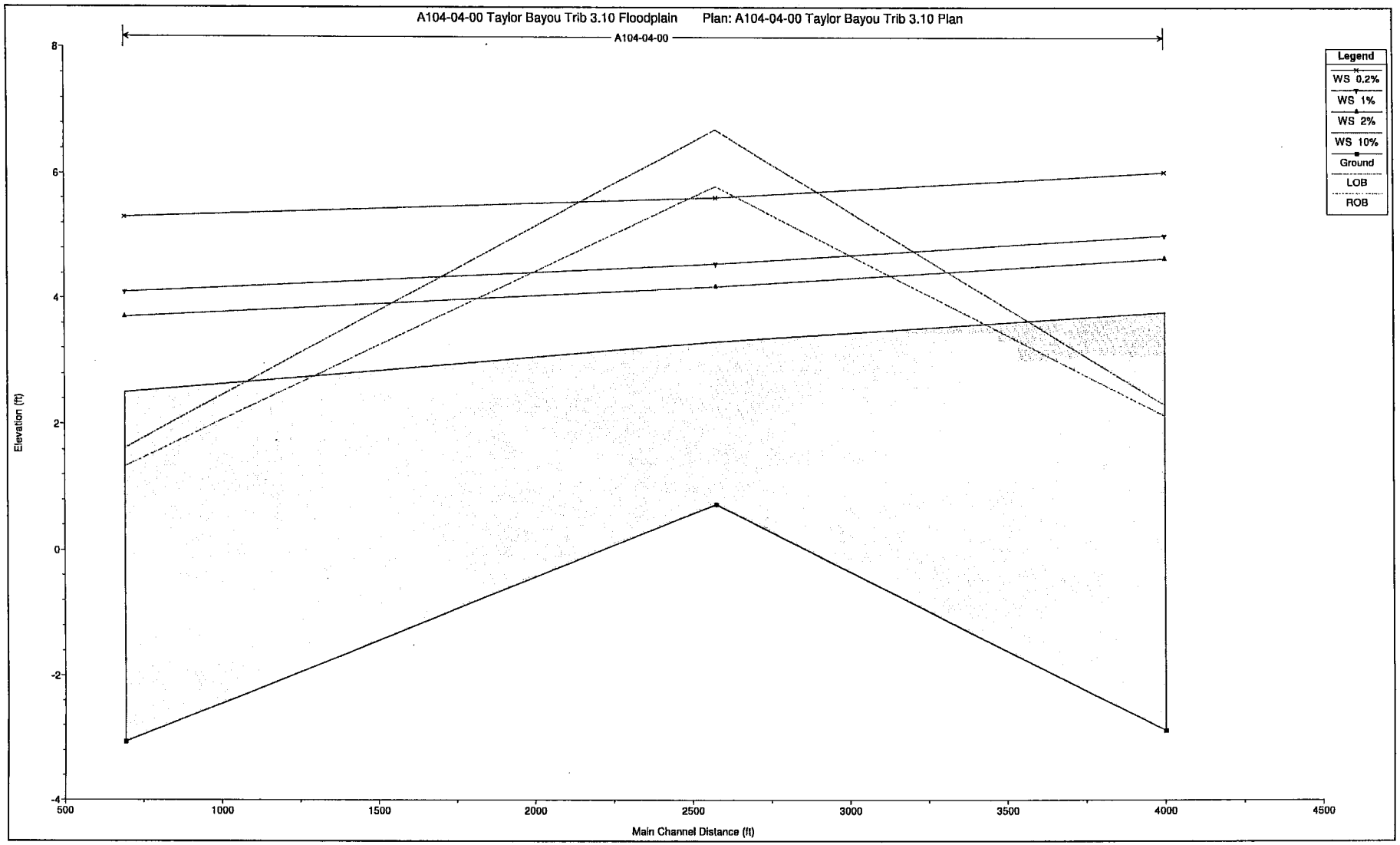
HEC-RAS Plan: Plan 01 River: Taylor Bayou Reach: A104-00-00 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A104-00-00	17007.19	2668.00	-9.81	2.45		2.46	0.000012	0.46	5787.48	1037.81	0.03
A104-00-00	17007.19	4469.00	-9.81	3.64		3.65	0.000018	0.63	7112.13	1307.02	0.04
A104-00-00	17007.19	5386.00	-9.81	4.09		4.09	0.000021	0.72	7705.52	1356.58	0.05
A104-00-00	17007.19	8051.00	-9.81	5.23		5.24	0.000028	0.91	9766.38	2251.13	0.06
A104-00-00	15331.72	2768.00	-6.05	2.44	-4.77	2.44	0.000009	0.47	5909.73	848.50	0.03
A104-00-00	15331.72	4671.00	-6.05	3.62	-4.37	3.63	0.000016	0.67	6923.18	912.64	0.04
A104-00-00	15331.72	5619.00	-6.05	4.05	-4.20	4.06	0.000020	0.77	7309.04	1062.27	0.05
A104-00-00	15331.72	8384.00	-6.05	5.19	-3.77	5.20	0.000031	1.00	8363.45	1333.22	0.06
A104-00-00	14249.68	2768.00	-4.08	2.43		2.43	0.000023	0.58	4801.16	1000.92	0.05
A104-00-00	14249.68	4671.00	-4.08	3.60		3.61	0.000032	0.78	5988.31	1043.57	0.06
A104-00-00	14249.68	5619.00	-4.08	4.03		4.04	0.000037	0.87	6447.47	1083.37	0.06
A104-00-00	14249.68	8384.00	-4.08	5.14		5.16	0.000048	1.11	7684.04	1134.31	0.07
A104-00-00	14213.73	2578.00	-4.08	2.42	-2.45	2.43	0.000020	0.57	4552.46	889.65	0.04
A104-00-00	14213.73	4777.00	-4.08	3.59	-2.01	3.60	0.000036	0.85	5601.31	930.31	0.06
A104-00-00	14213.73	5833.00	-4.08	4.03	-1.86	4.04	0.000043	0.97	5997.90	970.09	0.07
A104-00-00	14213.73	8843.00	-4.08	5.13	-1.46	5.16	0.000059	1.26	7017.39	1027.80	0.08
A104-00-00	14178	Bridge									
A104-00-00	14143.7	2578.00	-4.08	2.40	-2.45	2.41	0.000020	0.57	4537.15	889.42	0.04
A104-00-00	14143.7	4777.00	-4.08	3.56	-2.01	3.57	0.000036	0.86	5576.65	927.83	0.06
A104-00-00	14143.7	5833.00	-4.08	4.02	-1.86	4.03	0.000043	0.97	5990.54	1127.13	0.07
A104-00-00	14143.7	8843.00	-4.08	5.11	-1.46	5.14	0.000060	1.26	6998.82	1748.75	0.08
A104-00-00	14023.11	2578.00	-4.08	2.40	-2.45	2.40	0.000020	0.55	4679.89	963.41	0.04
A104-00-00	14023.11	4777.00	-4.08	3.55	-2.01	3.56	0.000035	0.82	6037.13	1451.57	0.06
A104-00-00	14023.11	5833.00	-4.08	4.01	-1.86	4.02	0.000041	0.93	6703.88	1553.76	0.06
A104-00-00	14023.11	8843.00	-4.08	5.11	-1.45	5.13	0.000054	1.19	8405.98	1736.97	0.08
A104-00-00	13273.42	2578.00	-6.41	2.38		2.39	0.000008	0.44	5894.07	824.55	0.03
A104-00-00	13273.42	4777.00	-6.41	3.53		3.54	0.000017	0.70	6853.96	844.49	0.04
A104-00-00	13273.42	5833.00	-6.41	3.98		3.99	0.000021	0.81	7235.76	864.97	0.05
A104-00-00	13273.42	8843.00	-6.41	5.07		5.09	0.000032	1.08	8219.44	939.14	0.06
A104-00-00	11429.2	2427.00	-6.28	2.37	-5.24	2.37	0.000004	0.34	7070.34	944.39	0.02
A104-00-00	11429.2	4870.00	-6.28	3.50	-4.78	3.51	0.000011	0.60	8138.95	1031.89	0.04
A104-00-00	11429.2	6021.00	-6.28	3.94	-4.60	3.95	0.000015	0.70	8556.74	1056.73	0.04
A104-00-00	11429.2	9254.00	-6.28	5.01	-4.15	5.03	0.000025	0.97	9586.85	1150.11	0.05
A104-00-00	10155.22	2427.00	-5.10	2.35	-1.20	2.36	0.000106	0.85	2851.75	1154.04	0.09
A104-00-00	10155.22	4870.00	-5.10	3.46	-0.33	3.48	0.000141	1.21	4033.67	1247.40	0.11
A104-00-00	10155.22	6021.00	-5.10	3.89	-0.11	3.91	0.000151	1.34	4503.83	1436.98	0.12
A104-00-00	10155.22	9254.00	-5.10	4.93	0.43	4.97	0.000166	1.61	6512.60	1910.86	0.13
A104-00-00	9053.234	2335.00	-4.30	2.00		2.13	0.002349	2.93	797.24	468.99	0.40
A104-00-00	9053.234	4929.00	-4.30	2.92		3.16	0.002739	3.92	1258.66	540.80	0.45
A104-00-00	9053.234	6144.00	-4.30	3.29		3.56	0.002723	4.20	1461.67	570.63	0.46
A104-00-00	9053.234	9524.00	-4.30	4.26		4.60	0.002559	4.63	2055.49	656.17	0.46
A104-00-00	8149.993	2335.00	-6.50	1.03		1.03	0.000005	0.34	6893.78	1078.77	0.02
A104-00-00	8149.993	4929.00	-6.50	1.84		1.85	0.000016	0.63	7775.78	1090.19	0.04
A104-00-00	8149.993	6144.00	-6.50	2.24		2.25	0.000021	0.75	8208.52	1095.75	0.05
A104-00-00	8149.993	9524.00	-6.50	3.31		3.33	0.000033	1.01	9406.30	1151.65	0.06
A104-00-00	7544.621	2200.00	-5.80	1.02		1.02	0.000005	0.28	7936.15	1552.10	0.02
A104-00-00	7544.621	5024.00	-5.80	1.83		1.84	0.000016	0.55	9202.97	1569.97	0.04
A104-00-00	7544.621	6340.00	-5.80	2.23		2.23	0.000020	0.65	9822.43	1578.63	0.05
A104-00-00	7544.621	9962.00	-5.80	3.30		3.31	0.000030	0.86	11527.50	1604.71	0.06
A104-00-00	5194.954	2078.00	-4.30	1.00	-3.63	1.01	0.000010	0.38	5529.69	1158.15	0.03
A104-00-00	5194.954	5115.00	-4.30	1.77	-3.21	1.78	0.000037	0.80	6431.77	1183.24	0.06
A104-00-00	5194.954	6532.00	-4.30	2.15	-3.05	2.16	0.000049	0.95	6878.31	1212.10	0.07
A104-00-00	5194.954	10394.00	-4.30	3.18	-2.66	3.21	0.000073	1.28	8130.44	1271.09	0.09
A104-00-00	3430.390	2078.00	-14.70	0.95		0.97	0.000065	1.31	1883.52	895.08	0.08
A104-00-00	3430.390	5115.00	-14.70	1.53		1.66	0.000297	2.87	2412.13	905.20	0.18
A104-00-00	3430.390	6532.00	-14.70	1.82		1.99	0.000422	3.46	2670.00	910.10	0.21

HEC-RAS Plan: Plan 01 River: Taylor Bayou Reach: A104-00-00 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A104-00-00	3430.390	10394.00	-14.70	2.65		2.94	0.000715	4.64	3454.53	988.23	0.28
A104-00-00	3237.425	2078.00	-12.56	0.94		0.96	0.000069	1.35	1541.92	203.19	0.09
A104-00-00	3237.425	5115.00	-12.56	1.45		1.60	0.000348	3.10	1648.16	231.97	0.20
A104-00-00	3237.425	6532.00	-12.56	1.67		1.90	0.000525	3.85	1719.78	431.39	0.24
A104-00-00	3237.425	10394.00	-12.56	2.27		2.76	0.001080	5.67	2069.60	792.45	0.35
A104-00-00	3074.884	2078.00	-12.56	0.92	-8.72	0.96	0.000066	1.43	1453.06	169.42	0.09
A104-00-00	3074.884	5115.00	-12.56	1.36	-6.34	1.53	0.000346	3.35	1527.65	433.09	0.20
A104-00-00	3074.884	6532.00	-12.56	1.53	-5.50	1.80	0.000531	4.20	1562.93	527.76	0.25
A104-00-00	3074.884	10394.00	-12.56	1.90	-3.64	2.54	0.001179	6.41	1682.16	604.57	0.37
A104-00-00	3043	Bridge									
A104-00-00	3011.377	2078.00	-12.56	0.90	-8.72	0.93	0.000067	1.42	1460.77	405.41	0.09
A104-00-00	3011.377	5115.00	-12.56	1.29	-6.34	1.47	0.000355	3.35	1544.12	497.75	0.20
A104-00-00	3011.377	6532.00	-12.56	1.42	-5.49	1.70	0.000552	4.21	1575.96	528.26	0.25
A104-00-00	3011.377	10394.00	-12.56	1.68	-3.63	2.34	0.001273	6.51	1658.92	667.37	0.38
A104-00-00	2970.952	2078.00	-12.56	0.90	-8.72	0.92	0.000061	1.19	1816.41	378.70	0.08
A104-00-00	2970.952	5115.00	-12.56	1.30	-6.34	1.42	0.000302	2.75	2001.96	519.28	0.18
A104-00-00	2970.952	6532.00	-12.56	1.45	-5.49	1.63	0.000460	3.44	2082.67	575.88	0.22
A104-00-00	2970.952	10394.00	-12.56	1.75	-3.42	2.17	0.001012	5.24	2288.60	747.59	0.33

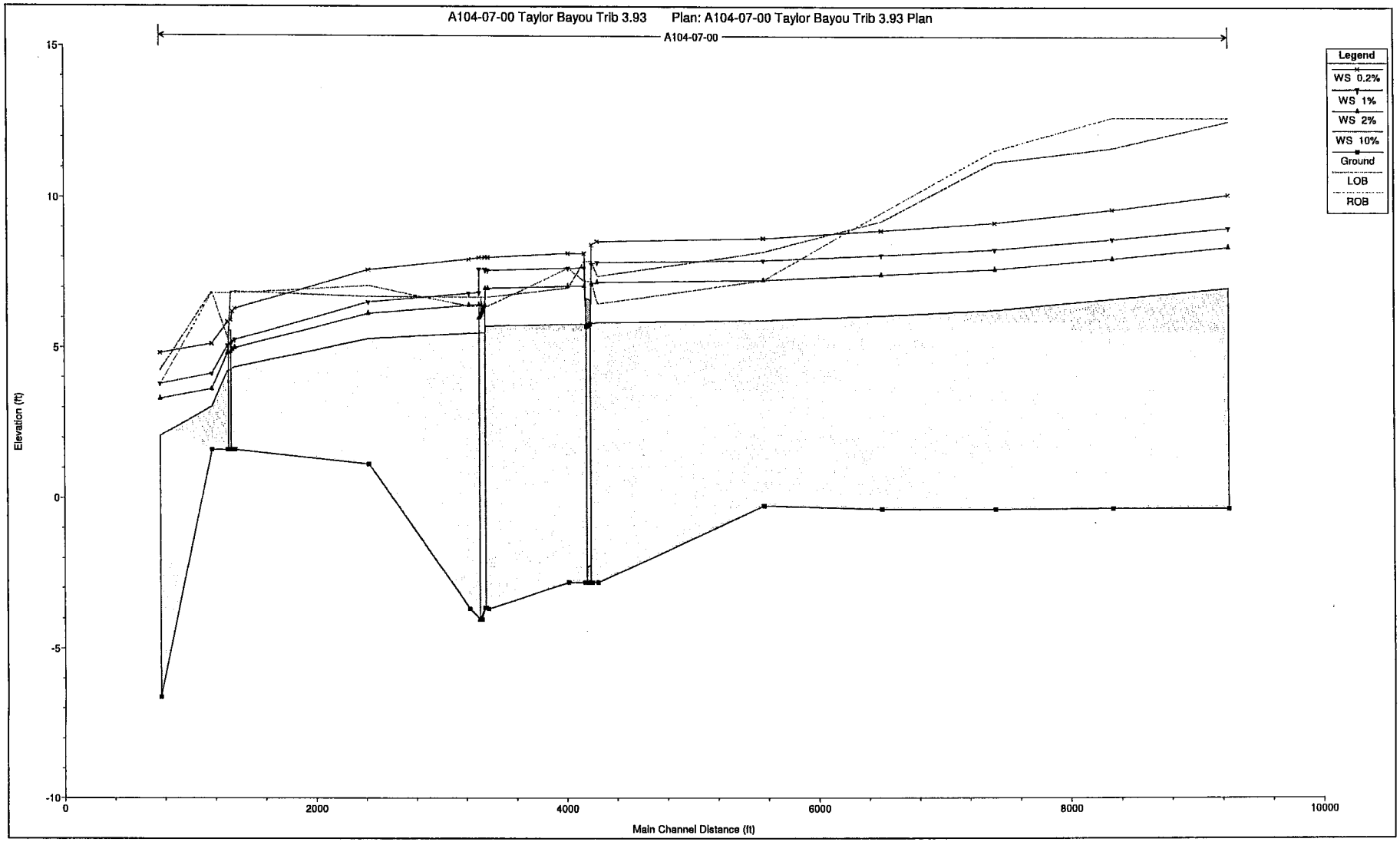
Taylor Bayou Tributary 3.10
A104-04-00


A104-04-00 Taylor Bayou Trib 3.10 Floodplain
Plan: A104-04-00 Taylor Bayou Trib 3.10 Plan
A104-04-00
Legend
WS 0.2%
WS 1%
WS 2%
WS 10%
Ground
LOB
ROB
Elevation (ft)
8
6
4
2
0
-2
-4
500
1000
1500
2000
2500
3000
3500
4000
4500
Main Channel Distance (ft)

