# HYDRAULIC REPORT

## ELGIN O'HARE – WEST BYPASS
## P-91-443-06

## ELGIN O'HARE EXPRESSWAY/RAMPS P1, P2, P8
## OVER WILLOW CREEK SOUTH TRIBUTARY
## RAMPS Q1, O4, P5 OVER WILLOW CREEK SOUTH TRIBUTARY
## RAMP Q5 OVER WILLOW CREEK SOUTH TRIBUTARY
## BENSENVILLE, ILLINOIS
## AND
## O'HARE WEST BYPASS OVER WILLOW CREEK
## CHICAGO, ILLINOIS

*Prepared For:*

Illinois Department of Transportation
201 West Center Court
Schaumburg, IL 60196-1096

Prepared By:

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CBBEL Project No. 07-0404

NOVEMBER 2012

VOLUME 1 OF 2

CH2MHILL

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# SECTION 1

**NARRATIVE**
**ELGIN O'HARE EXPRESSWAY/RAMPS P1, P2, P8**
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**RAMPS Q1, O4, P5 OVER WILLOW CREEK SOUTH TRIBUTARY**
**RAMP Q5 OVER WILLOW CREEK SOUTH TRIBUTARY**
**O'HARE WEST BYPASS OVER WILLOW CREEK**

Illinois Department of Transportation

# HYDRAULIC REPORT OUTLINE (HRO)

In order to facilitate a more efficient and timely approval of Hydraulic Reports, a "Hydraulic Report Outline" shall be prepared and submitted with each hydraulic project. This Outline shall be submitted to the District Hydraulic Engineer along with the Hydraulic Report to aid in review of the report.

If any deviations from the procedural steps below are necessary, they must be documented in the outline. Hydraulic Reports prepared by a Qualified District Hydraulic Engineer or under his supervision, are exempt from the HRO requirement. To facilitate Pump Station Hydraulic Report reviews, the Checklist and Data Sheets from the IDOT Drainage Manual, 13-303 and 13-304, will be used. The Data Sheets must be signed by the consultant's QA/QC person or the District Hydraulic Engineer.

1. SN ___-____ (Existing); SN ___-____ (Proposed)
   Route/Stream: EOWB NB SB/Willow Creek
   County: DuPage

2. Prepared By: ☒ Consultant: Christopher B. Burke Eng., Ltd.
   ☐ District _____

3. Chapter 2 of the IDOT Drainage ☒ Yes ☐ No
   If no, explain _____
   **Completed checklist (2-701.02) must be attached.**

4. Design Considerations:
   a. Backwater limitations due to:
      IDNR Individual or Floodway Permit ☒ Yes ☐ No
      Sensitive Flood Receptor(s) ☐ Yes ☒ No
   b. Does proposed average design velocity through the structure exceed natural channel velocities? ☐ Yes ☒ No
   c. Is the clearance policy met? ☐ Yes ☐ No ☒ N/A
   d. Is the freeboard policy met? ☒ Yes ☐ No

5. Project scope (check all that apply):
   a. ☐ Complete replacement.
   b. ☐ Superstructure replacement.
   c. ☐ Superstructure replacement and/or widening; Length of pier extension in the water, upstream _____ft., downstream _____ft.
   d. ☐ Bridge ☒ Culvert
   e. ☒ New alignment
   f. Work planned below Q100 HWE: ☒ Yes ☐ No

6. Hydrology: ☐ USGS ☐ FIS ☒ Other DuPage County Watershed Plan Model
   Gage data utilized? ☐ Yes ☒ No

7. WIT: Attached copy of all completed WIT(s) ☒ Yes ☐ No _____

8. Modeling:
   a. ☒ HEC RAS ☐ WSPRO ☐ Other _____
   b. N-values estimated according to Chapter 5 of Drainage Manual? ☒ Yes ☐ No
   c. Source of starting WSE Des Plaines River
   d. Non-IDOT encroachments in survey? ☒ Yes ☐ No
      If yes, are they accounted for? ☒ Yes ☐ No
   e. Tail water controls(s)? ☐ Yes ☒ No
      If yes, list: _____
      Properly addressed? ☐ Yes ☐ No
   f. Expansion/Contraction cones addressed per Chapter 7 of Drainage Manual? ☒ Yes ☐ No
      If N/A, explain: _____

9. IDNR-OWR Permit: Drainage Area 5.96 sq. ☐ Rural; ☒ Urbanizing;
   Public Water or within Public Water boundaries ☐ Yes ☒ No
   Indicate Permit Type Required:
   a. Individual ☐
   b. Statewide #2 ☐
   c. Statewide #12 ☐
   d. Floodway ☒
   e. Other: _____
   f. None: ☐

10. Sensitive flood receptors ☐ Yes ☒ No
    Give type, elevations and locations: _____

    History of flooding or overtopping problems: Yes ☐ No ☒
    Sources of observed highwater: _____

11. Scour/migration problems: ☒ None/minimal ☐ Significant ☐ Severe
    Comments: _____

    Ice/Debris concerns: None/minimal ☒ Significant ☐ Severe ☐
    Comments: _____

    Countermeasures proposed: _____

12. Deviations from the general procedures presented above and in Chapters 6 and 7 of the Drainage Manual: _____
    (Attach supporting documents if necessary)

Prepared by: Jeana Gowin Date: May 7, 2012

Signed: (AQ/QC) _____ Date: 5/9/2012

Illinois Department of Transportation

# HYDRAULIC REPORT OUTLINE (HRO)

In order to facilitate a more efficient and timely approval of Hydraulic Reports, a "Hydraulic Report Outline" shall be prepared and submitted with each hydraulic project. This Outline shall be submitted to the District Hydraulic Engineer along with the Hydraulic Report to aid in review of the report.

If any deviations from the procedural steps below are necessary, they must be documented in the outline. Hydraulic Reports prepared by a Qualified District Hydraulic Engineer or under his supervision, are exempt from the HRO requirement. To facilitate Pump Station Hydraulic Report reviews, the Checklist and Data Sheets from the IDOT Drainage Manual, 13-303 and 13-304, will be used. The Data Sheets must be signed by the consultant's QA/QC person or the District Hydraulic Engineer.

1. SN ___-____ (Existing); SN ___-____ (Proposed)
   Route/Stream: EOWB Ramps O4, P1,P2,P5,P8,Q1/Willow Ck S.Trib
   County: DuPage

2. Prepared By: ☒ Consultant: Christopher B. Burke Eng., Ltd.
   ☐ District _____

3. Chapter 2 of the IDOT Drainage ☒ Yes ☐ No
   If no, explain _____
   **Completed checklist (2-701.02) must be attached.**

4. Design Considerations:
   a. Backwater limitations due to:
      IDNR Individual or Floodway Permit ☒ Yes ☐ No
      Sensitive Flood Receptor(s) ☐ Yes ☒ No
   b. Does proposed average design velocity through the structure exceed natural channel velocities? ☐ Yes ☒ No
   c. Is the clearance policy met? ☐ Yes ☐ No ☒ N/A
   d. Is the freeboard policy met? ☒ Yes ☐ No

5. Project scope (check all that apply):
   a. ☐ Complete replacement.
   b. ☐ Superstructure replacement.
   c. ☐ Superstructure replacement and/or widening; Length of pier extension in the water, upstream _____ft., downstream _____ft.
   d. ☐ Bridge ☒ Culvert
   e. ☒ New alignment
   f. Work planned below Q100 HWE: ☒ Yes ☐ No

6. Hydrology: ☐ USGS ☐ FIS ☒ Other DuPage County Watershed Plan Model
   Gage data utilized? ☐ Yes ☒ No

7. WIT: Attached copy of all completed WIT(s) ☒ Yes ☐ No _____

8. Modeling:
   a. ☒ HEC RAS ☐ WSPRO ☐ Other _____
   b. N-values estimated according to Chapter 5 of Drainage Manual? ☒ Yes ☐ No
   c. Source of starting WSE Des Plaines River
   d. Non-IDOT encroachments in survey? ☒ Yes ☐ No
      If yes, are they accounted for? ☒ Yes ☐ No
   e. Tail water controls(s)? ☐ Yes ☒ No
      If yes, list: _____
      Properly addressed? ☐ Yes ☐ No
   f. Expansion/Contraction cones addressed per Chapter 7 of Drainage Manual? ☒ Yes ☐ No
      If N/A, explain: _____

9. IDNR-OWR Permit: Drainage Area 5.96 sq. ☐ Rural; ☒ Urbanizing;
   Public Water or within Public Water boundaries ☐ Yes ☒ No
   Indicate Permit Type Required:
   a. Individual ☐
   b. Statewide #2 ☐
   c. Statewide #12 ☐
   d. Floodway ☒
   e. Other: _____
   f. None: ☐

10. Sensitive flood receptors ☐ Yes ☒ No
    Give type, elevations and locations: Lowest adjacent grades are shown on existing plan and profile sheets.

    History of flooding or overtopping problems: Yes ☒ No ☐
    Sources of observed highwater: Thorndale Ave overtopped in Aug 1987 flood. Culvert replaced.

11. Scour/migration problems: ☒ None/minimal ☐ Significant ☐ Severe
    Comments: _____

    Ice/Debris concerns: None/minimal ☒ Significant ☐ Severe ☐
    Comments: _____

    Countermeasures proposed: _____

12. Deviations from the general procedures presented above and in Chapters 6 and 7 of the Drainage Manual: _____
    (Attach supporting documents if necessary)

Prepared by: Jeana Gowin Date: May 7, 2012

Signed:
(AQ/QC) _____ Date: 7/9/2012

## Hydraulic Report Checklist

The District or Consultant should complete the following checklist before submitting the Hydraulic Report for approval.

1. ☒ Title Page
2. ☒ Table of Contents
3. ☒ Narrative - (as outlined in Section 2-601.01 Item #3)
4. ☒ Waterway Information Table (WIT) - (as outlined in Section 2-601.01 Item #4)
5. ☒ Hydraulic Report Data Sheets
6. ☒ Location Map - should show the subject structure along with nearby location defining landmarks (cities, roads, highways, etc.)
7. ☒ USGS Hydraulic Investigation Map (District 1 only)
8. ☒ Photographs - (Minimum: U/S & D/S Structure Faces, Up & Down Channel, Up & Down Roadway Across Structure)
9. ☒ Hydrology (map and calculations)
10. ☒ Streambed Profile
11. ☒ Roadway Profile (existing and proposed)
12. ☒ Cross Section Plots - with plan layout preferably overlayed upon an aerial photo with the contours
13. ☐ Bridge Opening Plots
14. ☒ Natural Condition Analysis
15. ☒ Existing Condition Analysis
16. ☒ Proposed Condition Analysis

When HEC-RAS modeling is being used, ALL Plans (Natural, Existing, & Proposed) shall be included in ONE Project File.

17. ☐ Scour Analysis – Existing and Proposed Conditions
18. ☒ Compensatory Storage Calculations (if required)
19. ☒ Survey Notes (if available, No Electronic Point Files)
20. ☒ Correspondence Notes
21. ☒ CD with Project Files (Include pdf copy of the Hydraulic Report)

# NARRATIVE

## Project Description

The Elgin O'Hare-West Bypass study area encompasses nine (9) watersheds: West Branch DuPage River, Spring Brook, Meacham Creek, Salt Creek, Willow Creek, Higgins Creek, Bensenville Ditch, Silver Creek and Addison Creek. The length of the expressway and interchanges to be improved is approximately 50 miles, including the Elgin O'Hare Expressway and Thorndale Avenue approximately from Gary Avenue to York Road, I-90 approximately from Arlington Heights Road to Wolf Road and I-294 approximately from North Avenue to Wolf Road. It is estimated that approximately 25 miles of arterials and frontage roads also will be included in the study. A general project location map is included in Section 3 of this report.

This hydraulic report is submitted for structures over the Willow Creek South Tributary and all remaining impacted structures within the Willow Creek watershed. Separate hydraulic reports for impacted structures within each of the other watersheds are concurrently being prepared.

This hydraulic report documents the hydraulic conditions for the structures in the City of Chicago, and the Village of Bensenville, DuPage County, Illinois. The USGS Hydrologic Investigations Atlas and Flood Insurance Rate Map are included in Section 3 for the structure location.

## Site Description

Thorndale Avenue

The culvert crossing is located on Thorndale Avenue approximately 1,000 feet west of York Road. The surrounding area is industrial and the O'Hare International Airport is located on the east side of York Road.

The existing Thorndale Avenue structure is a triple 10 feet (span) by 4 feet (rise) reinforced concrete box culvert (RCBC). Thorndale Avenue is approximately 68 feet wide and carries two lanes of traffic in each direction. A roadway plan and profile of the existing structure is provided in Section 5.

O'Hare West Bypass

The proposed crossing is located approximately 500 feet east of York Road. The surrounding area is industrial and the O'Hare International Airport. The existing conditions for this project assumes that the O'Hare Modernization Program (OMP) Completion Phase is complete. The OMP project is scheduled to be completed prior to the Elgin O'Hare - West Bypass project.

## Field Observations

Field visits to the project site were made on November 12, 2010 and on November 18, 2010. Visits were also completed to photograph and observe surrounding structures within the modeling limits of this study. Photographs of all modeled structures are included in Section 4.

Thorndale Avenue

The Willow Creek South Tributary is highly channelized in the vicinity of Thorndale Avenue. Downstream of the crossing the channel traverses east and then north where it joins the Willow Creek North Tributary. Downstream of the confluence with the North Tributary, the creek travels east onto the O'Hare International Airport.

Upstream of Thorndale Avenue, the channel extends south and then west through industrial/commercial areas in the Village of Bensenville. There is heavy sedimentation at the Thorndale Avenue crossing.

O'Hare West Bypass

Willow Creek is highly channelized in the vicinity of the O'Hare International Airport. Downstream of the proposed crossing the channel continues through culverts constructed as part of the OMP and outlets into a vertical walled section on the airport property. The creek travels north, east and then north through the O'Hare International Airport until the confluence with Higgins Creek.

Upstream of the O'Hare International Airport, the channel extends west through culverts under the Canadian Pacific Railroad (CPRR), Union Pacific Railroad (UPRR) and York Road. The North Tributary and the South Tributary split at this location. The North Tributary travels west and then north through Elk Grove Village. The South Tributary travels south and then east through the Village of Bensenville.

## Stream Survey

A stream survey of the Willow Creek was prepared by D.B. Sterlin Consultants, Inc. on June 8, 2010 in accordance with the stream survey requirements in Section 2-600 of the IDOT Drainage Manual. Eighteen cross-section locations were surveyed along the Willow Creek: one cross-section was surveyed between York Road and the CPRR and UPRR, at the downstream face of York Road and at the upstream face of York Road at each of the three trapezoidal bridge openings. Along the Willow Creek South Tributary, cross-sections were surveyed from approximately 12 feet downstream of Supreme Drive to approximately 1,260 feet upstream of Thorndale Avenue. Two additional cross-

sections were surveyed along the Willow Creek North Tributary: one approximately 120 feet upstream of York Road and the other 535 feet upstream of York Road. Plots of the cross-sections are included in Section 6. The stream survey was based on the FEMA datum (NGVD 1929) which is the same datum used for the hydraulic modeling. Survey notes and a survey CD-ROM are included in Section 14 and Section 15, respectively.

## Datum Correlation

The stream survey and available hydraulic modeling is based on the NGVD 1929 datum. The O'Hare International Airport survey and Elgin O'Hare – West Bypass roadway survey are based on the NAVD 1988 datum.

The vertical datum conversion factor was determined to be 0.24 feet added to the NAVD 1988 datum to calculate the equivalent NGVD 1929 elevation. The conversion value was determined using a FEMA Reference Mark. Supporting documentation is included in Section 14.

The hydraulic modeling is based on the NGVD 1929 datum; however, the Waterway Information Table is based on the NAVD 1988 datum. The Waterway Information Tables and supporting calculations are included in Section 2.

## Historical Flooding

On August 14, 1987 significant flooding occurred within the Willow Creek watershed when O'Hare International Airport recorded 9.35 inches of rainfall. There are two recorded flood elevations: Miller Fluids entrance and at Thorndale Avenue.

## Sensitive Flood Receptors

There is no flood sensitive housing 1,000 feet upstream or downstream of the proposed Thorndale Avenue crossing or the O'Hare West Bypass crossing. All buildings and houses are located above the 100-year floodplain.

## Other Studies and Reports

In the 1980's, the Soil Conservation Service (SCS) prepared hydrologic and hydraulic models for the Willow-Higgins Creek watershed. The models were prepared for the Lower Des Plaines Tributaries Watershed Plan published in 1984. The SCS TR-20 hydrologic model was prepared using National Weather Service (NWS) TP-40 rainfall depths. The SCS WSP-2 Lisle hydraulic model

was prepared to produce flood profiles for the Willow-Higgins Creek. In the late 1980's Christopher B. Burke Engineering, Ltd. (CBBEL) developed the Willow Creek Flood Control Project on behalf of the Village of Bensenville and DuPage County Department of Environmental Concerns (DEC). The SCS TR-20 hydrologic model was updated to include the subbasins revisions calibration to the August 14, 1987 storm event and the use of the Illinois State Water Survey (ISWS) Bulletin 70 rainfall depths and Huff rainfall distributions. The HEC-2 hydraulic models were prepared by including cross-sections of the Willow Creek North and South Tributaries. DEC has used the results of the updated Willow-Higgins Creek hydrologic and hydraulic model as best available data for processing stormwater management permits for several projects located along the North Tributary including the FCL Builder's development at the southeast corner of IL Route 83/Devon Avenue (Elk Grove Village), Prime Scaffolding (Ellis Street, Bensenville), McLennan development (Pan Am Boulevard, Elk Grove Village), the Seefried Properties development (southwest of the intersection of Devon Avenue and Ellis Street, Bensenville) plus the IL Route 83/Devon Avenue intersection improvements and the South Tributary including the Thorndale Avenue and York Road roadway improvements and the Village of Bensenville streambank stabilization downstream of Thomas Road. FEMA has approved the use of the hydrologic and hydraulic model by issuing a Letter of Map Revision along the North Tributary.

The Village of Bensenville (VOB) is in the process of preparing a Letter of Map Revision (LOMR) request for the Willow Creek South Tributary and Willow Creek North Tributary that will reflect current conditions through the EOWB limits of improvements (corridor). The VOB LOMR will include the level pool area immediately west of York Road and both tributaries.

The VOB will remap the effective FIRM(s) to reflect the current floodway boundaries. The EOWB project will relocate the South Tributary after the VOB LOMR. Both FEMA National Flood Insurance Program (NFIP) rules and IDNR-OWR Part 3708 rules require a Conditional Letter of Map Revision (CLOMR) for any changes to the regulatory floodway boundary. An IDNR-OWR floodway construction permit is required prior to the issuance of a FEMA CLOMR and can take up to 6 months to obtain. Both the FEMA and IDNR-OWR processes require concurrence from all affected property owners; a public notice and CLOMR approval can take up to a year to process. Because this is an extensive process, it is recommended that the permitting process begin in the early stages of Phase II.

## Hydrology

The SCS TR-20 hydrologic model calibrated to the August 14, 1987 storm event was used for the hydraulic models. There are no stream flow gages in the Willow Creek watershed. A discharge concurrence received from the Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR) on

March 30, 2012. A copy of the concurrence is included in Section 13. The TR-20 hydrologic model input/output from this model is included in Section 7 and on the CD-ROM in Section 15.

## Hydraulic Analysis

A hydraulic analysis of the Willow Creek, Willow Creek North Tributary and Willow Creek South Tributary was performed to develop the existing conditions and natural conditions flood elevations to determine the effects, if any, of the structure on the water surface profiles. The proposed structure will be developed to accommodate a new interchange and channel relocation. Compensatory storage is required if the roadway is widened and fill is proposed within the Willow Creek South Tributary floodplain and Willow Creek floodplain. The analysis performed for this report includes several hydraulic models, which are summarized in the following sections. The flow rates from the aforementioned flow concurrence are used for all of these analyses.

### Baseline Conditions Model

The Flood Insurance Study (FIS) regulatory models for the North and South Tributaries are not representative of existing conditions within the Willow Creek watershed. The FIS regulatory models do not include the York Road and Thorndale Avenue improvement completed by the DuPage County Division of Transportation. The HEC-2 hydraulic models that were prepared by CBBEL for the Willow Creek North and South Tributaries down to York Road have been used as best available data for processing stormwater management permits in DuPage County. These models include the York Road bridge and a Thorndale Avenue triple RCBC. From York Road downstream to the confluence with the Des Plaines River, the HEC-RAS model that was prepared for the Willow Creek Relocation for the OMP will be used as existing conditions. A floodway construction permit for the OMP project was received from the Illinois Department of Natural Resources – Office of Water Resources in April 2011. A copy is included in Section 13. This work is anticipated to be completed before the EOWB is begun. The HEC-2 models for the North Tributary and the South Tributary were converted to HEC-RAS and appended upstream to the OMP HEC-RAS model. The reach along the South Tributary was truncated 1,749 feet upstream of Thomas Drive. This model was used as the baseline hydraulic model. The HEC-RAS model output is included in Section 8 and on the CD-ROM located Section 15.

Existing Conditions Model

The surveyed cross-sections were added to the baseline conditions model to create the existing conditions model. Sixteen surveyed stream cross-sections were located from approximately 20 feet upstream of the CPRR and UPRR to 1,262 feet upstream of Thorndale Avenue. Two additional cross-sections were surveyed along the North Tributary. Baseline model cross-sections that corresponded to the surveyed cross-sections were removed and replaced with the surveyed cross-sections. Manning's "n" values remain unchanged throughout the entire reach. The baseline cross-sections that did not have corresponding surveyed cross-sections were kept in the existing conditions model. The invert at the downstream face of York Road was surveyed to be approximately 0.7 feet higher than the invert in the baseline conditions model. The baseline cross-section was replaced by the higher surveyed cross-section. The existing Thorndale Avenue culvert of a triple 10 feet (span) by 4 feet (rise) RCBC was also surveyed and the upstream and downstream inverts and culvert lengths were revised. The streambed profile is included in Section 5. The cross-section plots are included in Section 6.

Waterway Information Table included in Section 2 indicates that the 500-year storm event will not overtop the existing Thorndale Avenue at this location.

A comparison of the existing conditions and baseline conditions 10-, 50- and 100-year storm events is summarized in Tables 1, 2 and 3. The HEC-RAS model output is included in Section 9 and on the CD-ROM located in Section 15.

TABLE 1
Comparison of 10-Year Water Surface Elevations between
Baseline Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Thorndale Avenue Culvert[1] (ft) | Baseline Model (ft) | Existing Conditions (ft) | Difference Between Baseline and Existing Conditions (ft) |
|---|---|---|---|---|---|
| 6.19 [2] | Main Stem | 5,583.06 | 652.15 | 652.15 | 0.00 |
| 6.418 [2] | Main Stem | 4,377.67 | 652.61 | 652.61 | 0.00 |
| 6.538 [2] | Main Stem | 3,745.75 | 652.83 | 652.83 | 0.00 |
| 6.59 [2] | Main Stem | 3,525.84 | 653.06 | 653.06 | 0.00 |
| 6.637 [3] | Main Stem | 3,250 | 653.44 | 653.85 | 0.41 |
| 6.645 [2] | South Trib | 2,687 | 655.18 | 655.18 | 0.00 |
| 6.759 [2] | South Trib | 2,087 | 657.94 | 657.94 | 0.00 |
| 6.872 [2] | South Trib | 1,488 | 659.07 | 659.07 | 0.00 |
| 6.886 [2] | South Trib | 1,416 | 659.09 | 659.09 | 0.00 |
| 7.084 [4] | South Trib | 369 | --- | 660.86 | --- |
| 7.145 [3] | South Trib | D/S Face | 661.41 | 661.38 | -0.03 |
| 7.168 [3] | South Trib | U/S Face | 661.46 | 661.46 | 0.00 |
| 7.247 [2] | South Trib | 412 | 661.70 | 661.69 | -0.01 |
| 7.331 [2] | South Trib | 902 | 662.25 | 662.31 | 0.06 |
| 7.399 [2] | South Trib | 1,262 | 663.42 | 663.39 | -0.03 |
| 7.486 [2] | South Trib | 1,649 | 664.90 | 664.90 | 0.00 |

[1] The reference point used for every cross-section downstream of the existing Thorndale Avenue culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the existing Thorndale Avenue culvert was the upstream face of the culvert.
[2] Regulatory cross-section
[3] Regulatory cross-section replaced with a surveyed cross-section
[4] Surveyed cross-section

TABLE 2
Comparison of 50-Year Water Surface Elevations between
Baseline Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Thorndale Avenue Culvert[1] (ft) | Baseline Model (ft) | Existing Conditions (ft) | Difference Between Baseline and Existing Conditions (ft) |
|---|---|---|---|---|---|
| 6.19 [2] | Main Stem | 5,583.06 | 653.91 | 653.91 | 0.00 |
| 6.418 [2] | Main Stem | 4,377.67 | 654.45 | 654.45 | 0.00 |
| 6.538 [2] | Main Stem | 3,745.75 | 654.69 | 654.69 | 0.00 |
| 6.59 [2] | Main Stem | 3,525.84 | 655.01 | 655.01 | 0.00 |
| 6.637 [3] | Main Stem | 3,250 | 655.50 | 655.80 | 0.30 |
| 6.645 [2] | South Trib | 2,687 | 655.94 | 656.62 | 0.68 |
| 6.759 [2] | South Trib | 2,087 | 658.87 | 658.88 | 0.01 |
| 6.872 [2] | South Trib | 1,488 | 660.12 | 660.13 | 0.01 |
| 6.886 [2] | South Trib | 1,416 | 660.17 | 660.17 | 0.00 |
| 7.084 [4] | South Trib | 369 | --- | 662.04 | --- |
| 7.145 [3] | South Trib | D/S Face | 662.63 | 662.63 | 0.00 |
| 7.168 [3] | South Trib | U/S Face | 662.87 | 662.92 | 0.05 |
| 7.247 [2] | South Trib | 412 | 663.08 | 663.10 | 0.02 |
| 7.331 [2] | South Trib | 902 | 663.47 | 663.53 | 0.06 |
| 7.399 [2] | South Trib | 1262 | 664.58 | 664.53 | -0.05 |
| 7.486 [2] | South Trib | 1,649 | 666.76 | 666.77 | 0.01 |

[1] The reference point used for every cross-section downstream of the existing Thorndale Avenue culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the existing Thorndale Avenue culvert was the upstream face of the culvert.
[2] Regulatory cross-section
[3] Regulatory cross-section replaced with a surveyed cross-section
[4] Surveyed cross-section

TABLE 3
Comparison of 100-Year Water Surface Elevations between
Natural Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Thorndale Avenue Culvert[1] (ft) | Baseline Model (ft) | Existing Conditions (ft) | Difference Between Baseline and Existing Conditions (ft) |
|---|---|---|---|---|---|
| 6.19 [2] | Main Stem | 5,583.06 | 654.72 | 654.72 | 0.00 |
| 6.418 [2] | Main Stem | 4,377.67 | 655.26 | 655.26 | 0.00 |
| 6.538 [2] | Main Stem | 3,745.75 | 655.50 | 655.50 | 0.00 |
| 6.59 [2] | Main Stem | 3,525.84 | 655.83 | 655.83 | 0.00 |
| 6.637 [3] | Main Stem | 3,250 | 656.30 | 656.60 | 0.30 |
| 6.645 [2] | South Trib | 2,687 | 656.69 | 657.28 | 0.59 |
| 6.759 [2] | South Trib | 2,087 | 659.13 | 659.16 | 0.03 |
| 6.872 [2] | South Trib | 1,488 | 660.42 | 660.43 | 0.01 |
| 6.886 [2] | South Trib | 1,416 | 660.47 | 660.48 | 0.01 |
| 7.084 [4] | South Trib | 369 | --- | 662.46 | --- |
| 7.145 [3] | South Trib | D/S Face | 662.97 | 662.97 | 0.00 |
| 7.168 [3] | South Trib | U/S Face | 663.29 | 663.34 | 0.05 |
| 7.247 [2] | South Trib | 412 | 663.51 | 663.52 | 0.01 |
| 7.331 [2] | South Trib | 902 | 663.85 | 663.90 | 0.05 |
| 7.399 [2] | South Trib | 1,262 | 664.92 | 664.85 | -0.07 |
| 7.486 [2] | South Trib | 1,649 | 666.93 | 666.93 | 0.00 |

[1] The reference point used for every cross-section downstream of the existing Thorndale Avenue culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the existing Thorndale Avenue culvert was the upstream face of the culvert.
[2] Regulatory cross-section
[3] Regulatory cross-section replaced with a surveyed cross-section
[4] Surveyed cross-section

Natural Conditions Model – Thorndale Avenue

A natural conditions model was developed to determine the natural water surface elevations at the Thorndale Avenue crossing. The natural conditions model was prepared by removing the Thorndale Avenue crossing from the existing conditions model. In addition, expansion/contraction and ineffective flow boundaries were removed.

A comparison of the existing conditions and natural conditions 10-, 50- and 100-year storm events is summarized in Tables 4, 5 and 6.

TABLE 4
Comparison of 10-Year Water Surface Elevations between
Natural Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Thorndale Avenue Culvert[1] (ft) | Natural Conditions (ft) | Existing Conditions (ft) | Difference Between Existing and Natural Conditions (ft) |
|---|---|---|---|---|---|
| 6.59 [2] | Main Stem | 3,525.84 | 653.06 | 653.06 | 0.00 |
| 6.637 [3] | Main Stem | 3,250 | 653.85 | 653.85 | 0.00 |
| 6.645 [2] | South Trib | 2,687 | 655.18 | 655.18 | 0.00 |
| 6.759 [2] | South Trib | 2,087 | 657.94 | 657.94 | 0.00 |
| 6.872 [2] | South Trib | 1,488 | 659.07 | 659.07 | 0.00 |
| 6.886 [2] | South Trib | 1,416 | 659.09 | 659.09 | 0.00 |
| 7.084 [4] | South Trib | 369 | 660.86 | 660.86 | 0.00 |
| 7.145 [3] | South Trib | D/S Face | 661.37 | 661.38 | 0.01 |
| 7.168 [3] | South Trib | U/S Face | 661.42 | 661.46 | 0.04 |
| 7.247 [2] | South Trib | 412 | 661.62 | 661.69 | 0.07 |
| 7.331 [2] | South Trib | 902 | 662.28 | 662.31 | 0.03 |
| 7.399 [2] | South Trib | 1,262 | 663.39 | 663.39 | 0.00 |
| 7.486 [2] | South Trib | 1,649 | 664.90 | 664.90 | 0.00 |

[1] The reference point used for every cross-section downstream of the existing Thorndale Avenue culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the existing Thorndale Avenue culvert was the upstream face of the culvert.
[2] Regulatory cross-section
[3] Regulatory cross-section replaced with a surveyed cross-section
[4] Surveyed cross-section

TABLE 5
Comparison of 50-Year Water Surface Elevations between
Natural Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Thorndale Avenue Culvert[1] (ft) | Natural Conditions (ft) | Existing Conditions (ft) | Difference Between Existing and Natural Conditions (ft) |
|---|---|---|---|---|---|
| 6.59 [2] | Main Stem | 3,525.84 | 655.01 | 655.01 | 0.00 |
| 6.637 [3] | Main Stem | 3,250 | 655.80 | 655.80 | 0.00 |
| 6.645 [2] | South Trib | 2,687 | 656.62 | 656.62 | 0.00 |
| 6.759 [2] | South Trib | 2,087 | 658.88 | 658.88 | 0.00 |
| 6.872 [2] | South Trib | 1,488 | 660.13 | 660.13 | 0.00 |
| 6.886 [2] | South Trib | 1,416 | 660.17 | 660.17 | 0.00 |
| 7.084 [4] | South Trib | 369 | 662.04 | 662.04 | 0.00 |
| 7.145 [3] | South Trib | D/S Face | 662.63 | 662.63 | 0.00 |
| 7.168 [3] | South Trib | U/S Face | 662.69 | 662.92 | 0.23 |
| 7.247 [2] | South Trib | 412 | 662.85 | 663.10 | 0.25 |
| 7.331 [2] | South Trib | 902 | 663.37 | 663.53 | 0.16 |
| 7.399 [2] | South Trib | 1262 | 664.47 | 664.53 | 0.06 |
| 7.486 [2] | South Trib | 1,649 | 666.76 | 666.77 | 0.01 |

[1] The reference point used for every cross-section downstream of the existing Thorndale Avenue culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the existing Thorndale Avenue culvert was the upstream face of the culvert.
[2] Regulatory cross-section
[3] Regulatory cross-section replaced with a surveyed cross-section
[4] Surveyed cross-section

TABLE 6
Comparison of 100-Year Water Surface Elevations between
Natural Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Thorndale Avenue Culvert[1] (ft) | Natural Conditions (ft) | Existing Conditions (ft) | Difference Between Existing and Natural Conditions (ft) |
|---|---|---|---|---|---|
| 6.59 [2] | Main Stem | 3,525.84 | 655.83 | 655.83 | 0.00 |
| 6.637 [3] | Main Stem | 3,250 | 656.60 | 656.60 | 0.00 |
| 6.645 [2] | South Trib | 2,687 | 657.28 | 657.28 | 0.00 |
| 6.759 [2] | South Trib | 2,087 | 659.16 | 659.16 | 0.00 |
| 6.872 [2] | South Trib | 1,488 | 660.43 | 660.43 | 0.00 |
| 6.886 [2] | South Trib | 1,416 | 660.48 | 660.48 | 0.00 |
| 7.084 [4] | South Trib | 369 | 662.46 | 662.46 | 0.00 |
| 7.145 [3] | South Trib | D/S Face | 662.97 | 662.97 | 0.00 |
| 7.168 [3] | South Trib | U/S Face | 663.03 | 663.34 | 0.31 |
| 7.247 [2] | South Trib | 412 | 663.18 | 663.52 | 0.34 |
| 7.331 [2] | South Trib | 902 | 663.67 | 663.90 | 0.23 |
| 7.399 [2] | South Trib | 1,262 | 664.76 | 664.85 | 0.09 |
| 7.486 [2] | South Trib | 1,649 | 666.93 | 666.93 | 0.00 |

[1] The reference point used for every cross-section downstream of the existing Thorndale Avenue culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the existing Thorndale Avenue culvert was the upstream face of the culvert.
[2] Regulatory cross-section
[3] Regulatory cross-section replaced with a surveyed cross-section
[4] Surveyed cross-section

Natural Conditions Model – O'Hare West Bypass

Under existing conditions, there is no structure located where the O'Hare West Bypass is proposed. Since the natural conditions are the existing conditions, a separate analysis was not performed.

TABLE 7
Comparison of 10-Year Water Surface Elevations between
Natural Conditions and Existing Conditions
NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Existing Distance to York Rd Crossing[1] (ft) | Natural Conditions (ft) | Existing Conditions (ft) | Difference Between Natural and Existing Conditions (ft) |
|---|---|---|---|---|---|
| 6.19 [2] | Main Stem | 2,154.83 | 652.15 | 652.15 | 0.00 |
| 6.418 [2] | Main Stem | 949.44 | 652.61 | 652.61 | 0.00 |
| 6.538 [2] | Main Stem | 317.52 | 652.83 | 652.83 | 0.00 |
| 6.59 [2] | Main Stem | 285.84 | 653.06 | 653.06 | 0.00 |
| 6.637 [3] | Main Stem | 10 | 653.85 | 653.85 | 0.00 |
| **YORK ROAD** | | | | | |
| 6.645 [2] | South Trib | 474 | 655.18 | 655.18 | 0.00 |
| 6.759 [2] | South Trib | 1,074 | 657.94 | 657.94 | 0.00 |
| 6.872 [2] | South Trib | 1,673 | 659.07 | 659.07 | 0.00 |
| 6.886 [2] | South Trib | 1,745 | 659.09 | 659.09 | 0.00 |
| 7.084 [4] | South Trib | 2,428 | 660.86 | 660.86 | 0.00 |

[1] The reference point used for every cross-section downstream of the existing Thorndale Avenue culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the existing Thorndale Avenue culvert was the upstream face of the culvert.
[2] Regulatory cross-section
[3] Regulatory cross-section replaced with a surveyed cross-section
[4] Surveyed cross-section

TABLE 8
Comparison of 50-Year Water Surface Elevations between
Natural Conditions and Existing Conditions
NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Existing Distance to York Rd Crossing[1] (ft) | Natural Conditions (ft) | Existing Conditions (ft) | Difference Between Natural and Existing Conditions (ft) |
|---|---|---|---|---|---|
| 6.19 [2] | Main Stem | 2,154.83 | 653.91 | 653.91 | 0.00 |
| 6.418 [2] | Main Stem | 949.44 | 654.45 | 654.45 | 0.00 |
| 6.538 [2] | Main Stem | 317.52 | 654.69 | 654.69 | 0.00 |
| 6.59 [2] | Main Stem | 285.84 | 655.01 | 655.01 | 0.00 |
| 6.637 [3] | Main Stem | 10 | 655.80 | 655.80 | 0.00 |
| **YORK ROAD** | | | | | |
| 6.645 [2] | South Trib | 474 | 656.62 | 656.62 | 0.00 |
| 6.759 [2] | South Trib | 1,074 | 658.88 | 658.88 | 0.00 |
| 6.872 [2] | South Trib | 1,673 | 660.13 | 660.13 | 0.00 |
| 6.886 [2] | South Trib | 1,745 | 660.17 | 660.17 | 0.00 |
| 7.084 [4] | South Trib | 2,428 | 662.04 | 662.04 | 0.00 |

[1] The reference point used for every cross-section downstream of the existing Thorndale Avenue culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the existing Thorndale Avenue culvert was the upstream face of the culvert.
[2] Regulatory cross-section
[3] Regulatory cross-section replaced with a surveyed cross-section
[4] Surveyed cross-section

TABLE 9
Comparison of 100-Year Water Surface Elevations between
Natural Conditions and Existing Conditions
NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Existing Distance to York Rd Crossing[1] (ft) | Natural Conditions (ft) | Existing Conditions (ft) | Difference Between Natural and Existing Conditions (ft) |
|---|---|---|---|---|---|
| 6.19 [2] | Main Stem | 2,154.83 | 654.72 | 654.72 | 0.00 |
| 6.418 [2] | Main Stem | 949.44 | 655.26 | 655.26 | 0.00 |
| 6.538 [2] | Main Stem | 317.52 | 655.50 | 655.50 | 0.00 |
| 6.59 [2] | Main Stem | 285.84 | 655.83 | 655.83 | 0.00 |
| 6.637 [3] | Main Stem | 10 | 656.60 | 656.60 | 0.00 |
| **YORK ROAD** | | | | | |
| 6.645 [2] | South Trib | 474 | 657.28 | 657.28 | 0.00 |
| 6.759 [2] | South Trib | 1,074 | 659.16 | 659.16 | 0.00 |
| 6.872 [2] | South Trib | 1,673 | 660.43 | 660.43 | 0.00 |
| 6.886 [2] | South Trib | 1,745 | 660.48 | 660.48 | 0.00 |
| 7.084 [4] | South Trib | 2,428 | 662.46 | 662.46 | 0.00 |

[1] The reference point used for every cross-section downstream of the existing Thorndale Avenue culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the existing Thorndale Avenue culvert was the upstream face of the culvert.
[2] Regulatory cross-section
[3] Regulatory cross-section replaced with a surveyed cross-section
[4] Surveyed cross-section

## Proposed Conditions Model

Willow Creek South Tributary is proposed be relocated between Thorndale Avenue and York Road to accommodate the York Road/Thorndale Avenue interchange. Historically the creek was located further west than its current location, as shown on Exhibit 3.2, and will be relocated as shown on the Exhibit in Section 5.

This model reflects the proposed York Road/Elgin O'Hare Expressway structures, road profiles and filling due to the channel relocation. The relocated channel cross-sections and streambed profile are included in Section 6 and Section 5, respectively. In proposed conditions, the Miller Fluids and Thorndale Avenue structures will be removed. Where there is no channel in existing conditions, tables have been created comparing the proposed conditions and natural conditions water surface elevations. Waterway Information Tables have been created for the following structures:

- Existing Thorndale Avenue (to be replaced with Ramps P1, P2 & P8);
- Existing Miller Fluids (to be removed);
- Ramps Q1, O4 and P5 (to be constructed);
- Ramp Q5 (to be constructed);
- York Road (no change);
- CPRR and UPRR (no change);
- O'Hare West Bypass (to be constructed).

Incremental storage is required for all fill between York Road and Elgin O'Hare Expressway. All proposed crossings located downstream of the existing Thorndale Avenue are either equivalent in size or larger than the existing Thorndale Avenue crossing. Compensatory storage is being provided incrementally at a ratio of 2.0:1 between the NWL and 10-year flood elevations and at a ratio of 1.9:1 between the 10- and 100-year flood elevations. The proposed conditions water surface elevations upstream of the existing Thorndale Avenue are decreased by 2.22 feet in the 10-year event, 3.23 feet in the 50-year event and 3.43 feet in the 100-year event. The proposed conditions water surface elevation is lowered due the lowering of the profile through the proposed reach. The hydraulic modeling is included in Section 11 of this report.

Elgin O'Hare Expressway/Ramps P1, P2, P8 (Thorndale Avenue)

The existing Thorndale Avenue crossing will be removed and replaced with a triple 10 feet (span) by 5 feet (rise) RCBC that will traverse under proposed Ramps P1, P2 and P8. This proposed crossing waterway opening is the exact same size as the existing Thorndale Avenue crossing. This model reflects the proposed structure, road profile and fill associated with the Elgin O'Hare Expressway extension. The proposed culverts have been modeled to reflect the invert being buried 12-inches with stone placed within this portion of the culvert. Additionally, the proposed conditions shows increases greater than 0.1 feet at the upstream side of the culverts, however, this increase does not exceed the existing conditions flood elevations associated with the South Tributary at this location. The proposed conditions hydraulic model is included in Section 11. This model was used to demonstrate that the proposed structure and compensatory storage are sized properly and that there is no increase in flood

stages in existing versus proposed conditions for all storm events up to and including the 100-year storm due to the project.

TABLE 10
Comparison of 10-Year Water Surface Elevations between
Proposed Conditions and Natural Conditions
Based on NGVD 1929 Datum

| Cross-Section ID[5] | Willow Creek Watercourse | Distance to Ramps P1, P2, P8 Culvert[1] (ft) | Existing Conditions (ft) | Proposed Conditions (ft) | Natural[6] Conditions (ft) | Difference Between Proposed and Natural Conditions (ft) |
|---|---|---|---|---|---|---|
| 6.6 [2] | Main Stem | 2,261 | 653.03 | 653.04 | 653.04 | 0.00 |
| 6.637 [2] | Main Stem | 2,059 | 653.85 | 653.85 | 653.85 | 0.00 |
| 6.650 [3] | South Trib | 1,489 | --- | 655.74 | --- | --- |
| 6.655 [3] | South Trib | 535 | --- | 656.97 | --- | --- |
| 7.12 [3] | South Trib | D/S Face | --- | 658.24 | --- | --- |
| 7.21 [3] | South Trib | U/S Face | --- | 658.82 | --- | --- |
| 7.247 [2] | South Trib | 197.34 | 661.69 | 660.63 | 661.62 | -0.99[4] |
| 7.331 [2] | South Trib | 687.34 | 662.31 | 662.09 | 662.28 | -0.19[4] |
| 7.399 [2] | South Trib | 1,047.34 | 663.39 | 663.34 | 663.39 | -0.05[4] |
| 7.486 [2] | South Trib | 1,434.34 | 664.90 | 664.87 | 664.90 | -0.03[4] |

[1] The reference point used for every cross-section downstream of the proposed Ramps P1, P2 and P8 culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the proposed Ramps P1, P2 and P8 culvert was the upstream face of the proposed culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Water surface elevations have decreased compared to existing conditions
[5] Decrease due to increased velocities
[6] Natural Conditions of existing Thorndale Avenue

TABLE 11
Comparison of 50-Year Water Surface Elevations between
Proposed Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Ramps P1, P2, P8 Culvert[1] (ft) | Existing Conditions (ft) | Proposed Conditions (ft) | Natural[6] Conditions (ft) | Difference Between Proposed and Natural Conditions (ft) |
|---|---|---|---|---|---|---|
| 6.6 [2] | Main Stem | 2,261 | 654.99 | 654.95 | 655.01 | -0.06[4] |
| 6.637 [2] | Main Stem | 2,059 | 655.80 | 655.77 | 655.80 | -0.03[4] |
| 6.650 [3] | South Trib | 1,489 | --- | 656.88 | --- | --- |
| 6.655 [3] | South Trib | 535 | --- | 657.81 | --- | --- |
| 7.12 [3] | South Trib | D/S Face | --- | 658.83 | --- | --- |
| 7.21 [3] | South Trib | U/S Face | --- | 659.68 | --- | --- |
| 7.247 [2] | South Trib | 197.34 | 663.10 | 661.14 | 662.85 | -1.71[4] |
| 7.331 [2] | South Trib | 687.34 | 663.53 | 662.87 | 663.37 | -0.50[4] |
| 7.399 [2] | South Trib | 1,047.34 | 664.53 | 664.34 | 664.47 | -0.13[4] |
| 7.486 [2] | South Trib | 1,434.34 | 666.77 | 666.75 | 666.76 | -0.01[4] |

[1] The reference point used for every cross-section downstream of the proposed Ramps P1, P2 and P8 culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the proposed Ramps P1, P2 and P8 culvert was the upstream face of the proposed culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Water surface elevations have decreased compared to existing conditions
[5] Decrease due to increased velocities
[6] Natural Conditions of existing Thorndale Avenue

TABLE 12
Comparison of 100-Year Water Surface Elevations between
Proposed Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Ramps P1, P2, P8 Culvert[1] (ft) | Existing Conditions (ft) | Proposed Conditions (ft) | Natural[6] Conditions (ft) | Difference Between Proposed and Natural Conditions (ft) |
|---|---|---|---|---|---|---|
| 6.6 [2] | Main Stem | 2,261 | 655.70 | 655.69 | 655.83 | -0.14[4] |
| 6.637 [2] | Main Stem | 2,059 | 656.56 | 656.55 | 656.60 | -0.05[4] |
| 6.650 [3] | South Trib | 1,489 | --- | 657.55 | --- | --- |
| 6.655 [3] | South Trib | 535 | --- | 658.34 | --- | --- |
| 7.12 [3] | South Trib | D/S Face | --- | 659.11 | --- | --- |
| 7.21 [3] | South Trib | U/S Face | --- | 660.08 | --- | --- |
| 7.247 [2] | South Trib | 197.34 | 663.52 | 661.25 | 663.18 | -1.93[4] |
| 7.331 [2] | South Trib | 687.34 | 663.90 | 663.09 | 663.67 | -0.58[4] |
| 7.399 [2] | South Trib | 1,047.34 | 664.85 | 664.60 | 664.76 | -0.16[4] |
| 7.486 [2] | South Trib | 1,434.34 | 666.93 | 666.92 | 666.93 | -0.01 |

[1] The reference point used for every cross-section downstream of the proposed Ramps P1, P2 and P8 culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the proposed Ramps P1, P2 and P8 culvert was the upstream face of the proposed culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Water surface elevations have decreased compared to existing conditions
[5] Decrease due to increased velocities
[6] Natural Conditions of existing Thorndale Avenue

Ramps Q1, O4, P5

Also to accommodate the York Road/Elgin O'Hare Expressway interchange Ramps Q1, O4 and P5 will be constructed and will be located as shown on the proposed plan included in Section 5. Four 11 feet (span) by 5 feet (rise) RCBC that will traverse under the proposed ramps. This model reflects the proposed structure, road profile and fill associated with the Elgin O'Hare Expressway extension. The proposed culverts have been modeled to reflect the invert being

buried 12-inches with stone placed within this portion of the culvert. Additionally, the proposed conditions shows increases greater than 0.1 feet at the upstream side of the culverts, however, this increase does not exceed the existing conditions flood elevations associated with the South Tributary at this location. The proposed conditions hydraulic model is included in Section 11. This model was used to demonstrate that the proposed structure and compensatory storage are sized properly and that there is no increase in flood stages in existing versus proposed conditions for all storm events up to and including the 100-year storm due to the project.

TABLE 13
Comparison of 10-Year Water Surface Elevations between
Proposed Conditions and Natural Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Ramps Q1, O4, P5 Culvert[1] (ft) | Existing Conditions (ft) | Proposed Conditions (ft) | Natural Conditions (ft) | Difference Between Proposed and Natural Conditions (ft) |
|---|---|---|---|---|---|---|
| 6.6 [2] | Main Stem | 1,205 | 653.03 | 653.04 | 653.04 | 0.00 |
| 6.637 [2] | Main Stem | 1,003 | 653.85 | 653.85 | 653.85 | 0.00 |
| 6.650 [3] | South Trib | 433 | --- | 655.74 | 655.72 | 0.00 |
| 6.653 [3] | South Trib | D/S Face | --- | 656.48 | 656.48 | 0.00 |
| 6.655 [3] | South Trib | U/S Face | --- | 656.97 | 656.91 | 0.06 |
| 6.657 [3] | South Trib | 296 | --- | 658.06 | 658.08 | -0.02[5] |
| 7.247 [2] | South Trib | 1,194.34 | 661.69 | 660.63 | 660.64 | -0.01[5] |
| 7.331 [2] | South Trib | 1,684.34 | 662.31 | 662.09 | 662.09 | 0.00[4] |
| 7.399 [2] | South Trib | 2,044.34 | 663.39 | 663.34 | 663.34 | 0.00[4] |
| 7.486 [2] | South Trib | 2,431.34 | 664.90 | 664.87 | 664.87 | 0.00[4] |

[1] The reference point used for every cross-section downstream of the proposed Ramps Q1, O4 and P5 culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the proposed Ramps Q1, O4 and P5 culvert was the upstream face of the proposed culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Water surface elevations have decreased compared to existing conditions
[5] Decrease due to increased velocities

TABLE 14
Comparison of 50-Year Water Surface Elevations between
Proposed Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Ramps Q1, O4, P5 Culvert[1] (ft) | Existing Conditions (ft) | Proposed Conditions (ft) | Natural Conditions (ft) | Difference Between Proposed and Natural Conditions (ft) |
|---|---|---|---|---|---|---|
| 6.6 [2] | Main Stem | 1,205 | 654.99 | 654.95 | 654.95 | 0.00 |
| 6.637 [2] | Main Stem | 1,003 | 655.80 | 655.77 | 655.77 | 0.00 |
| 6.650 [3] | South Trib | 433 | --- | 656.89 | 656.84 | 0.00 |
| 6.653 [3] | South Trib | D/S Face | --- | 657.25 | 657.25 | 0.00 |
| 6.655 [3] | South Trib | U/S Face | --- | 657.81 | 657.69 | 0.12 |
| 6.657 [3] | South Trib | 296 | --- | 658.68 | 658.58 | 0.10 |
| 7.247 [2] | South Trib | 1,194.34 | 663.10 | 661.14 | 661.15 | -0.01[4] |
| 7.331 [2] | South Trib | 1,684.34 | 663.53 | 662.87 | 662.87 | 0.00[4] |
| 7.399 [2] | South Trib | 2,044.34 | 664.53 | 664.34 | 664.34 | 0.00[4] |
| 7.486 [2] | South Trib | 2,431.34 | 666.77 | 666.75 | 666.75 | 0.00[4] |

[1] The reference point used for every cross-section downstream of the proposed Ramps Q1, O4 and P5 culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the proposed Ramps Q1, O4 and P5 culvert was the upstream face of the proposed culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Water surface elevations have decreased compared to existing conditions
[5] Decrease due to increased velocities

TABLE 15
Comparison of 100-Year Water Surface Elevations between
Proposed Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Ramps Q1, O4, P5 Culvert[1] (ft) | Existing Conditions (ft) | Proposed Conditions (ft) | Natural Conditions (ft) | Difference Between Proposed and Natural Conditions (ft) |
|---|---|---|---|---|---|---|
| 6.6 [2] | Main Stem | 1,205 | 654.99 | 655.69 | 655.69 | 0.00 |
| 6.637 [2] | Main Stem | 1,003 | 655.80 | 656.55 | 656.55 | 0.00 |
| 6.650 [3] | South Trib | 433 | --- | 657.55 | 657.55 | 0.00 |
| 6.653 [3] | South Trib | D/S Face | --- | 657.77 | 657.77 | 0.00 |
| 6.655 [3] | South Trib | U/S Face | --- | 658.34 | 658.12 | 0.22 |
| 6.657 [3] | South Trib | 296 | --- | 659.00 | 658.80 | 0.20 |
| 7.247 [2] | South Trib | 1,194.34 | 663.10 | 661.25 | 661.26 | -0.01 |
| 7.331 [2] | South Trib | 1,684.34 | 663.53 | 663.09 | 663.09 | 0.00[4] |
| 7.399 [2] | South Trib | 2,044.34 | 664.53 | 664.60 | 664.60 | 0.00[4] |
| 7.486 [2] | South Trib | 2,431.34 | 666.77 | 666.92 | 666.92 | 0.00[4] |

[1] The reference point used for every cross-section downstream of the proposed Ramps Q1, O4 and P5 culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the proposed Ramps Q1, O4 and P5 culvert was the upstream face of the proposed culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Water surface elevations have decreased compared to existing conditions
[5] Decrease due to increased velocities

Ramp Q5

Also to accommodate the York Road/Elgin O'Hare Expressway interchange Ramps Q5 will be constructed and will be located as shown on the proposed plan included in Section 5. Four 11 feet (span) by 5 feet (rise) RCBC that will traverse under proposed ramps. This model reflects the proposed structure, road profile and fill associated with the Elgin O'Hare Expressway extension. The proposed culverts have been modeled to reflect the invert being buried 12-inches with stone placed within this portion of the culvert. Additionally, the proposed

conditions shows increases greater than 0.1 feet at the upstream side of the culverts, however, this increase does not exceed the existing conditions flood elevations associated with the South Tributary at this location. The proposed conditions hydraulic model is included in Section 11. This model was used to demonstrate that the proposed structure and compensatory storage are sized properly and that there is no increase in flood stages in existing versus proposed conditions for all storm events up to and including the 100-year storm due to the project.

TABLE 16
Comparison of 10-Year Water Surface Elevations between
Proposed Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Ramp Q5 Culvert[1] (ft) | Existing Conditions (ft) | Proposed Conditions (ft) | Natural Conditions (ft) | Difference Between Proposed and Natural Conditions (ft) |
|---|---|---|---|---|---|---|
| 6.6 [2] | Main Stem | 573 | 655.70 | 653.04 | 653.04 | 0.00 |
| 6.637 [2] | Main Stem | 371 | 656.56 | 653.85 | 653.85 | 0.00 |
| 6.647 [3] | South Trib | D/S Face | --- | 655.21 | 655.20 | 0.01 |
| 6.648 [3] | South Trib | U/S Face | --- | 655.41 | 655.34 | 0.07 |
| 6.657 [3] | South Trib | 1,347 | --- | 658.06 | 658.06 | 0.00 |
| 7.247 [2] | South Trib | 2,446.34 | 663.52 | 660.63 | 660.63 | 0.00 |
| 7.331 [2] | South Trib | 2,933.34 | 663.90 | 662.09 | 662.09 | 0.00[4] |
| 7.399 [2] | South Trib | 3,296.34 | 664.85 | 663.34 | 663.34 | 0.00[4] |
| 7.486 [2] | South Trib | 3,683.34 | 666.93 | 664.87 | 664.87 | 0.00[4] |

[1] The reference point used for every cross-section downstream of the proposed Ramps Q5 culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the proposed Ramp Q5 culvert was the upstream face of the proposed culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Water surface elevations have decreased compared to existing conditions
[5] Decrease due to increased velocities

TABLE 17
Comparison of 50-Year Water Surface Elevations between
Proposed Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Ramp Q5 Culvert[1] (ft) | Existing Conditions (ft) | Proposed Conditions (ft) | Natural Conditions (ft) | Difference Between Proposed and Natural Conditions (ft) |
|---|---|---|---|---|---|---|
| 6.6 [2] | Main Stem | 573 | 655.70 | 654.95 | 654.95 | 0.00 |
| 6.637 [2] | Main Stem | 371 | 656.56 | 655.77 | 655.77 | 0.00 |
| 6.647 [3] | South Trib | D/S Face | --- | 656.56 | 656.56 | 0.05 |
| 6.648 [3] | South Trib | U/S Face | --- | 656.74 | 656.67 | 0.07 |
| 6.657 [3] | South Trib | 1,347 | --- | 658.68 | 658.66 | 0.02 |
| 7.247 [2] | South Trib | 2,446.34 | 663.52 | 661.14 | 661.14 | 0.00 |
| 7.331 [2] | South Trib | 2,933.34 | 663.90 | 662.87 | 662.87 | 0.00[4] |
| 7.399 [2] | South Trib | 3,296.34 | 664.85 | 664.34 | 664.34 | 0.00[4] |
| 7.486 [2] | South Trib | 3,683.34 | 666.93 | 666.75 | 666.75 | 0.00[4] |

[1] The reference point used for every cross-section downstream of the proposed Ramps Q5 culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the proposed Ramp Q5 culvert was the upstream face of the proposed culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Water surface elevations have decreased compared to existing conditions
[5] Decrease due to increased velocities

TABLE 18
Comparison of 100-Year Water Surface Elevations between
Proposed Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Distance to Ramp Q5 Culvert[1] (ft) | Existing Conditions (ft) | Proposed Conditions (ft) | Natural Conditions (ft) | Difference Between Proposed and Natural Conditions (ft) |
|---|---|---|---|---|---|---|
| 6.6 [2] | Main Stem | 573 | 655.70 | 655.69 | 655.69 | 0.00 |
| 6.637 [2] | Main Stem | 371 | 656.56 | 656.55 | 656.55 | 0.00 |
| 6.647 [3] | South Trib | D/S Face | --- | 657.19 | 657.19 | 0.00 |
| 6.648 [3] | South Trib | U/S Face | --- | 657.45 | 657.27 | 0.18 |
| 6.657 [3] | South Trib | 1,347 | --- | 659.00 | 658.91 | 0.09 |
| 7.247 [2] | South Trib | 2,446.34 | 663.52 | 661.25 | 661.25 | 0.00[4] |
| 7.331 [2] | South Trib | 2,933.34 | 663.90 | 663.09 | 663.09 | 0.00[4] |
| 7.399 [2] | South Trib | 3,296.34 | 664.85 | 664.60 | 664.60 | 0.00[4] |
| 7.486 [2] | South Trib | 3,683.34 | 666.93 | 666.92 | 666.92 | 0.00[4] |

[1] The reference point used for every cross-section downstream of the proposed Ramps Q5 culvert was the downstream face of the culvert. The reference point used for every cross-section upstream of the proposed Ramp Q5 culvert was the upstream face of the proposed culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Water surface elevations have decreased compared to existing conditions
[5] Decrease due to increased velocities

## O'Hare West Bypass

The area between the UPRR and the Tank Farm Road will be enclosed in a culvert. The Tank Farm Road crossings consist of three 12 feet (span) by 8 feet (rise) RCBCs that will be extended upstream through the trapezoidal channel to the downstream end of the railroad culverts, completely enclosing Willow Creek in this vicinity. The crossings will be constructed at Stations 293+20 (SB), 298+00 (SB) and 303+20 (SB). The proposed conditions hydraulic modeling was updated to reflect the proposed O'Hare West Bypass, the road profile and the fill associated with the West Bypass. This model was used to demonstrate that the proposed structures and compensatory storage are sized properly and that there

is no increase in flood stages in existing versus proposed conditions for all storm events up to and including the 100-year storm due to the project. The proposed conditions hydraulic model is included in Section 11. Compensatory storage will be provided for these crossings in the compensatory storage basins upstream of York Road.

TABLE 19
Comparison of 10-Year Water Surface Elevations between
Proposed Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Proposed Distance to Tank Farm Rd Crossing[1] (ft) | Proposed Conditions (ft) | Existing Conditions (ft) | Difference Between Proposed and Existing Conditions (ft) |
|---|---|---|---|---|---|
| 6.19 [2] | Main Stem | 1,497.05 | 652.15 | 652.15 | 0.00 |
| 6.418 [2] | Main Stem | 291.66 | 652.61 | 652.61 | 0.00 |
| 6.473 [2] | Main Stem | D/S Face | 652.61 | 652.61 | 0.00 |
| 6.597 [3] | Main Stem | U/S Face | 653.04 | --- | --- |
| 6.645 [2] | Main Stem | 424 | 655.17 | 655.18 | -0.01 |
| 6.656 [3] | South Trib | 1,719 | 657.31 | --- | --- |
| 7.259 [2] | South Trib | 2,832.34 | 660.78 | 661.72 | -0.94[4] |

[1] The reference point used for every cross-section downstream of the proposed EOWB crossing was the downstream face of the Tank Farm Road culvert. The reference point used for every cross-section upstream of the proposed EOWB crossing was the upstream face of the Tank Farm Road culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Decrease due to lower profile

TABLE 20
Comparison of 50-Year Water Surface Elevations between
Proposed Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Proposed Distance to Tank Farm Rd Crossing[1] (ft) | Proposed Conditions (ft) | Existing Conditions (ft) | Difference Between Proposed and Existing Conditions (ft) |
|---|---|---|---|---|---|
| 6.19 [2] | Main Stem | 1,497.05 | 653.91 | 653.91 | 0.00 |
| 6.418 [2] | Main Stem | 291.66 | 654.45 | 654.45 | 0.00 |
| 6.473 [2] | Main Stem | D/S Face | 654.42 | 654.42 | 0.00 |
| 6.597 [3] | Main Stem | U/S Face | 654.96 | --- | --- |
| 6.645 [2] | Main Stem | 424 | 656.55 | 656.62 | -0.07 |
| 6.656 [3] | South Trib | 1,719 | 658.13 | --- | --- |
| 7.259 [2] | South Trib | 2,832.34 | 661.31 | 663.12 | -1.78[4] |

[1] The reference point used for every cross-section downstream of the proposed EOWB crossing was the downstream face of the Tank Farm Road culvert. The reference point used for every cross-section upstream of the proposed EOWB crossing was the upstream face of the Tank Farm Road culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Decrease due to lower profile

TABLE 21
Comparison of 100-Year Water Surface Elevations between
Proposed Conditions and Existing Conditions
Based on NGVD 1929 Datum

| Cross-Section ID | Willow Creek Watercourse | Proposed Distance to Tank Farm Rd Crossing[1] (ft) | Proposed Conditions (ft) | Existing Conditions (ft) | Difference Between Proposed and Existing Conditions (ft) |
|---|---|---|---|---|---|
| 6.19 [2] | Main Stem | 1,497.05 | 654.62 | 654.62 | 0.00 |
| 6.418 [2] | Main Stem | 291.66 | 655.18 | 655.18 | 0.00 |
| 6.473 [2] | Main Stem | D/S Face | 655.13 | 655.13 | 0.00 |
| 6.597 [3] | Main Stem | U/S Face | 655.70 | --- | 0.00 |
| 6.645 [2] | Main Stem | 424 | 657.19 | 657.25 | -0.06 |
| 6.656 [3] | South Trib | 1,719 | 658.58 | --- | --- |
| 7.259 [2] | South Trib | 2,832.34 | 661.44 | 663.54 | -2.06[4] |

[1] The reference point used for every cross-section downstream of the proposed EOWB crossing was the downstream face of the Tank Farm Road culvert. The reference point used for every cross-section upstream of the proposed EOWB crossing was the upstream face of the Tank Farm Road culvert.
[2] Regulatory cross-section
[3] New cross-section along relocated channel
[4] Decrease due to lower profile

**IDNR-OWR Permit Requirements**

Since the total area tributary to both the Elgin O'Hare Expressway structures and the O'Hare West Bypass structure are greater than 1 square mile and the channel is being relocated, a permit is required from the Illinois Department of Natural Resources – Office of Water Resources for the proposed work within the floodway and floodplain of Willow Creek South Tributary and the Willow Creek Main Stem.

The regulatory floodplain and floodway boundaries shown on the effective FIRM, included in Section 3, do not reflect the existing field conditions. As part of the proposed project, it was assumed that the proposed floodplain and floodway would be coincident. Existing floodplain storage volume has compensated for

incrementally, as required, and therefore the floodplain and floodway storage volumes would be met and the project would be permissible. The proposed crossings will create greater than 0.1 foot of head; however, the increases are contained within the EOWB right-of-way.

The proposed creek relocation and the proposed Elgin O'Hare Expressway crossing are located in DuPage County. DuPage County has an additional requirement that fill within the floodplain will be compensated for at a ratio of 1.5:1. Compensatory storage for the floodway and floodplain will be provided to satisfy both DuPage County and IDNR-OWR requirements.

Excavation is proposed upstream of York Road between Willow Creek North Tributary and Elgin O'Hare Expressway. The incremental compensatory storage in the NWL to 10-year is being provided for at a ratio of 2.1:1 and the 10- to 100-year storage is being provided for at a ratio of 1.7:1. Floodplain storage volume calculations are included in Section 12 and are summarized in Table 19.

TABLE 22
Summary of Floodplain Fill and Compensatory Storage

| Increment | Floodplain Fill (ac-ft) | Compensatory Storage Required (1.5:1) (ac-ft) | Provided (ac-ft) |
|---|---|---|---|
| NWL to 10-year | 12.1 | 18.2 | 25.2 |
| 10- to 100-year | 13.3 | 20.0 | 22.2 |
| Total | 25.3 | 38.2 | 47.4 |

## Conclusion and Design Requirements

In order to facilitate the IDOT review, a "Hydraulic Report Outline" for the Elgin O'Hare Expressway and O'Hare West Bypass structures are included at the beginning of the report. The proposed crossings are sized to meet the following criteria:

<u>Elgin O'Hare Expressway /Ramps P1, P2, P8</u>

- The proposed 460 feet long 10 feet (span) by 5 feet (rise) RCBCs, with 1 foot buried, has the same waterway opening area as the existing Thorndale Avenue crossing of 111 feet long,
- The proposed crossing will create 0.0 feet in head over existing conditions at the upstream face of the crossing for the 100-year storm event, and is

approximately 3 feet lower than the existing conditions 100-year flood elevation,
- The 50-year headwater elevation of 659.72 feet (NAVD 1988) is lower than the culvert crown elevation of 660.10 feet (NAVD 1988),
- The 50-year freeboard of 16.1 feet to the proposed edge of pavement (EOP) is greater than the 3 feet requirement,
- The 500-year freeboard of 15.7 feet to the EOP is greater than the 0.0 foot requirement.

Ramps Q1, O4, P5

- The proposed 510 feet long 11 feet (span) by 5 feet (rise) RCBCs, with 1 foot buried, are larger than the existing Thorndale Avenue crossing,
- The proposed crossing will create 0.41 feet in head at the upstream face of the crossing for the 100-year storm event, which will be contained within the proposed right-of-way,
- The 50-year headwater elevation of 657.82 feet (NAVD 1988) is lower than the culvert crown elevation of 658.26 feet (NAVD 1988),
- The 50-year freeboard of 5.5 feet to the proposed edge of pavement (EOP) is greater than the 3 feet requirement,
- The 500-year freeboard of 4.1 feet to the EOP is greater than the 0.0 foot requirement.

Ramp Q5

- The proposed 100 feet long 11 feet (span) by 5 feet (rise) RCBCs, with 1 foot buried, are larger than the existing Thorndale Avenue crossing and equivalent to the proposed culverts at Ramps Q1, O4, and P5,
- The proposed crossing will create 0.28 feet in head at the upstream face of the crossing for the 100-year storm event, which will be contained within the proposed right-of-way,
- The 50-year headwater elevation of 656.63 feet (NAVD 1988) is lower than the culvert crown elevation of 656.76 feet (NAVD 1988),
- The 50-year freeboard of 3.0 feet to the proposed edge of pavement (EOP) is greater than the 3 feet requirement.
- The 500-year freeboard of 1.1 feet is greater than the 0.0 foot requirement.

O'Hare West Bypass

- Three 12 feet (span) by 8 feet (rise) RCBC structures of varying lengths will be placed in the existing trapezoidal channel between the CPRR, UPRR and Tank Farm Road to accommodate the proposed West Bypass,
- The proposed crossing will create 0.0 feet in head at the upstream face of the crossing for the 100-year storm event,

- The 50-year headwater elevation of 654.73 feet (NAVD 1988) is lower than the culvert crown elevation of 656.28 feet (NAVD 1988),
- The 50-year freeboard of 6.7 feet to the proposed edge of pavement (EOP) is greater than the 3 feet requirement,
- The 500-year freeboard of 3.2 feet to the EOP is greater than the 0.0 foot requirement.

JMG\
N:\Idot\070404\Drain\Docs\Hydraulic Reports\Willow Creek\Proposed HR October 2012\WH Hydraulic Report 10_2012.doc

# HYDRAULIC REPORT

## ELGIN O'HARE – WEST BYPASS
## P-91-443-06

## ELGIN O'HARE EXPRESSWAY/RAMPS P1, P2, P8 OVER WILLOW CREEK SOUTH TRIBUTARY
## RAMPS Q1, O4, P5 OVER WILLOW CREEK SOUTH TRIBUTARY
## RAMP Q5 OVER WILLOW CREEK SOUTH TRIBUTARY
## BENSENVILLE, ILLINOIS
## AND
## O'HARE WEST BYPASS OVER WILLOW CREEK
## CHICAGO, ILLINOIS

*Prepared For:*

Illinois Department of Transportation
201 West Center Court
Schaumburg, IL 60196-1096

Prepared By:

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Il 60018

CBBEL Project No. 07-0404

NOVEMBER 2012

VOLUME 2 OF 2

CH2MHILL

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018-4920 Tel (847) 823-0500 Fax (847) 823-0520

# SECTION 2

## WATERWAY INFORMATION TABLE
## HYDRAULIC REPORT DATA SHEETS

Illinois Department of Transportation

# Culvert Waterway Information Table

Route: EOWB
Section: West Bypass over Willow Creek
County: DuPage
Station:

S.N. Exist: NA
S.N. Prop: NA
Waterway: Willow Creek

Computed by: JMG
Checked by: ETA

Date: 3-16-2012
Date: 3-16-2012

Drainage Area = 5.96 Square Miles

Existing Overtopping Elevation: ft. @ Sta
Proposed Overtopping Evaluation: 661.74 ft. @ Sta 304+50

| Flood | Frequency Year | Discharge cfs | Waterway Opening (sq. ft.) | | Natural H.W.E. | Head (ft.) | | Headwater Elev. (ft.) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Existing | Proposed | | Existing | Proposed | Existing | Proposed |
| | 10 | 603 | N/A | 171.4 | 652.82 | N/A | 0.01 | N/A | 652.83 |
| Design | 50 | 996 | N/A | 240.5 | 654.77 | N/A | 0.00 | N/A | 654.77 |
| Base | 100 | 1,156 | N/A | 269.6 | 655.52 | N/A | 0.00 | N/A | 655.52 |
| OVT(E) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| OVT(P) | NA N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Max Calc | 500 | 1,729 | N/A | 288.0 | 658.34 | N/A | 0.00 | N/A | 658.34 |

10-Year Outlet Velocity from Existing Structure = N/A fps
10-Year Outlet Velocity from Proposed Structure = 3.5 fps

OVT = Overtopping Event
(E) Existing (P) Proposed

DATUM: NAVD88
ALL-TIME H.W.E. & DATE: August 1987

SCOPE OF WORK:

## EXISTING STRUCTURE

Bridge or Culvert Type:
Cell Dimensions (W x H):
# of spans \ cells:
Length:
U/S Flowline:
D/S Flowline:
Skew:
Low EOP:

## PROPOSED STRUCTURE

Culvert Type: RCBC
Cell Dimensions (W x H): 3-12'x8'
# of cells: 1
Length: 275,275,305
U/S Flowline:
D/S Flowline:
Skew: 0
Low EOP: N/A

## EXISTING DROPBOX

Dimensions:
Drop:
Weir Elevation:

## PROPOSED DROPBOX

Dimensions:
Drop:
Weir Elevation:

NOTE(S): NAVD88 = NGVD29 – 0.24

# DESIGN BACK-UP CALCULATIONS FOR WIT - EOWB (NAVD88)

Route:
Waterway:

Computed: JMG
Checked:

Date:
Date:

## Calculate Created Head

| Frequency | Natural H.W.E. (ft)[1] | | Exist. Headwater Elev. (ft) | | Prop. Headwater Elev. (ft) | | Created Head (ft)[2] @ Approach Section | |
|---|---|---|---|---|---|---|---|---|
| | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | Existing | Proposed |
| 10-year | 652.82 | 652.79 | **652.82** | 652.79 | **652.83** | 652.80 | **0.00** | **0.01** |
| 50-year | 654.77 | 654.75 | **654.77** | 654.75 | **654.73** | 654.71 | **0.00** | **-0.04** |
| 100-year | 655.52 | 655.46 | **655.52** | 655.46 | **655.51** | 655.45 | **0.00** | **-0.01** |
| 500-year | 658.34 | 658.27 | **658.34** | 658.27 | **658.29** | 658.22 | **0.00** | **-0.05** |

(1) The natural highwater elevation is the water survface elevation at the upstream side of the crossing as modeled in the stream natural condition, without the structure.

(2) The created head is calculated at the approach cross-section, and not at the upstream face of the bridge/culvert. This difference in elevation is then added to the Natural H.W.E. at the U/S face of the structure. This method of calcuating created head is only required for bridges and some major culvert crossings. Also, the preferred created head should never be negative. headwater elevations = The natural highwater elevation + the created head

## CALCULATE FREEBOARD AND CLEARANCE

| Low Road Elevation (ft)[3] | | | |
|---|---|---|---|
| Existing | Station | Proposed | Station |
| N/A | N/A | 661.46 | EOWB 305+00 |
| **Low Beam Elevation (ft)** | | | |
| Existing | Station | Proposed | Station |
| N/A | N/A | N/A | N/A |
| **Proposed Freeboard (ft)** | | | |
| 10-year | 50-year[4] | 100-year | 500-year |
| 8.63 | 6.73 | 5.95 | 3.17 |
| **Proposed Clearance (ft)** | | | |
| 10-year | 50-year[5] | 100-year | 500-year |
| N/A | N/A | N/A | N/A |

(3) Low road elevation is calculated at the edge of pavement, and on the low side of the roadway.

## CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR CULVERT

| Structure Size (ft x ft) | | | |
|---|---|---|---|
| Existing Width | Existing Height | Proposed Width | Proposed Height |
| N/A | N/A | 12.0 | 8.0 |
| **Structure Invert Elevation (ft)** | | | |
| Existing | | Proposed | |
| U/S | D/S | U/S | D/S |
| N/A | N/A | variable | variable |
| Waterway Opening Area ($ft^2$)[6] | | | # of Culverts |
| Frequency | Existing | Proposed | 3 |
| 10-year | N/A | 154.08 | |
| 50-year | N/A | 219.96 | |
| 100-year | N/A | 245.88 | |
| 500-year | N/A | 288.00 | |

(4) Freeboard is calculated from the 50-year design headwater elevation to the proposed low road elevation in the floodplain.

(5) Vertical clearance is calculated from the 50-year natural high-water elevation to the proposed low chord (beam) bridge elevation (2 ft minimum requirement)

Illinois Department of Transportation

# Hydraulic Report Data Sheets

| | | | |
|---|---|---|---|
| Route | Elgin O'Hare West Bypass | P or D # | |
| Section | EOWB SB STA: 293+20, 298+00, 303+20 | PTB # | |
| County | DuPage | | |
| Exist SN | | | |
| Prop SN | | | |

## General Information

1. Name of the Stream: Willow Creek

2. Location of the Structure: NW ¼ of the SW ¼ of Section 1 , Township 40N, Range 11E of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant Christopher B. Burke Engineering, Ltd. ☐ District

4. Hydraulic Report Approval Authority: ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server ☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

## Site Design Data

5. Drainage Area (sq. mi.): 5.96 sq. mi.

6. Highway Classification: ☐ Rural ☒ Urban ☐ Other ☒ Principal Arterial ☐ Minor Arterial ☐ Collector ☐ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 1
   If more than one, explain:

## Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☐ USGS/Stream Stats ☐ FIS ☐ Gage Data ☒ Other DuPage County Watershed Plan Model

10. Hydraulic Modeling (check all that apply):
    a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
    b. Manning's "n" values determined as per IDOT DM CH.5? ☒ Yes ☐ No
       If no, explain:
    c. Source of Starting WSE: Des Plaines River
    d. Non- IDOT encroachments in Survey? ☒ Yes ☐ No
       If yes, are they accounted for? ☒ Yes ☐ No
    e. Does the Tailwater Control? ☐ Yes ☒ No
       If yes, list:
    f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A
       If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 4:1 (X:1)
Contraction 1:1 (X:1)

## IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources of Observed Highwater:

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☐ Yes ☒ No

15. Required IDNR - OWR Permit type:
☐ Individual ☐ SWP #2 ☐ SWP #12 ☒ Floodway
☐ None ☐ Other

## Proposed Structure Data

16. Project Scope (check all that apply):
a. ☐ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☐ Culvert
e. ☒ New Alignment
f. Work Planned Below $Q_{100}$ HWE? ☒ Yes ☐ No
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft):
Preliminary low beam elevation (ft):
Width of deck (ft):
Total length from face to face of abutment (ft)
Abutment type:
Skew (degrees):
Number of spans:

18. If a culvert is proposed, supply:
Type and size: 3-12'x8' RCBC
Upstream invert elevation (ft): varies
Downstream invert elevation (ft): varies
Length (ft): 275, 275, 305
Entrance type: headwall
Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the 3" drop is applied

19. If a three-sided structure is proposed, supply:
Flow line elevation (ft):
Span (ft):
Height (ft):
Skew (degrees):
Length (ft):
Number of spans:

20. a. Is the IDOT Clearance Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):
b. Is the IDOT Freeboard Policy Met? ☒ Yes ☐ No ☐ NA Value (ft):

21. Type of streambed soil : ☐ Clay ☐ Silt ☐ Sand ☒ Loam ☐

22. Scour/ Migration Problems: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Countermeasures Proposed:

## Existing Structure Data

| | | CPRS (UP) Structure U/S | Subject Structure | Tank Farm Rd Structure D/S |
|---|---|---|---|---|
| 23. | Distance from proposed structure: (ft.) | 28' | N/A | 304' |
| 24. | Type of structure: | 3 – 12'x8' RCBC | N/A | 3 - 12'x8' RCBC |
| 25. | Low beam elevation: | 656.66 | N/A | 655.85 |
| 26. | Flow line elevation: | 648.66 | N/A | 647.85 |
| 27. | Maximum known high water elevation: | N/A | N/A | N/A |
| 28. | Date of maximum high water: | August 1987 | N/A | N/A |
| 29. | Cause (backwater, headwater, etc.): | Backwater | N/A | N/A |
| 30. | Does structure carry entire design flood flow? | ☒ Yes ☐ No | ☒ Yes ☐ No | ☒ Yes ☐ No |
| | If not, state area of additional waterway opening: ($ft^2$) | N/A | N/A | N/A |
| 31. | Type and size of existing overflow structures: | N/A | N/A | N/A |
| 32. | Has adverse scour occurred under or adjacent to the structure? | No | No | No |
| 33. | Classify type of scour and/or aggradation / degradation: | N/A | N/A | N/A |

## Required Additional Data

34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:

35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:

36. Site Inspection made by: CBBEL Date: 11/12/10

Remarks:

37. Prepared by: Jeana Gowin, PE, CFM Date 12-15-10

Signed (QA/QC): Date 9/9/2012

Illinois Department of Transportation

# Culvert Waterway Information Table

Route: EOWB
Section: CP & UPRR over Willow Creek
County: DuPage
Station:

S.N. Exist: NA
S.N. Prop: NA
Waterway: Willow Creek

Computed by: JMG
Checked by: ETA

Date: 5-9-2012
Date: 5-9-2012

Drainage Area = 5.96 Square Miles

Existing Overtopping Elevation: 660.8' ft. @ Sta N/A
Proposed Overtopping Evaluation: ft. @ Sta

| Flood | Frequency Year | Discharge cfs | Waterway Opening (sq. ft.) | | Natural H.W.E. | Head (ft.) | | Headwater Elev. (ft.) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Existing | Proposed | | Existing | Proposed | Existing | Proposed |
| | 10 | 603 | 96.1 | N/A | 652.87 | 0.74 | N/A | 653.61 | N/A |
| Design | 50 | 996 | 178.6 | N/A | 654.81 | 0.75 | N/A | 655.56 | N/A |
| Base | 100 | 1,156 | 208.1 | N/A | 655.54 | 0.72 | N/A | 656.32 | N/A |
| OVT(E) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| OVT(P) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Max Calc | 500 | 1,729 | 288.0 | N/A | 658.54 | 0.72 | N/A | 659.26 | N/A |

10-Year Outlet Velocity from Existing Structure = 6.3 fps
10-Year Outlet Velocity from Proposed Structure = N/A fps

OVT = Overtopping Event
(E) Existing (P) Proposed

DATUM: NAVD88
ALL-TIME H.W.E. & DATE: August 1987

SCOPE OF WORK: Structure not modified

## EXISTING STRUCTURE

Bridge or Culvert Type: RCBC
Cell Dimensions (W x H): 12'x8'
# of spans \ cells: 3
Length: 177'
U/S Flowline: 649.20, 648.66, 649.39
D/S Flowline: 648.06, 648.06, 648.91
Skew: N/A
Low EOP: N/A

## PROPOSED STRUCTURE

Culvert Type: N/A
Cell Dimensions (W x H): N/A
# of cells: N/A
Length: N/A
U/S Flowline: N/A
D/S Flowline: N/A
Skew: N/A
Low EOP: N/A

## EXISTING DROPBOX

Dimensions:
Drop:
Weir Elevation:

## PROPOSED DROPBOX

Dimensions:
Drop:
Weir Elevation:

NOTE(S): NAVD88 = NGVD29 – 0.24

# BACK-UP CALCULATIONS FOR WIT - CP & UPRR

Route: CPRS (UP) Computed: SAN Date: 01.31.12
Waterway: Willow Creek Checked: Date:

## Calculate Created Head

| Frequency | Natural H.W.E. (ft)[1] | | Exist. Headwater Elev. (ft) | | Prop. Headwater Elev. (ft) | | Created Head (ft)[2] @ Approach Section | |
|---|---|---|---|---|---|---|---|---|
| | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | Existing | Proposed |
| 10-year | 652.87 | 652.87 | 653.61 | 653.61 | N/A | N/A | 0.74 | N/A |
| 50-year | 654.81 | 654.81 | 655.56 | 655.56 | N/A | N/A | 0.75 | N/A |
| 100-year | 655.54 | 655.60 | 656.26 | 656.32 | N/A | N/A | 0.72 | N/A |
| 500-year | 658.54 | 658.54 | 659.26 | 659.26 | N/A | N/A | 0.72 | N/A |

(1) The natural highwater elevation is the water survface elevation at the upstream side of the crossing as modeled in the stream natural condition, without the structure.