HEC-RAS Plan: Plan 01 River: Taylor Trib 3.10 Reach: A104-04-00

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A104-04-00	4000.427	919.00	-2.89	3.79		3.83	0.000200	1.70	827.60	331.40	0.14
A104-04-00	4000.427	1386.00	-2.89	4.66		4.71	0.000232	2.04	1134.14	372.84	0.15
A104-04-00	4000.427	1630.00	-2.89	5.02		5.08	0.000250	2.21	1278.33	407.63	0.16
A104-04-00	4000.427	2350.00	-2.89	6.04		6.12	0.000294	2.66	1745.92	554.18	0.18
A104-04-00	2575.275	986.00	0.73	3.31		3.36	0.000879	1.75	562.05	341.51	0.24
A104-04-00	2575.275	1488.00	0.73	4.20		4.24	0.000543	1.68	887.91	402.35	0.20
A104-04-00	2575.275	1749.00	0.73	4.56		4.61	0.000498	1.68	1039.60	439.47	0.19
A104-04-00	2575.275	2523.00	0.73	5.62		5.66	0.000342	1.63	1547.43	516.98	0.17
A104-04-00	692.588	986.00	-3.07	2.50	-2.02	2.50	0.000018	0.47	2135.27	582.18	0.04
A104-04-00	692.588	1488.00	-3.07	3.70	-1.78	3.70	0.000017	0.55	3140.70	1058.59	0.04
A104-04-00	692.588	1749.00	-3.07	4.10	-1.67	4.11	0.000019	0.59	3578.60	1248.52	0.04
A104-04-00	692.588	2523.00	-3.07	5.30	-1.38	5.31	0.000019	0.68	5806.84	2249.71	0.05

Taylor Bayou Tributary 3.93
A104-07-00


A104-07-00 Taylor Bayou Trib 3.93 Plan: A104-07-00 Taylor Bayou Trib 3.93 Plan
A104-07-00
Legend
WS 0.2%
WS 1%
WS 2%
WS 10%
Ground
LOB
ROB
Elevation (ft)
15
10
5
0
-5
-10
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)

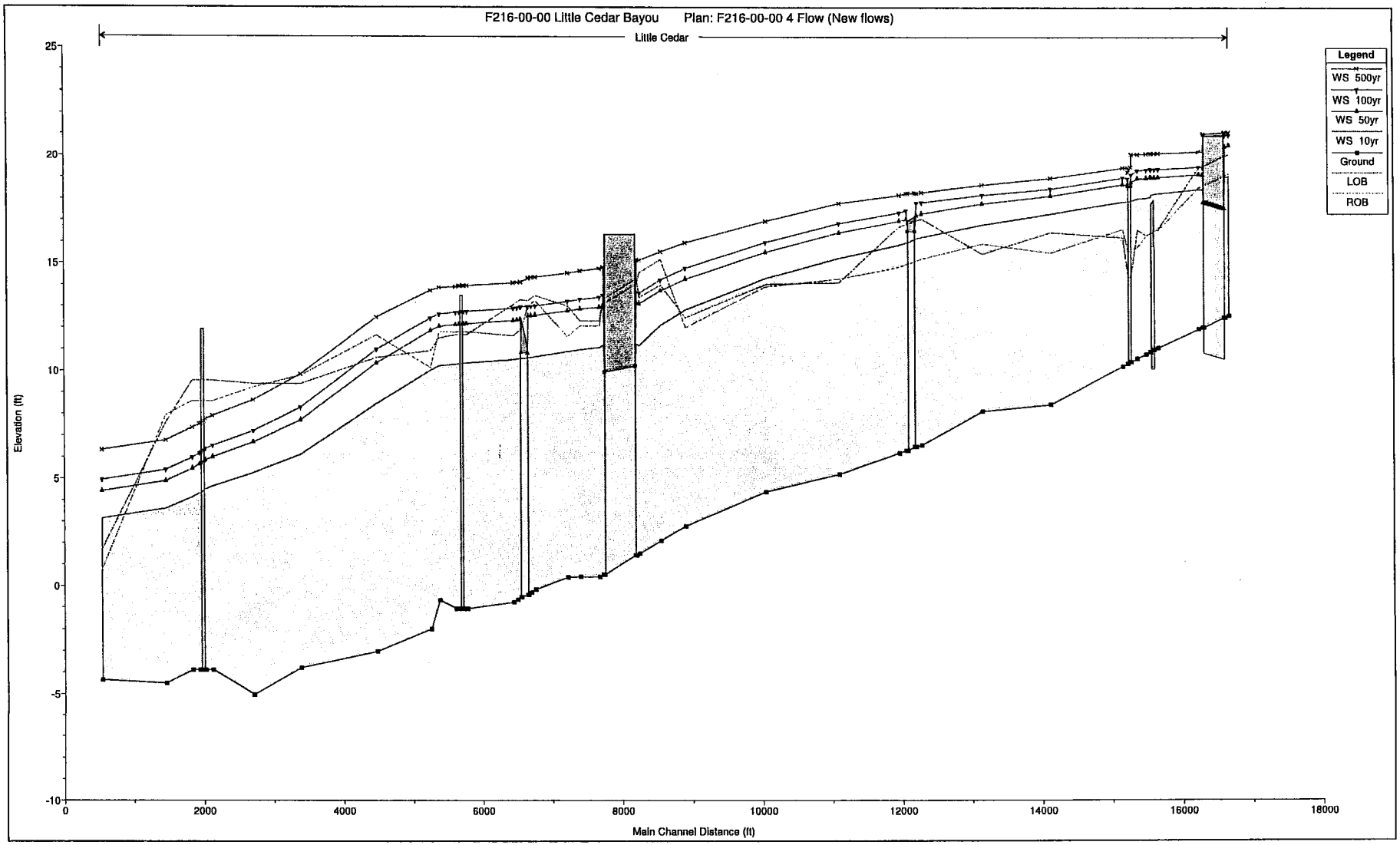
HEC-RAS Plan: Plan 01 River: Taylor Trib 3.93 Reach: A104-07-00

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A104-07-00	9250.709	569.00	-0.34	7.00		7.06	0.000293	1.88	302.41	69.95	0.16
A104-07-00	9250.709	879.00	-0.34	8.36		8.44	0.000316	2.17	404.59	79.93	0.17
A104-07-00	9250.709	1043.00	-0.34	9.00		9.08	0.000320	2.28	457.00	84.60	0.17
A104-07-00	9250.709	1529.00	-0.34	10.11		10.23	0.000405	2.75	555.60	92.74	0.20
A104-07-00	8334.997	587.00	-0.34	6.63		6.71	0.000495	2.25	260.68	67.25	0.20
A104-07-00	8334.997	906.00	-0.34	7.98		8.08	0.000491	2.53	357.79	77.10	0.21
A104-07-00	8334.997	1075.00	-0.34	8.61		8.72	0.000480	2.63	408.47	81.77	0.21
A104-07-00	8334.997	1576.00	-0.34	9.61		9.77	0.000613	3.19	493.90	89.09	0.24
A104-07-00	7404.076	604.00	-0.37	6.26		6.32	0.000351	1.91	316.30	83.42	0.17
A104-07-00	7404.076	933.00	-0.37	7.63		7.70	0.000331	2.14	436.45	92.82	0.17
A104-07-00	7404.076	1107.00	-0.37	8.28		8.35	0.000320	2.22	498.27	97.30	0.17
A104-07-00	7404.076	1623.00	-0.37	9.17		9.29	0.000430	2.76	587.87	103.45	0.20
A104-07-00	6501.877	623.00	-0.37	6.08		6.11	0.000157	1.46	427.88	93.15	0.12
A104-07-00	6501.877	962.00	-0.37	7.44		7.48	0.000171	1.72	559.51	100.56	0.13
A104-07-00	6501.877	1141.00	-0.37	8.09		8.14	0.000173	1.82	626.20	104.11	0.13
A104-07-00	6501.877	1673.00	-0.37	8.90		8.98	0.000257	2.35	712.50	108.54	0.16
A104-07-00	5564.735	650.00	-0.26	5.92		5.96	0.000169	1.51	430.53	93.11	0.12
A104-07-00	5564.735	1004.00	-0.26	7.26		7.31	0.000189	1.79	561.88	102.65	0.13
A104-07-00	5564.735	1191.00	-0.26	7.91		7.97	0.000187	1.89	630.59	108.45	0.14
A104-07-00	5564.735	1746.00	-0.26	8.64		8.73	0.000276	2.47	744.01	268.82	0.17
A104-07-00	4247.948	672.00	-2.81	5.84	-0.43	5.85	0.000045	0.76	887.45	200.60	0.06
A104-07-00	4247.948	1038.00	-2.81	7.18	0.17	7.19	0.000047	0.89	1181.83	280.91	0.07
A104-07-00	4247.948	1231.00	-2.81	7.84	0.45	7.85	0.000045	0.94	1349.08	344.60	0.07
A104-07-00	4247.948	1805.00	-2.81	8.53	1.13	8.56	0.000067	1.23	1561.87	445.14	0.08
A104-07-00	4203.118	672.00	-2.81	5.81	-1.09	5.84	0.000069	1.28	526.62	63.20	0.08
A104-07-00	4203.118	1038.00	-2.81	7.14	-0.56	7.18	0.000106	1.70	610.28	156.11	0.10
A104-07-00	4203.118	1231.00	-2.81	7.78	-0.31	7.84	0.000121	1.89	654.07	259.89	0.10
A104-07-00	4203.118	1805.00	-2.81	8.42	0.37	8.53	0.000213	2.61	700.21	324.29	0.14
A104-07-00	4174	Culvert									
A104-07-00	4144.764	672.00	-2.81	5.79	-1.08	5.81	0.000071	1.28	524.56	63.19	0.08
A104-07-00	4144.764	1038.00	-2.81	7.05	-0.55	7.10	0.000110	1.72	604.72	100.68	0.10
A104-07-00	4144.764	1231.00	-2.81	7.66	-0.30	7.71	0.000127	1.91	644.06	205.81	0.11
A104-07-00	4144.764	1805.00	-2.81	8.14	0.37	8.25	0.000235	2.68	677.14	399.46	0.14
A104-07-00	4016.328	672.00	-2.81	5.78		5.80	0.000083	1.11	606.51	120.83	0.09
A104-07-00	4016.328	1038.00	-2.81	7.05		7.08	0.000109	1.35	789.12	176.22	0.10
A104-07-00	4016.328	1231.00	-2.81	7.65		7.68	0.000116	1.43	904.64	239.26	0.11
A104-07-00	4016.328	1805.00	-2.81	8.14		8.19	0.000187	1.92	1112.22	538.41	0.14
A104-07-00	3375.279	672.00	-3.68	5.72	-0.80	5.75	0.000079	1.20	561.05	126.82	0.09
A104-07-00	3375.279	1038.00	-3.68	6.97	-0.09	7.01	0.000104	1.51	693.17	264.66	0.10
A104-07-00	3375.279	1231.00	-3.68	7.57	0.21	7.61	0.000108	1.64	869.46	930.21	0.11
A104-07-00	3375.279	1805.00	-3.68	8.01	1.15	8.08	0.000174	2.16	1676.53	1542.63	0.14
A104-07-00	3356.388	672.00	-3.64	5.72	-1.15	5.74	0.000072	1.17	575.79	96.06	0.08
A104-07-00	3356.388	1038.00	-3.64	6.97	-0.43	7.00	0.000097	1.48	699.93	227.39	0.10
A104-07-00	3356.388	1231.00	-3.64	7.57	-0.11	7.61	0.000103	1.62	760.66	1257.04	0.10
A104-07-00	3356.388	1805.00	-3.64	8.01	0.90	8.07	0.000162	2.11	1860.16	1669.13	0.13
A104-07-00	3330	Culvert									
A104-07-00	3305.833	672.00	-4.03	5.49	-1.53	5.51	0.000074	1.18	568.44	94.57	0.08
A104-07-00	3305.833	1038.00	-4.03	6.42	-0.78	6.46	0.000117	1.57	659.42	101.06	0.11
A104-07-00	3305.833	1231.00	-4.03	6.83	-0.44	6.88	0.000136	1.76	701.01	550.32	0.12
A104-07-00	3305.833	1805.00	-4.03	8.00	0.65	8.05	0.000144	2.00	2214.91	1808.73	0.12
A104-07-00	3225.215	690.00	-3.68	5.48		5.50	0.000094	1.28	537.65	94.50	0.09
A104-07-00	3225.215	1065.00	-3.68	6.40		6.45	0.000144	1.70	627.88	100.84	0.12
A104-07-00	3225.215	1263.00	-3.68	6.81		6.87	0.000166	1.89	670.68	109.70	0.13
A104-07-00	3225.215	1853.00	-3.68	7.95		8.03	0.000207	2.34	909.16	452.82	0.15
A104-07-00	2421.262	714.00	1.13	5.29		5.36	0.000451	2.07	344.67	97.70	0.19

HEC-RAS Plan: Plan 01 River: Taylor Trib 3.93 Reach: A104-07-00 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
A104-07-00	2421.262	1103.00	1.13	6.14		6.24	0.000553	2.57	429.18	102.35	0.22
A104-07-00	2421.262	1308.00	1.13	6.51		6.63	0.000601	2.80	467.71	104.40	0.23
A104-07-00	2421.262	1918.00	1.13	7.59		7.75	0.000630	3.27	678.22	409.08	0.25
A104-07-00	1356.696	728.00	1.60	4.35		4.50	0.001730	3.15	231.02	96.14	0.36
A104-07-00	1356.696	1124.00	1.60	4.98		5.21	0.001990	3.83	293.73	101.35	0.40
A104-07-00	1356.696	1333.00	1.60	5.25		5.51	0.002149	4.16	320.76	103.52	0.42
A104-07-00	1356.696	1955.00	1.60	6.29		6.58	0.002248	4.37	478.44	285.94	0.43
A104-07-00	1336.02	728.00	1.60	4.30	3.04	4.46	0.001838	3.21	226.48	95.75	0.37
A104-07-00	1336.02	1124.00	1.60	4.92	3.49	5.16	0.002114	3.90	287.93	100.88	0.41
A104-07-00	1336.02	1333.00	1.60	5.19	3.71	5.47	0.002277	4.24	314.61	103.03	0.43
A104-07-00	1336.02	1955.00	1.60	6.20	4.29	6.53	0.002043	4.61	423.73	113.35	0.42
A104-07-00	1317	Bridge									
A104-07-00	1298.46	728.00	1.60	4.22	3.04	4.39	0.002038	3.32	218.95	95.10	0.39
A104-07-00	1298.46	1124.00	1.60	4.82	3.49	5.07	0.002375	4.06	277.04	99.99	0.43
A104-07-00	1298.46	1333.00	1.60	5.07	3.71	5.37	0.002569	4.41	302.23	102.04	0.45
A104-07-00	1298.46	1955.00	1.60	5.86	4.28	6.26	0.002583	5.08	387.52	118.33	0.47
A104-07-00	1173.729	728.00	1.60	3.04	3.04	3.69	0.016404	6.50	112.05	85.37	1.00
A104-07-00	1173.729	1124.00	1.60	3.61		4.35	0.012272	6.93	162.16	90.06	0.91
A104-07-00	1173.729	1333.00	1.60	4.12		4.75	0.007785	6.35	209.84	94.31	0.75
A104-07-00	1173.729	1955.00	1.60	5.12		5.75	0.005220	6.35	308.02	102.50	0.65
A104-07-00	763.312	728.00	-6.61	2.06	-0.76	2.16	0.000700	2.58	282.34	74.42	0.23
A104-07-00	763.312	1124.00	-6.61	3.29	-0.06	3.42	0.000701	2.92	453.01	214.72	0.24
A104-07-00	763.312	1333.00	-6.61	3.78	0.24	3.92	0.000701	3.05	580.98	317.85	0.24
A104-07-00	763.312	1955.00	-6.61	4.82	0.97	4.99	0.000700	3.43	1009.61	613.46	0.25

Little Cedar Bayou
F216-00-00


F216-00-00 Little Cedar Bayou Plan: F216-00-00 4 Flow (New flows)
Little Cedar
Legend
WS 500yr
WS 100yr
WS 50yr
WS 10yr
Ground
LOB
ROB
Elevation (ft)
25
20
15
10
5
0
-5
-10
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
Main Channel Distance (ft)

HEC-RAS Plan: FH new flows River: F216-00-00 Reach: Little Cedar

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Little Cedar	16666.65	307.00	12.59	19.08		19.09	0.000035	0.44	4045.51	3017.26	0.04
Little Cedar	16666.65	461.00	12.59	20.54		20.54	0.000009	0.26	9290.56	4064.95	0.02
Little Cedar	16666.65	541.00	12.59	20.99		20.99	0.000007	0.25	11175.43	4228.03	0.02
Little Cedar	16666.65	779.00	12.59	21.11		21.11	0.000013	0.35	11665.05	4270.26	0.03
Little Cedar	16612.63	321.00	12.51	19.03	14.97	19.07	0.000333	1.59	202.15	3497.10	0.13
Little Cedar	16612.63	482.00	12.51	20.47	15.53	20.52	0.000293	1.80	268.45	4255.09	0.13
Little Cedar	16612.63	566.00	12.51	20.99	15.77	20.99	0.000007	0.25	12712.13	4410.20	0.02
Little Cedar	16612.63	815.00	12.51	21.11	16.41	21.11	0.000012	0.34	13215.62	4439.68	0.03
Little Cedar	16453.34	Culvert									
Little Cedar	16294.05	324.00	12.04	18.46	14.50	18.50	0.000358	1.63	199.19	1033.72	0.14
Little Cedar	16294.05	486.00	12.04	19.14	15.06	19.21	0.000493	2.11	230.66	2243.38	0.17
Little Cedar	16294.05	571.00	12.04	19.49	15.30	19.57	0.000546	2.32	246.51	2699.60	0.18
Little Cedar	16294.05	821.00	12.04	20.24	15.95	20.25	0.000158	1.15	4885.52	3315.61	0.09
Little Cedar	16239.12	351.00	11.96	18.46		18.47	0.000183	1.05	2180.00	2200.21	0.10
Little Cedar	16239.12	527.00	11.96	19.16		19.17	0.000126	0.95	3956.68	2936.71	0.09
Little Cedar	16239.12	619.00	11.96	19.52		19.52	0.000098	0.88	5069.96	3337.08	0.08
Little Cedar	16239.12	890.00	11.96	20.24		20.24	0.000070	0.80	7665.73	3738.46	0.06
Little Cedar	15662.67	354.00	11.10	18.28		18.32	0.000413	1.72	454.61	897.64	0.14
Little Cedar	15662.67	531.00	11.10	19.03		19.06	0.000336	1.72	1338.37	1611.11	0.13
Little Cedar	15662.67	623.00	11.10	19.41		19.43	0.000277	1.64	2100.60	2382.10	0.12
Little Cedar	15662.67	897.00	11.10	20.16		20.18	0.000196	1.50	4221.26	2937.34	0.11
Little Cedar	15609.67	371.00	11.01	18.25	14.59	18.28	0.000335	1.57	871.10	948.92	0.13
Little Cedar	15609.67	556.00	11.01	19.01	15.32	19.03	0.000245	1.49	2128.79	2216.44	0.11
Little Cedar	15609.67	653.00	11.01	19.39	15.62	19.41	0.000200	1.41	3030.14	2449.53	0.10
Little Cedar	15609.67	940.00	11.01	20.15	16.38	20.16	0.000161	1.37	5067.15	2812.90	0.10
Little Cedar	15580.45	Culvert									
Little Cedar	15551.24	371.00	10.91	18.11	14.49	18.12	0.000171	1.11	1991.58	1271.23	0.09
Little Cedar	15551.24	556.00	10.91	19.02	15.22	19.03	0.000131	1.10	3707.61	2406.26	0.08
Little Cedar	15551.24	653.00	10.91	19.40	15.51	19.41	0.000118	1.09	4660.30	2586.05	0.08
Little Cedar	15551.24	940.00	10.91	20.15	16.28	20.16	0.000115	1.17	6776.68	3017.54	0.08
Little Cedar	15493.04	371.00	10.81	18.07		18.10	0.000363	1.63	815.23	1163.03	0.14
Little Cedar	15493.04	556.00	10.81	18.99		19.01	0.000243	1.51	2516.18	2483.50	0.11
Little Cedar	15493.04	653.00	10.81	19.37		19.39	0.000209	1.47	3554.52	2953.07	0.11
Little Cedar	15493.04	940.00	10.81	20.13		20.15	0.000174	1.46	6016.68	3328.07	0.10
Little Cedar	15368.24	371.00	10.60	18.03		18.06	0.000322	1.57	1101.19	1029.24	0.13
Little Cedar	15368.24	556.00	10.60	18.96		18.98	0.000238	1.53	2621.90	2243.13	0.12
Little Cedar	15368.24	653.00	10.60	19.34		19.36	0.000213	1.51	3582.54	2665.02	0.11
Little Cedar	15368.24	940.00	10.60	20.11		20.13	0.000179	1.51	5939.91	3385.79	0.10
Little Cedar	15276.72	377.00	10.45	17.93	13.94	18.00	0.000518	2.24	174.31	875.77	0.17
Little Cedar	15276.72	566.00	10.45	18.79	14.67	18.91	0.000696	2.87	204.34	2024.82	0.20
Little Cedar	15276.72	664.00	10.45	19.14	15.00	19.29	0.000792	3.17	216.56	2385.44	0.22
Little Cedar	15276.72	956.00	10.45	20.10	15.82	20.11	0.000124	1.37	5505.59	3018.12	0.09
Little Cedar	15253.54	Bridge									
Little Cedar	15230.36	377.00	10.37	17.89	13.86	17.97	0.000504	2.22	175.80	834.56	0.17
Little Cedar	15230.36	566.00	10.37	18.67	14.59	18.79	0.000712	2.89	202.91	1777.59	0.20
Little Cedar	15230.36	664.00	10.37	18.95	14.92	19.11	0.000838	3.22	212.89	2149.39	0.22
Little Cedar	15230.36	956.00	10.37	19.48	15.74	19.50	0.000266	1.91	3612.98	2674.57	0.13
Little Cedar	15158.08	435.00	10.25	17.88		17.92	0.000444	1.73	475.02	778.41	0.15
Little Cedar	15158.08	653.00	10.25	18.69		18.71	0.000299	1.60	1539.06	1867.25	0.13
Little Cedar	15158.08	767.00	10.25	18.99		19.01	0.000247	1.52	2150.18	2108.64	0.12
Little Cedar	15158.08	1104.00	10.25	19.46		19.48	0.000242	1.59	3245.24	2465.91	0.12
Little Cedar	14131.39	500.00	8.45	17.33		17.41	0.000562	2.23	253.17	131.44	0.17
Little Cedar	14131.39	750.00	8.45	18.15		18.26	0.000691	2.73	412.22	337.77	0.20
Little Cedar	14131.39	880.00	8.45	18.48		18.59	0.000745	2.94	586.04	742.52	0.21
Little Cedar	14131.39	1266.00	8.45	18.98		19.08	0.000707	3.01	1298.64	2014.79	0.20

HEC-RAS Plan: FH new flows River: F216-00-00 Reach: Little Cedar (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Little Cedar	13151.40	564.00	8.14	16.82		16.88	0.000514	2.07	411.75	501.67	0.17
Little Cedar	13151.40	847.00	8.14	17.79		17.82	0.000304	1.79	1491.34	1530.41	0.13
Little Cedar	13151.40	994.00	8.14	18.19		18.21	0.000236	1.65	2180.20	1957.11	0.12
Little Cedar	13151.40	1430.00	8.14	18.66		18.68	0.000253	1.80	3175.30	2213.56	0.12
Little Cedar	12285.23	570.00	6.57	16.24		16.32	0.000817	2.37	258.45	115.79	0.20
Little Cedar	12285.23	855.00	6.57	17.34		17.43	0.000738	2.54	564.49	894.40	0.20
Little Cedar	12285.23	1004.00	6.57	17.85		17.91	0.000517	2.27	1214.47	1438.48	0.17
Little Cedar	12285.23	1445.00	6.57	18.31		18.37	0.000548	2.46	1938.18	1738.74	0.18
Little Cedar	12213.19	580.00	6.49	16.18	11.98	16.27	0.000833	2.40	251.06	108.40	0.20
Little Cedar	12213.19	871.00	6.49	17.25	12.93	17.37	0.000833	2.75	336.30	885.79	0.21
Little Cedar	12213.19	1021.00	6.49	17.82	13.34	17.88	0.000497	2.23	1302.97	1562.57	0.17
Little Cedar	12213.19	1468.00	6.49	18.28	14.32	18.33	0.000490	2.34	2123.08	1913.00	0.17
Little Cedar	12138.43	Bridge									
Little Cedar	12063.67	580.00	6.32	15.98	11.81	16.07	0.000859	2.43	245.63	73.07	0.21
Little Cedar	12063.67	871.00	6.32	17.07	12.75	17.18	0.000883	2.77	330.41	656.40	0.22
Little Cedar	12063.67	1021.00	6.32	17.47	13.16	17.56	0.000707	2.61	888.89	1102.40	0.20
Little Cedar	12063.67	1468.00	6.32	18.27	14.14	18.32	0.000489	2.38	2168.56	1969.67	0.17
Little Cedar	11962.65	617.00	6.20	15.87		15.97	0.000961	2.57	250.96	107.53	0.22
Little Cedar	11962.65	925.00	6.20	16.99		17.10	0.000868	2.76	549.02	573.55	0.21
Little Cedar	11962.65	1082.00	6.20	17.37		17.47	0.000798	2.78	823.11	862.70	0.21
Little Cedar	11962.65	1551.00	6.20	18.18		18.26	0.000629	2.70	1909.43	1672.66	0.19
Little Cedar	11103.33	666.00	5.22	15.25		15.32	0.000604	2.18	315.65	88.80	0.18
Little Cedar	11103.33	997.00	5.22	16.43		16.51	0.000542	2.39	664.40	619.69	0.17
Little Cedar	11103.33	1162.00	5.22	16.87		16.95	0.000488	2.38	1007.43	1026.61	0.17
Little Cedar	11103.33	1660.00	5.22	17.80		17.85	0.000372	2.28	2378.77	1825.26	0.15
Little Cedar	10051.04	723.00	4.39	14.32		14.45	0.001191	2.93	247.98	61.45	0.24
Little Cedar	10051.04	1081.00	4.39	15.52		15.70	0.001151	3.37	346.02	113.77	0.25
Little Cedar	10051.04	1256.00	4.39	15.98		16.17	0.001154	3.56	418.86	195.64	0.25
Little Cedar	10051.04	1787.00	4.39	16.98		17.19	0.001154	3.93	766.72	595.03	0.26
Little Cedar	8905.061	760.00	2.79	12.84		12.98	0.001380	3.02	255.25	73.10	0.26
Little Cedar	8905.061	1135.00	2.79	14.29		14.44	0.001043	3.20	401.89	168.38	0.24
Little Cedar	8905.061	1317.00	2.79	14.78		14.94	0.000996	3.31	496.42	216.58	0.24
Little Cedar	8905.061	1869.00	2.79	15.96		16.09	0.000783	3.30	1184.36	899.90	0.22
Little Cedar	8551.573	760.00	2.10	12.11		12.32	0.002587	3.63	209.36	58.07	0.34
Little Cedar	8551.573	1135.00	2.10	13.74		13.94	0.002013	3.55	319.97	78.27	0.31
Little Cedar	8551.573	1317.00	2.10	14.24		14.45	0.001992	3.64	364.64	111.51	0.31
Little Cedar	8551.573	1869.00	2.10	15.54		15.72	0.001496	3.60	886.41	753.79	0.28
Little Cedar	8249.000	760.00	1.52	11.19		11.44	0.003257	4.00	190.21	53.87	0.37
Little Cedar	8249.000	1135.00	1.52	13.12		13.32	0.002053	3.58	317.21	77.67	0.31
Little Cedar	8249.000	1317.00	1.52	13.63		13.84	0.002037	3.67	360.88	107.46	0.31
Little Cedar	8249.000	1869.00	1.52	15.14		15.29	0.001240	3.35	979.64	853.23	0.26
Little Cedar	8208.269	786.00	1.44	11.24	6.35	11.27	0.000145	1.17	671.07	153.02	0.09
Little Cedar	8208.269	1174.00	1.44	13.16	7.03	13.19	0.000113	1.28	920.68	171.80	0.08
Little Cedar	8208.269	1360.00	1.44	13.67	7.27	13.70	0.000120	1.38	986.57	240.07	0.09
Little Cedar	8208.269	1927.00	1.44	15.16	7.78	15.20	0.000133	1.63	1180.09	2045.40	0.10
Little Cedar	7970.648	Bridge									
Little Cedar	7733.031	816.00	0.53	11.20	5.51	11.22	0.000059	1.05	778.81	161.51	0.08
Little Cedar	7733.031	1217.00	0.53	13.05	6.17	13.07	0.000053	1.19	1024.26	408.55	0.08
Little Cedar	7733.031	1408.00	0.53	13.51	6.40	13.54	0.000058	1.30	1085.77	535.54	0.08
Little Cedar	7733.031	1991.00	0.53	14.82	6.91	14.86	0.000071	1.58	1259.76	1008.04	0.09
Little Cedar	7679.985	816.00	0.43	11.11		11.19	0.000384	2.31	353.84	68.99	0.18
Little Cedar	7679.985	1217.00	0.43	12.96		13.05	0.000310	2.43	587.59	327.77	0.17
Little Cedar	7679.985	1408.00	0.43	13.42		13.51	0.000309	2.54	788.63	556.69	0.17
Little Cedar	7679.985	1991.00	0.43	14.76		14.84	0.000247	2.55	1638.39	743.76	0.16

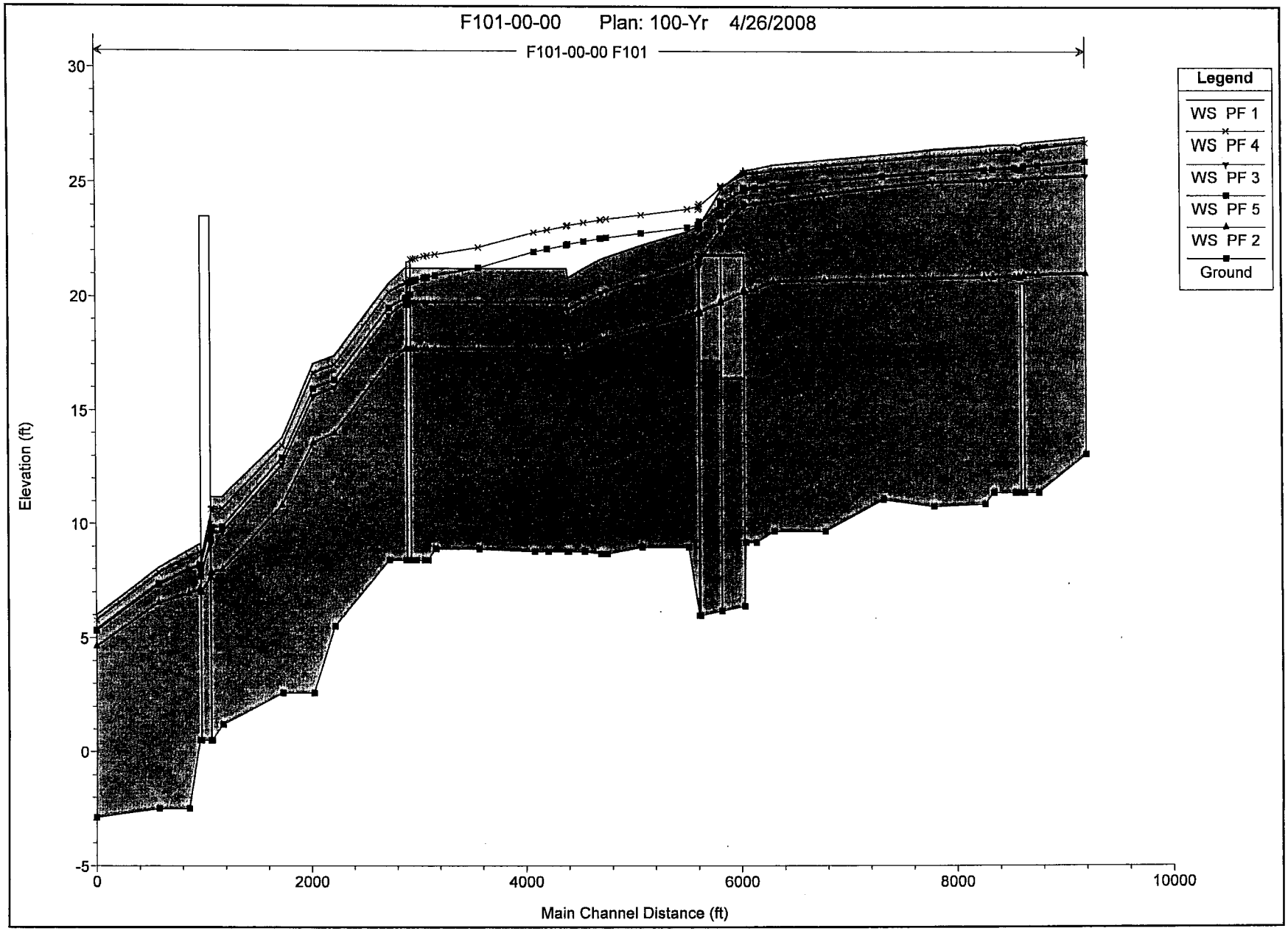
HEC-RAS Plan: FH new flows River: F216-00-00 Reach: Little Cedar (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Little Cedar	7404.070	816.00	0.43	11.00		11.08	0.000406	2.36	346.44	68.28	0.18
Little Cedar	7404.070	1217.00	0.43	12.87		12.96	0.000331	2.49	553.87	239.49	0.17
Little Cedar	7404.070	1408.00	0.43	13.32		13.43	0.000334	2.61	680.24	383.08	0.18
Little Cedar	7404.070	1991.00	0.43	14.66		14.76	0.000298	2.78	1427.10	724.90	0.17
Little Cedar	7222.301	863.00	0.41	10.90		10.99	0.000653	2.40	359.85	70.45	0.19
Little Cedar	7222.301	1286.00	0.41	12.78		12.88	0.000548	2.55	526.99	121.08	0.18
Little Cedar	7222.301	1484.00	0.41	13.23		13.35	0.000582	2.73	589.53	175.37	0.19
Little Cedar	7222.301	2093.00	0.41	14.56		14.68	0.000548	2.99	1068.20	509.45	0.19
Little Cedar	6759.369	863.00	-0.16	10.66		10.73	0.000467	2.13	405.89	73.85	0.16
Little Cedar	6759.369	1286.00	-0.16	12.57		12.65	0.000433	2.31	564.45	146.54	0.16
Little Cedar	6759.369	1484.00	-0.16	13.00		13.10	0.000476	2.47	684.12	512.41	0.17
Little Cedar	6759.369	2093.00	-0.16	14.36		14.45	0.000418	2.58	2132.66	1493.50	0.16
Little Cedar	6699.486	863.00	-0.30	10.64		10.71	0.000440	2.08	414.95	74.57	0.16
Little Cedar	6699.486	1286.00	-0.30	12.55		12.63	0.000405	2.24	618.83	214.83	0.15
Little Cedar	6699.486	1484.00	-0.30	12.98		13.07	0.000441	2.40	764.83	527.05	0.16
Little Cedar	6699.486	2093.00	-0.30	14.34		14.43	0.000389	2.52	2240.40	1603.62	0.16
Little Cedar	6659.565	863.00	-0.40	10.63	5.07	10.69	0.000255	2.05	421.10	75.05	0.15
Little Cedar	6659.565	1286.00	-0.40	12.54	5.93	12.61	0.000223	2.21	679.40	331.40	0.15
Little Cedar	6659.565	1484.00	-0.40	12.97	6.28	13.05	0.000252	2.34	875.47	651.46	0.16
Little Cedar	6659.565	2093.00	-0.40	14.33	7.14	14.41	0.000223	2.47	2518.99	1721.90	0.15
Little Cedar	6602.855	Bridge									
Little Cedar	6546.143	863.00	-0.52	10.57	4.88	10.64	0.000248	2.00	431.15	79.73	0.15
Little Cedar	6546.143	1286.00	-0.52	12.37	5.77	12.45	0.000217	2.22	579.68	188.81	0.15
Little Cedar	6546.143	1484.00	-0.52	12.94	6.12	13.02	0.000234	2.29	822.64	804.93	0.15
Little Cedar	6546.143	2093.00	-0.52	14.14	7.04	14.21	0.000203	2.35	2438.83	1743.13	0.15
Little Cedar	6500.687	863.00	-0.63	10.56		10.62	0.000392	1.97	438.60	80.40	0.15
Little Cedar	6500.687	1286.00	-0.63	12.36		12.43	0.000362	2.14	654.01	166.33	0.15
Little Cedar	6500.687	1484.00	-0.63	12.92		13.00	0.000360	2.23	918.89	806.24	0.15
Little Cedar	6500.687	2093.00	-0.63	14.12		14.19	0.000299	2.24	2392.36	1737.03	0.14
Little Cedar	6445.129	905.00	-0.76	10.53		10.59	0.000410	2.02	446.99	81.15	0.15
Little Cedar	6445.129	1349.00	-0.76	12.33		12.41	0.000390	2.23	613.33	212.74	0.15
Little Cedar	6445.129	1553.00	-0.76	12.89		12.97	0.000388	2.33	851.90	734.67	0.15
Little Cedar	6445.129	2185.00	-0.76	14.10		14.17	0.000328	2.37	2112.17	1482.48	0.15
Little Cedar	5777.244	940.00	-1.06	10.36		10.42	0.000185	1.83	514.35	87.76	0.13
Little Cedar	5777.244	1399.00	-1.06	12.17		12.23	0.000178	2.02	791.79	336.11	0.13
Little Cedar	5777.244	1609.00	-1.06	12.74		12.81	0.000169	2.07	1079.34	601.38	0.13
Little Cedar	5777.244	2259.00	-1.06	13.98		14.03	0.000137	2.07	2326.01	1277.11	0.12
Little Cedar	5733.993	940.00	-1.06	10.35	3.98	10.41	0.000186	1.83	513.52	117.95	0.13
Little Cedar	5733.993	1399.00	-1.06	12.16	4.84	12.23	0.000183	2.05	686.48	335.53	0.14
Little Cedar	5733.993	1609.00	-1.06	12.73	5.18	12.80	0.000186	2.17	746.41	850.54	0.14
Little Cedar	5733.993	2259.00	-1.06	13.98	6.12	14.02	0.000123	1.96	2838.42	1591.43	0.12
Little Cedar	5699.263	Bridge									
Little Cedar	5664.537	940.00	-1.06	10.33	3.98	10.38	0.000188	1.84	511.03	182.96	0.13
Little Cedar	5664.537	1399.00	-1.06	12.13	4.84	12.20	0.000186	2.05	683.56	508.31	0.14
Little Cedar	5664.537	1609.00	-1.06	12.70	5.18	12.78	0.000188	2.18	743.95	911.07	0.14
Little Cedar	5664.537	2259.00	-1.06	13.96	6.09	14.01	0.000139	2.08	2795.83	1221.87	0.12
Little Cedar	5615.555	940.00	-1.06	10.32		10.37	0.000189	1.84	510.21	87.41	0.13
Little Cedar	5615.555	1399.00	-1.06	12.13		12.19	0.000186	2.05	750.03	385.95	0.14
Little Cedar	5615.555	1609.00	-1.06	12.70		12.77	0.000183	2.15	1077.10	786.96	0.14
Little Cedar	5615.555	2259.00	-1.06	13.92		13.99	0.000175	2.32	2428.16	1290.56	0.14
Little Cedar	5380.519	940.00	-0.67	10.24		10.30	0.000612	1.97	478.28	78.96	0.14
Little Cedar	5380.519	1399.00	-0.67	12.04		12.12	0.000615	2.20	718.90	473.04	0.15
Little Cedar	5380.519	1609.00	-0.67	12.62		12.70	0.000583	2.26	1225.86	1225.54	0.14
Little Cedar	5380.519	2259.00	-0.67	13.87		13.93	0.000422	2.12	3627.69	2404.59	0.12
Little Cedar	5255.402	994.00	-1.99	10.03		10.16	0.001874	2.91	341.55	68.29	0.23