(2) The created head is calculated at the approach cross-section, and not at the upstream face of the bridge/culvert. This difference in elevation is then added to the Natural H.W.E. at the U/S face of the structure. This method of calcuating created head is only required for bridges and some major culvert crossings. Also, the preferred created head should never be negative. headwater elevations = The natural highwater elevation + the created head

## CALCULATE FREEBOARD AND CLEARANCE

| Low Road Elevation (ft)[3] | | | |
|---|---|---|---|
| Existing | Station | Proposed | Station |
| N/A | N/A | N/A | N/A |
| **Low Beam Elevation (ft)** | | | |
| Existing | Station | Proposed | Station |
| N/A | N/A | N/A | N/A |
| **Proposed Freeboard (ft)** | | | |
| 10-year | 50-year[4] | 100-year | 500-year |
| N/A | N/A | N/A | N/A |
| **Proposed Clearance (ft)** | | | |
| 10-year | 50-year[5] | 100-year | 500-year |
| N/A | N/A | N/A | N/A |

(3) Low road elevation is calculated at the edge of pavement, and on the low side of the roadway.

(4) Freeboard is calculated from the 50-year design headwater elevation to the proposed low road elevation in the floodplain.

(5) Vertical clearance is calculated from the 50-year natural high-water elevation to the proposed low chord (beam) bridge elevation (2 ft minimum requirement)

## CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR CULVERT

| Structure Size (ft x ft) | | | |
|---|---|---|---|
| Existing Width | Existing Height | Proposed Width | Proposed Height |
| 12.0 | 8.0 | N/A | N/A |
| **Structure Invert Elevation (ft)** | | | |
| Existing | | Proposed | |
| U/S | D/S | U/S | D/S |
| different inv | different inv | N/A | N/A |

| Waterway Opening Area ($ft^2$)[6] | | | # of Culverts |
|---|---|---|---|
| Frequency | Existing | Proposed | 3 |
| 10-year | 96.10 | N/A | |
| 50-year | 178.60 | N/A | |
| 100-year | 208.10 | N/A | |
| 500-year | 288.00 | N/A | |

Illinois Department of Transportation

# Hydraulic Report Data Sheets

| | | | |
|---|---|---|---|
| Route | Elgin O'Hare West Bypass | P or D # | |
| Section | CP & UPRR over Willow Creek | PTB # | |
| County | DuPage | | |
| Exist SN | | | |
| Prop SN | | | |

## General Information

1. Name of the Stream: Willow Creek

2. Location of the Structure: NW ¼ of the SW ¼ of Section 1 , Township 40N, Range 11E of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant Christopher B. Burke Engineering, Ltd. ☐ District

4. Hydraulic Report Approval Authority: ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server ☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

## Site Design Data

5. Drainage Area (sq. mi.): 5.96 sq. mi.

6. Highway Classification: ☐ Rural ☐ Urban ☒ Other ☐ Principal Arterial ☐ Minor Arterial ☐ Collector ☐ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 1
If more than one, explain:

## Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☐ USGS/Stream Stats ☐ FIS ☐ Gage Data ☒ Other DuPage County Watershed Plan Model

10. Hydraulic Modeling (check all that apply):
a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
b. Manning's "n" values determined as per IDOT DM CH.5? ☒ Yes ☐ No
If no, explain:
c. Source of Starting WSE: Des Plaines River
d. Non- IDOT encroachments in Survey? ☒ Yes ☐ No
If yes, are they accounted for? ☒ Yes ☐ No
e. Does the Tailwater Control? ☐ Yes ☒ No
If yes, list:

f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A
If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 4:1 (X:1)
Contraction 1:1 (X:1)

## IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources of Observed Highwater:

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☐ Yes ☒ No

15. Required IDNR - OWR Permit type:
☐ Individual ☐ SWP #2 ☐ SWP #12 ☐ Floodway
☒ None ☐ Other

## Proposed Structure Data

16. Project Scope (check all that apply):
a. ☐ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☐ Culvert
e. ☐ New Alignment
f. Work Planned Below $Q_{100}$ HWE? ☐ Yes ☒ No
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft): Abutment type:
Preliminary low beam elevation (ft): Skew (degrees):
Width of deck (ft): Number of spans:
Total length from face to face of abutment (ft)

18. If a culvert is proposed, supply:
Type and size: Length (ft):
Upstream invert elevation (ft): Entrance type:
Downstream invert elevation (ft): Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the 3" drop is applied

19. If a three-sided structure is proposed, supply:
Flow line elevation (ft): Skew (degrees):
Span (ft): Length (ft):
Height (ft): Number of spans:

20. a. Is the IDOT Clearance Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):
b. Is the IDOT Freeboard Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):

21. Type of streambed soil : ☐ Clay ☐ Silt ☐ Sand ☒ Loam ☐

22. Scour/ Migration Problems: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Countermeasures Proposed:

**Existing Structure Data**

| | | York Road Structure U/S | Subject Structure | Tank Farm Rd Structure |
|---|---|---|---|---|
| 23. | Distance from proposed structure: (ft.) | 13' | N/A | 304' |
| 24. | Type of structure: | bridge, 3 trapezoidal open | 3 - 12'x8' RCBC | 3 - 12'x8' RCBC |
| 25. | Low beam elevation: | 660.66 | 656.66 | 655.85 |
| 26. | Flow line elevation: | 649.62 | 648.66 | 647.85 |
| 27. | Maximum known high water elevation: | N/A | N/A | N/A |
| 28. | Date of maximum high water: | August 1987 | August 1987 | N/A |
| 29. | Cause (backwater, headwater, etc.): | Backwater | Backwater | N/A |
| 30. | Does structure carry entire design flood flow? | ☒ Yes ☐ No | ☒ Yes ☐ No | ☒ Yes ☐ No |
| | If not, state area of additional waterway opening: ($ft^2$) | N/A | N/A | N/A |
| 31. | Type and size of existing overflow structures: | N/A | N/A | N/A |
| 32. | Has adverse scour occurred under or adjacent to the structure? | No | No | No |
| 33. | Classify type of scour and/or aggradation / degradation: | N/A | N/A | N/A |

**Required Additional Data**

34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:

35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:

36. Site Inspection made by: CBBEL Date: 11/12/10

Remarks:

37. Prepared by: Jeana Gowin, PE, CFM Date 01-31-12

Signed (QA/QC): Date 7/9/2012

Illinois Department of Transportation

**Waterway Information Table**
**Based on NAVD 1988 Datum**

Route: Elgin O'Hare - West Bypass
Section: York Road over Willow Creek
County: DuPage
Date: 01-31-12

Existing SN: N/A
Proposed SN:
Waterway: Willow Creek
Prepared by: Christopher B. Burke Engineering, Ltd.

Existing Overtopping Elev. = 660.76 at Sta.

Drainage Area = 5.96 sq. mi. Proposed Overtopping Elev. = N/A at Sta. N/A

| Flood | Freq. Yr. | Q $Ft^3/s$ | Opening - $ft^2$ | | Natural H.W.E. | Head – ft. | | Headwater Elevation | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Existing | Proposed | | Existing | Proposed | Existing | Proposed |
| | 10 | 603 | 102.4 | N/A | 654.31 | 0.04 | N/A | 654.35 | N/A |
| Design | 50 | 996 | 188.6 | N/A | 655.77 | 0.01 | N/A | 655.78 | N/A |
| Base | 100 | 1,156 | 235.5 | N/A | 656.46 | 0.00 | N/A | 656.46 | N/A |
| Overtop Existing | | | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Overtop Proposed | | | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Max. Calc. | 500 | 1,729 | 443.0 | N/A | 658.72 | 0.00 | N/A | 658.72 | N/A |

10 YEAR VELOCITY THROUGH EXISTING BRIDGE = 5.9 ft/s

10 YEAR VELOCITY THROUGH PROPOSED BRIDGE = N/A ft/s

**ALL–TIME H.W.E. & DATE: August 1987**

**Scope of Work:** Structure not to be modified.

EXISTING STRUCTURE

TYPE: Bridge
LENGTH: 78'
# SPANS: 3
LOW BEAM: 657.76
SKEW: N/A
LOW E.O.P.: N/A

PROPOSED STRUCTURE

TYPE: N/A
LENGTH: N/A
# SPANS: N/A
LOW BEAM: N/A
SKEW: N/A
LOW E.O.P.: N/A

# BACK-UP CALCULATIONS FOR WIT - YORK RD

Route: York Road
Waterway: Willow Creek

Computed: SAN
Checked:

Date: 01.31.12
Date:

## Calculate Created Head

| Frequency | Natural H.W.E. (ft)[1] | | Exist. Headwater Elev. (ft) | | Prop. Headwater Elev. (ft) | | Created Head (ft)[2] @ Approach Section | |
|---|---|---|---|---|---|---|---|---|
| | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | Existing | Proposed |
| 10-year | 654.31 | 654.47 | 654.35 | 654.51 | N/A | N/A | 0.04 | N/A |
| 50-year | 655.77 | 655.86 | 655.78 | 655.87 | N/A | N/A | 0.01 | N/A |
| 100-year | 656.46 | 656.53 | 656.46 | 656.53 | N/A | N/A | 0.00 | N/A |
| 500-year | 658.72 | 658.63 | 658.72 | 658.54 | N/A | N/A | 0.00 | N/A |

(1) The natural highwater elevation is the water survface elevation at the upstream side of the crossing as modeled in the stream natural condition, without the structure.

(2) The created head is calculated at the approach cross-section, and not at the upstream face of the bridge/culvert. This difference in elevation is then added to the Natural H.W.E. at the U/S face of the structure. This method of calcuating created head is only required for bridges and some major culvert crossings. Also, the preferred created head should never be negative. headwater elevations = The natural highwater elevation + the created head

## CALCULATE FREEBOARD AND CLEARANCE

| Low Road Elevation (ft)[3] | | | |
|---|---|---|---|
| Existing | Station | Proposed | Station |
| N/A | N/A | N/A | N/A |
| **Low Beam Elevation (ft)** | | | |
| Existing | Station | Proposed | Station |
| N/A | N/A | N/A | N/A |
| **Proposed Freeboard (ft)** | | | |
| 10-year | 50-year[4] | 100-year | 500-year |
| N/A | N/A | N/A | N/A |
| **Proposed Clearance (ft)** | | | |
| 10-year | 50-year[5] | 100-year | 500-year |
| N/A | N/A | N/A | N/A |

(3) Low road elevation is calculated at the edge of pavement, and on the low side of the roadway.

(4) Freeboard is calculated from the 50-year design headwater elevation to the proposed low road elevation in the floodplain.

(5) Vertical clearance is calculated from the 50-year natural high-water elevation to the proposed low chord (beam) bridge elevation (2 ft minimum requirement)

## CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR CULVERT

| Structure Size (ft x ft) | | | |
|---|---|---|---|
| Existing Width | Existing Height | Proposed Width | Proposed Height |
| bridge | bridge | N/A | N/A |
| **Structure Invert Elevation (ft)** | | | |
| Existing | | Proposed | |
| U/S | D/S | U/S | D/S |
| | | N/A | N/A |

| Waterway Opening Area ($ft^2$)[6] | | | # of Culverts |
|---|---|---|---|
| Frequency | Existing | Proposed | 3 openings |
| 10-year | 102.40 | N/A | |
| 50-year | 188.60 | N/A | |
| 100-year | 235.50 | N/A | |
| 500-year | 443.00 | N/A | |

Illinois Department of Transportation

# Hydraulic Report Data Sheets

| | | | |
|---|---|---|---|
| Route | Elgin O'Hare West Bypass | P or D # | |
| Section | York Road over Willow Creek | PTB # | |
| County | DuPage | | |
| Exist SN | | | |
| Prop SN | | | |

## General Information

1. Name of the Stream: Willow Creek

2. Location of the Structure: NW ¼ of the SW ¼ of Section 1
, Township 40N, Range 11E of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant Christopher B. Burke Engineering, Ltd.
☐ District

4. Hydraulic Report Approval Authority: ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server
☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

## Site Design Data

5. Drainage Area (sq. mi.): 5.96 sq. mi.

6. Highway Classification:
☐ Rural ☐ Principal Arterial
☒ Urban ☐ Minor Arterial
☐ Other ☐ Collector
☒ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 1
If more than one, explain:

## Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☐ USGS/Stream Stats ☐ FIS ☐ Gage Data
☒ Other DuPage County Watershed Plan Model

10. Hydraulic Modeling (check all that apply):
a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
b. Manning's "n" values determined as per IDOT DM CH.5? ☒ Yes ☐ No
If no, explain:
c. Source of Starting WSE: Des Plaines River
d. Non- IDOT encroachments in Survey? ☒ Yes ☐ No
If yes, are they accounted for? ☒ Yes ☐ No
e. Does the Tailwater Control? ☐ Yes ☒ No
If yes, list:

f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A
If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 4:1 (X:1)
Contraction 1:1 (X:1)

## IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources of Observed Highwater:

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☐ Yes ☒ No

15. Required IDNR - OWR Permit type:
☐ Individual ☐ SWP #2 ☐ SWP #12 ☐ Floodway
☒ None ☐ Other

## Proposed Structure Data

16. Project Scope (check all that apply):
a. ☐ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☐ Culvert
e. ☐ New Alignment
f. Work Planned Below $Q_{100}$ HWE? ☐ Yes ☒ No
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft):
Preliminary low beam elevation (ft):
Width of deck (ft):
Total length from face to face of abutment (ft)
Abutment type:
Skew (degrees):
Number of spans:

18. If a culvert is proposed, supply:
Type and size:
Upstream invert elevation (ft):
Downstream invert elevation (ft):
Length (ft):
Entrance type:
Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the 3" drop is applied

19. If a three-sided structure is proposed, supply:
Flow line elevation (ft):
Span (ft):
Height (ft):
Skew (degrees):
Length (ft):
Number of spans:

20. a. Is the IDOT Clearance Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):
b. Is the IDOT Freeboard Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):

21. Type of streambed soil : ☐ Clay ☐ Silt ☐ Sand ☒ Loam ☐

22. Scour/ Migration Problems: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Countermeasures Proposed:

**Existing Structure Data**

| | Supreme Drive Structure U/S | Subject Structure | CP& UPRR Structure D/S |
|---|---|---|---|
| 23. Distance from proposed structure: (ft.) | 60 | N/A | 24 |
| 24. Type of structure: | 2 – 9' x 7' RCBC | bridge, 3 trapezoidal open | 3 -12' x 8' RCBC |
| 25. Low beam elevation: | 656.75 | 660.66 | 656.66 |
| 26. Flow line elevation: | 649.75 | 649.62 | 648.66 |
| 27. Maximum known high water elevation: | N/A | N/A | N/A |
| 28. Date of maximum high water: | August 1987 | August 1987 | August 1987 |
| 29. Cause (backwater, headwater, etc.): | Backwater | Backwater | Backwater |
| 30. Does structure carry entire design flood flow? | ☒ Yes ☐ No | ☒ Yes ☐ No | ☒ Yes ☐ No |
| If not, state area of additional waterway opening: ($ft^2$) | N/A | N/A | N/A |
| 31. Type and size of existing overflow structures: | N/A | N/A | N/A |
| 32. Has adverse scour occurred under or adjacent to the structure? | No | No | No |
| 33. Classify type of scour and/or aggradation / degradation: | N/A | N/A | N/A |

**Required Additional Data**

34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:

35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:

36. Site Inspection made by: CBBEL Date: 11/12/10

Remarks:

37. Prepared by: Jeana Gowin, PE, CFM Date 01-31-12

Signed (QA/QC): Date 7/9/2012

Illinois Department of Transportation

# Culvert Waterway Information Table

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Route: | EOWB | S.N. Exist: | NA | Computed by: | JMG | Date: | 5-9-2012 |
| Section: | Supreme Drive over Willow Creek South Tributary | S.N. Prop: | NA | Checked by: | ETA | Date: | 5-9-2012 |
| County: | DuPage | Waterway: | Willow Creek South Tributatry | | | | |
| Station: | | | | | | | |

Drainage Area = 2.26 Square Miles

Existing Overtopping Elevation: 658.56' ft. @ Sta N/A

Proposed Overtopping Evaluation: N/A ft. @ Sta N/A

| Flood | Frequency Year | Discharge cfs | Waterway Opening (sq. ft.) | | Natural H.W.E. | Head (ft.) | | Headwater Elev. (ft.) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Existing | Proposed | | Existing | Proposed | Existing | Proposed |
| | 10 | 314 | 49.7 | N/A | 654.52 | 0.00 | N/A | 654.52 | N/A |
| Design | 50 | 506 | 74.0 | N/A | 655.87 | 0.00 | N/A | 655.87 | N/A |
| Base | 100 | 570 | 86.6 | N/A | 656.57 | 0.00 | N/A | 656.57 | N/A |
| OVT(E) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| OVT(P) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Max Calc | 500 | 730 | 108.7 | N/A | 657.80 | 0.00 | N/A | 657.80 | N/A |

10-Year Outlet Velocity from Existing Structure = 6.3 fps

10-Year Outlet Velocity from Proposed Structure = N/A fps

OVT = Overtopping Event
(E) Existing (P) Proposed

DATUM: NAVD88

ALL-TIME H.W.E. & DATE: August 1987

SCOPE OF WORK: Structure not to be modified

## EXISTING STRUCTURE

| | |
|---|---|
| Bridge or Culvert Type: | RCBC |
| Cell Dimensions (W x H): | 9' x 7' |
| # of spans \ cells: | 2 |
| Length: | 85' |
| U/S Flowline: | 648.99' |
| D/S Flowline: | 649.30' |
| Skew: | N/A |
| Low EOP: | N/A |

## PROPOSED STRUCTURE

| | |
|---|---|
| Culvert Type: | N/A |
| Cell Dimensions (W x H): | N/A |
| # of cells: | N/A |
| Length: | N/A |
| U/S Flowline: | N/A |
| D/S Flowline: | N/A |
| Skew: | N/A |
| Low EOP: | N/A |

## EXISTING DROPBOX

| | |
|---|---|
| Dimensions: | |
| Drop: | |
| Weir Elevation: | |

## PROPOSED DROPBOX

| | |
|---|---|
| Dimensions: | |
| Drop: | |
| Weir Elevation: | |

NOTE(S): NAVD88 = NGVD29 – 0.24

# BACK-UP CALCULATIONS FOR WIT - SUPREME DRIVE

Route: Supreme Drive | Computed: SAN | Date: 9-May-12

Waterway: Willow Creek - South Tributary | Checked: | Date:

## Calculate Created Head

| Frequency | Natural H.W.E. (ft)[1] | | Exist. Headwater Elev. (ft) | | Prop. Headwater Elev. (ft) | | Created Head (ft)[2] @ Approach Section | |
|---|---|---|---|---|---|---|---|---|
| | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | Existing | Proposed |
| 10-year | 654.52 | 654.52 | 654.52 | 654.52 | N/A | N/A | 0.00 | N/A |
| 50-year | 655.87 | 655.87 | 655.87 | 655.87 | N/A | N/A | 0.00 | N/A |
| 100-year | 656.57 | 656.57 | 656.57 | 656.57 | N/A | N/A | 0.00 | N/A |
| 500-year | 657.80 | 657.80 | 657.80 | 657.80 | N/A | N/A | 0.00 | N/A |

(1) The natural highwater elevation is the water survface elevation at the upstream side of the crossing as modeled in the stream natural condition, without the structure.

(2) The created head is calculated at the approach cross-section, and not at the upstream face of the bridge/culvert. This difference in elevation is then added to the Natural H.W.E. at the U/S face of the structure. This method of calcuating created head is only required for bridges and some major culvert crossings. Also, the preferred created head should never be negative. headwater elevations = The natural highwater elevation + the created head

## CALCULATE FREEBOARD AND CLEARANCE

| Low Road Elevation (ft)[3] | | | |
|---|---|---|---|
| Existing | Station | Proposed | Station |
| N/A | N/A | N/A | N/A |
| Low Beam Elevation (ft) | | | |
| Existing | Station | Proposed | Station |
| N/A | N/A | N/A | N/A |
| Proposed Freeboard (ft) | | | |
| 10-year | 50-year(4) | 100-year | 500-year |
| N/A | N/A | N/A | N/A |
| Proposed Clearance (ft) | | | |
| 10-year | 50-year(5) | 100-year | 500-year |
| N/A | N/A | N/A | N/A |

(3) Low road elevation is calculated at the edge of pavement, and on the low side of the roadway.

(4) Freeboard is calculated from the 50-year design headwater elevation to the proposed low road elevation in the floodplain.

(5) Vertical clearance is calculated from the 50-year natural high-water elevation to the proposed low chord (beam) bridge elevation (2 ft minimum requirement)

## CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR CULVERT

| Structure Size (ft x ft) | | | |
|---|---|---|---|
| Existing Width | Existing Height | Proposed Width | Proposed Height |
| 9.0 | 7.0 | N/A | N/A |
| Structure Invert Elevation (ft) | | | |
| Existing | | Proposed | |
| U/S | D/S | U/S | D/S |
| 651.76 | 651.76 | N/A | N/A |
| Waterway Opening Area ($ft^2$)[6] | | | # of Culverts |
| Frequency | Existing | Proposed | 2 |
| 10-year | 49.68 | N/A | |
| 50-year | 73.98 | N/A | |
| 100-year | 86.58 | N/A | |
| 500-year | 108.72 | N/A | |

Illinois Department of Transportation

# Hydraulic Report Data Sheets

| | | | |
|---|---|---|---|
| Route | Elgin O'Hare West Bypass | P or D # | |
| Section | Supreme Dr. over Willow Creek South Trib. | PTB # | |
| County | DuPage | | |
| Exist SN | | | |
| Prop SN | | | |

## General Information

1. Name of the Stream: Willow Creek South Tributary

2. Location of the Structure: NE ¼ of the SE ¼ of Section 2 , Township 40N, Range 11E of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant Christopher B. Burke Engineering, Ltd.
   ☐ District

4. Hydraulic Report Approval Authority: ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server
   ☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

## Site Design Data

5. Drainage Area (sq. mi.): 2.26 sq. mi.

6. Highway Classification:
   ☐ Rural ☐ Principal Arterial
   ☒ Urban ☐ Minor Arterial
   ☐ Other ☐ Collector
   ☒ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 1
   If more than one, explain:

## Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☐ USGS/Stream Stats ☐ FIS ☐ Gage Data
   ☒ Other DuPage County Watershed Plan Model

10. Hydraulic Modeling (check all that apply):
    a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
    b. Manning's "n" values determined as per IDOT DM CH.5? ☒ Yes ☐ No
       If no, explain:
    c. Source of Starting WSE: Des Plaines River
    d. Non- IDOT encroachments in Survey? ☒ Yes ☐ No
       If yes, are they accounted for? ☒ Yes ☐ No
    e. Does the Tailwater Control? ☐ Yes ☒ No
       If yes, list:

    f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A
       If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 4:1 (X:1)
Contraction 1:1 (X:1)

## IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☐ No
Sources of Observed Highwater:

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☐ Yes ☒ No

15. Required IDNR - OWR Permit type:
☐ Individual ☐ SWP #2 ☐ SWP #12 ☒ Floodway
☐ None ☐ Other

## Proposed Structure Data

16. Project Scope (check all that apply):
a. ☒ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☒ Culvert
e. ☐ New Alignment
f. Work Planned Below $Q_{100}$ HWE? ☒ Yes ☐ No
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft):
Preliminary low beam elevation (ft):
Width of deck (ft):
Total length from face to face of abutment (ft)
Abutment type:
Skew (degrees):
Number of spans:

18. If a culvert is proposed, supply:
Type and size: 3–12'x5' RCBC
Upstream invert elevation (ft): 652.3
Downstream invert elevation (ft): 651.8
Length (ft): 130'
Entrance type: headwall
Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the 3" drop is applied

19. If a three-sided structure is proposed, supply:
Flow line elevation (ft):
Span (ft):
Height (ft):
Skew (degrees):
Length (ft):
Number of spans:

20. a. Is the IDOT Clearance Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):
b. Is the IDOT Freeboard Policy Met? ☒ Yes ☐ No ☐ NA Value (ft):

21. Type of streambed soil : ☐ Clay ☐ Silt ☐ Sand ☒ Loam ☐

22. Scour/ Migration Problems: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Countermeasures Proposed:

**Existing Structure Data**

| | | Miller Fluids Structure U/S | Subject Structure | York Road Structure D/S |
|---|---|---|---|---|
| 23. | Distance from proposed structure: (ft.) | 1,850 | N/A | 60 |
| 24. | Type of structure: | 1 – 30' x 6' RCBC | 2 – 9 'x 7' RCBC | bridge,3 trapezoidal open |
| 25. | Low beam elevation: | 660.66 | 656.75 | 660.66 |
| 26. | Flow line elevation: | 654.66 | 649.75 | 649.62 |
| 27. | Maximum known high water elevation: | 662.90 | N/A | N/A |
| 28. | Date of maximum high water: | August 1987 | August 1987 | August 1987 |
| 29. | Cause (backwater, headwater, etc.): | Backwater | Backwater | Backwater |
| 30. | Does structure carry entire design flood flow? | ☒ Yes ☐ No | ☒ Yes ☐ No | ☒ Yes ☐ No |
| | If not, state area of additional waterway opening: ($ft^2$) | N/A | N/A | N/A |
| 31. | Type and size of existing overflow structures: | N/A | N/A | N/A |
| 32. | Has adverse scour occurred under or adjacent to the structure? | No | No | No |
| 33. | Classify type of scour and/or aggradation / degradation: | N/A | N/A | N/A |

**Required Additional Data**

34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:

35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:

36. Site Inspection made by: CBBEL Date: 11/12/10

Remarks:

37. Prepared by: Jeana Gowin, PE, CFM Date 01-31-12

Signed (QA/QC): Date 7/9/2012

Illinois Department of Transportation

# Culvert Waterway Information Table

Route: EOWB
Section: Miller Fluids Entrance
County: DuPage
Station:

S.N. Exist: NA
S.N. Prop: NA
Waterway: Willow Creek South Tributary

Computed by: JMG
Checked by: ETA

Date: 5-9-2012
Date: 5-9-2012

Drainage Area = 2.23 Square Miles

Existing Overtopping Elevation: 663.23 ft. @ Sta N/A
Proposed Overtopping Evaluation: N/A ft. @ Sta N/A

| Flood | Frequency Year | Discharge cfs | Waterway Opening (sq. ft.) | | Natural H.W.E. | Head (ft.) | | Headwater Elev. (ft.) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Existing | Proposed | | Existing | Proposed | Existing | Proposed |
| | 10 | 314 | 129.3 | N/A | 658.97 | 0.00 | N/A | 658.97 | N/A |
| Design | 50 | 506 | 161.4 | N/A | 660.04 | 0.00 | N/A | 660.04 | N/A |
| Base | 100 | 570 | 170.4 | N/A | 660.34 | 0.00 | N/A | 660.34 | N/A |
| OVT(E) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| OVT(P) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Max Calc | 500 | 730 | 171.3 | N/A | 661.29 | 0.00 | N/A | 661.29 | N/A |

10-Year Outlet Velocity from Existing Structure = 2.4 fps
10-Year Outlet Velocity from Proposed Structure = N/A fps

OVT = Overtopping Event
(E) Existing (P) Proposed

DATUM: NAVD88
ALL-TIME H.W.E. & DATE: August 1987

SCOPE OF WORK: Structure to be removed

## EXISTING STRUCTURE

Bridge or Culvert Type: RCBC
Cell Dimensions (W x H): 30' x 6'
# of spans \ cells: 1
Length: 70'
U/S Flowline: 654.66
D/S Flowline: 654.66
Skew: N/A
Low EOP: N/A

## PROPOSED STRUCTURE

Culvert Type: N/A
Cell Dimensions (W x H): N/A
# of cells: N/A
Length: N/A
U/S Flowline: N/A
D/S Flowline: N/A
Skew: N/A
Low EOP: N/A

## EXISTING DROPBOX

Dimensions:
Drop:
Weir Elevation:

## PROPOSED DROPBOX

Dimensions:
Drop:
Weir Elevation:

NOTE(S): NAVD88 = NGVD29 – 0.24

# BACK-UP CALCULATIONS FOR WIT - MILLER FLUIDS

Route: Miller Fluids | Computed: SAN | Date: 01.31.12
Waterway: Willow Creek - South Tributary | Checked: | Date:

## Calculate Created Head

| Frequency | Natural H.W.E. (ft)[1] | | Exist. Headwater Elev. (ft) | | Prop. Headwater Elev. (ft) | | Created Head (ft)[2] @ Approach Section | |
|---|---|---|---|---|---|---|---|---|
| | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | Existing | Proposed |
| 10-year | 658.97 | 659.14 | 658.97 | 659.05 | N/A | N/A | 0.00 | N/A |
| 50-year | 660.04 | 660.22 | 660.04 | 660.13 | N/A | N/A | 0.00 | N/A |
| 100-year | 660.34 | 660.52 | 660.34 | 660.44 | N/A | N/A | 0.00 | N/A |
| 500-year | 661.29 | 661.51 | 661.29 | 661.40 | N/A | N/A | 0.00 | N/A |

(1) The natural highwater elevation is the water survface elevation at the upstream side of the crossing as modeled in the stream natural condition, without the structure.

(2) The created head is calculated at the approach cross-section, and not at the upstream face of the bridge/culvert. This difference in elevation is then added to the Natural H.W.E. at the U/S face of the structure. This method of calcuating created head is only required for bridges and some major culvert crossings. Also, the preferred created head should never be negative. headwater elevations = The natural highwater elevation + the created head

## CALCULATE FREEBOARD AND CLEARANCE

| Low Road Elevation (ft)[3] | | | |
|---|---|---|---|
| Existing | Station | Proposed | Station |
| N/A | N/A | N/A | N/A |
| **Low Beam Elevation (ft)** | | | |
| Existing | Station | Proposed | Station |
| N/A | N/A | N/A | N/A |
| **Proposed Freeboard (ft)** | | | |
| 10-year | 50-year[4] | 100-year | 500-year |
| N/A | N/A | N/A | N/A |
| **Proposed Clearance (ft)** | | | |
| 10-year | 50-year[5] | 100-year | 500-year |
| N/A | N/A | N/A | N/A |

(3) Low road elevation is calculated at the edge of pavement, and on the low side of the roadway.

(4) Freeboard is calculated from the 50-year design headwater elevation to the proposed low road elevation in the floodplain.

(5) Vertical clearance is calculated from the 50-year natural high-water elevation to the proposed low chord (beam) bridge elevation (2 ft minimum requirement)

## CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR CULVERT

| Structure Size (ft x ft) | | | |
|---|---|---|---|
| Existing Width | Existing Height | Proposed Width | Proposed Height |
| 30.0 | 6.0 | N/A | N/A |
| **Structure Invert Elevation (ft)** | | | |
| Existing | | Proposed | |
| U/S | D/S | U/S | D/S |
| 654.66 | 654.66 | N/A | N/A |

| Waterway Opening Area ($ft^2$) | | | # of Culverts |
|---|---|---|---|
| Frequency | Existing | Proposed | 1 |
| 10-year | 129.30 | N/A | |
| 50-year | 161.40 | N/A | |
| 100-year | 170.40 | N/A | |
| 500-year | 171.30 | N/A | |

Illinois Department of Transportation

# Hydraulic Report Data Sheets

| | | | |
|---|---|---|---|
| Route | Elgin O'Hare West Bypass | P or D # | |
| Section | Miller Fluids over Willow Creek South Trib. | PTB # | |
| County | DuPage | | |
| Exist SN | | | |
| Prop SN | | | |

## General Information

1. Name of the Stream: Willow Creek South Tributary

2. Location of the Structure: SE ¼ of the SE ¼ of Section 2 , Township 40N, Range 11E of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant Christopher B. Burke Engineering, Ltd.
   ☐ District

4. Hydraulic Report Approval Authority: ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server
   ☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

## Site Design Data

5. Drainage Area (sq. mi.): 2.23 sq. mi.

6. Highway Classification:
   ☐ Rural ☐ Principal Arterial
   ☒ Urban ☐ Minor Arterial
   ☐ Other ☐ Collector
   ☒ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 1
   If more than one, explain:

## Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☐ USGS/Stream Stats ☐ FIS ☐ Gage Data
   ☒ Other DuPage County Watershed Plan Model

10. Hydraulic Modeling (check all that apply):
    a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
    b. Manning's "n" values determined as per IDOT DM CH.5? ☒ Yes ☐ No
       If no, explain:
    c. Source of Starting WSE: Des Plaines River
    d. Non- IDOT encroachments in Survey? ☒ Yes ☐ No
       If yes, are they accounted for? ☒ Yes ☐ No
    e. Does the Tailwater Control? ☐ Yes ☒ No
       If yes, list:

    f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A
       If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 4:1 (X:1)
Contraction 1:1 (X:1)

## IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources of Observed Highwater:

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☐ Yes ☒ No

15. Required IDNR - OWR Permit type:
☐ Individual ☐ SWP #2 ☐ SWP #12 ☐ Floodway
☒ None ☐ Other

## Proposed Structure Data

16. Project Scope (check all that apply):
a. ☐ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☐ Culvert
e. ☐ New Alignment
f. Work Planned Below $Q_{100}$ HWE? ☒ Yes ☐ No
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft): Abutment type:
Preliminary low beam elevation (ft): Skew (degrees):
Width of deck (ft): Number of spans:
Total length from face to face of abutment (ft)

18. If a culvert is proposed, supply:
Type and size: Length (ft):
Upstream invert elevation (ft): Entrance type:
Downstream invert elevation (ft): Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the 3" drop is applied

19. If a three-sided structure is proposed, supply:
Flow line elevation (ft): Skew (degrees):
Span (ft): Length (ft):
Height (ft): Number of spans:

20. a. Is the IDOT Clearance Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):
b. Is the IDOT Freeboard Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):

21. Type of streambed soil : ☐ Clay ☐ Silt ☐ Sand ☒ Loam ☐

22. Scour/ Migration Problems: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Countermeasures Proposed:

**Existing Structure Data**

| | | Thorndale Ave Structure U/S | Subject Structure | Supreme Drive Structure D/S |
|---|---|---|---|---|
| 23. | Distance from proposed structure: (ft.) | 1,419 | N/A | 1,850 |
| 24. | Type of structure: | 3-10' x 4' RCBC | 1-30'x6' RCBC | 2 – 9' x 7' RCBC |
| 25. | Low beam elevation: | 661.15 | 660.66 | 656.75 |
| 26. | Flow line elevation: | 656.85 | 654.66 | 649.75 |
| 27. | Maximum known high water elevation: | 666.00 | 662.90 | N/A |
| 28. | Date of maximum high water: | August 1987 | August 1987 | August 1987 |
| 29. | Cause (backwater, headwater, etc.): | Headwater | Backwater | Backwater |
| 30. | Does structure carry entire design flood flow? | ☒ Yes ☐ No | ☒ Yes ☐ No | ☒ Yes ☐ No |
| | If not, state area of additional waterway opening: ($ft^2$) | N/A | N/A | N/A |
| 31. | Type and size of existing overflow structures: | N/A | N/A | N/A |
| 32. | Has adverse scour occurred under or adjacent to the structure? | No | No | No |
| 33. | Classify type of scour and/or aggradation / degradation: | N/A | N/A | N/A |

**Required Additional Data**

34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:

35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:

36. Site Inspection made by: CBBEL Date: 11/12/10

Remarks:

37. Prepared by: Jeana Gowin, PE, CFM Date 01-31-12

Signed (QA/QC): Date 7/9/2012

Illinois Department of Transportation

# Culvert Waterway Information Table

Route: EOWB
Section: West Bypass Ramps Q5
County: DuPage
Station:

S.N. Exist: NA
S.N. Prop: NA
Waterway: Willow Creek South Tributary

Computed by: JMG
Checked by: ETA

Date: 11-20-2012
Date: 11-20-2012

Drainage Area = 2.19 Square Miles

Existing Overtopping Elevation: N/A
Proposed Overtopping Evaluation: 659.62

ft. @ Sta N/A
ft. @ Sta 502+50

| Flood | Frequency Year | Discharge cfs | Waterway Opening (sq. ft.) | | Natural H.W.E. | Head (ft.) | | Headwater Elev. (ft.) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Existing | Proposed | | Existing | Proposed | Existing | Proposed |
| | 10 | 314 | N/A | 110 | 655.10 | N/A | 0.22 | N/A | 655.32 |
| Design | 50 | 506 | N/A | 168 | 656.41 | N/A | 0.22 | N/A | 656.63 |
| Base | 100 | 570 | N/A | 176 | 657.03 | N/A | 0.28 | N/A | 657.31 |
| OVT(E) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| OVT(P) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Max Calc | 500 | 738 | N/A | 176 | 658.21 | N/A | 0.29 | N/A | 658.50 |

10-Year Outlet Velocity from Existing Structure = N/A fps
10-Year Outlet Velocity from Proposed Structure = 2.9 fps

OVT = Overtopping Event
(E) Existing (P) Proposed

DATUM: NAVD88
ALL-TIME H.W.E. & DATE: N/A

SCOPE OF WORK: Proposed Structure

## EXISTING STRUCTURE

Bridge or Culvert Type: N/A
Cell Dimensions (W x H): N/A
# of spans \ cells: N/A
Length: N/A
U/S Flowline: N/A
D/S Flowline: N/A
Skew: N/A
Low EOP: N/A

## PROPOSED STRUCTURE

Culvert Type: RCBC
Cell Dimensions (W x H): 11' x 5'
# of cells: 4
Length: 100'
U/S Flowline: 652.76
D/S Flowline: 652.26
Skew: 0
Low EOP: N/A

## EXISTING DROPBOX

Dimensions:
Drop:
Weir Elevation:

## PROPOSED DROPBOX

Dimensions:
Drop:
Weir Elevation:

NOTE(S): NAVD88 = NGVD29 – 0.24

# DESIGN BACK-UP CALCULATIONS FOR WIT - Ramp Q5 (NAVD 1988)

Route:
Waterway:

Computed: JMG Date:
Checked: Date:

## Calculate Created Head

| Frequency | Natural H.W.E. (ft)[1] | | Exist. Headwater Elev. (ft) | | Prop. Headwater Elev. (ft) | | Created Head (ft)[2] @ Approach Section | |
|---|---|---|---|---|---|---|---|---|
| | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | Existing | Proposed |
| 10-year | 655.10 | 655.16 | **N/A** | N/A | **655.32** | 655.38 | **N/A** | **0.22** |
| 50-year | 656.41 | 656.43 | **N/A** | N/A | **656.63** | 656.65 | **N/A** | **0.22** |
| 100-year | 657.03 | 657.04 | **N/A** | N/A | **657.31** | 657.32 | **N/A** | **0.28** |
| 500-year | 658.21 | 658.18 | **N/A** | N/A | **658.50** | 658.47 | **N/A** | **0.29** |

(1) The natural highwater elevation is the water survface elevation at the upstream side of the crossing as modeled in the stream natural condition, without the structure.

(2) The created head is calculated at the approach cross-section, and not at the upstream face of the bridge/culvert. This difference in elevation is then added to the Natural H.W.E. at the U/S face of the structure. This method of calcuating created head is only required for bridges and some major culvert crossings. Also, the preferred created head should never be negative. headwater elevations = The natural highwater elevation + the created head

## CALCULATE FREEBOARD AND CLEARANCE

| Low Road Elevation (ft)[3] | | | |
|---|---|---|---|
| Existing | Station | Proposed | Station |
| N/A | N/A | 659.62 | Ramp Q5 STA 502+50 |
| **Low Beam Elevation (ft)** | | | |
| Existing | Station | Proposed | Station |
| N/A | N/A | 659.62 | Ramp Q5 STA 502+50 |
| **Proposed Freeboard (ft)** | | | |
| 10-year | 50-year[4] | 100-year | 500-year |
| 4.30 | 2.99 | 2.31 | 1.12 |
| **Proposed Clearance (ft)** | | | |
| 10-year | 50-year[5] | 100-year | 500-year |
| 4.52 | 3.21 | 2.59 | 1.41 |

(3) Low road elevation is calculated at the edge of pavement, and on the low side of the roadway.

## CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR CULVERT

| Structure Size (ft x ft) | | | |
|---|---|---|---|
| Existing Width | Existing Height | Proposed Width | Proposed Height |
| N/A | N/A | 11.0 | 5.0 |
| **Structure Invert Elevation (ft)** | | | |
| Existing | | Proposed | |
| U/S | D/S | U/S | D/S |
| N/A | N/A | 651.8 | 651.3 |
| **Waterway Opening Area ($ft^2$)** [6] | | | # of Culverts |
| Frequency | Existing | Proposed | 4 |
| 10-year | N/A | 109.78 | |
| 50-year | N/A | 167.64 | |
| 100-year | N/A | 176.00 | |
| 500-year | N/A | 176.00 | |

(4) Freeboard is calculated from the 50-year design headwater elevation to the proposed low road elevation in the floodplain.

(5) Vertical clearance is calculated from the 50-year natural high-water elevation to the proposed low chord (beam) bridge elevation (2 ft minimum requirement)

Illinois Department of Transportation

# Hydraulic Report Data Sheets

| | | | |
|---|---|---|---|
| Route | Elgin O'Hare West Bypass | P or D # | |
| Section | EOWB Ramps Q5 | PTB # | |
| County | DuPage | | |
| Exist SN | | | |
| Prop SN | | | |

## General Information

1. Name of the Stream: Willow Creek South Tributary

2. Location of the Structure: SE ¼ of the SE ¼ of Section 2 , Township 40N, Range 11E of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant Christopher B. Burke Engineering, Ltd. ☐ District

4. Hydraulic Report Approval Authority: ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server ☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

## Site Design Data

5. Drainage Area (sq. mi.): 2.19 sq. mi.

6. Highway Classification: ☐ Rural ☒ Urban ☐ Other ☒ Principal Arterial ☐ Minor Arterial ☐ Collector ☐ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 1
   If more than one, explain:

## Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☐ USGS/Stream Stats ☐ FIS ☐ Gage Data ☒ Other DuPage County Watershed Plan Model

10. Hydraulic Modeling (check all that apply):
    a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
    b. Manning's "n" values determined as per IDOT DM CH.5? ☒ Yes ☐ No
       If no, explain:
    c. Source of Starting WSE: Des Plaines River
    d. Non- IDOT encroachments in Survey? ☒ Yes ☐ No
       If yes, are they accounted for? ☒ Yes ☐ No
    e. Does the Tailwater Control? ☐ Yes ☒ No
       If yes, list:
    f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A
       If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 4:1 (X:1)
Contraction 1:1 (X:1)

## IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources of Observed Highwater:

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☒ Yes ☐ No

15. Required IDNR - OWR Permit type:
☐ Individual ☐ SWP #2 ☐ SWP #12 ☒ Floodway
☐ None ☐ Other

## Proposed Structure Data

16. Project Scope (check all that apply):
a. ☐ Complete Replacement
b. ☐ Superstructure Replacement
c. ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☒ Culvert
e. ☒ New Alignment
f. Work Planned Below $Q_{100}$ HWE? ☒ Yes ☐ No
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft):
Preliminary low beam elevation (ft):
Width of deck (ft):
Total length from face to face of abutment (ft)
Abutment type:
Skew (degrees):
Number of spans:

18. If a culvert is proposed, supply:
Type and size: 4–11'x5' RCBC
Upstream invert elevation (ft): 651.76
Downstream invert elevation (ft): 651.26
Length (ft): 100'
Entrance type: Wingwalls
Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the 3" drop is applied

19. If a three-sided structure is proposed, supply:
Flow line elevation (ft):
Span (ft):
Height (ft):
Skew (degrees):
Length (ft):
Number of spans:

20. a. Is the IDOT Clearance Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):
b. Is the IDOT Freeboard Policy Met? ☒ Yes ☐ No ☐ NA Value (ft): 3.0

21. Type of streambed soil : ☐ Clay ☐ Silt ☐ Sand ☒ Loam ☐

22. Scour/ Migration Problems: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Countermeasures Proposed:

## Existing Structure Data

| | | Miller Fluids Structure U/S | Subject Structure | Supreme Drive Structure D/S |
|---|---|---|---|---|
| 23. | Distance from proposed structure: (ft.) | N/A | N/A | N/A |
| 24. | Type of structure: | N/A | N/A | N/A |
| 25. | Low beam elevation: | N/A | N/A | N/A |
| 26. | Flow line elevation: | N/A | N/A | N/A |
| 27. | Maximum known high water elevation: | N/A | N/A | N/A |
| 28. | Date of maximum high water: | N/A | N/A | N/A |
| 29. | Cause (backwater, headwater, etc.): | N/A | N/A | N/A |
| 30. | Does structure carry entire design flood flow? | ☐ Yes ☐ No | ☐ Yes ☐ No | ☐ Yes ☐ No |
| | If not, state area of additional waterway opening: ($ft^2$) | N/A | N/A | N/A |
| 31. | Type and size of existing overflow structures: | N/A | N/A | N/A |
| 32. | Has adverse scour occurred under or adjacent to the structure? | N/A | N/A | N/A |
| 33. | Classify type of scour and/or aggradation / degradation: | N/A | N/A | N/A |

## Required Additional Data

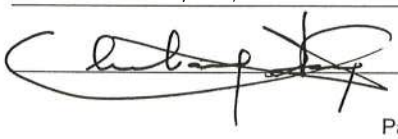
34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:

35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:

36. Site Inspection made by: CBBEL Date: 11/12/10

Remarks:

37. Prepared by: Jeana Gowin, PE, CFM Date 04-30-12

Signed (QA/QC):  Date 7/9/2012

Illinois Department of Transportation

# Culvert Waterway Information Table

Route: EOWB
Section: West Bypass Ramps P5, O4, Q5
County: DuPage
Station:

S.N. Exist: NA
S.N. Prop: NA
Waterway: Willow Creek South Tributary

Computed by: JMG Date: 11-20-2012
Checked by: ETA Date: 11-20-2012

Drainage Area = 2.19 Square Miles

Existing Overtopping Elevation: N/A ft. @ Sta N/A
Proposed Overtopping Evaluation: 665.0 ft. @ Sta York Rd 270+00

| Flood | Frequency Year | Discharge cfs | Waterway Opening (sq. ft.) | | Natural H.W.E. | Head (ft.) | | Headwater Elev. (ft.) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Existing | Proposed | | Existing | Proposed | Existing | Proposed |
| | 10 | 314 | N/A | 125 | 656.67 | N/A | 0.13 | N/A | 656.80 |
| Design | 50 | 506 | N/A | 160 | 657.45 | N/A | 0.37 | N/A | 657.82 |
| Base | 100 | 570 | N/A | 176 | 657.88 | N/A | 0.42 | N/A | 658.30 |
| OVT(E) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| OVT(P) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Max Calc | 500 | 738 | N/A | 176 | 658.62 | N/A | 0.64 | N/A | 659.26 |

10-Year Outlet Velocity from Existing Structure = N/A fps
10-Year Outlet Velocity from Proposed Structure = 2.5 fps

OVT = Overtopping Event
(E) Existing (P) Proposed

DATUM: NAVD88
ALL-TIME H.W.E. & DATE: N/A

SCOPE OF WORK: Proposed Structure

## EXISTING STRUCTURE

Bridge or Culvert Type: N/A
Cell Dimensions (W x H): N/A
# of spans \ cells: N/A
Length: N/A
U/S Flowline: N/A
D/S Flowline: N/A
Skew: N/A
Low EOP: N/A

## PROPOSED STRUCTURE

Culvert Type: RCBC
Cell Dimensions (W x H): 11' x 5'
# of cells: 4
Length: 510'
U/S Flowline: 654.26
D/S Flowline: 653.26
Skew:
Low EOP:

## EXISTING DROPBOX

Dimensions:
Drop:
Weir Elevation:

## PROPOSED DROPBOX

Dimensions:
Drop:
Weir Elevation:

NOTE(S): NAVD88 = NGVD29 – 0.24

# DESIGN BACK-UP CALCULATIONS FOR WIT - Ramp P5, O4, Q5 (NAVD 1988)

Route:
Waterway:

Computed: JMG Date:
Checked: Date:

## Calculate Created Head

| Frequency | Natural H.W.E. (ft)[1] | | Exist. Headwater Elev. (ft) | | Prop. Headwater Elev. (ft) | | Created Head (ft)[2] @ Approach Section | |
|---|---|---|---|---|---|---|---|---|
| | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | Existing | Proposed |
| 10-year | 656.67 | 656.94 | **N/A** | N/A | **656.80** | 657.07 | **N/A** | **0.13** |
| 50-year | 657.45 | 657.52 | **N/A** | N/A | **657.82** | 657.89 | **N/A** | **0.37** |
| 100-year | 657.88 | 657.92 | **N/A** | N/A | **658.30** | 658.34 | **N/A** | **0.42** |
| 500-year | 658.62 | 658.48 | **N/A** | N/A | **659.26** | 659.12 | **N/A** | **0.64** |

(1) The natural highwater elevation is the water surface elevation at the upstream side of the crossing as modeled in the stream natural condition, without the structure.

(2) The created head is calculated at the approach cross-section, and not at the upstream face of the bridge/culvert. This difference in elevation is then added to the Natural H.W.E. at the U/S face of the structure. This method of calcuating created head is only required for bridges and some major culvert crossings. Also, the preferred created head should never be negative. headwater elevations = The natural highwater elevation + the created head

## CALCULATE FREEBOARD AND CLEARANCE

| Low Road Elevation (ft)[3] | | | |
|---|---|---|---|
| Existing | Station | Proposed | Station |
| N/A | N/A | 663.31 | Ramp O8 STA 137+00 |
| **Low Beam Elevation (ft)** | | | |
| Existing | Station | Proposed | Station |
| N/A | N/A | 663.31 | Ramp O8 STA 137+00 |
| **Proposed Freeboard (ft)** | | | |
| 10-year | 50-year[4] | 100-year | 500-year |
| 6.51 | 5.49 | 5.01 | 4.05 |
| **Proposed Clearance (ft)** | | | |
| 10-year | 50-year[5] | 100-year | 500-year |
| 6.64 | 5.86 | 5.43 | 4.69 |

(3) Low road elevation is calculated at the edge of pavement, and on the low side of the roadway.

## CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR CULVERT

| Structure Size (ft x ft) | | | |
|---|---|---|---|
| Existing Width | Existing Height | Proposed Width | Proposed Height |
| N/A | N/A | 11.0 | 5.0 |
| **Structure Invert Elevation (ft)** | | | |
| Existing | | Proposed | |
| U/S | D/S | U/S | D/S |
| N/A | N/A | 653.3 | 652.3 |

| Waterway Opening Area ($ft^2$) [6] | | | # of Culverts |
|---|---|---|---|
| Frequency | Existing | Proposed | 4 |
| 10-year | N/A | 125.40 | |
| 50-year | N/A | 160.38 | |
| 100-year | N/A | 176.00 | |
| 500-year | N/A | 176.00 | |

(4) Freeboard is calculated from the 50-year design headwater elevation to the proposed low road elevation in the floodplain.

(5) Vertical clearance is calculated from the 50-year natural high-water elevation to the proposed low chord (beam) bridge elevation (2 ft minimum requirement)

Illinois Department of Transportation

# Hydraulic Report Data Sheets

| | | | |
|---|---|---|---|
| Route | Elgin O'Hare West Bypass | P or D # | |
| Section | EOWB Ramps Q5, O4, P5 (P5 STA:550+00) | PTB # | |
| County | DuPage | | |
| Exist SN | | | |
| Prop SN | | | |

## General Information

1. Name of the Stream: Willow Creek South Tributary

2. Location of the Structure: SE ¼ of the SE ¼ of Section 2 , Township 40N, Range 11E of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant Christopher B. Burke Engineering, Ltd.
   ☐ District

4. Hydraulic Report Approval Authority: ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server
   ☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

## Site Design Data

5. Drainage Area (sq. mi.): 2.19 sq. mi.

6. Highway Classification:
   ☐ Rural ☒ Urban ☐ Other
   ☒ Principal Arterial ☐ Minor Arterial ☐ Collector ☐ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 1
   If more than one, explain:

## Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☐ USGS/Stream Stats ☐ FIS ☐ Gage Data
   ☒ Other DuPage County Watershed Plan Model

10. Hydraulic Modeling (check all that apply):
    a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
    b. Manning's "n" values determined as per IDOT DM CH.5? ☒ Yes ☐ No
       If no, explain:
    c. Source of Starting WSE: Des Plaines River
    d. Non- IDOT encroachments in Survey? ☒ Yes ☐ No
       If yes, are they accounted for? ☒ Yes ☐ No
    e. Does the Tailwater Control? ☐ Yes ☒ No
       If yes, list:
    f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A
       If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 4:1 (X:1)
Contraction 1:1 (X:1)

## IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources of Observed Highwater:

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☒ Yes ☐ No

15. Required IDNR - OWR Permit type:
☐ Individual ☐ SWP #2 ☐ SWP #12 ☒ Floodway
☐ None ☐ Other

## Proposed Structure Data

16. Project Scope (check all that apply):
a. ☐ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☒ Culvert
e. ☒ New Alignment
f. Work Planned Below $Q_{100}$ HWE? ☒ Yes ☐ No
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft):
Preliminary low beam elevation (ft):
Width of deck (ft):
Total length from face to face of abutment (ft)
Abutment type:
Skew (degrees):
Number of spans:

18. If a culvert is proposed, supply:
Type and size: 4–11'x5' RCBC
Upstream invert elevation (ft): 653.26
Downstream invert elevation (ft): 652.26
Length (ft): 510'
Entrance type: Wingwalls
Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the 3" drop is applied

19. If a three-sided structure is proposed, supply:
Flow line elevation (ft):
Span (ft):
Height (ft):
Skew (degrees):
Length (ft):
Number of spans:

20. a. Is the IDOT Clearance Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):
b. Is the IDOT Freeboard Policy Met? ☒ Yes ☐ No ☐ NA Value (ft): 5.5

21. Type of streambed soil : ☐ Clay ☐ Silt ☐ Sand ☒ Loam ☐

22. Scour/ Migration Problems: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Countermeasures Proposed:

## Existing Structure Data

| | | Miller Fluids Structure U/S | Subject Structure | Supreme Drive Structure D/S |
|---|---|---|---|---|
| 23. | Distance from proposed structure: (ft.) | N/A | N/A | N/A |
| 24. | Type of structure: | N/A | N/A | N/A |
| 25. | Low beam elevation: | N/A | N/A | N/A |
| 26. | Flow line elevation: | N/A | N/A | N/A |
| 27. | Maximum known high water elevation: | N/A | N/A | N/A |
| 28. | Date of maximum high water: | N/A | N/A | N/A |
| 29. | Cause (backwater, headwater, etc.): | N/A | N/A | N/A |
| 30. | Does structure carry entire design flood flow? | ☐ Yes ☐ No | ☐ Yes ☐ No | ☐ Yes ☐ No |
| | If not, state area of additional waterway opening: ($ft^2$) | N/A | N/A | N/A |
| 31. | Type and size of existing overflow structures: | N/A | N/A | N/A |
| 32. | Has adverse scour occurred under or adjacent to the structure? | N/A | N/A | N/A |
| 33. | Classify type of scour and/or aggradation / degradation: | N/A | N/A | N/A |

## Required Additional Data

34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:

35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:

36. Site Inspection made by: CBBEL Date: 11/12/10

Remarks:

37. Prepared by: Jeana Gowin, PE, CFM Date 04-30-12

Signed (QA/QC): Date 7/9/2012

Illinois Department of Transportation

# Culvert Waterway Information Table

Route: EOWB
Section: West Bypass Ramps P1, P2, P8
County: DuPage
Station: EOWB Ramp P2 STA 217+30

S.N. Exist: NA
S.N. Prop: NA
Waterway: Willow Creek South Tributary

Computed by: JMG
Checked by: ETA

Date: 11-20-2012
Date: 11-20-2012

Drainage Area = 2.12 Square Miles

Existing Overtopping Elevation: 665.28 ft. @ Sta 248+00
Proposed Overtopping Evaluation: >675 ft. @ Sta Ramp P8, P1

| Flood | Frequency Year | Discharge cfs | Waterway Opening (sq. ft.) | | Natural H.W.E. | Head (ft.) | | Headwater Elev. (ft.) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Existing | Proposed | | Existing | Proposed | Existing | Proposed |
| | 10 | 287 | 120.0 | 89 | 661.18 | 0.07 | * | 661.25 | 659.13 |
| Design | 50 | 461 | 120.0 | 109 | 662.45 | 0.28 | * | 662.73 | 659.72 |
| Base | 100 | 517 | 120.0 | 117 | 662.79 | 0.37 | * | 663.16 | 660.13 |
| OVT(E) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| OVT(P) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Max Calc | 500 | 675 | 120.0 | 120.0 | 663.93 | 0.57 | * | 664.50 | 660.71 |

10-Year Outlet Velocity from Existing Structure = 2.4 fps
10-Year Outlet Velocity from Proposed Structure = 3.2 fps
OVT = Overtopping Event
(E) Existing (P) Proposed

DATUM: NAVD88
ALL-TIME H.W.E. & DATE: August 1987 (the current triple RCBC was installed after the August 1987 flood event)

SCOPE OF WORK: Structure to be replaced with 3 – 10' x 5' RCBCs with 1-foot buried

## EXISTING STRUCTURE

Bridge or Culvert Type: RCBC
Cell Dimensions (W x H): 10' x 4'
# of spans \ cells: 3
Length: 116',111',107'
U/S Flowline: 657.42'
D/S Flowline: 657.06'
Skew: N/A
Low EOP: N/A

## PROPOSED STRUCTURE

Culvert Type: RCBC
Cell Dimensions (W x H): 10' x 5'
# of cells: 3
Length: 460'
U/S Flowline: 655.86
D/S Flowline: 654.76
Skew: 0
Low EOP: N/A

## EXISTING DROPBOX

Dimensions:
Drop:
Weir Elevation:

## PROPOSED DROPBOX

Dimensions:
Drop:
Weir Elevation:

NOTE(S): NAVD88 = NGVD29 – 0.24 * Inverts and streambed profiles have been lowered.

# DESIGN BACK-UP CALCULATIONS FOR WIT - Ramp P1, P8, P2 (NAVD 1988)

Route:
Waterway:

Computed: JMG Date:
Checked: Date:

## Calculate Created Head

| Frequency | Natural H.W.E. (ft)[1] | | Exist. Headwater Elev. (ft) | | Prop. Headwater Elev. (ft) | | Created Head (ft)[2] @ Approach Section | |
|---|---|---|---|---|---|---|---|---|
| | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | U/S Face of Structure | Approach Sect. (40' U/S) | Existing | Proposed |
| 10-year | 661.18 | 661.21 | **661.25** | 661.28 | **659.13** | 659.16 | **0.07** | **-2.05** |
| 50-year | 662.45 | 662.47 | **662.73** | 662.75 | **659.72** | 659.74 | **0.28** | **-2.73** |
| 100-year | 662.79 | 662.81 | **663.16** | 663.18 | **660.13** | 660.15 | **0.37** | **-2.66** |
| 500-year | 663.93 | 663.94 | **664.50** | 664.51 | **660.71** | 660.72 | **0.57** | **-3.22** |

(1) The natural highwater elevation is the water survface elevation at the upstream side of the crossing as modeled in the stream natural condition, without the structure.

(2) The created head is calculated at the approach cross-section, and not at the upstream face of the bridge/culvert. This difference in elevation is then added to the Natural H.W.E. at the U/S face of the structure. This method of calcuating created head is only required for bridges and some major culvert crossings. Also, the preferred created head should never be negative. headwater elevations = The natural highwater elevation + the created head

## CALCULATE FREEBOARD AND CLEARANCE

| Low Road Elevation (ft)[3] | | | |
|---|---|---|---|
| Existing | Station | Proposed | Station |
| 665.28 | 248+00 | 675.82 | Ramp P2 STA 200+00 |
| **Low Beam Elevation (ft)** | | | |
| Existing | Station | Proposed | Station |
| N/A | N/A | 675.82 | Ramp P2 STA 200+00 |
| **Proposed Freeboard (ft)** | | | |
| 10-year | 50-year[4] | 100-year | 500-year |
| 16.69 | 16.10 | 15.69 | 15.11 |
| **Proposed Clearance (ft)** | | | |
| 10-year | 50-year[5] | 100-year | 500-year |
| 14.64 | 13.37 | 13.03 | 11.89 |

(3) Low road elevation is calculated at the edge of pavement, and on the low side of the roadway.

(4) Freeboard is calculated from the 50-year design headwater elevation to the proposed low road elevation in the floodplain.

(5) Vertical clearance is calculated from the 50-year natural high-water elevation to the proposed low chord (beam) bridge elevation (2 ft minimum requirement)

## CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR CULVERT

| Structure Size (ft x ft) | | | |
|---|---|---|---|
| Existing Width | Existing Height | Proposed Width | Proposed Height |
| 10.0 | 4.0 | 10.0 | 5.0 |
| **Structure Invert Elevation (ft)** | | | |
| Existing | | Proposed | |
| U/S | D/S | U/S | D/S |
| Variable | Variable | 654.9 | 653.8 |

| Waterway Opening Area ($ft^2$)[6] | | | # of Culverts |
|---|---|---|---|
| Frequency | Existing | Proposed | 3 |
| 10-year | 120.00 | 88.65 | |
| 50-year | 120.00 | 109.05 | |
| 100-year | 120.00 | 117.45 | |
| 500-year | 120.00 | 120.00 | |

Illinois Department of Transportation

# Hydraulic Report Data Sheets

| | | | |
|---|---|---|---|
| Route | Elgin O'Hare-West Bypass | P or D # | |
| Section | EOWB Ramps P1, P2, P8 (P2 STA: 217+30)/Thorndale Avenue | PTB # | |
| County | DuPage | | |
| Exist SN | | | |
| Prop SN | | | |

## General Information

1. Name of the Stream: Willow Creek South Tributary

2. Location of the Structure: NW ¼ of the NE ¼ of Section 11 , Township 40N, Range 11E of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant Christopher B. Burke Engineering, Ltd. ☐ District

4. Hydraulic Report Approval Authority: ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server ☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

## Site Design Data

5. Drainage Area (sq. mi.): 2.12 sq. mi.

6. Highway Classification: ☐ Rural ☒ Urban ☐ Other ☐ Principal Arterial ☐ Minor Arterial ☐ Collector ☒ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 1
If more than one, explain:

## Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☐ USGS/Stream Stats ☐ FIS ☐ Gage Data ☒ Other DuPage County Watershed Plan Model

10. Hydraulic Modeling (check all that apply):
a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
b. Manning's "n" values determined as per IDOT DM CH.5? ☒ Yes ☐ No
If no, explain:
c. Source of Starting WSE: Des Plaines River
d. Non- IDOT encroachments in Survey? ☒ Yes ☐ No
If yes, are they accounted for? ☒ Yes ☐ No
e. Does the Tailwater Control? ☐ Yes ☒ No
If yes, list:

f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A

If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 4:1 (X:1)
Contraction 1:1 (X:1)

## IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.

13. Is there any History of Flooding or Overtopping problems? ☒ Yes ☐ No
Sources of Observed Highwater:
Prior to the installation of the triple RCBC, the roadway frequently overtopped.

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☐ Yes ☒ No

15. Required IDNR - OWR Permit type:
☐ Individual ☐ SWP #2 ☐ SWP #12 ☒ Floodway
☐ None ☐ Other

## Proposed Structure Data

16. Project Scope (check all that apply):
a. ☒ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☒Culvert
e. ☒ New Alignment
f. Work Planned Below $Q_{100}$ HWE? ☒ Yes ☐ No
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft):
Preliminary low beam elevation (ft):
Width of deck (ft):
Total length from face to face of abutment (ft)
Abutment type:
Skew (degrees):
Number of spans:

18. If a culvert is proposed, supply:
Type and size: 3–10'x5' RCBC
Upstream invert elevation (ft): 654.86
Downstream invert elevation (ft): 653.76
Length (ft): 460'
Entrance type: Wingwalls
Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the 3" drop is applied

19. If a three-sided structure is proposed, supply:
Flow line elevation (ft):
Span (ft):
Height (ft):
Skew (degrees):
Length (ft):
Number of spans:

20. a. Is the IDOT Clearance Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):
b. Is the IDOT Freeboard Policy Met? ☒ Yes ☐ No ☐ NA Value (ft): 16.1

21. Type of streambed soil : ☐ Clay ☐ Silt ☐ Sand ☒ Loam ☐ _____

22. Scour/ Migration Problems: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Countermeasures Proposed:

## Existing Structure Data

| | Thomas Drive Structure U/S | Subject Structure | Miller Fluids Structure D/S |
|---|---|---|---|
| 23. Distance from proposed structure: (ft.) | 1,491 | N/A | 1,419 |
| 24. Type of structure: | 2 - 82" x 58" CMP | 3 – 10' x 4' RCBC | 1 – 30' x 6' RCBC |
| 25. Low beam elevation: | 662.69 | 660.77 | 660.66 |
| 26. Flow line elevation: | 657.86 | 656.77 | 654.66 |
| 27. Maximum known high water elevation: | 666.60 | 666.00* | 662.90 |
| 28. Date of maximum high water: | August 1987 | August 1987 | August 1987 |
| 29. Cause (backwater, headwater, etc.): | Backwater | Headwater | Backwater |
| 30. Does structure carry entire design flood flow? | ☐ Yes ☒ No | ☒ Yes ☐ No | ☒ Yes ☐ No |
| If not, state area of additional waterway opening: ($ft^2$) | 314.8 | N/A | N/A |
| 31. Type and size of existing overflow structures: | N/A | N/A | N/a |
| 32. Has adverse scour occurred under or adjacent to the structure? | No | No | No |
| 33. Classify type of scour and/or aggradation / degradation: | N/A | N/A | N/A |

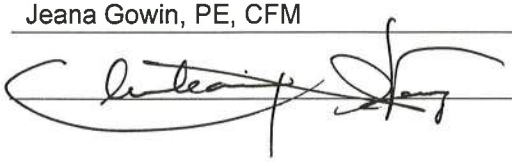
- During the August 1987 flood, the Thorndale Ave culvert was a 5' CMP.

## Required Additional Data

34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:
None.

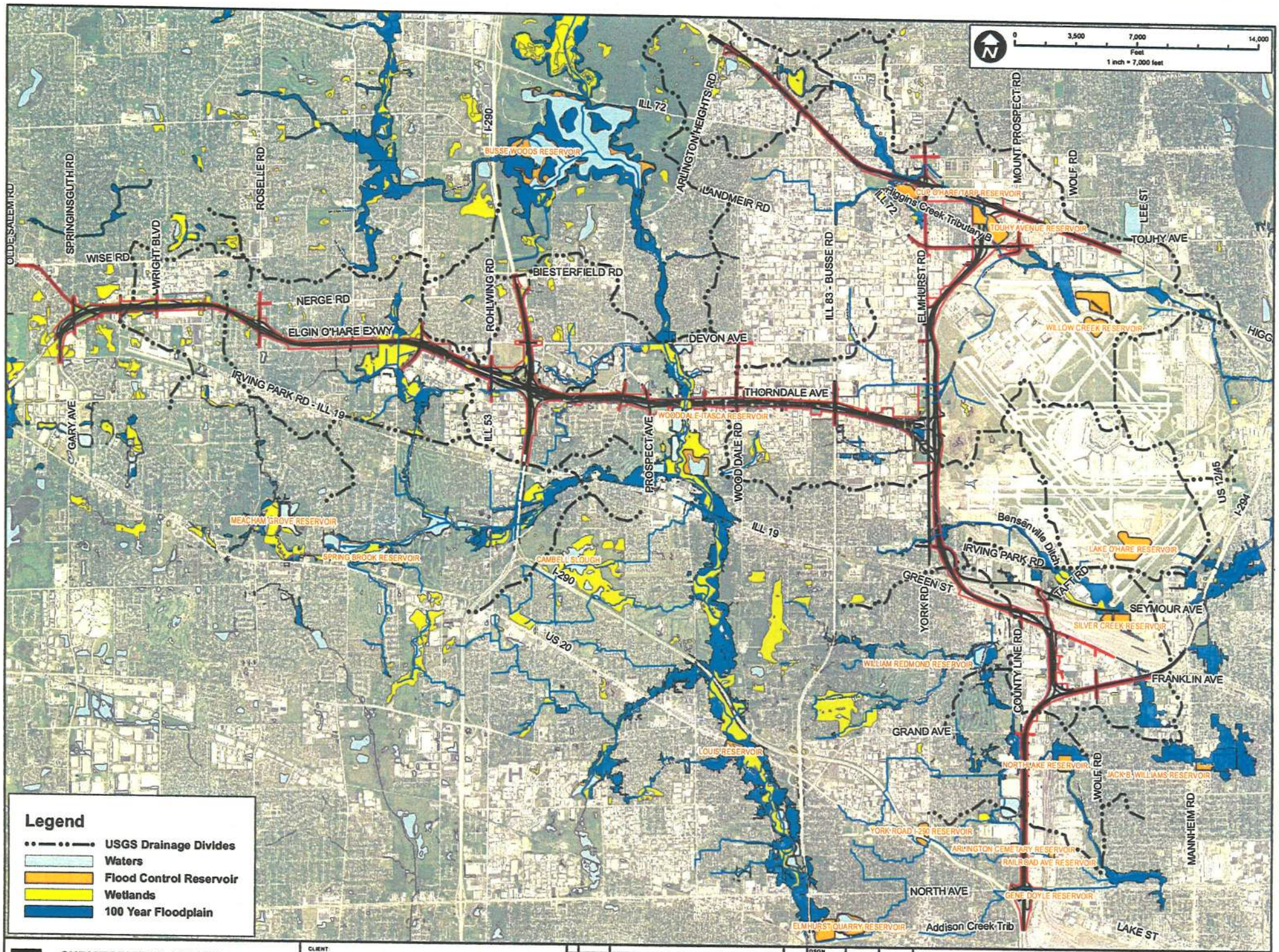
35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:
None.

36. Site Inspection made by: CBBEL Date: 11/12/10
Remarks:

37. Prepared by: Jeana Gowin, PE, CFM Date 12-15-10
Signed (QA/QC):  Date 7/9/2012

# SECTION 3

## GENERAL PROJECT LOCATION MAP
## USGS HYDROLOGIC INVESTIGATIONS ATLAS
## FLOOD INSURANCE RATE MAP
## FLOOD INSURANCE STUDY INFORMATION




CHRISTOPHER B. BURKE ENGINEERING LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

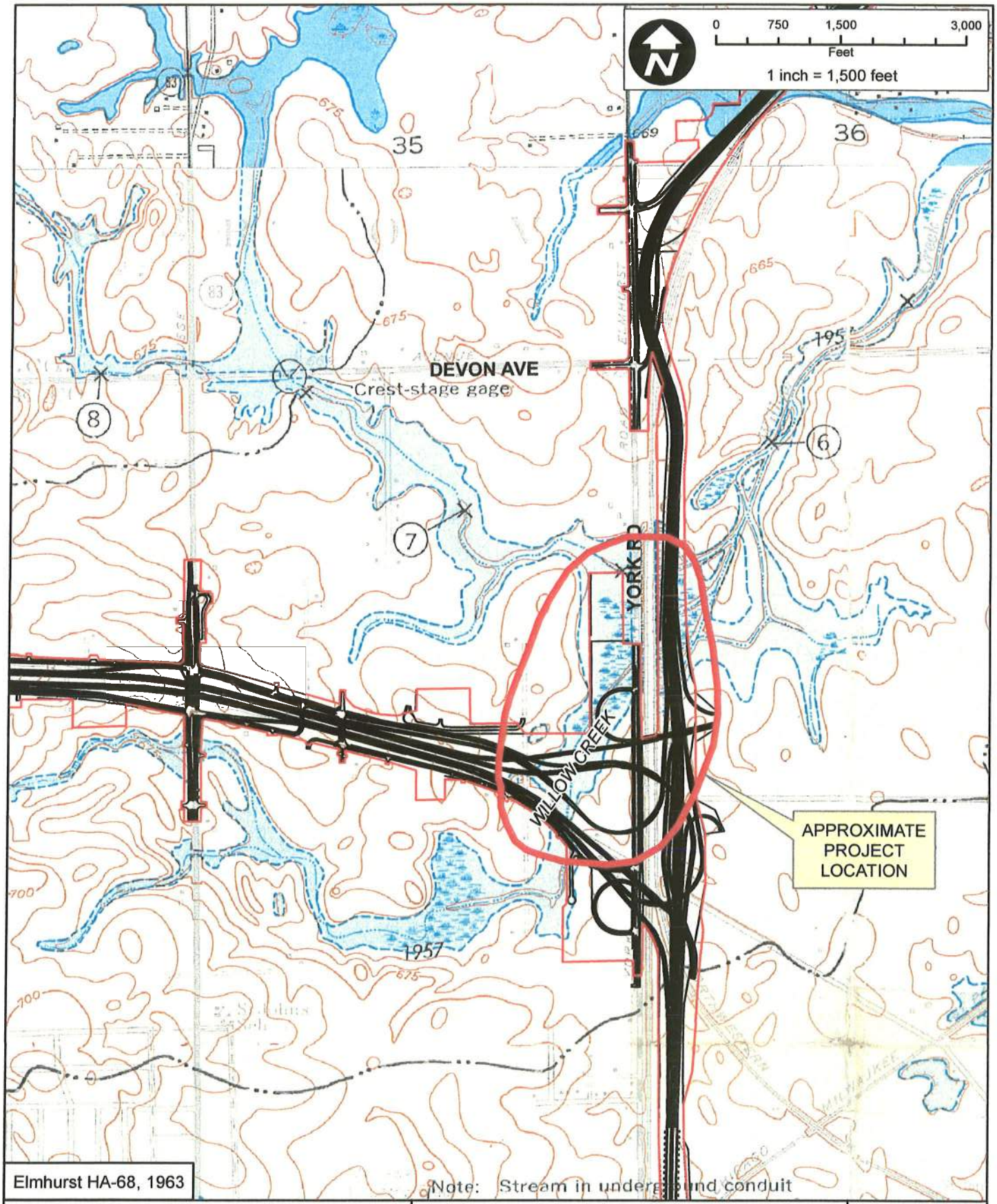
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| | |
|---|---|
| DSGN | |
| DWN | DWALTERS |
| CHKD | |
| SCALE | 1" = 7,000' |
| CHKD | MODEL ArcGIS 10 |
| PLOT DATE | 1/26/2011 |

TITLE: ELGIN O'HARE - WEST BYPASS GENERAL PROJECT LOCATION MAP

| | |
|---|---|
| PROJ NO. | 070404 |
| DATE | |
| SHEET | 0 OF 0 |
| DRAWING NO. | EXH 3.1 |




CLIENT:
**ILLINOIS DEPARTMENT OF TRANSPORTATION**

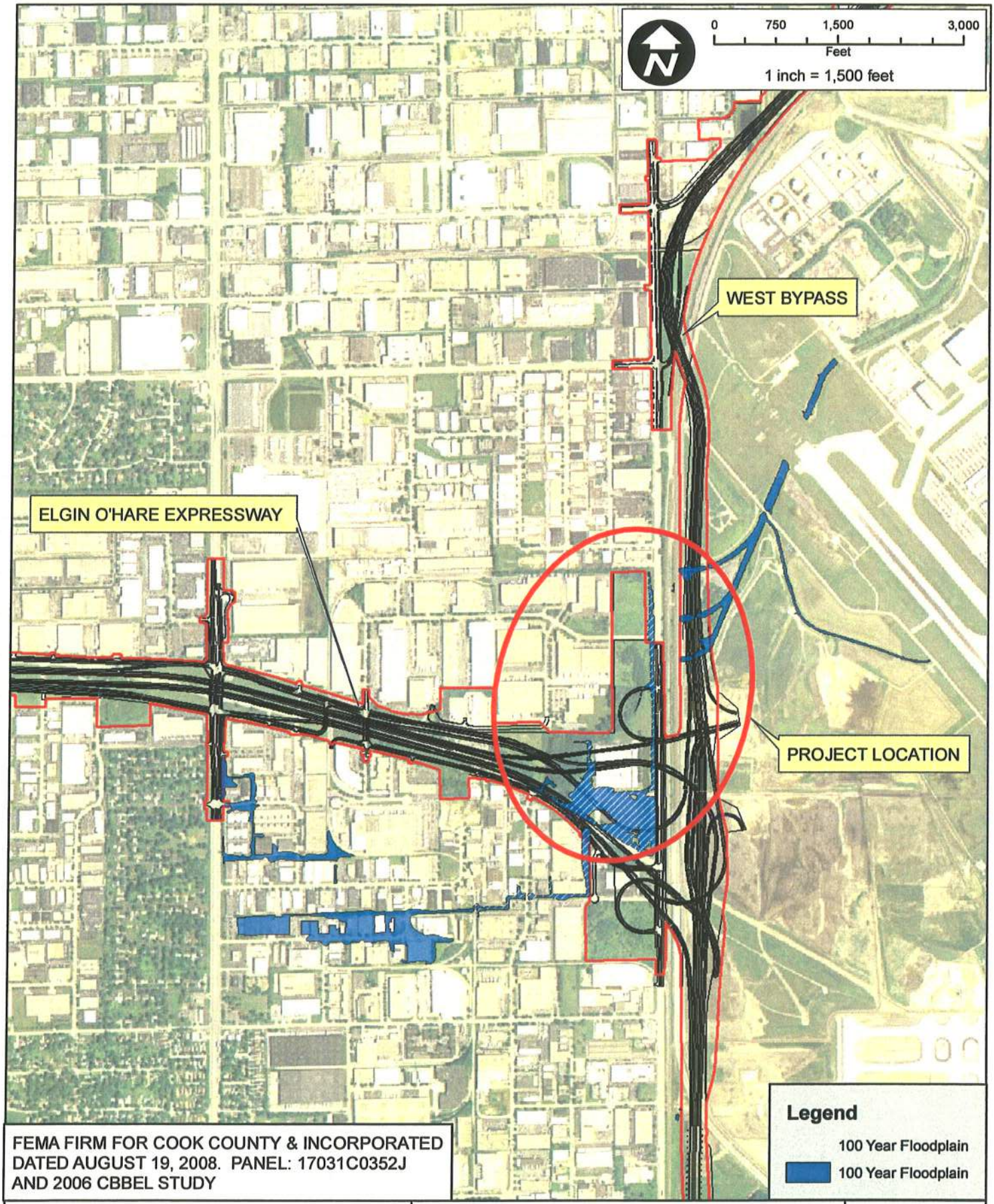
TITLE:
**ELGIN O'HARE - WEST BYPASS**
**WEST BYPASS OVER WILLOW CREEK**
**HYDROLOGIC INVESTIGATIONS ATALS**

| | |
|---|---|
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| DATE: | 7-28-2011 |
| SHEET | 0 OF 0 |
| DRAWING NO. | EXH 3.2 |


**CHRISTOPHER B. BURKE** ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 · Rosemont, Illinois 60018 · (847) 823-0500


| | | | | |
|---|---|---|---|---|
| DSGN. | | | SCALE: | 1"=1,500' |
| DWN. | | | GIS USER | MHAYES |
| CHKD. | | | PLOT DATE | |
| FILE: | | | | |

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Date: 2/1/2012 Time: 1:13:17 PM




FEMA FIRM FOR COOK COUNTY & INCORPORATED
DATED AUGUST 19, 2008. PANEL: 17031C0352J
AND 2006 CBBEL STUDY

CLIENT:
**ILLINOIS DEPARTMENT OF TRANSPORTATION**

TITLE:
**ELGIN O'HARE - WEST BYPASS**
**WEST BYPASS OVER WILLOW CREEK**
**FLOOD INSURANCE RATE MAP**

| | |
|---|---|
| PROJ. NO. | 070404 |
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| SHEET | 0 OF 0 |
| DRAWING NO. | EXH 3.3 |

**CHRISTOPHER B. BURKE** ENGINEERING, LTD.
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| | | | | |
|---|---|---|---|---|
| DSGN. | | | SCALE: | 1"=1,500' |
| DWN. | | | GIS USER | MHAYES |
| CHKD. | | | PLOT DATE | |
| FILE: | | | | |

Map Document: (N:\dot\070404\GIS\Exhibits\HA and FIRM Exhibits\FIRM Exhibits\Willow Creek.mxd)
11/1/2010 – 14:03:49

## 3.1.7 Willow Creek (DPWL)

### 3.1.7.1 Tributary Description

Willow Creek is a tributary to the Des Plaines River, which can be located as the watershed immediately to the north of Bensenville Ditch. Within the confines of DuPage County, the total watershed area for Willow Creek totals 3257 acres. The communities that feed watershed area into Willow Creek are Unincorporated DuPage County, Elk Grove Village, Bensenville and the City of Chicago.

Willow Creek drains from west to east, starting in an older residential section of DuPage County, west of Kingery Highway (Route 83). After passing under Kingery Highway, the stream enters the Village of Bensenville and an area of large commercial buildings used primarily for the storage of goods arriving and departing from O'Hare Airport. Once beyond these commercial zones, Willow Creek enters the confines of O'Hare Airport.

### 3.1.7.2 Hydrologic Analysis

Hydrologic analyses were carried out to establish the peak discharge-frequency relationship for Willow Creek.

Peak discharges for Willow Creek, which does not have a streamflow gage, were determined using the HEC-1 computer program (USCOE, HEC-1 Hydrograph Package 723-X6-L2010) and the SCS hydrograph feature of the HEC-1 model (SCS, National Engineering Handbook, Section 4 "Hydrology"). Peak Discharges for the Addison Creek Tributaries were computed using the TR-20 computer program (SCS, Technical Release No. 20 – Computer Program for Project Formulation, Hydrology). The 500-year peak discharge was determined using a linear extrapolation preformed on probability paper.

Peak discharge-drainage area relationships for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail are presented in the Table DPWL.1.

**Table DPWL.1: Willow Creek Summary of Discharges**

Summary of Discharges

| Flooding Source And Location | Drainage Area ($mi^2$) | Peak Discharges (cfs) 10-yr | 50-yr | 100-yr | 500-yr |
|---|---|---|---|---|---|
| Willow Creek | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| - at York Road | 1.68 | 426 | 736 | 915 | 1,421 |
| - at d/s end of culvert | 1.12 | 202 | 346 | 429 | 693 |

3.1.7.3 Hydraulic Analysis

Analysis of the hydraulic characteristics of flooding from the sources studied was carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Channel cross-section data were obtained from field surveys. All bridges and culverts were surveyed to obtain elevation data and structural geometry

Locations of selected cross-sections used in the hydraulic analysis are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Roughness coefficients (Manning's "n") were assigned based on doled inspection, photographs, and engineering judgment (USGS, Roughness Characteristics of Natural Channels; Chow, Open Channel Hydraulics). Roughness values range from 0.030 to 0.075 for the channels and from 0.030 to 0.095 for the overbanks.

Water-surface elevations for floods of the selected recurrence intervals on Willow Creek were computed using the HEC-2 step-backwater computer program (USCOE, HEC-2Water Surface Profiles 723-X6-L202A). Starting water-surface elevations for those creeks were determined by performing a routing at restrictive culverts that cause ponding at York Road and the Chicago and North Western railroad embankment. The ponding area is just east of the study area.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been shown.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevation as shown on the profiles are, therefore, considered valid only if hydraulic structures, in general, remain unobstructed and if channel and overbank conditions remain essentially the same as ascertained during this study.