HEC-RAS Plan: FH new flows River: F216-00-00 Reach: Little Cedar (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Little Cedar	5255.402	1479.00	-1.99	11.86		12.00	0.001476	3.03	532.32	196.28	0.21
Little Cedar	5255.402	1696.00	-1.99	12.44		12.58	0.001347	3.08	714.44	437.60	0.21
Little Cedar	5255.402	2375.00	-1.99	13.73		13.84	0.000971	2.93	2443.32	2338.38	0.18
Little Cedar	4475.840	1075.00	-3.03	8.47		8.64	0.002011	3.39	317.30	51.38	0.24
Little Cedar	4475.840	1597.00	-3.03	10.36		10.57	0.002274	3.73	428.42	67.73	0.26
Little Cedar	4475.840	1826.00	-3.03	10.98		11.22	0.002315	3.86	478.65	104.29	0.27
Little Cedar	4475.840	2548.00	-3.03	12.48		12.73	0.002112	4.13	762.99	341.73	0.26
Little Cedar	3384.195	1129.00	-3.79	6.12		6.30	0.002273	3.43	329.56	62.04	0.26
Little Cedar	3384.195	1676.00	-3.79	7.71		7.94	0.002559	3.79	441.71	78.80	0.28
Little Cedar	3384.195	1912.00	-3.79	8.30		8.53	0.002604	3.91	489.52	84.94	0.29
Little Cedar	3384.195	2661.00	-3.79	9.85		10.12	0.002691	4.17	641.08	119.75	0.30
Little Cedar	2707.204	1177.00	-5.03	5.26		5.38	0.000891	2.75	427.22	72.77	0.20
Little Cedar	2707.204	1746.00	-5.03	6.68		6.85	0.001094	3.24	538.12	84.07	0.23
Little Cedar	2707.204	1989.00	-5.03	7.21		7.39	0.001163	3.40	584.20	89.09	0.23
Little Cedar	2707.204	2763.00	-5.03	8.63		8.86	0.001354	3.83	720.79	103.80	0.26
Little Cedar	2123.560	1236.00	-3.89	4.65		4.77	0.001247	2.79	451.30	134.36	0.23
Little Cedar	2123.560	1831.00	-3.89	6.00		6.15	0.001289	3.08	675.06	185.28	0.24
Little Cedar	2123.560	2082.00	-3.89	6.52		6.68	0.001266	3.16	776.03	199.44	0.24
Little Cedar	2123.560	2884.00	-3.89	7.91		8.09	0.001249	3.41	1077.55	236.74	0.25
Little Cedar	2021.986	1236.00	-3.89	4.50	0.52	4.63	0.001352	2.88	429.54	98.46	0.24
Little Cedar	2021.986	1831.00	-3.89	5.85	1.29	6.01	0.001406	3.19	574.70	116.58	0.25
Little Cedar	2021.986	2082.00	-3.89	6.38	1.58	6.54	0.001354	3.26	637.72	122.87	0.25
Little Cedar	2021.986	2884.00	-3.89	7.76	2.55	7.95	0.001255	3.56	809.18	139.31	0.25
Little Cedar	1979.236	Bridge									
Little Cedar	1936.482	1236.00	-3.89	4.31	0.52	4.45	0.001509	3.01	410.90	95.67	0.26
Little Cedar	1936.482	1831.00	-3.89	5.65	1.29	5.82	0.001571	3.32	551.19	114.14	0.27
Little Cedar	1936.482	2082.00	-3.89	6.16	1.58	6.34	0.001531	3.40	611.89	120.32	0.27
Little Cedar	1936.482	2884.00	-3.89	7.53	2.55	7.74	0.001399	3.70	779.71	136.60	0.26
Little Cedar	1834.600	1236.00	-3.89	4.13		4.29	0.001673	3.14	394.07	93.08	0.27
Little Cedar	1834.600	1831.00	-3.89	5.46		5.64	0.001744	3.45	530.00	111.91	0.28
Little Cedar	1834.600	2082.00	-3.89	5.98		6.17	0.001693	3.53	590.18	118.15	0.28
Little Cedar	1834.600	2884.00	-3.89	7.36		7.58	0.001628	3.77	764.82	134.63	0.28
Little Cedar	1452.611	1649.00	-4.51	3.60		3.74	0.001272	2.92	563.88	120.24	0.24
Little Cedar	1452.611	2440.00	-4.51	4.89		5.06	0.001376	3.36	726.98	133.78	0.25
Little Cedar	1452.611	2799.00	-4.51	5.41		5.60	0.001391	3.51	797.88	138.55	0.26
Little Cedar	1452.611	3842.00	-4.51	6.77		7.00	0.001435	3.86	996.53	153.82	0.27
Little Cedar	538.677	1649.00	-4.36	3.13	-0.78	3.17	0.000336	1.58	1055.57	222.43	0.13
Little Cedar	538.677	2440.00	-4.36	4.42	-0.32	4.47	0.000336	1.84	1344.59	226.80	0.13
Little Cedar	538.677	2799.00	-4.36	4.95	-0.12	5.00	0.000336	1.94	1464.42	228.87	0.13
Little Cedar	538.677	3842.00	-4.36	6.32	0.33	6.40	0.000337	2.20	1784.16	235.30	0.14

F101-00-00


F101-00-00 Plan: 100-Yr 4/26/2008
F101-00-00 F101
Legend
WS PF 1
WS PF 4
WS PF 3
WS PF 5
WS PF 2
Ground
Elevation (ft)
30
25
20
15
10
5
0
-5
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)

HEC-RAS Plan: 100YR River: F101-00-00 Reach: F101

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
F101	9320	PF 1	2171.00	13.10	26.97		27.06	0.000353	3.22	7439.20	1010.00	0.17
F101	9320	PF 2	348.00	13.10	21.04		21.08	0.000308	1.73	1450.82	1010.00	0.14
F101	9320	PF 3	1264.00	13.10	25.31		25.37	0.000238	2.36	5763.41	1010.00	0.14
F101	9320	PF 4	2124.00	13.10	26.72		26.81	0.000372	3.25	7182.96	1010.00	0.18
F101	9320	PF 5	1833.00	13.10	25.97		26.06	0.000374	3.10	6431.05	1010.00	0.18
F101	8882	PF 1	2171.00	11.40	26.77		26.91	0.000371	3.72	5388.07	637.00	0.18
F101	8882	PF 2	348.00	11.40	20.98		21.01	0.000109	1.36	1702.36	637.00	0.09
F101	8882	PF 3	1264.00	11.40	25.20		25.27	0.000210	2.57	4389.85	637.00	0.13
F101	8882	PF 4	2124.00	11.40	26.51		26.65	0.000385	3.74	5222.38	637.00	0.18
F101	8882	PF 5	1833.00	11.40	25.78		25.91	0.000362	3.49	4757.72	637.00	0.18
F101	8751	PF 1	2171.00	11.40	26.72	19.70	26.86	0.000377	3.74	5355.71	637.00	0.18
F101	8751	PF 2	348.00	11.40	20.97	14.71	20.99	0.000109	1.36	1693.11	637.00	0.09
F101	8751	PF 3	1264.00	11.40	25.17	17.54	25.24	0.000212	2.58	4371.77	637.00	0.13
F101	8751	PF 4	2124.00	11.40	26.45	19.63	26.60	0.000391	3.76	5188.75	637.00	0.19
F101	8751	PF 5	1833.00	11.40	25.73	19.01	25.86	0.000368	3.51	4726.11	637.00	0.18
F101	8726		Bridge									
F101	8701	PF 1	2171.00	11.40	26.61		26.76	0.000389	3.78	5286.70	637.00	0.19
F101	8701	PF 2	348.00	11.40	20.88		20.90	0.000115	1.39	1637.02	637.00	0.09
F101	8701	PF 3	1264.00	11.40	25.10		25.17	0.000218	2.60	4325.32	637.00	0.14
F101	8701	PF 4	2124.00	11.40	26.34		26.49	0.000406	3.81	5114.47	637.00	0.19
F101	8701	PF 5	1833.00	11.40	25.61		25.74	0.000384	3.56	4648.87	637.00	0.18
F101	8665	PF 1	2171.00	11.40	26.66		26.72	0.000165	2.34	5483.71	735.00	0.12
F101	8665	PF 2	348.00	11.40	20.89		20.90	0.000059	0.88	1242.60	735.00	0.06
F101	8665	PF 3	1264.00	11.40	25.12		25.16	0.000095	1.62	4356.13	735.00	0.09
F101	8665	PF 4	2124.00	11.40	26.39		26.46	0.000172	2.35	5285.55	735.00	0.12
F101	8665	PF 5	1833.00	11.40	25.65		25.71	0.000165	2.20	4744.06	735.00	0.12
F101	8465	PF 1	2171.00	11.40	26.62		26.69	0.000166	2.35	5458.52	735.00	0.12
F101	8465	PF 2	348.00	11.40	20.87		20.88	0.000059	0.88	1233.84	735.00	0.06
F101	8465	PF 3	1264.00	11.40	25.10		25.14	0.000096	1.62	4341.75	735.00	0.09
F101	8465	PF 4	2124.00	11.40	26.35		26.42	0.000174	2.36	5259.19	735.00	0.12
F101	8465	PF 5	1833.00	11.40	25.61		25.68	0.000167	2.21	4718.83	735.00	0.12
F101	8385	PF 1	2171.00	10.90	26.58		26.67	0.000251	3.06	6884.75	868.00	0.15
F101	8385	PF 2	348.00	10.90	20.86		20.88	0.000081	1.17	1924.19	868.00	0.08
F101	8385	PF 3	1264.00	10.90	25.08		25.13	0.000142	2.12	5584.09	868.00	0.11
F101	8385	PF 4	2124.00	10.90	26.30		26.40	0.000262	3.08	6647.78	868.00	0.15
F101	8385	PF 5	1833.00	10.90	25.57		25.66	0.000250	2.89	6012.21	868.00	0.15
F101	7910	PF 1	2171.00	10.80	26.47		26.55	0.000237	2.91	7166.46	918.00	0.15
F101	7910	PF 2	348.00	10.80	20.82		20.84	0.000080	1.13	1986.38	918.00	0.08
F101	7910	PF 3	1264.00	10.80	25.01		25.06	0.000134	2.01	5834.38	918.00	0.11
F101	7910	PF 4	2124.00	10.80	26.19		26.28	0.000249	2.94	6910.82	918.00	0.15
F101	7910	PF 5	1833.00	10.80	25.46		25.54	0.000238	2.76	6242.82	918.00	0.14
F101	7440	PF 1	2332.00	11.10	26.27		26.42	0.000329	3.48	4805.16	599.00	0.17
F101	7440	PF 2	348.00	11.10	20.79		20.80	0.000072	1.10	1519.40	599.00	0.07
F101	7440	PF 3	2003.00	11.10	24.78		24.93	0.000395	3.51	3913.00	599.00	0.19
F101	7440	PF 4	2243.00	11.10	26.00		26.14	0.000331	3.44	4639.20	599.00	0.17
F101	7440	PF 5	1939.00	11.10	25.28		25.41	0.000312	3.21	4212.54	599.00	0.17
F101	6870	PF 1	2332.00	9.70	26.04		26.21	0.000441	3.77	4566.78	653.00	0.19
F101	6870	PF 2	348.00	9.70	20.73		20.76	0.000112	1.27	1098.55	653.00	0.09
F101	6870	PF 3	2003.00	9.70	24.49		24.68	0.000571	3.90	3552.20	653.00	0.22
F101	6870	PF 4	2243.00	9.70	25.76		25.93	0.000449	3.74	4383.41	653.00	0.19
F101	6870	PF 5	1939.00	9.70	25.06		25.21	0.000431	3.51	3924.99	653.00	0.19
F101	6395	PF 1	2332.00	9.70	25.82		25.99	0.000477	3.87	4417.54	653.00	0.20
F101	6395	PF 2	348.00	9.70	20.68		20.70	0.000116	1.29	1062.82	653.00	0.09
F101	6395	PF 3	2003.00	9.70	24.18		24.39	0.000646	4.07	3350.99	653.00	0.23
F101	6395	PF 4	2243.00	9.70	25.53		25.71	0.000487	3.84	4231.07	653.00	0.20
F101	6395	PF 5	1939.00	9.70	24.84		25.00	0.000468	3.61	3778.85	653.00	0.20
F101	6230	PF 1	2928.00	9.20	25.62		25.89	0.000689	4.35	2569.87	460.00	0.24
F101	6230	PF 2	1198.00	9.20	20.34		20.59	0.001325	3.96	370.93	282.52	0.30
F101	6230	PF 3	2114.00	9.20	24.07		24.28	0.000652	3.79	1856.95	460.00	0.23
F101	6230	PF 4	2442.00	9.20	25.43		25.62	0.000514	3.71	2480.47	460.00	0.21
F101	6230	PF 5	2115.00	9.20	24.74		24.92	0.000499	3.48	2164.78	460.00	0.20
F101	6130	PF 1	2928.00	9.20	25.55		25.82	0.000708	4.38	2535.27	460.00	0.24
F101	6130	PF 2	1198.00	9.20	20.19		20.45	0.001449	4.08	331.36	227.95	0.31

HEC-RAS Plan: 100YR River: F101-00-00 Reach: F101 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
F101	6130	PF 3	2114.00	9.20	24.00		24.21	0.000672	3.83	1824.34	460.00	0.23
F101	6130	PF 4	2442.00	9.20	25.37		25.57	0.000524	3.73	2455.25	460.00	0.21
F101	6130	PF 5	2115.00	9.20	24.69		24.87	0.000509	3.51	2140.36	460.00	0.20
F101	6120	PF 1	2928.00	6.40	25.67	11.93	25.76	0.000147	2.60	4024.73	600.00	0.11
F101	6120	PF 2	1198.00	6.40	20.34	9.99	20.38	0.000090	1.61	1053.94	291.73	0.08
F101	6120	PF 3	2114.00	6.40	24.10	11.09	24.17	0.000109	2.10	3086.78	600.00	0.09
F101	6120	PF 4	2442.00	6.40	25.46	11.43	25.53	0.000107	2.20	3901.07	600.00	0.09
F101	6120	PF 5	2115.00	6.40	24.77	11.09	24.83	0.000093	2.00	3486.54	600.00	0.09
F101	6013		Bridge									
F101	5908	PF 1	2928.00	6.20	24.83	12.33	24.95	0.000203	2.82	3486.24	600.00	0.12
F101	5908	PF 2	1198.00	6.20	19.85	10.34	19.89	0.000124	1.74	898.53	193.22	0.09
F101	5908	PF 3	2114.00	6.20	23.16	11.51	23.24	0.000159	2.32	2480.74	600.00	0.11
F101	5908	PF 4	2442.00	6.20	24.87	11.87	24.95	0.000140	2.34	3511.20	600.00	0.10
F101	5908	PF 5	2115.00	6.20	24.16	11.51	24.23	0.000124	2.14	3084.36	600.00	0.09
F101	5808		Bridge									
F101	5708	PF 1	2962.00	6.00	23.40	12.78	23.56	0.000342	3.27	2588.88	600.00	0.15
F101	5708	PF 2	1242.00	6.00	19.38	10.64	19.44	0.000185	1.95	783.31	142.63	0.10
F101	5708	PF 3	2151.00	6.00	21.79	11.97	21.90	0.000278	2.74	1623.54	597.52	0.13
F101	5708	PF 4	2524.00	6.00	24.10	12.36	24.20	0.000208	2.63	3008.04	600.00	0.12
F101	5708	PF 5	2188.00	6.00	23.32	11.99	23.40	0.000190	2.43	2540.33	600.00	0.11
F101	5700		Bridge									
F101	5698	PF 1	2962.00	6.00	23.11		23.28	0.000368	3.35	2416.57	600.00	0.15
F101	5698	PF 2	1242.00	6.00	19.32		19.38	0.000188	1.96	774.90	136.05	0.11
F101	5698	PF 3	2151.00	6.00	21.58		21.70	0.000294	2.79	1504.03	553.68	0.14
F101	5698	PF 4	2524.00	6.00	23.98		24.08	0.000214	2.66	2935.61	600.00	0.12
F101	5698	PF 5	2188.00	6.00	23.18		23.27	0.000197	2.46	2458.03	600.00	0.11
F101	5598	PF 1	2962.00	9.00	22.87		23.20	0.001116	4.70	1459.66	604.26	0.30
F101	5598	PF 2	1242.00	9.00	19.14		19.33	0.000966	3.55	349.89	61.30	0.26
F101	5598	PF 3	2151.00	9.00	21.35		21.63	0.001116	4.30	663.17	306.25	0.29
F101	5598	PF 4	2524.00	9.00	23.86		24.04	0.000529	3.49	2069.75	624.00	0.21
F101	5598	PF 5	2188.00	9.00	23.06		23.23	0.000562	3.38	1574.99	605.06	0.21
F101	5170	PF 1	2962.00	9.00	22.24		22.65	0.001467	5.16	1082.70	593.05	0.34
F101	5170	PF 2	1242.00	9.00	18.63		18.86	0.001233	3.89	319.40	58.66	0.29
F101	5170	PF 3	2151.00	9.00	20.74		21.09	0.001432	4.72	509.61	217.62	0.33
F101	5170	PF 4	2549.00	9.00	23.60		23.80	0.000603	3.65	1906.65	624.00	0.22
F101	5170	PF 5	2209.00	9.00	22.78		22.97	0.000645	3.55	1406.60	603.89	0.22
F101	4847	PF 1	2962.00	8.70	21.73		22.15	0.001590	5.21	673.45	241.63	0.35
F101	4847	PF 2	1242.00	8.70	18.17		18.42	0.001532	4.02	308.64	63.74	0.32
F101	4847	PF 3	2151.00	8.70	20.25		20.60	0.001580	4.76	451.98	73.97	0.34
F101	4847	PF 4	2549.00	8.70	23.41		23.60	0.000608	3.54	1305.51	507.45	0.22
F101	4847	PF 5	2209.00	8.70	22.58		22.76	0.000635	3.44	935.32	378.14	0.22
F101	4797	PF 1	2962.00	8.70	21.64		22.07	0.001650	5.28	651.67	228.84	0.35
F101	4797	PF 2	1242.00	8.70	18.08		18.34	0.001608	4.10	303.05	63.16	0.33
F101	4797	PF 3	2151.00	8.70	20.16		20.52	0.001647	4.83	445.23	73.52	0.35
F101	4797	PF 4	2549.00	8.70	23.37		23.57	0.000616	3.56	1289.06	505.54	0.22
F101	4797	PF 5	2209.00	8.70	22.55		22.73	0.000643	3.46	922.62	372.68	0.22
F101	4787	PF 1	2962.00	8.70	21.62		22.06	0.001663	5.30	647.30	226.45	0.35
F101	4787	PF 2	1242.00	8.70	18.06		18.32	0.001625	4.11	301.90	63.03	0.33
F101	4787	PF 3	2151.00	8.70	20.14		20.50	0.001661	4.85	443.84	73.43	0.35
F101	4787	PF 4	2549.00	8.70	23.37		23.56	0.000617	3.56	1285.75	505.15	0.22
F101	4787	PF 5	2209.00	8.70	22.54		22.72	0.000645	3.46	920.07	371.57	0.22
F101	4637	PF 1	2962.00	8.80	21.24		21.77	0.002068	5.86	517.72	133.73	0.39
F101	4637	PF 2	1242.00	8.80	17.77		18.07	0.001736	4.41	281.64	55.27	0.34
F101	4637	PF 3	2151.00	8.80	19.78		20.22	0.001986	5.33	403.82	65.92	0.38
F101	4637	PF 4	2549.00	8.80	23.24		23.46	0.000673	3.84	1133.19	498.04	0.23
F101	4637	PF 5	2209.00	8.80	22.41		22.62	0.000709	3.71	789.36	330.97	0.24
F101	4487	PF 1	2962.00	8.80	20.82		21.43	0.002435	6.23	475.39	74.49	0.43
F101	4487	PF 2	1242.00	8.80	17.44		17.78	0.002072	4.71	263.65	53.52	0.37
F101	4487	PF 3	2151.00	8.80	19.39		19.89	0.002362	5.68	378.41	63.85	0.41
F101	4487	PF 4	2549.00	8.80	23.13		23.36	0.000705	3.89	1078.95	480.57	0.24
F101	4487	PF 5	2209.00	8.80	22.29		22.51	0.000743	3.77	751.89	311.25	0.24

HEC-RAS Plan: 100YR River: F101-00-00 Reach: F101 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
F101	4477	PF 1	1.00	8.80	21.24		21.24	0.000000	0.00	518.22	134.35	0.00
F101	4477	PF 2	1.00	8.80	17.67		17.67	0.000000	0.00	276.44	54.77	0.00
F101	4477	PF 3	1.00	8.80	19.74		19.74	0.000000	0.00	400.79	65.68	0.00
F101	4477	PF 4	2698.00	8.80	23.08		23.35	0.000803	4.14	1059.10	474.02	0.25
F101	4477	PF 5	2343.00	8.80	22.25		22.50	0.000850	4.02	739.18	304.27	0.26
F101	4300	PF 1	1.00	8.80	21.24		21.24	0.000000	0.00	518.22	134.35	0.00
F101	4300	PF 2	1.00	8.80	17.67		17.67	0.000000	0.00	276.44	54.77	0.00
F101	4300	PF 3	1.00	8.80	19.74		19.74	0.000000	0.00	400.79	65.68	0.00
F101	4300	PF 4	2698.00	8.80	22.92		23.20	0.000860	4.23	985.41	448.85	0.26
F101	4300	PF 5	2343.00	8.80	22.08		22.34	0.000911	4.11	690.22	275.74	0.27
F101	4175	PF 1	1.00	8.80	21.24		21.24	0.000000	0.00	518.22	134.35	0.00
F101	4175	PF 2	1.00	8.80	17.67		17.67	0.000000	0.00	276.44	54.77	0.00
F101	4175	PF 3	1.00	8.80	19.74		19.74	0.000000	0.00	400.79	65.68	0.00
F101	4175	PF 4	2698.00	8.80	22.80		23.09	0.000905	4.29	933.92	399.06	0.27
F101	4175	PF 5	2343.00	8.80	21.95		22.22	0.000960	4.19	656.42	254.18	0.27
F101	3658	PF 1	1.00	8.90	21.24		21.24	0.000000	0.00	563.16	215.90	0.00
F101	3658	PF 2	1.00	8.90	17.67		17.67	0.000000	0.00	268.44	49.84	0.00
F101	3658	PF 3	1.00	8.90	19.74		19.74	0.000000	0.00	381.20	62.73	0.00
F101	3658	PF 4	2698.00	8.90	22.14		22.54	0.001182	5.10	824.56	358.19	0.31
F101	3658	PF 5	2343.00	8.90	21.26		21.64	0.001293	4.96	567.19	218.99	0.31
F101	3253	PF 1	1.00	8.90	21.24		21.24	0.000000	0.00	975.41	288.30	0.00
F101	3253	PF 2	1.00	8.90	17.67		17.67	0.000000	0.00	434.67	103.72	0.00
F101	3253	PF 3	1.00	8.90	19.74		19.74	0.000000	0.00	677.26	134.62	0.00
F101	3253	PF 4	2698.00	8.90	21.83		22.14	0.000760	4.49	1166.93	361.53	0.26
F101	3253	PF 5	2343.00	8.90	20.92		21.20	0.000808	4.34	888.61	248.10	0.26
F101	3179	PF 1	1.00	8.40	21.24		21.24	0.000000	0.00	655.58	306.54	0.00
F101	3179	PF 2	1.00	8.40	17.67		17.67	0.000000	0.00	314.02	65.78	0.00
F101	3179	PF 3	1.00	8.40	19.74		19.74	0.000000	0.00	460.71	76.14	0.00
F101	3179	PF 4	2698.00	8.40	21.78		22.07	0.000966	4.32	872.09	473.86	0.27
F101	3179	PF 5	2343.00	8.40	20.85		21.13	0.001095	4.28	565.96	159.85	0.29
F101	3149	PF 1	1.00	8.40	21.24		21.24	0.000000	0.00	655.58	306.54	0.00
F101	3149	PF 2	1.00	8.40	17.67		17.67	0.000000	0.00	314.02	65.78	0.00
F101	3149	PF 3	1.00	8.40	19.74		19.74	0.000000	0.00	460.71	76.14	0.00
F101	3149	PF 4	2698.00	8.40	21.75		22.04	0.000980	4.34	857.08	466.55	0.28
F101	3149	PF 5	2343.00	8.40	20.81		21.10	0.001113	4.30	560.30	151.74	0.29
F101	3073	PF 1	1.00	8.40	21.24		21.24	0.000000	0.00	655.58	306.54	0.00
F101	3073	PF 2	1.00	8.40	17.67		17.67	0.000000	0.00	314.02	65.78	0.00
F101	3073	PF 3	1.00	8.40	19.74		19.74	0.000000	0.00	460.71	76.14	0.00
F101	3073	PF 4	2698.00	8.40	21.66		21.96	0.001015	4.39	819.12	447.53	0.28
F101	3073	PF 5	2343.00	8.40	20.72		21.01	0.001163	4.36	546.90	130.49	0.29
F101	3048	PF 1	1.00	8.40	21.24		21.24	0.000000	0.00	655.58	306.54	0.00
F101	3048	PF 2	1.00	8.40	17.67		17.67	0.000000	0.00	314.02	65.78	0.00
F101	3048	PF 3	1.00	8.40	19.74		19.74	0.000000	0.00	460.71	76.14	0.00
F101	3048	PF 4	2698.00	8.40	21.64		21.94	0.001027	4.40	806.70	441.13	0.28
F101	3048	PF 5	2343.00	8.40	20.69		20.98	0.001180	4.38	542.82	123.29	0.30
F101	3023	PF 1	1.00	8.40	21.24	8.76	21.24	0.000000	0.00	655.58	306.54	0.00
F101	3023	PF 2	1.00	8.40	17.67	8.76	17.67	0.000000	0.00	314.02	65.78	0.00
F101	3023	PF 3	1.00	8.40	19.74	8.76	19.74	0.000000	0.00	460.71	76.14	0.00
F101	3023	PF 4	2698.00	8.40	21.61	16.42	21.91	0.001039	4.42	794.20	434.59	0.28
F101	3023	PF 5	2343.00	8.40	20.65	16.00	20.95	0.001199	4.40	538.87	115.91	0.30
F101	3004		Bridge									
F101	2985	PF 1	1.00	8.40	21.24		21.24	0.000000	0.00	655.58	306.54	0.00
F101	2985	PF 2	1.00	8.40	17.67		17.67	0.000000	0.00	314.02	65.78	0.00
F101	2985	PF 3	1.00	8.40	19.74		19.74	0.000000	0.00	460.71	76.14	0.00
F101	2985	PF 4	2698.00	8.40	20.61		21.02	0.001621	5.10	534.26	106.63	0.35
F101	2985	PF 5	2343.00	8.40	19.93		20.31	0.001682	4.93	475.61	77.10	0.35
F101	2975	PF 1	1.00	8.40	21.24		21.24	0.000000	0.00	655.58	306.54	0.00
F101	2975	PF 2	1.00	8.40	17.67		17.67	0.000000	0.00	314.02	65.78	0.00
F101	2975	PF 3	1.00	8.40	19.74		19.74	0.000000	0.00	460.71	76.14	0.00
F101	2975	PF 4	2698.00	8.40	20.59		21.00	0.001635	5.11	532.29	103.56	0.35
F101	2975	PF 5	2343.00	8.40	19.91		20.29	0.001697	4.94	474.11	77.00	0.35
F101	2820	PF 1	3095.00	8.40	20.58		21.11	0.002167	5.88	530.73	102.60	0.40
F101	2820	PF 2	1411.00	8.40	17.15		17.54	0.002677	5.03	280.58	62.77	0.42