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks used in the study are shown on the maps.

3.1.7.4 Flood Boundaries

To reference the flood boundaries for Willow Creek, see Map Panels: 0302, 0303, 0305 and 0306

3.1.7.5 Floodways

Please reference attached Floodway Data Tables for further information.

3.1.7.6 Flood Profiles

Please reference attached Flood Profile Sheets

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION (FEET NGVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| **South Unnamed Creek (DPWL)** | | | | | | | | |
| DPWL0001 | 34,291[1] | 200 | 597 | 1.5 | 662.1 | 662.1 | 662.1 | 0.0 |
| DPWL0002 | 35,900[1] | 299 | 1,018 | 0.8 | 666.4 | 666.4 | 666.4 | 0.0 |
| DPWL0003 | 37,357[1] | 206[2] | 629 | 1.3 | 666.7 | 666.7 | 666.7 | 0.0 |
| DPWL0004 | 37,517[1] | 110 | 309 | 2.7 | 666.8 | 666.8 | 666.8 | 0.0 |
| DPWL0005 | 38,248[1] | 57 | 193 | 2.2 | 669.1 | 669.1 | 669.2 | 0.1 |
| DPWL0006 | 39,051[1] | 204 | 692 | 0.6 | 669.4 | 669.4 | 669.5 | 0.1 |
| DPWL0007 | 39,811[1] | 317 | 831 | 0.5 | 669.4 | 669.4 | 669.5 | 0.1 |

[1] In feet above confluence with Des Plaines River

[2] Actual floodway width cannot be shown on FIRM due to redelineation of floodplain

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

DUPAGE COUNTY

AND INCORPORATED AREAS

# FLOODWAY DATA

SOUTH UNNAMED CREEK (DPWL)

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION (FEET NGVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| **North Unnamed Creek (DPWL)** | | | | | | | | |
| DPWL0008 | 33,672[1] | 409[2] | 732 | 2.2 | 663.8 | 663.8 | 663.8 | 0.0 |
| DPWL0009 | 33,952[1] | 208 | 467 | 0.9 | 664.3 | 664.3 | 664.3 | 0.0 |
| DPWL0010 | 35,922[1] | 560 | 121 | 2.7 | 665.8 | 665.8 | 665.8 | 0.0 |
| DPWL0011 | 36,122[1] | 190 | 178 | 1.6 | 666.5 | 666.5 | 666.5 | 0.0 |

[1] In feet above confluence with Des Plaines River

[2] Actual floodway width cannot be shown on FIRM due to redelineation of floodplain

TABLE 5

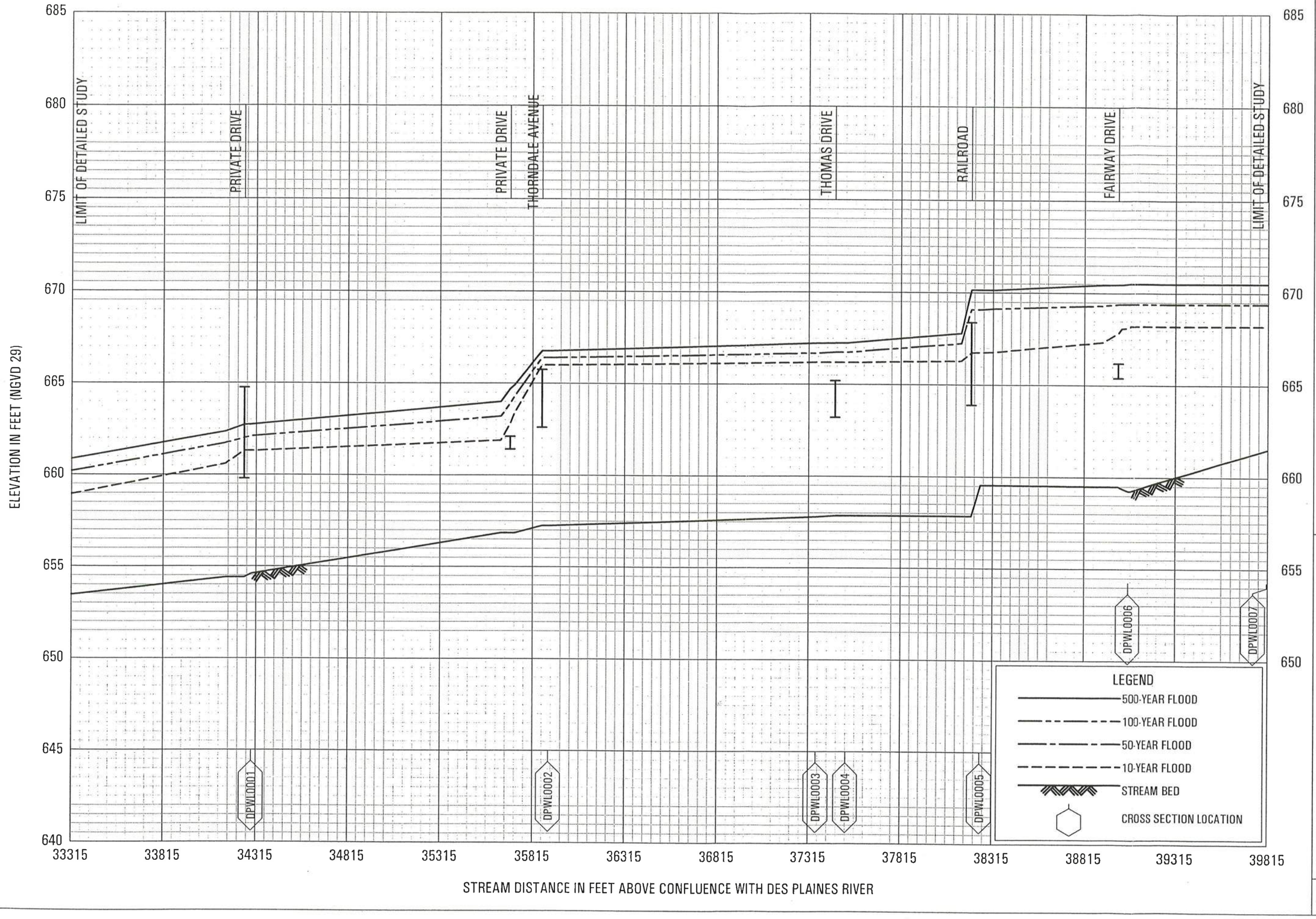
FEDERAL EMERGENCY MANAGEMENT AGENCY

DUPAGE COUNTY

AND INCORPORATED AREAS

# FLOODWAY DATA

NORTH UNNAMED CREEK (DPWL)



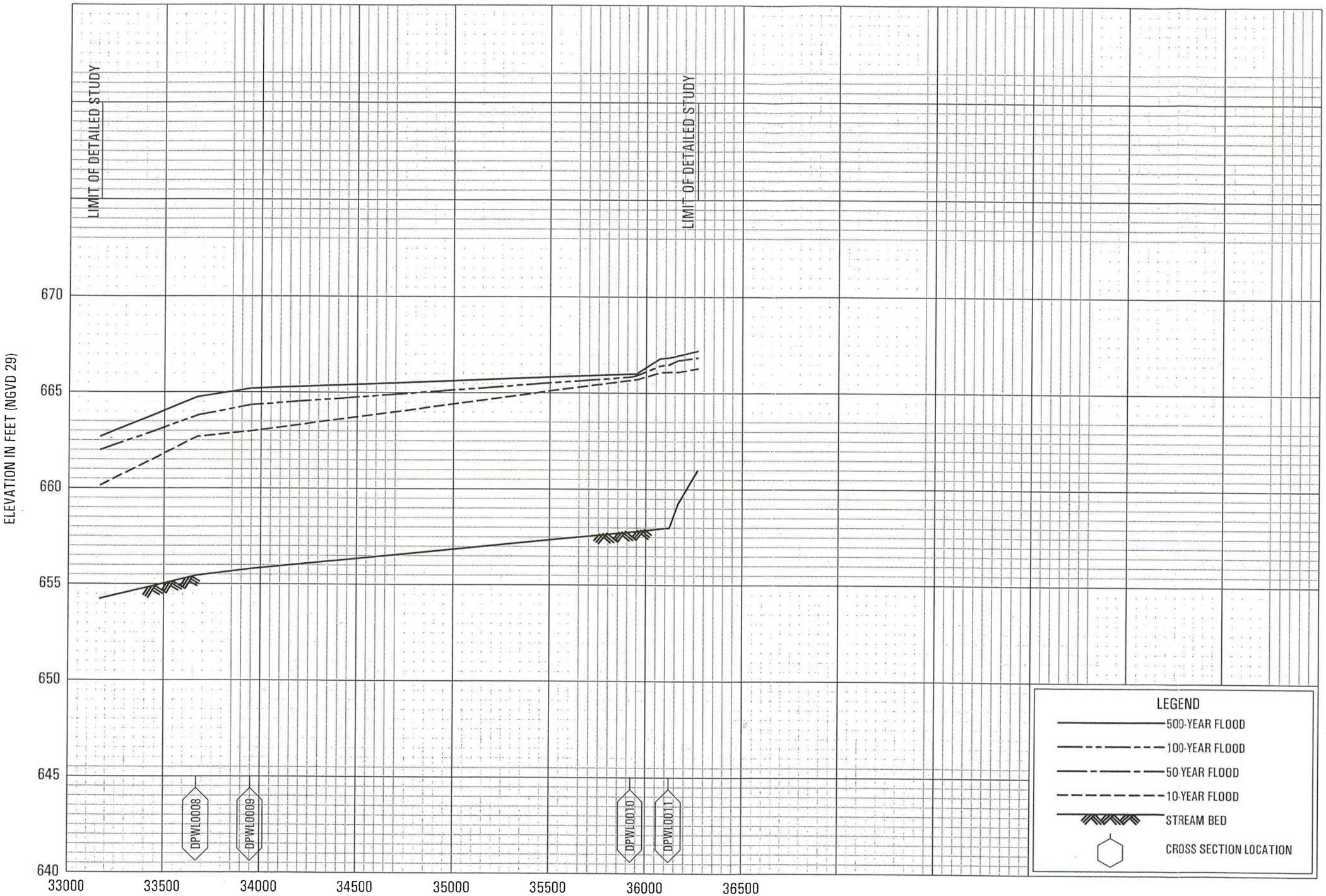

# FLOOD PROFILES

## SOUTH UNNAMED CREEK (DPWL)

FEDERAL EMERGENCY MANAGEMENT AGENCY

DUPAGE COUNTY, IL

AND INCORPORATED AREAS




# FLOOD PROFILES

## NORTH UNNAMED CREEK (DPWL)

FEDERAL EMERGENCY MANAGEMENT AGENCY

DUPAGE COUNTY, IL

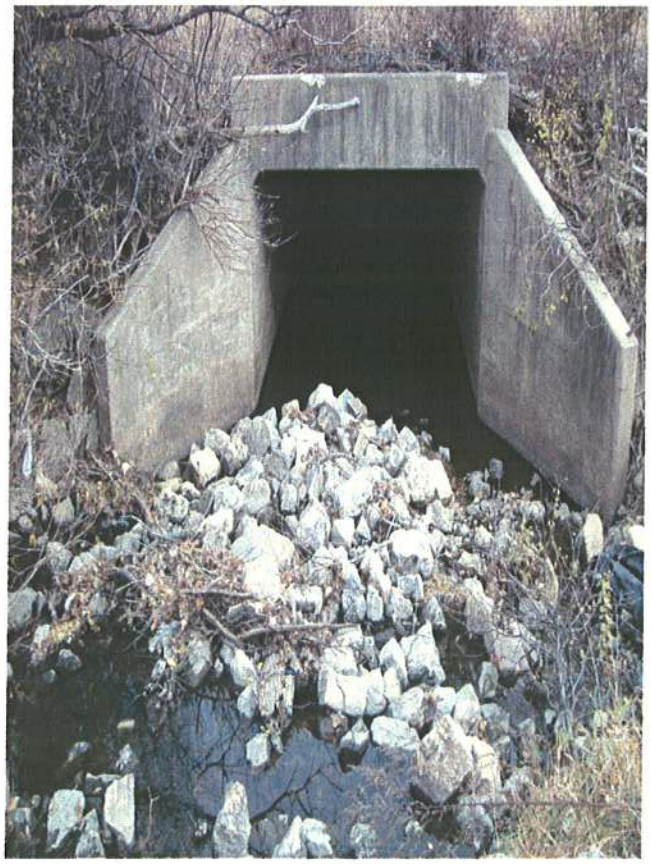
AND INCORPORATED AREAS

# SECTION 4

## SITE PHOTOGRAPHS

# Willow Creek at CP&UP Railroad

**North Sister looking east at the upstream face of the C&NW RR**



**North Sister looking west at the upstream face of the C&NW RR**



# Willow Creek at CP&UP Railroad

**Middle Sister looking east at the upstream face of the C&NW RR**

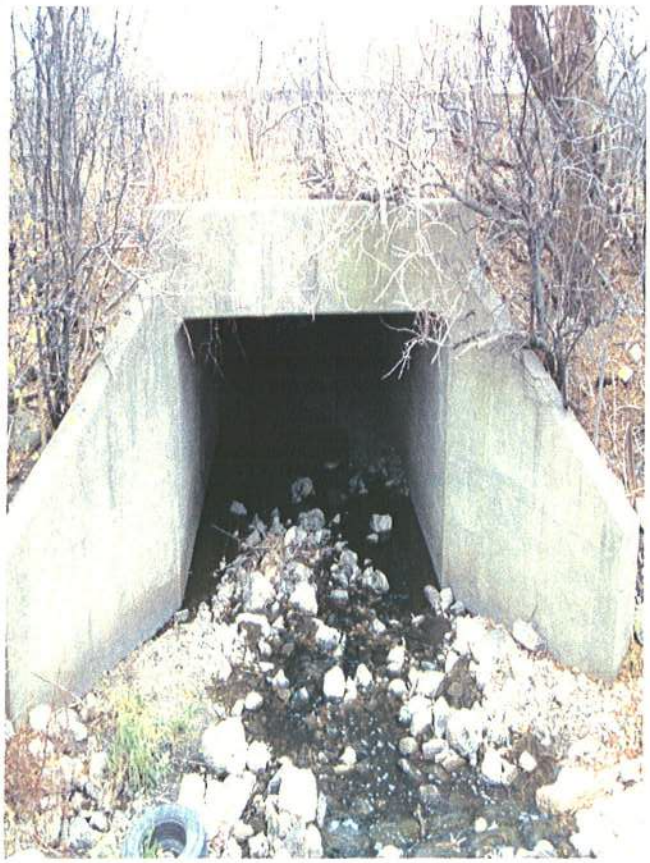


**Middle Sister looking west at the downstream face of the C&NW RR**



# Willow Creek at CP&UP Railroad

**South Sister looking east at the upstream face of the C&NW RR**

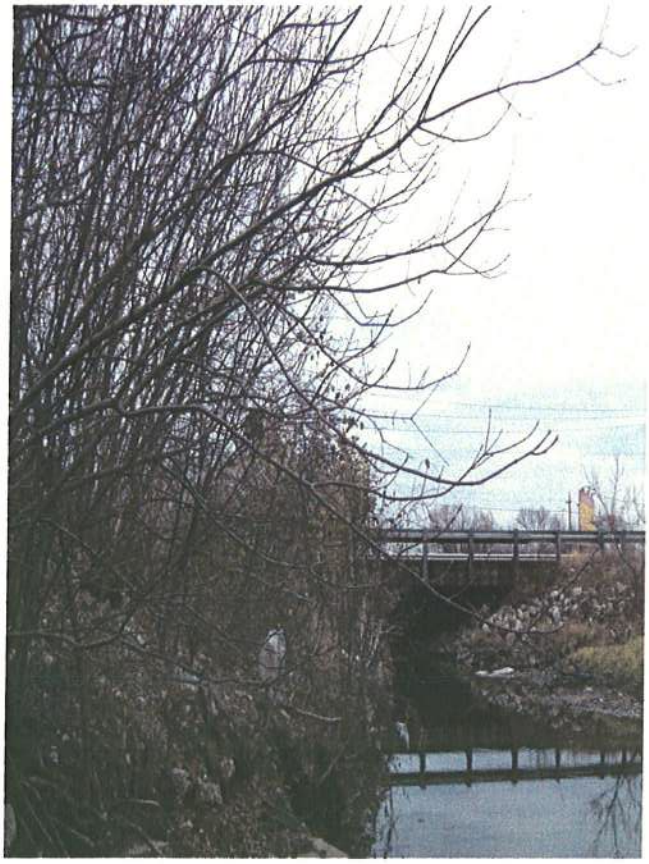


**South Sister looking west at the downstream face of the C&NW RR**

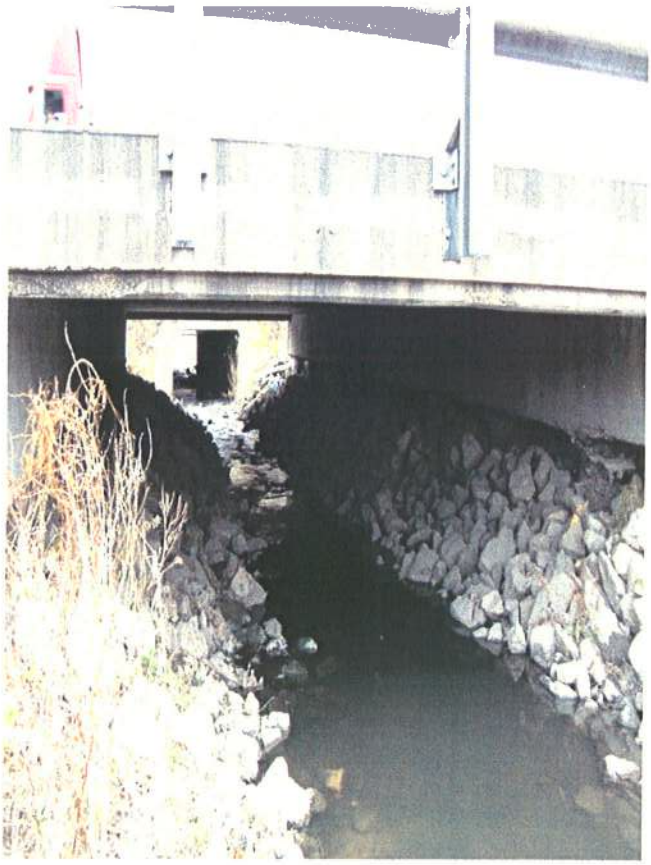


# Willow Creek

**Looking east at the upstream face of York Road (North Tributary)**



**Looking east at the upstream face of York Road (South Tributary north of Supreme Drive)**

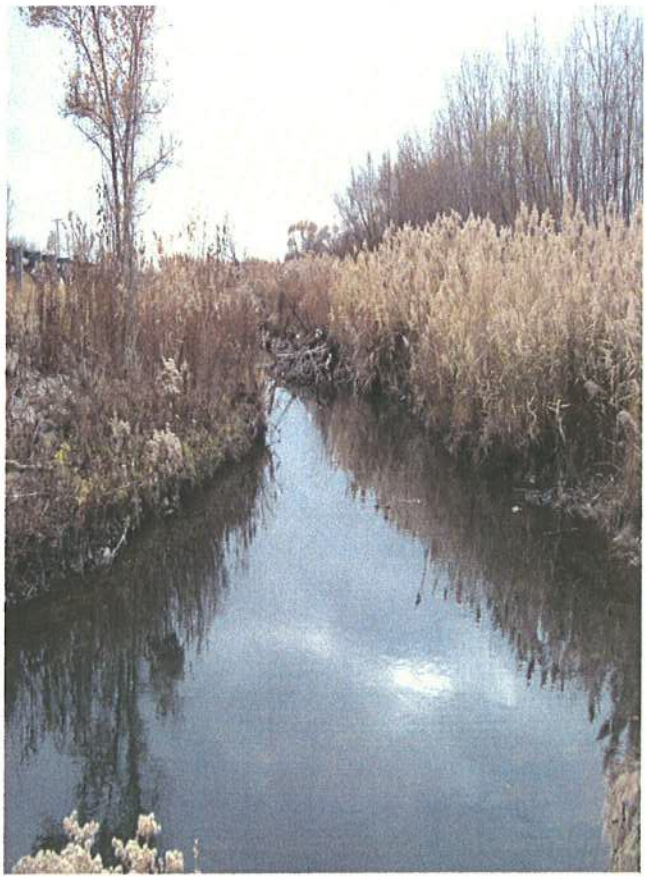


# Willow Creek South Tributary

**Looking west at the downstream face of York Road (South Tributary south of Supreme Drive)**

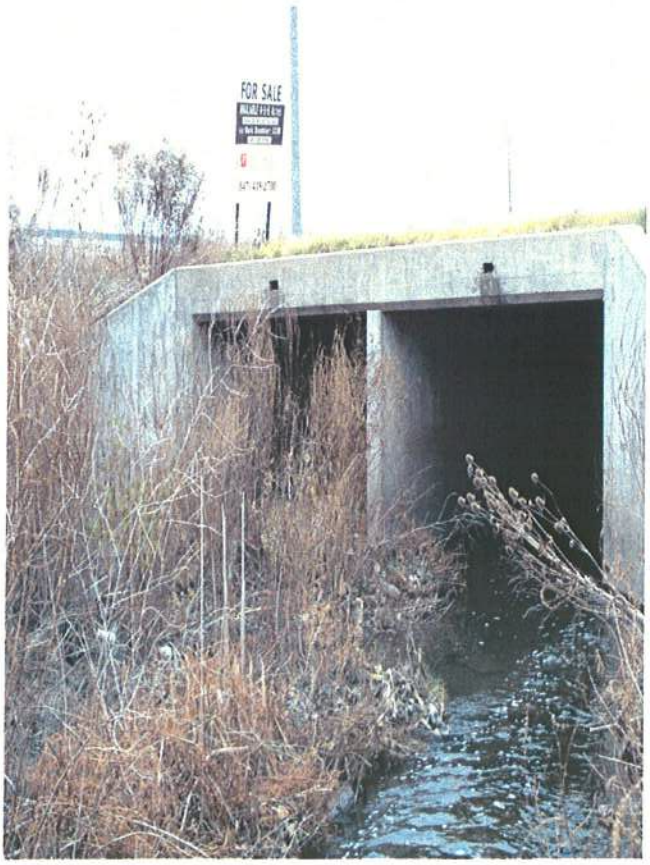


**Looking south from the upstream face of York Road (South Tributary south of Supreme Drive)**

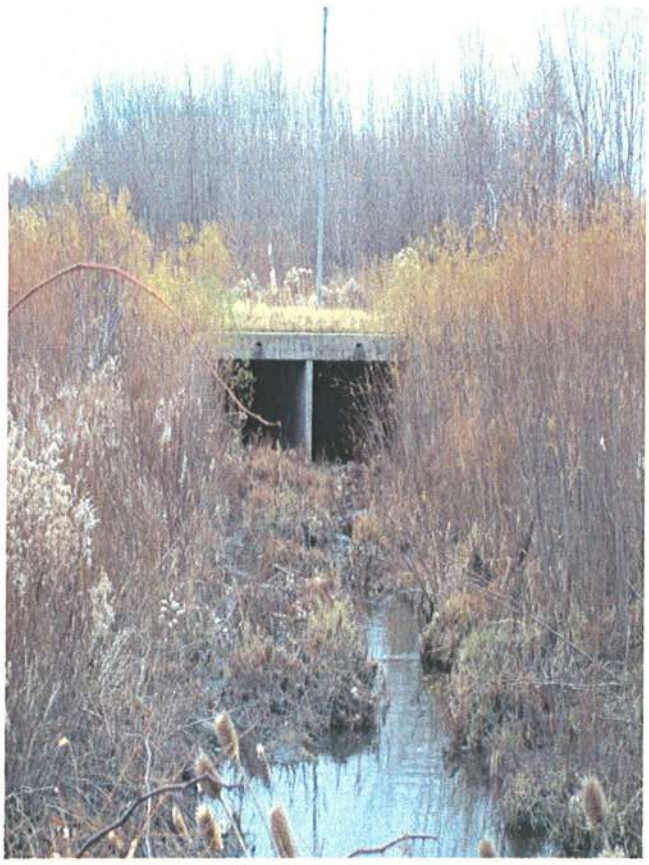


# Willow Creek South Tributary at Supreme Drive

**Looking north at the upstream face of Supreme Drive**

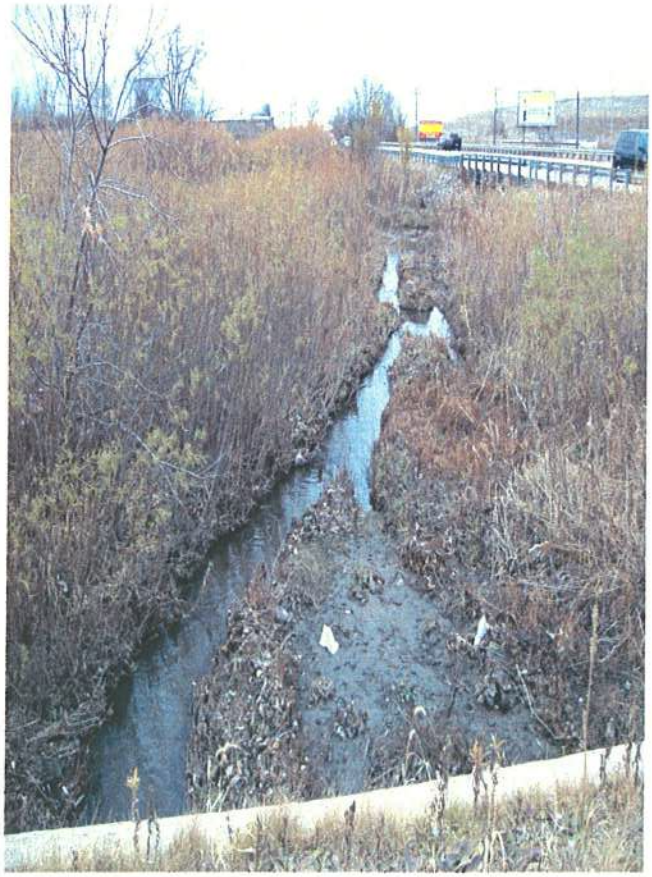



**Looking south at the downstream face Supreme Drive**



# Willow Creek South Tributary

**Looking north/downstream from Supreme Drive**

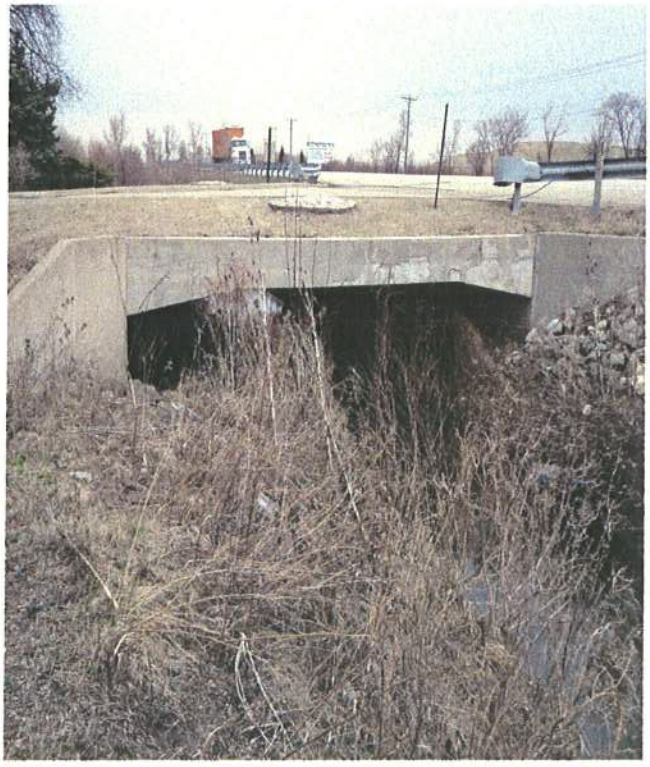


**Looking south/upstream from Supreme Drive**

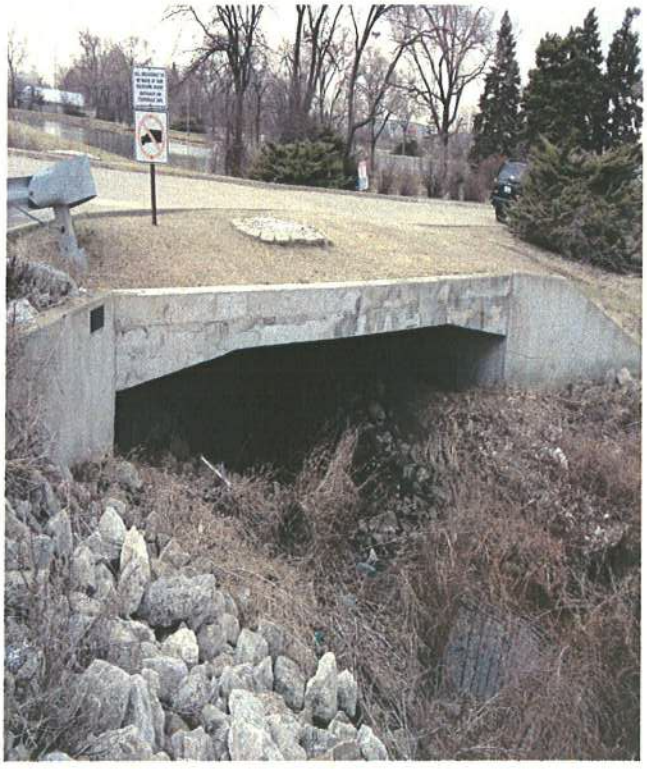


# Willow Creek South Tributary at Miller Fluids Entrance

**Looking north at the upstream face of Miller Fluids Entrance**

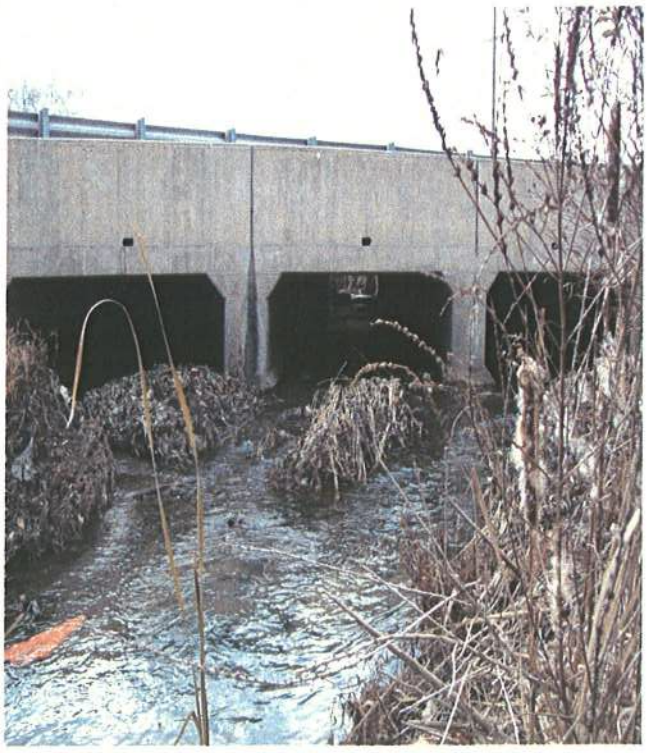


**Looking south at the downstream face of Miller Fluids Entrance**

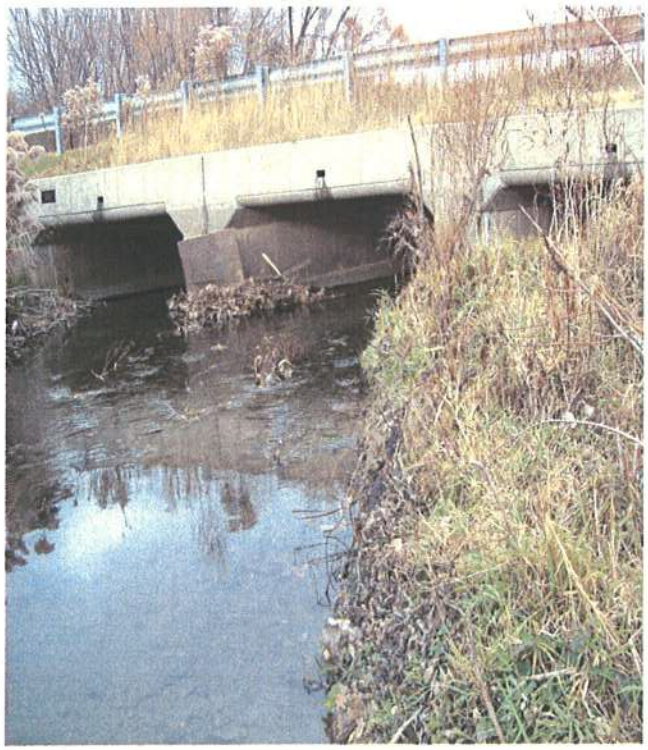


# Willow Creek South Tributary at Thorndale Avenue

**Looking south at the downstream face of Thorndale Avenue**

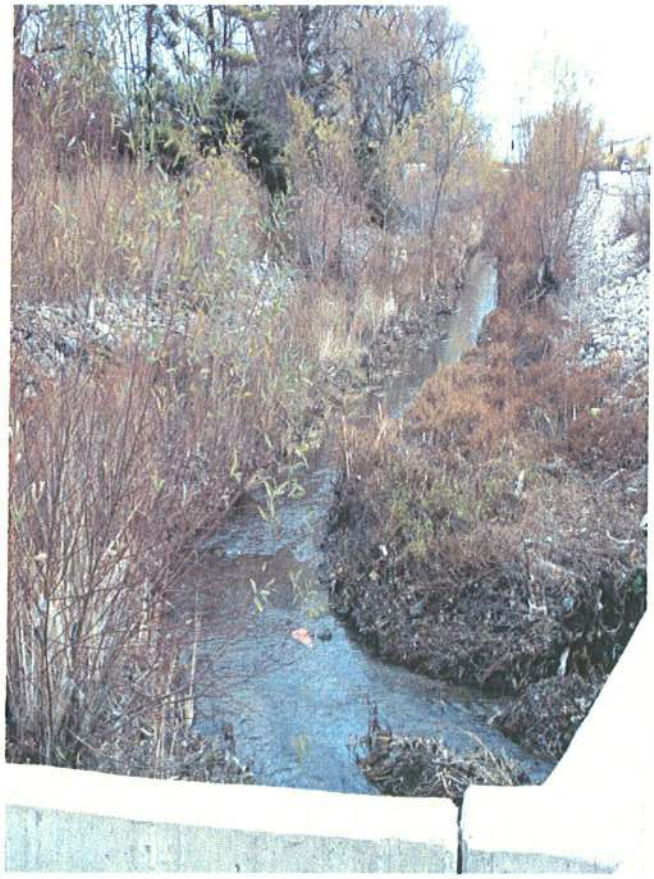


**Looking north at the upstream face of Thorndale Avenue**



# Willow Creek South Tributary

**Looking east/downstream along Thorndale Avenue**

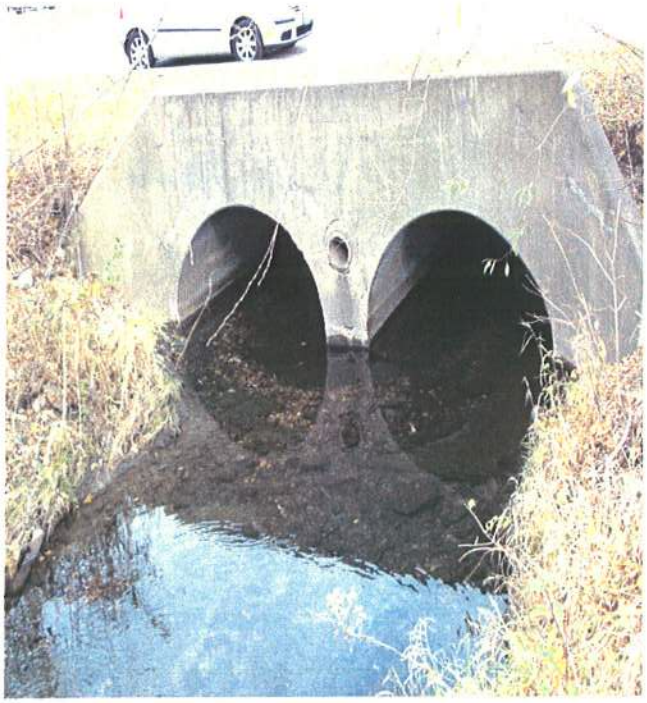


**Looking south/upstream from Thorndale Avenue**

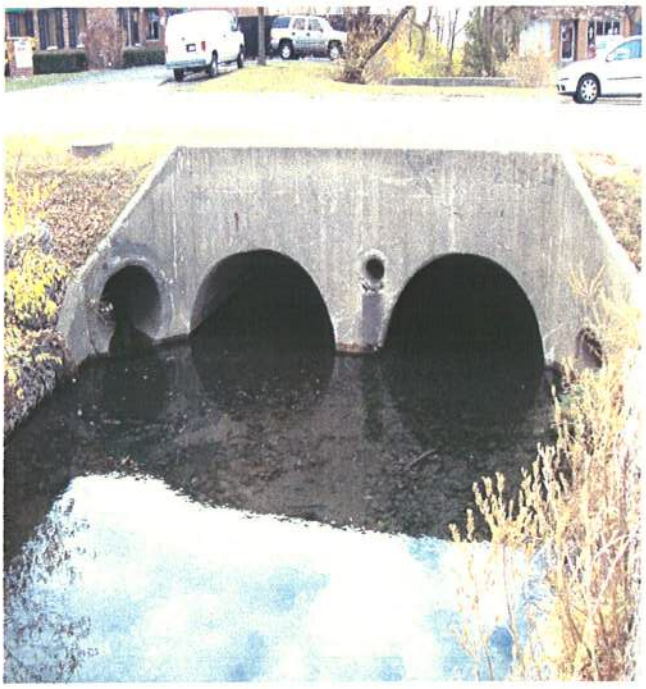


# Willow Creek South Tributary at Thomas Drive

**Looking east at the upstream face of Thomas Drive**



**Looking west at the upstream face of Thomas Drive**

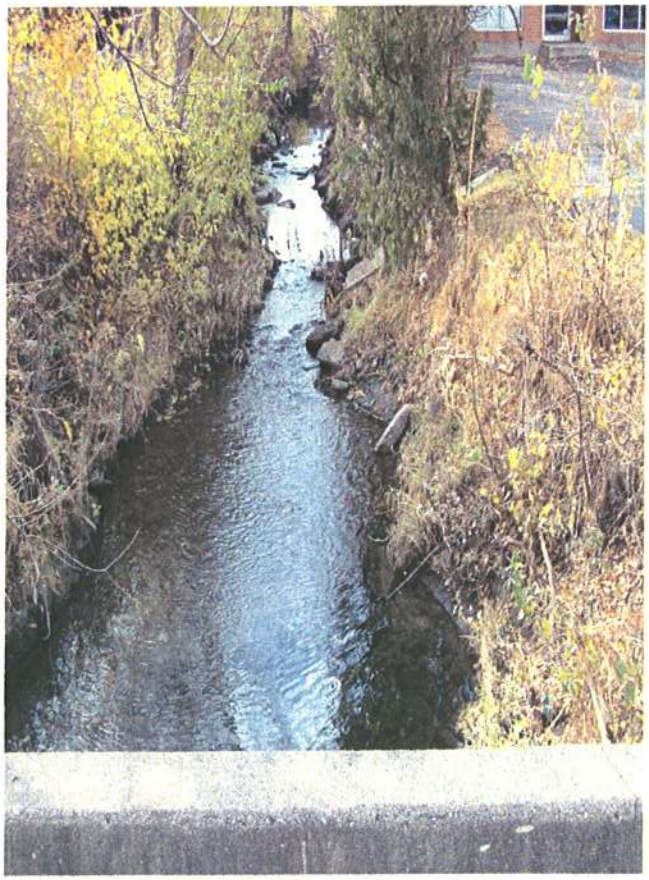


# Willow Creek South Tributary

**Looking east/downstream from Thomas Drive**



**Looking west/upstream from Thomas Drive**



# SECTION 5

## STREAMBED PLAN AND PROFILE (EXISTING AND PROPOSED)
## ROADWAY PLAN AND PROFILE

**MATCH LINE STA. 408 + 00**

50 0 50
SCALE IN FEET

N

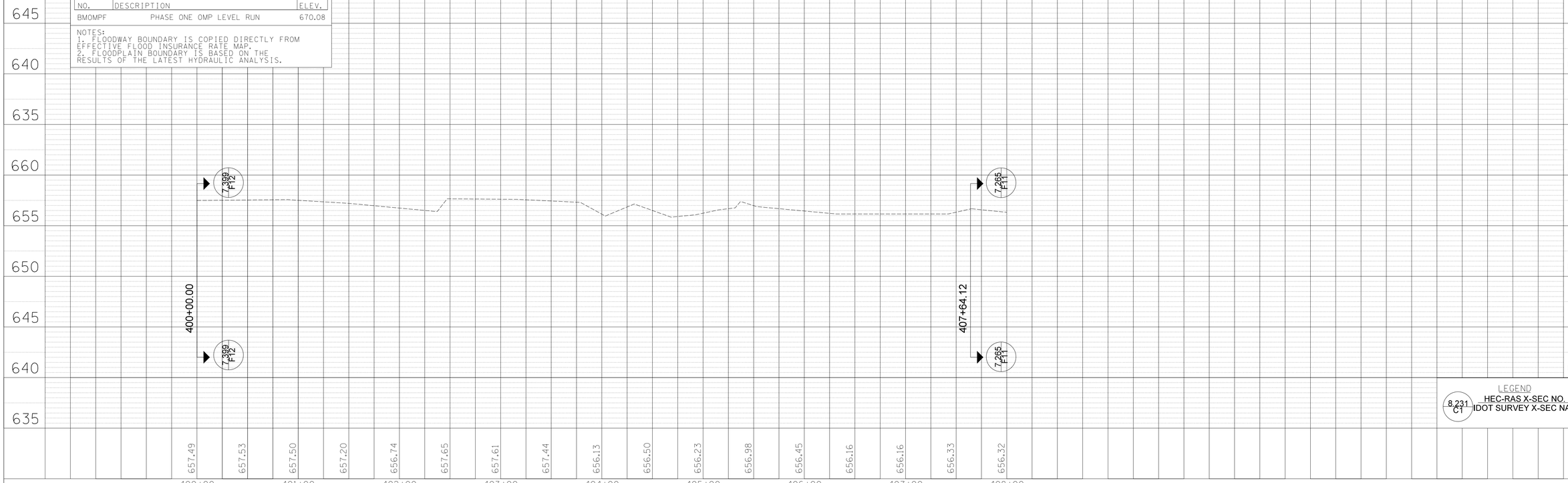



PLAN
SURVEYED
PLOTTED
BOUNDARY CHECKED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
BOUNDARY CHECKED
BM. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
BY
DATE

| NO. | ELEVATION BENCHMARKS<br>DATUM: NGVD 1929 = NAVD 1988 + 0.24'<br>DESCRIPTION | ELEV. |
|---|---|---|
| BMOMPF | PHASE ONE OMP LEVEL RUN | 670.08 |

NOTES:
1. FLOODWAY BOUNDARY IS COPIED DIRECTLY FROM EFFECTIVE FLOOD INSURANCE RATE MAP.
2. FLOODPLAIN BOUNDARY IS BASED ON THE RESULTS OF THE LATEST HYDRAULIC ANALYSIS.




LEGEND
8,231 C1 — HEC-RAS X-SEC NO. / IDOT SURVEY X-SEC NAME

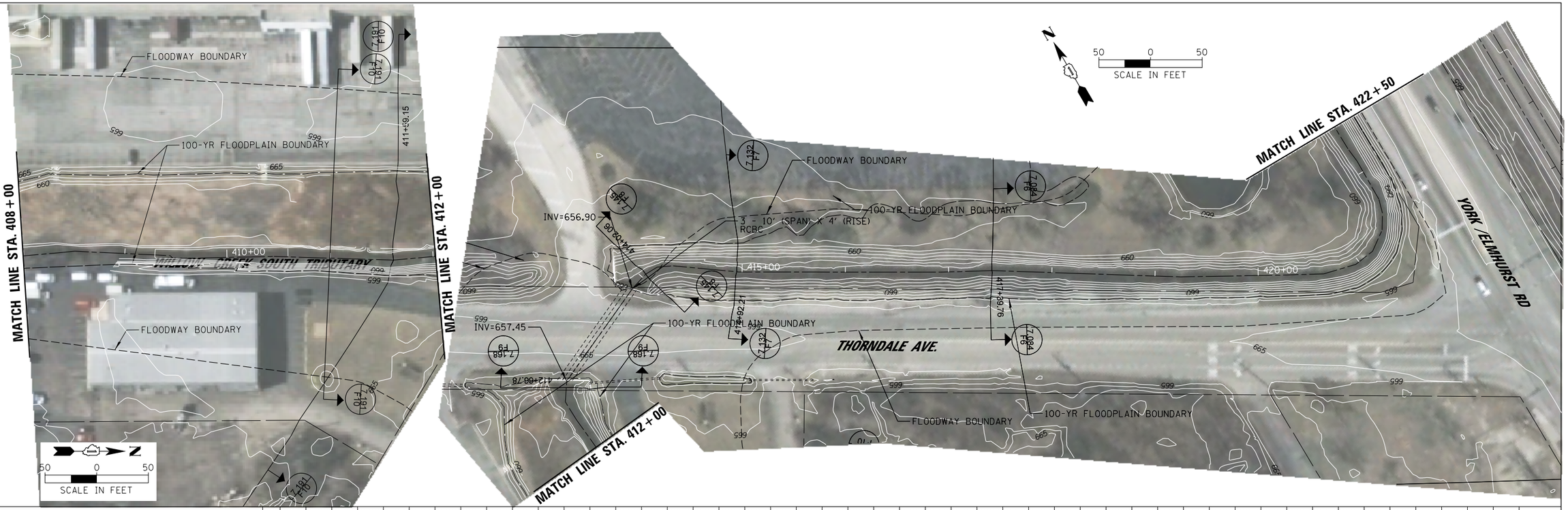
| FILE NAME = | USER NAME = pmagnell | DESIGNED - | REVISED - |
|---|---|---|---|
| Y:\361180 - Elgin O'Hare - West Bypass\TIER TWO\HY\CAD\Sheets\D1EOWB-03-sht-plnprf-008.dgn | | DRAWN - | REVISED - |
| | PLOT SCALE = 50' | CHECKED - | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY**
**EXISTING CHANNEL PLAN AND PROFILE**

SCALE: SHEET NO. OF SHEETS STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS FED. AID PROJECT | | | |




## ELEVATION BENCHMARKS

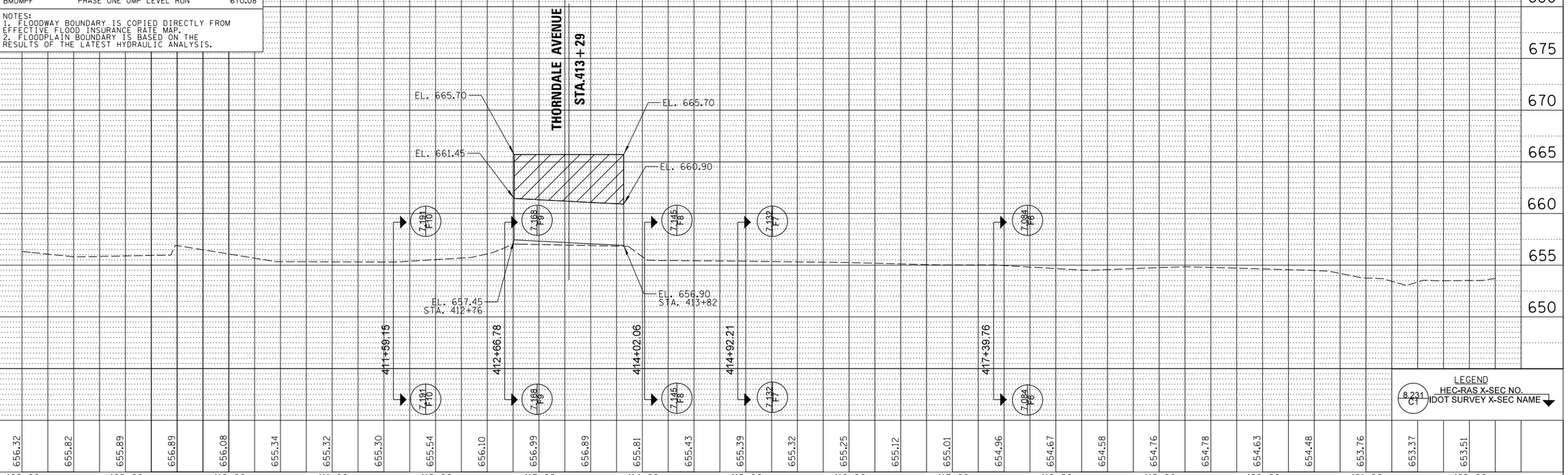
DATUM: NGVD 1929 = NAVD 1988 + 0.24'

| NO. | DESCRIPTION | ELEV. |
|---|---|---|
| BMOMPF | PHASE ONE OMP LEVEL RUN | 670.08 |

NOTES:
1. FLOODWAY BOUNDARY IS COPIED DIRECTLY FROM EFFECTIVE FLOOD INSURANCE RATE MAP.
2. FLOODPLAIN BOUNDARY IS BASED ON THE RESULTS OF THE LATEST HYDRAULIC ANALYSIS.

PLAN — SURVEYED / PLOTTED / ALIGNMENT CHECKED / RT. OF WAY CHECKED / CADD FILE NAME / NOTE BOOK / NO. / BY / DATE

PROFILE — SURVEYED / PLOTTED / PROFILE CHECKED / ELM. NOTED / STRUCTURE NOTATNS CHKD / NOTE BOOK / NO. / BY / DATE




LEGEND
8,231 C1 — HEC-RAS X-SEC NO. / IDOT SURVEY X-SEC NAME

| FILE NAME = | USER NAME = pmagnell | DESIGNED - | REVISED - |
|---|---|---|---|
| Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\DIEOWB-03-sht-plnprf-000.dgn | | DRAWN - | REVISED - |
| | PLOT SCALE = 100' | CHECKED - | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY**
**EXISTING CHANNEL PLAN AND PROFILE**

SCALE: | SHEET NO. OF SHEETS | STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS FED. AID PROJECT | | | |

MATCH LINE STA. 422+50

MATCH LINE STA. 437+50




PLAN

| | |
|---|---|
| SURVEYED | |
| PLOTTED | |
| DESIGN CHECKED | |
| ALIGNMENT CHECKED | |
| RT. OF WAY CHECKED | |
| CADD FILE NAME | |
| NOTE BOOK | |
| NO. | |

| NO. | DESCRIPTION | BY | DATE |
|---|---|---|---|

ELEVATION BENCHMARKS
DATUM: NGVD 1929 = NAVD 1988 + 0.24'

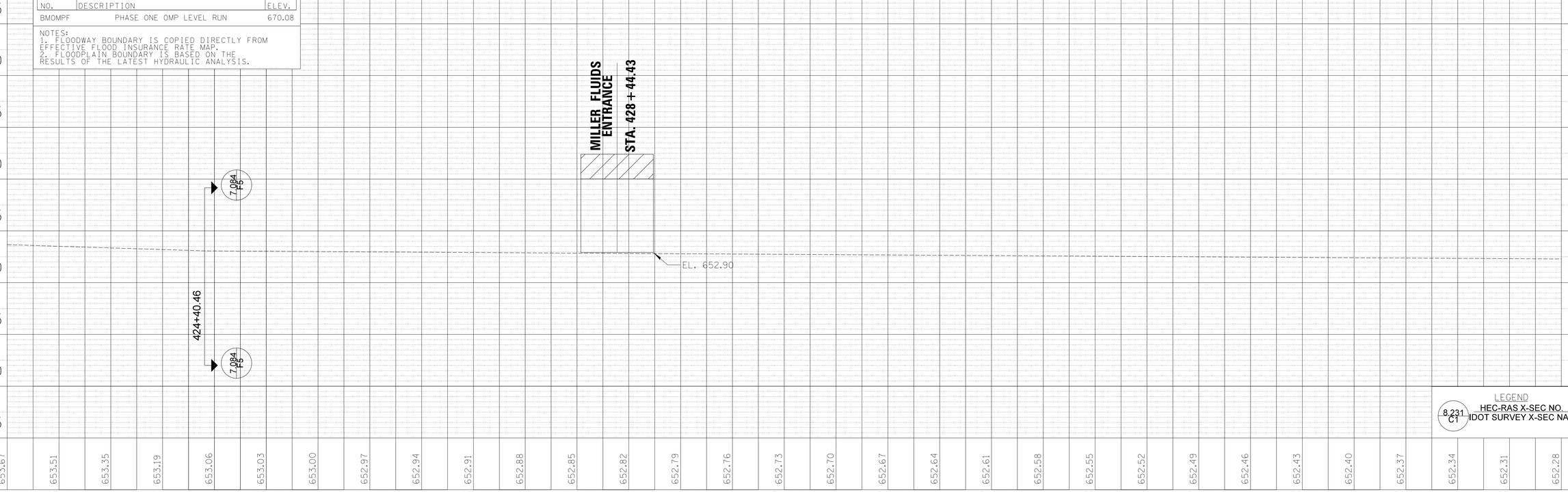
| NO. | DESCRIPTION | ELEV. |
|---|---|---|
| BMOMPF | PHASE ONE OMP LEVEL RUN | 670.08 |

NOTES:
1. FLOODWAY BOUNDARY IS COPIED DIRECTLY FROM EFFECTIVE FLOOD INSURANCE RATE MAP.
2. FLOODPLAIN BOUNDARY IS BASED ON THE RESULTS OF THE LATEST HYDRAULIC ANALYSIS.

PROFILE

| | |
|---|---|
| SURVEYED | |
| PLOTTED | |
| DESIGN CHECKED | |
| BKM. NOTED | |
| STRUCTURE NOTATNS CHKD | |
| NOTE BOOK | |
| NO. | |

| NO. | DESCRIPTION | BY | DATE |
|---|---|---|---|




LEGEND
8,231 C1 — HEC-RAS X-SEC NO.
IDOT SURVEY X-SEC NAME

| | | | |
|---|---|---|---|
| FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER TWO\HY\CAD\Sheets\D1EOWB-03-sht-plnprf-010.dgn | USER NAME = pmagnell | DESIGNED - | REVISED - |
| | | DRAWN - | REVISED - |
| | PLOT SCALE = 50' | CHECKED - | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY**
**EXISTING CHANNEL PLAN AND PROFILE**

SCALE: | SHEET NO. OF SHEETS | STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |

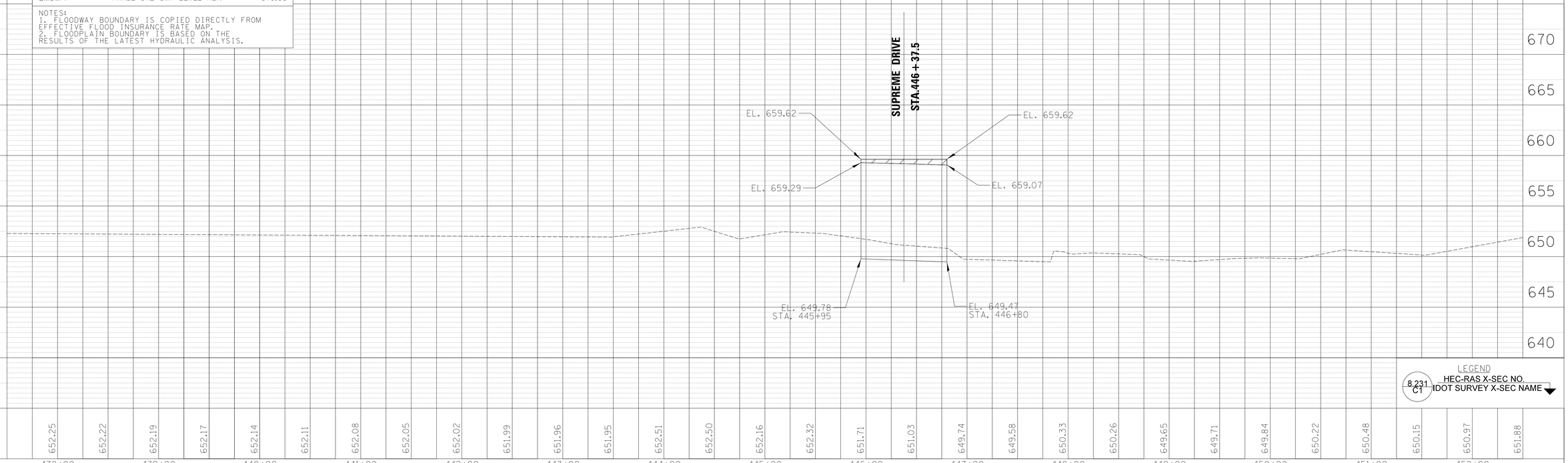
CONTRACT NO.

ILLINOIS | FED. AID PROJECT




| NO. | ELEVATION BENCHMARKS DATUM: NGVD 1929 = NAVD 1988 + 0.24' DESCRIPTION | ELEV. |
|---|---|---|
| BMOMPF | PHASE ONE OMP LEVEL RUN | 670.08 |

NOTES:
1. FLOODWAY BOUNDARY IS COPIED DIRECTLY FROM EFFECTIVE FLOOD INSURANCE RATE MAP.
2. FLOODPLAIN BOUNDARY IS BASED ON THE RESULTS OF THE LATEST HYDRAULIC ANALYSIS.




PLAN: SURVEYED — PLOTTED — BOOKS CHECKED — ALIGNMENT CHECKED — RT. OF WAY CHECKED — CADD FILE NAME — NOTE BOOK — NO. — BY — DATE

PROFILE: SURVEYED — PLOTTED — BOOKS CHECKED — BM. NOTED — STRUCTURE NOTATNS CHKD — NOTE BOOK — NO. — BY — DATE

| | | | |
|---|---|---|---|
| FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\D1EOWB-03-sht-plnprf-01l.dgn | USER NAME = pmagnell | DESIGNED - | REVISED - |
| | | DRAWN - | REVISED - |
| | PLOT SCALE = 50' | CHECKED - | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

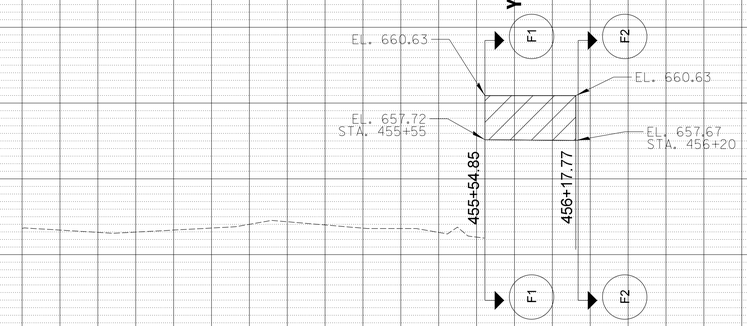
**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY**
**EXISTING CHANNEL PLAN AND PROFILE**

SCALE: | SHEET NO. OF SHEETS | STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS FED. AID PROJECT | | | |




| NO. | ELEVATION BENCHMARKS DATUM: NGVD 1929 = NAVD 1988 + 0.24' DESCRIPTION | ELEV. |
|---|---|---|
| BMOMPF | PHASE ONE OMP LEVEL RUN | 670.08 |

NOTES:
1. FLOODWAY BOUNDARY IS COPIED DIRECTLY FROM EFFECTIVE FLOOD INSURANCE RATE MAP.
2. FLOODPLAIN BOUNDARY IS BASED ON THE RESULTS OF THE LATEST HYDRAULIC ANALYSIS.

675 670 665 660 655 650 645 640 635

651.88 651.60 651.76 652.14 652.09 651.86 651.28

453+00 454+00 455+00

LEGEND
8.231 C1 — HEC-RAS X-SEC NO. / IDOT SURVEY X-SEC NAME

PLAN: SURVEYED; PLOTTED; ALIGNMENT CHECKED; RT. OF WAY CHECKED; CADD FILE NAME; NOTE BOOK; NO.; BY; DATE

PROFILE: SURVEYED; PLOTTED; GRADES CHECKED; BKM. NOTED; STRUCTURE NOTATNS CHKD; NOTE BOOK; NO.; BY; DATE

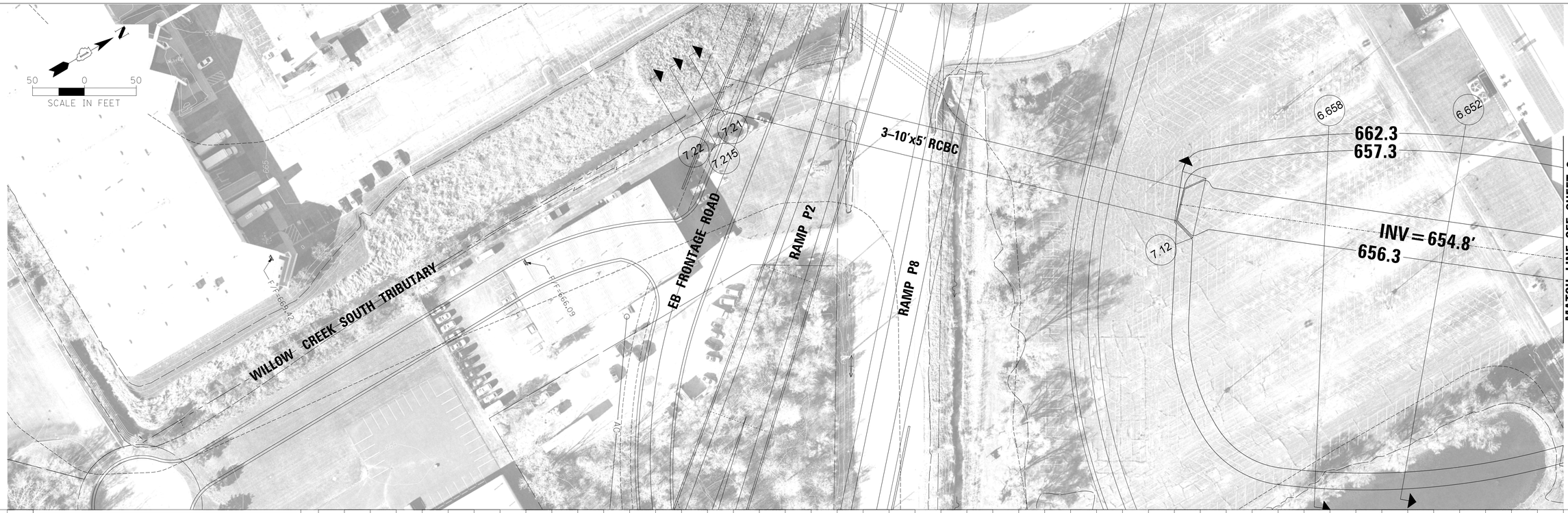
| FILE NAME = | USER NAME = pmagnelli | DESIGNED - | REVISED - |
|---|---|---|---|
| Y:\361180 - Elgin O'Hare - West Bypass\TIER TWO\HY\CAD\Sheets\D1EOWB-03-sht-plnprf-012.dgn | | DRAWN - | REVISED - |
| | PLOT SCALE = 50' | CHECKED - | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY**
**EXISTING CHANNEL PLAN AND PROFILE**

SCALE: | SHEET NO. OF SHEETS | STA. TO STA.

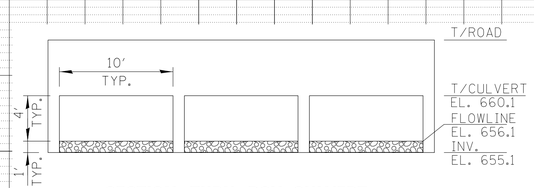
| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS FED. AID PROJECT | | | |



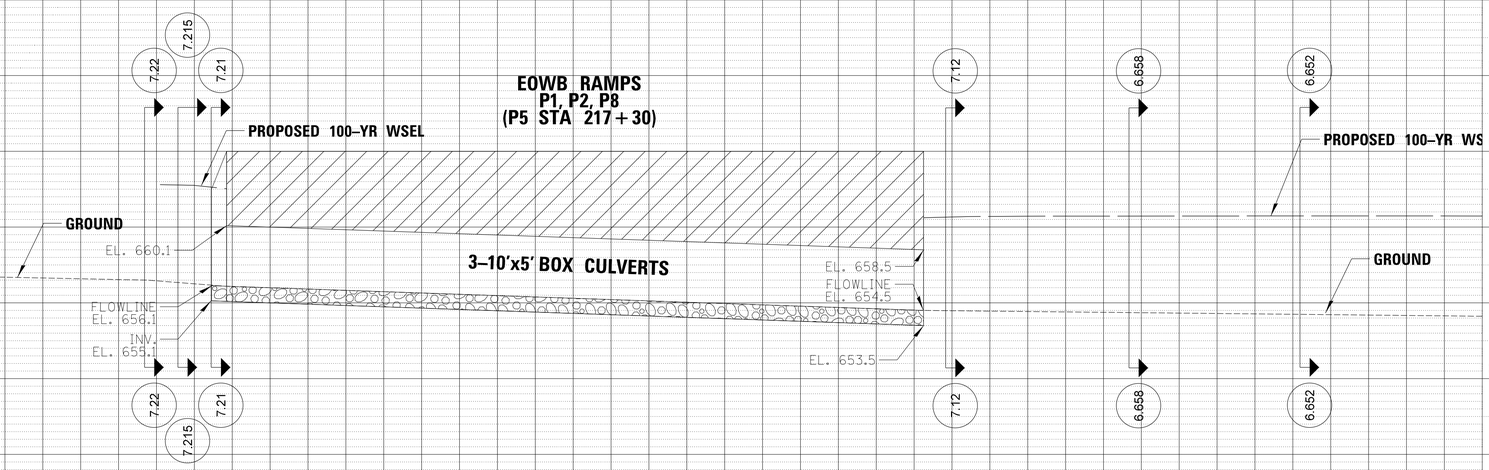

DATUM: NGVD 1929 = NAVD 1988 + 0.24'

BMOMPF PHASE ONE OMP LEVEL RUN 670.08

NOTES:
1. FLOODWAY BOUNDARY IS COINCEDENT WITH FLOODPLAIN BOUNDARY.
2. FLOODPLAIN BOUNDARY IS BASED ON THE RESULTS OF THE LATEST HYDRAULIC ANALYSIS.
3. FIRST FOOT OF DEPTH PROPOSED CULVERT BURIED.




SECTION THRU BOX CULVERT




LEGEND
6.642 HEC-RAS X-SEC NO

PLAN: SURVEYED; PLOTTED; ALIGNMENT CHECKED; RT. OF WAY CHECKED; CADD FILE NAME; NOTE BOOK; NO.; BY; DATE

PROFILE: SURVEYED; PLOTTED; GRADE CHECKED; BM. NOTED; STRUCTURE NOTATNS CHKD; NOTE BOOK; NO.; BY; DATE

| | | |
|---|---|---|
| FILE NAME = Y:\3611180 - Elgin O'Hare - West Bypass\TIER TWO\HY\CAD\Models Geometric Full Build\Concept Drainage Exhibit\DIEOWB-Willow_Cr_S_Trib_REVISED.dgn | USER NAME = pmagnelli | DESIGNED - |
| | PLOT SCALE = 50' | CHECKED - |
| | PLOT DATE = 11/27/2012 | DATE - |

REVISED -
REVISED -
REVISED -

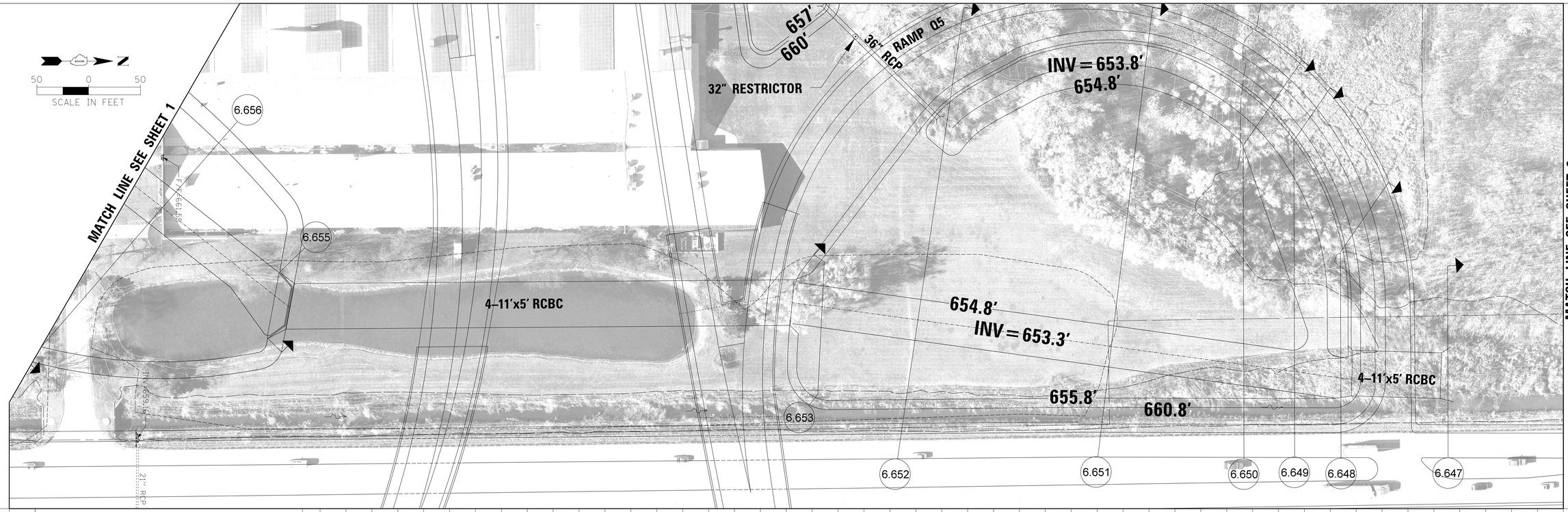
**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY**
**PROPOSED CHANNEL PLAN AND PROFILE**

SCALE: | SHEET NO. 1 OF 3 SHEETS | STA. | TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |

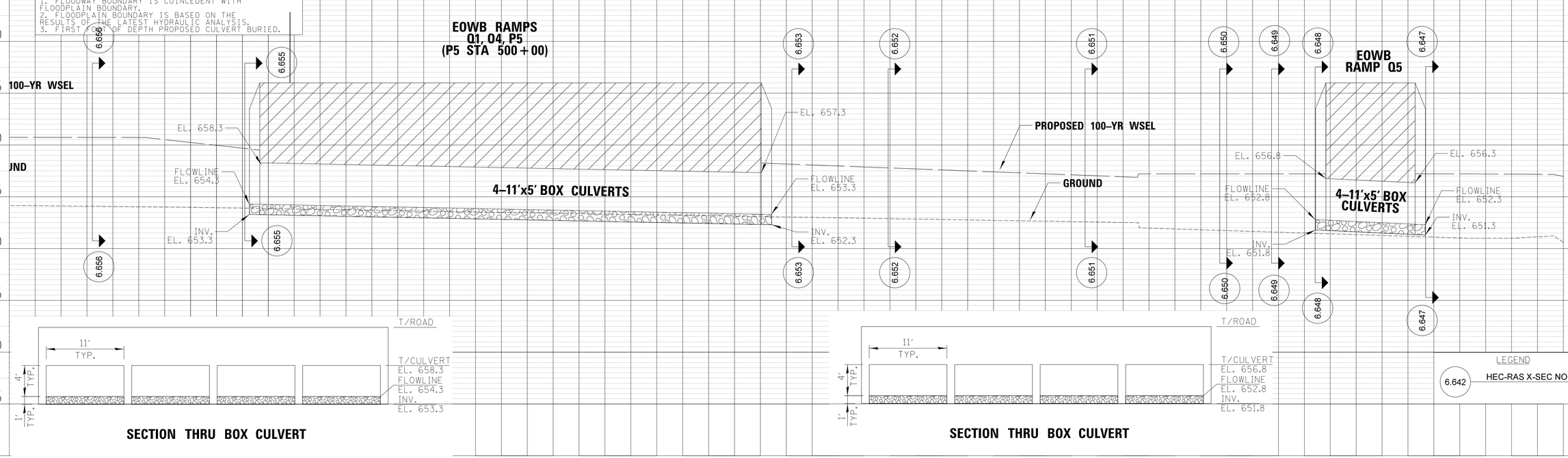
CONTRACT NO.
ILLINOIS FED. AID PROJECT




DATUM: NGVD 1929 = NAVD 1988 + 0.24'

BMOMPF PHASE ONE OMP LEVEL RUN 670.08

NOTES:
1. FLOODWAY BOUNDARY IS COINCEDENT WITH FLOODPLAIN BOUNDARY.
2. FLOODPLAIN BOUNDARY IS BASED ON THE RESULTS OF THE LATEST HYDRAULIC ANALYSIS.
3. FIRST FOOT OF DEPTH PROPOSED CULVERT BURIED.







SECTION THRU BOX CULVERT




SECTION THRU BOX CULVERT

LEGEND
6.642 HEC-RAS X-SEC NO

PLAN: SURVEYED, PLOTTED, ALIGNMENT CHECKED, RT. OF WAY CHECKED, CADD FILE NAME, NOTE BOOK, NO., BY, DATE

PROFILE: SURVEYED, PLOTTED, PROFILE CHECKED, BM. NOTED, STRUCTURE NOTATNS CHKD, NOTE BOOK, NO., BY, DATE

| | | |
|---|---|---|
| FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER TWO\HY\CAD\Models Geometric Full Build\ConceptDrainage Exhibit\DIEOWB-Willow_Cr_S_Trib_EXH_02.dgn | USER NAME = pmagnelli | DESIGNED - |
| | PLOT SCALE = 50' | CHECKED - |
| | PLOT DATE = 11/27/2012 | DATE - |

REVISED -
REVISED -
REVISED -

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY**
**PROPOSED CHANNEL PLAN AND PROFILE**

SCALE: SHEET NO. 2 OF 3 SHEETS STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |

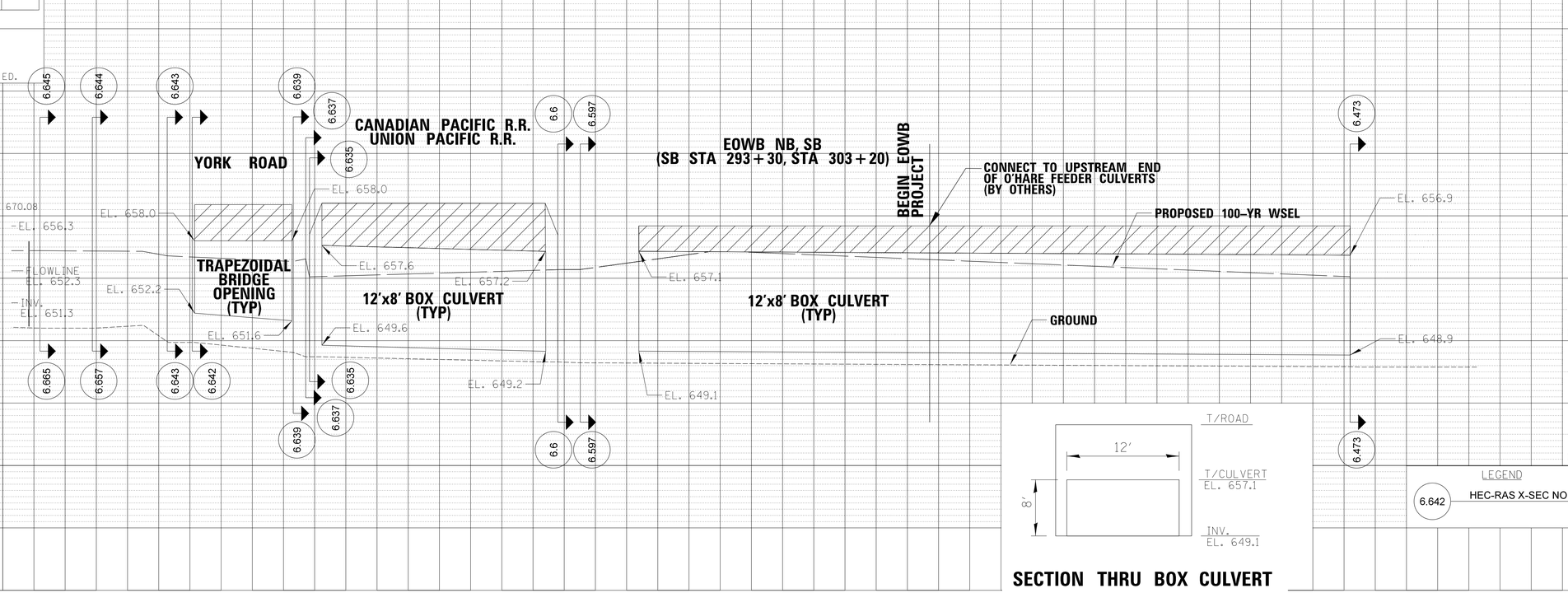
CONTRACT NO.

ILLINOIS FED. AID PROJECT




DATUM: NGVD 1929 = NAVD 1988 + 0.24'

NOTES:
1. FLOODWAY BOUNDARY IS COINCEDENT WITH FLOODPLAIN BOUNDARY.
2. FLOODPLAIN BOUNDARY IS BASED ON THE RESULTS OF THE LATEST HYDRAULIC ANALYSIS.
3. FIRST FOOT OF DEPTH PROPOSED CULVERT BURIED.







SECTION THRU BOX CULVERT

LEGEND
6.642 HEC-RAS X-SEC NO

PLAN: SURVEYED, PLOTTED, ALIGNMENT CHECKED, RT. OF WAY CHECKED, CADD FILE NAME, NOTE BOOK, NO., BY, DATE

PROFILE: SURVEYED, PLOTTED, PROFILE CHECKED, BM, NOTED, STRUCTURE NOTATNS CHKD, NOTE BOOK, NO., BY, DATE

| | | |
|---|---|---|
| FILE NAME = Y:\3611180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Models Geometric Full Build\ConceptDrawings\Drainage Exhibit\DIEOWB-Willow_Cr_S_Trib_EXHIBIT.dgn | USER NAME = pmagnelli | DESIGNED - / REVISED - |
| | PLOT SCALE = 50' | CHECKED - / REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - / REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY**
**PROPOSED CHANNEL PLAN AND PROFILE**

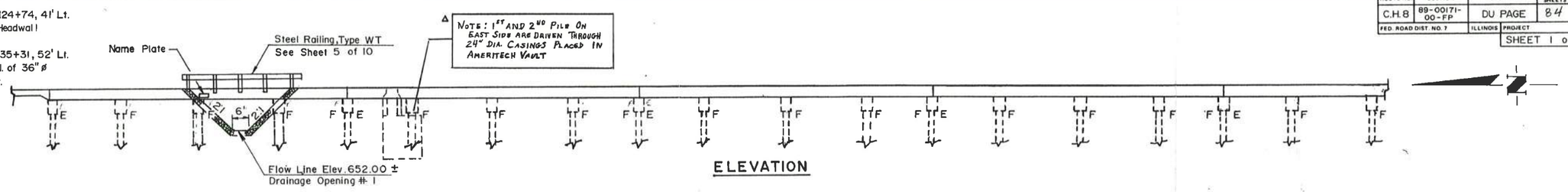
SCALE: | SHEET NO. 3 OF 3 SHEETS | STA. | TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS FED. AID PROJECT | | | |

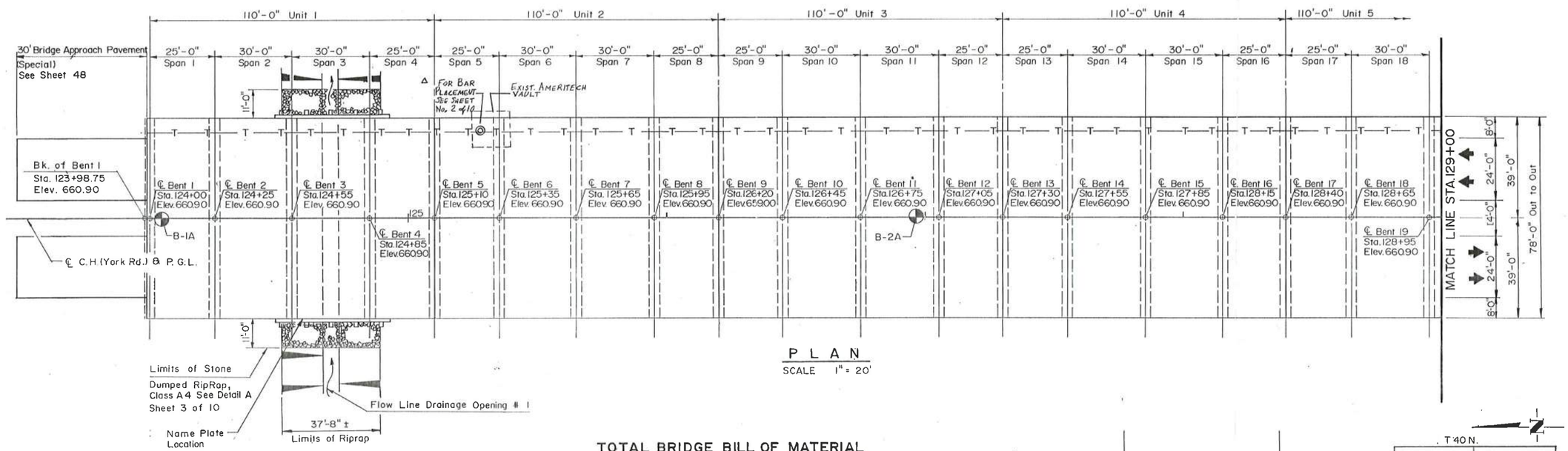
| ROUTE NO. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| C.H. 8 | 89-00171-00-FP | DU PAGE | 84 | 49 |
| FED. ROAD DIST. NO. 7 | ILLINOIS | PROJECT | | |
| | | SHEET 1 OF 10 | | |

B.M. #29 Elev. 665.55 Sta. 124+74, 41' Lt.
Chiseled "+" on Headwall

B.M. #27 Elev. 654.69 Sta. 135+31, 52' Lt.
Chiseled "+" on N. of 36" ø
Metal Pipe Culvert.