HEC-RAS Plan: 100YR River: F101-00-00 Reach: F101 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
F101	2820	PF 3	2297.00	8.40	19.14		19.61	0.002353	5.52	415.95	73.19	0.41
F101	2820	PF 4	2851.00	8.40	20.18		20.69	0.002231	5.76	494.73	78.31	0.40
F101	2820	PF 5	2477.00	8.40	19.48		19.97	0.002312	5.61	441.72	74.90	0.41
F101	2310	PF 1	3095.00	5.50	17.38		19.09	0.007952	10.49	295.14	46.18	0.73
F101	2310	PF 2	1411.00	5.50	13.99		15.21	0.008623	8.88	158.91	34.03	0.72
F101	2310	PF 3	2297.00	5.50	15.98		17.48	0.008158	9.83	233.75	41.15	0.73
F101	2310	PF 4	2851.00	5.50	16.98		18.63	0.008005	10.30	276.82	44.74	0.73
F101	2310	PF 5	2477.00	5.50	16.32		17.87	0.008110	9.99	247.91	42.36	0.73
F101	2110	PF 1	3095.00	2.60	17.03		17.87	0.003220	7.35	421.14	57.85	0.48
F101	2110	PF 2	1411.00	2.60	13.56		14.08	0.002856	5.77	244.38	44.08	0.43
F101	2110	PF 3	2297.00	2.60	15.59		16.29	0.003091	6.72	341.95	52.14	0.46
F101	2110	PF 4	2851.00	2.60	16.61		17.41	0.003186	7.17	397.56	56.21	0.48
F101	2110	PF 5	2477.00	2.60	15.93		16.67	0.003128	6.88	360.23	53.51	0.47
F101	1820	PF 1	3095.00	2.60	13.78	13.31	16.08	0.012371	12.18	254.21	44.96	0.90
F101	1820	PF 2	1411.00	2.60	10.81	10.40	12.43	0.013032	10.20	138.29	33.17	0.88
F101	1820	PF 3	2297.00	2.60	12.59	12.10	14.57	0.012330	11.29	203.50	40.23	0.88
F101	1820	PF 4	2851.00	2.60	13.45	12.95	15.65	0.012315	11.91	239.42	43.63	0.90
F101	1820	PF 5	2477.00	2.60	12.91	12.38	14.94	0.012154	11.44	216.52	41.49	0.88
F101	1260	PF 1	3095.00	1.20	11.18		12.12	0.003851	7.76	399.01	59.93	0.53
F101	1260	PF 2	1411.00	1.20	7.98		8.57	0.003736	6.21	227.33	47.10	0.50
F101	1260	PF 3	2297.00	1.20	9.62		10.47	0.004207	7.40	310.41	53.70	0.54
F101	1260	PF 4	2851.00	1.20	10.65		11.59	0.004082	7.75	367.69	57.81	0.54
F101	1260	PF 5	2477.00	1.20	9.86		10.77	0.004385	7.67	323.09	54.63	0.55
F101	1160	PF 1	3095.00	0.50	11.20		11.70	0.002235	5.70	696.82	131.04	0.36
F101	1160	PF 2	1411.00	0.50	7.84		8.16	0.002972	4.55	327.34	88.83	0.38
F101	1160	PF 3	2297.00	0.50	9.58		10.02	0.002659	5.34	501.20	110.71	0.37
F101	1160	PF 4	2851.00	0.50	10.65		11.14	0.002415	5.65	626.98	124.16	0.37
F101	1160	PF 5	2477.00	0.50	9.82		10.30	0.002722	5.54	528.56	113.77	0.38
F101	1150	PF 1	3095.00	0.50	11.17	7.29	11.68	0.002262	5.72	693.25	130.69	0.36
F101	1150	PF 2	1411.00	0.50	7.80	4.95	8.13	0.003052	4.58	324.14	88.37	0.38
F101	1150	PF 3	2297.00	0.50	9.55	6.57	9.99	0.002708	5.37	497.49	110.29	0.38
F101	1150	PF 4	2851.00	0.50	10.62	7.08	11.12	0.002448	5.67	623.31	123.79	0.37
F101	1150	PF 5	2477.00	0.50	9.79	6.74	10.27	0.002770	5.57	524.73	113.35	0.38
F101	1104		Bridge									
F101	1058	PF 1	3095.00	0.50	9.00	7.29	9.98	0.006665	7.93	439.43	103.47	0.58
F101	1058	PF 2	1411.00	0.50	7.07	4.95	7.53	0.005516	5.48	262.67	79.15	0.50
F101	1058	PF 3	2297.00	0.50	8.14	6.57	8.89	0.006353	6.94	354.75	92.62	0.55
F101	1058	PF 4	2851.00	0.50	8.65	7.08	9.59	0.007009	7.79	403.55	99.02	0.59
F101	1058	PF 5	2477.00	0.50	8.05	6.74	8.95	0.007843	7.62	346.82	91.54	0.61
F101	1043	PF 1	3095.00	0.50	9.10		9.85	0.004734	6.97	496.58	104.71	0.48
F101	1043	PF 2	1411.00	0.50	7.12		7.45	0.003307	4.58	314.03	79.86	0.38
F101	1043	PF 3	2297.00	0.50	8.22		8.78	0.004244	5.99	409.25	93.65	0.44
F101	1043	PF 4	2851.00	0.50	8.75		9.46	0.004844	6.79	460.36	100.27	0.48
F101	1043	PF 5	2477.00	0.50	8.16		8.82	0.005128	6.53	403.27	92.84	0.49
F101	948	PF 1	3465.00	-2.50	8.84		9.58	0.001839	7.13	1607.89	345.93	0.40
F101	948	PF 2	1861.00	-2.50	6.92		7.28	0.001145	4.87	1008.61	279.51	0.30
F101	948	PF 3	2696.00	-2.50	7.99		8.55	0.001534	6.14	1327.73	316.62	0.36
F101	948	PF 4	3148.00	-2.50	8.53		9.18	0.001704	6.72	1501.32	335.09	0.38
F101	948	PF 5	2739.00	-2.50	7.96		8.54	0.001603	6.26	1317.59	315.51	0.37
F101	580	PF 1	3465.00	-2.50	8.06		8.96	0.002470	7.82	1348.26	318.86	0.46
F101	580	PF 2	1861.00	-2.50	6.52		6.92	0.001378	5.16	897.96	265.44	0.33
F101	580	PF 3	2696.00	-2.50	7.40		8.04	0.001958	6.62	1144.53	295.89	0.40
F101	580	PF 4	3148.00	-2.50	7.83		8.62	0.002231	7.31	1276.62	310.98	0.43
F101	580	PF 5	2739.00	-2.50	7.32		8.01	0.002083	6.79	1123.50	293.41	0.41
F101	0.0	PF 1	4275.00	-2.90	5.98	4.30	7.02	0.004707	8.71	2615.21	1043.97	0.61
F101	0.0	PF 2	2796.00	-2.90	4.62	3.02	5.40	0.004701	7.42	1412.06	637.64	0.58
F101	0.0	PF 3	3557.00	-2.90	5.37	3.66	6.29	0.004697	8.13	2000.01	934.96	0.60
F101	0.0	PF 4	3992.00	-2.90	5.76	4.10	6.77	0.004707	8.50	2387.21	1018.21	0.60
F101	0.0	PF 5	3486.00	-2.90	5.30	3.58	6.22	0.004696	8.07	1940.80	909.44	0.59

Appendix B
HEC-HMS Output

Armand Bayou and Clear Creek Watershed

		(10%) 10-Yr Storm Event		(50%) 2-Yr Storm Event		(1%) 100-Yr Storm Event		(0.2%) 500-Yr Storm Event	
Hydrologic Element	Drainage Area (sq mi)	Discharge Peak (cfs)	Total Volume (ac-ft)	Discharge Peak (cfs)	Total Volume (ac-ft)	Discharge Peak (cfs)	Total Volume (ac-ft)	Discharge Peak (cfs)	Total Volume (ac-ft)
b104b	1.245	539.28	421.56	277.3	191.05	930.76	796.23	1320.8	1178.3
b104a	0.691	417.91	221.28	220.29	96.029	699.09	427.98	969.17	639.63
b104c	0.985	445.08	341.68	233.66	157.59	756.04	638.91	1068	941.48
b104#1	2.921	1328.5	984.51	678.59	444.67	2304.2	1863.1	3272.9	2759.4
rt_b104#1-b104#2	2.921	1326.6	984.51	677.31	444.67	2275.1	1863.1	2875.7	2759.4
b104d	0.669	378.53	222.46	200.93	99.455	633.95	423.38	882.11	628.57
b104#2	3.59	1654.5	1207	842.71	544.13	2830.8	2286.5	3517.2	3388
rt_b104#2-b104#3	3.59	1652.1	1207	841.36	544.13	2815.7	2286.5	3397.3	3388
b104e	0.526	178.31	151.97	85.82	60.114	320.17	307.69	464.09	468.26
b104#3u	4.116	1825.3	1358.9	922.11	604.24	3126.4	2594.2	3744.3	3856.3
b10405a	1.88	666.61	543.89	322.41	215.43	1190.5	1100.5	1720.9	1674.4
b10405#1	1.88	666.61	543.89	322.41	215.43	1190.5	1100.5	1720.9	1674.4
rt_b10405#1-b104#3	1.88	665.76	543.89	320.87	215.43	1190	1100.5	1720.5	1674.4
b10405b	0.823	699.49	270.26	384.53	119.66	1132.6	517.1	1533.3	769.41
b10405#2	2.703	1298.5	814.15	654.24	335.09	2220.1	1617.6	3114.8	2443.9
b104#3d	6.819	2999.2	2173.1	1510	939.33	5057.1	4211.8	6582.8	6300.1
rt_b104#3-b104#4	6.819	2998.5	2173.1	1508.8	939.33	5032.1	4211.8	6191	6300.1
b104f	0.661	813.5	231.43	470.49	107.44	1270	431.1	1676.8	634.22
b104#4	7.48	3487.4	2404.5	1763.1	1046.8	5638.6	4642.9	6895.7	6934.3
rt_b104#4-b104#5	7.48	3485.3	2404.5	1760.4	1046.8	5604.6	4642.9	6797.3	6934.3
b104g	0.097	135.8	33.547	79.598	15.44	209.78	62.808	274.56	92.601
b104#5u	7.577	3554.4	2438.1	1794.4	1062.2	5710.5	4705.7	6916.4	7026.9
b10404a	2.3	601.25	745.73	296.14	326.9	1088	1434.6	1590.5	2139.4
B10404_RES	2.3	402.12	745.32	177.2	326.76	767.03	1433.7	1573.6	2137.6
b10404#1	2.3	402.12	745.32	177.2	326.75	767.03	1433.7	1573.6	2137.6
rt_b10404#1-b10404	2.3	191.99	491.25	45.656	167.37	447.07	1138.1	700.48	1819.8
b10404b	0.592	320.5	190.11	166.92	82.694	541.4	367.25	757.21	548.6
b10404c	1.005	363.57	297.38	177.66	120.39	645.47	595.6	931.01	902.62
b10404#2u	3.897	689.71	978.75	347.25	370.34	1196.3	2101	1706.9	3271
B20404_Div	3.897	637.13	962.38	346.86	370.4	987.66	1970.3	1406.7	2913.4
B20404_US_Flow	3.897	637.13	962.38	346.86	370.28	987.66	1970.3	1406.7	2913.4
rt_b10404#2-b104#5	3.897	636.98	961.92	346.65	370.1	987.56	1969.8	1406.6	2912.8
b104#5d	11.474	4183.2	3400	2126.7	1432.2	6697.4	6675.5	8322.3	9939.7
rt_b104#5-b104#6	11.474	4174.3	3398.2	2121.4	1431.2	6659.6	6673.4	8184.4	9936.7
b104h	0.263	230.11	83.982	126.03	36.362	372.36	162.63	503.19	243.18
b104#6u	11.737	4341.3	3482.2	2202.7	1467.4	6894.6	6836	8394.9	10180
B20404_Div(br)	0	52.586	16.363	0.39288	0.059748	208.63	130.68	300.22	357.56
b10404#2d	0	52.586	16.363	0.39288	0.059732	208.63	130.68	300.22	357.56
rt_b10404#2-b104#6	0	52.009	16.363	0.15039	0.05947	207.9	130.68	299.62	357.56
b10404d	0.396	294.17	124.56	157.47	53.255	483.57	242.79	660.56	364.01
b10404#3	0.396	311.16	140.92	157.48	53.315	641.09	373.47	909.89	721.57
b104#6d	12.133	4631	3623.1	2319.1	1520.8	7457.4	7209.5	9031.8	10901
rt_b104#6-b104#7	12.133	4626.8	3620.4	2309.8	1519.2	7448.2	7206.2	8994.3	10897
b104i	0.312	215.11	97.126	114.22	41.163	356.54	190.18	489.67	285.65
b104#7u	12.445	4803.9	3717.6	2393.2	1560.2	7715.5	7396.3	9243.4	11183
b10403a	2.777	1524.3	952.87	804.01	436.07	2567.3	1789.8	3590	2642.5
b104#7d	15.222	6314	4670.4	3166.4	1996.3	10145	9186.2	12164	13825
rt_b104#7-b104#8	15.222	6300.2	4667.5	3155	1994.6	10136	9182.3	12157	13820
b104j	0.254	189.11	81.502	101.78	35.428	310.64	157.5	425.01	235.3
b104k	0.309	284.1	103.79	158.04	46.756	456.47	196.7	615.66	291.5
b104#8u	15.785	6649.3	4852.8	3317.8	2076.7	10654	9536.5	12742	14347
b10408a	0.748	642.2	260.92	358.01	120.81	1034.7	486.78	1398.6	716.59
b104#8d	16.533	7117.9	5113.7	3543.8	2197.5	11359	10023	13712	15063
rt_b104#8-b104#9	16.533	7080	5112.3	3520.1	2196.7	11330	10021	13697	15060
b104#9u	16.533	7080	5112.3	3520.1	2196.6	11330	10021	13697	15060
b10402a	0.924	720.61	316.45	395.34	144.62	1173	594.88	1597.3	878.58
b104#9d	17.457	7626.7	5428.7	3782.5	2341.2	12179	10616	14946	15939
rt_b104#9-b104#10	17.457	7583.4	5425	3750	2339	12164	10611	14927	15932
b104l	0.368	165.21	112.8	83.265	47.162	285.51	222.38	405.52	334.93
b104m	0.383	278.83	130.72	152.01	59.595	456.85	246.09	625.32	363.67
b104#10u	18.208	7937.2	5668.6	3911.8	2445.6	12758	11080	15800	16630
b10401a	0.557	517.01	178.37	282.4	77.407	833.98	344.98	1130.4	515.59

b104#10d	18.765	8259.1	5846.9	4050.8	2523	13279	11425	16570	17146
rt_b104#10-b100#8	18.765	8197.2	5842.8	3995.8	2520.5	13258	11418	16516	17138
b104n	0.682	231.89	200.92	112.33	81.003	415.31	403.21	601.39	611.53
b104#11	19.447	8411.7	6043.7	4087.6	2601.4	13656	11822	17098	17749
b111a	0.95	501.85	269.8	252.47	104.89	860.61	550.58	1209.1	840.43
b111#1	0.95	501.85	269.8	252.47	104.89	860.61	550.58	1209.1	840.43
rt_b111#1-b100#4	0.95	500	269.8	251.37	104.89	855.95	550.58	1204	840.43
b111b	0.438	283.22	131.59	148.11	54.033	473.78	261.75	654.19	395.63
b111#2	1.388	770.61	401.39	392.78	158.92	1300.8	812.33	1820.7	1236.1
b113a	1.528	536.4	512.64	273.33	230.74	936.85	972.01	1344.1	1440.8
b113#1	1.528	536.4	512.64	273.33	230.74	936.85	972.01	1344.1	1440.8
rt_b113#1-b100#3	1.528	522.09	512.64	271.79	230.74	865.91	972.01	1050.9	1440.8
b113b	2.15	602.28	678.75	294.83	291.11	1088.6	1320.9	1588.2	1979.1
b113#2	3.678	1019.2	1191.4	554.93	521.85	1635.5	2292.9	2166.9	3419.9
b115a	1.125	857.65	388.35	471.98	178.49	1396.3	727.64	1901.9	1073.2
b115#1	1.125	857.65	388.35	471.98	178.49	1396.3	727.64	1901.9	1073.2
rt_b115#1-b100#2	1.125	840.79	388.35	460.8	178.49	1287.6	727.64	1676.1	1073.2
b115b	1.547	493.09	525.62	248.66	238.82	871.85	991.35	1258	1466.2
b115#2	2.672	1254	913.97	655.88	417.31	2159.4	1719	2901.8	2539.3
b100a	1.433	520.04	476.13	264.43	212.74	907.37	906.48	1300.6	1346
b114a	1.228	626.05	414.69	330.69	187.57	1055.7	784.13	1479.7	1161
b100#1	2.661	1137.7	890.82	588.84	400.31	1946.3	1690.6	2759.1	2507
rt_b100#1-b100#2	2.661	1075.3	890.82	579.54	400.31	1926.2	1690.6	2736.5	2507
b100#2u	2.661	1075.3	890.82	579.54	400.31	1926.2	1690.6	2736.5	2507
b100#2d	5.333	2233.8	1804.8	1235.4	817.62	4056.6	3409.6	5485.6	5046.3
rt_b100#2-b100#3	5.333	2172.8	1804.8	1207.8	817.62	3983.7	3409.6	5440.8	5046.3
b100b	1.364	734.98	447.03	384.02	197.63	1240.2	856.05	1735.1	1274.2
b100#3u	6.697	2574.4	2251.8	1483.2	1015.3	4769.8	4265.7	6472.2	6320.5
b112a	3.158	1675	1050.9	877.01	470.12	2827.3	1999.5	3958.5	2968.1
b112#1u	3.158	1675	1050.9	877.01	470.12	2827.3	1999.5	3958.5	2968.1
b11202a	2.519	702.03	776.02	340.18	325.91	1275.5	1526.5	1864.3	2297.1
b10903_div	2.519	126.35	93.694	26.965	23.924	340.77	279.42	575.54	513.58
b112#1d	5.677	1788	1144.6	899.55	494.05	3138.3	2278.9	4494	3481.7
rt_b112#1-b100#3	5.677	1779.8	1144.6	888.81	494.05	3129.2	2278.9	4433.9	3481.7
b112b	1.933	1013.8	618.75	525.53	268.43	1718.5	1196.9	2409.4	1789
b112#2	7.61	2740.6	1763.4	1369.2	762.48	4787.7	3475.8	6628.1	5270.7
b100#3d	17.985	5897.1	5206.6	3207.5	2299.6	10176	10034	14369	15011
rt_b100#3-b100#4	17.985	5788.3	5206.6	3188.8	2299.6	10014	10034	14288	15011
b100c	0.292	136.19	84.628	67.766	33.58	236.04	171.1	334.89	260.24
b100#4u	18.277	5882.6	5291.2	3234.1	2333.2	10164	10206	14522	15271
b100#4d	19.665	6359.9	5692.6	3466.2	2492.1	10886	11018	15687	16507
rt_b100#4-b100#5	19.665	6318.2	5692.6	3435.9	2492.1	10759	11018	15591	16507
b100d	1.685	452.96	484.43	211.01	190.68	838.37	983.02	1232.8	1497.3
b100#5u	21.35	6715.6	6177	3615	2682.8	11434	12001	16653	18005
b10903_div(br)	0	575.68	682.32	313.21	301.99	934.69	1247.1	1288.8	1783.5
rt_b11202-b109_div	0	574.92	682.32	311.05	301.99	934.12	1247.1	1288.1	1783.5
b109a	2.874	670.25	871.68	318.88	361.24	1242.3	1726.2	1834	2604.5
b109#1	2.874	1240.4	1554	612.18	663.23	2173.8	2973.3	3117.8	4387.9
b100#5d	24.224	7847.1	7731	4176	3346	13278	14974	19414	22393
rt_b100#5-b100#6	24.224	7814.5	7729.3	4138.3	3345.3	13236	14971	19207	22388
b100e	1.705	624.31	509.59	305.89	208.25	1107	1016	1594.9	1537.1
b100#6	25.929	8193.7	8238.9	4306.4	3553.5	13843	15987	20056	23925
rt_b100#6-b100#7	25.929	8173.5	8236.2	4278.5	3552.6	13828	15981	19992	23917
b100f	0.89	464.78	286.38	235	124.77	803.35	552.75	1138	825.4
b100#7u	26.819	8370.2	8522.5	4368.6	3677.3	14152	16534	20334	24742
b106a	1.678	807.44	517.37	411.54	217.45	1384.6	1017.3	1955.7	1530.6
b106#1	1.678	807.44	517.37	411.54	217.45	1384.6	1017.3	1955.7	1530.6
rt_b106#1-b106#2	1.678	805.36	517.37	408.08	217.45	1382.8	1017.3	1951.4	1530.6
b106b	1.287	1230.1	428.45	686.88	191.72	1969.4	815.04	2644.2	1209.8
b106#2	2.965	1857.8	945.82	957.12	409.17	3111.8	1832.4	4309.2	2740.4
rt_b106#2-b106#3	2.965	1846.4	945.82	945.9	409.17	3066.7	1832.4	4021.5	2740.4
b106c	1.428	1257.4	490.17	701.2	224.38	2023.2	920.57	2728.7	1359.1
b106#3	4.393	2922.7	1436	1495.3	633.55	4782.8	2753	6329.3	4099.5
rt_b106#3-b106#4	4.393	2891.2	1436	1470.7	633.55	4756.2	2753	6134.6	4099.5
b106d	2.679	785.54	847.49	386.23	364.11	1412.6	1647.8	2054.9	2468.1
b106#4	7.072	3676.4	2283.5	1849.4	997.66	6166.4	4400.8	8181	6567.6
rt_b106#4-b100#7	7.072	3661.5	2283.5	1837.4	997.66	6103.3	4400.8	8049.6	6567.6
b106e	0.906	270.34	277.94	130.99	116.3	488.86	547.75	712.24	824.85
b106#5	7.978	3931.8	2561.4	1965.1	1114	6590	4948.5	8701.9	7392.4

b100#7d	34.797	10116	11084	5225.4	4791.3	17444	21483	24139	32135
rt_b100#7-b100#8	34.797	10098	11075	5198.6	4787.9	17417	21466	24032	32110
b100g	1.052	288.66	321.63	136.78	134.18	528.5	634.82	772.75	956.54
b100#8u	35.849	10312	11397	5288.7	4922	17841	22101	24709	33067
b100#8d	55.296	14895	17441	7169.9	7523.5	28030	33922	39139	50816
rt_b100#8-b100#9	55.296	14871	17284	7164.5	7449	27996	33617	39098	50383
b100h	3.802	587.3	1138.5	271	483.76	1107.5	2228.1	1642.2	3346.6
b100#9	59.098	15433	18422	7398.7	7932.4	29102	35845	40693	53730
cw103a_ovfl(br)	0	578.33	306.35	0	0	1104	1216.5	1104	1696.5
rt_cw103a_ovfl	0	578.33	306.35	0	0	1104	1216.5	1104	1696.5
cw103b	1.93	196.28	486.18	69.839	178.06	509	1068.3	912.47	1677.7
cw103#2u	1.93	774.47	792.53	69.839	178.01	1613	2284.8	2016.5	3374.2
cw100a_ovfl(br)	0	316	269.43	84.33	25.326	316	477.49	316	611
rt_cw100a_ovfl	0	316	269.43	84.33	25.326	316	477.49	316	611
cw100a2_ovfl(br)	0	464.01	530.45	185.95	156.02	963	1412.9	963	1889.1
rt_cw100a2_ovfl	0	464.01	530.45	185.95	156.02	963	1412.9	963	1889.1
cw103a	1.351	371.06	396.27	173.96	159.08	683.52	796.81	1002.6	1209.4
cw103#1u	1.351	1130.3	1196.1	425.21	340.43	1962.5	2687.2	2281.6	3709.5
cw103a_ovfl	1.351	552	889.8	425.21	340.43	858.52	1470.7	1177.6	2013
cw103#1d	1.351	552	889.8	425.21	340.43	858.52	1470.7	1177.6	2013
rt_cw103#1-cw103#	1.351	535.32	889.79	304.76	340.43	722.5	1470.7	1030.4	2013
cw103#2d	3.281	1172.3	1682.3	368.36	518.44	2313.2	3755.5	3004.5	5387.1
rt_cw103#2-cw100#	3.281	888	1675.1	347.34	515.16	2174.4	3746	2817.1	5378
cw103c	1.637	484.84	468.93	229.21	183.91	886.83	953.16	1297.2	1452.7
cw103#3	4.918	1123.3	2144	451.39	699.01	2674.1	4699.1	3669.4	6830.8
cw103c_ovfl	4.918	749.41	1815.7	451.39	699.07	990.14	2692.8	1595.4	3509.6
cw100a	2.949	742.55	874.14	340.25	354.47	1381.2	1749.3	2030.2	2650.3
cw100#1a	2.949	742.55	874.14	340.25	354.47	1381.2	1749.3	2030.2	2650.3
cw100a_ovfl	2.949	426.55	604.71	255.92	329.15	1065.2	1271.9	1714.2	2039.3
cw104a	1.613	184.95	429.61	67.505	162.66	469.63	919.24	832.28	1426.7
cw100#1b	4.562	611.35	1034.3	322.18	491.77	1532.9	2191.1	2537.1	3465.9
cw100a2_ovfl	4.562	147.35	503.87	136.23	335.79	569.94	778.21	1574.1	1576.9
cw100#1d	4.562	147.35	503.87	136.23	335.75	569.94	778.21	1574.1	1576.9
rt_cw100#1-cw100#	4.562	139.88	497.29	129.69	332.62	388.94	770.14	942.54	1569.3
cw100b	1.833	265.27	517.02	99.961	201.11	650.73	1072.2	1127.4	1641.8
cw100#2u	6.395	383.95	1014.3	206.34	533.65	984.55	1842.3	1825.3	3211.1
cw100#2d	11.313	1120.7	2830	657.72	1232.7	1940.8	4535.1	3420.2	6720.8
rt_cw100#2-cw100#	11.313	1120.5	2819.5	657.27	1227.7	1938.4	4522.4	3413.3	6709.1
cw100c	1.231	785.68	380.82	410.14	160.53	1314.9	747.73	1821.7	1124.3
cw100#3u	12.544	1542.6	3200.3	709.02	1388.1	2487.4	5270.2	3861.2	7833.5
cw103c_ovfl(br)	0	373.88	328.34	0	0	1684	2006.3	2074	3321.2
rt_cw103c_ovfl	0	373.88	328.34	0	0	1684	2006.3	2074	3321.2
cw102a	2.993	309.08	754.98	109.41	275.36	804.63	1659.4	1445.1	2604.5
cw102a_ovfl	2.993	309.08	754.98	109.41	275.36	451.29	1336.9	971.07	1877.3
cw102#1	2.993	309.08	754.98	109.41	275.29	451.29	1336.9	971.07	1877.3
rt_cw102#1-cw100#	2.993	276.82	742.18	94.158	269.47	422.28	1320.6	686.99	1862
cw102b	1.703	492.98	491.58	233.3	194.28	902.83	995.7	1321.8	1515.6
cw102#2	4.696	642.25	1233.8	267.49	463.66	1202.4	2316.3	1786	3377.6
cw103c_infl	4.696	912.49	1562.1	267.49	463.66	2679.3	4322.6	3848.9	6698.7
cw100#3d	17.24	2337.8	4762.4	950.3	1851.8	4982	9592.8	7546	14532
rt_cw100#3-a100#1	17.24	2331.2	4731.3	943.3	1837.4	4967.6	9552.9	7532.2	14494
cw100d	3.456	1230.9	1076.3	606.36	456.31	2185.6	2107.1	3149.1	3164.7
cw100#4	20.696	3336.5	5807.6	1422.8	2293.5	6266.5	11660	9757.6	17659
ma100a	3.947	481.53	1112.3	184.76	444.64	1166.8	2309.9	2016.2	3548.3
ma100b	1.048	130.56	284.76	48.358	108.74	325.31	602.17	569.62	930.13
ma100#1	4.995	611.91	1397.1	232.97	553.25	1491.5	2912	2584.5	4478.4
swec	4.995	551.34	1363.2	232.97	553.37	1269.6	2695.4	2275.7	4261.8
rt_ma100#1-ma100#	4.995	496.16	1327.1	193.98	534.79	1002.8	2653.5	1536.8	4221.6
ma100c	4.844	1151.7	1473.1	547.24	611.86	2130.6	2914	3137.9	4394.7
ma100#2	9.839	1472.5	2800.2	617	1146.5	2841	5567.5	4232.9	8616.3
rt_ma100#2-ma100#	9.839	1460.4	2752.2	615.6	1122.1	2722	5514.5	4047.3	8563
ma100d	2.47	329.88	711.64	128.93	287.34	780.73	1459.1	1330.5	2230.2
ma100#3	12.309	1755.1	3463.8	739.57	1409.2	3176.7	6973.6	4718.3	10793
rt_ma100#3-a100#1	12.309	1749	3414.2	736.22	1381.1	3167.3	6917.3	4701.5	10736
ma100e	3.903	1128.7	1210.5	550.01	511.35	2040.3	2374.1	2974.5	3568.3
ma100#4	16.212	2398.5	4624.6	1067.5	1892.2	3764.6	9291.3	5337.1	14304
hi100a	3.604	335.41	893.37	120.52	331.64	864.34	1971.4	1548.2	3111.3
hi100#1	3.604	335.41	893.37	120.52	331.54	864.34	1971.4	1548.2	3111.3
rt_hi100#1-a100#7	3.604	310.13	861	102.74	315.47	686.02	1933.2	1034.5	3072.4

hi100b	4.108	507	1136.7	195.61	448.2	1201.4	2368.9	2043.4	3649.3
hi100#2	7.712	787.82	1997.7	271.7	763.45	1801.5	4302.1	2863.5	6721.7
a100a	3.213	414.31	856.09	147.38	315.4	1077.2	1832.4	1925.2	2834.9
a100#1	3.213	414.31	856.09	147.38	315.34	1077.2	1832.4	1925.2	2834.9
rt_a100#1-a100#2	3.213	238.67	831.38	109.36	302.06	434.78	1700.2	1088.4	2614.5
a100b	2.213	176.59	512.28	62.824	187.25	458.69	1157.7	826.62	1854.3
a100#2	5.426	388.21	1343.7	165.13	489.17	814.45	2857.9	1751.2	4468.9
rt_a100#2-a100#3	5.426	340.94	1293	147.56	471.94	634.74	2580.2	1231.7	4061.1
a100c	2.217	325.25	638.5	126.38	254.34	773.92	1308.8	1319.4	1997.8
a100#3u	7.643	530.84	1931.5	226.83	726.07	1103.3	3889	1748.4	6058.9
a100d	1.657	242.34	459.03	88.707	174.26	613.15	961.09	1078	1473.7
a100#3a	1.657	242.34	459.03	88.707	174.24	613.15	961.09	1078	1473.7
rt_a100#3a-a100#3	1.657	184.81	454.53	71.233	171.76	438.12	957.17	698.37	1472
a100e	3.698	328.83	872.48	112.54	308.09	882.08	1982.2	1611.6	3159
a100#3b	5.355	500.13	1327	178.17	479.72	1278.9	2939.4	2230.6	4630.9
a100#3d	12.998	1030.8	3258.5	397.17	1205.8	2381.5	6828.4	3951	10690
rt_a100#3-a100#4	12.998	858.39	3146.5	364.21	1169.2	1766.8	6412	3118.8	10086
a100f	3.358	445.57	951.23	173.09	378.25	1057.6	1964	1803	3010.5
a100#4	16.356	1122.4	4097.7	479.12	1547	2341.7	8376	3918.2	13096
rt_a100#4-a100#5	16.356	850.56	3373	401.6	1495.8	1935	7001.5	3328.4	11404
a100g	3.201	909.58	952.16	433.28	387.38	1662.3	1902.5	2433	2880.5
a100#5u	19.557	1166.1	4325.2	566.04	1882.5	2139.4	8904	3655.9	14284
a100h	3.866	337.67	912.98	116.53	325.23	902.8	2070.9	1648.4	3301.3
a100#5a	3.866	337.67	912.98	116.53	325.12	902.8	2070.9	1648.4	3301.3
rt_a100#5a-a100#5	3.866	335.31	885.33	113.99	308.52	893.99	2036.5	1625.5	3266.1
a100i	1.829	316.97	560.79	125.21	233.28	750.68	1116.7	1277.4	1679.6
a100#5b	5.695	621.82	1446.1	221.33	541.65	1568.2	3153.2	2763.8	4945.7
a100#5d	25.252	1755.8	5771.3	753.02	2424.2	3658.7	12057	5884.2	19230
rt_a100#5-a100#6	25.252	1281.7	5342.1	636.99	2291.1	2832.7	10926	4826.9	17717
a100j	6.781	1364.1	2012.1	635.2	822.2	2566.7	4013.1	3806.9	6072.4
a100#6	32.033	2202.6	7354.2	1003.7	3112.3	4244.1	14939	7002.3	23790
rt_a100#6-a100#7	32.033	1427.1	6026.8	788.88	2956.7	2751.4	11121	4805.1	18110
a100k	6.62	1278.2	2029.5	599.63	857.64	2388	3981	3529.6	5984.4
a100#7u	38.653	2083.1	8056.2	1169.3	3813.1	3596.8	15102	5487.2	24094
a100#7d	46.365	2870.7	10054	1440.8	4576.5	5376.3	19404	7966.4	30816
david_l_smith	46.365	2868.3	10053	1440.8	4578	5276.6	19250	7958.6	30662
rt_a100#7-a100#8	46.365	2576.1	9706.9	1351.7	4443.2	4468.6	18243	6895.5	28328
a100l	6.044	486.82	1438.1	178.32	543.93	1233	3191.8	2195.5	5083.4
a100#8	52.409	2981.9	11145	1504.6	4985.3	5279.5	21435	7991.2	33412
rt_a100#8-a100#9	52.409	2342.5	9097.1	1184.9	4339.2	4055.3	15728	6349.8	23711
a100m	5.376	791.61	1518.5	353.63	613.19	1519.3	3047.5	2268.8	4623.5
a100#9u	57.785	2554.7	10616	1294.3	4949.9	4325.9	18775	6694.3	28334
a120a	3.04	735.96	957.14	355.03	409.71	1349.6	1864.6	1981.4	2794.9
a120#1	3.04	735.96	957.14	355.03	409.71	1349.6	1864.6	1981.4	2794.9
rt_a120#1-a120#2	3.04	735.06	957.04	354	409.69	1348.6	1864.4	1972	2794.6
a120b	2.233	1251.2	772.85	670.6	355.88	2087.6	1446.5	2903.7	2132.4
a120#2	5.273	1730.9	1729.9	864.71	765.57	3097.5	3310.9	4472.3	4927
rt_a120#2-a120#3	5.273	1728.3	1729.8	863.89	765.52	2980.2	3310.6	4213.4	4926.6
a120c	1.33	835.24	464.28	453	215.09	1379.5	865.9	1903.4	1274.5
a120#3u	6.603	2368.2	2194	1201.1	980.61	3908.4	4176.5	5125.9	6201.1
A120_OVFL	6.603	2368.2	2194	1201.1	980.61	3692.4	4092.7	4332.4	5773.5
a120#3d	6.603	2368.2	2194	1201.1	980.61	3692.4	4092.7	4332.4	5773.5
rt_a120#3-a100#9	6.603	2363	2193.2	1195.5	980.24	3684.7	4091.2	4313.7	5771.3
a120d	2.788	1117.4	874.4	561.25	372.95	1947.8	1706.6	2784.7	2559.9
a120#4	9.391	3368	3067.6	1664.7	1353.2	5398.4	5797.7	6769.1	8331.2
a100#9d	67.176	4361.3	13683	2052.1	6303	7900.9	24573	10572	36665
rt_a100#9-a100#10	67.176	3813.6	13324	1720.9	6169.4	6568.4	23779	9465.3	34967
a100#10u	67.176	3813.6	13324	1720.9	6166.7	6568.4	23779	9465.3	34967
a119a	1.443	767.91	504.84	409.6	234.25	1285.9	940.7	1796	1384.1
A120_OVFL(br)	0	0	0	0	0	216.03	83.811	793.5	427.63
a119#1u	1.443	767.91	504.84	409.6	234.25	1451.1	1024.5	2334.2	1811.7
a11906a	0.981	436.02	335.98	227.87	153.54	742.54	631.57	1050.8	932.77
a11906#1	0.981	436.02	335.98	227.87	153.54	742.54	631.57	1050.8	932.77
rt_a11906#1-a11906	0.981	376.6	335.98	187.22	153.54	624.99	631.57	784.28	932.77
a11906b	0.376	63.412	117.3	24.927	49.41	152.57	232.26	262.34	348.21
a11906#2	1.357	439.99	453.28	211.78	202.95	774.8	863.83	1028.7	1281
rt_a11906#2-a119#1	1.357	439.76	453.01	211.46	202.78	773.16	863.65	1021.5	1281
a11906c	0.229	181.33	82.28	101.14	38.88	293.33	151.66	398.01	222.1
a11906#3u	1.586	548.95	535.29	263.52	241.65	944.09	1015.3	1220.3	1503.1