ELEVATION




PLAN
SCALE 1" = 20'

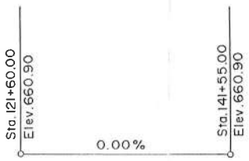



## DRAINAGE OPENING # 1
## WATERWAY INFORMATION

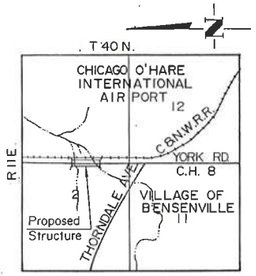
| | | |
|---|---|---|
| Drainage Area | 3.70 | Sq. Mi. |
| Provided Opening | 108 | Sq. Ft. |
| Present Opening | 19.2 | Sq. Ft. |
| Created Head (15 yr) | negligible | |
| 100 yr. Discharge | 469 | C.F.S. |
| Created Head (100 yr.) | negligible | |

## TOTAL BRIDGE BILL OF MATERIAL

| | ITEM | UNIT | SUPER | SUB | TOTAL |
|---|---|---|---|---|---|
| | Structure Excavation | Cu. Yd. | | 2790 | 2790 |
| | Structure Excavation (Special) | Cu. Yd. | | 60 | 60 |
| * | Class SI Concrete Dryland Bridge | Cu. Yd. | 5115.1 | | 5115.1 |
| | Protective Coat | Sq. Yd. | 10,474 | | 10,474 |
| * | Class SI Concrete | Cu. Yd. | | 1080 | 1080 |
| | Steel, Railing, Type WT | Lin. Ft. | 262 | | 262 |
| | Reinforcement Bars | Lbs. | | 137,130 | 137,130 |
| | Reinforcement Bars, Epoxy Coated | Lbs. | 887790 | | 887790 |
| | Furnishing Concrete Piles | Lin. Ft. | | 29,580 | 29,580 |
| | Driving Concrete Piles | Lin. Ft. | | 29,580 | 29,580 |
| | Test Piles Concrete | Each | | 11 | 11 |
| * | Class SI Concrete Encasement | Cu. Yd. | | 45.0 | 45.0 |
| | Name Plates | Each | 1 | | 1 |
| | Stone Dumped Riprap, Class A4 | Sq. Yd. | | 1504 | 1504 |




PROFILE GRADE
C. H. 8 (York Road)




LOCATION SKETCH

YORK ROAD LAND BRIDGE
BUILT 1995 BY
DUPAGE COUNTY
SEC. 89-00171-00-FP
LOADING HS 20-44
STR. NO. 022-3018

NAME PLATE
(Std. No. 2113)

I certify that to the best of my knowledge, information and belief, this bridge design is structurally adequate for the design loading shown on the plans. The design is an economical one for the style of structure and complies with requirements of the current AASHTO Standard Specifications for Highway Bridges.

STATE OF ILLINOIS
DAVID BOOHER
4775
SPRINGFIELD, ILL.
LICENSED STRUCTURAL ENGINEER

David R. Booher 8-20-93
David R. Booher ILLINOIS S.E. 081-004775
Expires 11-30-1994

* Revised 3/14/95
DuPage DOT

Δ Revised 12/10/96
Record Drawings

C.H. 8 (YORK ROAD)
DRYLAND BRIDGE
GENERAL PLAN & ELEVATION
SECTION 89-00171-01-FP
DU PAGE COUNTY
STATION 130+05
STRUCTURE NUMBER 022-3018

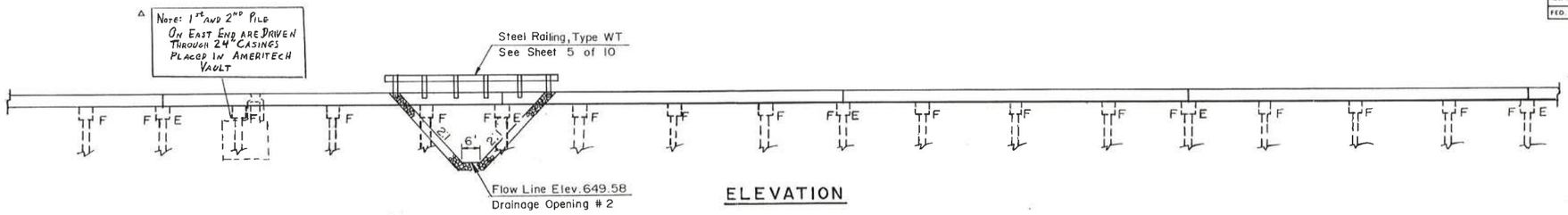
MTA, INCORPORATED

| | |
|---|---|
| DESIGNED H.A. | CHECKED O.R.B. |
| DRAWN K.T.M. | DATE 2-91 NO. 89-12 |

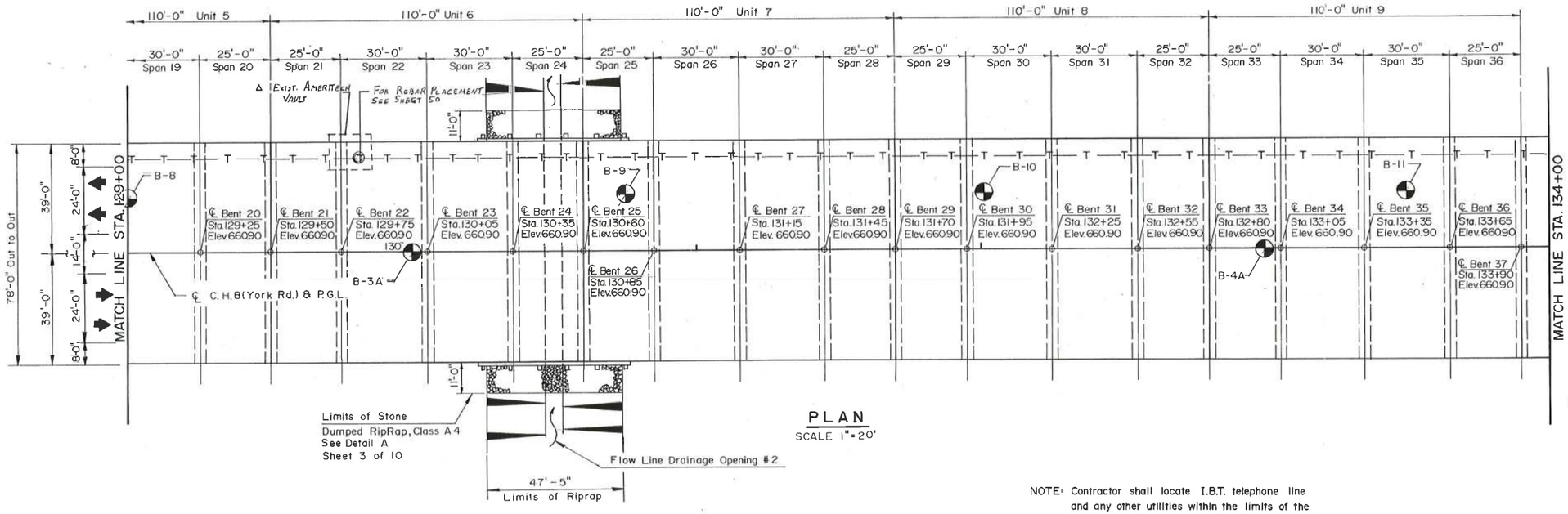
Job No. 89-12

| ROUTE NO. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| C.H. 8 | 89-00171-01-FP | DU PAGE | 84 | 50 |
| FED. ROAD DIST. NO. 7 | ILLINOIS | PROJECT | | |
| | | SHEET 2 OF 10 | | |

△ Note: 1st and 2nd Pile On East End are Driven Through 24" Casings Placed in Ameritech Vault




ELEVATION




PLAN
SCALE 1"=20'

NOTE: Contractor shall locate I.B.T. telephone line and any other utilities within the limits of the bridge prior to layout of piles. The Engineer shall be notified if any adjustment of pile location is required.

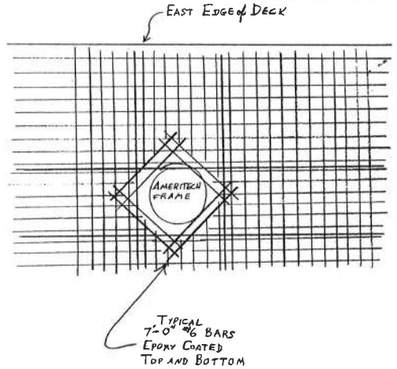
## DESIGN STRESSES

Cast-in-place Unit
f'c = 3,500 psi
fy = 60,000 psi
n = 9
LOADING HS 20-44
Allow 25 #/ft.² for future W.S.
DESIGN SPECIFICATIONS 1989 AASHTO

## DRAINAGE OPENING # 2
## WATERWAY INFORMATION

| | | |
|---|---|---|
| Drainage Area | 2.26 | Sq. Mi. |
| Provided Opening | 192 | Sq. Ft. |
| Present Opening | 21 | Sq. Ft. |
| Created Head (15 yr.) | negligible | |
| 100 yr. Discharge | 791 | C.F.S. |
| Created Head (100 yr.) | negligible | |

△ Rebar Placement For Ameritech Frames




Notes:
1. Field Cut Proposed Bar To Clear Ameritech Frame Top & Bottom
2. Add Additional Traverse And Longitudinal Bars At Half Space Next To First Uncut Traverse and Longitudinal Bar. Size To Match Cut Bars Each Direction. Top & Bottom
3. Place 8 Ea. 7'-0" #6 Bars Diagonally Around Frame As Shown. Top & Bottom

C.H. 8 (YORK ROAD)
DRYLAND BRIDGE
GENERAL PLAN & ELEVATION
SECTION 89-00171-01-FP
DU PAGE COUNTY
STATION 130+05
STRUCTURE NUMBER 022-3018

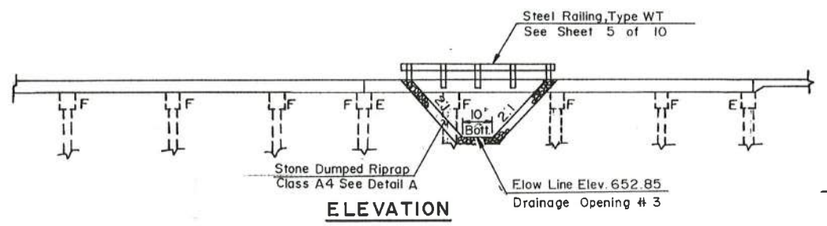
MTA, INCORPORATED

| | |
|---|---|
| DESIGNED H. A. | CHECKED D.R.B. |
| DRAWN K.T.M. | DATE 2-91 NO. 89-12 |

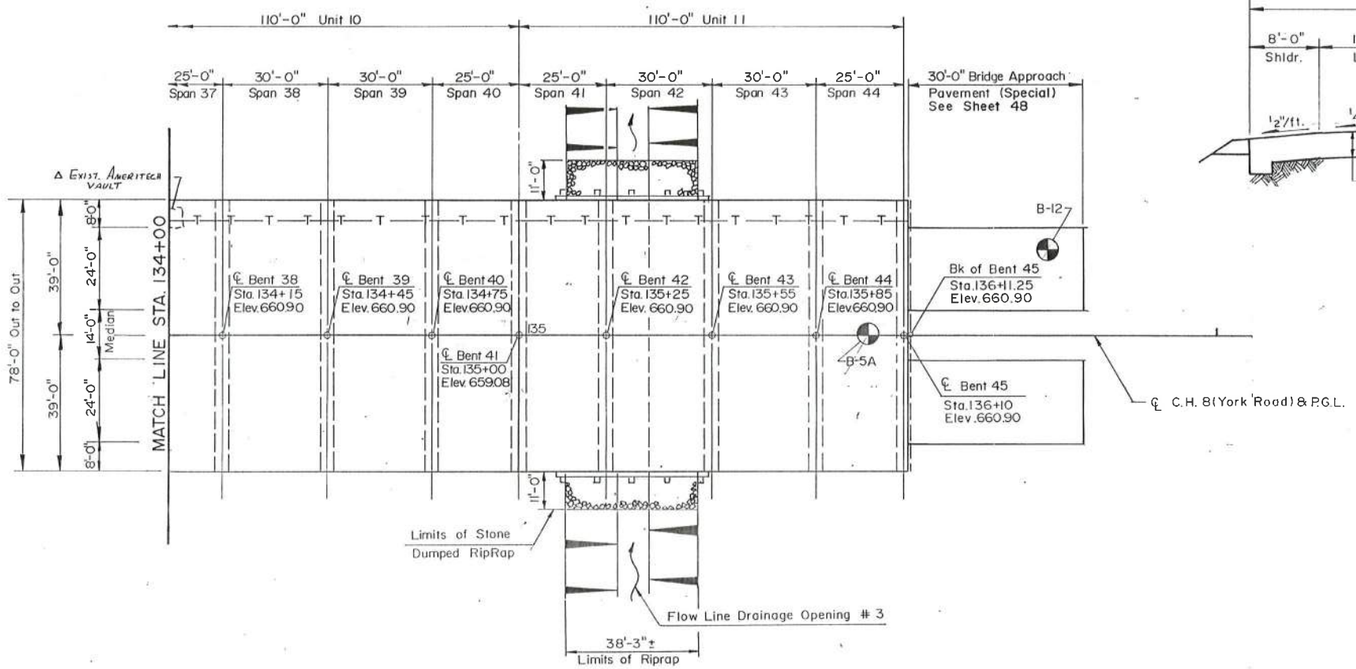
△ Revised 12/10/97 Record Drawings

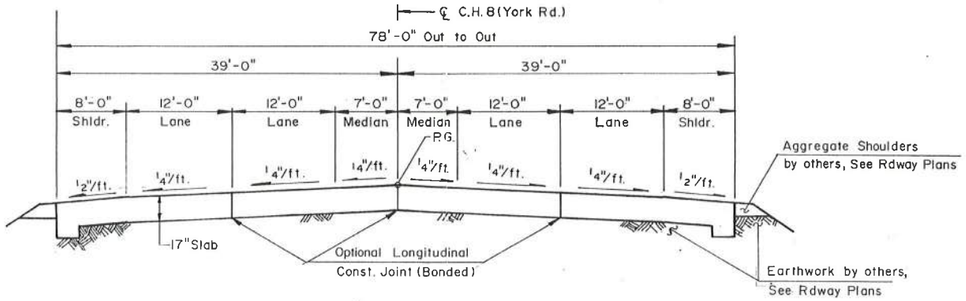
Job No. 89-12

| ROUTE NO. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| C.H. 8 | 89-00171-00-FP | DU PAGE | 84 | 51 |
| FED. ROAD DIST. NO. 7 | ILLINOIS PROJECT | | | |
| | | Sheet 3 OF 10 | | |




## ELEVATION




## TYPICAL SECTION

Dry Land Bridge on Grade

## GENERAL NOTES

See Proposal for Boring Data.

Reinforcement Bars shall conform to the requirements of AASHTO M-31, M-42, or M-53 Grade 50.

The Contractor shall make allowance for the deflection of forms, shrinkage, and settlement of falsework, in addition to allowance for dead load deflection.

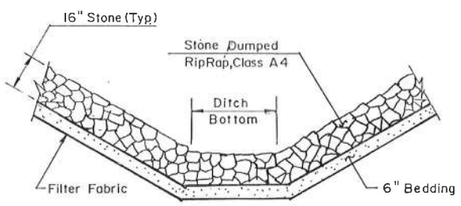
All piles shall be 12" diameter Metal Shell Piles. Precast concrete piles will not be allowed. Any reference within the Plans and Specifications to Concrete Piles shall be taken to mean Metal Shell Piles.

The Contractor shall drive eleven metal shell test piles in permanent locations at Bents 3, 11, 15, 17, 18, 24, 28, 32, 36, 39, and 42 as directed by the Engineer before ordering the remainder of piles. Test piles shall be furnished 20' longer than the length shown for the permanent piles.

All piles shall be driven in holes precored in existing ground. The precoring shall extend to a depth of 2' below the bottom of peat in accordance with the following table or as directed by the Engineer. The precoring and backfilling shall be in accordance with Article 513.09(c) of the Standard Specifications and will not be paid for separately but shall be included in the cost of DRIVING CONCRETE PILES.

The outside surfaces of the metal shell piles shall be coated with 1/4" minimum thickness of either Asphaltic Cement or SC/MC liquid asphalt. The limits of the coating shall be as shown in the following table or as directed by the Engineer. The cost of the asphaltic coating will not be paid for separately but shall be included in the cost of DRIVING CONCRETE PILES.

| PILE LOCATION | LIMIT OF PRECORING AND ASPHALT COATING |
|---|---|
| Bent 1 thru 3 | Above Elev. 645 |
| Bent 4 thru 10 & Bent 20 thru 27 | Above Elev. 635 |
| Bent 11 thru 19 | Above Elev. 630 |
| Bent 28 thru 45 | Above Elev. 640 |

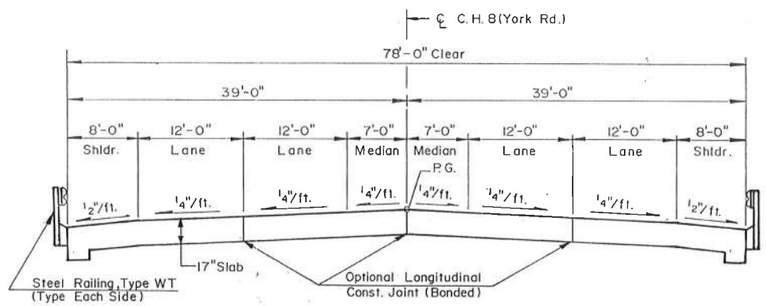



## DETAIL A

Stone Dumped Riprap on the drainage opening slopes shall extend to the R.O.W. limits. Riprap layout is subject to final terrain details and conditions, and shall be placed as directed by the Engineer.

## DRAINAGE OPENING # 3 WATERWAY INFORMATION

| | | |
|---|---|---|
| Drainage Area | 2.26 | Sq. Mi. |
| Provided Opening | 105 | Sq. Ft. |
| Present Opening | 14.1 | Sq. Ft. |
| Created Head (15yr.) | negligible | |
| 100yr. Discharge | 615 | C.F.S. |
| Created Head (100yr.) | negligible | |




## TYPICAL SECTION

Dry Land Bridge over Drainage Opening

## C.H. 8 (YORK ROAD) DRYLAND BRIDGE GENERAL PLAN & ELEVATION SECTION 89-00171-01-FP DU PAGE COUNTY STATION 130+05 STRUCTURE NUMBER 022-3018

| MTA, INCORPORATED | |
|---|---|
| DESIGNED H. A. | CHECKED D.R.B. |
| DRAWN K.T.M. | DATE 2-91 NO. 89-12 |

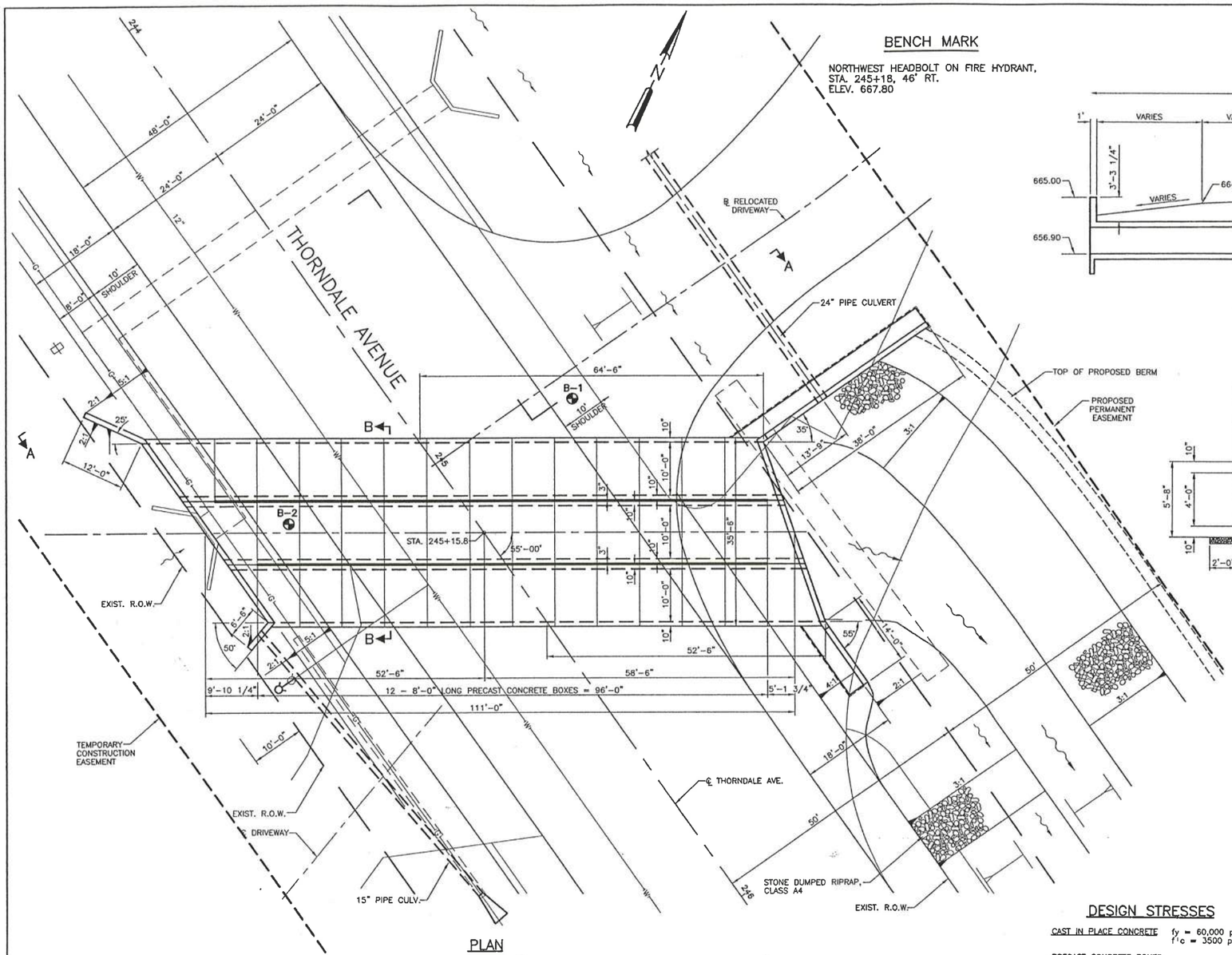
Job No. 89-12

Δ Revised 12 10 96 Record Drawings

| RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| CH 26 | * | DU PAGE | 53 | 30A |
| *SECTION 95-00245-00-CH | | | | |
| BOX CULVERT-THORNDALE AVE. STA. 245+15.8 | | | | |

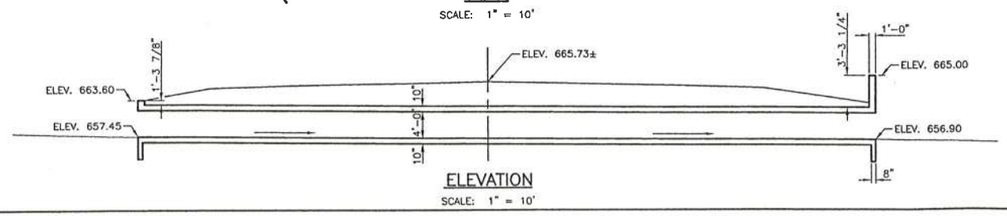
## BENCH MARK

NORTHWEST HEADBOLT ON FIRE HYDRANT,
STA. 245+18, 46' RT.
ELEV. 667.80



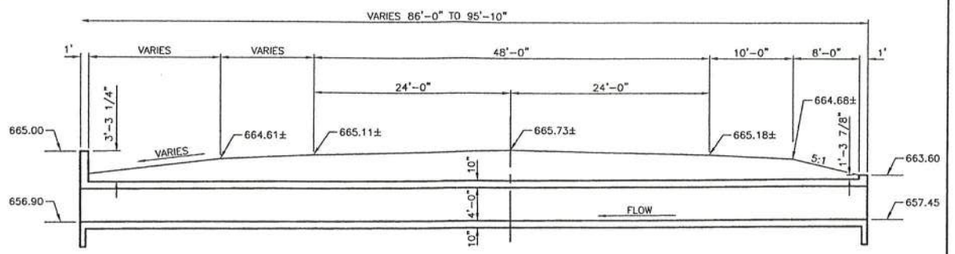

## PLAN

SCALE: 1" = 10'



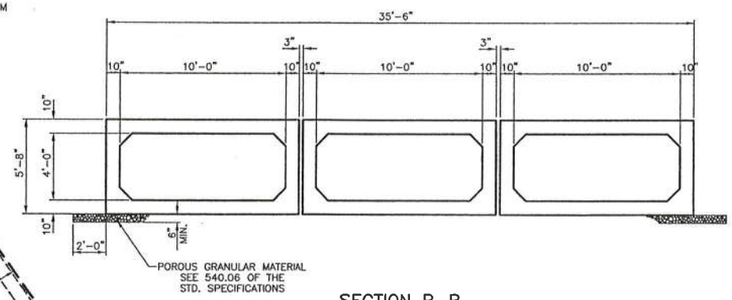

## ELEVATION

SCALE: 1" = 10'




## SECTION A-A

LOOKING EAST
SCALE: 1/8" = 1'




## SECTION B-B

SCALE: 1/4" = 1'

NOTES:

1. WATER FLOW DIVERSION SHALL BE IN ACCORDANCE WITH SECTION 540.04 OF THE STANDARD SPECIFICATIONS.
2. SEE THE DUPAGE COUNTY DEPARTMENT OF TRANSPORTATION (DCDOT) FOR THE FOUNDATION REPORT AT THE SITE.
3. REINFORCEMENT BARS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-31, M-42 OR M-53, GRADE 60.
4. BARS INDICATED THUS 12 X 4-#5 ETC. INDICATES 12 LINES OF BARS WITH 4 LENGTHS PER LINE.

## DESIGN STRESSES

CAST IN PLACE CONCRETE $f_y$ = 60,000 psi
$f'_c$ = 3500 psi

PRECAST CONCRETE BOXES

PRECAST CONCRETE BOXES SHALL CONFORM TO THE REQUIREMENTS OF ARTICLE 540.06 OF THE "STANDARD SPECIFICATIONS" AND THE APPLICABLE REQUIREMENTS OF AASHTO M 259. (FILL GREATER THAN 2 FEET.)

$f_y$ = 65,000 psi (WELDED WIRE FABRIC)
$f'_c$ = 5000 psi

LOADING HS20-44

STATE OF ILLINOIS
OTTO J. HATLESTAD
40BO
REGISTERED STRUCTURAL ENGINEER
License expires 11-30-00

## TOTAL BILL OF MATERIAL - BOX CULVERT

| ITEM | UNITS | QUANTITY |
|---|---|---|
| POROUS GRANULAR BACKFILL | CU. YD. | 250 |
| STRUCTURE EXCAVATION | CU. YD. | 1420 |
| PRECAST CONCRETE BOX CULVERT 10' X 4' | FOOT | 280 |
| CONCRETE BOX CULVERTS | CU. YD. | 101.5 |
| REINFORCEMENT BARS (EPOXY COATED) | POUND | 15,070 |

| REVISIONS | |
|---|---|
| NAME | DATE |
| | |

DU PAGE COUNTY DIVISION OF TRANSPORTATION

# TRIPLE 10' X 4' BOX CULVERT
# THORNDALE AVE. STA. 245+15.8

SCALE: AS SHOWN

DATE: 10/02/00
CHECKED BY: O.J.H.

# SECTION 6

**CROSS-SECTION LOCATION MAP**
**CROSS-SECTION PLOTS**
**STRUCTURE OPENING PLOTS***
***(See Section 5 Plan and Profile Sheets)**

$FILE$





**CHRISTOPHER B. BURKE** ENGINEERING LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500


CLIENT:

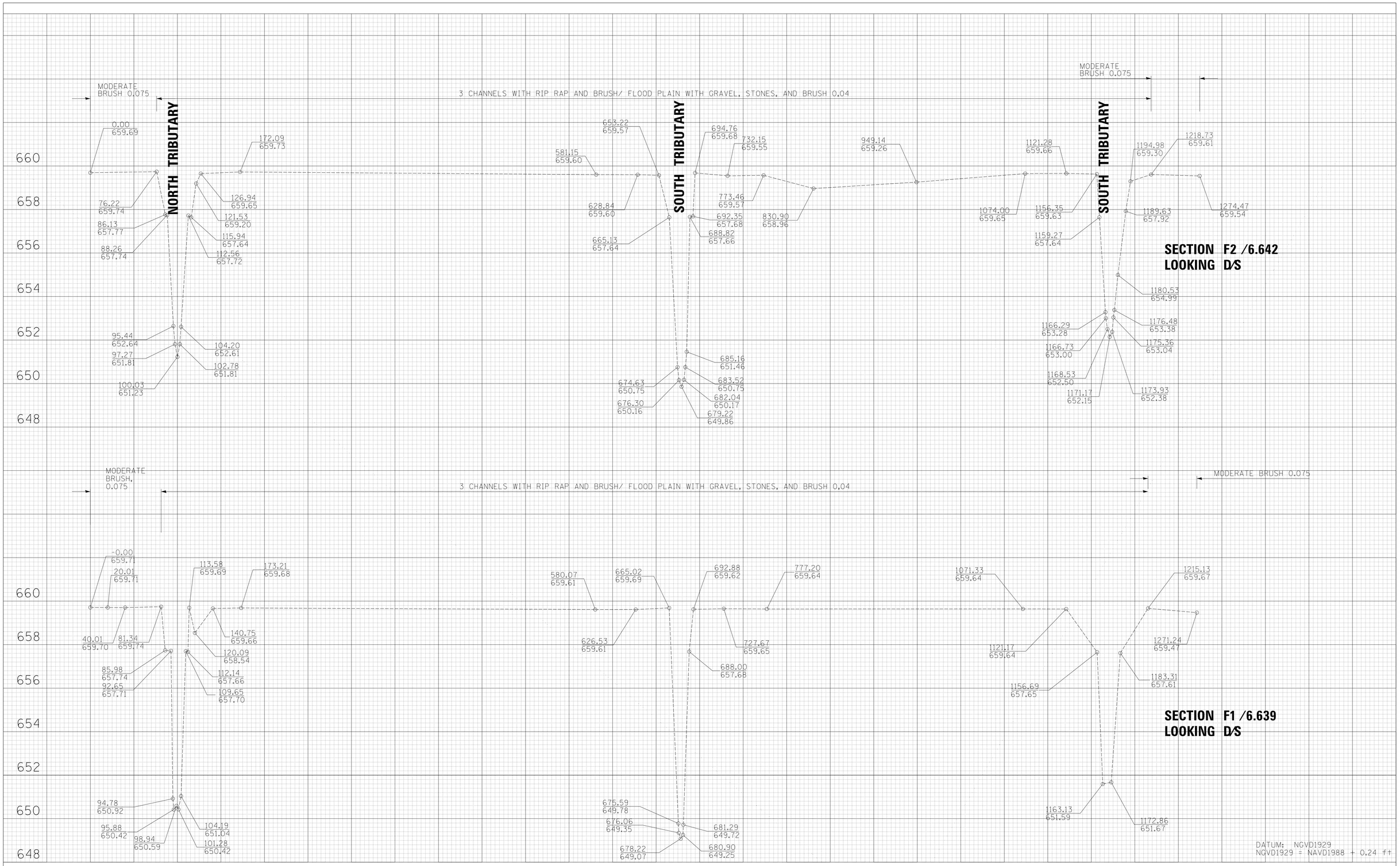
**ILLINOIS DEPARTMENT OF TRANSPORTATION**

| NO. | DATE | NATURE OF REVISION | CHKD. |
|---|---|---|---|
| DSGN. | JMG | | |
| DWN. | EAT | | |
| CHKD. | JMG | | |
| SCALE: | 1"=150' | | |

TITLE :
**ELGIN O'HARE WEST BYPASS**
**WILLOW CREEK AND WILLOW CREEK SOUTH TRIBUTARY**
**EXISTING CROSS-SECTION LOCATION MAP**

PROJECT NO. 07-0404
DATE: 11/27/2012
SHEET OF

**EXHIBIT**




FINAL SURVEY — NOTE BOOK — NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED — BY — DATE

ORIGINAL SURVEY — NOTE BOOK — NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED — BY — DATE

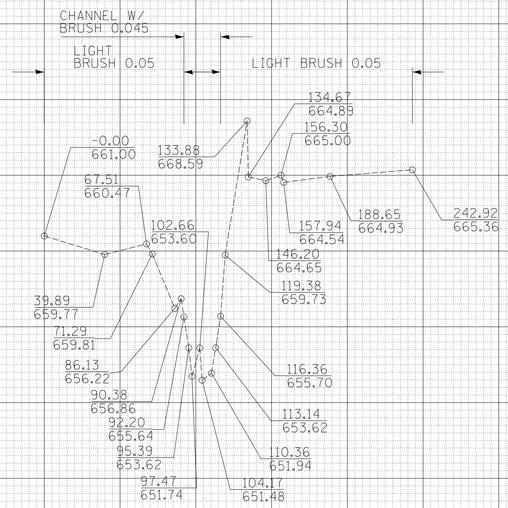
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| | | DRAWN - MYG | REVISED - |
| | PLOT SCALE = 50' | CHECKED - CW | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK CROSS SECTIONS**

SCALE: 50H 2V | SHEET NO. OF SHEETS | STA. | TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS | FED. AID PROJECT | | |

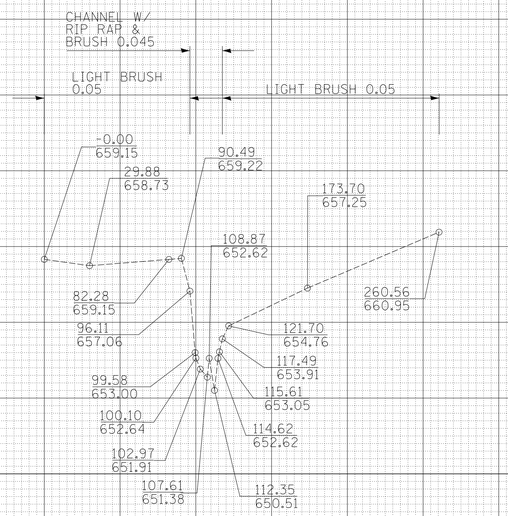



FINAL SURVEY

| NOTE BOOK | BY | DATE |
|---|---|---|
| NO. | | |

SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED

**SECTION F4 /0.1543**
**LOOKING D/S**




ORIGINAL SURVEY

| NOTE BOOK | BY | DATE |
|---|---|---|
| NO. | | |

SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED

**SECTION F3 /0.0748**
**LOOKING D/S**

DATUM: NGVD1929
NGVD1929 = NAVD1988 + 0.24 ft

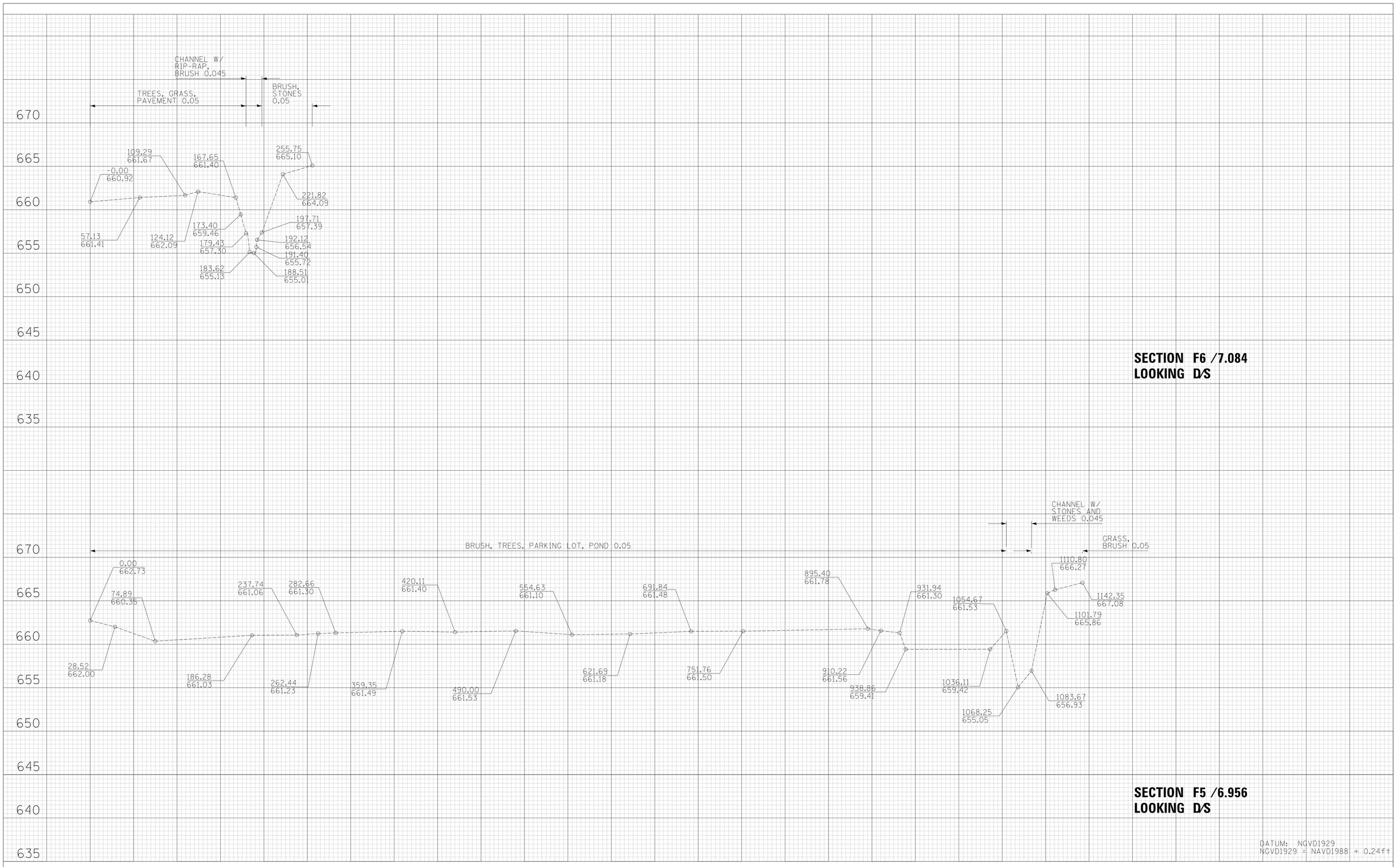
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| | | DRAWN - MYG | REVISED - |
| | PLOT SCALE = 50' | CHECKED - CW | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK NORTH TRIBUTARY CROSS SECTIONS**

SCALE: 50H 2V | SHEET NO. OF SHEETS | STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| ILLINOIS | FED. AID PROJECT | | | |




FINAL SURVEY

| NOTE BOOK | BY | DATE |
|---|---|---|
| NO. | | |

SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED

ORIGINAL SURVEY

| NOTE BOOK | BY | DATE |
|---|---|---|
| NO. | | |

SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED

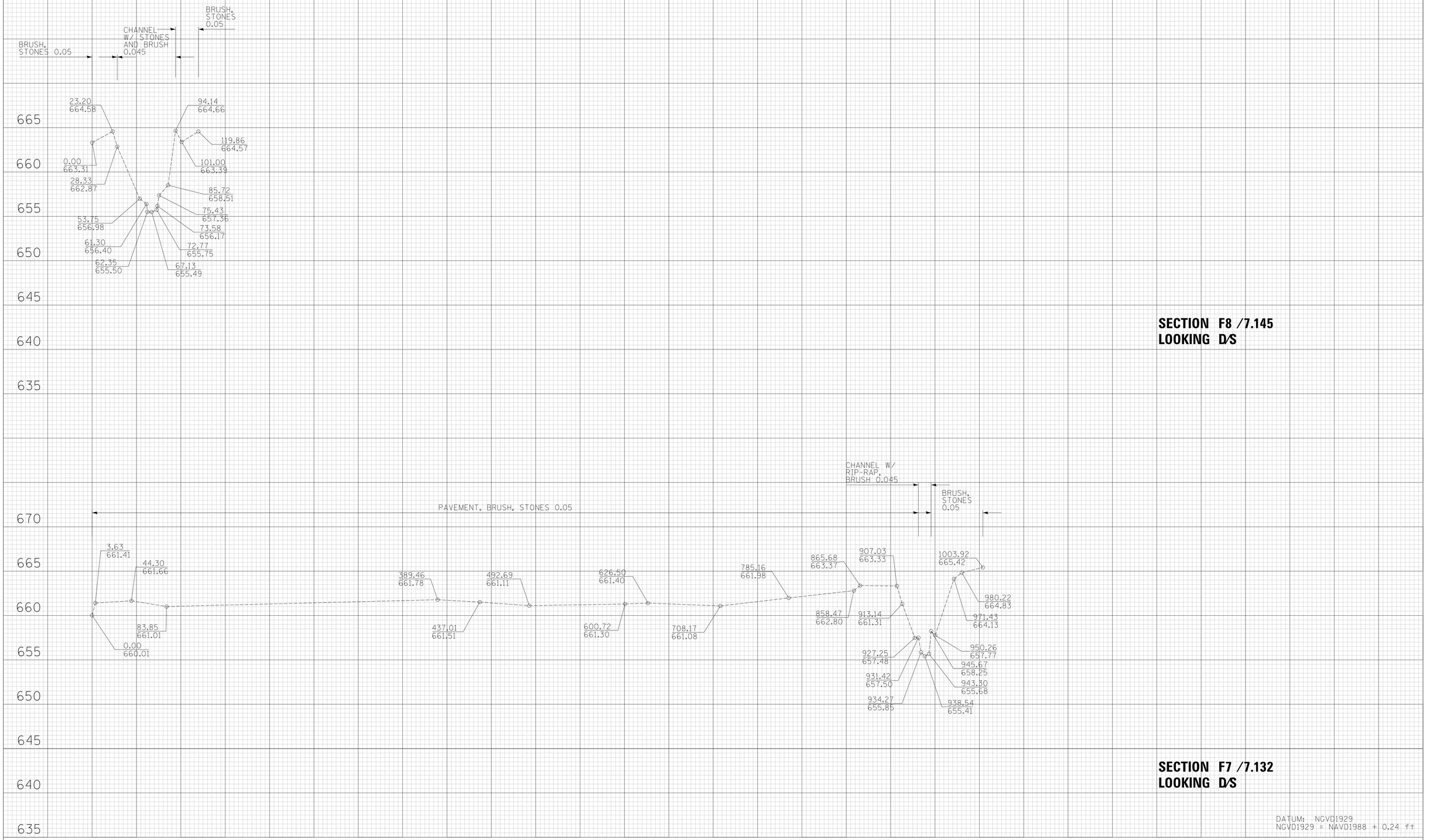
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| | | DRAWN - MYG | REVISED - |
| | PLOT SCALE = 50' | CHECKED - CW | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY CROSS SECTIONS**

SCALE: 50H 5V | SHEET NO. OF SHEETS | STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS | FED. AID PROJECT | | |




**SECTION F8 /7.145**
**LOOKING D/S**

**SECTION F7 /7.132**
**LOOKING D/S**

DATUM: NGVD1929
NGVD1929 = NAVD1988 + 0.24 ft

FINAL SURVEY
NOTE BOOK
NO.
SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED
BY
DATE

ORIGINAL SURVEY
NOTE BOOK
NO.
SURVEYED
PLOTTED
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BY
DATE

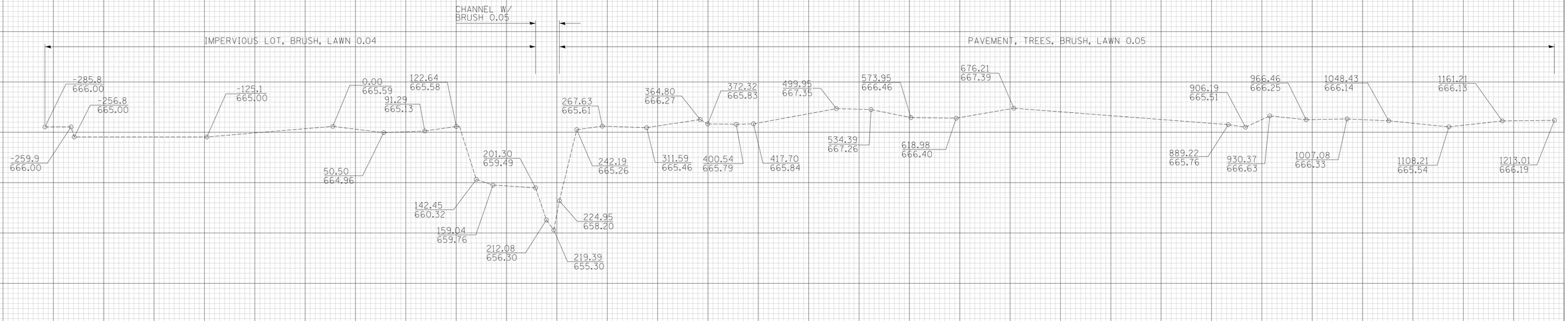
| | | | |
|---|---|---|---|
| FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\D1EOWB-03-sht-xssht-03.dgn | USER NAME = pmagnell | DESIGNED - PP | REVISED - |
| | | DRAWN - MYG | REVISED - |
| | PLOT SCALE = 50' | CHECKED - CW | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

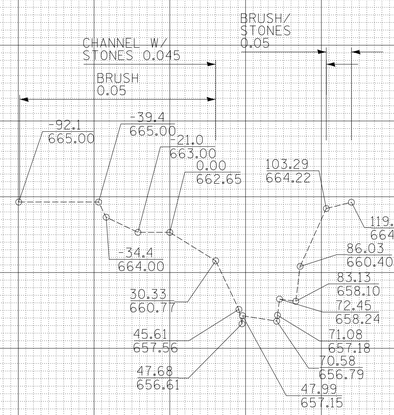
**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY CROSS SECTIONS**

SCALE: 50H 5V | SHEET NO. OF SHEETS | STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS FED. AID PROJECT | | | |




**SECTION F10 /7.191**
**LOOKING D/S**




**SECTION F9 /7.168**
**LOOKING D/S**

DATUM: NGVD1929
NGVD1929 = NAVD1988 + 0.24 ft

FINAL SURVEY — NOTE BOOK — NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED — BY — DATE

ORIGINAL SURVEY — NOTE BOOK — NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED — BY — DATE

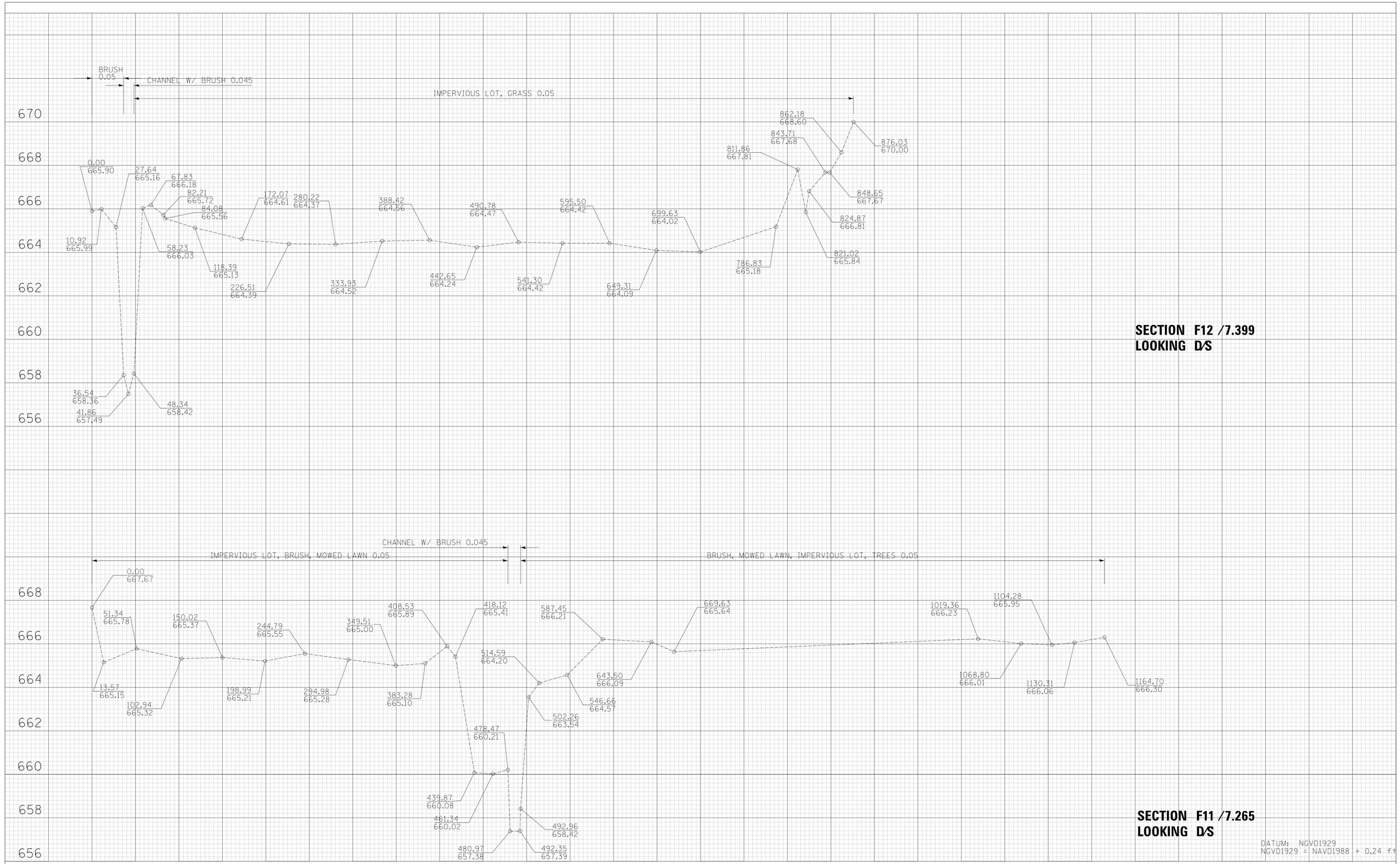
| | | | |
|---|---|---|---|
| FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\D1EOWB-03-sht-xssht-03.dgn | USER NAME = pmagnelli | DESIGNED - PP | REVISED - |
| | | DRAWN - MYG | REVISED - |
| | PLOT SCALE = 50' | CHECKED - CW | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY CROSS SECTIONS**

SCALE: 50H 5V | SHEET NO. OF SHEETS | STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS | FED. AID PROJECT | | |




FINAL SURVEY
NOTE BOOK
NO.
SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED
BY
DATE

ORIGINAL SURVEY
NOTE BOOK
NO.
SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED
BY
DATE

| | | | |
|---|---|---|---|
| FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\D1EOWB-03-sht-xssht-03.dgn | USER NAME = pmagnelli | DESIGNED - PP | REVISED - |
| | | DRAWN - MYC | REVISED - |
| | PLOT SCALE = 50' | CHECKED - CW | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK SOUTH TRIBUTARY CROSS SECTIONS**

SCALE: 50H 5V | SHEET NO. OF SHEETS | STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS | FED. AID PROJECT | | |

WILLOW CREEK SOUTH TRIBUTARY

EB FRONTAGE RD – 00

RAMP P1

RAMP P5

RAMP 04

DETENTION STORAGE

WILLOW CREEK COMP. STORAGE
SITE: CS 11–S

AVAILABLE STORAGE
NORMAL – 10 YR: 3.3 A–F
10 YR – 100 YR: 3.2 A–F

100 YR = 658.8
10 YR: = 657.9
NWL = 656.3

RAMP P2

RAMP P8

WILLOW CREEK COMP. STORAGE
SITE: CS 11–C

AVAILABLE STORAGE
NORMAL – 10 YR: 4.2 A–F
10 YR – 100 YR: 5.2 A–F

100 YR = 657.4
10 YR: = 656.2
NWL = 654.8

SUPREME DR

WILLOW CREEK COMP. STORAGE
SITE: CS 11–N

AVAILABLE STORAGE
NORMAL – 10 YR: 14.3 A–F
10 YR – 100 YR: 12.6 A–F

100 YR = 657.0
10 YR: = 655.0
NWL = 653.8

WILLOW CREEK NORTH TRIBUTARY

RAMP 05

RAMP 01

OUTLET WL 9

OUTLET WL 10

4-11'X5' RCBC

N YORK RD

CANADIAN PACIFIC R.R.

UNION PACIFIC R.R.

OUTLET WL 12

OUTLET WL 13

OUTLET WL 14

RAMP P1

WEST BYPASS SB

WEST BYPASS NB

INV. = 648.9

INV. = 648.0

INV. = 648.0

12'X8' BOX

12'X8' BOX

12'X8' BOX

CONNECT TO UPSTREAM END O'HARE FEEDER CULVERT #1 INV. = 648.7

CONNECT TO UPSTREAM END O'HARE FEEDER CULVERT #2 INV. = 647.8

CONNECT TO UPSTREAM END O'HARE FEEDER CULVERT #3 INV. = 647.8

0 120' 240'

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Models Geometric FullBuild\Concept Drainage Exhibit\DEOWB-Willow_Cr_Comp_Stor_FullBuild exh.dgn
11/7/50 AM

| | | | |
|---|---|---|---|
| FILE NAME = DEOWB-Willow_Cr_Comp_Stor_FullBuild exh.dgn | USER NAME = pmagnell | DESIGNED MA | REVISED - |
| | | DRAWN MYG | REVISED - |
| | PLOT SCALE = 120' | CHECKED CW | REVISED - |
| | PLOT DATE = 11/27/2012 | DATE - | REVISED - |

ELGIN O'HARE WEST BYPASS
communities. opportunities. solutions.

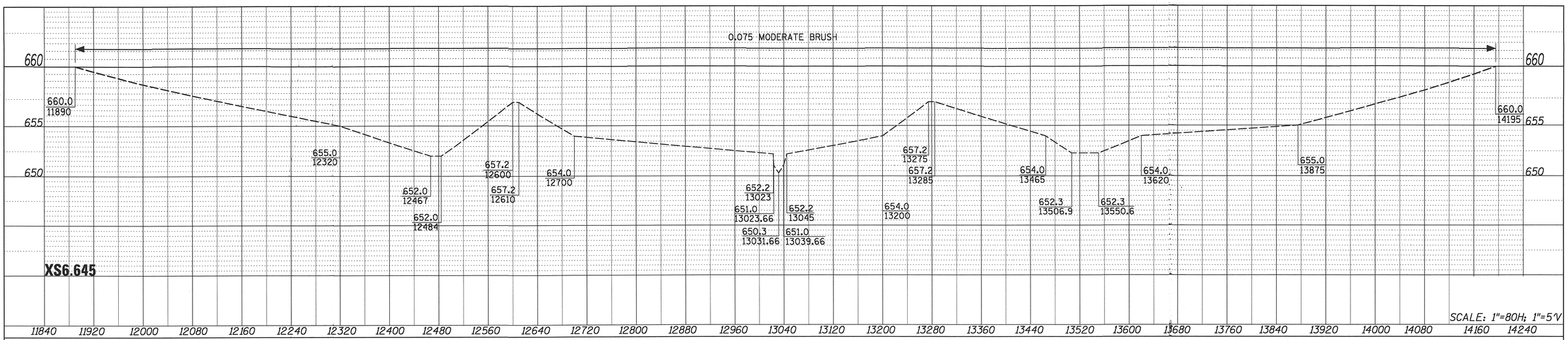
Illinois Department of Transportation

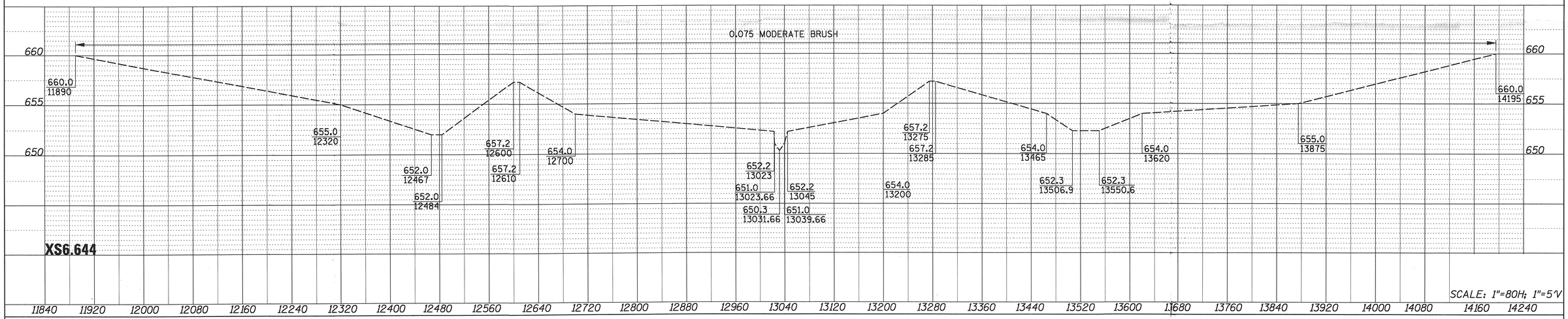
CHRISTOPHER B. BURKE ENGINEERING LTD.

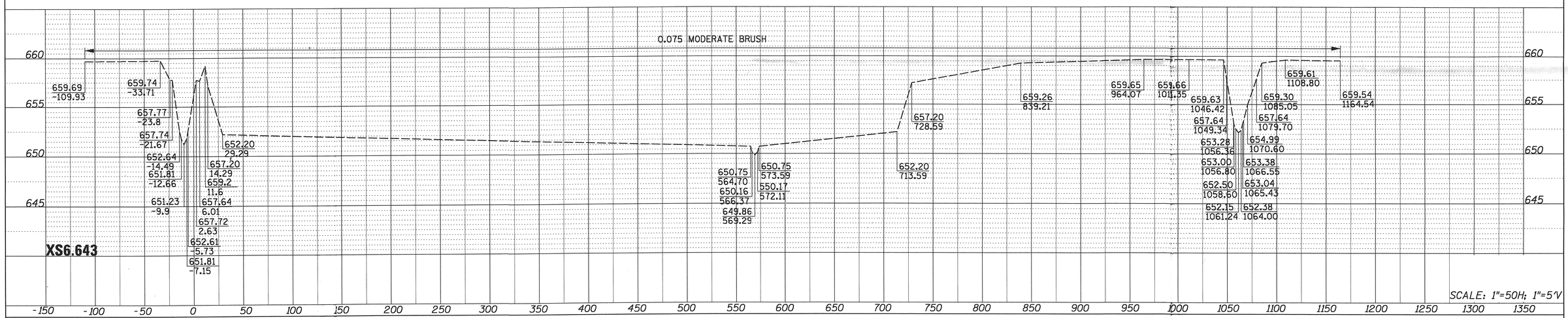
**ELGIN O'HARE WEST BYPASS**
**WILLOW CREEK**
**PROPOSED ROADWAY PLAN**

SHEET NO. OF SHEETS STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | COOK,DuPAGE | $TOTAL | |
| | | CONTRACT NO. | | |
| FULL BUILD | ILLINOIS | FED. AID PROJECT | | |




PROFILE
SURVEYED
PLOTTED
NOTE BOOK
NO.
GRADES CHECKED
STA. NO. PER
PERTURBE NO.
DATE
BY
ITEM
CHK'D

| | | | |
|---|---|---|---|
| FILE NAME = N:\Idot\070404\Water\Willow-Higgins Creek\exhibits\070404exh WC XS South Tributary.dgn | USER NAME = elmotoda | DESIGNED - | REVISED - |
| | | DRAWN - | REVISED - |
| | PLOT SCALE = 1.00 ft / in. | CHECKED - | REVISED - |
| | PLOT DATE = 7/11/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

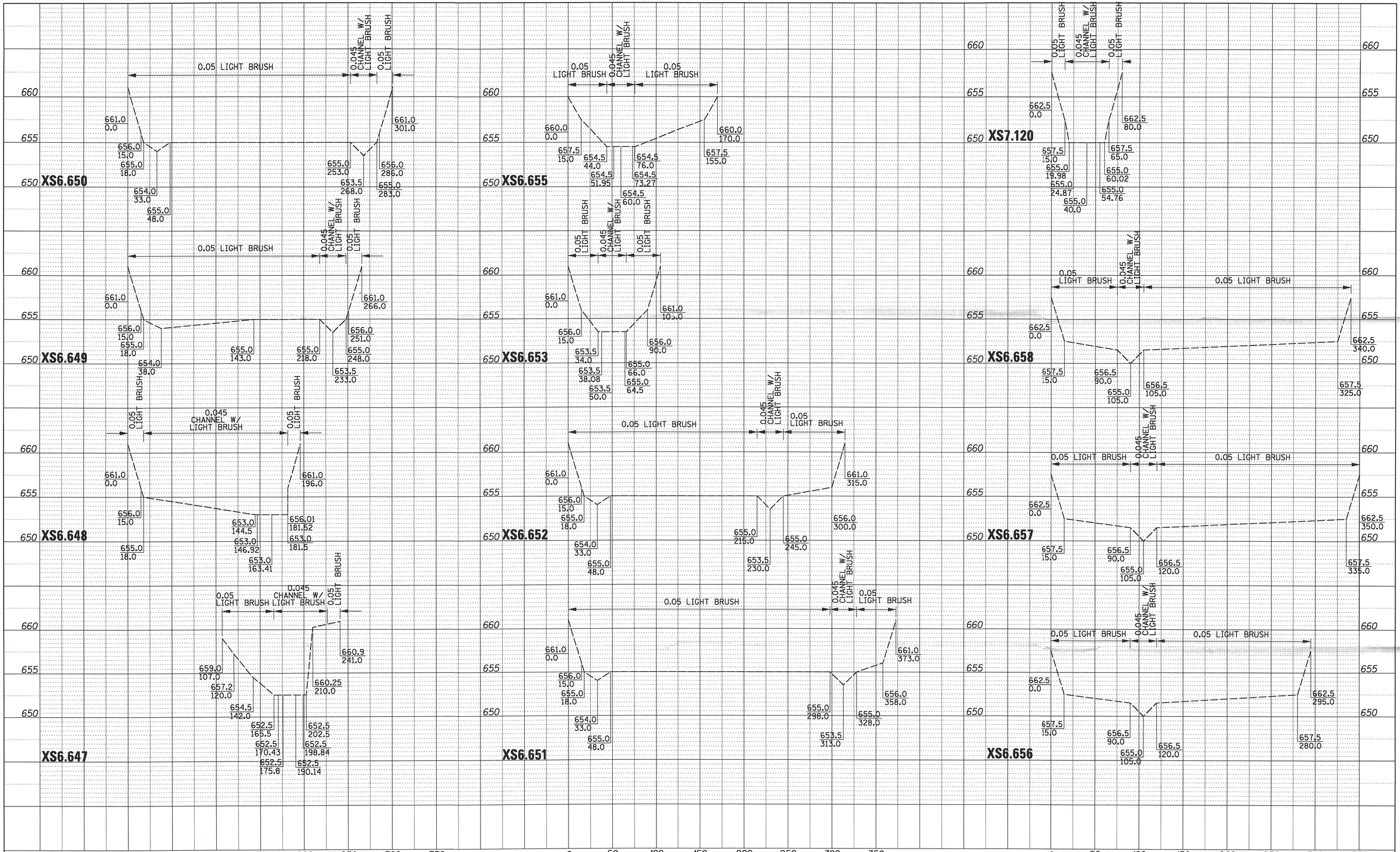
**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK**
**FLOODPLAIN CROSS-SECTIONS**

SCALE: | SHEET OF SHEETS | STA. | TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS FED. AID PROJECT | | | |

PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
GRADES CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
ALIGNMENT CHECKED
STRUCTURE NO
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE
NOTATIONS CHKD




| | | | |
|---|---|---|---|
| FILE NAME = N:\Idot\070404\Water\Willow-Higgins Creek\exhibits\070404exh WC XS South Tributary.dgn | USER NAME = elmotoda | DESIGNED - | REVISED - |
| | | DRAWN - | REVISED - |
| | PLOT SCALE = 1.00 ft / in. | CHECKED - | REVISED - |
| | PLOT DATE = 7/11/2012 | DATE - | REVISED - |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**ELGIN O'HARE – WEST BYPASS**
**WILLOW CREEK**
**FLOODPLAIN CROSS-SECTIONS**

SCALE: 50H 5V | SHEET OF SHEETS | STA. TO STA.

| F.A. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| | | | | |
| | | CONTRACT NO. | | |
| | ILLINOIS FED. AID PROJECT | | | |

# HYDRAULIC REPORT

## ELGIN O'HARE – WEST BYPASS
## P-91-443-06

## ELGIN O'HARE EXPRESSWAY/RAMPS P1, P2, P8 OVER WILLOW CREEK SOUTH TRIBUTARY
## RAMPS Q1, O4, P5 OVER WILLOW CREEK SOUTH TRIBUTARY
## RAMP Q5 OVER WILLOW CREEK SOUTH TRIBUTARY
## BENSENVILLE, ILLINOIS
## AND
## O'HARE WEST BYPASS OVER WILLOW CREEK
## CHICAGO, ILLINOIS

*Prepared For:*

Illinois Department of Transportation
201 West Center Court
Schaumburg, IL 60196-1096

Prepared By:

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Il 60018

CBBEL Project No. 07-0404

NOVEMBER 2012

VOLUME 2 OF 2

CH2MHILL

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018-4920 Tel (847) 823-0500 Fax (847) 823-0520

# SECTION 7

## REGULATORY HYDROLOGIC AND HYDRAULIC MODELING

1

**********80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY**********

```
 JOB TR-20 WHC                                                  NOPLOTS
 TITLE     WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00  2@5X10 DIV 450 AT 34
 TITLE     650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2
  3 STRUCT       1
  8                     668.20        0.0         0.0
  8                     671.13       50.00        8.34
  8                     672.44      100.00       12.07
  8                     673.34      150.00       14.63
  8                     674.13      200.00       16.98
  8                     674.83      250.00       22.32
  8                     675.49      300.00       30.00
  8                     676.11      350.00       42.80
  8                     676.76      400.00       57.25
  8                     677.42      450.00       73.75
  8                     678.17      500.00       92.50
  9 ENDTBL
  3 STRUCT       2
  8                     663.08        0.0         0.0
  8                     666.00       56.00        0.81
  8                     667.00       94.00        2.19
  8                     668.00      140.00        5.19
  8                     669.00      183.00       12.45
  8                     670.00      222.00       24.57
  8                     671.00      398.00       55.12
  9 ENDTBL
  3 STRUCT       3
  8                     665.30        0.0         0.0
  8                     666.50       20.00        0.01
  8                     667.20       40.00        0.02
  8                     667.77       60.00        0.03
  8                     668.28       80.00        0.04
  8                     668.76      100.00        0.05
  8                     669.22      120.00        0.06
  8                     669.67      140.00        0.93
  8                     670.15      160.00        2.13
  8                     670.66      180.00        5.20
  8                     671.08      200.00        8.35
  9 ENDTBL
  3 STRUCT       4
  8                     666.70        0.0         0.0
  8                     668.02       20.00        0.01
  8                     668.74       40.00        0.02
  8                     669.31       60.00        0.03
  8                     669.81       80.00        1.28
  8                     670.28      100.00        2.50
  8                     670.65      120.00        5.13
  8                     670.79      140.00        6.18
  8                     670.93      160.00        7.23
  8                     671.05      180.00        8.13
  8                     671.15      200.00        8.88
```

1

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
  9 ENDTBL
  3 STRUCT       5
  8                     657.50        0.0         0.0
  8                     662.00      429.00        1.16
  8                     663.00      659.00        3.29
  8                     664.00      727.00        8.46
  8                     665.00      923.00       16.92
  9 ENDTBL
  3 STRUCT      10
  8                     652.50        0.0         0.0
  8                     657.00      183.00        6.69
  8                     657.30      298.00       12.55
  8                     657.60      393.00       14.93
  8                     658.00      531.00       19.11
  8                     658.40      643.00       22.42
  8                     658.70      760.00       26.24
  8                     659.70      845.00       31.17
  9 ENDTBL
  3 STRUCT      20
  8                     657.90        0.0         0.0
  8                     663.20      223.00        2.95
  8                     663.80      232.00        3.32
  8                     664.50      416.00        3.71
  8                     665.30      554.00        4.29
  8                     665.70      663.00        4.87
  8                     666.00      761.00        5.31
  8                     666.70     1192.00        7.01
  9 ENDTBL
  3 STRUCT      30
  8                     659.50        0.0         0.0
  8                     664.30      199.0         2.11
```

```
 8                      105.        24.3        7.12
 8                      106.        100.        7.3
 8                      107.        150.        7.4
 9 ENDTBL
 3 STRUCT      42
 8                      693.        0.0         0.
 8                      695.5       42.         7.39
 8                      696.5       58.         13.65
 8                      697.        102.        17.
 9 ENDTBL
 3 STRUCT      44
 8                      693.1       0.0         0.
 8                      694.        21.         1.5
 8                      695.        48.         6.5
 8                      696.        110.        13.8
 8                      697.        173.        22.4
 8                      698.        350.        33.1
 9 ENDTBL
 3 STRUCT      52
 8                      100.        0.0         0.
 8                      105.        5.92        7.78
 8                      106.        100.        7.8
 8                      107.        150.        7.9
 9 ENDTBL
 3 STRUCT      55
 8                      693.        0.0         0.
 8                      694.        13.         .11
 8                      695.        14.         .39
 8                      696.        14.5        .95
 8                      697.        15.         1.83
 8                      698.        200.        2.9
 9 ENDTBL
 3 STRUCT      58
 8                      100.        0.0         0.
 8                      105.        5.41        7.11
 8                      106.        100.        7.3
 8                      107.        150.        7.5
 9 ENDTBL
1
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 3 STRUCT      73
 8                      681.8       0.0         0.
 8                      686.4       246.        4.7
 8                      686.9       311.        7.1
 8                      687.4       480.        10.6
 8                      687.9       751.        14.3
 8                      688.8       925.        23.4
 8                      688.9       1101.       24.5
 9 ENDTBL
 3 STRUCT      80
 8                      680.8       0.0         0.
 8                      681.2       21.3        8.9
 8                      682.3       110.        33.7
 8                      682.9       170.        47.6
 8                      684.5       329.        85.4
 8                      685.1       510.        99.9
 8                      685.5       646.        109.6
 9 ENDTBL
 3 STRUCT      89
 8                      616.0       0.0         0.0
 9 ENDTBL
 3 STRUCT      90
 8                      581.0       0.0         0.0
 8                      590.0       10.0        44.3
 8                      600.0       15.         191.
 8                      610.0       20.         367.
 8                      616.0       25.         489.
 8                      620.0       30.         582.
 8                      630.0       50.         929.
 8                      635.0       52.         1130.
 8                      640.0       55.         1308.
 8                      640.6       58.         1333.
 8                      641.7       60.         1365.
 8                      643.3       250.        1415.
 8                      645.0       2100.       1467.
 8                      646.67      3500.       1520.
 9 ENDTBL
 2 XSECTN    033         1.0
 8                      699.3       0.0         0.0
 8                      700.6       20.         14.
 8                      700.9       27.         18.
 8                      701.3       41.         24.
 8                      701.8       61.         34.
 8                      702.6       79.         49.
 8                      703.6       84.         72.
 8                      705.        87.         112.
 8                      707.1       112.        214.
 9 ENDTBL
 2 XSECTN    034         1.0
```

```
 8                    652.95      2067.0      0.15
 8                    653.35      2401.0      0.16
 9 ENDTBL
 2 XSECTN   003       1.0
 8                    644.12      0.0         0.00
 8                    646.0       100.0       0.005
 8                    647.52      250.0       0.01
 8                    648.34      332.0       0.02
 8                    649.4       475.0       0.04
 8                    650.0       536.0       0.06
 8                    650.7       624.0       0.08
 8                    651.5       660.0       0.10
 8                    652.00      750.0       0.12
 8                    655.46      1674.0      0.14
 9 ENDTBL
 2 XSECTN   004       1.0
 8                    644.12      0.0         0.00
 8                    646.0       100.0       0.005
 8                    647.87      250.0       0.01
 8                    648.71      332.0       0.02
1

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8                    650.09      455.0       0.04
 8                    650.97      570.0       0.06
 8                    651.31      620.0       0.08
 8                    651.53      650.0       0.10
 8                    651.82      677.0       0.11
 8                    652.00      750.0       0.12
 8                    655.46      1674.0      0.14
 9 ENDTBL
 2 XSECTN   037       1.0
 8                    1.00        0.0         0.0
 8                    2.00        4.62        6.87
 8                    3.00        9.24        11.61
 8                    4.00        13.85       14.72
 8                    5.00        18.47       17.92
 8                    6.00        46.18       36.67
 8                    7.00        92.36       68.75
 8                    8.00        184.73      120.12
 8                    9.00        369.45      214.48
 8                    10.00       692.73      341.44
 8                    11.00       923.64      419.66
 8                    12.0        1200.       550.
 9 ENDTBL
 2 XSECTN   131       1.0
 8                    1.0         0.0         0.0
 8                    2.0         2.55        4.70
 8                    3.0         5.11        8.18
 8                    4.0         7.66        10.13
 8                    5.0         10.22       10.83
 8                    6.0         25.55       24.95
 8                    7.0         51.10       38.96
 8                    8.0         102.19      68.26
 8                    9.0         162.06      85.76
 8                    10.0        204.39      100.86
 8                    11.0        383.22      170.53
 8                    12.0        510.97      227.20
 9 ENDTBL
 2 XSECTN   132       1.0
 8                    1.0         0.0         0.0
 8                    2.0         1.5         3.20
 8                    3.0         3.00        5.32
 8                    4.0         4.50        6.41
 8                    5.0         6.00        7.93
 8                    6.0         11.74       12.32
 8                    7.0         15.00       15.27
 8                    8.0         30.00       29.77
 8                    9.0         60.00       82.30
 8                    10.0        114.48      185.92
 8                    11.0        120.00      196.53
 8                    12.0        225.00      327.17
 8                    13.0        300.00      443.39
1

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 9 ENDTBL
 2 XSECTN   133       1.0
 8                    1.0         0.0         0.0
 8                    2.0         4.0         13.15
 8                    3.0         7.99        16.69
 8                    4.0         11.99       21.51
 8                    5.0         15.98       24.60
 8                    6.0         39.96       45.66
 8                    7.0         79.92       75.63
 8                    8.0         136.94      140.39
 8                    9.0         159.84      193.08
```

```
  8                    3.0         300.        160.
  8                    4.0         400.        200.
1
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
  8                    5.0         580.        265.
  8                    6.0         750.        330.
  8                    7.0         900.        400.
  8                    8.0         1300.       520.
  8                    9.0         1800.       760.
  9 ENDTBL
  2 XSECTN   140       1.0
  8                    1.0         0.0         0.0
  8                    2.0         250.        200.
  8                    3.0         540.        340.
  8                    4.0         650.        420.
  8                    5.0         850.        650.
  8                    6.0         1020.       910.
  8                    7.0         1320.       1200.
  8                    8.0         1940.       1600.
  8                    9.0         2900.       2430.
  9 ENDTBL
  2 XSECTN   141       1.0
  8                    1.0         0.0         0.0
  8                    2.0         300.        240.
  8                    3.0         550.        450.
  8                    4.0         670.        520.
  8                    5.0         870.        650.
  8                    6.0         1050.       750.
  8                    7.0         1300.       970.
  8                    8.0         1950.       1520.
  8                    9.0         2950.       2400.
  9 ENDTBL
  2 XSECTN   180       1.0
  8                    632.0       0.0         0.0                 REV
  8                    636.8       280.0       120.0               RMB
  8                    639.1       605.        380.
  8                    640.7       862.        505.
  8                    641.3       897.        510.
  8                    641.6       916.        515.
  8                    641.9       940.0       520.0
  8                    642.6       1000.       522.
  8                    643.5       1200.       532.
  8                    645.8       2550.0      552.0
  8                    647.0       4000.       1000.
  9 ENDTBL
  2 XSECTN   181       1.0
  8                    632.0       0.0         0.0
  8                    638.0       0.1         4.0
  8                    640.5       1.0         5.0
  8                    640.6       10.0        22.
  8                    640.8       51.         60.
  8                    641.0       110.        90.
  8                    641.2       215.        140.
  8                    641.5       441.        150.0
1
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
  8                    641.7       625.        220.
  8                    642.0       941.        396.0
  8                    642.5       1260.0      550.0
  8                    643.0       1327.       600.
  8                    643.5       1450.       660.
  8                    645.0       2600.       990.
  8                    647.0       3300.       1400.
  9 ENDTBL
  2 XSECTN   190       1.0
  8                    629.0       0.0         0.0
  8                    632.0       1.0         15.
  8                    633.0       50.         21.
  8                    635.0       134.        32.
  8                    636.0       180.        33.1
  8                    639.9       284.        33.2
  8                    640.5       300.        33.3
  8                    643.0       350.        33.4
  9 ENDTBL
  2 XSECTN   191       1.0
  8                    629.0       0.0         0.0
  8                    639.9       1.          1.
  8                    640.0       4.          10.
  8                    640.5       160.        130.
  8                    641.0       630.        350.
  8                    642.0       2700.       930.
  8                    643.0       6100.       1700.
  9 ENDTBL
  2 XSECTN    41       1.0
  8                    1.0         0.0         0.0
```

```
 8                    636.0       30.0        10.0
 8                    637.0       150.0       100.0
 8                    638.0       200.0       110.0
 8                    640.0       202.0       111.0
 8                    645.0       204.0       112.0
 9 ENDTBL
 2 XSECTN   177       1.0
 8                    635.0       0.0         0.0
 8                    636.0       1.0         1.0
 8                    637.0       2.0         2.0
 8                    638.0       3.0         2.5
 8                    640.0       200.0       110.0
 8                    645.0       500.0       125.0
 9 ENDTBL
 2 XSECTN   197       1.0
 8                    638.0       0.0         0.0
 8                    640.0       90.0        20.0
 8                    642.0       91.0        21.0
 8                    644.0       92.0        22.0
 8                    645.0       93.0        23.0
 9 ENDTBL
 2 XSECTN   198       1.0
 8                    638.0       0.0         0.0
 8                    640.0       3.0         3.0
 8                    642.0       180.0       40.0
 8                    644.0       450.0       45.0
 8                    645.0       700.0       70.0
 9 ENDTBL
 2 XSECTN   199       1.0
 8                    640.0       0.0         0.0
 8                    640.5       166.0       102.0
 8                    641.0       790.0       200.0
 8                    641.5       2080.0      306.0
 8                    642.0       4200.0      410.0
 9 ENDTBL
 3 STRUCT    34
 8                    589.50      0.0         0.0
 8                    605.00      5.0         41.0
 8                    620.00      10.0        124.0
 8                    630.00      15.0        203.
1
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 8                    640.00      20.0        302.
 8                    645.00      25.0        360.
 8                    650.00      30.0        437.
 8                    652.50      350.0       477.
 8                    654.50      1200.       527.
 8                    655.5       3200.       577.
 9 ENDTBL
 3 STRUCT    35
 8                    595.00      0.0         0.0
 8                    600.00      1.0         8.0
 8                    610.00      2.0         96.0
 8                    620.00      3.0         218.0
 8                    630.00      4.0         364.0
 8                    640.00      5.0         535.0
 8                    645.00      6.0         631.0
 8                    650.00      10.0        754.0
 8                    652.50      500.0       824.0
 8                    654.50      1500.       895.0
 9 ENDTBL
 3 STRUCT    36
 8                    589.50      0.0         0.0                   REV
 8                    605.00      35.0        41.0                  RMB
 8                    620.00      110.0       124.0
 8                    630.00      200.0       203.
 8                    640.00      250.0       302.
 8                    645.00      290.0       360.
 8                    650.00      314.0       437.
 8                    652.50      590.0       477.
 8                    654.50      1200.       527.
 8                    655.5       3200.       577.
 9 ENDTBL
 4 DIMHYD              0.7000
 8          0.0       .3565       .6942       1.000       .8920
 8          .7807     .6832       .5979       .5233       .4580
 8          .4008     .3508       .3070       .2687       .2351
 8          .2058     .1801       .1576       .1379       .1207
 8          .1056     .0925       .0809       .0708       .0620
 8          .0524     .0475       .0415       .0364       .0321
 8          .0282     .0247       .0216       .0189       .0166
 8          .0145     .0127       .0111       .0097       .0085
 8          .0074     .0065       .0057       .0050       .0044
 8          .0038     .0033       .0029       .0026       .0000
 9 ENDTBL
 5 RAINFL 1            0.500
 8          0.0       .0080       .0170       .0260       .0350
 8          .0450     .0550       .0650       .0760       .0870
 8          .0990     .1120       .1250       .1400       .1560       SCS
```

```
  6 RUNOFF 1 134        5 0.48        78.0        1.10
  6 ADDHYD 4  81   5 6 7
  6 DIVERT 6 003   7 2 4             0.5         002.
  6 REACH  3 003   2   6 450.0
  6 REACH  3 002   4   3 1.0
  6 RESVOR 2    36 3   5 589.5
  6 ADDHYD 4  82   5 6 7
  6 REACH  3 135   7   6 2000.
  6 RUNOFF 1    34      5 0.2         80.         1.0
  6 ADDHYD 4  84   5 6 7
  6 DIVERT 6 146   7 2 3             0.5         147.
  6 REACH  3 146   2   6 200.
  6 REACH  3 147   3   7 10.
  6 RESVOR 2    35 7   5 595.0                                        NEW
  6 ADDHYD 4  85   5 6 7
  6 REACH  3 134   7   6 2150.0
  6 RUNOFF 1 034        5 0.3         78.0        1.61
  6 ADDHYD 4  83   5 6 2                                          1
  6 RUNOFF 1 100        5 2.4700      80.          4.8300        1  NORTH F
  6 REACH  3 136   5   4 6000.
  6 RUNOFF 1 101        6 0.0220      91.          0.3500           BRICKVA
  6 ADDHYD 4   1   4 6 7                                          1
1


**********80-80 LIST OF INPUT DATA (CONTINUED)**********

  6 RUNOFF 1 102        5 0.0600      90.          0.3200           W. ELLI
  6 ADDHYD 4   2   5 7 6                                          1
  6 RUNOFF 1 103        5 0.0800      90.          0.2300           DEVON-E
  6 ADDHYD 4   3   5 6 7                                          1
  6 RUNOFF 1 104        5 0.0270      91.          0.1500
  6 ADDHYD 4   4   5 7 1                                          1
  6 RUNOFF 1 105        5 0.5000      88.          2.2000           W. 83 &
  6 RESVOR 2     1 5    3 668.20                                  1  RT 83 C
  6 RUNOFF 1 106        6 0.0600      74.          1.4200           FIELD E
  6 ADDHYD 4   5   3 6 7                                          1
  6 RUNOFF 1 107        5 0.0450      85.          0.7600           E. 83 S
  6 ADDHYD 4   6   5 7 6                                          1
  6 RUNOFF 1 108        5 0.2200      88.          2.4400           SUPREME
  6 ADDHYD 4   7   5 6 7                                          1
  6 RESVOR 2     2 7    5 663.08                                  1
  6 ADDHYD 4   8   1 5 6                                          1
  6 RUNOFF 1 109        5 0.1700      91.          0.4000           EGV
  6 ADDHYD 4   9   5 6 7                                          1
  6 RUNOFF 1 110        5 0.0430      74.          1.4200           UNDEVEL
  6 ADDHYD 4  10   5 7 6                                          1
  6 RUNOFF 1 150        3 0.5700      84.          3.1100        1  U/S ARE
  6 RESVOR 2     3 3    7 665.30
  6 RUNOFF 1 151        4 0.0400      87.          0.2200           HAMILTO
  6 ADDHYD 4  21   7 4 5                                          1
  6 RUNOFF 1 152        3 0.0600      91.          0.1800           BRYN MA
  6 ADDHYD 4  22   3 5 4                                          1
  6 RESVOR 2    60 4    7 662.5                                   1
  6 RUNOFF 1 153        3 0.5500      78.          3.2400        1  U/S ARE
  6 RESVOR 2     4 3    5 666.70
  6 ADDHYD 4  23   7 5 3                                          1
  6 RUNOFF 1 154        4 0.0650      86.          0.2700           S. SUPR
  6 ADDHYD 4  24   3 4 7                                          1
  6 RESVOR 2    50 7    3 661.5                                   1
  6 RUNOFF 1 155        4 0.0660      81.          0.6300           U/S ARE
  6 RUNOFF 1 156        5 0.0610      91.          0.8000
  6 ADDHYD 4  25   4 5 7                                          1
  6 ADDHYD 4  26   3 7 5                                          1
  6 RESVOR 2    40 5    4 659.3                                   1
  6 RUNOFF 1 157        5 0.0260      91.          0.4500
  6 ADDHYD 4  27   4 5 3                                          1
  6 RUNOFF 1 158        4 0.0380      91.          0.9600
  6 ADDHYD 4  28   3 4 5                                          1
  6 RUNOFF 1 159        3 0.0150      91.          0.5500
  6 ADDHYD 4  29   5 3 7                                          1
  6 RESVOR 2    30 7    4 659.5                                   1
  6 RUNOFF 1 160        3 0.4200      87.          2.4200
  6 ADDHYD 4  30   4 3 5                                          1
  6 RUNOFF 1 161        3 0.0380      86.          0.7900
  6 ADDHYD 4  31   5 3 7                                          1
  6 RESVOR 2    20 7    4 657.9                                   1
1


**********80-80 LIST OF INPUT DATA (CONTINUED)**********

  6 RUNOFF 1 162        5 0.0790      91.          0.9700           THOMAS
  6 ADDHYD 4  32   4 5 3                                          1
  6 RUNOFF 1 163        4 0.0100      91.          0.2300           THOMAS
  6 ADDHYD 4  33   3 4 5                                          1
  6 RUNOFF 1 164        3 0.0330      70.          1.1700           UNDEVEL
  6 ADDHYD 4  34   5 3 4                                          1
  6 RUNOFF 1 165        3 0.0160      91.          0.4500           220 THO
  6 ADDHYD 4  35   4 3 5                                          1
  6 RUNOFF 1 167        4 0.0100      78.          0.5000
```

```
  8                223.00      223.00      223.00      223.00      223.00       5
  8                223.00      223.00      223.00      223.00      223.00       6
  8                223.00      223.00      223.00      223.00      223.00       7
  8                223.00      223.00      223.00      223.00      223.00       8
1
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

  9 ENDTBL
  7 COMPUT 7  10   145   0.0         9.10        1.0         8 2  01  01  500YR
    ENDCMP 1
  7 READHD 8     3                                                      XSEC  39
  7 READHD 9       .0000       2.000       0.100       .0000            A 1  S 6
  8                149.00      149.00      149.00      149.00      149.00       1
  8                200.00      215.00      220.00      223.00      223.00       2
  8                223.00      223.00      223.00      223.00      223.00       3
  8                223.00      223.00      223.00      223.00      223.00       4
  8                223.00      223.00      223.00      223.00      223.00       5
  8                223.00      223.00      223.00      223.00      223.00       6
  8                223.00      223.00      223.00      223.00      223.00       7
  8                223.00      223.00      223.00      223.00      223.00       8
  9 ENDTBL
  7 COMPUT 7  10   145   0.0         7.00        1.0         8 2  01  02  100YR
    ENDCMP 1
  7 READHD 8     3                                                      XSEC  39
  7 READHD 9       .0000       2.000       0.100       .0000            A 1  S 6
  8                149.00      149.00      149.00      149.00      149.00       1
  8                200.00      215.00      220.00      223.00      223.00       2
  8                223.00      223.00      223.00      223.00      223.00       3
  8                223.00      223.00      223.00      223.00      223.00       4
  8                223.00      223.00      223.00      223.00      223.00       5
  8                223.00      223.00      223.00      223.00      223.00       6
  8                223.00      223.00      223.00      223.00      223.00       7
  8                223.00      223.00      223.00      223.00      223.00       8
  9 ENDTBL
  7 COMPUT 7  10   145   0.0         6.20        1.0         8 2  01  03   50YR
    ENDCMP 1
  7 READHD 8     3                                                      XSEC  39
  7 READHD 9       .0000       2.000       0.100       .0000            A 1  S 6
  8                149.00      149.00      149.00      149.00      149.00       1
  8                200.00      215.00      220.00      223.00      223.00       2
  8                223.00      223.00      223.00      223.00      223.00       3
  8                223.00      223.00      223.00      223.00      223.00       4
  8                223.00      223.00      223.00      223.00      223.00       5
  8                223.00      223.00      223.00      223.00      223.00       6
  8                223.00      223.00      223.00      223.00      223.00       7
  8                223.00      223.00      223.00      223.00      223.00       8
  9 ENDTBL
  7 COMPUT 7  10   145   0.0         5.25        1.0         8 2  01  04
    ENDCMP 1
  7 READHD 8     3                                                      XSEC  39
  7 READHD 9       .0000       2.000       0.100       .0000            A 1  S 6
  8                149.00      149.00      149.00      149.00      149.00       1
  8                200.00      215.00      220.00      223.00      223.00       2
  8                223.00      223.00      223.00      223.00      223.00       3
  8                223.00      223.00      223.00      223.00      223.00       4
  8                223.00      223.00      223.00      223.00      223.00       5
  8                223.00      223.00      223.00      223.00      223.00       6
1
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

  8                223.00      223.00      223.00      223.00      223.00       7
  8                223.00      223.00      223.00      223.00      223.00       8
  9 ENDTBL
  7 COMPUT 7  10   145   0.0         4.25        1.0         8 2  01  05
    ENDCMP 1
  7 READHD 8     3                                                      XSEC  39
  7 READHD 9       .0000       2.000       0.100       .0000            A 1  S 6
  8                149.00      149.00      149.00      149.00      149.00       1
  8                200.00      215.00      220.00      223.00      223.00       2
  8                223.00      223.00      223.00      223.00      223.00       3
  8                223.00      223.00      223.00      223.00      223.00       4
  8                223.00      223.00      223.00      223.00      223.00       5
  8                223.00      223.00      223.00      223.00      223.00       6
  8                223.00      223.00      223.00      223.00      223.00       7
  8                223.00      223.00      223.00      223.00      223.00       8
  9 ENDTBL
  7 COMPUT 7  10   145   0.0         3.60        1.0         8 2  01  06
    ENDCMP 1
  7 READHD 8     3                                                      XSEC  39
  7 READHD 9       .0000       2.000       0.100       .0000            A 1  S 6
  8                149.00      149.00      149.00      149.00      149.00       1
  8                200.00      215.00      220.00      223.00      223.00       2
  8                223.00      223.00      223.00      223.00      223.00       3
  8                223.00      223.00      223.00      223.00      223.00       4
  8                223.00      223.00      223.00      223.00      223.00       5
  8                223.00      223.00      223.00      223.00      223.00       6
  8                223.00      223.00      223.00      223.00      223.00       7
```

```
   STARTING TIME =      .00    TIME INCREMENT =   2.000
   DRAINAGE AREA =      .10    BASE FLOW =      .00

 8                149.00      149.00      149.00      149.00      149.00
 8                200.00      215.00      220.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 9 ENDTBL
1
 TR20 ------------------------------------------------------------------------ SCS -
 WHC      WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00  2@5X10 DIV 450 AT VERSION
 12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2   2.04TEST
 15:29:38                    PASS   2   JOB NO.   1                     PAGE   3


 EXECUTIVE CONTROL COMPUT    FROM XSECTION  10  TO XSECTION 145         100YR
    STARTING TIME =    .00      RAIN DEPTH =  7.00       RAIN DURATION =  1.00
    ANT. RUNOFF COND. = 2       MAIN TIME INCREMENT =    .250 HOURS
    ALTERNATE NO. = 1           STORM NO. = 2            RAIN TABLE NO. = 8


 EXECUTIVE CONTROL ENDCMP    COMPUTATIONS COMPLETED FOR PASS   2


 EXECUTIVE CONTROL READHD    DISCHARGE HYDROGRAPH, IN LOCATION 3       XSEC  39

   STARTING TIME =      .00    TIME INCREMENT =   2.000
   DRAINAGE AREA =      .10    BASE FLOW =      .00

 8                149.00      149.00      149.00      149.00      149.00
 8                200.00      215.00      220.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 9 ENDTBL


 EXECUTIVE CONTROL COMPUT    FROM XSECTION  10  TO XSECTION 145           50YR
    STARTING TIME =    .00      RAIN DEPTH =  6.20       RAIN DURATION =  1.00
    ANT. RUNOFF COND. = 2       MAIN TIME INCREMENT =    .250 HOURS
    ALTERNATE NO. = 1           STORM NO. = 3            RAIN TABLE NO. = 8


 EXECUTIVE CONTROL ENDCMP    COMPUTATIONS COMPLETED FOR PASS   3


 EXECUTIVE CONTROL READHD    DISCHARGE HYDROGRAPH, IN LOCATION 3       XSEC  39

   STARTING TIME =      .00    TIME INCREMENT =   2.000
   DRAINAGE AREA =      .10    BASE FLOW =      .00

 8                149.00      149.00      149.00      149.00      149.00
 8                200.00      215.00      220.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
1
 TR20 ------------------------------------------------------------------------ SCS -
 WHC      WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00  2@5X10 DIV 450 AT VERSION
 12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2   2.04TEST
 15:29:38                    PASS   4   JOB NO.   1                     PAGE   4

 8                223.00      223.00      223.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
 9 ENDTBL


 EXECUTIVE CONTROL COMPUT    FROM XSECTION  10  TO XSECTION 145
    STARTING TIME =    .00      RAIN DEPTH =  5.25       RAIN DURATION =  1.00
    ANT. RUNOFF COND. = 2       MAIN TIME INCREMENT =    .250 HOURS
    ALTERNATE NO. = 1           STORM NO. = 4            RAIN TABLE NO. = 8


 EXECUTIVE CONTROL ENDCMP    COMPUTATIONS COMPLETED FOR PASS   4


 EXECUTIVE CONTROL READHD    DISCHARGE HYDROGRAPH, IN LOCATION 3       XSEC  39

   STARTING TIME =      .00    TIME INCREMENT =   2.000
   DRAINAGE AREA =      .10    BASE FLOW =      .00

 8                149.00      149.00      149.00      149.00      149.00
 8                200.00      215.00      220.00      223.00      223.00
 8                223.00      223.00      223.00      223.00      223.00
```

EXECUTIVE CONTROL COMPUT FROM XSECTION 10 TO XSECTION 145
STARTING TIME = .00 RAIN DEPTH = 2.40 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .250 HOURS
ALTERNATE NO. = 1 STORM NO. = 8 RAIN TABLE NO. = 8

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 8

1
TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 7

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINFALL OF 9.10 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs. | | | | | | | |
| RAINTABLE NUMBER 8, ARC 2 | | | | | | | |
| MAIN TIME INCREMENT .250 HOURS | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | |
| XSECTION 107 | ADDHYD | 1.46 | 6.94 | --- | 17.14 | 475 | 325.3 |
| XSECTION 83 | ADDHYD | 7.26 | 8.54 | --- | 26.22 | 1666 | 229.5 |
| XSECTION 100 | RUNOFF | 2.47 | 6.66 | --- | 19.36 | 636 | 257.5 |
| XSECTION 1 | ADDHYD | 2.49 | 6.67 | 650.64 | 21.65 | 594 | 238.6 |
| XSECTION 2 | ADDHYD | 2.55 | 6.70 | 650.82 | 21.64 | 603 | 236.5 |
| XSECTION 3 | ADDHYD | 2.63 | 6.74 | 650.62 | 21.64 | 614 | 233.5 |
| XSECTION 4 | ADDHYD | 2.66 | 6.75 | 651.30 | 21.64 | 618 | 232.3 |
| STRUCTURE 1 | RESVOR | .50 | 7.65 | 674.08 | 18.02 | 197 | 394.0 |
| XSECTION 5 | ADDHYD | .56 | 7.46 | --- | 17.90 | 218 | 389.3 |
| XSECTION 6 | ADDHYD | .61 | 7.45 | --- | 17.69 | 236 | 386.9 |
| XSECTION 7 | ADDHYD | .83 | 7.50 | --- | 17.67 | 321 | 386.7 |
| STRUCTURE 2 | RESVOR | .83 | 7.50 | 670.32 | 19.61 | 278 | 334.9 |
| XSECTION 8 | ADDHYD | 3.48 | 6.93 | --- | 20.82 | 881 | 253.2 |
| XSECTION 9 | ADDHYD | 3.65 | 6.98 | --- | 20.74 | 907 | 248.5 |
| XSECTION 10 | ADDHYD | 3.70 | 6.97 | --- | 20.68 | 916 | 247.6 |
| XSECTION 150 | RUNOFF | .57 | 7.16 | --- | 18.14 | 192 | 336.8 |
| XSECTION 21 | ADDHYD | .61 | 7.18 | --- | 19.21 | 188 | 308.2 |
| XSECTION 22 | ADDHYD | .67 | 7.25 | --- | 16.76 | 211 | 314.9 |
| STRUCTURE 60 | RESVOR | .67 | 7.25 | 667.66 | 18.19 | 201 | 300.0 |
| XSECTION 153 | RUNOFF | .55 | 6.42 | --- | 18.31 | 167 | 303.6 |
| XSECTION 23 | ADDHYD | 1.22 | 6.87 | --- | 18.95 | 364 | 298.4 |
| XSECTION 24 | ADDHYD | 1.29 | 6.89 | --- | 18.57 | 378 | 293.0 |
| STRUCTURE 50 | RESVOR | 1.29 | 6.90 | 669.38 | 18.70 | 378 | 293.0 |
| XSECTION 25 | ADDHYD | .13 | 7.38 | --- | 16.67 | 64 | 492.3 |
| XSECTION 26 | ADDHYD | 1.41 | 6.95 | --- | 18.05 | 422 | 299.3 |
| STRUCTURE 40 | RESVOR | 1.41 | 6.95 | 667.92 | 18.44 | 420 | 297.9 |
| XSECTION 27 | ADDHYD | 1.44 | 6.96 | --- | 18.28 | 428 | 297.2 |
| XSECTION 28 | ADDHYD | 1.48 | 6.99 | --- | 18.14 | 443 | 299.3 |

1
TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 8

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 1 | | | | | | | |
| XSECTION 29 | ADDHYD | 1.49 | 7.00 | --- | 18.06 | 448 | 300.7 |
| STRUCTURE 30 | RESVOR | 1.49 | 7.00 | 666.19 | 18.11 | 448 | 300.7 |
| XSECTION 30 | ADDHYD | 1.91 | 7.12 | --- | 17.88 | 608 | 318.3 |
| XSECTION 31 | ADDHYD | 1.95 | 7.12 | --- | 17.76 | 623 | 319.5 |
| STRUCTURE 20 | RESVOR | 1.95 | 7.12 | 665.55 | 17.82 | 623 | 319.5 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 1 | | | | | | | |
| XSECTION 180 | DIVERT | 7.92 | 9.95 | 643.82 | 26.38 | 1388 | 175.3 |
| XSECTION 181 | DIVERT | 7.92 | 5.68 | 643.82 | 26.38 | 1696 | 214.1 |
| XSECTION 141 | REACH | 7.92 | 9.95 | 7.09 | 27.55 | 1358 | 171.5 |
| XSECTION 181 | REACH | 7.92 | 5.68 | 643.82 | 26.38 | 1696 | 214.1 |
| XSECTION 40 | RUNOFF | .23 | 6.04 | --- | 16.66 | 105 | 456.5 |
| XSECTION 181 | ADDHYD | 8.15 | 5.69 | 643.82 | 26.37 | 1698 | 208.3 |
| XSECTION 182 | ADDHYD | 9.39 | 5.62 | --- | 17.21 | 2114 | 225.1 |
| STRUCTURE 90 | RESVOR | 9.39 | 3.40 | 644.63 | 26.66 | 1699 | 180.9 |
| XSECTION 199 | REACH | 9.39 | 3.40 | 641.35 | 26.66 | 1699 | 180.9 |
| XSECTION 141 | RUNOFF | .54 | 7.28 | --- | 17.04 | 238 | 440.7 |
| XSECTION 41 | ADDHYD | 9.93 | 3.61 | 7.62 | 26.56 | 1731 | 174.3 |
| XSECTION 183 | ADDHYD | 17.85 | 6.43 | --- | 26.95 | 3065 | 171.7 |
| XSECTION 128 | RUNOFF | .32 | 7.89 | --- | 16.79 | 159 | 496.9 |
| XSECTION 81 | ADDHYD | .69 | 7.55 | --- | 16.80 | 250 | 362.3 |
| XSECTION 190 | DIVERT | .35 | 15.03 | 638.60 | 16.80 | 249 | 711.4 |
| XSECTION 191 | DIVERT | .35 | .07 | 638.60 | 16.75R | 1R | 2.9 |
| XSECTION 191 | REACH | .35 | .07 | 638.58 | 17.00R | 1R | 2.9 |
| XSECTION 42 | ADDHYD | 18.19 | 6.30 | --- | 26.95 | 3065 | 168.5 |
| XSECTION 41 | REACH | 18.19 | 6.30 | 9.02 | 28.05 | 3019 | 166.0 |
| XSECTION 41 | RUNOFF | .27 | 5.92 | --- | 17.41 | 95 | 351.9 |
| XSECTION 142 | ADDHYD | 18.46 | 6.29 | --- | 28.02 | 3033 | 164.3 |
| XSECTION 190 | REACH | .35 | 15.03 | 638.60 | 16.80 | 249 | 711.4 |
| XSECTION 129 | ADDHYD | 18.81 | 6.45 | 8.95 | 27.94 | 3051 | 162.2 |
| XSECTION 129 | REACH | 18.81 | 6.45 | 8.95 | 28.33 | 3048 | 162.0 |
| XSECTION 129 | RUNOFF | .31 | 7.52 | --- | 16.76 | 154 | 496.8 |
| XSECTION 93 | ADDHYD | 19.12 | 6.47 | --- | 28.31 | 3051 | 159.6 |
| XSECTION 143 | RUNOFF | .54 | 5.92 | --- | 16.84 | 232 | 429.6 |
| XSECTION 144 | ADDHYD | 19.66 | 6.45 | 8.80 | 28.29 | 3055 | 155.4 |
| XSECTION 144 | REACH | 19.66 | 6.45 | 8.79 | 28.86 | 3043 | 154.8 |
| XSECTION 144 | RUNOFF | .57 | 6.29 | --- | 17.11 | 227 | 398.2 |

1
TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RM82 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 11

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 1 | | | | | | | |
| XSECTION 145 | ADDHYD | 20.23 | 6.45 | --- | 28.81 | 3057 | 151.1 |

RAINFALL OF 7.00 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 2 | | | | | | | |
| XSECTION 107 | ADDHYD | 1.46 | 4.98 | --- | 17.06 | 341 | 233.6 |
| XSECTION 83 | ADDHYD | 7.26 | 6.59 | --- | 34.96 | 729 | 100.4 |
| XSECTION 100 | RUNOFF | 2.47 | 4.69 | --- | 19.44 | 454 | 183.8 |
| XSECTION 1 | ADDHYD | 2.49 | 4.70 | 648.96 | 23.92 | 379 | 152.2 |
| XSECTION 2 | ADDHYD | 2.55 | 4.73 | 650.38 | 23.82 | 384 | 150.6 |
| XSECTION 3 | ADDHYD | 2.63 | 4.76 | 648.78 | 22.96 | 391 | 148.7 |
| XSECTION 4 | ADDHYD | 2.66 | 4.78 | 649.40 | 22.86 | 394 | 148.1 |
| STRUCTURE 1 | RESVOR | .50 | 5.59 | 673.27 | 18.10 | 146 | 292.0 |
| XSECTION 5 | ADDHYD | .56 | 5.43 | --- | 18.00 | 161 | 287.5 |
| XSECTION 6 | ADDHYD | .61 | 5.41 | --- | 17.82 | 175 | 286.9 |
| XSECTION 7 | ADDHYD | .83 | 5.46 | --- | 17.78 | 238 | 286.7 |
| STRUCTURE 2 | RESVOR | .83 | 5.46 | 669.54 | 19.77 | 204 | 245.8 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| XSECTION 172 | DIVERT | .26 | 8.44 | 103.28 | 16.70 | 97 | 373.1 |
| XSECTION 125 | DIVERT | .26 | 2.13 | 103.28 | 16.70 | 93 | 357.7 |
| XSECTION 172 | REACH | .26 | 8.44 | 103.28 | 16.70 | 97 | 373.1 |
| XSECTION 175 | ADDHYD | 7.08 | 5.03 | --- | 18.35 | 1324 | 187.0 |
| XSECTION 126 | REACH | 7.08 | 5.03 | 8.04 | 19.00 | 1319 | 186.3 |
| XSECTION 126 | RUNOFF | .16 | 4.37 | --- | 17.45 | 42 | 262.5 |
| XSECTION 126 | ADDHYD | 7.24 | 5.02 | 8.11 | 18.86 | 1356 | 187.3 |
| XSECTION 125 | REACH | .26 | 2.13 | 103.28 | 16.98 | 92 | 353.8 |
| XSECTION 125 | RUNOFF | .41 | 5.82 | --- | 16.89 | 151 | 368.3 |
| XSECTION 176 | DIVERT | .21 | 11.43 | 636.99 | 16.89 | 149 | 709.5 |
| XSECTION 177 | DIVERT | .21 | .22 | 636.99 | 16.89T | 2T | 9.5 |
| XSECTION 176 | REACH | .21 | 11.43 | 636.99 | 16.89 | 149 | 709.5 |
| XSECTION 178 | ADDHYD | 7.45 | 5.19 | --- | 18.44 | 1469 | 197.2 |
| XSECTION 139 | RUNOFF | .80 | 5.03 | --- | 17.65 | 218 | 272.5 |
| XSECTION 91 | ADDHYD | 8.25 | 5.18 | --- | 18.21 | 1682 | 203.9 |
| XSECTION 92 | ADDHYD | 15.50 | 5.84 | --- | 18.16 | 2200 | 141.9 |
| XSECTION 140 | REACH | 15.50 | 5.84 | 8.23 | 19.33 | 2163 | 139.5 |
| XSECTION 140 | RUNOFF | .34 | 5.25 | --- | 16.85 | 120 | 352.9 |
| XSECTION 141 | ADDHYD | 15.84 | 5.82 | 8.29 | 19.10 | 2240 | 141.4 |
| XSECTION 177 | REACH | .21 | .22 | 636.99 | 16.89T | 2T | 9.5 |
| XSECTION 179 | ADDHYD | .47 | 1.29 | --- | 16.98 | 94 | 200.0 |
| XSECTION 124 | REACH | .47 | 1.29 | 639.70 | 16.98 | 94 | 200.0 |
| XSECTION 130 | RUNOFF | .07 | 4.58 | --- | 16.75 | 25 | 357.1 |
| XSECTION 130 | ADDHYD | .54 | 1.73 | --- | 16.95 | 118 | 218.5 |
| XSECTION 127 | RUNOFF | .74 | 4.69 | --- | 16.96 | 237 | 320.3 |
| XSECTION 197 | DIVERT | .37 | 6.33 | 641.62 | 16.96 | 91 | 245.9 |
| XSECTION 198 | DIVERT | .37 | 3.06 | 641.62 | 16.96 | 146 | 394.6 |
| XSECTION 197 | REACH | .37 | 6.33 | 641.62 | 16.96 | 91 | 245.9 |
| XSECTION 198 | REACH | .37 | 3.06 | 641.62 | 16.96 | 146 | 394.6 |
| XSECTION 124 | RUNOFF | .33 | 5.37 | --- | 16.65 | 127 | 384.8 |

1
TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 14

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 2 | | | | | | | |
| XSECTION 127 | ADDHYD | .70 | 4.15 | --- | 16.82 | 272 | 388.6 |
| XSECTION 128 | ADDHYD | 1.24 | 3.10 | --- | 16.88 | 390 | 314.5 |
| STRUCTURE 89 | RESVOR | 1.24 | 3.10 | --- | 16.88 | 390 | 314.5 |
| XSECTION 180 | DIVERT | 7.92 | 8.72 | 642.48 | 19.10 | 990 | 125.0 |
| XSECTION 181 | DIVERT | 7.92 | 2.93 | 642.48 | 19.10 | 1249 | 157.7 |
| XSECTION 141 | REACH | 7.92 | 8.71 | 5.65 | 20.19 | 986 | 124.5 |
| XSECTION 181 | REACH | 7.92 | 2.93 | 642.48 | 19.10 | 1249 | 157.7 |
| XSECTION 40 | RUNOFF | .23 | 4.15 | --- | 16.68 | 75 | 326.1 |
| XSECTION 181 | ADDHYD | 8.15 | 2.96 | 642.71 | 18.95 | 1288 | 158.0 |
| XSECTION 182 | ADDHYD | 9.39 | 2.98 | --- | 18.00 | 1547 | 164.7 |
| STRUCTURE 90 | RESVOR | 9.39 | .79 | 642.19 | 36.12T | 118T | 12.6 |
| XSECTION 199 | REACH | 9.39 | .79 | 640.35 | 36.61T | 117T | 12.5 |
| XSECTION 141 | RUNOFF | .54 | 5.25 | --- | 17.07 | 176 | 325.9 |
| XSECTION 41 | ADDHYD | 9.93 | 1.03 | 1.65 | 17.15T | 195T | 19.6 |
| XSECTION 183 | ADDHYD | 17.85 | 4.44 | --- | 18.43 | 1148 | 64.3 |
| XSECTION 128 | RUNOFF | .32 | 5.82 | --- | 16.81 | 120 | 375.0 |
| XSECTION 81 | ADDHYD | .69 | 6.09 | --- | 16.81 | 211 | 305.8 |
| XSECTION 190 | DIVERT | .35 | 12.12 | 637.13 | 16.81 | 210 | 600.0 |
| XSECTION 191 | DIVERT | .35 | .06 | 637.13 | 16.75R | 1R | 2.9 |
| XSECTION 191 | REACH | .35 | .06 | 637.12 | 17.00R | 1R | 2.9 |
| XSECTION 42 | ADDHYD | 18.19 | 4.36 | --- | 18.42 | 1149 | 63.2 |
| XSECTION 41 | REACH | 18.19 | 4.35 | 6.39 | 19.03 | 1147 | 63.1 |
| XSECTION 41 | RUNOFF | .27 | 4.04 | --- | 17.48 | 67 | 248.1 |
| XSECTION 142 | ADDHYD | 18.46 | 4.35 | --- | 18.60 | 1208 | 65.4 |
| XSECTION 190 | REACH | .35 | 12.12 | 637.13 | 16.81 | 210 | 600.0 |
| XSECTION 129 | ADDHYD | 18.81 | 4.49 | 6.98 | 17.67 | 1396 | 74.2 |
| XSECTION 129 | REACH | 18.81 | 4.49 | 6.98 | 18.18 | 1394 | 74.1 |
| XSECTION 129 | RUNOFF | .31 | 5.48 | --- | 16.78 | 115 | 371.0 |
| XSECTION 93 | ADDHYD | 19.12 | 4.50 | --- | 17.63 | 1491 | 78.0 |
| XSECTION 143 | RUNOFF | .54 | 4.04 | --- | 16.87 | 164 | 303.7 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| XSECTION | 33 | ADDHYD | 2.04 | 4.40 | 735.21 | 17.19 | 447 | 219.1 |
| XSECTION | 34 | ADDHYD | 2.07 | 4.37 | 707.12 | 17.18 | 454 | 219.3 |
| XSECTION | 35 | ADDHYD | 2.09 | 4.38 | 699.16 | 17.15 | 459 | 219.6 |
| XSECTION | 36 | ADDHYD | 2.10 | 4.38 | 697.06 | 17.13 | 462 | 220.0 |
| STRUCTURE | 5 | RESVOR | 2.10 | 4.38 | 662.14 | 17.28 | 461 | 219.5 |
| XSECTION | 37 | ADDHYD | 2.12 | 4.39 | 9.31 | 17.27 | 469 | 221.2 |
| XSECTION | 38 | ADDHYD | 2.26 | 4.34 | 682.61 | 17.22 | 506 | 223.9 |
| STRUCTURE | 10 | RESVOR | 2.26 | 4.34 | 657.91 | 17.57 | 500 | 221.2 |
| XSECTION | 39 | ADDHYD | 5.96 | 4.27 | 690.59 | 18.04 | 937 | 157.2 |
| XSECTION | 120 | RUNOFF | .25 | 3.16 | --- | 19.32 | 34 | 136.0 |
| XSECTION | 120 | REACH | .25 | 3.16 | 658.14 | 22.08 | 31 | 124.0 |
| XSECTION | 122 | RUNOFF | .27 | 3.26 | --- | 19.16 | 38 | 140.7 |
| XSECTION | 122 | ADDHYD | .52 | 3.21 | --- | 20.48 | 67 | 128.8 |
| XSECTION | 37 | ADDHYD | 6.48 | 4.19 | 11.26 | 18.12 | 996 | 153.7 |
| XSECTION | 37 | REACH | 6.48 | 4.19 | 11.25 | 18.89 | 992 | 153.1 |
| XSECTION | 37 | RUNOFF | .33 | 3.65 | --- | 16.78 | 94 | 284.8 |
| XSECTION | 123 | ADDHYD | 6.82 | 4.16 | 651.56 | 18.35 | 1056 | 154.8 |
| XSECTION | 121 | RUNOFF | .31 | 4.17 | --- | 16.87 | 92 | 296.8 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 17

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 3 | | | | | | | |
| XSECTION 121 | REACH | .31 | 4.17 | 658.84 | 17.28 | 91 | 293.5 |
| XSECTION 123 | RUNOFF | .22 | 5.04 | --- | 15.72 | 79 | 359.1 |
| XSECTION 124 | ADDHYD | .53 | 4.53 | 641.80 | 16.71 | 165 | 311.3 |
| XSECTION 172 | DIVERT | .26 | 7.66 | 103.20 | 16.71 | 97 | 373.1 |
| XSECTION 125 | DIVERT | .26 | 1.40 | 103.20 | 16.71 | 67 | 257.7 |
| XSECTION 172 | REACH | .26 | 7.66 | 103.20 | 16.71 | 97 | 373.1 |
| XSECTION 175 | ADDHYD | 7.08 | 4.29 | --- | 18.35 | 1153 | 162.9 |
| XSECTION 126 | REACH | 7.08 | 4.29 | 7.62 | 19.01 | 1147 | 162.0 |
| XSECTION 126 | RUNOFF | .16 | 3.65 | --- | 17.48 | 35 | 218.8 |
| XSECTION 126 | ADDHYD | 7.24 | 4.28 | 7.70 | 18.90 | 1179 | 162.8 |
| XSECTION 125 | REACH | .26 | 1.39 | 103.20 | 16.99 | 67 | 257.7 |
| XSECTION 125 | RUNOFF | .41 | 5.04 | --- | 16.90 | 132 | 322.0 |
| XSECTION 176 | DIVERT | .21 | 9.88 | 636.83 | 16.90 | 130 | 619.0 |
| XSECTION 177 | DIVERT | .21 | .20 | 636.83 | 16.90T | 2T | 9.5 |
| XSECTION 176 | REACH | .21 | 9.88 | 636.83 | 16.90 | 130 | 619.0 |
| XSECTION 178 | ADDHYD | 7.45 | 4.43 | --- | 18.51 | 1277 | 171.4 |
| XSECTION 139 | RUNOFF | .80 | 4.28 | --- | 17.68 | 187 | 233.8 |
| XSECTION 91 | ADDHYD | 8.25 | 4.42 | --- | 18.31 | 1459 | 176.8 |
| XSECTION 92 | ADDHYD | 15.50 | 5.09 | --- | 18.25 | 1959 | 126.4 |
| XSECTION 140 | REACH | 15.50 | 5.09 | 7.98 | 19.37 | 1928 | 124.4 |
| XSECTION 140 | RUNOFF | .34 | 4.49 | --- | 16.87 | 104 | 305.9 |
| XSECTION 141 | ADDHYD | 15.84 | 5.08 | 8.04 | 19.15 | 1994 | 125.9 |
| XSECTION 177 | REACH | .21 | .20 | 636.83 | 16.90T | 2T | 9.5 |
| XSECTION 179 | ADDHYD | .47 | .87 | --- | 16.99 | 69 | 146.8 |
| XSECTION 124 | REACH | .47 | .87 | 638.43 | 16.99 | 69 | 146.8 |
| XSECTION 130 | RUNOFF | .07 | 3.86 | --- | 16.76 | 21 | 300.0 |
| XSECTION 130 | ADDHYD | .54 | 1.27 | --- | 16.96 | 90 | 166.7 |
| XSECTION 127 | RUNOFF | .74 | 3.96 | --- | 16.98 | 203 | 274.3 |
| XSECTION 197 | DIVERT | .37 | 5.82 | 641.23 | 16.98 | 91 | 245.9 |
| XSECTION 198 | DIVERT | .37 | 2.11 | 641.23 | 16.98 | 112 | 302.7 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 18

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE | STANDARD CONTROL | DRAINAGE | RUNOFF | PEAK DISCHARGE |
|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| XSECTION | 10 | ADDHYD | 3.70 | 3.36 | --- | 21.50 | 395 | 106.8 |
| XSECTION | 150 | RUNOFF | .57 | 3.50 | --- | 18.26 | 97 | 170.2 |
| XSECTION | 21 | ADDHYD | .61 | 3.52 | --- | 18.01 | 104 | 170.5 |
| XSECTION | 22 | ADDHYD | .67 | 3.58 | --- | 16.80 | 116 | 173.1 |
| STRUCTURE | 60 | RESVOR | .67 | 3.58 | 666.06 | 17.05 | 115 | 171.6 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 20

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 4 | | | | | | | |
| XSECTION 153 | RUNOFF | .55 | 2.92 | --- | 18.47 | 79 | 143.6 |
| XSECTION 23 | ADDHYD | 1.22 | 3.29 | --- | 18.31 | 187 | 153.3 |
| XSECTION 24 | ADDHYD | 1.29 | 3.31 | --- | 18.09 | 197 | 152.7 |
| STRUCTURE 50 | RESVOR | 1.29 | 3.31 | 666.57 | 18.20 | 196 | 151.9 |
| XSECTION 25 | ADDHYD | .13 | 3.70 | --- | 16.70 | 34 | 261.5 |
| XSECTION 26 | ADDHYD | 1.41 | 3.34 | --- | 17.01 | 229 | 162.4 |
| STRUCTURE 40 | RESVOR | 1.41 | 3.34 | 666.35 | 17.24 | 227 | 161.0 |
| XSECTION 27 | ADDHYD | 1.44 | 3.36 | --- | 17.17 | 233 | 161.8 |
| XSECTION 28 | ADDHYD | 1.48 | 3.38 | --- | 17.14 | 244 | 164.9 |
| XSECTION 29 | ADDHYD | 1.49 | 3.39 | --- | 17.12 | 248 | 166.4 |
| STRUCTURE 30 | RESVOR | 1.49 | 3.39 | 664.74 | 17.18 | 248 | 166.4 |
| XSECTION 30 | ADDHYD | 1.91 | 3.48 | --- | 17.26 | 331 | 173.3 |
| XSECTION 31 | ADDHYD | 1.95 | 3.48 | --- | 17.23 | 341 | 174.9 |
| STRUCTURE 20 | RESVOR | 1.95 | 3.48 | 664.21 | 17.24 | 341 | 174.9 |
| XSECTION 32 | ADDHYD | 2.03 | 3.51 | --- | 17.18 | 362 | 178.3 |
| XSECTION 33 | ADDHYD | 2.04 | 3.52 | 728.30 | 17.15 | 364 | 178.4 |
| XSECTION 34 | ADDHYD | 2.07 | 3.50 | 704.73 | 17.15 | 370 | 178.7 |
| XSECTION 35 | ADDHYD | 2.09 | 3.50 | 698.40 | 17.12 | 375 | 179.4 |
| XSECTION 36 | ADDHYD | 2.10 | 3.50 | 696.82 | 17.11 | 377 | 179.5 |
| STRUCTURE 5 | RESVOR | 2.10 | 3.50 | 661.45 | 17.21 | 377 | 179.5 |
| XSECTION 37 | ADDHYD | 2.12 | 3.51 | 9.04 | 17.20 | 383 | 180.7 |
| XSECTION 38 | ADDHYD | 2.26 | 3.47 | 682.21 | 17.17 | 413 | 182.7 |
| STRUCTURE 10 | RESVOR | 2.26 | 3.47 | 657.64 | 17.48 | 408 | 180.5 |
| XSECTION 39 | ADDHYD | 5.96 | 3.40 | 690.07 | 17.95 | 756 | 126.8 |
| XSECTION 120 | RUNOFF | .25 | 2.39 | --- | 19.44 | 26 | 104.0 |
| XSECTION 120 | REACH | .25 | 2.39 | 658.09 | 22.56 | 24 | 96.0 |
| XSECTION 122 | RUNOFF | .27 | 2.48 | --- | 19.25 | 29 | 107.4 |
| XSECTION 122 | ADDHYD | .52 | 2.44 | --- | 20.75 | 51 | 98.1 |
| XSECTION 37 | ADDHYD | 6.48 | 3.32 | 10.46 | 18.04 | 799 | 123.3 |
| XSECTION 37 | REACH | 6.48 | 3.32 | 10.44 | 18.59 | 795 | 122.7 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 21

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 4 | | | | | | | |
| XSECTION 37 | RUNOFF | .33 | 2.83 | --- | 16.81 | 74 | 224.2 |
| XSECTION 123 | ADDHYD | 6.82 | 3.30 | 649.49 | 18.25 | 849 | 124.5 |
| XSECTION 121 | RUNOFF | .31 | 3.30 | --- | 16.89 | 75 | 241.9 |
| XSECTION 121 | REACH | .31 | 3.30 | 658.63 | 17.57 | 73 | 235.5 |
| XSECTION 123 | RUNOFF | .22 | 4.12 | --- | 15.73 | 65 | 295.5 |
| XSECTION 124 | ADDHYD | .53 | 3.64 | 641.22 | 16.74 | 132 | 249.1 |
| XSECTION 172 | DIVERT | .26 | 6.63 | 103.10 | 16.74 | 97 | 373.1 |

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 4 | | | | | | | |
| XSECTION 190 | REACH | .35 | 9.21 | 635.94 | 16.83 | 177 | 505.7 |
| XSECTION 129 | ADDHYD | 18.81 | 3.65 | 6.40 | 17.70 | 1249 | 66.4 |
| XSECTION 129 | REACH | 18.81 | 3.65 | 6.39 | 18.26 | 1247 | 66.3 |
| XSECTION 129 | RUNOFF | .31 | 3.80 | --- | 16.81 | 83 | 267.7 |
| XSECTION 93 | ADDHYD | 19.12 | 3.65 | --- | 17.85 | 1315 | 68.8 |
| XSECTION 143 | RUNOFF | .54 | 2.57 | --- | 16.90 | 108 | 200.0 |
| XSECTION 144 | ADDHYD | 19.66 | 3.62 | 6.76 | 17.40 | 1413 | 71.9 |
| XSECTION 144 | REACH | 19.66 | 3.62 | 6.75 | 17.98 | 1409 | 71.7 |
| XSECTION 144 | RUNOFF | .57 | 2.83 | --- | 17.22 | 108 | 189.5 |
| XSECTION 145 | ADDHYD | 20.23 | 3.60 | --- | 17.81 | 1513 | 74.8 |

RAINFALL OF 4.25 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 5 | | | | | | | |
| XSECTION 107 | ADDHYD | 1.46 | 2.52 | --- | 18.03 | 164 | 112.3 |
| XSECTION 83 | ADDHYD | 7.26 | 5.13 | --- | 18.62 | 453 | 62.4 |
| XSECTION 100 | RUNOFF | 2.47 | 2.25 | --- | 19.64 | 222 | 89.9 |
| XSECTION 1 | ADDHYD | 2.49 | 2.26 | 646.97 | 24.84 | 181 | 72.7 |
| XSECTION 2 | ADDHYD | 2.55 | 2.28 | 649.90 | 24.04 | 183 | 71.8 |
| XSECTION 3 | ADDHYD | 2.63 | 2.31 | 646.88 | 23.94 | 186 | 70.7 |
| XSECTION 4 | ADDHYD | 2.66 | 2.32 | 647.09 | 23.92 | 188 | 70.7 |
| STRUCTURE 1 | RESVOR | .50 | 2.96 | 671.87 | 18.56 | 78 | 156.0 |
| XSECTION 5 | ADDHYD | .56 | 2.84 | --- | 18.45 | 85 | 151.8 |
| XSECTION 6 | ADDHYD | .61 | 2.82 | --- | 18.25 | 92 | 150.8 |
| XSECTION 7 | ADDHYD | .83 | 2.86 | --- | 18.12 | 126 | 151.8 |
| STRUCTURE 2 | RESVOR | .83 | 2.86 | 667.61 | 18.93 | 122 | 147.0 |
| XSECTION 8 | ADDHYD | 3.48 | 2.44 | --- | 21.62 | 276 | 79.3 |
| XSECTION 9 | ADDHYD | 3.65 | 2.48 | --- | 21.56 | 288 | 78.9 |
| XSECTION 10 | ADDHYD | 3.70 | 2.47 | --- | 21.45 | 291 | 78.6 |
| XSECTION 150 | RUNOFF | .57 | 2.59 | --- | 18.32 | 73 | 128.1 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 24

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 5 | | | | | | | |
| XSECTION 21 | ADDHYD | .61 | 2.61 | --- | 18.04 | 78 | 127.9 |
| XSECTION 22 | ADDHYD | .67 | 2.67 | --- | 16.80 | 87 | 129.9 |
| STRUCTURE 60 | RESVOR | .67 | 2.67 | 665.41 | 18.01 | 85 | 126.9 |
| XSECTION 153 | RUNOFF | .55 | 2.09 | --- | 18.54 | 57 | 103.6 |
| XSECTION 23 | ADDHYD | 1.22 | 2.41 | --- | 18.22 | 142 | 116.4 |
| XSECTION 24 | ADDHYD | 1.29 | 2.43 | --- | 18.02 | 150 | 116.3 |
| STRUCTURE 50 | RESVOR | 1.29 | 2.43 | 665.56 | 18.14 | 150 | 116.3 |
| XSECTION 25 | ADDHYD | .13 | 2.78 | --- | 16.72 | 26 | 200.0 |
| XSECTION 26 | ADDHYD | 1.41 | 2.46 | --- | 17.08 | 174 | 123.4 |
| STRUCTURE 40 | RESVOR | 1.41 | 2.46 | 665.25 | 17.29 | 173 | 122.7 |
| XSECTION 27 | ADDHYD | 1.44 | 2.47 | --- | 17.23 | 178 | 123.6 |
| XSECTION 28 | ADDHYD | 1.48 | 2.49 | --- | 17.20 | 186 | 125.7 |
| XSECTION 29 | ADDHYD | 1.49 | 2.50 | --- | 17.17 | 189 | 126.8 |
| STRUCTURE 30 | RESVOR | 1.49 | 2.50 | 664.06 | 17.32 | 189 | 126.8 |
| XSECTION 30 | ADDHYD | 1.91 | 2.58 | --- | 17.37 | 253 | 132.5 |
| XSECTION 31 | ADDHYD | 1.95 | 2.58 | --- | 17.34 | 260 | 133.3 |
| STRUCTURE 20 | RESVOR | 1.95 | 2.58 | 663.91 | 17.33 | 261 | 133.8 |
| XSECTION 32 | ADDHYD | 2.03 | 2.61 | --- | 17.30 | 277 | 136.5 |
| XSECTION 33 | ADDHYD | 2.04 | 2.61 | 721.13 | 17.29 | 279 | 136.8 |
| XSECTION 34 | ADDHYD | 2.07 | 2.60 | 702.24 | 17.29 | 283 | 136.7 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| XSECTION 130 | ADDHYD | .54 | .44 | --- | 17.16 | 18 | 33.3 |
| XSECTION 127 | RUNOFF | .74 | 2.25 | --- | 17.03 | 120 | 162.2 |
| XSECTION 197 | DIVERT | .37 | 4.12 | 640.31 | 17.03 | 90 | 243.2 |
| XSECTION 198 | DIVERT | .37 | .38 | 640.31 | 17.03 | 30 | 81.1 |
| XSECTION 197 | REACH | .37 | 4.12 | 640.31 | 17.03 | 90 | 243.2 |
| XSECTION 198 | REACH | .37 | .38 | 640.31 | 17.03 | 30 | 81.1 |
| XSECTION 124 | RUNOFF | .33 | 2.77 | --- | 16.68 | 70 | 212.1 |
| XSECTION 127 | ADDHYD | .70 | 1.51 | --- | 16.87 | 99 | 141.4 |
| XSECTION 128 | ADDHYD | 1.24 | 1.04 | --- | 16.89 | 117 | 94.4 |
| STRUCTURE 89 | RESVOR | 1.24 | 1.04 | --- | 16.89 | 117 | 94.4 |
| XSECTION 180 | DIVERT | 7.92 | 6.82 | 641.51 | 19.49 | 910 | 114.9 |
| XSECTION 181 | DIVERT | 7.92 | .71 | 641.51 | 19.49 | 446 | 56.3 |
| XSECTION 141 | REACH | 7.92 | 6.82 | 5.21 | 20.71 | 908 | 114.6 |
| XSECTION 181 | REACH | 7.92 | .71 | 641.51 | 19.49 | 446 | 56.3 |
| XSECTION 40 | RUNOFF | .23 | 1.86 | --- | 16.72 | 36 | 156.5 |
| XSECTION 181 | ADDHYD | 8.15 | .74 | 641.53 | 19.37 | 464 | 56.9 |
| XSECTION 182 | ADDHYD | 9.39 | .78 | --- | 19.14 | 512 | 54.5 |
| STRUCTURE 90 | RESVOR | 9.39 | .26 | 610.18 | 28.39T | 20T | 2.1 |
| XSECTION 199 | REACH | 9.39 | .25 | 640.06 | 29.75F | 20F | 2.1 |
| XSECTION 141 | RUNOFF | .54 | 2.68 | --- | 17.13 | 95 | 175.9 |
| XSECTION 41 | ADDHYD | 9.93 | .39 | 1.35 | 17.21T | 104T | 10.5 |
| XSECTION 183 | ADDHYD | 17.85 | 3.24 | --- | 18.57 | 991 | 55.5 |
| XSECTION 128 | RUNOFF | .32 | 3.16 | --- | 16.85 | 69 | 215.6 |
| XSECTION 81 | ADDHYD | .69 | 3.68 | --- | 16.85 | 159 | 230.4 |
| XSECTION 190 | DIVERT | .35 | 7.30 | 635.53 | 16.85 | 158 | 451.4 |
| XSECTION 191 | DIVERT | .35 | .05 | 635.53 | 16.75R | 1R | 2.9 |
| XSECTION 191 | REACH | .35 | .05 | 635.53 | 16.75R | 1R | 2.9 |
| XSECTION 42 | ADDHYD | 18.19 | 3.18 | --- | 18.57 | 991 | 54.5 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 27

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 5 | | | | | | | |
| XSECTION 41 | REACH | 18.19 | 3.18 | 5.61 | 19.08 | 991 | 54.5 |
| XSECTION 41 | RUNOFF | .27 | 1.78 | --- | 17.64 | 31 | 114.8 |
| XSECTION 142 | ADDHYD | 18.46 | 3.16 | --- | 18.85 | 1019 | 55.2 |
| XSECTION 190 | REACH | .35 | 7.30 | 635.53 | 17.10 | 158 | 451.4 |
| XSECTION 129 | ADDHYD | 18.81 | 3.23 | 6.05 | 18.20 | 1163 | 61.8 |
| XSECTION 129 | REACH | 18.81 | 3.23 | 6.05 | 18.80 | 1161 | 61.7 |
| XSECTION 129 | RUNOFF | .31 | 2.87 | --- | 16.83 | 64 | 206.5 |
| XSECTION 93 | ADDHYD | 19.12 | 3.23 | --- | 18.38 | 1208 | 63.2 |
| XSECTION 143 | RUNOFF | .54 | 1.78 | --- | 16.93 | 77 | 142.6 |
| XSECTION 144 | ADDHYD | 19.66 | 3.19 | 6.17 | 18.12 | 1271 | 64.6 |
| XSECTION 144 | REACH | 19.66 | 3.19 | 6.16 | 18.64 | 1267 | 64.4 |
| XSECTION 144 | RUNOFF | .57 | 2.01 | --- | 17.28 | 78 | 136.8 |
| XSECTION 145 | ADDHYD | 20.23 | 3.15 | --- | 18.49 | 1337 | 66.1 |
| RAINFALL OF 3.60 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs. | | | | | | | |
| ALTERNATE 1 STORM 6 | | | | | | | |
| XSECTION 107 | ADDHYD | 1.46 | 1.98 | --- | 17.10 | 126 | 86.3 |
| XSECTION 83 | ADDHYD | 7.26 | 4.89 | --- | 18.62 | 436 | 60.1 |
| XSECTION 100 | RUNOFF | 2.47 | 1.72 | --- | 19.77 | 170 | 68.8 |
| XSECTION 1 | ADDHYD | 2.49 | 1.72 | 646.50 | 24.75 | 142 | 57.0 |
| XSECTION 2 | ADDHYD | 2.55 | 1.74 | 649.77 | 24.03 | 144 | 56.5 |
| XSECTION 3 | ADDHYD | 2.63 | 1.77 | 646.47 | 23.93 | 147 | 55.9 |
| XSECTION 4 | ADDHYD | 2.66 | 1.78 | 646.59 | 23.92 | 148 | 55.6 |
| STRUCTURE 1 | RESVOR | .50 | 2.36 | 671.43 | 18.88 | 62 | 124.0 |
| XSECTION 5 | ADDHYD | .56 | 2.25 | --- | 18.78 | 66 | 117.9 |
| XSECTION 6 | ADDHYD | .61 | 2.24 | --- | 18.59 | 71 | 116.4 |
| XSECTION 7 | ADDHYD | .83 | 2.27 | --- | 18.41 | 99 | 119.3 |
| STRUCTURE 2 | RESVOR | .83 | 2.27 | 667.06 | 19.06 | 97 | 116.9 |
| XSECTION 8 | ADDHYD | 3.48 | 1.89 | --- | 22.62 | 218 | 62.6 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| XSECTION 175 | ADDHYD | 7.08 | 1.96 | --- | 18.39 | 552 | 78.0 |
| XSECTION 126 | REACH | 7.08 | 1.96 | 4.83 | 19.11 | 549 | 77.5 |
| XSECTION 126 | RUNOFF | .16 | 1.51 | --- | 17.65 | 15 | 93.8 |
| XSECTION 126 | ADDHYD | 7.24 | 1.95 | 4.90 | 19.05 | 562 | 77.6 |
| XSECTION 125 | REACH | .26 | .16 | 101.85 | 17.16T | 2T | 7.7 |
| XSECTION 125 | RUNOFF | .41 | 2.54 | --- | 16.93 | 71 | 173.2 |
| XSECTION 176 | DIVERT | .21 | 4.95 | 636.33 | 16.93 | 69 | 328.6 |
| XSECTION 177 | DIVERT | .21 | .13 | 636.33 | 16.93T | 1T | 4.8 |
| XSECTION 176 | REACH | .21 | 4.95 | 636.33 | 16.93 | 69 | 328.6 |
| XSECTION 178 | ADDHYD | 7.45 | 2.03 | --- | 18.62 | 614 | 82.4 |
| XSECTION 139 | RUNOFF | .80 | 1.94 | --- | 17.82 | 89 | 111.3 |
| XSECTION 91 | ADDHYD | 8.25 | 2.02 | --- | 18.49 | 700 | 84.8 |
| XSECTION 92 | ADDHYD | 15.50 | 3.36 | --- | 18.50 | 1136 | 73.3 |
| XSECTION 140 | REACH | 15.50 | 3.36 | 6.32 | 19.79 | 1115 | 71.9 |
| XSECTION 140 | RUNOFF | .34 | 2.10 | --- | 16.91 | 52 | 152.9 |

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SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 6 | | | | | | | |
| XSECTION 141 | ADDHYD | 15.84 | 3.34 | 6.38 | 19.56 | 1146 | 72.3 |
| XSECTION 177 | REACH | .21 | .13 | 636.33 | 16.93T | 1T | 4.8 |
| XSECTION 179 | ADDHYD | .47 | .15 | --- | 17.08T | 3T | 6.4 |
| XSECTION 124 | REACH | .47 | .15 | 635.16 | 17.55T | 3T | 6.4 |
| XSECTION 130 | RUNOFF | .07 | 1.64 | --- | 16.82 | 10 | 142.9 |
| XSECTION 130 | ADDHYD | .54 | .35 | --- | 16.87 | 13 | 24.1 |
| XSECTION 127 | RUNOFF | .74 | 1.72 | --- | 17.06 | 94 | 127.0 |
| XSECTION 197 | DIVERT | .37 | 3.32 | 640.20 | 17.12 | 90 | 243.2 |
| XSECTION 198 | DIVERT | .37 | .11 | 640.01 | 17.01T | 4T | 10.8 |
| XSECTION 197 | REACH | .37 | 3.32 | 640.20 | 17.12 | 90 | 243.2 |
| XSECTION 198 | REACH | .37 | .11 | 640.01 | 17.01T | 4T | 10.8 |
| XSECTION 124 | RUNOFF | .33 | 2.19 | --- | 16.70 | 57 | 172.7 |
| XSECTION 127 | ADDHYD | .70 | 1.09 | --- | 16.75 | 60 | 85.7 |
| XSECTION 128 | ADDHYD | 1.24 | .77 | --- | 16.77 | 73 | 58.9 |
| STRUCTURE 89 | RESVOR | 1.24 | .77 | --- | 16.77 | 73 | 58.9 |
| XSECTION 180 | DIVERT | 7.92 | 6.34 | 641.25 | 19.56 | 894 | 112.9 |
| XSECTION 181 | DIVERT | 7.92 | .33 | 641.25 | 19.56 | 252 | 31.8 |
| XSECTION 141 | REACH | 7.92 | 6.34 | 5.12 | 21.07 | 892 | 112.6 |
| XSECTION 181 | REACH | 7.92 | .33 | 641.25 | 19.85 | 252 | 31.8 |
| XSECTION 40 | RUNOFF | .23 | 1.37 | --- | 16.75 | 28 | 121.7 |
| XSECTION 181 | ADDHYD | 8.15 | .36 | 641.26 | 19.74 | 264 | 32.4 |
| XSECTION 182 | ADDHYD | 9.39 | .42 | --- | 19.45 | 300 | 31.9 |
| STRUCTURE 90 | RESVOR | 9.39 | .19 | 600.16 | 27.14T | 15T | 1.6 |
| XSECTION 199 | REACH | 9.39 | .19 | 640.05 | 29.25F | 15F | 1.6 |
| XSECTION 141 | RUNOFF | .54 | 2.10 | --- | 17.16 | 76 | 140.7 |
| XSECTION 41 | ADDHYD | 9.93 | .29 | 1.27 | 17.28T | 82T | 8.3 |
| XSECTION 183 | ADDHYD | 17.85 | 2.97 | --- | 19.33 | 954 | 53.4 |
| XSECTION 128 | RUNOFF | .32 | 2.54 | --- | 16.86 | 56 | 175.0 |
| XSECTION 81 | ADDHYD | .69 | 2.96 | --- | 16.96 | 146 | 211.6 |
| XSECTION 190 | DIVERT | .35 | 5.87 | 635.26 | 16.96 | 146 | 417.1 |

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SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| XSECTION | 36 | ADDHYD | 2.10 | 1.45 | 696.12 | 17.58 | 162 | 77.1 |
| STRUCTURE | 5 | RESVOR | 2.10 | 1.45 | 659.20 | 17.60 | 162 | 77.1 |
| XSECTION | 37 | ADDHYD | 2.12 | 1.46 | 7.79 | 17.58 | 165 | 77.8 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@SX10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 33

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 7 | | | | | | | |
| XSECTION 38 | ADDHYD | 2.26 | 1.43 | 680.32 | 17.51 | 176 | 77.9 |
| STRUCTURE 10 | RESVOR | 2.26 | 1.43 | 656.77 | 18.03 | 173 | 76.5 |
| XSECTION 39 | ADDHYD | 5.96 | 1.38 | 688.74 | 18.33 | 332 | 55.7 |
| XSECTION 120 | RUNOFF | .25 | .75 | --- | 20.19 | 8 | 32.0 |
| XSECTION 120 | REACH | .25 | .75 | 657.86 | 25.00 | 7 | 28.0 |
| XSECTION 122 | RUNOFF | .27 | .80 | --- | 19.90 | 10 | 37.0 |
| XSECTION 122 | ADDHYD | .52 | .77 | --- | 23.00 | 16 | 30.8 |
| XSECTION 37 | ADDHYD | 6.48 | 1.33 | 8.87 | 18.94 | 345 | 53.2 |
| XSECTION 37 | REACH | 6.48 | 1.33 | 8.86 | 19.53 | 343 | 52.9 |
| XSECTION 37 | RUNOFF | .33 | 1.00 | --- | 16.90 | 29 | 87.9 |
| XSECTION 123 | ADDHYD | 6.82 | 1.32 | 644.60 | 19.24 | 360 | 52.8 |
| XSECTION 121 | RUNOFF | .31 | 1.30 | --- | 16.96 | 32 | 103.2 |
| XSECTION 121 | REACH | .31 | 1.30 | 658.12 | 17.54 | 31 | 100.0 |
| XSECTION 123 | RUNOFF | .22 | 1.89 | --- | 15.83 | 32 | 145.5 |
| XSECTION 124 | ADDHYD | .53 | 1.54 | 638.01 | 16.75 | 60 | 113.2 |
| XSECTION 172 | DIVERT | .26 | 2.95 | 101.61 | 16.75 | 59 | 226.9 |
| XSECTION 125 | DIVERT | .26 | .13 | 101.61 | 16.75T | 2T | 7.7 |
| XSECTION 172 | REACH | .26 | 2.95 | 101.61 | 16.75 | 59 | 226.9 |
| XSECTION 175 | ADDHYD | 7.08 | 1.38 | --- | 18.40 | 400 | 56.5 |
| XSECTION 126 | REACH | 7.08 | 1.38 | 3.98 | 19.23 | 398 | 56.2 |
| XSECTION 126 | RUNOFF | .16 | 1.00 | --- | 17.75 | 10 | 62.5 |
| XSECTION 126 | ADDHYD | 7.24 | 1.37 | 4.04 | 19.15 | 407 | 56.2 |
| XSECTION 125 | REACH | .26 | .13 | 101.59 | 17.19T | 2T | 7.7 |
| XSECTION 125 | RUNOFF | .41 | 1.89 | --- | 16.95 | 54 | 131.7 |
| XSECTION 176 | DIVERT | .21 | 3.68 | 636.19 | 16.95 | 53 | 252.4 |
| XSECTION 177 | DIVERT | .21 | .11 | 636.19 | 16.95T | 1T | 4.8 |
| XSECTION 176 | REACH | .21 | 3.68 | 636.19 | 16.95 | 53 | 252.4 |
| XSECTION 178 | ADDHYD | 7.45 | 1.43 | --- | 18.68 | 446 | 59.9 |
| XSECTION 139 | RUNOFF | .80 | 1.37 | --- | 17.90 | 63 | 78.8 |
| XSECTION 91 | ADDHYD | 8.25 | 1.43 | --- | 18.55 | 508 | 61.6 |

1
TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@SX10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 34

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 7 | | | | | | | |
| XSECTION 92 | ADDHYD | 15.50 | 2.91 | --- | 18.59 | 926 | 59.7 |
| XSECTION 140 | REACH | 15.50 | 2.91 | 5.37 | 19.78 | 914 | 59.0 |
| XSECTION 140 | RUNOFF | .34 | 1.50 | --- | 16.94 | 38 | 111.8 |
| XSECTION 141 | ADDHYD | 15.84 | 2.88 | 5.37 | 19.57 | 937 | 59.2 |
| XSECTION 177 | REACH | .21 | .11 | 636.19 | 16.95T | 1T | 4.8 |
| XSECTION 179 | ADDHYD | .47 | .12 | --- | 17.11T | 3T | 6.4 |
| XSECTION 124 | REACH | .47 | .12 | 635.14 | 17.60T | 3T | 6.4 |
| XSECTION 130 | RUNOFF | .07 | 1.12 | --- | 16.86 | 7 | 100.0 |
| XSECTION 130 | ADDHYD | .54 | .25 | --- | 16.90 | 10 | 18.5 |
| XSECTION 127 | RUNOFF | .74 | 1.18 | --- | 17.10 | 66 | 89.2 |

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 8 | | | | | | | |
| STRUCTURE 1 | RESVOR | .50 | 1.30 | 670.13 | 19.62 | 33 | 66.0 |
| XSECTION 5 | ADDHYD | .56 | 1.22 | --- | 19.48 | 35 | 62.5 |
| XSECTION 6 | ADDHYD | .61 | 1.21 | --- | 19.21 | 37 | 60.7 |
| XSECTION 7 | ADDHYD | .83 | 1.23 | --- | 18.69 | 52 | 62.7 |
| STRUCTURE 2 | RESVOR | .83 | 1.23 | 665.81 | 18.88 | 52 | 62.7 |
| XSECTION 8 | ADDHYD | 3.48 | .95 | --- | 21.64 | 125 | 35.9 |
| XSECTION 9 | ADDHYD | 3.65 | .98 | --- | 21.59 | 131 | 35.9 |
| XSECTION 10 | ADDHYD | 3.70 | .97 | --- | 21.54 | 132 | 35.7 |
| XSECTION 150 | RUNOFF | .57 | 1.04 | --- | 18.53 | 30 | 52.6 |
| XSECTION 21 | ADDHYD | .61 | 1.05 | --- | 18.12 | 32 | 52.5 |
| XSECTION 22 | ADDHYD | .67 | 1.09 | --- | 16.81 | 37 | 55.2 |
| STRUCTURE 60 | RESVOR | .67 | 1.09 | 663.73 | 18.15 | 36 | 53.7 |
| XSECTION 153 | RUNOFF | .55 | .72 | --- | 18.98 | 20 | 36.4 |
| XSECTION 23 | ADDHYD | 1.22 | .93 | --- | 18.35 | 56 | 45.9 |
| XSECTION 24 | ADDHYD | 1.29 | .94 | --- | 18.12 | 59 | 45.7 |
| STRUCTURE 50 | RESVOR | 1.29 | .94 | 663.38 | 18.25 | 59 | 45.7 |
| XSECTION 25 | ADDHYD | .13 | 1.18 | --- | 16.78 | 12 | 92.3 |
| XSECTION 26 | ADDHYD | 1.41 | .96 | --- | 17.12 | 70 | 49.6 |
| STRUCTURE 40 | RESVOR | 1.41 | .96 | 662.24 | 17.62 | 69 | 48.9 |
| XSECTION 27 | ADDHYD | 1.44 | .97 | --- | 17.52 | 71 | 49.3 |
| XSECTION 28 | ADDHYD | 1.48 | .98 | --- | 17.41 | 75 | 50.7 |
| XSECTION 29 | ADDHYD | 1.49 | .99 | --- | 17.36 | 77 | 51.7 |
| STRUCTURE 30 | RESVOR | 1.49 | .99 | 661.34 | 17.54 | 76 | 51.0 |
| XSECTION 30 | ADDHYD | 1.91 | 1.04 | --- | 17.64 | 105 | 55.0 |
| XSECTION 31 | ADDHYD | 1.95 | 1.04 | --- | 17.58 | 108 | 55.4 |
| STRUCTURE 20 | RESVOR | 1.95 | 1.04 | 660.47 | 17.79 | 108 | 55.4 |
| XSECTION 32 | ADDHYD | 2.03 | 1.06 | --- | 17.66 | 116 | 57.1 |
| XSECTION 33 | ADDHYD | 2.04 | 1.07 | 707.48 | 17.65 | 117 | 57.4 |
| XSECTION 34 | ADDHYD | 2.07 | 1.06 | 698.57 | 17.64 | 118 | 57.0 |
| XSECTION 35 | ADDHYD | 2.09 | 1.06 | 696.08 | 17.61 | 119 | 56.9 |

1
TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 37

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 8 | | | | | | | |
| XSECTION 36 | ADDHYD | 2.10 | 1.06 | 695.85 | 17.60 | 120 | 57.1 |
| STRUCTURE 5 | RESVOR | 2.10 | 1.06 | 658.75 | 17.63 | 120 | 57.1 |
| XSECTION 37 | ADDHYD | 2.12 | 1.06 | 7.32 | 17.60 | 122 | 57.5 |
| XSECTION 38 | ADDHYD | 2.26 | 1.04 | 679.91 | 17.55 | 130 | 57.5 |
| STRUCTURE 10 | RESVOR | 2.26 | 1.04 | 655.64 | 18.08 | 128 | 56.6 |
| XSECTION 39 | ADDHYD | 5.96 | 1.00 | 688.36 | 18.35 | 249 | 41.8 |
| XSECTION 120 | RUNOFF | .25 | .48 | --- | 20.57 | 5 | 20.0 |
| XSECTION 120 | REACH | .25 | .47 | 657.73 | 25.66T | 5T | 20.0 |
| XSECTION 122 | RUNOFF | .27 | .51 | --- | 20.22 | 6 | 22.2 |
| XSECTION 122 | ADDHYD | .52 | .49 | --- | 23.80 | 10 | 19.2 |
| XSECTION 37 | ADDHYD | 6.48 | .96 | 8.39 | 18.99 | 257 | 39.7 |
| XSECTION 37 | REACH | 6.48 | .96 | 8.38 | 19.57 | 256 | 39.5 |
| XSECTION 37 | RUNOFF | .33 | .68 | --- | 16.93 | 20 | 60.6 |
| XSECTION 123 | ADDHYD | 6.82 | .94 | 643.33 | 19.36 | 268 | 39.3 |
| XSECTION 121 | RUNOFF | .31 | .93 | --- | 16.99 | 23 | 74.2 |
| XSECTION 121 | REACH | .31 | .93 | 658.02 | 17.64 | 22 | 71.0 |
| XSECTION 123 | RUNOFF | .22 | 1.44 | --- | 16.63 | 25 | 113.6 |
| XSECTION 124 | ADDHYD | .53 | 1.14 | 637.25 | 16.76 | 45 | 84.9 |
| XSECTION 172 | DIVERT | .26 | 2.15 | 101.42 | 16.76 | 44 | 169.2 |
| XSECTION 125 | DIVERT | .26 | .12 | 101.42 | 16.76T | 1T | 3.8 |
| XSECTION 172 | REACH | .26 | 2.15 | 101.42 | 16.76 | 44 | 169.2 |
| XSECTION 175 | ADDHYD | 7.08 | .99 | --- | 18.57 | 297 | 41.9 |

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 XSECTION 190  DIVERT      .35     3.00     633.68     17.03       78    222.9
 XSECTION 191  DIVERT      .35     3.00        ---       .00        0       .0
 XSECTION 191  REACH       .35     3.00        ---       .00        0       .0
 XSECTION  42  ADDHYD    18.19     2.29        ---     20.75      809     44.5
 XSECTION  41  REACH     18.19     2.29       4.56     21.12      808     44.4

 XSECTION  41  RUNOFF      .27      .55        ---     17.98       10     37.0
 XSECTION 142  ADDHYD    18.46     2.26        ---     21.08      816     44.2
 XSECTION 190  REACH       .35     3.00     633.67     17.35       78    222.9
 XSECTION 129  ADDHYD    18.81     2.28       4.56     20.67      859     45.7
 XSECTION 129  REACH     18.81     2.28       4.55     21.34      856     45.5

 XSECTION 129  RUNOFF      .31     1.23        ---     16.90       30     96.8
 XSECTION  93  ADDHYD    19.12     2.26        ---     21.26      869     45.4
 XSECTION 143  RUNOFF      .54      .55        ---     17.05       26     48.1
 XSECTION 144  ADDHYD    19.66     2.21       4.49     21.19      881     44.8
 XSECTION 144  REACH     19.66     2.21       4.48     21.87      879     44.7

 XSECTION 144  RUNOFF      .57      .68        ---     17.49       28     49.1
 XSECTION 145  ADDHYD    20.23     2.17        ---     21.79      896     44.3
1
 TR20 ------------------------------------------------------------------- SCS -
 WHC      WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00  2@5X10 DIV 450 AT VERSION
 12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2   2.04TEST
 15:29:38                    SUMMARY, JOB NO.   1                       PAGE  40


                              SUMMARY TABLE 2
                              ---------------
          MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
  QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
                           LENGTH FACTOR - VALUE K* GREATER THAN  1.0;
                           ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

                     HYDROGRAPH INFORMATION          ROUTING PARAMETERS
                     ----------------------    -------------------------------
              FLOOD     INFLOW       OUTFLOW      Q-A EQ.                PEAK  ATT-
XSEC REACH   PLAIN     -----------  -----------  -----------  LENGTH     RATIO  KIN
 ID  LENGTH  LENGTH PEAK   TIME   PEAK   TIME   COEFF POWER  FACTOR     Q/I   COEFF
      (FT)    (FT)  (CFS)  (HR)  (CFS)  (HR)    (X)   (M)    (k*)      (Q*)   (C)


BASEFLOW IS     .0 CFS

   ALTERNATE    1   STORM    1
   ----------------------------
  33   1830          110  19.8     107  20.8    .54   1.00   .065    .974   .23
  34   2050          186  16.5     185  17.3    .77   1.19   .011    .995   .65
  35   1200          196  17.8     196  17.8    .38   1.55   .000   1.000  1.00?
  36   1450          215  16.8     214  18.3   1.30   1.00   .023    .996   .58
  39    650           93  15.5      84  16.3    .52   1.00   .040    .902   .53

  38   1450          598  18.0     598  18.0   1.20   1.24   .002   1.000  1.00?
 131   8750          643  18.0     615  19.0    .62   1.23   .044    .957   .25
 133   5700         1888  17.8    1689  19.8    .079  1.26   .121    .894   .12
 134   1700         2151  19.5    2149  20.0    .47   1.19   .006    .999   .72?
   3    450          799  19.5     799  19.5******** 1.00   .000   1.000  1.00?

   2      1         1474  19.5    1474  19.5******** 1.69   .000   1.000  1.00?
 135   2000         2135  21.3    2133  21.5    .007  1.84   .000    .999   .95?
 146    200          491  21.5     491  21.5   3.56   1.00   .000   1.000  1.00?
 147     10         1677  21.5    1677  21.5    .54   1.50   .000   1.000  1.00?
 134   2150         1651  25.8    1643  26.3    .51   1.18   .007    .995   .59

 136   6000          636  19.3     591  21.8    .008  1.60   .067    .929   .12
 120   3000           60  19.3      56  21.3    .028  1.47   .072    .931   .13
  37   4050         1729  19.3    1718  19.8    .92   1.13   .020    .994   .43
 121   3000          146  16.8     143  17.3    .13   1.45   .023    .982   .40
 172     10           97  16.8      97  16.8   1.64   1.09   .000   1.000  1.00?

 126   5050         1893  19.5    1884  20.0    .75   1.17   .020    .995   .39
 125   4388          156  16.8     156  17.0   2.01   1.30   .018    .997   .84?
 176     10          196  17.0     196  17.0    .62   1.23   .000   1.000  1.00?
 140   4100         3181  25.5    3070  26.5    .71   1.07   .031    .965   .24
 177     10            3  17.0       3  17.0    .94   1.25   .000   1.000  1.00?

 124   1100          159  17.0     159  17.0    .050  1.90   .001   1.000  1.00?
 197     10           91  17.0      91  17.0   4.30   1.00   .000   1.000  1.00?
1
 TR20 ------------------------------------------------------------------- SCS -
 WHC      WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00  2@5X10 DIV 450 AT VERSION
 12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2   2.04TEST
 15:29:38                    SUMMARY, JOB NO.   1                       PAGE  41


                              SUMMARY TABLE 2
                              ---------------
          MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
  QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
                           LENGTH FACTOR - VALUE K* GREATER THAN  1.0;
                           ATT-KIN COEFF - VALUE C GREATER THAN 0.667.
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1
TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 43

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE K* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | HYDROGRAPH INFLOW PEAK (CFS) | HYDROGRAPH INFLOW TIME (HR) | HYDROGRAPH OUTFLOW PEAK (CFS) | HYDROGRAPH OUTFLOW TIME (HR) | ROUTING PARAMETERS Q-A EQ. COEFF (X) | Q-A EQ. POWER (M) | LENGTH FACTOR (k*) | PEAK RATIO Q/I (Q*) | ATT-KIN COEFF (C) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 3 | | | | | | | | | | | |
| 36 | 1450 | | 148 | 16.8 | 147 | 17.0 | 1.28 | 1.00 | .027 | .993 | .57 |
| 39 | 650 | | 40 | 17.3 | 40 | 17.5 | 1.14 | 1.00 | .012 | .982 | .88? |
| 38 | 1450 | | 313 | 19.8 | 313 | 19.8 | 1.91 | 1.12 | .004 | 1.000 | 1.00? |
| 131 | 8750 | | 332 | 19.3 | 328 | 20.3 | .24 | 1.44 | .020 | .988 | .28 |
| 133 | 5700 | | 1129 | 17.8 | 965 | 20.3 | .38 | 1.05 | .189 | .854 | .09 |
| 134 | 1700 | | 1325 | 20.0 | 1324 | 20.5 | .54 | 1.17 | .005 | .999 | .67? |
| 3 | 450 | | 641 | 20.0 | 641 | 20.0******** | 1.00 | | .000 | 1.000 | 1.00? |
| 2 | 1 | | 753 | 20.0 | 753 | 20.0******** | 1.56 | | .000 | 1.000 | 1.00? |
| 135 | 2000 | | 921 | 24.5 | 920 | 24.8 | .068 | 1.47 | .001 | 1.000 | .64 |
| 146 | 200 | | 444 | 24.3 | 444 | 24.3 | 4.09 | 1.00 | .000 | 1.000 | 1.00? |
| 147 | 10 | | 490 | 24.3 | 490 | 24.3 | .54 | 1.50 | .000 | 1.000 | 1.00? |
| 134 | 2150 | | 448 | 24.8 | 448 | 25.0 | .28 | 1.31 | .001 | 1.000 | .61 |
| 136 | 6000 | | 385 | 19.5 | 311 | 24.8 | .36 | 1.00 | .274 | .806 | .05 |
| 120 | 3000 | | 34 | 19.3 | 31 | 22.0 | .028 | 1.47 | .096 | .912 | .11 |
| 37 | 4050 | | 995 | 18.0 | 991 | 19.0 | .38 | 1.29 | .011 | .997 | .48 |
| 121 | 3000 | | 92 | 16.8 | 91 | 17.3 | .064 | 1.69 | .012 | .989 | .48 |
| 172 | 10 | | 97 | 16.8 | 97 | 16.8 | 1.64 | 1.09 | .000 | 1.000 | 1.00? |
| 126 | 5050 | | 1153 | 18.3 | 1147 | 19.0 | .37 | 1.30 | .012 | .996 | .44 |
| 125 | 4388 | | 67 | 16.8 | 67 | 17.0 | 1.98 | 1.30 | .035 | .990 | .75? |
| 176 | 10 | | 130 | 17.0 | 130 | 17.0 | 1.60 | 1.00 | .000 | 1.000 | 1.00? |
| 140 | 4100 | | 1959 | 18.3 | 1927 | 19.3 | .45 | 1.13 | .023 | .984 | .26 |
| 177 | 10 | | 2 | 17.0 | 2 | 17.0 | 1.00 | 1.00 | .000 | 1.000 | 1.00? |
| 124 | 1100 | | 69 | 17.0 | 69 | 17.0 | .050 | 1.90 | .004 | 1.000 | 1.00? |
| 197 | 10 | | 91 | 17.0 | 91 | 17.0 | 4.40 | 1.00 | .000 | 1.000 | 1.00? |
| 198 | 10 | | 112 | 17.0 | 112 | 17.0 | .53 | 1.58 | .000 | 1.000 | 1.00? |

1
TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 44

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE K* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | HYDROGRAPH INFLOW PEAK (CFS) | HYDROGRAPH INFLOW TIME (HR) | HYDROGRAPH OUTFLOW PEAK (CFS) | HYDROGRAPH OUTFLOW TIME (HR) | ROUTING PARAMETERS Q-A EQ. COEFF (X) | Q-A EQ. POWER (M) | LENGTH FACTOR (k*) | PEAK RATIO Q/I (Q*) | ATT-KIN COEFF (C) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 3 | | | | | | | | | | | |
| 141 | 4600 | | 961 | 19.3 | 958 | 20.3 | .76 | 1.09 | .016 | .997 | .25 |
| 181 | 2000 | | 1032 | 19.3 | 1032 | 19.3 | .005 | 2.00 | .001 | 1.000 | 1.00? |
| 199 | 3500 | | 51 | 31.3 | 51 | 32.0 | .014 | 2.00 | .000 | 1.000 | .35 |
| 191 | 600 | | 1 | 16.8 | 1 | 17.0 | 1.27 | 1.00 | .007 | 1.000 | .98? |
| 41 | 3300 | | 1098 | 18.0 | 1097 | 18.8 | .040 | 1.53 | .002 | .999 | .45 |
| 190 | 4500 | | 195 | 16.8 | 195 | 16.8 | .18 | 2.00 | .000 | 1.000 | 1.00? |
| 129 | 3600 | | 1330 | 17.5 | 1327 | 18.0 | .059 | 1.53 | .001 | .998 | .54 |
| 144 | 6300 | | 1542 | 17.3 | 1536 | 17.8 | .005 | 1.97 | .000 | .996 | .55 |
| ALTERNATE 1 STORM 4 | | | | | | | | | | | |
| 33 | 1830 | | 68 | 17.8 | 68 | 18.0 | .87 | 1.18 | .014 | .999 | .67? |
| 34 | 2050 | | 100 | 17.3 | 100 | 17.8 | .55 | 1.29 | .009 | .996 | .67? |
| 35 | 1200 | | 102 | 19.0 | 102 | 19.0 | .69 | 1.38 | .002 | 1.000 | 1.00? |
| 36 | 1450 | | 126 | 16.0 | 122 | 17.0 | 1.45 | 1.00 | .025 | .974 | .62 |
| 39 | 650 | | 26 | 16.8 | 26 | 16.8 | 1.74 | 1.00 | .006 | 1.000 | 1.00? |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 134 | 1700 | 869 | 20.5 | 868 | 20.8 | .60 | 1.15 | .005 | .999 | .64 |
| 3 | 450 | 571 | 20.5 | 571 | 20.5 | ******** | 1.00 | .000 | 1.000 | 1.00? |
| 2 | 1 | 336 | 20.5 | 336 | 20.5 | ******** | 2.00 | .000 | 1.000 | 1.00? |
| 135 | 2000 | 695 | 24.5 | 695 | 25.0 | .034 | 1.63 | .000 | 1.000 | .74? |
| 146 | 200 | 425 | 24.5 | 425 | 24.5 | 5.29 | 1.00 | .000 | 1.000 | 1.00? |
| 147 | 10 | 278 | 24.5 | 278 | 24.5 | .53 | 1.51 | .000 | 1.000 | 1.00? |
| 134 | 2150 | 428 | 24.5 | 428 | 25.0 | .26 | 1.33 | .001 | 1.000 | .62 |
| 136 | 6000 | 222 | 19.8 | 181 | 25.0 | .38 | 1.00 | .274 | .812 | .05 |
| 120 | 3000 | 18 | 19.8 | 16 | 23.3 | .028 | 1.47 | .133 | .891 | .09 |
| 37 | 4050 | 603 | 18.3 | 600 | 19.3 | .43 | 1.26 | .014 | .996 | .43 |
| 121 | 3000 | 56 | 17.0 | 55 | 17.5 | .064 | 1.69 | .018 | .977 | .41 |
| 172 | 10 | 97 | 16.8 | 97 | 16.8 | 1.64 | 1.09 | .000 | 1.000 | 1.00? |
| 126 | 5050 | 707 | 18.3 | 701 | 18.8 | .29 | 1.36 | .012 | .991 | .43 |
| 125 | 4388 | 6 | 16.8 | 5 | 17.0 | 2.00 | 1.32 | .034 | .877 | .52 |
| 176 | 10 | 84 | 17.0 | 84 | 17.0 | 1.92 | 1.00 | .000 | 1.000 | 1.00? |
| 140 | 4100 | 1347 | 18.5 | 1317 | 19.8 | .80 | 1.05 | .031 | .978 | .23 |
| 177 | 10 | 1 | 17.0 | 1 | 17.0 | 1.00 | 1.00 | .000 | 1.000 | 1.00? |
| 124 | 1100 | 6 | 17.0 | 6 | 17.5 | .050 | 1.90 | .007 | .945 | .56 |
| 197 | 10 | 90 | 17.0 | 90 | 17.0 | 4.47 | 1.00 | .000 | 1.000 | 1.00? |
| 198 | 10 | 30 | 17.0 | 30 | 17.0 | .53 | 1.58 | .000 | 1.000 | 1.00? |
| 141 | 4600 | 910 | 19.5 | 908 | 20.8 | .82 | 1.08 | .019 | .998 | .25 |
| 181 | 2000 | 446 | 19.5 | 446 | 19.5 | .019 | 2.00 | .001 | 1.000 | 1.00? |

1



SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE K* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| | | | HYDROGRAPH INFORMATION | | | | ROUTING PARAMETERS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | INFLOW | | OUTFLOW | | Q-A EQ. | | | PEAK | ATT- |
| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | PEAK (CFS) | TIME (HR) | PEAK (CFS) | TIME (HR) | COEFF (X) | POWER (M) | LENGTH FACTOR (k*) | RATIO Q/I (Q*) | KIN COEFF (C) |
| ALTERNATE 1 STORM 5 | | | | | | | | | | | |
| 199 | 3500 | | 20 | 28.5 | 20 | 29.8 | .012 | 2.00 | .001 | .997 | .22 |
| 191 | 600 | | 1 | 16.8 | 1 | 16.8 | 1.40 | 1.00 | .006 | 1.000 | 1.00? |
| 41 | 3300 | | 991 | 18.5 | 991 | 19.0 | .025 | 1.65 | .001 | .999 | .53 |
| 190 | 4500 | | 158 | 16.8 | 158 | 17.0 | .15 | 2.00 | .001 | 1.000 | .98? |
| 129 | 3600 | | 1163 | 18.3 | 1161 | 18.8 | .10 | 1.44 | .003 | .998 | .48 |
| 144 | 6300 | | 1271 | 18.0 | 1267 | 18.8 | .006 | 1.96 | .001 | .997 | .51 |
| ALTERNATE 1 STORM 6 | | | | | | | | | | | |
| 33 | 1830 | | 34 | 18.0 | 34 | 18.5 | .77 | 1.24 | .011 | .991 | .66 |
| 34 | 2050 | | 52 | 18.3 | 51 | 18.5 | .53 | 1.31 | .009 | .992 | .61 |
| 35 | 1200 | | 51 | 19.8 | 51 | 20.0 | 1.23 | 1.18 | .005 | 1.000 | .97? |
| 36 | 1450 | | 75 | 17.0 | 75 | 17.0 | 17.18 | 1.00 | .002 | 1.000 | 1.00? |
| 39 | 650 | | 17 | 16.8 | 17 | 16.8 | 2.67 | 1.00 | .004 | 1.000 | 1.00? |
| 38 | 1450 | | 146 | 19.8 | 146 | 19.8 | 1.78 | 1.15 | .004 | 1.000 | 1.00? |
| 131 | 8750 | | 157 | 19.3 | 154 | 20.3 | .13 | 1.60 | .017 | .986 | .27 |
| 133 | 5700 | | 543 | 17.8 | 447 | 21.0 | .53 | 1.00 | .231 | .824 | .08 |
| 134 | 1700 | | 727 | 20.5 | 726 | 21.0 | .63 | 1.14 | .005 | .999 | .62 |
| 3 | 450 | | 536 | 20.8 | 536 | 20.8 | ******** | 1.00 | .000 | 1.000 | 1.00? |
| 2 | 1 | | 220 | 20.8 | 220 | 20.8 | ******** | 2.00 | .000 | 1.000 | 1.00? |
| 135 | 2000 | | 607 | 24.3 | 607 | 24.5 | .019 | 1.76 | .000 | 1.000 | .79? |
| 146 | 200 | | 415 | 24.0 | 415 | 24.0 | 5.92 | 1.00 | .000 | 1.000 | 1.00? |
| 147 | 10 | | 199 | 24.0 | 199 | 24.0 | .52 | 1.51 | .000 | 1.000 | 1.00? |
| 134 | 2150 | | 418 | 24.3 | 418 | 24.5 | .24 | 1.34 | .001 | 1.000 | .63 |
| 136 | 6000 | | 170 | 19.8 | 141 | 25.0 | .41 | 1.00 | .254 | .830 | .06 |
| 120 | 3000 | | 13 | 19.8 | 12 | 24.0 | .028 | 1.47 | .155 | .883 | .08 |
| 37 | 4050 | | 475 | 19.0 | 473 | 19.5 | .49 | 1.24 | .017 | .996 | .40 |

1



SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE K* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

1
TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 50

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE K* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | HYDROGRAPH INFLOW PEAK (CFS) | INFLOW TIME (HR) | OUTFLOW PEAK (CFS) | OUTFLOW TIME (HR) | ROUTING PARAMETERS Q-A EQ. COEFF (X) | POWER (M) | LENGTH FACTOR (k*) | PEAK RATIO Q/I (Q*) | ATT-KIN COEFF (C) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 7 | | | | | | | | | | | |
| 191 | 600 | | 0 | 17.0 | 0 | 17.0 | 1.60 | 1.00 | .005 | 1.000 | 1.00? |
| 41 | 3300 | | 908 | 20.5 | 908 | 21.0 | .016 | 1.76 | .001 | 1.000 | .62 |
| 190 | 4500 | | 106 | 17.0 | 106 | 17.3 | .13 | 2.00 | .002 | .997 | .85? |
| 129 | 3600 | | 983 | 19.8 | 981 | 20.5 | .13 | 1.40 | .004 | .998 | .45 |
| 144 | 6300 | | 1021 | 20.0 | 1018 | 20.8 | .008 | 1.92 | .001 | .998 | .46 |
| ALTERNATE 1 STORM 8 | | | | | | | | | | | |
| 33 | 1830 | | 13 | 18.0 | 13 | 18.3 | .86 | 1.19 | .013 | .997 | .56 |
| 34 | 2050 | | 23 | 17.5 | 23 | 18.3 | .53 | 1.31 | .010 | .995 | .54 |
| 35 | 1200 | | 24 | 19.5 | 24 | 19.8 | 1.40 | 1.12 | .006 | 1.000 | .89? |
| 36 | 1450 | | 43 | 17.0 | 43 | 17.0******** | 1.00 | .000 | 1.000 | 1.00? | |
| 39 | 650 | | 10 | 16.8 | 10 | 16.8 | 4.39 | 1.00 | .003 | 1.000 | 1.00? |
| 38 | 1450 | | 80 | 19.8 | 80 | 19.8 | 1.92 | 1.13 | .005 | 1.000 | 1.00? |
| 131 | 8750 | | 86 | 19.3 | 83 | 20.8 | .25 | 1.43 | .039 | .971 | .19 |
| 133 | 5700 | | 286 | 18.0 | 246 | 20.8 | .61 | 1.01 | .188 | .859 | .10 |
| 134 | 1700 | | 495 | 20.8 | 495 | 21.0 | .34 | 1.26 | .002 | 1.000 | .69? |
| 3 | 450 | | 474 | 20.8 | 474 | 20.8******** | 1.00 | .000 | 1.000 | 1.00? | |
| 2 | 1 | | 35 | 20.8 | 35 | 20.8******** | 1.51 | .000 | 1.000 | 1.00? | |
| 135 | 2000 | | 480 | 21.5 | 480 | 21.8 | .010 | 1.88 | .000 | 1.000 | .80? |
| 146 | 200 | | 394 | 21.5 | 394 | 21.5 | 6.58 | 1.00 | .000 | 1.000 | 1.00? |
| 147 | 10 | | 92 | 21.5 | 92 | 21.5 | .52 | 1.51 | .000 | 1.000 | 1.00? |
| 134 | 2150 | | 395 | 21.8 | 395 | 22.3 | .22 | 1.37 | .001 | 1.000 | .64 |
| 136 | 6000 | | 82 | 20.3 | 76 | 23.8 | .75 | 1.00 | .140 | .925 | .11 |
| 120 | 3000 | | 5 | 20.5 | 5 | 25.8 | .028 | 1.47 | .238 | .858 | .06 |
| 37 | 4050 | | 257 | 19.0 | 256 | 19.5 | .52 | 1.22 | .022 | .995 | .36 |
| 121 | 3000 | | 23 | 17.0 | 22 | 17.8 | .064 | 1.69 | .039 | .947 | .30 |
| 172 | 10 | | 44 | 16.8 | 44 | 16.8 | 1.83 | 1.06 | .000 | 1.000 | 1.00? |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 51

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE K* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | HYDROGRAPH INFLOW PEAK (CFS) | INFLOW TIME (HR) | OUTFLOW PEAK (CFS) | OUTFLOW TIME (HR) | ROUTING PARAMETERS Q-A EQ. COEFF (X) | POWER (M) | LENGTH FACTOR (k*) | PEAK RATIO Q/I (Q*) | ATT-KIN COEFF (C) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ALTERNATE 1 STORM 8 | | | | | | | | | | | |
| 126 | 5050 | | 297 | 18.5 | 295 | 19.5 | .17 | 1.47 | .012 | .994 | .39 |
| 125 | 4388 | | 1 | 16.8 | 1 | 17.3 | 2.00 | 1.32 | .018 | .987 | .40 |
| 176 | 10 | | 41 | 17.0 | 41 | 17.0 | 2.63 | 1.00 | .000 | 1.000 | 1.00? |
| 140 | 4100 | | 779 | 18.8 | 773 | 19.8 | .31 | 1.23 | .010 | .992 | .32 |
| 177 | 10 | | 1 | 17.0 | 1 | 17.0 | 1.00 | 1.00 | .000 | 1.000 | 1.00? |
| 124 | 1100 | | 2 | 17.3 | 2 | 17.8 | .050 | 1.90 | .007 | .991 | .40 |
| 197 | 10 | | 45 | 17.3 | 45 | 17.3 | 47.37 | 1.00 | .000 | 1.000 | 1.00? |
| 198 | 10 | | 2 | 17.3 | 2 | 17.3 | .53 | 1.58 | .000 | 1.000 | 1.00? |
| 141 | 4600 | | 789 | 19.8 | 778 | 21.0 | .93 | 1.06 | .024 | .986 | .24 |
| 181 | 2000 | | 1 | 19.8 | 1 | 21.8 | .037 | 2.00 | .037 | .932 | .15 |
| 199 | 3500 | | 7 | 25.3 | 7 | 27.8 | .010 | 2.00 | .005 | .978 | .13 |
| 191 | 600 | | 0 | 17.0 | 0 | 17.0 | 1.75 | 1.00 | .005 | 1.000 | 1.00? |
| 41 | 3300 | | 809 | 20.8 | 808 | 21.0 | .008 | 1.92 | .000 | .999 | .69? |
| 190 | 4500 | | 78 | 17.0 | 78 | 17.3 | .12 | 2.00 | .002 | .994 | .76? |

| | | | | | | |
|---|---|---|---|---|---|---|
| ALTERNATE | 1 | 614 | 391 | 321 | 251 | 186 |
| XSECTION 4 | 2.66 | | | | | |
| ALTERNATE | 1 | 618 | 394 | 323 | 253 | 188 |
| XSECTION 5 | .56 | | | | | |
| ALTERNATE | 1 | 218 | 161 | 140 | 113 | 85 |
| XSECTION 6 | .61 | | | | | |
| ALTERNATE | 1 | 236 | 175 | 151 | 121 | 92 |
| XSECTION 7 | .83 | | | | | |
| ALTERNATE | 1 | 321 | 238 | 206 | 166 | 126 |
| XSECTION 8 | 3.48 | | | | | |
| ALTERNATE | 1 | 881 | 578 | 476 | 377 | 276 |
| XSECTION 9 | 3.65 | | | | | |
| ALTERNATE | 1 | 907 | 597 | 492 | 391 | 288 |
| XSECTION 10 | 3.70 | | | | | |
| ALTERNATE | 1 | 916 | 602 | 497 | 395 | 291 |
| XSECTION 21 | .61 | | | | | |
| ALTERNATE | 1 | 188 | 145 | 128 | 104 | 78 |
| XSECTION 22 | .67 | | | | | |
| ALTERNATE | 1 | 211 | 162 | 144 | 116 | 87 |
| XSECTION 23 | 1.22 | | | | | |
| ALTERNATE | 1 | 364 | 266 | 233 | 187 | 142 |
| XSECTION 24 | 1.29 | | | | | |
| ALTERNATE | 1 | 378 | 278 | 245 | 197 | 150 |
| XSECTION 25 | .13 | | | | | |
| ALTERNATE | 1 | 64 | 48 | 42 | 34 | 26 |
| XSECTION 26 | 1.41 | | | | | |
| ALTERNATE | 1 | 422 | 311 | 281 | 229 | 174 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 54

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| XSECTION 27 | 1.44 | | | | | |
| ALTERNATE | 1 | 428 | 317 | 288 | 233 | 178 |
| XSECTION 28 | 1.48 | | | | | |
| ALTERNATE | 1 | 443 | 330 | 300 | 244 | 186 |
| XSECTION 29 | 1.49 | | | | | |
| ALTERNATE | 1 | 448 | 336 | 305 | 248 | 189 |
| XSECTION 30 | 1.91 | | | | | |
| ALTERNATE | 1 | 608 | 454 | 407 | 331 | 253 |
| XSECTION 31 | 1.95 | | | | | |
| ALTERNATE | 1 | 623 | 467 | 419 | 341 | 260 |
| XSECTION 32 | 2.03 | | | | | |
| ALTERNATE | 1 | 658 | 497 | 444 | 362 | 277 |

| | | | | | | |
|---|---|---|---|---|---|---|
| XSECTION 122 | .52 | | | | | |
| ALTERNATE 1 | | 120 | 81 | 67 | 51 | 35 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 56

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| XSECTION 123 | .22 | | | | | |
| ALTERNATE 1 | | 119 | 90 | 79 | 65 | 51 |
| XSECTION 124 | .33 | | | | | |
| ALTERNATE 1 | | 170 | 127 | 111 | 91 | 70 |
| XSECTION 125 | .41 | | | | | |
| ALTERNATE 1 | | 199 | 151 | 132 | 110 | 86 |
| XSECTION 126 | 7.24 | | | | | |
| ALTERNATE 1 | | 1929 | 1356 | 1179 | 964 | 720 |
| XSECTION 127 | .70 | | | | | |
| ALTERNATE 1 | | 403 | 272 | 221 | 162 | 99 |
| XSECTION 128 | .32 | | | | | |
| ALTERNATE 1 | | 159 | 120 | 105 | 88 | 69 |
| XSECTION 129 | .31 | | | | | |
| ALTERNATE 1 | | 154 | 115 | 100 | 83 | 64 |
| XSECTION 130 | .54 | | | | | |
| ALTERNATE 1 | | 192 | 118 | 90 | 52 | 18 |
| XSECTION 139 | .80 | | | | | |
| ALTERNATE 1 | | 299 | 218 | 187 | 151 | 113 |
| XSECTION 140 | .34 | | | | | |
| ALTERNATE 1 | | 162 | 120 | 104 | 85 | 65 |
| XSECTION 141 | .54 | | | | | |
| ALTERNATE 1 | | 238 | 176 | 153 | 125 | 95 |
| XSECTION 142 | 18.46 | | | | | |
| ALTERNATE 1 | | 3033 | 1208 | 1150 | 1087 | 1019 |
| XSECTION 143 | .54 | | | | | |
| ALTERNATE 1 | | 232 | 164 | 138 | 108 | 77 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 57

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| XSECTION 144 | .57 | | | | | |
| ALTERNATE 1 | | 227 | 161 | 137 | 108 | 78 |
| XSECTION 145 | 20.23 | | | | | |

| STRUCTURE ID | AREA (SQ MI) | STORM NUMBERS 6 | 7 | 8 |
|---|---|---|---|---|
| STRUCTURE 90 | 9.39 | | | |
| ALTERNATE 1 | | 15 | 11 | 7 |
| STRUCTURE 89 | 1.24 | | | |
| ALTERNATE 1 | | 73 | 54 | 41 |
| STRUCTURE 60 | .67 | | | |
| ALTERNATE 1 | | 68 | 49 | 36 |
| STRUCTURE 50 | 1.29 | | | |
| ALTERNATE 1 | | 117 | 82 | 59 |
| STRUCTURE 40 | 1.41 | | | |
| ALTERNATE 1 | | 135 | 95 | 69 |
| STRUCTURE 30 | 1.49 | | | |
| ALTERNATE 1 | | 148 | 105 | 76 |
| STRUCTURE 20 | 1.95 | | | |
| ALTERNATE 1 | | 205 | 147 | 108 |

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TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 8UL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 59

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | DRAINAGE AREA (SQ MI) | STORM NUMBERS 6 | 7 | 8 |
|---|---|---|---|---|
| STRUCTURE 10 | 2.26 | | | |
| ALTERNATE 1 | | 239 | 173 | 128 |
| STRUCTURE 5 | 2.10 | | | |
| ALTERNATE 1 | | 226 | 162 | 120 |
| STRUCTURE 2 | .83 | | | |
| ALTERNATE 1 | | 97 | 69 | 52 |
| STRUCTURE 1 | .50 | | | |
| ALTERNATE 1 | | 62 | 43 | 33 |
| XSECTION 1 | 2.49 | | | |
| ALTERNATE 1 | | 142 | 105 | 77 |
| XSECTION 2 | 2.55 | | | |
| ALTERNATE 1 | | 144 | 106 | 78 |
| XSECTION 3 | 2.63 | | | |
| ALTERNATE 1 | | 147 | 109 | 81 |
| XSECTION 4 | 2.66 | | | |
| ALTERNATE 1 | | 148 | 110 | 82 |
| XSECTION 5 | .56 | | | |
| ALTERNATE 1 | | 66 | 46 | 35 |
| XSECTION 6 | .61 | | | |
| ALTERNATE 1 | | 71 | 49 | 37 |
| XSECTION 7 | .83 | | | |
| ALTERNATE 1 | | 99 | 70 | 52 |
| XSECTION 8 | 3.48 | | | |

| | | | | |
|---|---|---|---|---|
| ALTERNATE | 1 | 220 | 158 | 117 |
| XSECTION 34 | 2.07 | | | |
| ALTERNATE | 1 | 222 | 159 | 118 |
| XSECTION 35 | 2.09 | | | |
| ALTERNATE | 1 | 225 | 161 | 119 |
| XSECTION 36 | 2.10 | | | |
| ALTERNATE | 1 | 226 | 162 | 120 |
| XSECTION 37 | .33 | | | |
| ALTERNATE | 1 | 42 | 29 | 20 |
| XSECTION 38 | 2.26 | | | |
| ALTERNATE | 1 | 246 | 176 | 130 |
| XSECTION 39 | 5.96 | | | |
| ALTERNATE | 1 | 453 | 332 | 249 |
| XSECTION 40 | .23 | | | |
| ALTERNATE | 1 | 28 | 19 | 13 |
| XSECTION 41 | .27 | | | |
| ALTERNATE | 1 | 23 | 15 | 10 |
| XSECTION 42 | 18.19 | | | |
| ALTERNATE | 1 | 954 | 908 | 809 |
| XSECTION 81 | .69 | | | |
| ALTERNATE | 1 | 146 | 107 | 79 |
| XSECTION 83 | 7.26 | | | |
| ALTERNATE | 1 | 436 | 419 | 405 |
| XSECTION 91 | 8.25 | | | |
| ALTERNATE | 1 | 700 | 508 | 375 |

1
TR20 ---------- SCS -
WHC WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00 20X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2 2.04TEST
15:29:38 SUMMARY, JOB NO. 1 PAGE 62

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 6 | 7 | 8 |
|---|---|---|---|---|
| XSECTION 92 | 15.50 | | | |
| ALTERNATE | 1 | 1136 | 926 | 779 |
| XSECTION 93 | 19.12 | | | |
| ALTERNATE | 1 | 1119 | 999 | 869 |
| XSECTION 100 | 2.47 | | | |
| ALTERNATE | 1 | 170 | 117 | 82 |
| XSECTION 107 | 1.46 | | | |
| ALTERNATE | 1 | 126 | 93 | 72 |
| XSECTION 120 | .25 | | | |
| ALTERNATE | 1 | 12 | 7 | 5 |
| XSECTION 121 | .31 | | | |
| ALTERNATE | 1 | 43 | 31 | 22 |
| XSECTION 122 | .52 | | | |
| ALTERNATE | 1 | 25 | 16 | 10 |

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TR20 ------------------------------------------------------------------- SCS -
WHC      WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00  2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2   2.04TEST
15:29:38                    SUMMARY, JOB NO.   1                      PAGE  64


                            SUMMARY TABLE 3
                            ---------------
     STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
     QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

XSECTION/          DRAINAGE
STRUCTURE            AREA       STORM NUMBERS.....
  ID                (SQ MI)         6         7         8


XSECTION  176          .21
---------------------------
   ALTERNATE    1                   69        53        41

XSECTION  177          .21
---------------------------
   ALTERNATE    1                    1         1         1

XSECTION  178         7.45
---------------------------
   ALTERNATE    1                  614       446       330

XSECTION  179          .47
---------------------------
   ALTERNATE    1                    3         3         2

XSECTION  180         7.92
---------------------------
   ALTERNATE    1                  894       871       789

XSECTION  181         8.15
---------------------------
   ALTERNATE    1                  264        73        13

XSECTION  182         9.39
---------------------------
   ALTERNATE    1                  300        99        54

XSECTION  183        17.85
---------------------------
   ALTERNATE    1                  954       908       808

XSECTION  190          .35
---------------------------
   ALTERNATE    1                  146       106        78

XSECTION  191          .35
---------------------------
   ALTERNATE    1                   1?         0         0

XSECTION  197          .37
---------------------------
   ALTERNATE    1                   90        64        45

XSECTION  198          .37
---------------------------
   ALTERNATE    1                    4         2         2

XSECTION  199         9.39
---------------------------
   ALTERNATE    1                   15        11         7
1
TR20 ------------------------------------------------------------------- SCS -
WHC      WILLOW-HIGGINS CR - FN:6TRES70.T20 07/12/00  2@5X10 DIV 450 AT VERSION
12/17/** 650AF ADDED TO 34 BUL 70 STR 90-1350+AF WITH NRCS CHAN RMB2   2.04TEST



END OF  1 JOBS IN THIS RUN




                    SCS  TR-20,  VERSION 2.04TEST
                           WHC       FILES

     INPUT  = clomr.t20                              , GIVEN DATA FILE
     OUTPUT = clomr.out                              , DATED 12/17/**,15:29:38

              FILES GENERATED - DATED 12/17/**,15:29:38
```