a11907a	0.544	577.7	199.26	332.65	95.357	910.88	364.46	1213.3	531.91
a11906#3d	2.13	942.6	734.55	459.81	337.01	1632.2	1379.8	2238.3	2035
a119#1d	3.573	1708.6	1239.4	845.95	571.25	3074.1	2404.3	4400.8	3846.7
rt_a119#1-a119#2	3.573	1704.6	1238.8	840.84	570.85	2974.9	2403.8	4217	3846.7
a119b	0.722	672.18	248.95	377.15	114.33	1076	466.67	1447.1	688.41
a119#2u	4.295	2228.7	1487.7	1145	685.17	3510.4	2870.5	4639.8	4535.1
a11905a	0.936	487.8	293.56	252.44	125.21	828.6	572.93	1162.2	859.43
a11905#1	0.936	487.8	293.56	252.44	125.21	828.6	572.93	1162.2	859.43
rt_a11905#1-a119#2	0.936	473	293.56	245.21	125.21	718.11	572.93	1003.1	859.43
a11905b	1.244	591.4	402.23	305.32	175.93	1008.9	774.72	1424.3	1155.9
a11905#2	2.18	974.19	695.78	512	301.13	1540	1347.7	1998	2015.3
a119#2d	6.475	3099.1	2183.5	1555.1	986.31	5035	4218.2	6320.5	6550.4
rt_a119#2-a100#10	6.475	3030.3	2182.5	1526.3	985.69	4735.2	4217.4	6276.2	6550.2
a119c	2.252	303.51	627.48	117.19	245.02	720.14	1304.2	1224.4	2004.2
a119#3u	8.727	3333.3	2810	1642.2	1230.7	5328.4	5521.6	7300.6	8554.4
a11902a	1.401	192.99	391.51	74.499	152.97	456.59	812.63	774.57	1247.9
a119#3d	10.128	3526.2	3201.5	1716.7	1383.6	5714.4	6334.2	7969.2	9802.4
a100#10d	77.304	6876	16526	3116.6	7550.3	12282	30113	17205	44770
rt_a100#10-a100#11	77.304	6756.9	15879	3081.4	7234	12132	28824	17131	42533
a100n	2.125	380.35	623.6	174.05	254.55	720.44	1244.6	1070.6	1883.8
a100#11u	79.429	7050.9	16502	3215.8	7485.4	12587	30068	17798	44417
a100#11d	95.641	9343.1	21127	4248.7	9377.5	16162	39360	22566	58721
rt_a100#11-a100#12	95.641	9323.2	21008	4240	9315.3	16145	39138	22552	58357
a100#12u	95.641	9323.2	21008	4240	9311.8	16145	39138	22552	58357
a118a	1.222	893.23	397.8	482.41	174.93	1467.5	763.98	2007.1	1138.5
a100#12d	96.863	9368.6	21406	4279.2	9486.7	16161	39902	22565	59496
rt_a100#12-a100#13	96.863	9318.1	21035	4250.7	9309.5	16116	39167	22541	58294
a100o	0.9	189.79	283.79	90.147	122.24	350.77	551.15	516	825.15
a100#13u	97.763	9428.2	21318	4306.2	9428.1	16282	39718	22763	59119
a100#13d	118.459	11700	27126	5380.3	11722	20329	51378	28726	76777
rt_a100#13-a100#14	118.459	11597	26278	5324.4	11250	20272	49834	28435	74264
a100p	4.632	678.05	1377.1	314.08	586.36	1281	2692.1	1902.1	4042.1
a100#14u	123.091	11980	27655	5507.1	11832	20934	52526	29187	78306
ch100a	4.381	381.63	1035.3	134.68	371.92	994.25	2329.6	1789.7	3710.4
ch100a_ovfl#1	4.381	358.64	1007.7	134.68	371.92	621.24	1829.3	1254.7	2689.3
cw102a_ovfl(br)	0	0	0	0	0	353.33	322.48	474	727.13
rt_cw102a_ovfl	0	0	0	0	0	353.33	322.48	474	727.13
ch100#1u	4.381	358.64	1007.7	134.68	371.79	974.12	2151.8	1728.7	3416.5
ch100a_ovfl#2	4.381	355.76	1007.1	134.68	371.92	471.73	1617.7	573.73	1936.5
ch100#1d	4.381	355.76	1007.1	134.68	371.79	471.73	1617.7	573.73	1936.5
rt_ch100#1-ch100#2	4.381	354.29	976.26	134.47	357.87	467.7	1579.2	553.9	1896.6
ch100a_ovfl#2(br)	0	2.8791	0.66706	0	0	502.39	534.06	1155	1480
rt_ch100a_ovfl#2	0	2.8791	0.66706	0	0	502.39	534.06	1155	1480
ch100b	4.382	1199.9	1277.4	556.17	509.73	2217.8	2575.8	3253.7	3913.8
ch100#2u	4.382	1200.9	1278	556.17	509.73	2706.9	3109.8	4408.7	5393.8
ch100#2d	8.763	1490.2	2254.3	627.45	867.46	3026.9	4689.1	4729.2	7290.4
rt_ch100#2-ch100#3	8.763	1473.4	2240.1	604.6	861.21	2996.5	4667.9	4675.5	7267.5
ch100c	2.749	960.06	826.95	467.36	339.97	1714.8	1644	2477.5	2484.3
ch100#3u	11.512	2190.8	3067.1	901.67	1201	4320.1	6311.9	6531.8	9751.8
ch100d	1.248	234.45	371.22	91.957	150.02	554.89	746.42	939.93	1128
ch100#3a	1.248	234.45	371.22	91.957	150.01	554.89	746.42	939.93	1128
rt_ch100#3a-ch100#	1.248	229.59	370.27	86.71	149.38	554.55	746.21	939.66	1128
ch100e	0.75	209.16	231.92	85.55	97.715	472.93	455.46	778.71	684.91
ch100#3b	1.998	416.65	602.19	158.87	247.08	1014.5	1201.7	1697.9	1812.9
ch100#3d	13.51	2587.1	3669.3	1059.9	1448.1	5200.8	7513.6	7844.4	11565
rt_ch100#3-a100#14	13.51	2569.1	3658.7	1050.3	1443.4	5179.9	7498.3	7822.4	11548
ch100f	2.538	417.84	735.81	161.49	291.84	999	1502	1702.4	2283.4
ch100#4	16.048	2952.4	4394.6	1196	1735	6082.5	9000.4	9263.3	13832
a100#14d	139.139	13201	32050	6036.9	13567	22891	61526	30896	92138
rt_a100#14-a100#15	139.139	13167	31761	6022.9	13396	22882	61018	30866	91350
a100#15u	139.139	13167	31761	6022.9	13392	22882	61018	30866	91350
mg100a	1.375	161.79	358.98	56.924	131.18	425.55	777.87	767.19	1209.6
mg100#1	1.375	161.79	358.98	56.924	131.15	425.55	777.87	767.19	1209.6
rt_mg100#1-mg100a	1.375	161.54	356.05	56.39	129.7	425.02	774.88	766.18	1207.4
mg100b	1.897	230.62	497.78	82.859	182.9	590.48	1071.6	1047.7	1664.9
mg100c	1.084	877.36	329.88	470.14	137.04	1435.5	652.43	1956.6	983.89
mg100#2	4.356	1079.5	1183.7	536	449.58	2045.9	2498.9	3246.4	3856.2
rt_mg100#2-mg100a	4.356	1077.3	1182.4	533.13	449.02	2044.7	2497.6	3245.9	3855.2
mg100d	0.235	407.72	75.497	242.43	32.85	617.46	145.82	793.18	217.8

mg100#3	4.591	1347.8	1257.9	684.1	481.8	2427.4	2643.4	3648.5	4073
rt_mg100#3-mg100	4.591	1339.6	1254	664.64	479.93	2424.1	2639.3	3645.5	4069.8
mg100e	0.153	257.24	49.153	152.64	21.388	390.29	94.936	501.97	141.8
mg100#4	4.744	1491.4	1303.2	731.98	501.24	2661.8	2734.2	3962.1	4211.6
rt_mg100#4-mg100	4.744	1454.9	1301.4	686.15	500.42	2642	2732.3	3943.5	4210
mg100f	0.178	292.39	57.185	172.89	24.882	445.8	110.45	575.81	164.98
mg100#5u	4.922	1612.1	1358.6	748.79	525.23	2911.1	2842.8	4309.7	4375
mg100g	0.302	390.59	91.043	222.09	37.502	609.97	180.82	802.84	273.14
cg100#1	0.302	390.59	91.043	222.09	37.502	609.97	180.82	802.84	273.14
rt_cg100#1-cg100#2	0.302	379.88	91.043	212.68	37.502	599.8	180.82	793.5	273.14
mg100h	0.307	398.89	98.628	229.37	42.915	621.58	190.49	818.5	284.54
cg100#2	0.609	757.34	189.67	421.49	80.417	1196.6	371.31	1586.9	557.67
rt_cg100#2-mg100#	0.609	724.93	189.67	400	80.417	1152.4	371.31	1536.6	557.67
mg100i	0.114	188.68	36.624	111.65	15.936	286.85	70.736	369.47	105.66
cg100#3	0.723	857.61	226.29	471.44	96.353	1371.6	442.05	1830.5	663.33
mg100#5d	5.645	2409.9	1584.9	1113.3	621.58	4201.7	3284.8	6030.4	5038.3
rt_mg100#5-a100#1	5.645	2373.5	1583	1084.7	620.76	4157.3	3282.8	5991.9	5036.7
mg100j	0.076	142.56	24.416	85.591	10.624	214.22	47.158	273.11	70.439
mg100#6	5.721	2429.9	1607.5	1104.2	631.3	4260.2	3330	6137.8	5107.2
a100#15d	144.86	13407	33369	6120.4	14023	23340	64348	31269	96457
rt_a100#15-a100#16	144.86	13384	32641	6106	13506	23332	63244	31235	94923
a100q	2.873	556.33	843.41	255.68	341.99	1050.6	1688.4	1559.6	2558.7
a100#16u	147.733	13562	33484	6192	13843	23659	64932	31516	97482
ld100a	2.28	1463.5	710.65	768.37	301.5	2443.8	1390.7	3378.9	2088.5
a100#16d	150.013	13563	34195	6192.6	14144	23660	66323	31516	99570
rt_a100#16-a100#17	150.013	13557	33838	6187.8	13883	23649	65801	31471	98873
a100#17u	150.013	13557	33838	6187.8	13878	23649	65801	31471	98873
a111a	4.019	1074.2	1242.3	517.88	523.27	1960.2	2440.1	2870.4	3669.6
a100#17d	154.032	13729	35080	6280.9	14401	23940	68241	31637	102543
rt_a100#17-a100#18	154.032	13702	32967	6260	12627	23933	65452	31617	98998
a100r	8.072	1862.3	2528.2	885.84	1078.5	3431.3	4934.3	5040.5	7401.8
a100#18u	162.104	14037	35495	6435	13700	24535	70386	32653	106399
a107a	2.05	1289.1	719.07	696.4	334.25	2133	1338.4	2948.7	1968.4
a107#1	2.05	1289.1	719.07	696.4	334.25	2133	1338.4	2948.7	1968.4
rt_a107#1-a100#18	2.05	1268.8	719.07	675.12	334.25	2118.9	1338.4	2941.2	1968.4
a107b	2.033	879.73	654.18	439.12	285.02	1542.1	1262.6	2200.3	1885.4
a107#2	4.083	2090.9	1373.2	1091	619.26	3542	2601.1	4987.8	3853.9
a100#18d	166.187	14051	36868	6445.5	14319	24557	72987	32750	110253
rt_a100#18-a100#19	166.187	14048	36412	6444.2	13890	24553	72461	32748	109628
a100s	1.221	695.86	416.91	368.5	190.11	1166.5	784.7	1626.2	1159.5
a100#19u	167.408	14049	36829	6444.5	14075	24554	73246	32752	110787
rb100a	5.436	1312.3	1634.4	621.64	671.69	2429.8	3249.7	3580.7	4911
a100#19d	172.844	14229	38463	6683.3	14747	24879	76495	33496	115698
rt_a100#19-a100#20	172.844	13954	35656	6413.5	12032	24723	73428	33424	112275
a100#20u	172.844	13954	35656	6413.5	12027	24723	73428	33424	112275
a100#20d	231.942	20938	54079	7958.4	19959	42013	109274	64427	166005
rt_a100#20-a100#21	231.942	20541	51151	7947.9	17187	41635	106256	63816	162826
a100t	2.535	1998.1	850.48	1080.4	382.81	3268.3	1612.6	4480	2390.3
a100#21u	234.477	20611	52002	7947.9	17563	41996	107869	64575	165217
a104a	3.123	929.81	979.46	450.07	417.76	1680.9	1911.6	2445.5	2867.5
a104a_div	3.123	92.38	97.89	45.178	41.935	206.1	208.3	335.65	339.38
a104#1u	3.123	92.38	97.89	45.178	41.935	206.1	208.3	335.65	339.38
a10407a	2.836	727.83	877.33	349.5	369.82	1333.3	1722.6	1955.1	2590.2
a104#1d	5.959	819.76	975.22	393.02	411.75	1539.4	1930.9	2290.8	2929.6
rt_a104#1-a104#2	5.959	599.87	852.95	158.59	314.24	1286.2	1788.2	1968.2	2774.6
a104b	0.498	176.37	168.37	89.473	76.219	309.28	318.21	443.84	471.04
a104#2u	6.457	710.55	1021.3	185.07	390.34	1522.5	2106.4	2321.5	3245.6
a10413a	3.182	1539.2	1118.6	808.7	520.76	2616.7	2080.2	3683.5	3058.2
a104#2d	9.639	1750.9	2139.9	910.9	911.1	3604.2	4186.7	5439	6303.8
rt_a104#2-a104#3	9.639	1635.4	2063.1	667.07	848.67	3536	4096.9	5317.3	6205.3
a104#3u	9.639	1635.4	2063.1	667.07	848.48	3536	4096.9	5317.3	6205.3
a10404a	2.784	986.16	844.33	484.92	349.69	1749	1672.5	2522.6	2523.6
a104#3d	12.423	2524.6	2907.4	1002.3	1198.2	5055.6	5769.4	7576.7	8728.9
rt_a104#3-a104#4	12.423	2434.2	2785.8	734.18	1098.3	5027.9	5627.8	7518.7	8573.9
a104c	1.05	394.38	334.61	198.25	144.63	690.07	648.53	989.61	970.09
a104#4	13.473	2768.2	3120.4	828.55	1242.6	5619.2	6276.4	8384.3	9543.9
rt_a104#4-a104#5	13.473	1771.1	2145.9	167.3	652.93	5153.1	5245.9	8037.5	8480.4
a104d	2.821	1574.5	956.29	831.98	433.77	2643.8	1805.3	3688.1	2671.2
a104#5	16.294	2078.3	3102.2	841.36	1086.2	6532.2	7051.2	10394	11152

a100#21d	250.771	22481	55104	8104.2	18649	47042	114920	72745	176368
rt_a100#21-a100#22	250.771	21038	48951	7760.7	12590	44664	108624	69255	169790
lake	2.746	1227.5	1130.9	680.57	579.95	2032.9	1977.1	2847.8	2826.5
jb100a	4.794	2320	1540.8	1185.4	670.63	3984.9	2975.3	5627	4443.9
a100u	1.682	1083.8	548.42	578.36	241.47	1798.6	1052.5	2480.1	1568
a100#22	259.993	21618	52171	7774.5	14074	46341	114629	71847	178628

San Jacinto and Galveston Bay Watershed

		(10%) 10-Yr Storm		(50%) 2-Yr Storm		(1%) 100-Yr Storm		(0.2%) 500-Yr Storm	
Hydrologic Element	Drainage Area	Discharge Peak	Total Volume	Discharge Peak	Total Volume	Discharge Peak	Total Volume	Discharge Peak	Total Volume
	(sq mi)	(cfs)	(ac-ft)	(cfs)	(ac-ft)	(cfs)	(ac-ft)	(cfs)	(ac-ft)
f216a	1.637	569.84	526.71	855.27	853.42	1003.8	1016.6	1444.6	1518.1
f216#1	1.637	569.84	526.71	855.27	853.42	1003.8	1016.6	1444.6	1518.1
rt_f216#1-f	1.637	568.12	526.71	852.67	853.42	1001	1016.6	1436.7	1518.1
f216b	1.215	764.42	415.19	1094.1	659.63	1267	781.2	1750.9	1154.2
f216#2u	2.852	1235.5	941.89	1831.2	1513	2081.8	1797.8	2884.3	2672.3
f21601a	0.569	481.41	204.34	673.16	319.61	774.72	376.73	1047.2	551.74
f216#2	3.421	1608.9	1146.2	2378.5	1832.7	2724	2174.6	3743.5	3224.1
rt_f216#2-f	3.421	1606.7	1146.2	2377.2	1832.7	2722.4	2174.6	3741.8	3224.1
f216c	0.066	53.76	20.65	76.016	33.775	87.735	40.345	119.46	60.544
f216#3	3.487	1649.3	1166.9	2440.3	1866.4	2798.8	2214.9	3842	3284.6

Inside the City Limits

Appendix C
Photographs

Photos Taken: February 26, 2008

B106-00-00 Up Stream at Spencer Highway.

Photos Taken: February 26, 2008

B106-00-00 Down Stream at Spencer Highway

Photos Taken: February 26, 2008

Well Maintained B106-00-00

Photos Taken: February 26, 2008

B112-02-00 Upstream at Deer Park

Photos Taken: February 26, 2008

Roadside Ditch on S. Broadway St.

Photos Taken: February 26, 2008

Creekmont Park

Photos Taken: February 26, 2008

Neighborhood Roadside Ditch

Photos Taken: April 30, 2008

Neighborhood Roadside Ditch

Appendix D
Short Term Project Constructed

Photos Taken: April 30, 2008

Sheet flow path for Driftwood Detention Pond

Photos Taken: April 30, 2008

Sheet flow path for Driftwood Detention Pond

Photos Taken: April 30, 2008

Sheet flow path for B106-02-00

Photos Taken: April 30, 2008

Sheet flow path for Cattlet Street
into Big Island Slough (B106-00-00)

Photos Taken: April 30, 2008

Sheet flow path for Cattlet Street
into Big Island Slough (B106-00-00)

Photos Taken: April 30, 2008

Sheet flow path for Cattlet Street
into Big Island Slough (B106-00-00)