ADDHYD 4 38 3 4 5 1 SOUTH TRIB. TOTAL

The effective flow rates published in the FIS were superseded in the late 1980s (approximately 1988). A new hydrologic model, including enhanced subbasins, was completed and calibrated to the 1987 storm event. These flow rates upstream of York Road have been used since this time. This hydrologic model was again revised to reflect the construction of Structure 140 and the flows downstream of this structure have been certified by IDNR-OWR.

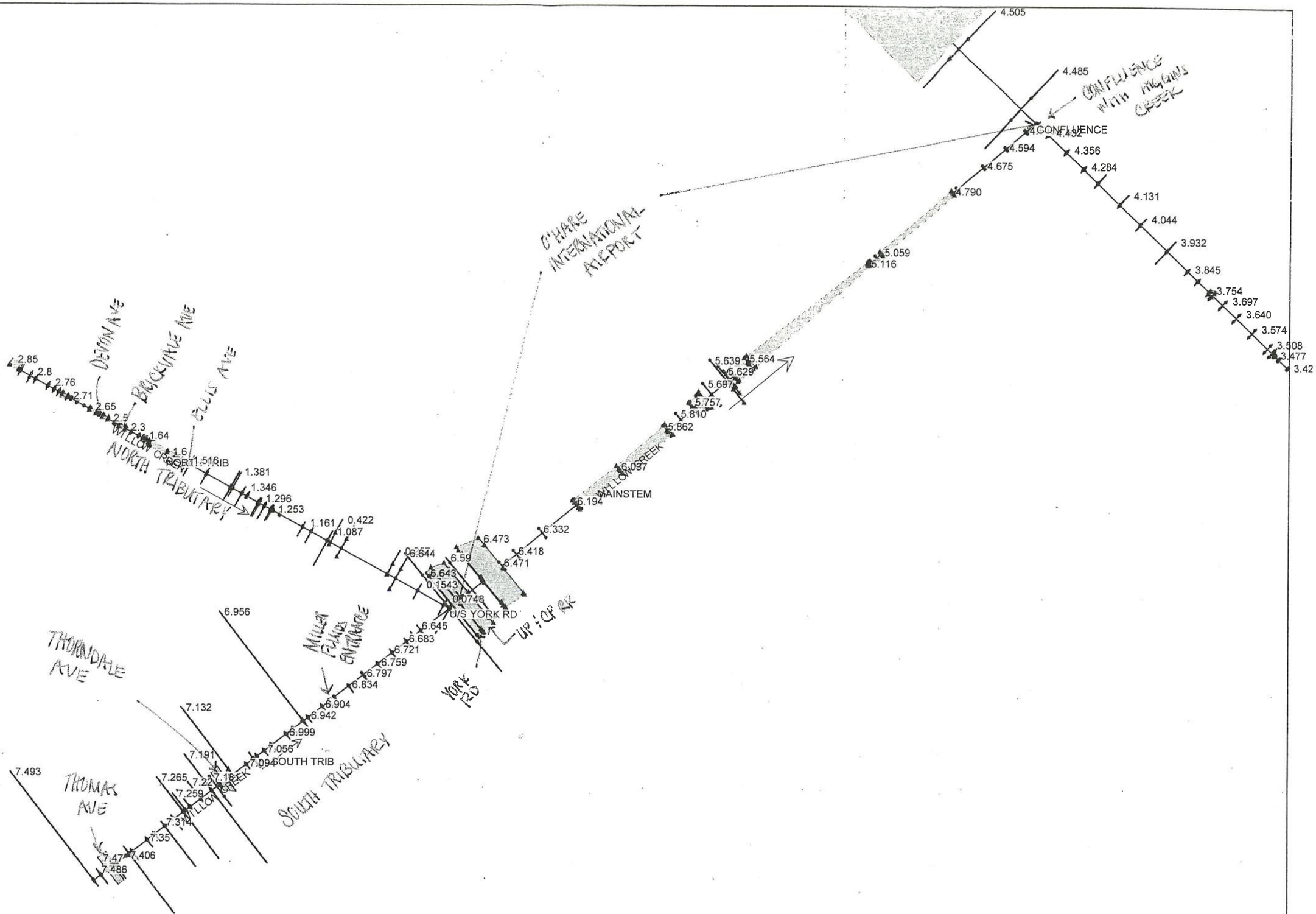
The effective HEC-2 hydraulic model for the South Unnamed Tributary of Willow Creek upstream of York Road does not include the numerous projects that have taken place along this watercourse. CBBEL developed a HEC-RAS model for the South Tributary of Willow Creek that reflects all of the projects to date, including the Thorndale Avenue and York Road crossing improvements. This model was approved for the York Road and Thorndale Ave improvements by both DuPage County and IDNR-OWR.

A HEC-RAS model for Willow Creek from the upstream face of the Canadian and Northwestern Railroad to the confluence with the Des Plaines River is being used for Completion Phase (Phase 2) permitting purposes within the O'Hare Airport.

The effective HEC-2 hydraulic model for the North Unnamed Tributary of Willow Creek has been revised and reviewed by DuPage County and IDNR-OWR for various construction activities along the watercourse.

# SECTION 8

## BASELINE CONDITIONS ANALYSIS




None of the XS's are Geo-Referenced (- Geo-Ref user entered XS - Geo-Ref interpolated XS - Non Geo-Ref user entered XS - Non Geo-Ref interpolated XS)

HEC-RAS Plan: Baseline

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 4.518 | 10-YEAR | 644.73 | 644.69 | 0.04 | 0.05 | 0.01 | 11.61 | 870.78 | 11.61 | 68.69 |
| MAINSTEM | 4.518 | 50-YEAR | 646.41 | 646.33 | 0.08 | 0.06 | 0.01 | 22.42 | 1414.15 | 22.42 | 70.33 |
| MAINSTEM | 4.518 | 100-YEAR | 647.00 | 646.91 | 0.09 | 0.06 | 0.01 | 27.25 | 1627.50 | 27.25 | 70.91 |
| | | | | | | | | | | | |
| MAINSTEM | 4.594 | 10-YEAR | 644.77 | 644.73 | 0.04 | 0.04 | 0.00 | 11.67 | 870.66 | 11.67 | 68.73 |
| MAINSTEM | 4.594 | 50-YEAR | 646.48 | 646.40 | 0.08 | 0.07 | 0.00 | 22.57 | 1413.87 | 22.57 | 70.40 |
| MAINSTEM | 4.594 | 100-YEAR | 647.07 | 646.98 | 0.09 | 0.07 | 0.00 | 27.43 | 1627.14 | 27.43 | 70.98 |
| | | | | | | | | | | | |
| MAINSTEM | 4.675 | 10-YEAR | 644.82 | 644.78 | 0.04 | 0.05 | 0.00 | 11.67 | 870.65 | 11.67 | 68.72 |
| MAINSTEM | 4.675 | 50-YEAR | 646.55 | 646.47 | 0.08 | 0.07 | 0.00 | 22.64 | 1413.71 | 22.64 | 70.41 |
| MAINSTEM | 4.675 | 100-YEAR | 647.15 | 647.06 | 0.09 | 0.08 | 0.00 | 27.55 | 1626.91 | 27.55 | 71.01 |
| | | | | | | | | | | | |
| MAINSTEM | 4.773 | 10-YEAR | 644.88 | 644.84 | 0.03 | 0.05 | 0.00 | 10.26 | 764.66 | 9.07 | 68.37 |
| MAINSTEM | 4.773 | 50-YEAR | 646.62 | 646.57 | 0.06 | 0.07 | 0.00 | 19.17 | 1190.88 | 16.95 | 70.04 |
| MAINSTEM | 4.773 | 100-YEAR | 647.24 | 647.17 | 0.07 | 0.08 | 0.00 | 24.25 | 1423.32 | 21.43 | 70.63 |
| | | | | | | | | | | | |
| MAINSTEM | 4.790 | 10-YEAR | 644.93 | 644.81 | 0.12 | 0.01 | 0.04 | | 784.00 | | 68.35 |
| MAINSTEM | 4.790 | 50-YEAR | 646.71 | 646.51 | 0.20 | 0.02 | 0.07 | | 1227.00 | | 69.99 |
| MAINSTEM | 4.790 | 100-YEAR | 647.35 | 647.09 | 0.26 | 0.02 | 0.09 | | 1469.00 | | 70.56 |
| | | | | | | | | | | | |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 645.42 | 645.28 | 0.15 | | | | 784.00 | | 65.50 |
| MAINSTEM | 5.059 | 50-YEAR | 647.81 | 647.60 | 0.21 | | | | 1227.00 | | 67.78 |
| MAINSTEM | 5.059 | 100-YEAR | 648.96 | 648.71 | 0.25 | | | | 1469.00 | | 68.88 |
| | | | | | | | | | | | |
| MAINSTEM | 5.076 | 10-YEAR | 645.46 | 645.41 | 0.05 | 0.03 | 0.01 | | 784.00 | | 65.48 |
| MAINSTEM | 5.076 | 50-YEAR | 647.85 | 647.79 | 0.07 | 0.03 | 0.01 | | 1227.00 | | 67.85 |
| MAINSTEM | 5.076 | 100-YEAR | 649.00 | 648.93 | 0.07 | 0.03 | 0.02 | | 1469.00 | | 68.98 |
| | | | | | | | | | | | |
| MAINSTEM | 5.104 | 10-YEAR | 645.51 | 645.41 | 0.10 | 0.03 | 0.02 | | 784.00 | | 65.32 |
| MAINSTEM | 5.104 | 50-YEAR | 647.90 | 647.76 | 0.14 | 0.03 | 0.02 | | 1227.00 | | 67.69 |
| MAINSTEM | 5.104 | 100-YEAR | 649.06 | 648.90 | 0.16 | 0.03 | 0.03 | | 1469.00 | | 68.83 |
| | | | | | | | | | | | |
| MAINSTEM | 5.109 | 10-YEAR | 645.54 | 645.37 | 0.17 | 0.01 | 0.02 | | 784.00 | | 65.24 |
| MAINSTEM | 5.109 | 50-YEAR | 647.94 | 647.71 | 0.24 | 0.01 | 0.03 | | 1227.00 | | 67.60 |
| MAINSTEM | 5.109 | 100-YEAR | 649.10 | 648.83 | 0.27 | 0.01 | 0.03 | | 1469.00 | | 68.73 |
| | | | | | | | | | | | |
| MAINSTEM | 5.110 | 10-YEAR | 645.56 | 645.33 | 0.23 | 0.00 | 0.02 | | 784.00 | | 44.59 |
| MAINSTEM | 5.110 | 50-YEAR | 647.98 | 647.64 | 0.34 | 0.00 | 0.03 | | 1227.00 | | 50.16 |
| MAINSTEM | 5.110 | 100-YEAR | 649.14 | 648.75 | 0.40 | 0.00 | 0.04 | | 1469.00 | | 52.83 |
| | | | | | | | | | | | |
| MAINSTEM | 5.116 | 10-YEAR | 645.57 | 645.33 | 0.24 | 0.01 | 0.00 | | 784.00 | | 25.00 |
| MAINSTEM | 5.116 | 50-YEAR | 647.99 | 647.64 | 0.35 | 0.01 | 0.01 | 0.02 | 1226.96 | 0.02 | 26.44 |
| MAINSTEM | 5.116 | 100-YEAR | 649.16 | 648.75 | 0.41 | 0.01 | 0.01 | 0.25 | 1468.50 | 0.25 | 31.23 |
| | | | | | | | | | | | |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 646.33 | 646.04 | 0.29 | | | | 634.00 | | 25.50 |
| MAINSTEM | 5.606 | 50-YEAR | 649.94 | 649.63 | 0.30 | | | | 1056.00 | | 57.44 |
| MAINSTEM | 5.606 | 100-YEAR | 651.85 | 651.57 | 0.28 | | | | 1227.00 | | 80.97 |
| | | | | | | | | | | | |
| MAINSTEM | 5.610 | 10-YEAR | 646.36 | 646.34 | 0.02 | 0.00 | 0.03 | | 634.00 | | 125.36 |
| MAINSTEM | 5.610 | 50-YEAR | 649.97 | 649.95 | 0.02 | 0.00 | 0.03 | | 1056.00 | | 145.88 |
| MAINSTEM | 5.610 | 100-YEAR | 651.88 | 651.86 | 0.02 | 0.00 | 0.03 | | 1227.00 | | 156.76 |
| | | | | | | | | | | | |
| MAINSTEM | 5.629 | 10-YEAR | 646.36 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 215.49 |
| MAINSTEM | 5.629 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 237.14 |
| MAINSTEM | 5.629 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 248.61 |
| | | | | | | | | | | | |
| MAINSTEM | 5.632 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 411.47 |
| MAINSTEM | 5.632 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 433.12 |
| MAINSTEM | 5.632 | 100-YEAR | 651.88 | 651.88 | 0.00 | 0.00 | 0.00 | | 1227.00 | | 444.58 |
| | | | | | | | | | | | |
| MAINSTEM | 5.639 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 737.22 |
| MAINSTEM | 5.639 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 758.86 |
| MAINSTEM | 5.639 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 770.33 |
| | | | | | | | | | | | |
| MAINSTEM | 5.697 | 10-YEAR | 646.41 | 646.37 | 0.04 | 0.03 | 0.01 | | 634.00 | | 311.74 |
| MAINSTEM | 5.697 | 50-YEAR | 649.99 | 649.96 | 0.03 | 0.01 | 0.01 | | 1056.00 | | 333.27 |
| MAINSTEM | 5.697 | 100-YEAR | 651.90 | 651.87 | 0.02 | 0.01 | 0.01 | | 1227.00 | | 344.73 |
| | | | | | | | | | | | |

HEC-RAS Plan: Baseline (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 5.720 | 10-YEAR | 646.51 | 646.35 | 0.16 | 0.06 | 0.04 | | 634.00 | | 161.07 |
| MAINSTEM | 5.720 | 50-YEAR | 650.05 | 649.91 | 0.14 | 0.02 | 0.03 | | 1056.00 | | 188.74 |
| MAINSTEM | 5.720 | 100-YEAR | 651.94 | 651.82 | 0.12 | 0.01 | 0.03 | | 1227.00 | | 203.61 |
| | | | | | | | | | | | |
| MAINSTEM | 5.725 | 10-YEAR | 646.59 | 646.28 | 0.31 | 0.03 | 0.04 | | 634.00 | | 93.92 |
| MAINSTEM | 5.725 | 50-YEAR | 650.10 | 649.82 | 0.28 | 0.01 | 0.04 | | 1056.00 | | 126.73 |
| MAINSTEM | 5.725 | 100-YEAR | 651.99 | 651.74 | 0.25 | 0.01 | 0.04 | | 1227.00 | | 144.48 |
| | | | | | | | | | | | |
| MAINSTEM | 5.727 | 10-YEAR | 646.68 | 646.23 | 0.45 | 0.02 | 0.07 | | 634.00 | | 25.00 |
| MAINSTEM | 5.727 | 50-YEAR | 650.18 | 649.77 | 0.41 | 0.01 | 0.06 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.727 | 100-YEAR | 652.05 | 651.69 | 0.36 | 0.01 | 0.06 | | 1227.00 | | 27.98 |
| | | | | | | | | | | | |
| MAINSTEM | 5.732 | 10-YEAR | 646.81 | 646.38 | 0.44 | 0.13 | 0.00 | | 634.00 | | 25.00 |
| MAINSTEM | 5.732 | 50-YEAR | 650.24 | 649.84 | 0.41 | 0.07 | 0.00 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.732 | 100-YEAR | 652.10 | 651.74 | 0.36 | 0.05 | 0.00 | | 1227.00 | | 27.64 |
| | | | | | | | | | | | |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 647.18 | 646.81 | 0.37 | | | | 634.00 | | 26.00 |
| MAINSTEM | 5.757 | 50-YEAR | 650.55 | 650.18 | 0.37 | | | | 1056.00 | | 26.00 |
| MAINSTEM | 5.757 | 100-YEAR | 652.40 | 652.07 | 0.33 | | | | 1227.00 | | 26.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.759 | 10-YEAR | 647.22 | 647.20 | 0.03 | 0.01 | 0.03 | | 634.00 | | 100.00 |
| MAINSTEM | 5.759 | 50-YEAR | 650.59 | 650.56 | 0.03 | 0.01 | 0.03 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.759 | 100-YEAR | 652.43 | 652.41 | 0.03 | 0.00 | 0.03 | | 1227.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.810 | 10-YEAR | 647.29 | 647.24 | 0.06 | 0.06 | 0.01 | | 634.00 | | 100.00 |
| MAINSTEM | 5.810 | 50-YEAR | 650.62 | 650.58 | 0.04 | 0.03 | 0.00 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.810 | 100-YEAR | 652.45 | 652.42 | 0.03 | 0.02 | 0.00 | | 1227.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.860 | 10-YEAR | 648.57 | 647.64 | 0.93 | 0.42 | 0.26 | | 634.00 | | 100.00 |
| MAINSTEM | 5.860 | 50-YEAR | 650.83 | 650.43 | 0.40 | 0.10 | 0.11 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.860 | 100-YEAR | 652.58 | 652.31 | 0.28 | 0.06 | 0.07 | | 1227.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.862 | 10-YEAR | 649.70 | 648.45 | 1.26 | 0.73 | 0.16 | | 634.00 | | 28.35 |
| MAINSTEM | 5.862 | 50-YEAR | 651.40 | 650.19 | 1.20 | 0.17 | 0.40 | | 1056.00 | | 28.35 |
| MAINSTEM | 5.862 | 100-YEAR | 652.90 | 652.14 | 0.76 | 0.07 | 0.24 | | 1227.00 | | 28.35 |
| | | | | | | | | | | | |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 651.96 | 651.60 | 0.37 | | | | 634.00 | | 33.00 |
| MAINSTEM | 6.037 | 50-YEAR | 653.74 | 653.22 | 0.52 | | | | 1056.00 | | 33.00 |
| MAINSTEM | 6.037 | 100-YEAR | 654.46 | 653.90 | 0.56 | | | | 1227.00 | | 33.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 652.40 | 652.15 | 0.25 | | | | 603.00 | | 34.00 |
| MAINSTEM | 6.190 | 50-YEAR | 654.26 | 653.91 | 0.35 | | | | 996.00 | | 34.00 |
| MAINSTEM | 6.190 | 100-YEAR | 655.00 | 654.62 | 0.38 | | | | 1156.00 | | 34.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.194 | 10-YEAR | 652.44 | 652.41 | 0.03 | 0.01 | 0.02 | | 603.00 | | 100.00 |
| MAINSTEM | 6.194 | 50-YEAR | 654.31 | 654.27 | 0.04 | 0.01 | 0.03 | | 996.00 | | 100.00 |
| MAINSTEM | 6.194 | 100-YEAR | 655.04 | 655.00 | 0.04 | 0.01 | 0.03 | | 1156.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.332 | 10-YEAR | 652.55 | 652.52 | 0.03 | 0.11 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.332 | 50-YEAR | 654.41 | 654.37 | 0.04 | 0.10 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.332 | 100-YEAR | 655.14 | 655.10 | 0.04 | 0.10 | 0.00 | | 1156.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.418 | 10-YEAR | 652.63 | 652.61 | 0.03 | 0.09 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.418 | 50-YEAR | 654.49 | 654.45 | 0.04 | 0.08 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.418 | 100-YEAR | 655.22 | 655.18 | 0.04 | 0.08 | 0.00 | | 1156.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.471 | 10-YEAR | 652.73 | 652.65 | 0.08 | 0.08 | 0.02 | | 603.00 | | 55.30 |
| MAINSTEM | 6.471 | 50-YEAR | 654.59 | 654.48 | 0.12 | 0.08 | 0.02 | | 996.00 | | 55.30 |
| MAINSTEM | 6.471 | 100-YEAR | 655.32 | 655.19 | 0.13 | 0.07 | 0.03 | | 1156.00 | | 55.30 |
| | | | | | | | | | | | |
| MAINSTEM | 6.473 | 10-YEAR | 652.79 | 652.61 | 0.18 | 0.01 | 0.05 | | 603.00 | | 40.00 |
| MAINSTEM | 6.473 | 50-YEAR | 654.67 | 654.42 | 0.25 | 0.01 | 0.07 | | 996.00 | | 40.00 |
| MAINSTEM | 6.473 | 100-YEAR | 655.40 | 655.13 | 0.27 | 0.01 | 0.07 | | 1156.00 | | 40.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | |
| | | | | | | | | | | | |

HEC-RAS Plan: Baseline (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 6.538 | 10-YEAR | 653.03 | 652.83 | 0.20 | | | | 603.00 | | 38.00 |
| MAINSTEM | 6.538 | 50-YEAR | 654.97 | 654.69 | 0.27 | | | | 996.00 | | 38.00 |
| MAINSTEM | 6.538 | 100-YEAR | 655.72 | 655.42 | 0.29 | | | | 1156.00 | | 38.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.540 | 10-YEAR | 653.05 | 653.04 | 0.01 | 0.00 | 0.02 | | 603.00 | | 191.09 |
| MAINSTEM | 6.540 | 50-YEAR | 654.99 | 654.98 | 0.02 | 0.00 | 0.03 | | 996.00 | | 220.15 |
| MAINSTEM | 6.540 | 100-YEAR | 655.75 | 655.73 | 0.02 | 0.00 | 0.03 | | 1156.00 | | 231.41 |
| | | | | | | | | | | | |
| MAINSTEM | 6.59 | 10-YEAR | 653.07 | 653.06 | 0.01 | 0.02 | 0.00 | | 603.00 | | 196.42 |
| MAINSTEM | 6.59 | 50-YEAR | 655.03 | 655.01 | 0.01 | 0.03 | 0.00 | 0.00 | 996.00 | | 1008.18 |
| MAINSTEM | 6.59 | 100-YEAR | 655.77 | 655.76 | 0.01 | 0.02 | 0.00 | 1.69 | 1154.31 | | 1050.50 |
| | | | | | | | | | | | |
| MAINSTEM | 6.6 | 10-YEAR | 653.14 | 653.03 | 0.11 | 0.02 | 0.05 | | 603.00 | | 199.69 |
| MAINSTEM | 6.6 | 50-YEAR | 655.13 | 654.99 | 0.14 | 0.04 | 0.07 | | 996.00 | | 234.83 |
| MAINSTEM | 6.6 | 100-YEAR | 655.86 | 655.70 | 0.16 | 0.02 | 0.08 | | 1156.00 | | 247.66 |
| | | | | | | | | | | | |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 653.44 | 653.40 | 0.04 | | | 13.45 | 581.01 | 8.54 | 538.08 |
| MAINSTEM | 6.635 | 50-YEAR | 655.48 | 655.43 | 0.05 | | | 24.94 | 950.29 | 20.78 | 1619.59 |
| MAINSTEM | 6.635 | 100-YEAR | 656.23 | 656.18 | 0.06 | | | 29.64 | 1100.42 | 25.94 | 1731.59 |
| | | | | | | | | | | | |
| MAINSTEM | 6.637 | 10-YEAR | 653.45 | 653.44 | 0.01 | 0.00 | 0.01 | 70.35 | 510.84 | 21.80 | 551.85 |
| MAINSTEM | 6.637 | 50-YEAR | 655.50 | 655.50 | 0.00 | 0.00 | 0.02 | 79.93 | 858.95 | 57.12 | 1629.53 |
| MAINSTEM | 6.637 | 100-YEAR | 656.25 | 656.25 | 0.00 | 0.00 | 0.02 | 80.04 | 991.75 | 84.22 | 1742.24 |
| | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 653.57 | 653.34 | 0.23 | 0.01 | 0.11 | | 603.00 | | 412.27 |
| MAINSTEM | 6.639 | 50-YEAR | 655.55 | 655.45 | 0.11 | 0.00 | 0.05 | | 996.00 | | 1621.88 |
| MAINSTEM | 6.639 | 100-YEAR | 656.30 | 656.20 | 0.10 | 0.00 | 0.05 | | 1156.00 | | 1735.12 |
| | | | | | | | | | | | |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 654.54 | 653.93 | 0.61 | 0.01 | 0.01 | | 603.00 | | 51.46 |
| MAINSTEM | 6.642 | 50-YEAR | 655.89 | 655.46 | 0.43 | 0.01 | 0.00 | | 996.00 | | 69.83 |
| MAINSTEM | 6.642 | 100-YEAR | 656.55 | 656.20 | 0.35 | 0.00 | 0.00 | | 1156.00 | | 78.73 |
| | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 654.73 | 654.32 | 0.41 | 0.13 | 0.06 | | 603.00 | | 56.14 |
| MAINSTEM | 6.643 | 50-YEAR | 655.98 | 655.58 | 0.40 | 0.07 | 0.01 | | 996.00 | | 71.26 |
| MAINSTEM | 6.643 | 100-YEAR | 656.61 | 656.27 | 0.33 | 0.05 | 0.00 | | 1156.00 | | 79.55 |
| | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 655.00 | 655.00 | 0.00 | 0.02 | 0.25 | | 586.12 | 16.88 | 1554.80 |
| MAINSTEM | 6.644 | 50-YEAR | 656.22 | 656.22 | 0.00 | 0.01 | 0.24 | 5.81 | 911.25 | 78.93 | 1738.11 |
| MAINSTEM | 6.644 | 100-YEAR | 656.81 | 656.81 | 0.00 | 0.01 | 0.20 | 13.70 | 1032.78 | 109.52 | 1826.54 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.645 | 10-YEAR | 655.73 | 655.18 | 0.55 | 0.10 | 0.16 | 94.68 | 205.34 | 13.98 | 54.47 |
| SOUTH TRIB | 6.645 | 50-YEAR | 656.39 | 655.94 | 0.45 | 0.03 | 0.13 | 212.50 | 268.25 | 25.25 | 62.14 |
| SOUTH TRIB | 6.645 | 100-YEAR | 656.91 | 656.65 | 0.27 | 0.02 | 0.08 | 272.77 | 265.80 | 31.43 | 69.25 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.664 | 10-YEAR | 656.48 | 656.28 | 0.21 | 0.72 | 0.03 | 105.64 | 190.31 | 18.04 | 49.31 |
| SOUTH TRIB | 6.664 | 50-YEAR | 657.11 | 656.78 | 0.33 | 0.71 | 0.01 | 188.17 | 286.11 | 31.72 | 53.60 |
| SOUTH TRIB | 6.664 | 100-YEAR | 657.40 | 657.07 | 0.33 | 0.47 | 0.02 | 221.61 | 311.01 | 37.38 | 56.09 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.683 | 10-YEAR | 656.90 | 656.63 | 0.26 | 0.40 | 0.02 | 64.85 | 223.48 | 25.67 | 37.11 |
| SOUTH TRIB | 6.683 | 50-YEAR | 657.67 | 657.25 | 0.42 | 0.53 | 0.03 | 117.82 | 341.53 | 46.65 | 41.29 |
| SOUTH TRIB | 6.683 | 100-YEAR | 657.94 | 657.49 | 0.45 | 0.50 | 0.04 | 138.27 | 376.99 | 54.74 | 42.95 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.721 | 10-YEAR | 657.60 | 657.36 | 0.24 | 0.70 | 0.00 | 43.87 | 238.18 | 31.94 | 36.35 |
| SOUTH TRIB | 6.721 | 50-YEAR | 658.54 | 658.19 | 0.35 | 0.86 | 0.01 | 85.22 | 361.38 | 59.40 | 46.60 |
| SOUTH TRIB | 6.721 | 100-YEAR | 658.81 | 658.44 | 0.37 | 0.87 | 0.01 | 102.95 | 398.00 | 69.05 | 49.70 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.759 | 10-YEAR | 658.12 | 657.94 | 0.19 | 0.51 | 0.01 | 51.87 | 227.34 | 34.79 | 36.08 |
| SOUTH TRIB | 6.759 | 50-YEAR | 659.13 | 658.87 | 0.27 | 0.59 | 0.01 | 97.05 | 343.87 | 65.09 | 41.08 |
| SOUTH TRIB | 6.759 | 100-YEAR | 659.42 | 659.13 | 0.29 | 0.60 | 0.01 | 113.25 | 380.79 | 75.96 | 42.49 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.797 | 10-YEAR | 658.55 | 658.41 | 0.14 | 0.43 | 0.00 | | 314.00 | | 36.40 |
| SOUTH TRIB | 6.797 | 50-YEAR | 659.61 | 659.42 | 0.19 | 0.47 | 0.01 | | 506.00 | | 41.65 |
| SOUTH TRIB | 6.797 | 100-YEAR | 659.91 | 659.71 | 0.20 | 0.48 | 0.01 | | 570.00 | | 43.13 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.834 | 10-YEAR | 658.90 | 658.77 | 0.13 | 0.34 | 0.00 | 46.08 | 204.14 | 63.78 | 44.24 |
| SOUTH TRIB | 6.834 | 50-YEAR | 659.98 | 659.81 | 0.17 | 0.37 | 0.00 | 85.35 | 302.52 | 118.13 | 51.55 |
| SOUTH TRIB | 6.834 | 100-YEAR | 660.29 | 660.11 | 0.18 | 0.37 | 0.00 | 99.31 | 333.24 | 137.45 | 53.60 |
| | | | | | | | | | | | |

HEC-RAS Plan: Baseline (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 6.872 | 10-YEAR | 659.25 | 659.07 | 0.18 | 0.33 | 0.03 | 43.40 | 235.44 | 35.16 | 33.76 |
| SOUTH TRIB | 6.872 | 50-YEAR | 660.38 | 660.12 | 0.25 | 0.35 | 0.04 | 82.32 | 356.99 | 66.69 | 38.47 |
| SOUTH TRIB | 6.872 | 100-YEAR | 660.69 | 660.42 | 0.28 | 0.36 | 0.05 | 96.36 | 395.58 | 78.06 | 39.79 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.879 Miller Fluids En | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 659.27 | 659.09 | 0.18 | | | 43.56 | 235.16 | 35.29 | 33.85 |
| SOUTH TRIB | 6.886 | 50-YEAR | 660.42 | 660.17 | 0.25 | | | 82.82 | 356.09 | 67.09 | 38.67 |
| SOUTH TRIB | 6.886 | 100-YEAR | 660.74 | 660.47 | 0.27 | | | 96.97 | 394.47 | 78.56 | 40.01 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.904 | 10-YEAR | 659.50 | 659.29 | 0.21 | 0.21 | 0.02 | 39.28 | 242.79 | 31.93 | 33.85 |
| SOUTH TRIB | 6.904 | 50-YEAR | 660.65 | 660.37 | 0.28 | 0.22 | 0.02 | 78.06 | 366.63 | 61.30 | 44.56 |
| SOUTH TRIB | 6.904 | 100-YEAR | 660.98 | 660.67 | 0.30 | 0.22 | 0.02 | 94.92 | 403.55 | 71.53 | 47.57 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.942 | 10-YEAR | 659.93 | 659.75 | 0.17 | 0.43 | 0.00 | 47.22 | 232.29 | 34.49 | 36.28 |
| SOUTH TRIB | 6.942 | 50-YEAR | 661.10 | 660.86 | 0.23 | 0.44 | 0.01 | 90.23 | 349.95 | 65.82 | 46.51 |
| SOUTH TRIB | 6.942 | 100-YEAR | 661.42 | 661.17 | 0.25 | 0.44 | 0.01 | 107.81 | 385.46 | 76.73 | 49.34 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.98 | 10-YEAR | 660.28 | 660.13 | 0.15 | 0.35 | 0.00 | 57.50 | 221.87 | 34.63 | 37.96 |
| SOUTH TRIB | 6.98 | 50-YEAR | 661.46 | 661.26 | 0.20 | 0.36 | 0.00 | 107.40 | 332.83 | 65.78 | 44.97 |
| SOUTH TRIB | 6.98 | 100-YEAR | 661.79 | 661.57 | 0.22 | 0.37 | 0.00 | 125.52 | 367.63 | 76.85 | 46.97 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.999 | 10-YEAR | 660.45 | 660.30 | 0.16 | 0.17 | 0.00 | 54.24 | 224.30 | 35.45 | 37.15 |
| SOUTH TRIB | 6.999 | 50-YEAR | 661.64 | 661.43 | 0.21 | 0.17 | 0.00 | 103.02 | 335.65 | 67.34 | 43.11 |
| SOUTH TRIB | 6.999 | 100-YEAR | 661.97 | 661.74 | 0.23 | 0.18 | 0.01 | 111.19 | 378.48 | 80.33 | 48.24 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.037 | 10-YEAR | 660.68 | 660.60 | 0.08 | 0.22 | 0.01 | 47.91 | 237.01 | 29.08 | 44.53 |
| SOUTH TRIB | 7.037 | 50-YEAR | 661.87 | 661.76 | 0.12 | 0.23 | 0.01 | 91.29 | 359.65 | 55.06 | 51.00 |
| SOUTH TRIB | 7.037 | 100-YEAR | 662.22 | 662.09 | 0.13 | 0.24 | 0.01 | 107.18 | 398.37 | 64.45 | 52.85 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.056 | 10-YEAR | 660.78 | 660.66 | 0.12 | 0.09 | 0.01 | 43.63 | 217.65 | 52.72 | 39.51 |
| SOUTH TRIB | 7.056 | 50-YEAR | 661.99 | 661.82 | 0.17 | 0.10 | 0.01 | 75.15 | 330.76 | 100.09 | 50.23 |
| SOUTH TRIB | 7.056 | 100-YEAR | 662.34 | 662.16 | 0.18 | 0.10 | 0.02 | 88.32 | 364.93 | 116.75 | 53.85 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.075 | 10-YEAR | 660.89 | 660.78 | 0.11 | 0.11 | 0.00 | 58.59 | 208.85 | 46.56 | 42.60 |
| SOUTH TRIB | 7.075 | 50-YEAR | 662.11 | 661.96 | 0.15 | 0.12 | 0.00 | 103.63 | 314.25 | 88.11 | 53.03 |
| SOUTH TRIB | 7.075 | 100-YEAR | 662.46 | 662.30 | 0.16 | 0.12 | 0.00 | 120.38 | 346.73 | 102.89 | 56.73 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.094 | 10-YEAR | 661.07 | 660.95 | 0.13 | 0.18 | 0.01 | 55.37 | 220.12 | 38.52 | 38.65 |
| SOUTH TRIB | 7.094 | 50-YEAR | 662.30 | 662.13 | 0.17 | 0.18 | 0.01 | 104.35 | 329.06 | 72.59 | 44.81 |
| SOUTH TRIB | 7.094 | 100-YEAR | 662.65 | 662.47 | 0.18 | 0.18 | 0.01 | 121.94 | 363.23 | 84.83 | 46.56 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.136 | 10-YEAR | 661.41 | 661.25 | 0.16 | 0.33 | 0.01 | 2.28 | 310.78 | 0.94 | 30.04 |
| SOUTH TRIB | 7.136 | 50-YEAR | 662.66 | 662.43 | 0.23 | 0.34 | 0.02 | 13.71 | 486.67 | 5.62 | 35.75 |
| SOUTH TRIB | 7.136 | 100-YEAR | 663.01 | 662.76 | 0.25 | 0.34 | 0.02 | 19.43 | 542.62 | 7.96 | 37.36 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.145 | 10-YEAR | 661.48 | 661.41 | 0.08 | 0.05 | 0.02 | | 287.00 | | 83.18 |
| SOUTH TRIB | 7.145 | 50-YEAR | 662.74 | 662.63 | 0.12 | 0.05 | 0.03 | | 461.00 | | 92.97 |
| SOUTH TRIB | 7.145 | 100-YEAR | 663.10 | 662.97 | 0.13 | 0.05 | 0.04 | | 517.00 | | 95.73 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.156 Thorndale Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.168 | 10-YEAR | 661.54 | 661.46 | 0.07 | | | | 287.00 | | 83.64 |
| SOUTH TRIB | 7.168 | 50-YEAR | 662.97 | 662.87 | 0.11 | | | | 461.00 | | 94.90 |
| SOUTH TRIB | 7.168 | 100-YEAR | 663.41 | 663.29 | 0.12 | | | | 517.00 | | 97.15 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.181 | 10-YEAR | 661.56 | 661.54 | 0.02 | 0.02 | 0.01 | | 287.00 | | 84.64 |
| SOUTH TRIB | 7.181 | 50-YEAR | 663.00 | 662.97 | 0.03 | 0.02 | 0.01 | | 461.00 | | 92.49 |
| SOUTH TRIB | 7.181 | 100-YEAR | 663.43 | 663.41 | 0.03 | 0.01 | 0.01 | | 517.00 | | 94.86 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.22 | 10-YEAR | 661.66 | 661.63 | 0.03 | 0.09 | 0.00 | 196.23 | 90.77 | | 85.68 |
| SOUTH TRIB | 7.22 | 50-YEAR | 663.06 | 663.04 | 0.03 | 0.06 | 0.00 | 337.21 | 123.79 | | 92.55 |
| SOUTH TRIB | 7.22 | 100-YEAR | 663.49 | 663.46 | 0.03 | 0.06 | 0.00 | 382.53 | 134.47 | | 94.64 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.247 | 10-YEAR | 661.73 | 661.70 | 0.03 | 0.07 | 0.00 | 219.80 | 67.20 | | 84.43 |
| SOUTH TRIB | 7.247 | 50-YEAR | 663.11 | 663.08 | 0.03 | 0.05 | 0.00 | 367.89 | 93.11 | | 91.31 |
| SOUTH TRIB | 7.247 | 100-YEAR | 663.54 | 663.51 | 0.03 | 0.04 | 0.00 | 415.35 | 101.65 | | 93.42 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.259 | 10-YEAR | 661.76 | 661.73 | 0.03 | 0.03 | 0.00 | 223.76 | 63.24 | | 85.24 |
| SOUTH TRIB | 7.259 | 50-YEAR | 663.13 | 663.10 | 0.03 | 0.02 | 0.00 | 372.07 | 88.93 | | 91.83 |
| SOUTH TRIB | 7.259 | 100-YEAR | 663.55 | 663.53 | 0.03 | 0.02 | 0.00 | 419.61 | 97.39 | | 93.85 |
| | | | | | | | | | | | |

HEC-RAS Plan: Baseline (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 7.289 | 10-YEAR | 661.95 | 661.80 | 0.15 | 0.16 | 0.04 | 125.42 | 161.58 | | 37.73 |
| SOUTH TRIB | 7.289 | 50-YEAR | 663.28 | 663.13 | 0.15 | 0.11 | 0.04 | 230.55 | 230.45 | | 46.82 |
| SOUTH TRIB | 7.289 | 100-YEAR | 663.69 | 663.54 | 0.15 | 0.10 | 0.04 | 266.61 | 250.39 | | 49.65 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.314 | 10-YEAR | 662.19 | 662.11 | 0.07 | 0.23 | 0.01 | 164.06 | 122.94 | | 48.96 |
| SOUTH TRIB | 7.314 | 50-YEAR | 663.47 | 663.39 | 0.08 | 0.19 | 0.01 | 284.27 | 176.73 | | 58.44 |
| SOUTH TRIB | 7.314 | 100-YEAR | 663.87 | 663.79 | 0.08 | 0.17 | 0.01 | 324.31 | 192.69 | | 61.38 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.331 | 10-YEAR | 662.55 | 662.25 | 0.31 | 0.30 | 0.07 | 113.27 | 173.73 | | 26.99 |
| SOUTH TRIB | 7.331 | 50-YEAR | 663.79 | 663.47 | 0.32 | 0.24 | 0.07 | 198.71 | 262.29 | | 33.65 |
| SOUTH TRIB | 7.331 | 100-YEAR | 664.17 | 663.85 | 0.32 | 0.23 | 0.07 | 227.48 | 289.52 | | 35.73 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.35 | 10-YEAR | 662.97 | 662.80 | 0.18 | 0.41 | 0.01 | 100.31 | 186.69 | | 31.24 |
| SOUTH TRIB | 7.35 | 50-YEAR | 664.17 | 663.95 | 0.22 | 0.37 | 0.01 | 182.29 | 278.71 | | 37.24 |
| SOUTH TRIB | 7.35 | 100-YEAR | 664.52 | 664.30 | 0.22 | 0.35 | 0.01 | 210.61 | 306.39 | | 39.05 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.391 | 10-YEAR | 663.48 | 663.33 | 0.15 | 0.50 | 0.00 | 96.20 | 190.80 | | 31.87 |
| SOUTH TRIB | 7.391 | 50-YEAR | 664.67 | 664.49 | 0.19 | 0.50 | 0.00 | 173.78 | 287.22 | | 37.41 |
| SOUTH TRIB | 7.391 | 100-YEAR | 665.02 | 664.82 | 0.20 | 0.49 | 0.00 | 200.27 | 316.32 | 0.41 | 50.79 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.399 | 10-YEAR | 663.55 | 663.42 | 0.13 | 0.07 | 0.00 | 97.11 | 166.41 | 23.49 | 36.81 |
| SOUTH TRIB | 7.399 | 50-YEAR | 664.75 | 664.58 | 0.17 | 0.07 | 0.00 | 175.07 | 243.14 | 42.79 | 43.16 |
| SOUTH TRIB | 7.399 | 100-YEAR | 665.09 | 664.92 | 0.18 | 0.07 | 0.00 | 201.83 | 265.73 | 49.44 | 45.00 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.406 | 10-YEAR | 663.64 | 663.41 | 0.23 | 0.06 | 0.03 | 43.32 | 207.10 | 36.58 | 25.22 |
| SOUTH TRIB | 7.406 | 50-YEAR | 664.86 | 664.53 | 0.33 | 0.07 | 0.05 | 80.72 | 312.23 | 68.04 | 28.73 |
| SOUTH TRIB | 7.406 | 100-YEAR | 665.21 | 664.86 | 0.35 | 0.07 | 0.05 | 94.74 | 343.33 | 78.92 | 29.20 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 664.05 | 663.68 | 0.37 | 0.37 | 0.04 | 56.70 | 195.83 | 34.46 | 23.92 |
| SOUTH TRIB | 7.431 | 50-YEAR | 665.29 | 664.83 | 0.47 | 0.39 | 0.04 | 104.60 | 286.16 | 70.25 | 28.68 |
| SOUTH TRIB | 7.431 | 100-YEAR | 665.64 | 665.16 | 0.49 | 0.39 | 0.04 | 120.88 | 312.16 | 83.96 | 29.71 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 664.12 | 664.01 | 0.12 | 0.05 | 0.03 | 130.01 | 130.65 | 26.34 | 31.55 |
| SOUTH TRIB | 7.447 | 50-YEAR | 665.38 | 665.21 | 0.17 | 0.05 | 0.03 | 207.12 | 198.43 | 55.45 | 36.01 |
| SOUTH TRIB | 7.447 | 100-YEAR | 665.73 | 665.52 | 0.21 | 0.06 | 0.03 | 245.27 | 232.00 | 39.73 | 60.21 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 664.16 | 664.07 | 0.09 | 0.03 | 0.01 | 122.21 | 114.25 | 24.54 | 31.77 |
| SOUTH TRIB | 7.456 | 50-YEAR | 665.42 | 665.29 | 0.13 | 0.04 | 0.01 | 187.72 | 179.26 | 51.02 | 36.30 |
| SOUTH TRIB | 7.456 | 100-YEAR | 665.78 | 665.62 | 0.16 | 0.04 | 0.01 | 222.79 | 209.91 | 35.30 | 70.50 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 664.89 | 664.82 | 0.07 | | | 122.93 | 110.51 | 27.56 | 34.57 |
| SOUTH TRIB | 7.47 | 50-YEAR | 666.75 | 666.68 | 0.07 | | | 128.09 | 189.66 | 100.25 | 296.70 |
| SOUTH TRIB | 7.47 | 100-YEAR | 666.93 | 666.86 | 0.07 | | | 147.52 | 195.20 | 125.28 | 335.82 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.01 | 58.50 | 112.74 | 89.76 | 208.30 |
| SOUTH TRIB | 7.486 | 50-YEAR | 666.76 | 666.76 | 0.00 | 0.00 | 0.01 | 104.27 | 150.52 | 163.21 | 208.30 |
| SOUTH TRIB | 7.486 | 100-YEAR | 666.94 | 666.93 | 0.00 | 0.00 | 0.01 | 117.50 | 166.32 | 184.18 | 208.30 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.00 | 232.95 | 24.25 | 3.80 | 1495.85 |
| SOUTH TRIB | 7.493 | 50-YEAR | 666.76 | 666.76 | 0.00 | 0.00 | 0.00 | 388.30 | 26.14 | 3.56 | 1585.41 |
| SOUTH TRIB | 7.493 | 100-YEAR | 666.94 | 666.94 | 0.00 | 0.00 | 0.00 | 435.60 | 28.47 | 3.93 | 1593.09 |

HEC-RAS Plan: Baseline

| 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) | |
| MAINSTEM | 4.518 | 10-YEAR | 894.00 | 636.00 | 644.69 | | 644.73 | 0.000113 | 1.67 | 558.91 | 68.69 | 0.10 |
| MAINSTEM | 4.518 | 50-YEAR | 1459.00 | 636.00 | 646.33 | | 646.41 | 0.000168 | 2.28 | 673.17 | 70.33 | 0.13 |
| MAINSTEM | 4.518 | 100-YEAR | 1682.00 | 636.00 | 646.91 | | 647.00 | 0.000185 | 2.49 | 713.97 | 70.91 | 0.13 |
| MAINSTEM | 4.594 | 10-YEAR | 894.00 | 636.00 | 644.73 | | 644.77 | 0.000111 | 1.66 | 562.03 | 68.73 | 0.10 |
| MAINSTEM | 4.594 | 50-YEAR | 1459.00 | 636.00 | 646.40 | | 646.48 | 0.000164 | 2.27 | 677.92 | 70.40 | 0.12 |
| MAINSTEM | 4.594 | 100-YEAR | 1682.00 | 636.00 | 646.98 | | 647.07 | 0.000181 | 2.47 | 719.27 | 70.98 | 0.13 |
| MAINSTEM | 4.675 | 10-YEAR | 894.00 | 636.10 | 644.78 | | 644.82 | 0.000114 | 1.67 | 558.61 | 68.72 | 0.10 |
| MAINSTEM | 4.675 | 50-YEAR | 1459.00 | 636.10 | 646.47 | | 646.55 | 0.000166 | 2.27 | 676.07 | 70.41 | 0.12 |
| MAINSTEM | 4.675 | 100-YEAR | 1682.00 | 636.10 | 647.06 | | 647.15 | 0.000182 | 2.47 | 717.95 | 71.01 | 0.13 |
| MAINSTEM | 4.773 | 10-YEAR | 784.00 | 636.20 | 644.84 | | 644.88 | 0.000089 | 1.47 | 554.70 | 68.37 | 0.09 |
| MAINSTEM | 4.773 | 50-YEAR | 1227.00 | 636.20 | 646.57 | | 646.62 | 0.000118 | 1.91 | 673.98 | 70.04 | 0.10 |
| MAINSTEM | 4.773 | 100-YEAR | 1469.00 | 636.20 | 647.17 | | 647.24 | 0.000139 | 2.16 | 716.27 | 70.63 | 0.12 |
| MAINSTEM | 4.790 | 10-YEAR | 784.00 | 636.20 | 644.81 | 638.80 | 644.93 | 0.000312 | 2.76 | 284.23 | 68.35 | 0.17 |
| MAINSTEM | 4.790 | 50-YEAR | 1227.00 | 636.20 | 646.51 | 639.71 | 646.71 | 0.000420 | 3.61 | 340.24 | 69.99 | 0.20 |
| MAINSTEM | 4.790 | 100-YEAR | 1469.00 | 636.20 | 647.09 | 640.14 | 647.35 | 0.000501 | 4.09 | 359.50 | 70.56 | 0.22 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 784.00 | 636.70 | 645.28 | 640.14 | 645.42 | 0.000448 | 3.07 | 255.65 | 65.50 | 0.19 |
| MAINSTEM | 5.059 | 50-YEAR | 1227.00 | 636.70 | 647.60 | 641.04 | 647.81 | 0.000458 | 3.69 | 332.24 | 67.78 | 0.21 |
| MAINSTEM | 5.059 | 100-YEAR | 1469.00 | 636.70 | 648.71 | 641.47 | 648.96 | 0.000462 | 3.98 | 368.99 | 68.88 | 0.21 |
| MAINSTEM | 5.076 | 10-YEAR | 784.00 | 636.90 | 645.41 | | 645.46 | 0.000215 | 1.80 | 435.78 | 65.48 | 0.12 |
| MAINSTEM | 5.076 | 50-YEAR | 1227.00 | 636.90 | 647.79 | | 647.85 | 0.000206 | 2.07 | 594.14 | 67.85 | 0.12 |
| MAINSTEM | 5.076 | 100-YEAR | 1469.00 | 636.90 | 648.93 | | 649.00 | 0.000204 | 2.19 | 672.29 | 68.98 | 0.12 |
| MAINSTEM | 5.104 | 10-YEAR | 784.00 | 637.12 | 645.41 | | 645.51 | 0.000341 | 2.55 | 306.96 | 65.32 | 0.17 |
| MAINSTEM | 5.104 | 50-YEAR | 1227.00 | 637.12 | 647.76 | | 647.90 | 0.000326 | 3.01 | 407.15 | 67.69 | 0.17 |
| MAINSTEM | 5.104 | 100-YEAR | 1469.00 | 637.12 | 648.90 | | 649.06 | 0.000322 | 3.23 | 455.31 | 68.83 | 0.17 |
| MAINSTEM | 5.109 | 10-YEAR | 784.00 | 637.18 | 645.37 | 640.64 | 645.54 | 0.000547 | 3.28 | 239.21 | 65.24 | 0.21 |
| MAINSTEM | 5.109 | 50-YEAR | 1227.00 | 637.18 | 647.71 | 641.55 | 647.94 | 0.000535 | 3.89 | 315.15 | 67.60 | 0.22 |
| MAINSTEM | 5.109 | 100-YEAR | 1469.00 | 637.18 | 648.83 | 642.01 | 649.10 | 0.000532 | 4.18 | 351.63 | 68.73 | 0.22 |
| MAINSTEM | 5.110 | 10-YEAR | 784.00 | 637.22 | 645.33 | | 645.56 | 0.000656 | 3.84 | 204.41 | 44.59 | 0.24 |
| MAINSTEM | 5.110 | 50-YEAR | 1227.00 | 637.22 | 647.64 | | 647.98 | 0.000698 | 4.67 | 262.56 | 50.16 | 0.26 |
| MAINSTEM | 5.110 | 100-YEAR | 1469.00 | 637.22 | 648.75 | | 649.14 | 0.000714 | 5.06 | 290.45 | 52.83 | 0.26 |
| MAINSTEM | 5.116 | 10-YEAR | 784.00 | 637.31 | 645.33 | | 645.57 | 0.000120 | 3.91 | 200.61 | 25.00 | 0.24 |
| MAINSTEM | 5.116 | 50-YEAR | 1227.00 | 637.31 | 647.64 | | 647.99 | 0.000143 | 4.75 | 258.35 | 26.44 | 0.26 |
| MAINSTEM | 5.116 | 100-YEAR | 1469.00 | 637.31 | 648.75 | | 649.16 | 0.000146 | 5.14 | 286.24 | 31.23 | 0.27 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 634.00 | 640.26 | 646.04 | 642.93 | 646.33 | 0.000191 | 4.30 | 147.43 | 25.50 | 0.32 |
| MAINSTEM | 5.606 | 50-YEAR | 1056.00 | 640.26 | 649.63 | 644.01 | 649.94 | 0.000121 | 4.42 | 239.06 | 57.44 | 0.25 |
| MAINSTEM | 5.606 | 100-YEAR | 1227.00 | 640.26 | 651.57 | 644.41 | 651.85 | 0.000087 | 4.25 | 288.43 | 80.97 | 0.22 |
| MAINSTEM | 5.610 | 10-YEAR | 634.00 | 640.30 | 646.34 | | 646.36 | 0.000075 | 1.05 | 603.33 | 125.36 | 0.08 |
| MAINSTEM | 5.610 | 50-YEAR | 1056.00 | 640.30 | 649.95 | | 649.97 | 0.000043 | 1.09 | 970.26 | 145.88 | 0.06 |
| MAINSTEM | 5.610 | 100-YEAR | 1227.00 | 640.30 | 651.86 | | 651.88 | 0.000031 | 1.05 | 1164.78 | 156.76 | 0.05 |
| MAINSTEM | 5.629 | 10-YEAR | 634.00 | 640.37 | 646.36 | | 646.36 | 0.000064 | 0.74 | 854.27 | 215.49 | 0.07 |
| MAINSTEM | 5.629 | 50-YEAR | 1056.00 | 640.37 | 649.97 | | 649.97 | 0.000021 | 0.64 | 1646.96 | 237.14 | 0.04 |
| MAINSTEM | 5.629 | 100-YEAR | 1227.00 | 640.37 | 651.88 | | 651.88 | 0.000014 | 0.59 | 2082.70 | 248.61 | 0.03 |
| MAINSTEM | 5.632 | 10-YEAR | 634.00 | 640.39 | 646.36 | | 646.37 | 0.000056 | 0.70 | 912.18 | 411.47 | 0.06 |
| MAINSTEM | 5.632 | 50-YEAR | 1056.00 | 640.39 | 649.97 | | 649.97 | 0.000019 | 0.60 | 1754.71 | 433.12 | 0.04 |
| MAINSTEM | 5.632 | 100-YEAR | 1227.00 | 640.39 | 651.88 | | 651.88 | 0.000012 | 0.55 | 2216.91 | 444.58 | 0.03 |
| MAINSTEM | 5.639 | 10-YEAR | 634.00 | 640.43 | 646.36 | | 646.37 | 0.000060 | 0.72 | 878.97 | 737.22 | 0.06 |
| MAINSTEM | 5.639 | 50-YEAR | 1056.00 | 640.43 | 649.97 | | 649.97 | 0.000020 | 0.62 | 1695.03 | 758.86 | 0.04 |
| MAINSTEM | 5.639 | 100-YEAR | 1227.00 | 640.43 | 651.88 | | 651.88 | 0.000013 | 0.57 | 2143.32 | 770.33 | 0.03 |
| MAINSTEM | 5.697 | 10-YEAR | 634.00 | 641.14 | 646.37 | | 646.41 | 0.000289 | 1.55 | 408.83 | 311.74 | 0.14 |
| MAINSTEM | 5.697 | 50-YEAR | 1056.00 | 641.14 | 649.96 | | 649.99 | 0.000090 | 1.34 | 788.12 | 333.27 | 0.09 |
| MAINSTEM | 5.697 | 100-YEAR | 1227.00 | 641.14 | 651.87 | | 651.90 | 0.000057 | 1.24 | 989.95 | 344.73 | 0.07 |
| MAINSTEM | 5.720 | 10-YEAR | 634.00 | 641.44 | 646.35 | | 646.51 | 0.000999 | 3.20 | 197.97 | 161.07 | 0.26 |
| MAINSTEM | 5.720 | 50-YEAR | 1056.00 | 641.44 | 649.91 | | 650.05 | 0.000407 | 3.00 | 351.91 | 188.74 | 0.19 |
| MAINSTEM | 5.720 | 100-YEAR | 1227.00 | 641.44 | 651.82 | | 651.94 | 0.000272 | 2.82 | 434.63 | 203.61 | 0.16 |
| MAINSTEM | 5.725 | 10-YEAR | 634.00 | 641.52 | 646.28 | | 646.59 | 0.001791 | 4.45 | 142.63 | 93.92 | 0.36 |
| MAINSTEM | 5.725 | 50-YEAR | 1056.00 | 641.52 | 649.82 | | 650.10 | 0.000777 | 4.24 | 248.84 | 126.73 | 0.26 |
| MAINSTEM | 5.725 | 100-YEAR | 1227.00 | 641.52 | 651.74 | | 651.99 | 0.000525 | 4.01 | 306.31 | 144.48 | 0.22 |
| MAINSTEM | 5.727 | 10-YEAR | 634.00 | 641.52 | 646.23 | | 646.68 | 0.003344 | 5.38 | 117.80 | 25.00 | 0.44 |
| MAINSTEM | 5.727 | 50-YEAR | 1056.00 | 641.52 | 649.77 | | 650.18 | 0.001669 | 5.12 | 206.14 | 25.00 | 0.31 |
| MAINSTEM | 5.727 | 100-YEAR | 1227.00 | 641.52 | 651.69 | | 652.05 | 0.001202 | 4.83 | 254.12 | 27.98 | 0.27 |

HEC-RAS Plan: Baseline (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) | |
| MAINSTEM | 5.732 | 10-YEAR | 634.00 | 641.59 | 646.38 | | 646.81 | 0.003878 | 5.29 | 119.74 | 25.00 | 0.43 |
| MAINSTEM | 5.732 | 50-YEAR | 1056.00 | 641.59 | 649.84 | | 650.24 | 0.002242 | 5.12 | 206.18 | 25.00 | 0.31 |
| MAINSTEM | 5.732 | 100-YEAR | 1227.00 | 641.59 | 651.74 | | 652.10 | 0.001699 | 4.84 | 253.74 | 27.64 | 0.27 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 634.00 | 641.81 | 646.81 | 644.45 | 647.18 | 0.003115 | 4.88 | 129.95 | 26.00 | 0.38 |
| MAINSTEM | 5.757 | 50-YEAR | 1056.00 | 641.81 | 650.18 | 645.52 | 650.55 | 0.001947 | 4.85 | 217.65 | 26.00 | 0.30 |
| MAINSTEM | 5.757 | 100-YEAR | 1227.00 | 641.81 | 652.07 | 645.91 | 652.40 | 0.001495 | 4.60 | 266.70 | 26.00 | 0.25 |
| MAINSTEM | 5.759 | 10-YEAR | 634.00 | 641.82 | 647.20 | | 647.22 | 0.000129 | 1.30 | 489.37 | 100.00 | 0.10 |
| MAINSTEM | 5.759 | 50-YEAR | 1056.00 | 641.82 | 650.56 | | 650.59 | 0.000071 | 1.33 | 795.30 | 100.00 | 0.08 |
| MAINSTEM | 5.759 | 100-YEAR | 1227.00 | 641.82 | 652.41 | | 652.43 | 0.000051 | 1.27 | 963.34 | 100.00 | 0.07 |
| MAINSTEM | 5.810 | 10-YEAR | 634.00 | 643.98 | 647.24 | | 647.29 | 0.000620 | 1.95 | 325.50 | 100.00 | 0.19 |
| MAINSTEM | 5.810 | 50-YEAR | 1056.00 | 643.98 | 650.58 | | 650.62 | 0.000177 | 1.60 | 659.72 | 100.00 | 0.11 |
| MAINSTEM | 5.810 | 100-YEAR | 1227.00 | 643.98 | 652.42 | | 652.45 | 0.000110 | 1.45 | 843.86 | 100.00 | 0.09 |
| MAINSTEM | 5.860 | 10-YEAR | 634.00 | 645.81 | 647.64 | 647.64 | 648.57 | 0.019302 | 7.73 | 82.06 | 100.00 | 1.01 |
| MAINSTEM | 5.860 | 50-YEAR | 1056.00 | 645.81 | 650.43 | | 650.83 | 0.002459 | 5.11 | 206.78 | 100.00 | 0.42 |
| MAINSTEM | 5.860 | 100-YEAR | 1227.00 | 645.81 | 652.31 | | 652.58 | 0.001062 | 4.21 | 291.10 | 100.00 | 0.29 |
| MAINSTEM | 5.862 | 10-YEAR | 634.00 | 645.96 | 648.45 | 648.45 | 649.70 | 0.021607 | 9.00 | 70.47 | 28.35 | 1.01 |
| MAINSTEM | 5.862 | 50-YEAR | 1056.00 | 645.96 | 650.19 | | 651.40 | 0.011607 | 8.80 | 120.02 | 28.35 | 0.75 |
| MAINSTEM | 5.862 | 100-YEAR | 1227.00 | 645.96 | 652.14 | | 652.90 | 0.005086 | 7.01 | 175.10 | 28.35 | 0.50 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 634.00 | 647.54 | 651.60 | 649.84 | 651.96 | 0.000320 | 4.85 | 130.71 | 33.00 | 0.42 |
| MAINSTEM | 6.037 | 50-YEAR | 1056.00 | 647.54 | 653.22 | 650.77 | 653.74 | 0.000320 | 5.77 | 183.00 | 33.00 | 0.43 |
| MAINSTEM | 6.037 | 100-YEAR | 1227.00 | 647.54 | 653.90 | 651.10 | 654.46 | 0.000310 | 5.99 | 204.81 | 33.00 | 0.42 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 603.00 | 647.73 | 652.15 | 649.86 | 652.40 | 0.002189 | 4.01 | 150.28 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 50-YEAR | 996.00 | 647.73 | 653.91 | 650.71 | 654.26 | 0.002167 | 4.74 | 210.25 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 100-YEAR | 1156.00 | 647.73 | 654.62 | 651.02 | 655.00 | 0.002121 | 4.94 | 234.15 | 34.00 | 0.33 |
| MAINSTEM | 6.194 | 10-YEAR | 603.00 | 647.75 | 652.41 | | 652.44 | 0.000159 | 1.31 | 461.22 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 50-YEAR | 996.00 | 647.75 | 654.27 | | 654.31 | 0.000142 | 1.54 | 645.30 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 100-YEAR | 1156.00 | 647.75 | 655.00 | | 655.04 | 0.000134 | 1.61 | 717.76 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 10-YEAR | 603.00 | 647.88 | 652.52 | | 652.55 | 0.000178 | 1.30 | 464.06 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 50-YEAR | 996.00 | 647.88 | 654.37 | | 654.41 | 0.000166 | 1.53 | 649.01 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 100-YEAR | 1156.00 | 647.88 | 655.10 | | 655.14 | 0.000160 | 1.60 | 721.72 | 100.00 | 0.11 |
| MAINSTEM | 6.418 | 10-YEAR | 603.00 | 647.88 | 652.61 | | 652.63 | 0.000167 | 1.27 | 472.97 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 50-YEAR | 996.00 | 647.88 | 654.45 | | 654.49 | 0.000159 | 1.52 | 657.40 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 100-YEAR | 1156.00 | 647.88 | 655.18 | | 655.22 | 0.000154 | 1.58 | 729.82 | 100.00 | 0.10 |
| MAINSTEM | 6.471 | 10-YEAR | 603.00 | 647.88 | 652.65 | | 652.73 | 0.000583 | 2.29 | 263.80 | 55.30 | 0.18 |
| MAINSTEM | 6.471 | 50-YEAR | 996.00 | 647.88 | 654.48 | | 654.59 | 0.000581 | 2.73 | 364.71 | 55.30 | 0.19 |
| MAINSTEM | 6.471 | 100-YEAR | 1156.00 | 647.88 | 655.19 | | 655.32 | 0.000571 | 2.86 | 404.33 | 55.30 | 0.19 |
| MAINSTEM | 6.473 | 10-YEAR | 603.00 | 647.91 | 652.61 | | 652.79 | 0.002320 | 3.43 | 175.73 | 40.00 | 0.29 |
| MAINSTEM | 6.473 | 50-YEAR | 996.00 | 647.91 | 654.42 | | 654.67 | 0.002456 | 4.01 | 248.07 | 40.00 | 0.28 |
| MAINSTEM | 6.473 | 100-YEAR | 1156.00 | 647.91 | 655.13 | | 655.40 | 0.002476 | 4.18 | 276.53 | 40.00 | 0.28 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 6.538 | 10-YEAR | 603.00 | 648.09 | 652.83 | 650.40 | 653.03 | 0.002651 | 3.61 | 167.21 | 38.00 | 0.30 |
| MAINSTEM | 6.538 | 50-YEAR | 996.00 | 648.09 | 654.69 | 651.19 | 654.97 | 0.002755 | 4.18 | 238.13 | 38.00 | 0.29 |
| MAINSTEM | 6.538 | 100-YEAR | 1156.00 | 648.09 | 655.42 | 651.48 | 655.72 | 0.002771 | 4.35 | 265.81 | 38.00 | 0.29 |
| MAINSTEM | 6.540 | 10-YEAR | 603.00 | 648.11 | 653.04 | | 653.05 | 0.000088 | 0.92 | 652.36 | 191.09 | 0.08 |
| MAINSTEM | 6.540 | 50-YEAR | 996.00 | 648.11 | 654.98 | | 654.99 | 0.000074 | 1.07 | 933.29 | 220.15 | 0.07 |
| MAINSTEM | 6.540 | 100-YEAR | 1156.00 | 648.11 | 655.73 | | 655.75 | 0.000069 | 1.11 | 1042.18 | 231.41 | 0.07 |
| MAINSTEM | 6.59 | 10-YEAR | 603.00 | 648.25 | 653.06 | | 653.07 | 0.000095 | 0.84 | 715.15 | 196.42 | 0.08 |
| MAINSTEM | 6.59 | 50-YEAR | 996.00 | 648.25 | 655.01 | | 655.03 | 0.000470 | 0.87 | 1143.06 | 1008.18 | 0.14 |
| MAINSTEM | 6.59 | 100-YEAR | 1156.00 | 648.25 | 655.76 | | 655.77 | 0.000119 | 0.61 | 1911.55 | 1050.50 | 0.08 |
| MAINSTEM | 6.6 | 10-YEAR | 603.00 | 648.30 | 653.03 | | 653.14 | 0.000703 | 2.66 | 226.57 | 199.69 | 0.22 |
| MAINSTEM | 6.6 | 50-YEAR | 996.00 | 648.30 | 654.99 | | 655.13 | 0.000567 | 3.05 | 326.52 | 234.83 | 0.21 |
| MAINSTEM | 6.6 | 100-YEAR | 1156.00 | 648.30 | 655.70 | | 655.86 | 0.000537 | 3.18 | 362.99 | 247.66 | 0.21 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 603.00 | 648.10 | 653.40 | 650.26 | 653.44 | 0.000343 | 1.71 | 368.91 | 538.08 | 0.15 |
| MAINSTEM | 6.635 | 50-YEAR | 996.00 | 648.10 | 655.43 | 650.83 | 655.48 | 0.000238 | 1.87 | 560.15 | 1619.59 | 0.13 |
| MAINSTEM | 6.635 | 100-YEAR | 1156.00 | 648.10 | 656.18 | 651.04 | 656.23 | 0.000217 | 1.93 | 630.33 | 1731.59 | 0.13 |

HEC-RAS Plan: Baseline (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) | |
| MAINSTEM | 6.637 | 10-YEAR | 603.00 | 648.10 | 653.44 | | 653.45 | 0.000222 | 0.77 | 895.34 | 551.85 | 0.11 |
| MAINSTEM | 6.637 | 50-YEAR | 996.00 | 648.10 | 655.50 | | 655.50 | 0.000028 | 0.34 | 3399.43 | 1629.53 | 0.04 |
| MAINSTEM | 6.637 | 100-YEAR | 1156.00 | 648.10 | 656.25 | | 656.25 | 0.000015 | 0.30 | 4666.21 | 1742.24 | 0.03 |
| MAINSTEM | 6.639 | 10-YEAR | 603.00 | 649.58 | 653.34 | 652.66 | 653.57 | 0.006220 | 3.81 | 158.26 | 412.27 | 0.55 |
| MAINSTEM | 6.639 | 50-YEAR | 996.00 | 649.58 | 655.45 | 653.25 | 655.55 | 0.000901 | 2.61 | 381.86 | 1621.88 | 0.24 |
| MAINSTEM | 6.639 | 100-YEAR | 1156.00 | 649.58 | 656.20 | 653.40 | 656.30 | 0.000643 | 2.50 | 462.09 | 1735.12 | 0.21 |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 603.00 | 649.58 | 653.93 | 653.63 | 654.54 | 0.013495 | 6.27 | 96.19 | 51.46 | 0.81 |
| MAINSTEM | 6.642 | 50-YEAR | 996.00 | 649.58 | 655.46 | 654.38 | 655.89 | 0.005914 | 5.27 | 189.04 | 69.83 | 0.56 |
| MAINSTEM | 6.642 | 100-YEAR | 1156.00 | 649.58 | 656.20 | 654.63 | 656.55 | 0.004006 | 4.73 | 244.15 | 78.73 | 0.47 |
| MAINSTEM | 6.643 | 10-YEAR | 603.00 | 649.58 | 654.32 | | 654.73 | 0.007890 | 5.15 | 117.18 | 56.14 | 0.63 |
| MAINSTEM | 6.643 | 50-YEAR | 996.00 | 649.58 | 655.58 | | 655.98 | 0.005260 | 5.04 | 197.45 | 71.26 | 0.53 |
| MAINSTEM | 6.643 | 100-YEAR | 1156.00 | 649.58 | 656.27 | | 656.61 | 0.003777 | 4.63 | 249.55 | 79.55 | 0.46 |
| MAINSTEM | 6.644 | 10-YEAR | 603.00 | 649.30 | 655.00 | | 655.00 | 0.000113 | 0.29 | 2181.76 | 1554.80 | 0.04 |
| MAINSTEM | 6.644 | 50-YEAR | 996.00 | 649.30 | 656.22 | | 656.22 | 0.000040 | 0.25 | 4192.86 | 1738.11 | 0.03 |
| MAINSTEM | 6.644 | 100-YEAR | 1156.00 | 649.30 | 656.81 | | 656.81 | 0.000028 | 0.23 | 5243.50 | 1826.54 | 0.02 |
| SOUTH TRIB | 6.645 | 10-YEAR | 314.00 | 653.20 | 655.18 | 655.18 | 655.73 | 0.017507 | 6.90 | 61.86 | 54.47 | 0.86 |
| SOUTH TRIB | 6.645 | 50-YEAR | 506.00 | 653.20 | 655.94 | | 656.39 | 0.010147 | 6.52 | 106.12 | 62.14 | 0.69 |
| SOUTH TRIB | 6.645 | 100-YEAR | 570.00 | 653.20 | 656.65 | | 656.91 | 0.004657 | 5.14 | 152.31 | 69.25 | 0.49 |
| SOUTH TRIB | 6.664 | 10-YEAR | 314.00 | 653.30 | 656.28 | 655.36 | 656.48 | 0.003892 | 4.26 | 96.40 | 49.31 | 0.44 |
| SOUTH TRIB | 6.664 | 50-YEAR | 506.00 | 653.30 | 656.78 | | 657.11 | 0.005221 | 5.48 | 122.35 | 53.60 | 0.52 |
| SOUTH TRIB | 6.664 | 100-YEAR | 570.00 | 653.30 | 657.07 | | 657.40 | 0.004714 | 5.49 | 138.40 | 56.09 | 0.50 |
| SOUTH TRIB | 6.683 | 10-YEAR | 314.00 | 653.40 | 656.63 | | 656.90 | 0.004069 | 4.61 | 84.27 | 37.11 | 0.45 |
| SOUTH TRIB | 6.683 | 50-YEAR | 506.00 | 653.40 | 657.25 | | 657.67 | 0.005339 | 5.92 | 108.21 | 41.29 | 0.53 |
| SOUTH TRIB | 6.683 | 100-YEAR | 570.00 | 653.40 | 657.49 | | 657.94 | 0.005304 | 6.15 | 118.44 | 42.95 | 0.54 |
| SOUTH TRIB | 6.721 | 10-YEAR | 314.00 | 653.70 | 657.36 | | 657.60 | 0.003055 | 4.34 | 89.65 | 36.35 | 0.40 |
| SOUTH TRIB | 6.721 | 50-YEAR | 506.00 | 653.70 | 658.19 | | 658.54 | 0.003569 | 5.37 | 123.93 | 46.60 | 0.45 |
| SOUTH TRIB | 6.721 | 100-YEAR | 570.00 | 653.70 | 658.44 | | 658.81 | 0.003615 | 5.60 | 135.93 | 49.70 | 0.45 |
| SOUTH TRIB | 6.759 | 10-YEAR | 314.00 | 654.00 | 657.94 | | 658.12 | 0.002190 | 3.85 | 100.51 | 36.08 | 0.34 |
| SOUTH TRIB | 6.759 | 50-YEAR | 506.00 | 654.00 | 658.87 | | 659.13 | 0.002466 | 4.71 | 136.49 | 41.08 | 0.38 |
| SOUTH TRIB | 6.759 | 100-YEAR | 570.00 | 654.00 | 659.13 | | 659.42 | 0.002539 | 4.95 | 147.44 | 42.49 | 0.39 |
| SOUTH TRIB | 6.797 | 10-YEAR | 314.00 | 654.30 | 658.41 | | 658.55 | 0.002067 | 2.97 | 105.70 | 36.40 | 0.31 |
| SOUTH TRIB | 6.797 | 50-YEAR | 506.00 | 654.30 | 659.42 | | 659.61 | 0.002245 | 3.49 | 145.11 | 41.65 | 0.33 |
| SOUTH TRIB | 6.797 | 100-YEAR | 570.00 | 654.30 | 659.71 | | 659.91 | 0.002291 | 3.63 | 157.16 | 43.13 | 0.33 |
| SOUTH TRIB | 6.834 | 10-YEAR | 314.00 | 654.60 | 658.77 | | 658.90 | 0.001455 | 3.26 | 123.53 | 44.24 | 0.28 |
| SOUTH TRIB | 6.834 | 50-YEAR | 506.00 | 654.60 | 659.81 | | 659.98 | 0.001519 | 3.87 | 173.43 | 51.55 | 0.30 |
| SOUTH TRIB | 6.834 | 100-YEAR | 570.00 | 654.60 | 660.11 | | 660.29 | 0.001536 | 4.04 | 188.84 | 53.60 | 0.30 |
| SOUTH TRIB | 6.872 | 10-YEAR | 314.00 | 654.90 | 659.07 | | 659.25 | 0.001929 | 3.76 | 101.77 | 33.76 | 0.32 |
| SOUTH TRIB | 6.872 | 50-YEAR | 506.00 | 654.90 | 660.12 | | 660.38 | 0.002103 | 4.56 | 139.60 | 38.47 | 0.35 |
| SOUTH TRIB | 6.872 | 100-YEAR | 570.00 | 654.90 | 660.42 | | 660.69 | 0.002151 | 4.78 | 151.09 | 39.79 | 0.36 |
| SOUTH TRIB | 6.879 Miller Fluids En | | Culvert | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 314.00 | 654.90 | 659.09 | 657.09 | 659.27 | 0.001894 | 3.74 | 102.44 | 33.85 | 0.32 |
| SOUTH TRIB | 6.886 | 50-YEAR | 506.00 | 654.90 | 660.17 | 657.82 | 660.42 | 0.002034 | 4.51 | 141.32 | 38.67 | 0.35 |
| SOUTH TRIB | 6.886 | 100-YEAR | 570.00 | 654.90 | 660.47 | 658.03 | 660.74 | 0.002075 | 4.72 | 153.13 | 40.01 | 0.35 |
| SOUTH TRIB | 6.904 | 10-YEAR | 314.00 | 655.30 | 659.29 | | 659.50 | 0.002391 | 4.06 | 94.42 | 33.85 | 0.36 |
| SOUTH TRIB | 6.904 | 50-YEAR | 506.00 | 655.30 | 660.37 | | 660.65 | 0.002449 | 4.82 | 136.85 | 44.56 | 0.38 |
| SOUTH TRIB | 6.904 | 100-YEAR | 570.00 | 655.30 | 660.67 | | 660.98 | 0.002443 | 5.01 | 150.87 | 47.57 | 0.38 |
| SOUTH TRIB | 6.942 | 10-YEAR | 314.00 | 655.60 | 659.75 | | 659.93 | 0.001908 | 3.73 | 104.35 | 36.28 | 0.32 |
| SOUTH TRIB | 6.942 | 50-YEAR | 506.00 | 655.60 | 660.86 | | 661.10 | 0.001969 | 4.43 | 150.20 | 46.51 | 0.34 |
| SOUTH TRIB | 6.942 | 100-YEAR | 570.00 | 655.60 | 661.17 | | 661.42 | 0.001978 | 4.61 | 164.90 | 49.34 | 0.34 |
| SOUTH TRIB | 6.98 | 10-YEAR | 314.00 | 655.90 | 660.13 | | 660.28 | 0.001634 | 3.49 | 112.12 | 37.96 | 0.30 |
| SOUTH TRIB | 6.98 | 50-YEAR | 506.00 | 655.90 | 661.26 | | 661.46 | 0.001674 | 4.14 | 158.75 | 44.97 | 0.31 |
| SOUTH TRIB | 6.98 | 100-YEAR | 570.00 | 655.90 | 661.57 | | 661.79 | 0.001694 | 4.32 | 172.99 | 46.97 | 0.32 |
| SOUTH TRIB | 6.999 | 10-YEAR | 314.00 | 656.10 | 660.30 | | 660.45 | 0.001720 | 3.56 | 109.43 | 37.15 | 0.31 |
| SOUTH TRIB | 6.999 | 50-YEAR | 506.00 | 656.10 | 661.43 | | 661.64 | 0.001740 | 4.20 | 154.77 | 43.11 | 0.32 |
| SOUTH TRIB | 6.999 | 100-YEAR | 570.00 | 656.10 | 661.74 | | 661.97 | 0.001834 | 4.48 | 168.74 | 48.24 | 0.33 |
| SOUTH TRIB | 7.037 | 10-YEAR | 314.00 | 655.90 | 660.60 | | 660.68 | 0.000743 | 2.52 | 150.82 | 44.53 | 0.21 |
| SOUTH TRIB | 7.037 | 50-YEAR | 506.00 | 655.90 | 661.76 | | 661.87 | 0.000818 | 3.07 | 206.36 | 51.00 | 0.22 |
| SOUTH TRIB | 7.037 | 100-YEAR | 570.00 | 655.90 | 662.09 | | 662.22 | 0.000835 | 3.22 | 223.65 | 52.85 | 0.23 |
| SOUTH TRIB | 7.056 | 10-YEAR | 314.00 | 656.00 | 660.66 | | 660.78 | 0.001141 | 3.11 | 127.05 | 39.51 | 0.25 |
| SOUTH TRIB | 7.056 | 50-YEAR | 506.00 | 656.00 | 661.82 | | 661.99 | 0.001255 | 3.79 | 178.42 | 50.23 | 0.28 |
| SOUTH TRIB | 7.056 | 100-YEAR | 570.00 | 656.00 | 662.16 | | 662.34 | 0.001269 | 3.95 | 195.78 | 53.85 | 0.28 |

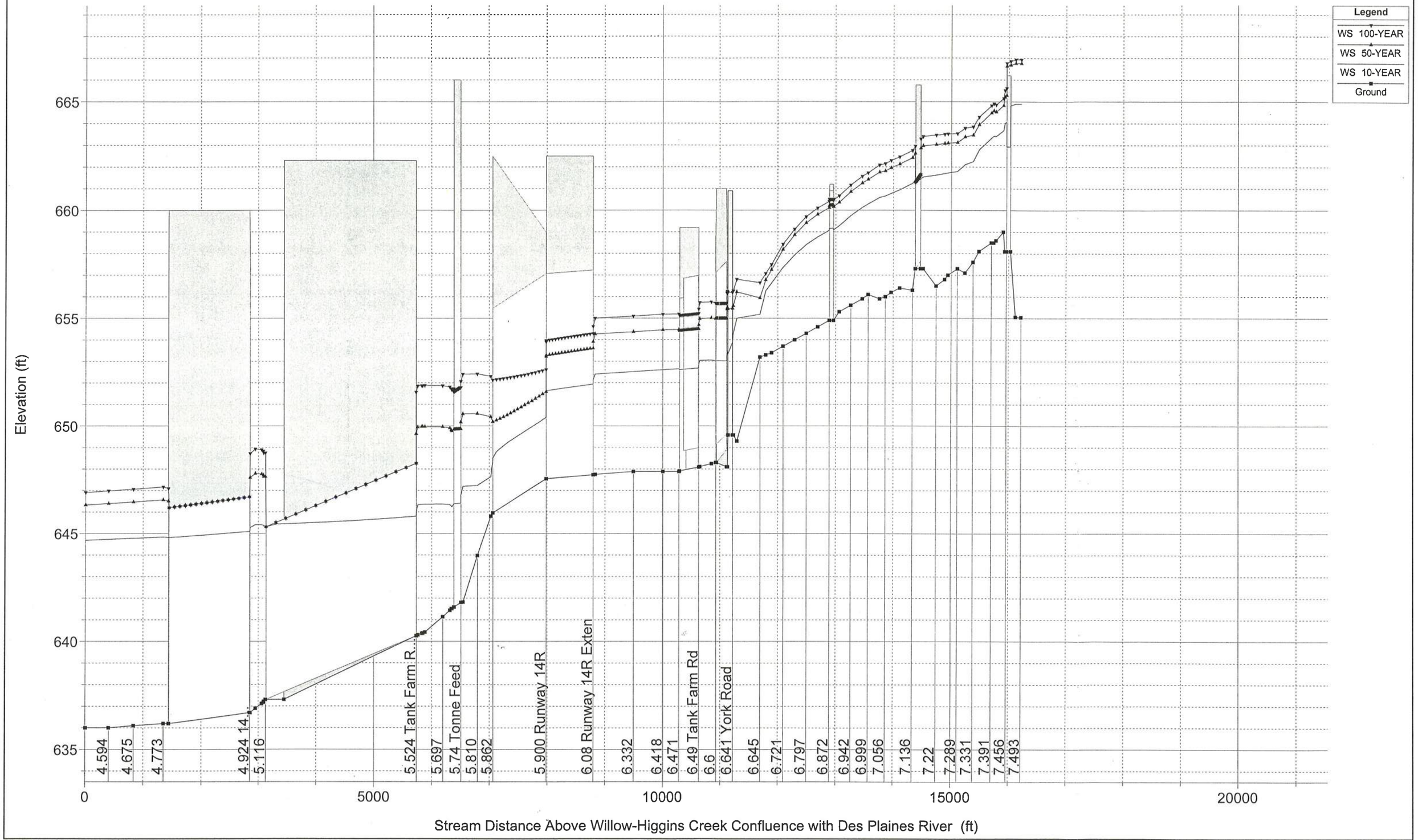
HEC-RAS Plan: Baseline (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.075 | 10-YEAR | 314.00 | 656.20 | 660.78 | | 660.89 | 0.001112 | 3.04 | 131.98 | 42.60 | 0.25 |
| SOUTH TRIB | 7.075 | 50-YEAR | 506.00 | 656.20 | 661.96 | | 662.11 | 0.001172 | 3.63 | 187.59 | 53.03 | 0.27 |
| SOUTH TRIB | 7.075 | 100-YEAR | 570.00 | 656.20 | 662.30 | | 662.46 | 0.001181 | 3.79 | 206.05 | 56.73 | 0.27 |
| SOUTH TRIB | 7.094 | 10-YEAR | 314.00 | 656.40 | 660.95 | | 661.07 | 0.001269 | 3.23 | 121.95 | 38.65 | 0.27 |
| SOUTH TRIB | 7.094 | 50-YEAR | 506.00 | 656.40 | 662.13 | | 662.30 | 0.001310 | 3.83 | 171.42 | 44.81 | 0.28 |
| SOUTH TRIB | 7.094 | 100-YEAR | 570.00 | 656.40 | 662.47 | | 662.65 | 0.001320 | 3.99 | 186.77 | 46.56 | 0.29 |
| SOUTH TRIB | 7.136 | 10-YEAR | 314.00 | 656.30 | 661.25 | | 661.41 | 0.001723 | 3.22 | 100.39 | 30.04 | 0.28 |
| SOUTH TRIB | 7.136 | 50-YEAR | 506.00 | 656.30 | 662.43 | | 662.66 | 0.001793 | 3.90 | 139.21 | 35.75 | 0.30 |
| SOUTH TRIB | 7.136 | 100-YEAR | 570.00 | 656.30 | 662.76 | | 663.01 | 0.001812 | 4.08 | 151.41 | 37.36 | 0.31 |
| SOUTH TRIB | 7.145 | 10-YEAR | 287.00 | 657.30 | 661.41 | 658.66 | 661.48 | 0.000691 | 2.23 | 128.96 | 83.18 | 0.19 |
| SOUTH TRIB | 7.145 | 50-YEAR | 461.00 | 657.30 | 662.63 | 659.19 | 662.74 | 0.000749 | 2.76 | 167.24 | 92.97 | 0.21 |
| SOUTH TRIB | 7.145 | 100-YEAR | 517.00 | 657.30 | 662.97 | 659.34 | 663.10 | 0.000765 | 2.90 | 178.05 | 95.73 | 0.21 |
| SOUTH TRIB | 7.156 Thorndale Ave | | Culvert | | | | | | | | | |
| SOUTH TRIB | 7.168 | 10-YEAR | 287.00 | 657.30 | 661.46 | 658.66 | 661.54 | 0.000660 | 2.20 | 130.75 | 83.64 | 0.19 |
| SOUTH TRIB | 7.168 | 50-YEAR | 461.00 | 657.30 | 662.87 | 659.19 | 662.97 | 0.000647 | 2.64 | 174.80 | 94.90 | 0.20 |
| SOUTH TRIB | 7.168 | 100-YEAR | 517.00 | 657.30 | 663.29 | 659.32 | 663.41 | 0.000636 | 2.75 | 188.15 | 97.15 | 0.20 |
| SOUTH TRIB | 7.181 | 10-YEAR | 287.00 | 657.30 | 661.54 | | 661.56 | 0.000360 | 1.22 | 234.70 | 84.64 | 0.13 |
| SOUTH TRIB | 7.181 | 50-YEAR | 461.00 | 657.30 | 662.97 | | 663.00 | 0.000249 | 1.27 | 361.64 | 92.49 | 0.11 |
| SOUTH TRIB | 7.181 | 100-YEAR | 517.00 | 657.30 | 663.41 | | 663.43 | 0.000228 | 1.29 | 402.27 | 94.86 | 0.11 |
| SOUTH TRIB | 7.22 | 10-YEAR | 287.00 | 656.50 | 661.63 | | 661.66 | 0.000438 | 1.53 | 231.61 | 85.68 | 0.14 |
| SOUTH TRIB | 7.22 | 50-YEAR | 461.00 | 656.50 | 663.04 | | 663.06 | 0.000305 | 1.48 | 356.93 | 92.55 | 0.12 |
| SOUTH TRIB | 7.22 | 100-YEAR | 517.00 | 656.50 | 663.46 | | 663.49 | 0.000279 | 1.47 | 397.01 | 94.64 | 0.12 |
| SOUTH TRIB | 7.247 | 10-YEAR | 287.00 | 656.80 | 661.70 | | 661.73 | 0.000524 | 1.54 | 220.19 | 84.43 | 0.15 |
| SOUTH TRIB | 7.247 | 50-YEAR | 461.00 | 656.80 | 663.08 | | 663.11 | 0.000353 | 1.47 | 341.84 | 91.31 | 0.13 |
| SOUTH TRIB | 7.247 | 100-YEAR | 517.00 | 656.80 | 663.51 | | 663.54 | 0.000320 | 1.46 | 381.00 | 93.42 | 0.12 |
| SOUTH TRIB | 7.259 | 10-YEAR | 287.00 | 657.00 | 661.73 | | 661.76 | 0.000511 | 1.50 | 223.14 | 85.24 | 0.15 |
| SOUTH TRIB | 7.259 | 50-YEAR | 461.00 | 657.00 | 663.10 | | 663.13 | 0.000346 | 1.44 | 344.77 | 91.83 | 0.13 |
| SOUTH TRIB | 7.259 | 100-YEAR | 517.00 | 657.00 | 663.53 | | 663.55 | 0.000314 | 1.43 | 383.95 | 93.85 | 0.12 |
| SOUTH TRIB | 7.289 | 10-YEAR | 287.00 | 657.30 | 661.80 | | 661.95 | 0.002656 | 3.58 | 95.83 | 37.73 | 0.34 |
| SOUTH TRIB | 7.289 | 50-YEAR | 461.00 | 657.30 | 663.13 | | 663.28 | 0.002031 | 3.61 | 151.97 | 46.82 | 0.31 |
| SOUTH TRIB | 7.289 | 100-YEAR | 517.00 | 657.30 | 663.54 | | 663.69 | 0.001844 | 3.57 | 171.95 | 49.65 | 0.30 |
| SOUTH TRIB | 7.314 | 10-YEAR | 287.00 | 657.10 | 662.11 | | 662.19 | 0.001243 | 2.54 | 135.20 | 48.96 | 0.24 |
| SOUTH TRIB | 7.314 | 50-YEAR | 461.00 | 657.10 | 663.39 | | 663.47 | 0.001058 | 2.66 | 203.76 | 58.44 | 0.22 |
| SOUTH TRIB | 7.314 | 100-YEAR | 517.00 | 657.10 | 663.79 | | 663.87 | 0.000989 | 2.66 | 227.48 | 61.38 | 0.22 |
| SOUTH TRIB | 7.331 | 10-YEAR | 287.00 | 657.60 | 662.25 | | 662.55 | 0.006056 | 4.86 | 66.21 | 26.99 | 0.51 |
| SOUTH TRIB | 7.331 | 50-YEAR | 461.00 | 657.60 | 663.47 | | 663.79 | 0.004845 | 4.98 | 103.22 | 33.65 | 0.47 |
| SOUTH TRIB | 7.331 | 100-YEAR | 517.00 | 657.60 | 663.85 | | 664.17 | 0.004432 | 4.94 | 116.44 | 35.73 | 0.45 |
| SOUTH TRIB | 7.35 | 10-YEAR | 287.00 | 658.10 | 662.80 | | 662.97 | 0.002705 | 3.74 | 88.52 | 31.24 | 0.35 |
| SOUTH TRIB | 7.35 | 50-YEAR | 461.00 | 658.10 | 663.95 | | 664.17 | 0.002643 | 4.16 | 128.02 | 37.24 | 0.35 |
| SOUTH TRIB | 7.35 | 100-YEAR | 517.00 | 658.10 | 664.30 | | 664.52 | 0.002561 | 4.22 | 141.35 | 39.05 | 0.35 |
| SOUTH TRIB | 7.391 | 10-YEAR | 287.00 | 658.50 | 663.33 | | 663.48 | 0.002016 | 3.37 | 97.65 | 31.87 | 0.30 |
| SOUTH TRIB | 7.391 | 50-YEAR | 461.00 | 658.50 | 664.49 | | 664.67 | 0.002096 | 3.85 | 137.68 | 37.41 | 0.32 |
| SOUTH TRIB | 7.391 | 100-YEAR | 517.00 | 658.50 | 664.82 | | 665.02 | 0.002078 | 3.95 | 151.89 | 50.79 | 0.32 |
| SOUTH TRIB | 7.399 | 10-YEAR | 287.00 | 658.50 | 663.42 | | 663.55 | 0.001276 | 3.40 | 114.57 | 36.81 | 0.27 |
| SOUTH TRIB | 7.399 | 50-YEAR | 461.00 | 658.50 | 664.58 | | 664.75 | 0.001341 | 4.02 | 160.96 | 43.16 | 0.29 |
| SOUTH TRIB | 7.399 | 100-YEAR | 517.00 | 658.50 | 664.92 | | 665.09 | 0.001338 | 4.16 | 175.77 | 45.00 | 0.29 |
| SOUTH TRIB | 7.406 | 10-YEAR | 287.00 | 658.60 | 663.41 | | 663.64 | 0.002095 | 4.31 | 84.70 | 25.22 | 0.35 |
| SOUTH TRIB | 7.406 | 50-YEAR | 461.00 | 658.60 | 664.53 | | 664.86 | 0.002364 | 5.26 | 115.06 | 28.73 | 0.38 |
| SOUTH TRIB | 7.406 | 100-YEAR | 517.00 | 658.60 | 664.86 | | 665.21 | 0.002392 | 5.49 | 124.49 | 29.20 | 0.39 |
| SOUTH TRIB | 7.431 | 10-YEAR | 287.00 | 659.00 | 663.68 | | 664.05 | 0.004046 | 5.59 | 67.44 | 23.92 | 0.47 |
| SOUTH TRIB | 7.431 | 50-YEAR | 461.00 | 659.00 | 664.83 | | 665.29 | 0.003972 | 6.47 | 97.67 | 28.68 | 0.49 |
| SOUTH TRIB | 7.431 | 100-YEAR | 517.00 | 659.00 | 665.16 | | 665.64 | 0.003901 | 6.66 | 107.27 | 29.71 | 0.49 |
| SOUTH TRIB | 7.447 | 10-YEAR | 287.00 | 658.10 | 664.01 | | 664.12 | 0.001176 | 3.26 | 113.58 | 31.55 | 0.26 |
| SOUTH TRIB | 7.447 | 50-YEAR | 461.00 | 658.10 | 665.21 | | 665.38 | 0.001323 | 3.99 | 154.26 | 36.01 | 0.28 |
| SOUTH TRIB | 7.447 | 100-YEAR | 517.00 | 658.10 | 665.52 | | 665.73 | 0.001538 | 4.45 | 168.15 | 60.21 | 0.31 |
| SOUTH TRIB | 7.456 | 10-YEAR | 261.00 | 658.10 | 664.07 | 660.99 | 664.16 | 0.000865 | 2.82 | 110.93 | 31.77 | 0.22 |
| SOUTH TRIB | 7.456 | 50-YEAR | 418.00 | 658.10 | 665.29 | 661.71 | 665.42 | 0.001035 | 3.56 | 157.12 | 36.30 | 0.25 |
| SOUTH TRIB | 7.456 | 100-YEAR | 468.00 | 658.10 | 665.62 | 661.91 | 665.78 | 0.001199 | 3.96 | 174.40 | 70.50 | 0.27 |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 261.00 | 658.10 | 664.82 | 660.99 | 664.89 | 0.000509 | 2.37 | 130.57 | 34.57 | 0.17 |
| SOUTH TRIB | 7.47 | 50-YEAR | 418.00 | 658.10 | 666.68 | 661.70 | 666.75 | 0.000595 | 3.09 | 365.27 | 296.70 | 0.20 |

HEC-RAS Plan: Baseline (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.47 | 100-YEAR | 468.00 | 658.10 | 666.86 | 661.90 | 666.93 | 0.000585 | 3.10 | 421.19 | 335.82 | 0.20 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 261.00 | 655.06 | 664.90 | | 664.90 | 0.000006 | 0.38 | 1055.58 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 50-YEAR | 418.00 | 655.06 | 666.76 | | 666.76 | 0.000006 | 0.43 | 1444.04 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 100-YEAR | 468.00 | 655.06 | 666.93 | | 666.94 | 0.000007 | 0.47 | 1479.88 | 208.30 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 261.00 | 655.05 | 664.90 | | 664.90 | 0.000001 | 0.11 | 4693.32 | 1495.85 | 0.01 |
| SOUTH TRIB | 7.493 | 50-YEAR | 418.00 | 655.05 | 666.76 | | 666.76 | 0.000000 | 0.09 | 7578.54 | 1585.41 | 0.01 |
| SOUTH TRIB | 7.493 | 100-YEAR | 468.00 | 655.05 | 666.94 | | 666.94 | 0.000000 | 0.10 | 7852.56 | 1593.09 | 0.01 |

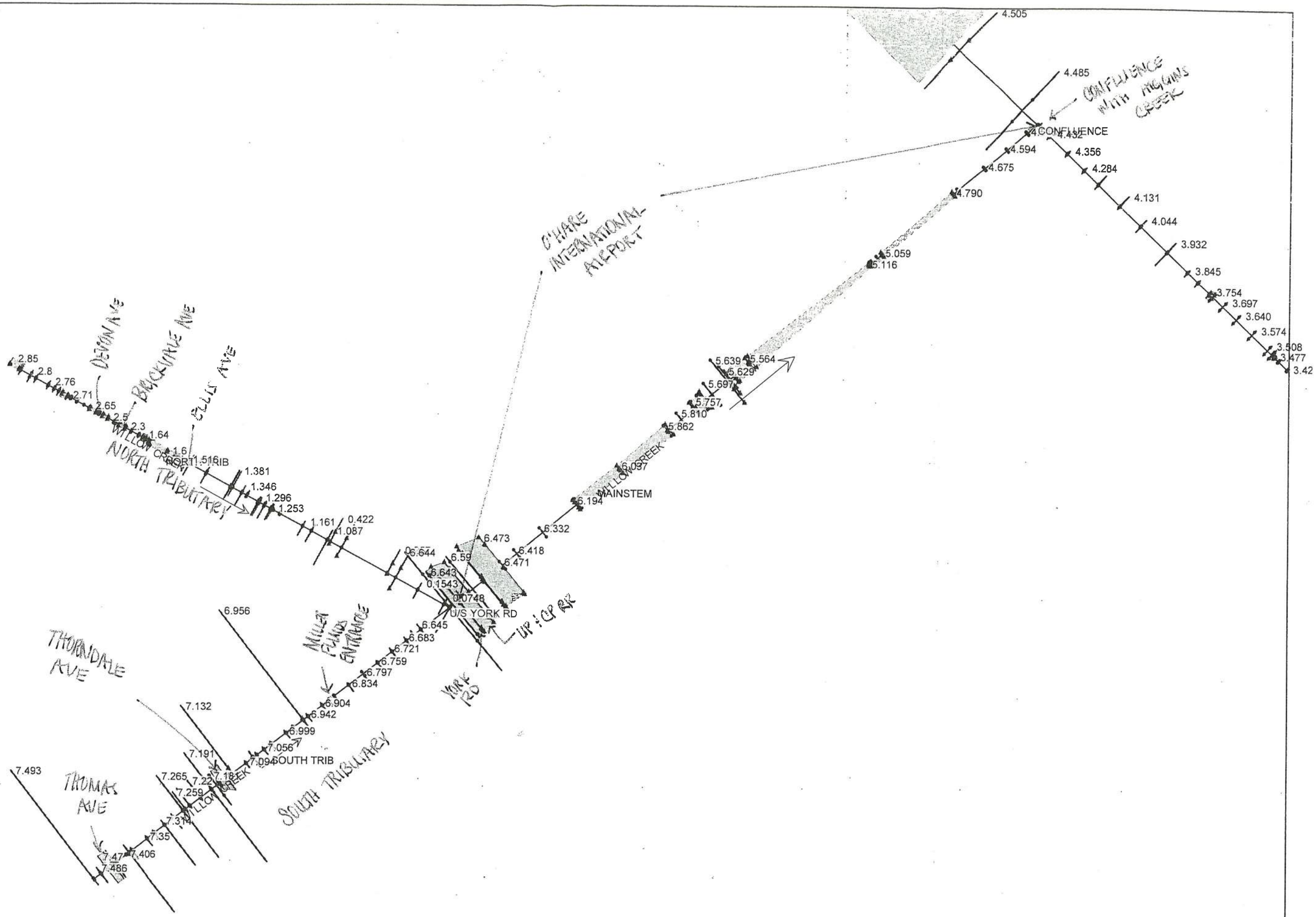
Willow Creek - Baseline Conditions




1 in Horiz. = 1500 ft  1 in Vert. = 4 ft

# SECTION 9

## EXISTING CONDITONS ANALYSIS




None of the XS's are Geo-Referenced (- Geo-Ref user entered XS - Geo-Ref interpolated XS - Non Geo-Ref user entered XS - Non Geo-Ref interpolated XS)

HEC-RAS Plan: Ex Cond

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 4.518 | 10-YEAR | 644.73 | 644.69 | 0.04 | 0.05 | 0.01 | 11.61 | 870.78 | 11.61 | 68.69 |
| MAINSTEM | 4.518 | 50-YEAR | 646.41 | 646.33 | 0.08 | 0.06 | 0.01 | 22.42 | 1414.15 | 22.42 | 70.33 |
| MAINSTEM | 4.518 | 100-YEAR | 647.00 | 646.91 | 0.09 | 0.06 | 0.01 | 27.25 | 1627.50 | 27.25 | 70.91 |
| | | | | | | | | | | | |
| MAINSTEM | 4.594 | 10-YEAR | 644.77 | 644.73 | 0.04 | 0.04 | 0.00 | 11.67 | 870.66 | 11.67 | 68.73 |
| MAINSTEM | 4.594 | 50-YEAR | 646.48 | 646.40 | 0.08 | 0.07 | 0.00 | 22.57 | 1413.87 | 22.57 | 70.40 |
| MAINSTEM | 4.594 | 100-YEAR | 647.07 | 646.98 | 0.09 | 0.07 | 0.00 | 27.43 | 1627.14 | 27.43 | 70.98 |
| | | | | | | | | | | | |
| MAINSTEM | 4.675 | 10-YEAR | 644.82 | 644.78 | 0.04 | 0.05 | 0.00 | 11.67 | 870.65 | 11.67 | 68.72 |
| MAINSTEM | 4.675 | 50-YEAR | 646.55 | 646.47 | 0.08 | 0.07 | 0.00 | 22.64 | 1413.71 | 22.64 | 70.41 |
| MAINSTEM | 4.675 | 100-YEAR | 647.15 | 647.06 | 0.09 | 0.08 | 0.00 | 27.55 | 1626.91 | 27.55 | 71.01 |
| | | | | | | | | | | | |
| MAINSTEM | 4.773 | 10-YEAR | 644.88 | 644.84 | 0.03 | 0.05 | 0.00 | 10.26 | 764.66 | 9.07 | 68.37 |
| MAINSTEM | 4.773 | 50-YEAR | 646.62 | 646.57 | 0.06 | 0.07 | 0.00 | 19.17 | 1190.88 | 16.95 | 70.04 |
| MAINSTEM | 4.773 | 100-YEAR | 647.24 | 647.17 | 0.07 | 0.08 | 0.00 | 24.25 | 1423.32 | 21.43 | 70.63 |
| | | | | | | | | | | | |
| MAINSTEM | 4.790 | 10-YEAR | 644.93 | 644.81 | 0.12 | 0.01 | 0.04 | | 784.00 | | 68.35 |
| MAINSTEM | 4.790 | 50-YEAR | 646.71 | 646.51 | 0.20 | 0.02 | 0.07 | | 1227.00 | | 69.99 |
| MAINSTEM | 4.790 | 100-YEAR | 647.35 | 647.09 | 0.26 | 0.02 | 0.09 | | 1469.00 | | 70.56 |
| | | | | | | | | | | | |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 645.42 | 645.28 | 0.15 | | | | 784.00 | | 65.50 |
| MAINSTEM | 5.059 | 50-YEAR | 647.81 | 647.60 | 0.21 | | | | 1227.00 | | 67.78 |
| MAINSTEM | 5.059 | 100-YEAR | 648.96 | 648.71 | 0.25 | | | | 1469.00 | | 68.88 |
| | | | | | | | | | | | |
| MAINSTEM | 5.076 | 10-YEAR | 645.46 | 645.41 | 0.05 | 0.03 | 0.01 | | 784.00 | | 65.48 |
| MAINSTEM | 5.076 | 50-YEAR | 647.85 | 647.79 | 0.07 | 0.03 | 0.01 | | 1227.00 | | 67.85 |
| MAINSTEM | 5.076 | 100-YEAR | 649.00 | 648.93 | 0.07 | 0.03 | 0.02 | | 1469.00 | | 68.98 |
| | | | | | | | | | | | |
| MAINSTEM | 5.104 | 10-YEAR | 645.51 | 645.41 | 0.10 | 0.03 | 0.02 | | 784.00 | | 65.32 |
| MAINSTEM | 5.104 | 50-YEAR | 647.90 | 647.76 | 0.14 | 0.03 | 0.02 | | 1227.00 | | 67.69 |
| MAINSTEM | 5.104 | 100-YEAR | 649.06 | 648.90 | 0.16 | 0.03 | 0.03 | | 1469.00 | | 68.83 |
| | | | | | | | | | | | |
| MAINSTEM | 5.109 | 10-YEAR | 645.54 | 645.37 | 0.17 | 0.01 | 0.02 | | 784.00 | | 65.24 |
| MAINSTEM | 5.109 | 50-YEAR | 647.94 | 647.71 | 0.24 | 0.01 | 0.03 | | 1227.00 | | 67.60 |
| MAINSTEM | 5.109 | 100-YEAR | 649.10 | 648.83 | 0.27 | 0.01 | 0.03 | | 1469.00 | | 68.73 |
| | | | | | | | | | | | |
| MAINSTEM | 5.110 | 10-YEAR | 645.56 | 645.33 | 0.23 | 0.00 | 0.02 | | 784.00 | | 44.59 |
| MAINSTEM | 5.110 | 50-YEAR | 647.98 | 647.64 | 0.34 | 0.00 | 0.03 | | 1227.00 | | 50.16 |
| MAINSTEM | 5.110 | 100-YEAR | 649.14 | 648.75 | 0.40 | 0.00 | 0.04 | | 1469.00 | | 52.83 |
| | | | | | | | | | | | |
| MAINSTEM | 5.116 | 10-YEAR | 645.57 | 645.33 | 0.24 | 0.01 | 0.00 | | 784.00 | | 25.00 |
| MAINSTEM | 5.116 | 50-YEAR | 647.99 | 647.64 | 0.35 | 0.01 | 0.01 | 0.02 | 1226.96 | 0.02 | 26.44 |
| MAINSTEM | 5.116 | 100-YEAR | 649.16 | 648.75 | 0.41 | 0.01 | 0.01 | 0.25 | 1468.50 | 0.25 | 31.23 |
| | | | | | | | | | | | |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 646.33 | 646.04 | 0.29 | | | | 634.00 | | 25.50 |
| MAINSTEM | 5.606 | 50-YEAR | 649.94 | 649.63 | 0.30 | | | | 1056.00 | | 57.44 |
| MAINSTEM | 5.606 | 100-YEAR | 651.85 | 651.57 | 0.28 | | | | 1227.00 | | 80.97 |
| | | | | | | | | | | | |
| MAINSTEM | 5.610 | 10-YEAR | 646.36 | 646.34 | 0.02 | 0.00 | 0.03 | | 634.00 | | 125.36 |
| MAINSTEM | 5.610 | 50-YEAR | 649.97 | 649.95 | 0.02 | 0.00 | 0.03 | | 1056.00 | | 145.88 |
| MAINSTEM | 5.610 | 100-YEAR | 651.88 | 651.86 | 0.02 | 0.00 | 0.03 | | 1227.00 | | 156.76 |
| | | | | | | | | | | | |
| MAINSTEM | 5.629 | 10-YEAR | 646.36 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 215.49 |
| MAINSTEM | 5.629 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 237.14 |
| MAINSTEM | 5.629 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 248.61 |
| | | | | | | | | | | | |
| MAINSTEM | 5.632 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 411.47 |
| MAINSTEM | 5.632 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 433.12 |
| MAINSTEM | 5.632 | 100-YEAR | 651.88 | 651.88 | 0.00 | 0.00 | 0.00 | | 1227.00 | | 444.58 |
| | | | | | | | | | | | |
| MAINSTEM | 5.639 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 737.22 |
| MAINSTEM | 5.639 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 758.86 |
| MAINSTEM | 5.639 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 770.33 |
| | | | | | | | | | | | |
| MAINSTEM | 5.697 | 10-YEAR | 646.41 | 646.37 | 0.04 | 0.03 | 0.01 | | 634.00 | | 311.74 |
| MAINSTEM | 5.697 | 50-YEAR | 649.99 | 649.96 | 0.03 | 0.01 | 0.01 | | 1056.00 | | 333.27 |
| MAINSTEM | 5.697 | 100-YEAR | 651.90 | 651.87 | 0.02 | 0.01 | 0.01 | | 1227.00 | | 344.73 |
| | | | | | | | | | | | |

HEC-RAS Plan: Ex Cond (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 5.720 | 10-YEAR | 646.51 | 646.35 | 0.16 | 0.06 | 0.04 | | 634.00 | | 161.07 |
| MAINSTEM | 5.720 | 50-YEAR | 650.05 | 649.91 | 0.14 | 0.02 | 0.03 | | 1056.00 | | 188.74 |
| MAINSTEM | 5.720 | 100-YEAR | 651.94 | 651.82 | 0.12 | 0.01 | 0.03 | | 1227.00 | | 203.61 |
| | | | | | | | | | | | |
| MAINSTEM | 5.725 | 10-YEAR | 646.59 | 646.28 | 0.31 | 0.03 | 0.04 | | 634.00 | | 93.92 |
| MAINSTEM | 5.725 | 50-YEAR | 650.10 | 649.82 | 0.28 | 0.01 | 0.04 | | 1056.00 | | 126.73 |
| MAINSTEM | 5.725 | 100-YEAR | 651.99 | 651.74 | 0.25 | 0.01 | 0.04 | | 1227.00 | | 144.48 |
| | | | | | | | | | | | |
| MAINSTEM | 5.727 | 10-YEAR | 646.68 | 646.23 | 0.45 | 0.02 | 0.07 | | 634.00 | | 25.00 |
| MAINSTEM | 5.727 | 50-YEAR | 650.18 | 649.77 | 0.41 | 0.01 | 0.06 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.727 | 100-YEAR | 652.05 | 651.69 | 0.36 | 0.01 | 0.06 | | 1227.00 | | 27.98 |
| | | | | | | | | | | | |
| MAINSTEM | 5.732 | 10-YEAR | 646.81 | 646.38 | 0.44 | 0.13 | 0.00 | | 634.00 | | 25.00 |
| MAINSTEM | 5.732 | 50-YEAR | 650.24 | 649.84 | 0.41 | 0.07 | 0.00 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.732 | 100-YEAR | 652.10 | 651.74 | 0.36 | 0.05 | 0.00 | | 1227.00 | | 27.64 |
| | | | | | | | | | | | |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 647.18 | 646.81 | 0.37 | | | | 634.00 | | 26.00 |
| MAINSTEM | 5.757 | 50-YEAR | 650.55 | 650.18 | 0.37 | | | | 1056.00 | | 26.00 |
| MAINSTEM | 5.757 | 100-YEAR | 652.40 | 652.07 | 0.33 | | | | 1227.00 | | 26.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.759 | 10-YEAR | 647.22 | 647.20 | 0.03 | 0.01 | 0.03 | | 634.00 | | 100.00 |
| MAINSTEM | 5.759 | 50-YEAR | 650.59 | 650.56 | 0.03 | 0.01 | 0.03 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.759 | 100-YEAR | 652.43 | 652.41 | 0.03 | 0.00 | 0.03 | | 1227.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.810 | 10-YEAR | 647.29 | 647.24 | 0.06 | 0.06 | 0.01 | | 634.00 | | 100.00 |
| MAINSTEM | 5.810 | 50-YEAR | 650.62 | 650.58 | 0.04 | 0.03 | 0.00 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.810 | 100-YEAR | 652.45 | 652.42 | 0.03 | 0.02 | 0.00 | | 1227.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.860 | 10-YEAR | 648.57 | 647.64 | 0.93 | 0.42 | 0.26 | | 634.00 | | 100.00 |
| MAINSTEM | 5.860 | 50-YEAR | 650.83 | 650.43 | 0.40 | 0.10 | 0.11 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.860 | 100-YEAR | 652.58 | 652.31 | 0.28 | 0.06 | 0.07 | | 1227.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.862 | 10-YEAR | 649.70 | 648.45 | 1.26 | 0.73 | 0.16 | | 634.00 | | 28.35 |
| MAINSTEM | 5.862 | 50-YEAR | 651.40 | 650.19 | 1.20 | 0.17 | 0.40 | | 1056.00 | | 28.35 |
| MAINSTEM | 5.862 | 100-YEAR | 652.90 | 652.14 | 0.76 | 0.07 | 0.24 | | 1227.00 | | 28.35 |
| | | | | | | | | | | | |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 651.96 | 651.60 | 0.37 | | | | 634.00 | | 33.00 |
| MAINSTEM | 6.037 | 50-YEAR | 653.74 | 653.22 | 0.52 | | | | 1056.00 | | 33.00 |
| MAINSTEM | 6.037 | 100-YEAR | 654.46 | 653.90 | 0.56 | | | | 1227.00 | | 33.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 652.40 | 652.15 | 0.25 | | | | 603.00 | | 34.00 |
| MAINSTEM | 6.190 | 50-YEAR | 654.26 | 653.91 | 0.35 | | | | 996.00 | | 34.00 |
| MAINSTEM | 6.190 | 100-YEAR | 655.00 | 654.62 | 0.38 | | | | 1156.00 | | 34.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.194 | 10-YEAR | 652.44 | 652.41 | 0.03 | 0.01 | 0.02 | | 603.00 | | 100.00 |
| MAINSTEM | 6.194 | 50-YEAR | 654.31 | 654.27 | 0.04 | 0.01 | 0.03 | | 996.00 | | 100.00 |
| MAINSTEM | 6.194 | 100-YEAR | 655.04 | 655.00 | 0.04 | 0.01 | 0.03 | | 1156.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.332 | 10-YEAR | 652.55 | 652.52 | 0.03 | 0.11 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.332 | 50-YEAR | 654.41 | 654.37 | 0.04 | 0.10 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.332 | 100-YEAR | 655.14 | 655.10 | 0.04 | 0.10 | 0.00 | | 1156.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.418 | 10-YEAR | 652.63 | 652.61 | 0.03 | 0.09 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.418 | 50-YEAR | 654.49 | 654.45 | 0.04 | 0.08 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.418 | 100-YEAR | 655.22 | 655.18 | 0.04 | 0.08 | 0.00 | | 1156.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.471 | 10-YEAR | 652.73 | 652.65 | 0.08 | 0.08 | 0.02 | | 603.00 | | 55.30 |
| MAINSTEM | 6.471 | 50-YEAR | 654.59 | 654.48 | 0.12 | 0.08 | 0.02 | | 996.00 | | 55.30 |
| MAINSTEM | 6.471 | 100-YEAR | 655.32 | 655.19 | 0.13 | 0.07 | 0.03 | | 1156.00 | | 55.30 |
| | | | | | | | | | | | |
| MAINSTEM | 6.473 | 10-YEAR | 652.79 | 652.61 | 0.18 | 0.01 | 0.05 | | 603.00 | | 40.00 |
| MAINSTEM | 6.473 | 50-YEAR | 654.67 | 654.42 | 0.25 | 0.01 | 0.07 | | 996.00 | | 40.00 |
| MAINSTEM | 6.473 | 100-YEAR | 655.40 | 655.13 | 0.27 | 0.01 | 0.07 | | 1156.00 | | 40.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | |
| | | | | | | | | | | | |

HEC-RAS Plan: Ex Cond (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 6.538 | 10-YEAR | 653.03 | 652.83 | 0.20 | | | | 603.00 | | 38.00 |
| MAINSTEM | 6.538 | 50-YEAR | 654.97 | 654.69 | 0.27 | | | | 996.00 | | 38.00 |
| MAINSTEM | 6.538 | 100-YEAR | 655.72 | 655.42 | 0.29 | | | | 1156.00 | | 38.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.540 | 10-YEAR | 653.05 | 653.04 | 0.01 | 0.00 | 0.02 | | 603.00 | | 191.09 |
| MAINSTEM | 6.540 | 50-YEAR | 654.99 | 654.98 | 0.02 | 0.00 | 0.03 | | 996.00 | | 220.15 |
| MAINSTEM | 6.540 | 100-YEAR | 655.75 | 655.73 | 0.02 | 0.00 | 0.03 | | 1156.00 | | 231.41 |
| | | | | | | | | | | | |
| MAINSTEM | 6.59 | 10-YEAR | 653.07 | 653.06 | 0.01 | 0.02 | 0.00 | | 603.00 | | 196.42 |
| MAINSTEM | 6.59 | 50-YEAR | 655.03 | 655.01 | 0.01 | 0.03 | 0.00 | 0.00 | 996.00 | | 1008.18 |
| MAINSTEM | 6.59 | 100-YEAR | 655.77 | 655.76 | 0.01 | 0.02 | 0.00 | 1.69 | 1154.31 | | 1050.50 |
| | | | | | | | | | | | |
| MAINSTEM | 6.6 | 10-YEAR | 653.14 | 653.03 | 0.11 | 0.02 | 0.05 | | 603.00 | | 199.69 |
| MAINSTEM | 6.6 | 50-YEAR | 655.13 | 654.99 | 0.14 | 0.04 | 0.07 | | 996.00 | | 234.83 |
| MAINSTEM | 6.6 | 100-YEAR | 655.86 | 655.70 | 0.16 | 0.02 | 0.08 | | 1156.00 | | 247.66 |
| | | | | | | | | | | | |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 653.45 | 652.11 | 1.34 | | | | 603.00 | | 219.18 |
| MAINSTEM | 6.635 | 50-YEAR | 655.48 | 654.41 | 1.07 | | | | 996.00 | | 1224.97 |
| MAINSTEM | 6.635 | 100-YEAR | 656.23 | 655.13 | 1.10 | | | | 1156.00 | | 1230.05 |
| | | | | | | | | | | | |
| MAINSTEM | 6.637 | 10-YEAR | 653.85 | 653.85 | 0.00 | 0.00 | 0.40 | 5.04 | 597.62 | 0.34 | 1208.75 |
| MAINSTEM | 6.637 | 50-YEAR | 655.80 | 655.80 | 0.00 | 0.00 | 0.32 | 15.58 | 979.15 | 1.27 | 1234.77 |
| MAINSTEM | 6.637 | 100-YEAR | 656.56 | 656.56 | 0.00 | 0.00 | 0.33 | 19.86 | 1134.35 | 1.79 | 1240.13 |
| | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 654.18 | 653.53 | 0.65 | 0.00 | 0.33 | | 603.00 | | 40.25 |
| MAINSTEM | 6.639 | 50-YEAR | 656.02 | 655.58 | 0.44 | 0.00 | 0.22 | | 996.00 | | 52.26 |
| MAINSTEM | 6.639 | 100-YEAR | 656.75 | 656.36 | 0.39 | 0.00 | 0.19 | | 1156.00 | | 56.86 |
| | | | | | | | | | | | |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 655.03 | 654.58 | 0.45 | 0.01 | 0.00 | | 603.00 | | 47.66 |
| MAINSTEM | 6.642 | 50-YEAR | 656.43 | 656.01 | 0.43 | 0.01 | 0.00 | | 996.00 | | 61.64 |
| MAINSTEM | 6.642 | 100-YEAR | 657.08 | 656.70 | 0.38 | 0.00 | 0.00 | | 1156.00 | | 68.64 |
| | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 655.14 | 654.75 | 0.39 | 0.09 | 0.02 | | 603.00 | | 49.23 |
| MAINSTEM | 6.643 | 50-YEAR | 656.51 | 656.11 | 0.40 | 0.07 | 0.01 | | 996.00 | | 62.66 |
| MAINSTEM | 6.643 | 100-YEAR | 657.13 | 656.77 | 0.36 | 0.05 | 0.00 | | 1156.00 | | 69.34 |
| | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 655.39 | 655.39 | 0.00 | 0.01 | 0.23 | 0.31 | 573.67 | 29.02 | 1612.85 |
| MAINSTEM | 6.644 | 50-YEAR | 656.75 | 656.75 | 0.00 | 0.00 | 0.24 | 11.18 | 891.80 | 93.03 | 1817.99 |
| MAINSTEM | 6.644 | 100-YEAR | 657.35 | 657.35 | 0.00 | 0.00 | 0.22 | 21.08 | 1012.14 | 122.78 | 1907.76 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.645 | 10-YEAR | 655.73 | 655.18 | 0.55 | 0.05 | 0.16 | 94.68 | 205.34 | 13.98 | 54.47 |
| SOUTH TRIB | 6.645 | 50-YEAR | 656.84 | 656.62 | 0.22 | 0.02 | 0.06 | 241.30 | 236.90 | 27.80 | 68.99 |
| SOUTH TRIB | 6.645 | 100-YEAR | 657.41 | 657.25 | 0.16 | 0.01 | 0.05 | 291.98 | 244.07 | 33.95 | 75.34 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.664 | 10-YEAR | 656.48 | 656.28 | 0.21 | 0.72 | 0.03 | 105.64 | 190.31 | 18.04 | 49.31 |
| SOUTH TRIB | 6.664 | 50-YEAR | 657.25 | 656.97 | 0.28 | 0.40 | 0.02 | 193.92 | 279.39 | 32.69 | 55.24 |
| SOUTH TRIB | 6.664 | 100-YEAR | 657.70 | 657.46 | 0.24 | 0.27 | 0.02 | 232.74 | 297.78 | 39.48 | 59.39 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.683 | 10-YEAR | 656.90 | 656.63 | 0.26 | 0.40 | 0.02 | 64.85 | 223.48 | 25.67 | 37.11 |
| SOUTH TRIB | 6.683 | 50-YEAR | 657.73 | 657.34 | 0.39 | 0.45 | 0.03 | 119.82 | 338.75 | 47.44 | 41.95 |
| SOUTH TRIB | 6.683 | 100-YEAR | 658.11 | 657.73 | 0.38 | 0.36 | 0.04 | 143.48 | 369.72 | 56.80 | 44.57 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.721 | 10-YEAR | 657.60 | 657.36 | 0.24 | 0.70 | 0.00 | 43.87 | 238.18 | 31.94 | 36.35 |
| SOUTH TRIB | 6.721 | 50-YEAR | 658.55 | 658.21 | 0.34 | 0.82 | 0.00 | 85.76 | 360.65 | 59.58 | 46.89 |
| SOUTH TRIB | 6.721 | 100-YEAR | 658.86 | 658.51 | 0.36 | 0.76 | 0.00 | 104.98 | 395.41 | 69.61 | 50.56 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.759 | 10-YEAR | 658.12 | 657.94 | 0.19 | 0.51 | 0.01 | 51.87 | 227.34 | 34.79 | 36.08 |
| SOUTH TRIB | 6.759 | 50-YEAR | 659.14 | 658.88 | 0.26 | 0.58 | 0.01 | 97.19 | 343.63 | 65.18 | 41.14 |
| SOUTH TRIB | 6.759 | 100-YEAR | 659.45 | 659.16 | 0.29 | 0.58 | 0.01 | 113.73 | 380.00 | 76.27 | 42.66 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.797 | 10-YEAR | 658.55 | 658.41 | 0.14 | 0.43 | 0.00 | | 314.00 | | 36.40 |
| SOUTH TRIB | 6.797 | 50-YEAR | 659.62 | 659.43 | 0.19 | 0.47 | 0.01 | | 506.00 | | 41.69 |
| SOUTH TRIB | 6.797 | 100-YEAR | 659.93 | 659.73 | 0.20 | 0.47 | 0.01 | | 570.00 | | 43.23 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.834 | 10-YEAR | 658.90 | 658.77 | 0.13 | 0.34 | 0.00 | 46.08 | 204.14 | 63.78 | 44.24 |
| SOUTH TRIB | 6.834 | 50-YEAR | 659.98 | 659.82 | 0.17 | 0.36 | 0.00 | 85.40 | 302.41 | 118.19 | 51.58 |
| SOUTH TRIB | 6.834 | 100-YEAR | 660.30 | 660.12 | 0.18 | 0.37 | 0.00 | 99.46 | 332.89 | 137.65 | 53.70 |
| | | | | | | | | | | | |

HEC-RAS Plan: Ex Cond (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 6.872 | 10-YEAR | 659.25 | 659.07 | 0.18 | 0.33 | 0.03 | 43.40 | 235.44 | 35.16 | 33.76 |
| SOUTH TRIB | 6.872 | 50-YEAR | 660.38 | 660.13 | 0.25 | 0.35 | 0.04 | 82.36 | 356.92 | 66.72 | 38.48 |
| SOUTH TRIB | 6.872 | 100-YEAR | 660.70 | 660.43 | 0.28 | 0.36 | 0.05 | 96.49 | 395.34 | 78.17 | 39.83 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.879 Miller Fluids En | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 659.27 | 659.09 | 0.18 | | | 43.56 | 235.16 | 35.29 | 33.85 |
| SOUTH TRIB | 6.886 | 50-YEAR | 660.42 | 660.17 | 0.25 | | | 82.86 | 356.02 | 67.12 | 38.68 |
| SOUTH TRIB | 6.886 | 100-YEAR | 660.75 | 660.48 | 0.27 | | | 97.10 | 394.24 | 78.66 | 40.06 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.904 | 10-YEAR | 659.50 | 659.29 | 0.21 | 0.21 | 0.02 | 39.28 | 242.79 | 31.93 | 33.85 |
| SOUTH TRIB | 6.904 | 50-YEAR | 660.66 | 660.37 | 0.28 | 0.22 | 0.02 | 78.12 | 366.55 | 61.32 | 44.59 |
| SOUTH TRIB | 6.904 | 100-YEAR | 660.98 | 660.68 | 0.30 | 0.22 | 0.02 | 95.13 | 403.27 | 71.60 | 47.66 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.942 | 10-YEAR | 659.93 | 659.75 | 0.17 | 0.43 | 0.00 | 47.22 | 232.29 | 34.49 | 36.28 |
| SOUTH TRIB | 6.942 | 50-YEAR | 661.10 | 660.86 | 0.23 | 0.44 | 0.00 | 90.26 | 349.91 | 65.84 | 46.52 |
| SOUTH TRIB | 6.942 | 100-YEAR | 661.42 | 661.17 | 0.25 | 0.44 | 0.01 | 107.93 | 385.30 | 76.77 | 49.39 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.956 | 10-YEAR | 660.07 | 659.89 | 0.19 | 0.14 | 0.00 | | 298.23 | 15.77 | 134.67 |
| SOUTH TRIB | 6.956 | 50-YEAR | 661.25 | 661.00 | 0.25 | 0.14 | 0.00 | | 468.62 | 37.38 | 277.69 |
| SOUTH TRIB | 6.956 | 100-YEAR | 661.57 | 661.31 | 0.27 | 0.14 | 0.01 | | 524.30 | 45.70 | 524.98 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.98 | 10-YEAR | 660.34 | 660.19 | 0.14 | 0.26 | 0.00 | 58.06 | 220.98 | 34.96 | 38.27 |
| SOUTH TRIB | 6.98 | 50-YEAR | 661.52 | 661.32 | 0.19 | 0.27 | 0.01 | 108.21 | 331.50 | 66.29 | 45.38 |
| SOUTH TRIB | 6.98 | 100-YEAR | 661.85 | 661.64 | 0.21 | 0.27 | 0.01 | 126.54 | 366.00 | 77.46 | 47.43 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.999 | 10-YEAR | 660.50 | 660.35 | 0.15 | 0.16 | 0.00 | 54.70 | 223.55 | 35.75 | 37.41 |
| SOUTH TRIB | 6.999 | 50-YEAR | 661.68 | 661.48 | 0.20 | 0.16 | 0.00 | 103.72 | 334.48 | 67.80 | 43.41 |
| SOUTH TRIB | 6.999 | 100-YEAR | 662.02 | 661.80 | 0.23 | 0.17 | 0.01 | 110.39 | 378.42 | 81.19 | 49.46 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.037 | 10-YEAR | 660.71 | 660.63 | 0.08 | 0.21 | 0.01 | 48.21 | 236.53 | 29.26 | 44.75 |
| SOUTH TRIB | 7.037 | 50-YEAR | 661.92 | 661.80 | 0.11 | 0.22 | 0.01 | 91.80 | 358.86 | 55.34 | 51.24 |
| SOUTH TRIB | 7.037 | 100-YEAR | 662.27 | 662.14 | 0.12 | 0.23 | 0.01 | 107.82 | 397.37 | 64.81 | 53.13 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.056 | 10-YEAR | 660.81 | 660.70 | 0.12 | 0.09 | 0.01 | 43.86 | 217.14 | 53.00 | 39.70 |
| SOUTH TRIB | 7.056 | 50-YEAR | 662.03 | 661.87 | 0.16 | 0.10 | 0.01 | 75.50 | 329.95 | 100.55 | 50.68 |
| SOUTH TRIB | 7.056 | 100-YEAR | 662.38 | 662.21 | 0.17 | 0.10 | 0.02 | 88.93 | 363.78 | 117.29 | 54.37 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.075 | 10-YEAR | 660.92 | 660.82 | 0.11 | 0.11 | 0.00 | 58.87 | 208.35 | 46.78 | 42.79 |
| SOUTH TRIB | 7.075 | 50-YEAR | 662.15 | 662.00 | 0.15 | 0.12 | 0.00 | 103.94 | 313.57 | 88.49 | 53.44 |
| SOUTH TRIB | 7.075 | 100-YEAR | 662.50 | 662.34 | 0.16 | 0.12 | 0.00 | 120.92 | 345.75 | 103.33 | 57.21 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.084 | 10-YEAR | 660.98 | 660.86 | 0.12 | 0.05 | 0.00 | 23.83 | 260.97 | 29.20 | 40.39 |
| SOUTH TRIB | 7.084 | 50-YEAR | 662.21 | 662.04 | 0.18 | 0.06 | 0.01 | 30.99 | 406.06 | 68.95 | 206.70 |
| SOUTH TRIB | 7.084 | 100-YEAR | 662.55 | 662.46 | 0.09 | 0.04 | 0.01 | 155.96 | 347.55 | 66.50 | 215.96 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.094 | 10-YEAR | 661.09 | 660.97 | 0.13 | 0.11 | 0.00 | 55.54 | 219.82 | 38.64 | 38.76 |
| SOUTH TRIB | 7.094 | 50-YEAR | 662.34 | 662.17 | 0.17 | 0.12 | 0.00 | 104.82 | 328.26 | 72.92 | 45.02 |
| SOUTH TRIB | 7.094 | 100-YEAR | 662.67 | 662.49 | 0.18 | 0.09 | 0.03 | 122.22 | 362.76 | 85.02 | 46.67 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.132 | 10-YEAR | 661.29 | 661.21 | 0.09 | 0.20 | 0.00 | 62.21 | 202.32 | 49.47 | 253.53 |
| SOUTH TRIB | 7.132 | 50-YEAR | 662.55 | 662.43 | 0.11 | 0.20 | 0.01 | 118.90 | 289.35 | 97.74 | 881.88 |
| SOUTH TRIB | 7.132 | 100-YEAR | 662.88 | 662.76 | 0.12 | 0.20 | 0.01 | 138.49 | 316.75 | 114.76 | 913.31 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.136 | 10-YEAR | 661.36 | 661.19 | 0.16 | 0.04 | 0.02 | 2.07 | 311.08 | 0.85 | 29.77 |
| SOUTH TRIB | 7.136 | 50-YEAR | 662.62 | 662.39 | 0.23 | 0.04 | 0.04 | 13.31 | 487.24 | 5.45 | 35.56 |
| SOUTH TRIB | 7.136 | 100-YEAR | 662.96 | 662.71 | 0.25 | 0.04 | 0.04 | 18.76 | 543.56 | 7.69 | 37.10 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.145 | 10-YEAR | 661.43 | 661.38 | 0.05 | 0.03 | 0.04 | | 287.00 | | 54.90 |
| SOUTH TRIB | 7.145 | 50-YEAR | 662.71 | 662.63 | 0.07 | 0.04 | 0.05 | | 461.00 | | 62.02 |
| SOUTH TRIB | 7.145 | 100-YEAR | 663.05 | 662.97 | 0.08 | 0.04 | 0.05 | | 517.00 | | 63.80 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.156 Thorndale Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.168 | 10-YEAR | 661.52 | 661.46 | 0.06 | | | | 287.00 | | 71.71 |
| SOUTH TRIB | 7.168 | 50-YEAR | 663.00 | 662.92 | 0.08 | | | | 461.00 | | 113.39 |
| SOUTH TRIB | 7.168 | 100-YEAR | 663.43 | 663.34 | 0.09 | | | | 517.00 | | 124.87 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.181 | 10-YEAR | 661.54 | 661.52 | 0.02 | 0.02 | 0.00 | | 287.00 | | 84.54 |
| SOUTH TRIB | 7.181 | 50-YEAR | 663.02 | 662.99 | 0.02 | 0.01 | 0.01 | | 461.00 | | 92.60 |
| SOUTH TRIB | 7.181 | 100-YEAR | 663.45 | 663.42 | 0.03 | 0.01 | 0.01 | | 517.00 | | 94.95 |
| | | | | | | | | | | | |

HEC-RAS Plan: Ex Cond (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 7.191 | 10-YEAR | 661.57 | 661.54 | 0.03 | 0.03 | 0.00 | 90.53 | 185.85 | 10.62 | 95.25 |
| SOUTH TRIB | 7.191 | 50-YEAR | 663.04 | 663.01 | 0.03 | 0.02 | 0.00 | 199.87 | 238.52 | 22.62 | 104.37 |
| SOUTH TRIB | 7.191 | 100-YEAR | 663.47 | 663.44 | 0.03 | 0.02 | 0.00 | 235.07 | 254.86 | 27.07 | 107.03 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.22 | 10-YEAR | 661.64 | 661.62 | 0.03 | 0.07 | 0.00 | 196.02 | 90.98 | | 85.61 |
| SOUTH TRIB | 7.22 | 50-YEAR | 663.08 | 663.06 | 0.03 | 0.04 | 0.00 | 337.41 | 123.59 | | 92.64 |
| SOUTH TRIB | 7.22 | 100-YEAR | 663.51 | 663.48 | 0.03 | 0.04 | 0.00 | 382.68 | 134.32 | | 94.72 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.247 | 10-YEAR | 661.71 | 661.69 | 0.03 | 0.07 | 0.00 | 219.67 | 67.33 | | 84.37 |
| SOUTH TRIB | 7.247 | 50-YEAR | 663.13 | 663.10 | 0.03 | 0.05 | 0.00 | 368.01 | 92.99 | | 91.41 |
| SOUTH TRIB | 7.247 | 100-YEAR | 663.55 | 663.52 | 0.03 | 0.04 | 0.00 | 415.44 | 101.56 | | 93.50 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.259 | 10-YEAR | 661.74 | 661.72 | 0.03 | 0.03 | 0.00 | 223.65 | 63.35 | | 85.18 |
| SOUTH TRIB | 7.259 | 50-YEAR | 663.15 | 663.12 | 0.03 | 0.02 | 0.00 | 372.17 | 88.83 | | 91.92 |
| SOUTH TRIB | 7.259 | 100-YEAR | 663.57 | 663.54 | 0.03 | 0.02 | 0.00 | 419.69 | 97.31 | | 93.93 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.265 | 10-YEAR | 661.79 | 661.70 | 0.09 | 0.03 | 0.02 | 100.20 | 172.76 | 14.04 | 65.64 |
| SOUTH TRIB | 7.265 | 50-YEAR | 663.18 | 663.11 | 0.07 | 0.02 | 0.01 | 220.16 | 213.46 | 27.38 | 73.95 |
| SOUTH TRIB | 7.265 | 100-YEAR | 663.60 | 663.53 | 0.07 | 0.01 | 0.01 | 258.43 | 226.32 | 32.25 | 76.43 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.289 | 10-YEAR | 662.04 | 661.90 | 0.14 | 0.24 | 0.01 | 127.02 | 159.98 | | 38.41 |
| SOUTH TRIB | 7.289 | 50-YEAR | 663.36 | 663.21 | 0.15 | 0.15 | 0.02 | 232.03 | 228.97 | | 47.38 |
| SOUTH TRIB | 7.289 | 100-YEAR | 663.76 | 663.61 | 0.14 | 0.14 | 0.02 | 267.88 | 249.12 | | 50.13 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.314 | 10-YEAR | 662.26 | 662.19 | 0.07 | 0.21 | 0.01 | 164.96 | 122.04 | | 49.50 |
| SOUTH TRIB | 7.314 | 50-YEAR | 663.54 | 663.46 | 0.08 | 0.18 | 0.01 | 285.14 | 175.86 | | 58.93 |
| SOUTH TRIB | 7.314 | 100-YEAR | 663.93 | 663.84 | 0.08 | 0.16 | 0.01 | 325.07 | 191.93 | | 61.81 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.331 | 10-YEAR | 662.60 | 662.31 | 0.29 | 0.28 | 0.07 | 113.88 | 173.12 | | 27.32 |
| SOUTH TRIB | 7.331 | 50-YEAR | 663.84 | 663.53 | 0.31 | 0.23 | 0.07 | 199.40 | 261.60 | | 33.98 |
| SOUTH TRIB | 7.331 | 100-YEAR | 664.21 | 663.90 | 0.31 | 0.22 | 0.07 | 228.10 | 288.90 | | 36.02 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.35 | 10-YEAR | 663.00 | 662.83 | 0.17 | 0.39 | 0.01 | 100.71 | 186.29 | | 31.40 |
| SOUTH TRIB | 7.35 | 50-YEAR | 664.20 | 663.99 | 0.21 | 0.35 | 0.01 | 182.91 | 278.09 | | 37.43 |
| SOUTH TRIB | 7.35 | 100-YEAR | 664.55 | 664.34 | 0.22 | 0.34 | 0.01 | 211.22 | 305.78 | | 39.24 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.391 | 10-YEAR | 663.49 | 663.35 | 0.14 | 0.49 | 0.00 | 96.40 | 190.60 | | 31.96 |
| SOUTH TRIB | 7.391 | 50-YEAR | 664.70 | 664.51 | 0.19 | 0.49 | 0.00 | 174.14 | 286.86 | | 37.52 |
| SOUTH TRIB | 7.391 | 100-YEAR | 665.04 | 664.85 | 0.19 | 0.48 | 0.00 | 200.60 | 315.87 | 0.53 | 52.14 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.399 | 10-YEAR | 663.57 | 663.39 | 0.17 | 0.06 | 0.01 | 27.84 | 232.43 | 26.73 | 24.85 |
| SOUTH TRIB | 7.399 | 50-YEAR | 664.79 | 664.53 | 0.27 | 0.07 | 0.02 | 53.48 | 355.88 | 51.64 | 522.90 |
| SOUTH TRIB | 7.399 | 100-YEAR | 665.15 | 664.85 | 0.29 | 0.08 | 0.03 | 62.63 | 393.81 | 60.56 | 643.78 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.406 | 10-YEAR | 663.64 | 663.42 | 0.23 | 0.06 | 0.02 | 43.37 | 207.00 | 36.63 | 25.25 |
| SOUTH TRIB | 7.406 | 50-YEAR | 664.88 | 664.56 | 0.32 | 0.07 | 0.02 | 81.08 | 311.68 | 68.24 | 28.77 |
| SOUTH TRIB | 7.406 | 100-YEAR | 665.24 | 664.89 | 0.35 | 0.08 | 0.02 | 95.12 | 342.70 | 79.18 | 29.25 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 664.05 | 663.68 | 0.37 | 0.37 | 0.04 | 56.75 | 195.73 | 34.52 | 23.95 |
| SOUTH TRIB | 7.431 | 50-YEAR | 665.31 | 664.85 | 0.46 | 0.38 | 0.04 | 104.83 | 285.65 | 70.51 | 28.77 |
| SOUTH TRIB | 7.431 | 100-YEAR | 665.66 | 665.18 | 0.48 | 0.38 | 0.04 | 121.13 | 311.47 | 84.40 | 29.76 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 664.13 | 664.01 | 0.12 | 0.05 | 0.03 | 130.01 | 130.62 | 26.37 | 31.56 |
| SOUTH TRIB | 7.447 | 50-YEAR | 665.39 | 665.23 | 0.16 | 0.05 | 0.03 | 207.10 | 198.28 | 55.62 | 36.07 |
| SOUTH TRIB | 7.447 | 100-YEAR | 665.75 | 665.54 | 0.21 | 0.06 | 0.03 | 245.53 | 232.08 | 39.39 | 62.17 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 664.17 | 664.07 | 0.09 | 0.03 | 0.01 | 122.22 | 114.22 | 24.56 | 31.79 |
| SOUTH TRIB | 7.456 | 50-YEAR | 665.44 | 665.31 | 0.13 | 0.03 | 0.01 | 188.52 | 179.91 | 49.57 | 37.04 |
| SOUTH TRIB | 7.456 | 100-YEAR | 665.80 | 665.64 | 0.16 | 0.04 | 0.01 | 222.82 | 209.78 | 35.40 | 72.44 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 664.89 | 664.83 | 0.07 | | | 122.93 | 110.49 | 27.58 | 34.58 |
| SOUTH TRIB | 7.47 | 50-YEAR | 666.77 | 666.70 | 0.07 | | | 128.32 | 188.54 | 101.13 | 299.57 |
| SOUTH TRIB | 7.47 | 100-YEAR | 666.93 | 666.86 | 0.07 | | | 147.56 | 195.07 | 125.37 | 336.11 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.01 | 58.52 | 112.68 | 89.80 | 208.30 |
| SOUTH TRIB | 7.486 | 50-YEAR | 666.77 | 666.77 | 0.00 | 0.00 | 0.01 | 104.32 | 150.39 | 163.29 | 208.30 |
| SOUTH TRIB | 7.486 | 100-YEAR | 666.94 | 666.93 | 0.00 | 0.00 | 0.01 | 117.51 | 166.31 | 184.19 | 208.30 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.00 | 232.98 | 24.22 | 3.80 | 1496.66 |
| SOUTH TRIB | 7.493 | 50-YEAR | 666.77 | 666.77 | 0.00 | 0.00 | 0.00 | 388.36 | 26.09 | 3.55 | 1585.92 |

HEC-RAS Plan: Ex Cond (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 7.493 | 100-YEAR | 666.94 | 666.94 | 0.00 | 0.00 | 0.00 | 435.61 | 28.46 | 3.93 | 1593.14 |

HEC-RAS Plan: Ex Cond

| 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) | |
| MAINSTEM | 4.518 | 10-YEAR | 894.00 | 636.00 | 644.69 | | 644.73 | 0.000113 | 1.67 | 558.91 | 68.69 | 0.10 |
| MAINSTEM | 4.518 | 50-YEAR | 1459.00 | 636.00 | 646.33 | | 646.41 | 0.000168 | 2.28 | 673.17 | 70.33 | 0.13 |
| MAINSTEM | 4.518 | 100-YEAR | 1682.00 | 636.00 | 646.91 | | 647.00 | 0.000185 | 2.49 | 713.97 | 70.91 | 0.13 |
| MAINSTEM | 4.594 | 10-YEAR | 894.00 | 636.00 | 644.73 | | 644.77 | 0.000111 | 1.66 | 562.03 | 68.73 | 0.10 |
| MAINSTEM | 4.594 | 50-YEAR | 1459.00 | 636.00 | 646.40 | | 646.48 | 0.000164 | 2.27 | 677.92 | 70.40 | 0.12 |
| MAINSTEM | 4.594 | 100-YEAR | 1682.00 | 636.00 | 646.98 | | 647.07 | 0.000181 | 2.47 | 719.27 | 70.98 | 0.13 |
| MAINSTEM | 4.675 | 10-YEAR | 894.00 | 636.10 | 644.78 | | 644.82 | 0.000114 | 1.67 | 558.61 | 68.72 | 0.10 |
| MAINSTEM | 4.675 | 50-YEAR | 1459.00 | 636.10 | 646.47 | | 646.55 | 0.000166 | 2.27 | 676.07 | 70.41 | 0.12 |
| MAINSTEM | 4.675 | 100-YEAR | 1682.00 | 636.10 | 647.06 | | 647.15 | 0.000182 | 2.47 | 717.95 | 71.01 | 0.13 |
| MAINSTEM | 4.773 | 10-YEAR | 784.00 | 636.20 | 644.84 | | 644.88 | 0.000089 | 1.47 | 554.70 | 68.37 | 0.09 |
| MAINSTEM | 4.773 | 50-YEAR | 1227.00 | 636.20 | 646.57 | | 646.62 | 0.000118 | 1.91 | 673.98 | 70.04 | 0.10 |
| MAINSTEM | 4.773 | 100-YEAR | 1469.00 | 636.20 | 647.17 | | 647.24 | 0.000139 | 2.16 | 716.27 | 70.63 | 0.12 |
| MAINSTEM | 4.790 | 10-YEAR | 784.00 | 636.20 | 644.81 | 638.80 | 644.93 | 0.000312 | 2.76 | 284.23 | 68.35 | 0.17 |
| MAINSTEM | 4.790 | 50-YEAR | 1227.00 | 636.20 | 646.51 | 639.71 | 646.71 | 0.000420 | 3.61 | 340.24 | 69.99 | 0.20 |
| MAINSTEM | 4.790 | 100-YEAR | 1469.00 | 636.20 | 647.09 | 640.14 | 647.35 | 0.000501 | 4.09 | 359.50 | 70.56 | 0.22 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 784.00 | 636.70 | 645.28 | 640.14 | 645.42 | 0.000448 | 3.07 | 255.65 | 65.50 | 0.19 |
| MAINSTEM | 5.059 | 50-YEAR | 1227.00 | 636.70 | 647.60 | 641.04 | 647.81 | 0.000458 | 3.69 | 332.24 | 67.78 | 0.21 |
| MAINSTEM | 5.059 | 100-YEAR | 1469.00 | 636.70 | 648.71 | 641.47 | 648.96 | 0.000462 | 3.98 | 368.99 | 68.88 | 0.21 |
| MAINSTEM | 5.076 | 10-YEAR | 784.00 | 636.90 | 645.41 | | 645.46 | 0.000215 | 1.80 | 435.78 | 65.48 | 0.12 |
| MAINSTEM | 5.076 | 50-YEAR | 1227.00 | 636.90 | 647.79 | | 647.85 | 0.000206 | 2.07 | 594.14 | 67.85 | 0.12 |
| MAINSTEM | 5.076 | 100-YEAR | 1469.00 | 636.90 | 648.93 | | 649.00 | 0.000204 | 2.19 | 672.29 | 68.98 | 0.12 |
| MAINSTEM | 5.104 | 10-YEAR | 784.00 | 637.12 | 645.41 | | 645.51 | 0.000341 | 2.55 | 306.96 | 65.32 | 0.17 |
| MAINSTEM | 5.104 | 50-YEAR | 1227.00 | 637.12 | 647.76 | | 647.90 | 0.000326 | 3.01 | 407.15 | 67.69 | 0.17 |
| MAINSTEM | 5.104 | 100-YEAR | 1469.00 | 637.12 | 648.90 | | 649.06 | 0.000322 | 3.23 | 455.31 | 68.83 | 0.17 |
| MAINSTEM | 5.109 | 10-YEAR | 784.00 | 637.18 | 645.37 | 640.64 | 645.54 | 0.000547 | 3.28 | 239.21 | 65.24 | 0.21 |
| MAINSTEM | 5.109 | 50-YEAR | 1227.00 | 637.18 | 647.71 | 641.55 | 647.94 | 0.000535 | 3.89 | 315.15 | 67.60 | 0.22 |
| MAINSTEM | 5.109 | 100-YEAR | 1469.00 | 637.18 | 648.83 | 642.01 | 649.10 | 0.000532 | 4.18 | 351.63 | 68.73 | 0.22 |
| MAINSTEM | 5.110 | 10-YEAR | 784.00 | 637.22 | 645.33 | | 645.56 | 0.000656 | 3.84 | 204.41 | 44.59 | 0.24 |
| MAINSTEM | 5.110 | 50-YEAR | 1227.00 | 637.22 | 647.64 | | 647.98 | 0.000698 | 4.67 | 262.56 | 50.16 | 0.26 |
| MAINSTEM | 5.110 | 100-YEAR | 1469.00 | 637.22 | 648.75 | | 649.14 | 0.000714 | 5.06 | 290.45 | 52.83 | 0.26 |
| MAINSTEM | 5.116 | 10-YEAR | 784.00 | 637.31 | 645.33 | | 645.57 | 0.000120 | 3.91 | 200.61 | 25.00 | 0.24 |
| MAINSTEM | 5.116 | 50-YEAR | 1227.00 | 637.31 | 647.64 | | 647.99 | 0.000143 | 4.75 | 258.35 | 26.44 | 0.26 |
| MAINSTEM | 5.116 | 100-YEAR | 1469.00 | 637.31 | 648.75 | | 649.16 | 0.000146 | 5.14 | 286.24 | 31.23 | 0.27 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 634.00 | 640.26 | 646.04 | 642.93 | 646.33 | 0.000191 | 4.30 | 147.43 | 25.50 | 0.32 |
| MAINSTEM | 5.606 | 50-YEAR | 1056.00 | 640.26 | 649.63 | 644.01 | 649.94 | 0.000121 | 4.42 | 239.06 | 57.44 | 0.25 |
| MAINSTEM | 5.606 | 100-YEAR | 1227.00 | 640.26 | 651.57 | 644.41 | 651.85 | 0.000087 | 4.25 | 288.43 | 80.97 | 0.22 |
| MAINSTEM | 5.610 | 10-YEAR | 634.00 | 640.30 | 646.34 | | 646.36 | 0.000075 | 1.05 | 603.33 | 125.36 | 0.08 |
| MAINSTEM | 5.610 | 50-YEAR | 1056.00 | 640.30 | 649.95 | | 649.97 | 0.000043 | 1.09 | 970.26 | 145.88 | 0.06 |
| MAINSTEM | 5.610 | 100-YEAR | 1227.00 | 640.30 | 651.86 | | 651.88 | 0.000031 | 1.05 | 1164.78 | 156.76 | 0.05 |
| MAINSTEM | 5.629 | 10-YEAR | 634.00 | 640.37 | 646.36 | | 646.36 | 0.000064 | 0.74 | 854.27 | 215.49 | 0.07 |
| MAINSTEM | 5.629 | 50-YEAR | 1056.00 | 640.37 | 649.97 | | 649.97 | 0.000021 | 0.64 | 1646.96 | 237.14 | 0.04 |
| MAINSTEM | 5.629 | 100-YEAR | 1227.00 | 640.37 | 651.88 | | 651.88 | 0.000014 | 0.59 | 2082.70 | 248.61 | 0.03 |
| MAINSTEM | 5.632 | 10-YEAR | 634.00 | 640.39 | 646.36 | | 646.37 | 0.000056 | 0.70 | 912.18 | 411.47 | 0.06 |
| MAINSTEM | 5.632 | 50-YEAR | 1056.00 | 640.39 | 649.97 | | 649.97 | 0.000019 | 0.60 | 1754.71 | 433.12 | 0.04 |
| MAINSTEM | 5.632 | 100-YEAR | 1227.00 | 640.39 | 651.88 | | 651.88 | 0.000012 | 0.55 | 2216.91 | 444.58 | 0.03 |
| MAINSTEM | 5.639 | 10-YEAR | 634.00 | 640.43 | 646.36 | | 646.37 | 0.000060 | 0.72 | 878.97 | 737.22 | 0.06 |
| MAINSTEM | 5.639 | 50-YEAR | 1056.00 | 640.43 | 649.97 | | 649.97 | 0.000020 | 0.62 | 1695.03 | 758.86 | 0.04 |
| MAINSTEM | 5.639 | 100-YEAR | 1227.00 | 640.43 | 651.88 | | 651.88 | 0.000013 | 0.57 | 2143.32 | 770.33 | 0.03 |
| MAINSTEM | 5.697 | 10-YEAR | 634.00 | 641.14 | 646.37 | | 646.41 | 0.000289 | 1.55 | 408.83 | 311.74 | 0.14 |
| MAINSTEM | 5.697 | 50-YEAR | 1056.00 | 641.14 | 649.96 | | 649.99 | 0.000090 | 1.34 | 788.12 | 333.27 | 0.09 |
| MAINSTEM | 5.697 | 100-YEAR | 1227.00 | 641.14 | 651.87 | | 651.90 | 0.000057 | 1.24 | 989.95 | 344.73 | 0.07 |
| MAINSTEM | 5.720 | 10-YEAR | 634.00 | 641.44 | 646.35 | | 646.51 | 0.000999 | 3.20 | 197.97 | 161.07 | 0.26 |
| MAINSTEM | 5.720 | 50-YEAR | 1056.00 | 641.44 | 649.91 | | 650.05 | 0.000407 | 3.00 | 351.91 | 188.74 | 0.19 |
| MAINSTEM | 5.720 | 100-YEAR | 1227.00 | 641.44 | 651.82 | | 651.94 | 0.000272 | 2.82 | 434.63 | 203.61 | 0.16 |
| MAINSTEM | 5.725 | 10-YEAR | 634.00 | 641.52 | 646.28 | | 646.59 | 0.001791 | 4.45 | 142.63 | 93.92 | 0.36 |
| MAINSTEM | 5.725 | 50-YEAR | 1056.00 | 641.52 | 649.82 | | 650.10 | 0.000777 | 4.24 | 248.84 | 126.73 | 0.26 |
| MAINSTEM | 5.725 | 100-YEAR | 1227.00 | 641.52 | 651.74 | | 651.99 | 0.000525 | 4.01 | 306.31 | 144.48 | 0.22 |
| MAINSTEM | 5.727 | 10-YEAR | 634.00 | 641.52 | 646.23 | | 646.68 | 0.003344 | 5.38 | 117.80 | 25.00 | 0.44 |
| MAINSTEM | 5.727 | 50-YEAR | 1056.00 | 641.52 | 649.77 | | 650.18 | 0.001669 | 5.12 | 206.14 | 25.00 | 0.31 |
| MAINSTEM | 5.727 | 100-YEAR | 1227.00 | 641.52 | 651.69 | | 652.05 | 0.001202 | 4.83 | 254.12 | 27.98 | 0.27 |

HEC-RAS Plan: Ex Cond (Continued)

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 5.732 | 10-YEAR | 634.00 | 641.59 | 646.38 | | 646.81 | 0.003878 | 5.29 | 119.74 | 25.00 | 0.43 |
| MAINSTEM | 5.732 | 50-YEAR | 1056.00 | 641.59 | 649.84 | | 650.24 | 0.002242 | 5.12 | 206.18 | 25.00 | 0.31 |
| MAINSTEM | 5.732 | 100-YEAR | 1227.00 | 641.59 | 651.74 | | 652.10 | 0.001699 | 4.84 | 253.74 | 27.64 | 0.27 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 634.00 | 641.81 | 646.81 | 644.45 | 647.18 | 0.003115 | 4.88 | 129.95 | 26.00 | 0.38 |
| MAINSTEM | 5.757 | 50-YEAR | 1056.00 | 641.81 | 650.18 | 645.52 | 650.55 | 0.001947 | 4.85 | 217.65 | 26.00 | 0.30 |
| MAINSTEM | 5.757 | 100-YEAR | 1227.00 | 641.81 | 652.07 | 645.91 | 652.40 | 0.001495 | 4.60 | 266.70 | 26.00 | 0.25 |
| MAINSTEM | 5.759 | 10-YEAR | 634.00 | 641.82 | 647.20 | | 647.22 | 0.000129 | 1.30 | 489.37 | 100.00 | 0.10 |
| MAINSTEM | 5.759 | 50-YEAR | 1056.00 | 641.82 | 650.56 | | 650.59 | 0.000071 | 1.33 | 795.30 | 100.00 | 0.08 |
| MAINSTEM | 5.759 | 100-YEAR | 1227.00 | 641.82 | 652.41 | | 652.43 | 0.000051 | 1.27 | 963.34 | 100.00 | 0.07 |
| MAINSTEM | 5.810 | 10-YEAR | 634.00 | 643.98 | 647.24 | | 647.29 | 0.000620 | 1.95 | 325.50 | 100.00 | 0.19 |
| MAINSTEM | 5.810 | 50-YEAR | 1056.00 | 643.98 | 650.58 | | 650.62 | 0.000177 | 1.60 | 659.72 | 100.00 | 0.11 |
| MAINSTEM | 5.810 | 100-YEAR | 1227.00 | 643.98 | 652.42 | | 652.45 | 0.000110 | 1.45 | 843.86 | 100.00 | 0.09 |
| MAINSTEM | 5.860 | 10-YEAR | 634.00 | 645.81 | 647.64 | 647.64 | 648.57 | 0.019302 | 7.73 | 82.06 | 100.00 | 1.01 |
| MAINSTEM | 5.860 | 50-YEAR | 1056.00 | 645.81 | 650.43 | | 650.83 | 0.002459 | 5.11 | 206.78 | 100.00 | 0.42 |
| MAINSTEM | 5.860 | 100-YEAR | 1227.00 | 645.81 | 652.31 | | 652.58 | 0.001062 | 4.21 | 291.10 | 100.00 | 0.29 |
| MAINSTEM | 5.862 | 10-YEAR | 634.00 | 645.96 | 648.45 | 648.45 | 649.70 | 0.021607 | 9.00 | 70.47 | 28.35 | 1.01 |
| MAINSTEM | 5.862 | 50-YEAR | 1056.00 | 645.96 | 650.19 | | 651.40 | 0.011607 | 8.80 | 120.02 | 28.35 | 0.75 |
| MAINSTEM | 5.862 | 100-YEAR | 1227.00 | 645.96 | 652.14 | | 652.90 | 0.005086 | 7.01 | 175.10 | 28.35 | 0.50 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 634.00 | 647.54 | 651.60 | 649.84 | 651.96 | 0.000320 | 4.85 | 130.71 | 33.00 | 0.42 |
| MAINSTEM | 6.037 | 50-YEAR | 1056.00 | 647.54 | 653.22 | 650.77 | 653.74 | 0.000320 | 5.77 | 183.00 | 33.00 | 0.43 |
| MAINSTEM | 6.037 | 100-YEAR | 1227.00 | 647.54 | 653.90 | 651.10 | 654.46 | 0.000310 | 5.99 | 204.81 | 33.00 | 0.42 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 603.00 | 647.73 | 652.15 | 649.86 | 652.40 | 0.002189 | 4.01 | 150.28 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 50-YEAR | 996.00 | 647.73 | 653.91 | 650.71 | 654.26 | 0.002167 | 4.74 | 210.25 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 100-YEAR | 1156.00 | 647.73 | 654.62 | 651.02 | 655.00 | 0.002121 | 4.94 | 234.15 | 34.00 | 0.33 |
| MAINSTEM | 6.194 | 10-YEAR | 603.00 | 647.75 | 652.41 | | 652.44 | 0.000159 | 1.31 | 461.22 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 50-YEAR | 996.00 | 647.75 | 654.27 | | 654.31 | 0.000142 | 1.54 | 645.30 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 100-YEAR | 1156.00 | 647.75 | 655.00 | | 655.04 | 0.000134 | 1.61 | 717.76 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 10-YEAR | 603.00 | 647.88 | 652.52 | | 652.55 | 0.000178 | 1.30 | 464.06 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 50-YEAR | 996.00 | 647.88 | 654.37 | | 654.41 | 0.000166 | 1.53 | 649.01 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 100-YEAR | 1156.00 | 647.88 | 655.10 | | 655.14 | 0.000160 | 1.60 | 721.72 | 100.00 | 0.11 |
| MAINSTEM | 6.418 | 10-YEAR | 603.00 | 647.88 | 652.61 | | 652.63 | 0.000167 | 1.27 | 472.97 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 50-YEAR | 996.00 | 647.88 | 654.45 | | 654.49 | 0.000159 | 1.52 | 657.40 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 100-YEAR | 1156.00 | 647.88 | 655.18 | | 655.22 | 0.000154 | 1.58 | 729.82 | 100.00 | 0.10 |
| MAINSTEM | 6.471 | 10-YEAR | 603.00 | 647.88 | 652.65 | | 652.73 | 0.000583 | 2.29 | 263.80 | 55.30 | 0.18 |
| MAINSTEM | 6.471 | 50-YEAR | 996.00 | 647.88 | 654.48 | | 654.59 | 0.000581 | 2.73 | 364.71 | 55.30 | 0.19 |
| MAINSTEM | 6.471 | 100-YEAR | 1156.00 | 647.88 | 655.19 | | 655.32 | 0.000571 | 2.86 | 404.33 | 55.30 | 0.19 |
| MAINSTEM | 6.473 | 10-YEAR | 603.00 | 647.91 | 652.61 | | 652.79 | 0.002320 | 3.43 | 175.73 | 40.00 | 0.29 |
| MAINSTEM | 6.473 | 50-YEAR | 996.00 | 647.91 | 654.42 | | 654.67 | 0.002456 | 4.01 | 248.07 | 40.00 | 0.28 |
| MAINSTEM | 6.473 | 100-YEAR | 1156.00 | 647.91 | 655.13 | | 655.40 | 0.002476 | 4.18 | 276.53 | 40.00 | 0.28 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 6.538 | 10-YEAR | 603.00 | 648.09 | 652.83 | 650.40 | 653.03 | 0.002651 | 3.61 | 167.21 | 38.00 | 0.30 |
| MAINSTEM | 6.538 | 50-YEAR | 996.00 | 648.09 | 654.69 | 651.19 | 654.97 | 0.002755 | 4.18 | 238.13 | 38.00 | 0.29 |
| MAINSTEM | 6.538 | 100-YEAR | 1156.00 | 648.09 | 655.42 | 651.48 | 655.72 | 0.002771 | 4.35 | 265.81 | 38.00 | 0.29 |
| MAINSTEM | 6.540 | 10-YEAR | 603.00 | 648.11 | 653.04 | | 653.05 | 0.000088 | 0.92 | 652.36 | 191.09 | 0.08 |
| MAINSTEM | 6.540 | 50-YEAR | 996.00 | 648.11 | 654.98 | | 654.99 | 0.000074 | 1.07 | 933.29 | 220.15 | 0.07 |
| MAINSTEM | 6.540 | 100-YEAR | 1156.00 | 648.11 | 655.73 | | 655.75 | 0.000069 | 1.11 | 1042.18 | 231.41 | 0.07 |
| MAINSTEM | 6.59 | 10-YEAR | 603.00 | 648.25 | 653.06 | | 653.07 | 0.000095 | 0.84 | 715.15 | 196.42 | 0.08 |
| MAINSTEM | 6.59 | 50-YEAR | 996.00 | 648.25 | 655.01 | | 655.03 | 0.000470 | 0.87 | 1143.06 | 1008.18 | 0.14 |
| MAINSTEM | 6.59 | 100-YEAR | 1156.00 | 648.25 | 655.76 | | 655.77 | 0.000119 | 0.61 | 1911.55 | 1050.50 | 0.08 |
| MAINSTEM | 6.6 | 10-YEAR | 603.00 | 648.30 | 653.03 | | 653.14 | 0.000703 | 2.66 | 226.57 | 199.69 | 0.22 |
| MAINSTEM | 6.6 | 50-YEAR | 996.00 | 648.30 | 654.99 | | 655.13 | 0.000567 | 3.05 | 326.52 | 234.83 | 0.21 |
| MAINSTEM | 6.6 | 100-YEAR | 1156.00 | 648.30 | 655.70 | | 655.86 | 0.000537 | 3.18 | 362.99 | 247.66 | 0.21 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 603.00 | 648.71 | 652.11 | 652.11 | 653.45 | 0.017173 | 9.29 | 64.88 | 219.18 | 1.00 |
| MAINSTEM | 6.635 | 50-YEAR | 996.00 | 648.71 | 654.41 | 653.18 | 655.48 | 0.006038 | 8.30 | 119.97 | 1224.97 | 0.65 |
| MAINSTEM | 6.635 | 100-YEAR | 1156.00 | 648.71 | 655.13 | 653.58 | 656.23 | 0.005190 | 8.42 | 137.28 | 1230.05 | 0.62 |

HEC-RAS Plan: Ex Cond (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) | |
| MAINSTEM | 6.637 | 10-YEAR | 603.00 | 648.71 | 653.85 | | 653.85 | 0.000147 | 0.47 | 1289.28 | 1208.75 | 0.08 |
| MAINSTEM | 6.637 | 50-YEAR | 996.00 | 648.71 | 655.80 | | 655.80 | 0.000013 | 0.28 | 3673.81 | 1234.77 | 0.03 |
| MAINSTEM | 6.637 | 100-YEAR | 1156.00 | 648.71 | 656.56 | | 656.56 | 0.000008 | 0.26 | 4616.02 | 1240.13 | 0.02 |
| MAINSTEM | 6.639 | 10-YEAR | 603.00 | 649.07 | 653.53 | | 654.18 | 0.012819 | 6.49 | 92.90 | 40.25 | 0.75 |
| MAINSTEM | 6.639 | 50-YEAR | 996.00 | 649.07 | 655.58 | | 656.02 | 0.005078 | 5.31 | 187.61 | 52.26 | 0.49 |
| MAINSTEM | 6.639 | 100-YEAR | 1156.00 | 649.07 | 656.36 | | 656.75 | 0.003926 | 5.02 | 230.40 | 56.86 | 0.44 |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 603.00 | 649.86 | 654.58 | 653.77 | 655.03 | 0.007927 | 5.39 | 111.84 | 47.66 | 0.62 |
| MAINSTEM | 6.642 | 50-YEAR | 996.00 | 649.86 | 656.01 | 654.62 | 656.43 | 0.005340 | 5.25 | 189.65 | 61.64 | 0.53 |
| MAINSTEM | 6.642 | 100-YEAR | 1156.00 | 649.86 | 656.70 | 654.91 | 657.08 | 0.004086 | 4.92 | 235.01 | 68.64 | 0.47 |
| MAINSTEM | 6.643 | 10-YEAR | 603.00 | 649.86 | 654.75 | | 655.14 | 0.006535 | 5.02 | 120.18 | 49.23 | 0.57 |
| MAINSTEM | 6.643 | 50-YEAR | 996.00 | 649.86 | 656.11 | | 656.51 | 0.004897 | 5.08 | 195.98 | 62.66 | 0.51 |
| MAINSTEM | 6.643 | 100-YEAR | 1156.00 | 649.86 | 656.77 | | 657.13 | 0.003874 | 4.82 | 239.79 | 69.34 | 0.46 |
| MAINSTEM | 6.644 | 10-YEAR | 603.00 | 649.30 | 655.39 | | 655.39 | 0.000052 | 0.22 | 2793.70 | 1612.85 | 0.03 |
| MAINSTEM | 6.644 | 50-YEAR | 996.00 | 649.30 | 656.75 | | 656.75 | 0.000022 | 0.21 | 5139.73 | 1817.99 | 0.02 |
| MAINSTEM | 6.644 | 100-YEAR | 1156.00 | 649.30 | 657.35 | | 657.35 | 0.000016 | 0.20 | 6254.57 | 1907.76 | 0.02 |
| SOUTH TRIB | 6.645 | 10-YEAR | 314.00 | 653.20 | 655.18 | 655.18 | 655.73 | 0.017507 | 6.90 | 61.86 | 54.47 | 0.86 |
| SOUTH TRIB | 6.645 | 50-YEAR | 506.00 | 653.20 | 656.62 | | 656.84 | 0.003792 | 4.62 | 150.54 | 68.99 | 0.44 |
| SOUTH TRIB | 6.645 | 100-YEAR | 570.00 | 653.20 | 657.25 | | 657.41 | 0.002284 | 4.01 | 196.28 | 75.34 | 0.35 |
| SOUTH TRIB | 6.664 | 10-YEAR | 314.00 | 653.30 | 656.28 | 655.36 | 656.48 | 0.003892 | 4.26 | 96.40 | 49.31 | 0.44 |
| SOUTH TRIB | 6.664 | 50-YEAR | 506.00 | 653.30 | 656.97 | | 657.25 | 0.004161 | 5.07 | 132.83 | 55.24 | 0.47 |
| SOUTH TRIB | 6.664 | 100-YEAR | 570.00 | 653.30 | 657.46 | | 657.70 | 0.003117 | 4.77 | 160.83 | 59.39 | 0.41 |
| SOUTH TRIB | 6.683 | 10-YEAR | 314.00 | 653.40 | 656.63 | | 656.90 | 0.004069 | 4.61 | 84.27 | 37.11 | 0.45 |
| SOUTH TRIB | 6.683 | 50-YEAR | 506.00 | 653.40 | 657.34 | | 657.73 | 0.004833 | 5.73 | 112.26 | 41.95 | 0.51 |
| SOUTH TRIB | 6.683 | 100-YEAR | 570.00 | 653.40 | 657.73 | | 658.11 | 0.004226 | 5.70 | 128.83 | 44.57 | 0.48 |
| SOUTH TRIB | 6.721 | 10-YEAR | 314.00 | 653.70 | 657.36 | | 657.60 | 0.003055 | 4.34 | 89.65 | 36.35 | 0.40 |
| SOUTH TRIB | 6.721 | 50-YEAR | 506.00 | 653.70 | 658.21 | | 658.55 | 0.003495 | 5.33 | 125.00 | 46.89 | 0.44 |
| SOUTH TRIB | 6.721 | 100-YEAR | 570.00 | 653.70 | 658.51 | | 658.86 | 0.003398 | 5.48 | 139.44 | 50.56 | 0.44 |
| SOUTH TRIB | 6.759 | 10-YEAR | 314.00 | 654.00 | 657.94 | | 658.12 | 0.002190 | 3.85 | 100.51 | 36.08 | 0.34 |
| SOUTH TRIB | 6.759 | 50-YEAR | 506.00 | 654.00 | 658.88 | | 659.14 | 0.002445 | 4.70 | 136.92 | 41.14 | 0.37 |
| SOUTH TRIB | 6.759 | 100-YEAR | 570.00 | 654.00 | 659.16 | | 659.45 | 0.002476 | 4.91 | 148.81 | 42.66 | 0.38 |
| SOUTH TRIB | 6.797 | 10-YEAR | 314.00 | 654.30 | 658.41 | | 658.55 | 0.002067 | 2.97 | 105.70 | 36.40 | 0.31 |
| SOUTH TRIB | 6.797 | 50-YEAR | 506.00 | 654.30 | 659.43 | | 659.62 | 0.002234 | 3.48 | 145.37 | 41.69 | 0.33 |
| SOUTH TRIB | 6.797 | 100-YEAR | 570.00 | 654.30 | 659.73 | | 659.93 | 0.002257 | 3.61 | 158.00 | 43.23 | 0.33 |
| SOUTH TRIB | 6.834 | 10-YEAR | 314.00 | 654.60 | 658.77 | | 658.90 | 0.001455 | 3.26 | 123.53 | 44.24 | 0.28 |
| SOUTH TRIB | 6.834 | 50-YEAR | 506.00 | 654.60 | 659.82 | | 659.98 | 0.001514 | 3.86 | 173.66 | 51.58 | 0.30 |
| SOUTH TRIB | 6.834 | 100-YEAR | 570.00 | 654.60 | 660.12 | | 660.30 | 0.001520 | 4.02 | 189.60 | 53.70 | 0.30 |
| SOUTH TRIB | 6.872 | 10-YEAR | 314.00 | 654.90 | 659.07 | | 659.25 | 0.001929 | 3.76 | 101.77 | 33.76 | 0.32 |
| SOUTH TRIB | 6.872 | 50-YEAR | 506.00 | 654.90 | 660.13 | | 660.38 | 0.002097 | 4.55 | 139.73 | 38.48 | 0.35 |
| SOUTH TRIB | 6.872 | 100-YEAR | 570.00 | 654.90 | 660.43 | | 660.70 | 0.002135 | 4.77 | 151.53 | 39.83 | 0.36 |
| SOUTH TRIB | 6.879 Miller Fluids En | | Culvert | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 314.00 | 654.90 | 659.09 | 657.09 | 659.27 | 0.001894 | 3.74 | 102.44 | 33.85 | 0.32 |
| SOUTH TRIB | 6.886 | 50-YEAR | 506.00 | 654.90 | 660.17 | 657.82 | 660.42 | 0.002028 | 4.50 | 141.45 | 38.68 | 0.35 |
| SOUTH TRIB | 6.886 | 100-YEAR | 570.00 | 654.90 | 660.48 | 658.03 | 660.75 | 0.002059 | 4.71 | 153.55 | 40.06 | 0.35 |
| SOUTH TRIB | 6.904 | 10-YEAR | 314.00 | 655.30 | 659.29 | | 659.50 | 0.002391 | 4.06 | 94.42 | 33.85 | 0.36 |
| SOUTH TRIB | 6.904 | 50-YEAR | 506.00 | 655.30 | 660.37 | | 660.66 | 0.002443 | 4.82 | 136.98 | 44.59 | 0.38 |
| SOUTH TRIB | 6.904 | 100-YEAR | 570.00 | 655.30 | 660.68 | | 660.98 | 0.002425 | 4.99 | 151.30 | 47.66 | 0.38 |
| SOUTH TRIB | 6.942 | 10-YEAR | 314.00 | 655.60 | 659.75 | | 659.93 | 0.001908 | 3.73 | 104.35 | 36.28 | 0.32 |
| SOUTH TRIB | 6.942 | 50-YEAR | 506.00 | 655.60 | 660.86 | | 661.10 | 0.001967 | 4.43 | 150.29 | 46.52 | 0.34 |
| SOUTH TRIB | 6.942 | 100-YEAR | 570.00 | 655.60 | 661.17 | | 661.42 | 0.001970 | 4.61 | 165.18 | 49.39 | 0.34 |
| SOUTH TRIB | 6.956 | 10-YEAR | 314.00 | 655.05 | 659.89 | 658.03 | 660.07 | 0.002456 | 3.52 | 93.49 | 134.67 | 0.34 |
| SOUTH TRIB | 6.956 | 50-YEAR | 506.00 | 655.05 | 661.00 | 658.75 | 661.25 | 0.002514 | 4.10 | 131.13 | 277.69 | 0.36 |
| SOUTH TRIB | 6.956 | 100-YEAR | 570.00 | 655.05 | 661.31 | 658.95 | 661.57 | 0.002544 | 4.26 | 142.48 | 524.98 | 0.36 |
| SOUTH TRIB | 6.98 | 10-YEAR | 314.00 | 655.90 | 660.19 | | 660.34 | 0.001549 | 3.43 | 114.33 | 38.27 | 0.29 |
| SOUTH TRIB | 6.98 | 50-YEAR | 506.00 | 655.90 | 661.32 | | 661.52 | 0.001597 | 4.07 | 161.60 | 45.38 | 0.31 |
| SOUTH TRIB | 6.98 | 100-YEAR | 570.00 | 655.90 | 661.64 | | 661.85 | 0.001611 | 4.25 | 176.29 | 47.43 | 0.31 |
| SOUTH TRIB | 6.999 | 10-YEAR | 314.00 | 656.10 | 660.35 | | 660.50 | 0.001643 | 3.51 | 111.28 | 37.41 | 0.30 |
| SOUTH TRIB | 6.999 | 50-YEAR | 506.00 | 656.10 | 661.48 | | 661.68 | 0.001669 | 4.14 | 157.17 | 43.41 | 0.31 |
| SOUTH TRIB | 6.999 | 100-YEAR | 570.00 | 656.10 | 661.80 | | 662.02 | 0.001768 | 4.43 | 171.72 | 49.46 | 0.33 |
| SOUTH TRIB | 7.037 | 10-YEAR | 314.00 | 655.90 | 660.63 | | 660.71 | 0.000720 | 2.50 | 152.52 | 44.75 | 0.20 |
| SOUTH TRIB | 7.037 | 50-YEAR | 506.00 | 655.90 | 661.80 | | 661.92 | 0.000795 | 3.04 | 208.58 | 51.24 | 0.22 |
| SOUTH TRIB | 7.037 | 100-YEAR | 570.00 | 655.90 | 662.14 | | 662.27 | 0.000809 | 3.18 | 226.31 | 53.13 | 0.22 |

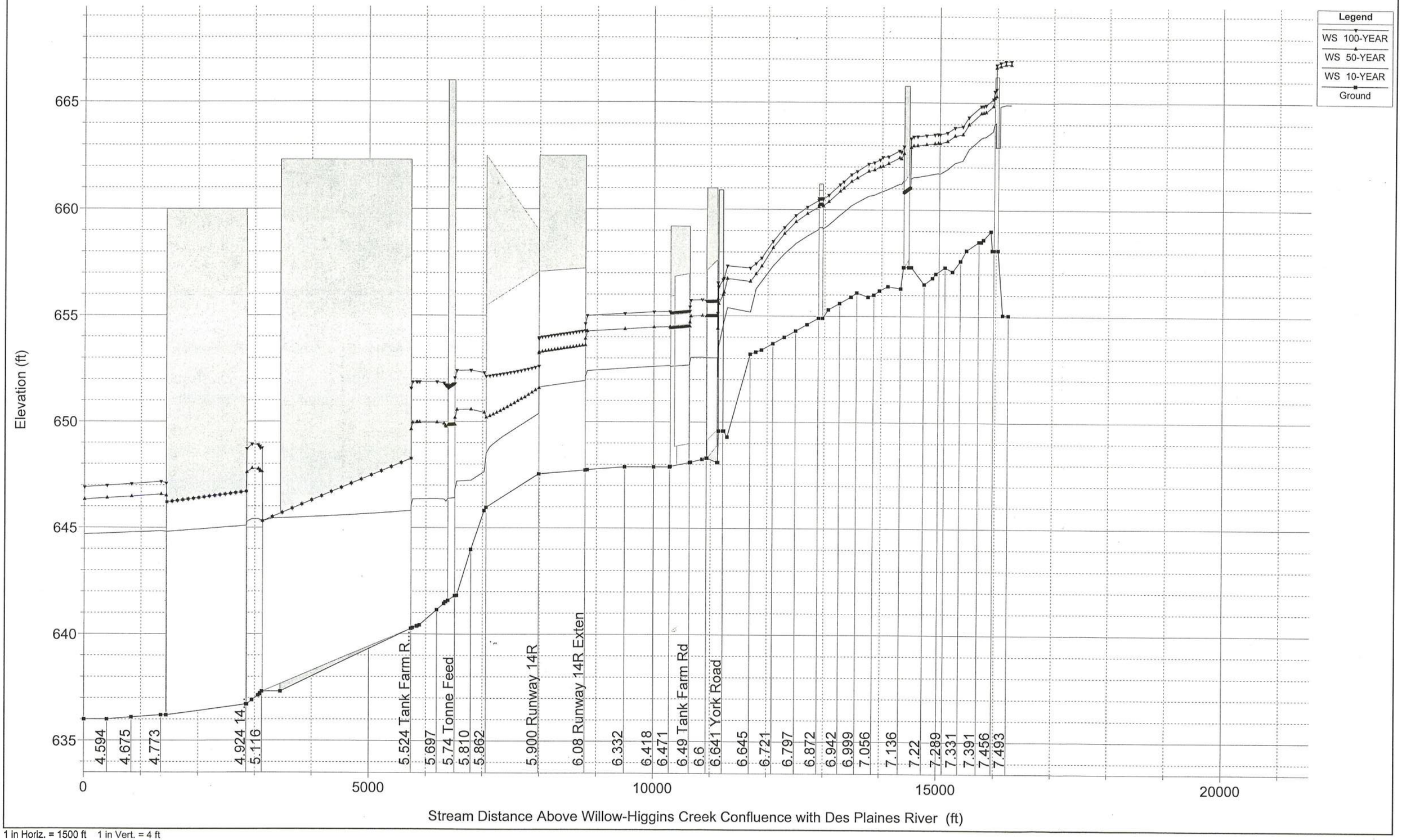
HEC-RAS Plan: Ex Cond (Continued)

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOUTH TRIB | 7.056 | 10-YEAR | 314.00 | 656.00 | 660.70 | | 660.81 | 0.001107 | 3.08 | 128.47 | 39.70 | 0.25 |
| SOUTH TRIB | 7.056 | 50-YEAR | 506.00 | 656.00 | 661.87 | | 662.03 | 0.001219 | 3.75 | 180.52 | 50.68 | 0.27 |
| SOUTH TRIB | 7.056 | 100-YEAR | 570.00 | 656.00 | 662.21 | | 662.38 | 0.001228 | 3.91 | 198.37 | 54.37 | 0.28 |
| SOUTH TRIB | 7.075 | 10-YEAR | 314.00 | 656.20 | 660.82 | | 660.92 | 0.001081 | 3.01 | 133.37 | 42.79 | 0.25 |
| SOUTH TRIB | 7.075 | 50-YEAR | 506.00 | 656.20 | 662.00 | | 662.15 | 0.001142 | 3.60 | 189.59 | 53.44 | 0.26 |
| SOUTH TRIB | 7.075 | 100-YEAR | 570.00 | 656.20 | 662.34 | | 662.50 | 0.001147 | 3.75 | 208.52 | 57.21 | 0.27 |
| SOUTH TRIB | 7.084 | 10-YEAR | 314.00 | 655.01 | 660.86 | 658.14 | 660.98 | 0.001036 | 2.94 | 127.99 | 40.39 | 0.23 |
| SOUTH TRIB | 7.084 | 50-YEAR | 506.00 | 655.01 | 662.04 | 658.94 | 662.21 | 0.001217 | 3.68 | 186.01 | 206.70 | 0.26 |
| SOUTH TRIB | 7.084 | 100-YEAR | 570.00 | 655.01 | 662.46 | 659.16 | 662.55 | 0.000711 | 2.94 | 354.96 | 215.96 | 0.20 |
| SOUTH TRIB | 7.094 | 10-YEAR | 314.00 | 656.40 | 660.97 | | 661.09 | 0.001246 | 3.21 | 122.75 | 38.76 | 0.26 |
| SOUTH TRIB | 7.094 | 50-YEAR | 506.00 | 656.40 | 662.17 | | 662.34 | 0.001274 | 3.79 | 173.20 | 45.02 | 0.28 |
| SOUTH TRIB | 7.094 | 100-YEAR | 570.00 | 656.40 | 662.49 | | 662.67 | 0.001301 | 3.97 | 187.77 | 46.67 | 0.28 |
| SOUTH TRIB | 7.132 | 10-YEAR | 314.00 | 655.41 | 661.21 | 658.60 | 661.29 | 0.000889 | 2.74 | 149.16 | 253.53 | 0.21 |
| SOUTH TRIB | 7.132 | 50-YEAR | 506.00 | 655.41 | 662.43 | 659.30 | 662.55 | 0.000894 | 3.17 | 213.18 | 881.88 | 0.22 |
| SOUTH TRIB | 7.132 | 100-YEAR | 570.00 | 655.41 | 662.76 | 659.49 | 662.88 | 0.000907 | 3.30 | 231.92 | 913.31 | 0.22 |
| SOUTH TRIB | 7.136 | 10-YEAR | 314.00 | 656.30 | 661.19 | | 661.36 | 0.001809 | 3.27 | 98.71 | 29.77 | 0.29 |
| SOUTH TRIB | 7.136 | 50-YEAR | 506.00 | 656.30 | 662.39 | | 662.62 | 0.001844 | 3.93 | 137.80 | 35.56 | 0.30 |
| SOUTH TRIB | 7.136 | 100-YEAR | 570.00 | 656.30 | 662.71 | | 662.96 | 0.001879 | 4.13 | 149.38 | 37.10 | 0.31 |
| SOUTH TRIB | 7.145 | 10-YEAR | 287.00 | 655.49 | 661.38 | 657.92 | 661.43 | 0.000368 | 1.73 | 166.35 | 54.90 | 0.14 |
| SOUTH TRIB | 7.145 | 50-YEAR | 461.00 | 655.49 | 662.63 | 658.48 | 662.71 | 0.000427 | 2.18 | 211.46 | 62.02 | 0.16 |
| SOUTH TRIB | 7.145 | 100-YEAR | 517.00 | 655.49 | 662.97 | 658.62 | 663.05 | 0.000446 | 2.31 | 223.59 | 63.80 | 0.16 |
| SOUTH TRIB | 7.156 Thorndale Ave | | Culvert | | | | | | | | | |
| SOUTH TRIB | 7.168 | 10-YEAR | 287.00 | 656.61 | 661.46 | 658.60 | 661.52 | 0.000538 | 1.94 | 148.27 | 71.71 | 0.17 |
| SOUTH TRIB | 7.168 | 50-YEAR | 461.00 | 656.61 | 662.92 | 659.07 | 663.00 | 0.000507 | 2.30 | 200.55 | 113.39 | 0.17 |
| SOUTH TRIB | 7.168 | 100-YEAR | 517.00 | 656.61 | 663.34 | 659.20 | 663.43 | 0.000499 | 2.40 | 215.81 | 124.87 | 0.17 |
| SOUTH TRIB | 7.181 | 10-YEAR | 287.00 | 657.30 | 661.52 | | 661.54 | 0.000368 | 1.23 | 233.03 | 84.54 | 0.13 |
| SOUTH TRIB | 7.181 | 50-YEAR | 461.00 | 657.30 | 662.99 | | 663.02 | 0.000245 | 1.27 | 363.47 | 92.60 | 0.11 |
| SOUTH TRIB | 7.181 | 100-YEAR | 517.00 | 657.30 | 663.42 | | 663.45 | 0.000225 | 1.28 | 403.81 | 94.95 | 0.11 |
| SOUTH TRIB | 7.191 | 10-YEAR | 287.00 | 655.30 | 661.54 | | 661.57 | 0.000385 | 1.72 | 230.18 | 95.25 | 0.14 |
| SOUTH TRIB | 7.191 | 50-YEAR | 461.00 | 655.30 | 663.01 | | 663.04 | 0.000250 | 1.67 | 376.66 | 104.37 | 0.12 |
| SOUTH TRIB | 7.191 | 100-YEAR | 517.00 | 655.30 | 663.44 | | 663.47 | 0.000227 | 1.67 | 422.04 | 107.03 | 0.12 |
| SOUTH TRIB | 7.22 | 10-YEAR | 287.00 | 656.50 | 661.62 | | 661.64 | 0.000444 | 1.54 | 230.40 | 85.61 | 0.14 |
| SOUTH TRIB | 7.22 | 50-YEAR | 461.00 | 656.50 | 663.06 | | 663.08 | 0.000301 | 1.47 | 358.75 | 92.64 | 0.12 |
| SOUTH TRIB | 7.22 | 100-YEAR | 517.00 | 656.50 | 663.48 | | 663.51 | 0.000276 | 1.46 | 398.53 | 94.72 | 0.12 |
| SOUTH TRIB | 7.247 | 10-YEAR | 287.00 | 656.80 | 661.69 | | 661.71 | 0.000533 | 1.55 | 219.09 | 84.37 | 0.15 |
| SOUTH TRIB | 7.247 | 50-YEAR | 461.00 | 656.80 | 663.10 | | 663.13 | 0.000348 | 1.46 | 343.58 | 91.41 | 0.13 |
| SOUTH TRIB | 7.247 | 100-YEAR | 517.00 | 656.80 | 663.52 | | 663.55 | 0.000316 | 1.45 | 382.45 | 93.50 | 0.12 |
| SOUTH TRIB | 7.259 | 10-YEAR | 287.00 | 657.00 | 661.72 | | 661.74 | 0.000518 | 1.50 | 222.07 | 85.18 | 0.15 |
| SOUTH TRIB | 7.259 | 50-YEAR | 461.00 | 657.00 | 663.12 | | 663.15 | 0.000341 | 1.43 | 346.49 | 91.92 | 0.12 |
| SOUTH TRIB | 7.259 | 100-YEAR | 517.00 | 657.00 | 663.54 | | 663.57 | 0.000311 | 1.42 | 385.38 | 93.93 | 0.12 |
| SOUTH TRIB | 7.265 | 10-YEAR | 287.00 | 657.38 | 661.70 | | 661.79 | 0.001452 | 2.95 | 136.13 | 65.64 | 0.26 |
| SOUTH TRIB | 7.265 | 50-YEAR | 461.00 | 657.38 | 663.11 | | 663.18 | 0.000818 | 2.70 | 234.58 | 73.95 | 0.20 |
| SOUTH TRIB | 7.265 | 100-YEAR | 517.00 | 657.38 | 663.53 | | 663.60 | 0.000718 | 2.66 | 266.10 | 76.43 | 0.19 |
| SOUTH TRIB | 7.289 | 10-YEAR | 287.00 | 657.30 | 661.90 | | 662.04 | 0.002399 | 3.45 | 99.60 | 38.41 | 0.33 |
| SOUTH TRIB | 7.289 | 50-YEAR | 461.00 | 657.30 | 663.21 | | 663.36 | 0.001902 | 3.52 | 155.81 | 47.38 | 0.30 |
| SOUTH TRIB | 7.289 | 100-YEAR | 517.00 | 657.30 | 663.61 | | 663.76 | 0.001750 | 3.50 | 175.42 | 50.13 | 0.29 |
| SOUTH TRIB | 7.314 | 10-YEAR | 287.00 | 657.10 | 662.19 | | 662.26 | 0.001158 | 2.48 | 138.75 | 49.50 | 0.23 |
| SOUTH TRIB | 7.314 | 50-YEAR | 461.00 | 657.10 | 663.46 | | 663.54 | 0.001005 | 2.61 | 207.66 | 58.93 | 0.22 |
| SOUTH TRIB | 7.314 | 100-YEAR | 517.00 | 657.10 | 663.84 | | 663.93 | 0.000948 | 2.62 | 231.05 | 61.81 | 0.21 |
| SOUTH TRIB | 7.331 | 10-YEAR | 287.00 | 657.60 | 662.31 | | 662.60 | 0.005680 | 4.74 | 67.84 | 27.32 | 0.49 |
| SOUTH TRIB | 7.331 | 50-YEAR | 461.00 | 657.60 | 663.53 | | 663.84 | 0.004600 | 4.88 | 105.27 | 33.98 | 0.46 |
| SOUTH TRIB | 7.331 | 100-YEAR | 517.00 | 657.60 | 663.90 | | 664.21 | 0.004243 | 4.86 | 118.38 | 36.02 | 0.44 |
| SOUTH TRIB | 7.35 | 10-YEAR | 287.00 | 658.10 | 662.83 | | 663.00 | 0.002627 | 3.70 | 89.51 | 31.40 | 0.35 |
| SOUTH TRIB | 7.35 | 50-YEAR | 461.00 | 658.10 | 663.99 | | 664.20 | 0.002567 | 4.11 | 129.45 | 37.43 | 0.35 |
| SOUTH TRIB | 7.35 | 100-YEAR | 517.00 | 658.10 | 664.34 | | 664.55 | 0.002496 | 4.18 | 142.76 | 39.24 | 0.35 |
| SOUTH TRIB | 7.391 | 10-YEAR | 287.00 | 658.50 | 663.35 | | 663.49 | 0.001984 | 3.35 | 98.23 | 31.96 | 0.30 |
| SOUTH TRIB | 7.391 | 50-YEAR | 461.00 | 658.50 | 664.51 | | 664.70 | 0.002060 | 3.83 | 138.59 | 37.52 | 0.31 |
| SOUTH TRIB | 7.391 | 100-YEAR | 517.00 | 658.50 | 664.85 | | 665.04 | 0.002044 | 3.92 | 153.10 | 52.14 | 0.32 |
| SOUTH TRIB | 7.399 | 10-YEAR | 287.00 | 657.49 | 663.39 | 660.52 | 663.57 | 0.001267 | 3.61 | 97.00 | 24.85 | 0.27 |
| SOUTH TRIB | 7.399 | 50-YEAR | 461.00 | 657.49 | 664.53 | 661.40 | 664.79 | 0.001582 | 4.58 | 126.84 | 522.90 | 0.31 |
| SOUTH TRIB | 7.399 | 100-YEAR | 517.00 | 657.49 | 664.85 | 661.65 | 665.15 | 0.001650 | 4.83 | 136.01 | 643.78 | 0.32 |

HEC-RAS Plan: Ex Cond (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.406 | 10-YEAR | 287.00 | 658.60 | 663.42 | | 663.64 | 0.002081 | 4.30 | 84.90 | 25.25 | 0.35 |
| SOUTH TRIB | 7.406 | 50-YEAR | 461.00 | 658.60 | 664.56 | | 664.88 | 0.002319 | 5.23 | 115.87 | 28.77 | 0.38 |
| SOUTH TRIB | 7.406 | 100-YEAR | 517.00 | 658.60 | 664.89 | | 665.24 | 0.002343 | 5.45 | 125.42 | 29.25 | 0.38 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 287.00 | 659.00 | 663.68 | | 664.05 | 0.004022 | 5.58 | 67.59 | 23.95 | 0.47 |
| SOUTH TRIB | 7.431 | 50-YEAR | 461.00 | 659.00 | 664.85 | | 665.31 | 0.003906 | 6.43 | 98.30 | 28.77 | 0.48 |
| SOUTH TRIB | 7.431 | 100-YEAR | 517.00 | 659.00 | 665.18 | | 665.66 | 0.003827 | 6.62 | 108.03 | 29.76 | 0.48 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 287.00 | 658.10 | 664.01 | | 664.13 | 0.001172 | 3.26 | 113.72 | 31.56 | 0.26 |
| SOUTH TRIB | 7.447 | 50-YEAR | 461.00 | 658.10 | 665.23 | | 665.39 | 0.001310 | 3.98 | 154.84 | 36.07 | 0.28 |
| SOUTH TRIB | 7.447 | 100-YEAR | 517.00 | 658.10 | 665.54 | | 665.75 | 0.001525 | 4.44 | 169.26 | 62.17 | 0.31 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 261.00 | 658.10 | 664.07 | 660.99 | 664.17 | 0.000862 | 2.81 | 111.04 | 31.79 | 0.22 |
| SOUTH TRIB | 7.456 | 50-YEAR | 418.00 | 658.10 | 665.31 | 661.71 | 665.44 | 0.001034 | 3.57 | 157.67 | 37.04 | 0.25 |
| SOUTH TRIB | 7.456 | 100-YEAR | 468.00 | 658.10 | 665.64 | 661.91 | 665.80 | 0.001187 | 3.95 | 175.69 | 72.44 | 0.27 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 261.00 | 658.10 | 664.83 | 660.99 | 664.89 | 0.000508 | 2.37 | 130.68 | 34.58 | 0.17 |
| SOUTH TRIB | 7.47 | 50-YEAR | 418.00 | 658.10 | 666.70 | 661.70 | 666.77 | 0.000585 | 3.06 | 369.13 | 299.57 | 0.19 |
| SOUTH TRIB | 7.47 | 100-YEAR | 468.00 | 658.10 | 666.86 | 661.90 | 666.93 | 0.000584 | 3.10 | 421.63 | 336.11 | 0.19 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 261.00 | 655.06 | 664.90 | | 664.90 | 0.000006 | 0.38 | 1056.50 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 50-YEAR | 418.00 | 655.06 | 666.77 | | 666.77 | 0.000006 | 0.43 | 1446.41 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 100-YEAR | 468.00 | 655.06 | 666.93 | | 666.94 | 0.000007 | 0.47 | 1480.13 | 208.30 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 261.00 | 655.05 | 664.90 | | 664.90 | 0.000001 | 0.11 | 4699.90 | 1496.66 | 0.01 |
| SOUTH TRIB | 7.493 | 50-YEAR | 418.00 | 655.05 | 666.77 | | 666.77 | 0.000000 | 0.09 | 7596.54 | 1585.92 | 0.01 |
| SOUTH TRIB | 7.493 | 100-YEAR | 468.00 | 655.05 | 666.94 | | 666.94 | 0.000000 | 0.10 | 7854.41 | 1593.14 | 0.01 |

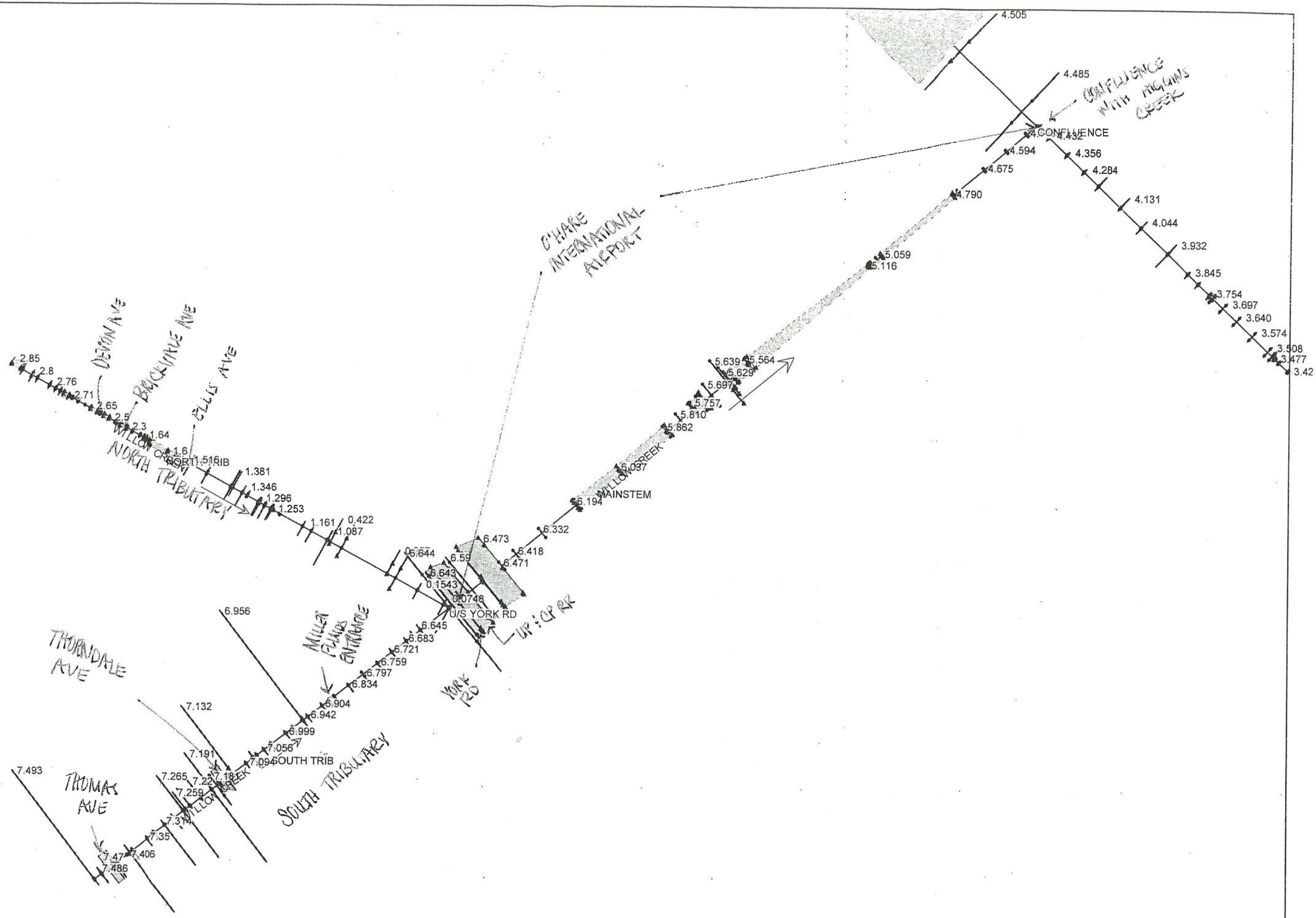
1) Ex Cond




1 in Horiz. = 1500 ft  1 in Vert. = 4 ft

# SECTION 10

## NATURAL CONDITIONS ANALYSIS




None of the XS's are Geo-Referenced (- Geo-Ref user entered XS - Geo-Ref interpolated XS - Non Geo-Ref user entered XS - Non Geo-Ref interpolated XS)

HEC-RAS Plan: Nat - CP&UPRR

| 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) | |
| MAINSTEM | 4.518 | 10-YEAR | 894.00 | 636.00 | 644.69 | | 644.73 | 0.000113 | 1.67 | 558.91 | 68.69 | 0.10 |
| MAINSTEM | 4.518 | 50-YEAR | 1459.00 | 636.00 | 646.33 | | 646.41 | 0.000168 | 2.28 | 673.17 | 70.33 | 0.13 |
| MAINSTEM | 4.518 | 100-YEAR | 1682.00 | 636.00 | 646.91 | | 647.00 | 0.000185 | 2.49 | 713.97 | 70.91 | 0.13 |
| MAINSTEM | 4.594 | 10-YEAR | 894.00 | 636.00 | 644.73 | | 644.77 | 0.000111 | 1.66 | 562.03 | 68.73 | 0.10 |
| MAINSTEM | 4.594 | 50-YEAR | 1459.00 | 636.00 | 646.40 | | 646.48 | 0.000164 | 2.27 | 677.92 | 70.40 | 0.12 |
| MAINSTEM | 4.594 | 100-YEAR | 1682.00 | 636.00 | 646.98 | | 647.07 | 0.000181 | 2.47 | 719.27 | 70.98 | 0.13 |
| MAINSTEM | 4.675 | 10-YEAR | 894.00 | 636.10 | 644.78 | | 644.82 | 0.000114 | 1.67 | 558.61 | 68.72 | 0.10 |
| MAINSTEM | 4.675 | 50-YEAR | 1459.00 | 636.10 | 646.47 | | 646.55 | 0.000166 | 2.27 | 676.07 | 70.41 | 0.12 |
| MAINSTEM | 4.675 | 100-YEAR | 1682.00 | 636.10 | 647.06 | | 647.15 | 0.000182 | 2.47 | 717.95 | 71.01 | 0.13 |
| MAINSTEM | 4.773 | 10-YEAR | 784.00 | 636.20 | 644.84 | | 644.88 | 0.000089 | 1.47 | 554.70 | 68.37 | 0.09 |
| MAINSTEM | 4.773 | 50-YEAR | 1227.00 | 636.20 | 646.57 | | 646.62 | 0.000118 | 1.91 | 673.98 | 70.04 | 0.10 |
| MAINSTEM | 4.773 | 100-YEAR | 1469.00 | 636.20 | 647.17 | | 647.24 | 0.000139 | 2.16 | 716.27 | 70.63 | 0.12 |
| MAINSTEM | 4.790 | 10-YEAR | 784.00 | 636.20 | 644.81 | 638.80 | 644.93 | 0.000312 | 2.76 | 284.23 | 68.35 | 0.17 |
| MAINSTEM | 4.790 | 50-YEAR | 1227.00 | 636.20 | 646.51 | 639.71 | 646.71 | 0.000420 | 3.61 | 340.24 | 69.99 | 0.20 |
| MAINSTEM | 4.790 | 100-YEAR | 1469.00 | 636.20 | 647.09 | 640.14 | 647.35 | 0.000501 | 4.09 | 359.50 | 70.56 | 0.22 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 784.00 | 636.70 | 645.28 | 640.14 | 645.42 | 0.000448 | 3.07 | 255.65 | 65.50 | 0.19 |
| MAINSTEM | 5.059 | 50-YEAR | 1227.00 | 636.70 | 647.60 | 641.04 | 647.81 | 0.000458 | 3.69 | 332.24 | 67.78 | 0.21 |
| MAINSTEM | 5.059 | 100-YEAR | 1469.00 | 636.70 | 648.71 | 641.47 | 648.96 | 0.000462 | 3.98 | 368.99 | 68.88 | 0.21 |
| MAINSTEM | 5.076 | 10-YEAR | 784.00 | 636.90 | 645.41 | | 645.46 | 0.000215 | 1.80 | 435.78 | 65.48 | 0.12 |
| MAINSTEM | 5.076 | 50-YEAR | 1227.00 | 636.90 | 647.79 | | 647.85 | 0.000206 | 2.07 | 594.14 | 67.85 | 0.12 |
| MAINSTEM | 5.076 | 100-YEAR | 1469.00 | 636.90 | 648.93 | | 649.00 | 0.000204 | 2.19 | 672.29 | 68.98 | 0.12 |
| MAINSTEM | 5.104 | 10-YEAR | 784.00 | 637.12 | 645.41 | | 645.51 | 0.000341 | 2.55 | 306.96 | 65.32 | 0.17 |
| MAINSTEM | 5.104 | 50-YEAR | 1227.00 | 637.12 | 647.76 | | 647.90 | 0.000326 | 3.01 | 407.15 | 67.69 | 0.17 |
| MAINSTEM | 5.104 | 100-YEAR | 1469.00 | 637.12 | 648.90 | | 649.06 | 0.000322 | 3.23 | 455.31 | 68.83 | 0.17 |
| MAINSTEM | 5.109 | 10-YEAR | 784.00 | 637.18 | 645.37 | 640.64 | 645.54 | 0.000547 | 3.28 | 239.21 | 65.24 | 0.21 |
| MAINSTEM | 5.109 | 50-YEAR | 1227.00 | 637.18 | 647.71 | 641.55 | 647.94 | 0.000535 | 3.89 | 315.15 | 67.60 | 0.22 |
| MAINSTEM | 5.109 | 100-YEAR | 1469.00 | 637.18 | 648.83 | 642.01 | 649.10 | 0.000532 | 4.18 | 351.63 | 68.73 | 0.22 |
| MAINSTEM | 5.110 | 10-YEAR | 784.00 | 637.22 | 645.33 | | 645.56 | 0.000656 | 3.84 | 204.41 | 44.59 | 0.24 |
| MAINSTEM | 5.110 | 50-YEAR | 1227.00 | 637.22 | 647.64 | | 647.98 | 0.000698 | 4.67 | 262.56 | 50.16 | 0.26 |
| MAINSTEM | 5.110 | 100-YEAR | 1469.00 | 637.22 | 648.75 | | 649.14 | 0.000714 | 5.06 | 290.45 | 52.83 | 0.26 |
| MAINSTEM | 5.116 | 10-YEAR | 784.00 | 637.31 | 645.33 | | 645.57 | 0.000120 | 3.91 | 200.61 | 25.00 | 0.24 |
| MAINSTEM | 5.116 | 50-YEAR | 1227.00 | 637.31 | 647.64 | | 647.99 | 0.000143 | 4.75 | 258.35 | 26.44 | 0.26 |
| MAINSTEM | 5.116 | 100-YEAR | 1469.00 | 637.31 | 648.75 | | 649.16 | 0.000146 | 5.14 | 286.24 | 31.23 | 0.27 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 634.00 | 640.26 | 646.04 | 642.93 | 646.33 | 0.000191 | 4.30 | 147.43 | 25.50 | 0.32 |
| MAINSTEM | 5.606 | 50-YEAR | 1056.00 | 640.26 | 649.63 | 644.01 | 649.94 | 0.000121 | 4.42 | 239.06 | 57.44 | 0.25 |
| MAINSTEM | 5.606 | 100-YEAR | 1227.00 | 640.26 | 651.57 | 644.41 | 651.85 | 0.000087 | 4.25 | 288.43 | 80.97 | 0.22 |
| MAINSTEM | 5.610 | 10-YEAR | 634.00 | 640.30 | 646.34 | | 646.36 | 0.000075 | 1.05 | 603.33 | 125.36 | 0.08 |
| MAINSTEM | 5.610 | 50-YEAR | 1056.00 | 640.30 | 649.95 | | 649.97 | 0.000043 | 1.09 | 970.26 | 145.88 | 0.06 |
| MAINSTEM | 5.610 | 100-YEAR | 1227.00 | 640.30 | 651.86 | | 651.88 | 0.000031 | 1.05 | 1164.78 | 156.76 | 0.05 |
| MAINSTEM | 5.629 | 10-YEAR | 634.00 | 640.37 | 646.36 | | 646.36 | 0.000064 | 0.74 | 854.27 | 215.49 | 0.07 |
| MAINSTEM | 5.629 | 50-YEAR | 1056.00 | 640.37 | 649.97 | | 649.97 | 0.000021 | 0.64 | 1646.96 | 237.14 | 0.04 |
| MAINSTEM | 5.629 | 100-YEAR | 1227.00 | 640.37 | 651.88 | | 651.88 | 0.000014 | 0.59 | 2082.70 | 248.61 | 0.03 |
| MAINSTEM | 5.632 | 10-YEAR | 634.00 | 640.39 | 646.36 | | 646.37 | 0.000056 | 0.70 | 912.18 | 411.47 | 0.06 |
| MAINSTEM | 5.632 | 50-YEAR | 1056.00 | 640.39 | 649.97 | | 649.97 | 0.000019 | 0.60 | 1754.71 | 433.12 | 0.04 |
| MAINSTEM | 5.632 | 100-YEAR | 1227.00 | 640.39 | 651.88 | | 651.88 | 0.000012 | 0.55 | 2216.91 | 444.58 | 0.03 |
| MAINSTEM | 5.639 | 10-YEAR | 634.00 | 640.43 | 646.36 | | 646.37 | 0.000060 | 0.72 | 878.97 | 737.22 | 0.06 |
| MAINSTEM | 5.639 | 50-YEAR | 1056.00 | 640.43 | 649.97 | | 649.97 | 0.000020 | 0.62 | 1695.03 | 758.86 | 0.04 |
| MAINSTEM | 5.639 | 100-YEAR | 1227.00 | 640.43 | 651.88 | | 651.88 | 0.000013 | 0.57 | 2143.32 | 770.33 | 0.03 |
| MAINSTEM | 5.697 | 10-YEAR | 634.00 | 641.14 | 646.37 | | 646.41 | 0.000289 | 1.55 | 408.83 | 311.74 | 0.14 |
| MAINSTEM | 5.697 | 50-YEAR | 1056.00 | 641.14 | 649.96 | | 649.99 | 0.000090 | 1.34 | 788.12 | 333.27 | 0.09 |
| MAINSTEM | 5.697 | 100-YEAR | 1227.00 | 641.14 | 651.87 | | 651.90 | 0.000057 | 1.24 | 989.95 | 344.73 | 0.07 |
| MAINSTEM | 5.720 | 10-YEAR | 634.00 | 641.44 | 646.35 | | 646.51 | 0.000999 | 3.20 | 197.97 | 161.07 | 0.26 |
| MAINSTEM | 5.720 | 50-YEAR | 1056.00 | 641.44 | 649.91 | | 650.05 | 0.000407 | 3.00 | 351.91 | 188.74 | 0.19 |
| MAINSTEM | 5.720 | 100-YEAR | 1227.00 | 641.44 | 651.82 | | 651.94 | 0.000272 | 2.82 | 434.63 | 203.61 | 0.16 |
| MAINSTEM | 5.725 | 10-YEAR | 634.00 | 641.52 | 646.28 | | 646.59 | 0.001791 | 4.45 | 142.63 | 93.92 | 0.36 |
| MAINSTEM | 5.725 | 50-YEAR | 1056.00 | 641.52 | 649.82 | | 650.10 | 0.000777 | 4.24 | 248.84 | 126.73 | 0.26 |

HEC-RAS Plan: Nat - CP&UPRR (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) | |
| MAINSTEM | 5.725 | 100-YEAR | 1227.00 | 641.52 | 651.74 | | 651.99 | 0.000525 | 4.01 | 306.31 | 144.48 | 0.22 |
| MAINSTEM | 5.727 | 10-YEAR | 634.00 | 641.52 | 646.23 | | 646.68 | 0.003344 | 5.38 | 117.80 | 25.00 | 0.44 |
| MAINSTEM | 5.727 | 50-YEAR | 1056.00 | 641.52 | 649.77 | | 650.18 | 0.001669 | 5.12 | 206.14 | 25.00 | 0.31 |
| MAINSTEM | 5.727 | 100-YEAR | 1227.00 | 641.52 | 651.69 | | 652.05 | 0.001202 | 4.83 | 254.12 | 27.98 | 0.27 |
| MAINSTEM | 5.732 | 10-YEAR | 634.00 | 641.59 | 646.38 | | 646.81 | 0.003878 | 5.29 | 119.74 | 25.00 | 0.43 |
| MAINSTEM | 5.732 | 50-YEAR | 1056.00 | 641.59 | 649.84 | | 650.24 | 0.002242 | 5.12 | 206.18 | 25.00 | 0.31 |
| MAINSTEM | 5.732 | 100-YEAR | 1227.00 | 641.59 | 651.74 | | 652.10 | 0.001699 | 4.84 | 253.74 | 27.64 | 0.27 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 634.00 | 641.81 | 646.81 | 644.45 | 647.18 | 0.003115 | 4.88 | 129.95 | 26.00 | 0.38 |
| MAINSTEM | 5.757 | 50-YEAR | 1056.00 | 641.81 | 650.18 | 645.52 | 650.55 | 0.001947 | 4.85 | 217.65 | 26.00 | 0.30 |
| MAINSTEM | 5.757 | 100-YEAR | 1227.00 | 641.81 | 652.07 | 645.91 | 652.40 | 0.001495 | 4.60 | 266.70 | 26.00 | 0.25 |
| MAINSTEM | 5.759 | 10-YEAR | 634.00 | 641.82 | 647.20 | | 647.22 | 0.000129 | 1.30 | 489.37 | 100.00 | 0.10 |
| MAINSTEM | 5.759 | 50-YEAR | 1056.00 | 641.82 | 650.56 | | 650.59 | 0.000071 | 1.33 | 795.30 | 100.00 | 0.08 |
| MAINSTEM | 5.759 | 100-YEAR | 1227.00 | 641.82 | 652.41 | | 652.43 | 0.000051 | 1.27 | 963.34 | 100.00 | 0.07 |
| MAINSTEM | 5.810 | 10-YEAR | 634.00 | 643.98 | 647.24 | | 647.29 | 0.000620 | 1.95 | 325.50 | 100.00 | 0.19 |
| MAINSTEM | 5.810 | 50-YEAR | 1056.00 | 643.98 | 650.58 | | 650.62 | 0.000177 | 1.60 | 659.72 | 100.00 | 0.11 |
| MAINSTEM | 5.810 | 100-YEAR | 1227.00 | 643.98 | 652.42 | | 652.45 | 0.000110 | 1.45 | 843.86 | 100.00 | 0.09 |
| MAINSTEM | 5.860 | 10-YEAR | 634.00 | 645.81 | 647.64 | 647.64 | 648.57 | 0.019302 | 7.73 | 82.06 | 100.00 | 1.01 |
| MAINSTEM | 5.860 | 50-YEAR | 1056.00 | 645.81 | 650.43 | | 650.83 | 0.002459 | 5.11 | 206.78 | 100.00 | 0.42 |
| MAINSTEM | 5.860 | 100-YEAR | 1227.00 | 645.81 | 652.31 | | 652.58 | 0.001062 | 4.21 | 291.10 | 100.00 | 0.29 |
| MAINSTEM | 5.862 | 10-YEAR | 634.00 | 645.96 | 648.45 | 648.45 | 649.70 | 0.021607 | 9.00 | 70.47 | 28.35 | 1.01 |
| MAINSTEM | 5.862 | 50-YEAR | 1056.00 | 645.96 | 650.19 | | 651.40 | 0.011607 | 8.80 | 120.02 | 28.35 | 0.75 |
| MAINSTEM | 5.862 | 100-YEAR | 1227.00 | 645.96 | 652.14 | | 652.90 | 0.005086 | 7.01 | 175.10 | 28.35 | 0.50 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 634.00 | 647.54 | 651.60 | 649.84 | 651.96 | 0.000320 | 4.85 | 130.71 | 33.00 | 0.42 |
| MAINSTEM | 6.037 | 50-YEAR | 1056.00 | 647.54 | 653.22 | 650.77 | 653.74 | 0.000320 | 5.77 | 183.00 | 33.00 | 0.43 |
| MAINSTEM | 6.037 | 100-YEAR | 1227.00 | 647.54 | 653.90 | 651.10 | 654.46 | 0.000310 | 5.99 | 204.81 | 33.00 | 0.42 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 603.00 | 647.73 | 652.15 | 649.86 | 652.40 | 0.002189 | 4.01 | 150.28 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 50-YEAR | 996.00 | 647.73 | 653.91 | 650.71 | 654.26 | 0.002167 | 4.74 | 210.25 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 100-YEAR | 1156.00 | 647.73 | 654.62 | 651.02 | 655.00 | 0.002121 | 4.94 | 234.15 | 34.00 | 0.33 |
| MAINSTEM | 6.194 | 10-YEAR | 603.00 | 647.75 | 652.41 | | 652.44 | 0.000159 | 1.31 | 461.22 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 50-YEAR | 996.00 | 647.75 | 654.27 | | 654.31 | 0.000142 | 1.54 | 645.30 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 100-YEAR | 1156.00 | 647.75 | 655.00 | | 655.04 | 0.000134 | 1.61 | 717.76 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 10-YEAR | 603.00 | 647.88 | 652.52 | | 652.55 | 0.000178 | 1.30 | 464.06 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 50-YEAR | 996.00 | 647.88 | 654.37 | | 654.41 | 0.000166 | 1.53 | 649.01 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 100-YEAR | 1156.00 | 647.88 | 655.10 | | 655.14 | 0.000160 | 1.60 | 721.72 | 100.00 | 0.11 |
| MAINSTEM | 6.418 | 10-YEAR | 603.00 | 647.88 | 652.61 | | 652.63 | 0.000167 | 1.27 | 472.97 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 50-YEAR | 996.00 | 647.88 | 654.45 | | 654.49 | 0.000159 | 1.52 | 657.40 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 100-YEAR | 1156.00 | 647.88 | 655.18 | | 655.22 | 0.000154 | 1.58 | 729.82 | 100.00 | 0.10 |
| MAINSTEM | 6.471 | 10-YEAR | 603.00 | 647.88 | 652.65 | | 652.73 | 0.000583 | 2.29 | 263.80 | 55.30 | 0.18 |
| MAINSTEM | 6.471 | 50-YEAR | 996.00 | 647.88 | 654.48 | | 654.59 | 0.000581 | 2.73 | 364.71 | 55.30 | 0.19 |
| MAINSTEM | 6.471 | 100-YEAR | 1156.00 | 647.88 | 655.19 | | 655.32 | 0.000571 | 2.86 | 404.33 | 55.30 | 0.19 |
| MAINSTEM | 6.473 | 10-YEAR | 603.00 | 647.91 | 652.61 | | 652.79 | 0.002320 | 3.43 | 175.73 | 40.00 | 0.29 |
| MAINSTEM | 6.473 | 50-YEAR | 996.00 | 647.91 | 654.42 | | 654.67 | 0.002456 | 4.01 | 248.07 | 40.00 | 0.28 |
| MAINSTEM | 6.473 | 100-YEAR | 1156.00 | 647.91 | 655.13 | | 655.40 | 0.002476 | 4.18 | 276.53 | 40.00 | 0.28 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 6.538 | 10-YEAR | 603.00 | 648.09 | 652.83 | 650.40 | 653.03 | 0.002651 | 3.61 | 167.21 | 38.00 | 0.30 |
| MAINSTEM | 6.538 | 50-YEAR | 996.00 | 648.09 | 654.69 | 651.19 | 654.97 | 0.002755 | 4.18 | 238.13 | 38.00 | 0.29 |
| MAINSTEM | 6.538 | 100-YEAR | 1156.00 | 648.09 | 655.42 | 651.48 | 655.72 | 0.002771 | 4.35 | 265.81 | 38.00 | 0.29 |
| MAINSTEM | 6.540 | 10-YEAR | 603.00 | 648.11 | 653.04 | | 653.05 | 0.000088 | 0.92 | 652.36 | 191.09 | 0.08 |
| MAINSTEM | 6.540 | 50-YEAR | 996.00 | 648.11 | 654.98 | | 654.99 | 0.000074 | 1.07 | 933.29 | 220.15 | 0.07 |
| MAINSTEM | 6.540 | 100-YEAR | 1156.00 | 648.11 | 655.73 | | 655.75 | 0.000069 | 1.11 | 1042.18 | 231.41 | 0.07 |
| MAINSTEM | 6.59 | 10-YEAR | 603.00 | 648.25 | 653.06 | | 653.07 | 0.000095 | 0.84 | 715.15 | 196.42 | 0.08 |
| MAINSTEM | 6.59 | 50-YEAR | 996.00 | 648.25 | 655.01 | | 655.03 | 0.000470 | 0.87 | 1143.06 | 1008.18 | 0.14 |
| MAINSTEM | 6.59 | 100-YEAR | 1156.00 | 648.25 | 655.76 | | 655.77 | 0.000119 | 0.61 | 1911.55 | 1050.50 | 0.08 |

HEC-RAS Plan: Nat - CP&UPRR (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) | |
| MAINSTEM | 6.6 | 10-YEAR | 603.00 | 648.30 | 653.07 | | 653.08 | 0.000095 | 0.84 | 719.98 | 200.44 | 0.08 |
| MAINSTEM | 6.6 | 50-YEAR | 996.00 | 648.30 | 655.02 | | 655.04 | 0.000069 | 0.87 | 1146.61 | 235.53 | 0.07 |
| MAINSTEM | 6.6 | 100-YEAR | 1156.00 | 648.30 | 655.76 | | 655.78 | 0.000061 | 0.87 | 1325.55 | 248.78 | 0.07 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 603.00 | 648.71 | 653.11 | | 653.12 | 0.000752 | 1.02 | 595.57 | 605.80 | 0.18 |
| MAINSTEM | 6.635 | 50-YEAR | 996.00 | 648.71 | 655.05 | | 655.05 | 0.000033 | 0.37 | 2750.61 | 1229.49 | 0.04 |
| MAINSTEM | 6.635 | 100-YEAR | 1156.00 | 648.71 | 655.78 | | 655.78 | 0.000017 | 0.32 | 3657.98 | 1234.68 | 0.03 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.637 | 10-YEAR | 603.00 | 648.71 | 653.11 | | 653.12 | 0.000752 | 1.02 | 596.94 | 608.83 | 0.18 |
| MAINSTEM | 6.637 | 50-YEAR | 996.00 | 648.71 | 655.05 | | 655.05 | 0.000033 | 0.37 | 2750.76 | 1229.49 | 0.04 |
| MAINSTEM | 6.637 | 100-YEAR | 1156.00 | 648.71 | 655.78 | | 655.78 | 0.000017 | 0.32 | 3658.05 | 1234.68 | 0.03 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 603.00 | 649.07 | 653.07 | 653.07 | 654.07 | 0.023395 | 8.04 | 74.96 | 37.54 | 1.00 |
| MAINSTEM | 6.639 | 50-YEAR | 996.00 | 649.07 | 654.67 | | 655.43 | 0.010726 | 6.99 | 142.56 | 46.93 | 0.71 |
| MAINSTEM | 6.639 | 100-YEAR | 1156.00 | 649.07 | 655.47 | | 656.10 | 0.007412 | 6.35 | 182.14 | 51.64 | 0.60 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 603.00 | 649.86 | 654.58 | 653.77 | 655.03 | 0.007939 | 5.39 | 111.77 | 47.64 | 0.62 |
| MAINSTEM | 6.642 | 50-YEAR | 996.00 | 649.86 | 655.64 | 654.62 | 656.19 | 0.007356 | 5.93 | 167.94 | 57.98 | 0.61 |
| MAINSTEM | 6.642 | 100-YEAR | 1156.00 | 649.86 | 656.15 | 654.91 | 656.67 | 0.006383 | 5.83 | 198.44 | 63.05 | 0.58 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 603.00 | 649.86 | 654.75 | | 655.14 | 0.006541 | 5.02 | 120.13 | 49.22 | 0.57 |
| MAINSTEM | 6.643 | 50-YEAR | 996.00 | 649.86 | 655.81 | | 656.30 | 0.006351 | 5.61 | 177.57 | 59.63 | 0.57 |
| MAINSTEM | 6.643 | 100-YEAR | 1156.00 | 649.86 | 656.28 | | 656.77 | 0.005713 | 5.59 | 206.97 | 64.40 | 0.55 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 603.00 | 649.30 | 655.39 | | 655.39 | 0.000052 | 0.22 | 2793.11 | 1612.80 | 0.03 |
| MAINSTEM | 6.644 | 50-YEAR | 996.00 | 649.30 | 656.59 | | 656.59 | 0.000026 | 0.22 | 4850.28 | 1793.95 | 0.02 |
| MAINSTEM | 6.644 | 100-YEAR | 1156.00 | 649.30 | 657.06 | | 657.06 | 0.000021 | 0.22 | 5703.46 | 1863.93 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.645 | 10-YEAR | 314.00 | 653.20 | 655.18 | 655.18 | 655.73 | 0.017507 | 6.90 | 61.86 | 54.47 | 0.86 |
| SOUTH TRIB | 6.645 | 50-YEAR | 506.00 | 653.20 | 656.43 | | 656.69 | 0.004859 | 5.03 | 137.84 | 67.10 | 0.49 |
| SOUTH TRIB | 6.645 | 100-YEAR | 570.00 | 653.20 | 656.93 | | 657.14 | 0.003280 | 4.55 | 172.54 | 72.14 | 0.42 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.664 | 10-YEAR | 314.00 | 653.30 | 656.28 | 655.36 | 656.48 | 0.003892 | 4.26 | 96.40 | 49.31 | 0.44 |
| SOUTH TRIB | 6.664 | 50-YEAR | 506.00 | 653.30 | 656.88 | | 657.18 | 0.004646 | 5.27 | 127.63 | 54.43 | 0.49 |
| SOUTH TRIB | 6.664 | 100-YEAR | 570.00 | 653.30 | 657.24 | | 657.52 | 0.003947 | 5.17 | 147.62 | 57.47 | 0.46 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.683 | 10-YEAR | 314.00 | 653.40 | 656.63 | | 656.90 | 0.004069 | 4.61 | 84.27 | 37.11 | 0.45 |
| SOUTH TRIB | 6.683 | 50-YEAR | 506.00 | 653.40 | 657.29 | | 657.70 | 0.005087 | 5.83 | 110.15 | 41.61 | 0.52 |
| SOUTH TRIB | 6.683 | 100-YEAR | 570.00 | 653.40 | 657.58 | | 658.00 | 0.004856 | 5.97 | 122.37 | 43.57 | 0.51 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.721 | 10-YEAR | 314.00 | 653.70 | 657.36 | | 657.60 | 0.003055 | 4.34 | 89.65 | 36.35 | 0.40 |
| SOUTH TRIB | 6.721 | 50-YEAR | 506.00 | 653.70 | 658.20 | | 658.55 | 0.003534 | 5.35 | 124.43 | 46.74 | 0.44 |
| SOUTH TRIB | 6.721 | 100-YEAR | 570.00 | 653.70 | 658.46 | | 658.83 | 0.003540 | 5.56 | 137.11 | 49.99 | 0.45 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.759 | 10-YEAR | 314.00 | 654.00 | 657.94 | | 658.12 | 0.002190 | 3.85 | 100.51 | 36.08 | 0.34 |
| SOUTH TRIB | 6.759 | 50-YEAR | 506.00 | 654.00 | 658.87 | | 659.14 | 0.002456 | 4.70 | 136.69 | 41.11 | 0.38 |
| SOUTH TRIB | 6.759 | 100-YEAR | 570.00 | 654.00 | 659.14 | | 659.43 | 0.002518 | 4.94 | 147.89 | 42.54 | 0.38 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.797 | 10-YEAR | 314.00 | 654.30 | 658.41 | | 658.55 | 0.002067 | 2.97 | 105.70 | 36.40 | 0.31 |
| SOUTH TRIB | 6.797 | 50-YEAR | 506.00 | 654.30 | 659.43 | | 659.61 | 0.002240 | 3.48 | 145.23 | 41.67 | 0.33 |
| SOUTH TRIB | 6.797 | 100-YEAR | 570.00 | 654.30 | 659.71 | | 659.92 | 0.002280 | 3.62 | 157.44 | 43.16 | 0.33 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.834 | 10-YEAR | 314.00 | 654.60 | 658.77 | | 658.90 | 0.001455 | 3.26 | 123.53 | 44.24 | 0.28 |
| SOUTH TRIB | 6.834 | 50-YEAR | 506.00 | 654.60 | 659.81 | | 659.98 | 0.001517 | 3.87 | 173.54 | 51.56 | 0.30 |
| SOUTH TRIB | 6.834 | 100-YEAR | 570.00 | 654.60 | 660.11 | | 660.29 | 0.001531 | 4.03 | 189.09 | 53.64 | 0.30 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.872 | 10-YEAR | 314.00 | 654.90 | 659.07 | | 659.25 | 0.001929 | 3.76 | 101.77 | 33.76 | 0.32 |
| SOUTH TRIB | 6.872 | 50-YEAR | 506.00 | 654.90 | 660.12 | | 660.38 | 0.002100 | 4.56 | 139.66 | 38.47 | 0.35 |
| SOUTH TRIB | 6.872 | 100-YEAR | 570.00 | 654.90 | 660.42 | | 660.70 | 0.002146 | 4.78 | 151.24 | 39.80 | 0.36 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.879 Miller Fluids En | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 314.00 | 654.90 | 659.09 | 657.09 | 659.27 | 0.001894 | 3.74 | 102.44 | 33.85 | 0.32 |
| SOUTH TRIB | 6.886 | 50-YEAR | 506.00 | 654.90 | 660.17 | 657.82 | 660.42 | 0.002031 | 4.51 | 141.39 | 38.67 | 0.35 |
| SOUTH TRIB | 6.886 | 100-YEAR | 570.00 | 654.90 | 660.47 | 658.03 | 660.74 | 0.002069 | 4.72 | 153.27 | 40.03 | 0.35 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.904 | 10-YEAR | 314.00 | 655.30 | 659.29 | | 659.50 | 0.002391 | 4.06 | 94.42 | 33.85 | 0.36 |
| SOUTH TRIB | 6.904 | 50-YEAR | 506.00 | 655.30 | 660.37 | | 660.65 | 0.002446 | 4.82 | 136.91 | 44.57 | 0.38 |
| SOUTH TRIB | 6.904 | 100-YEAR | 570.00 | 655.30 | 660.68 | | 660.98 | 0.002437 | 5.00 | 151.01 | 47.60 | 0.38 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.942 | 10-YEAR | 314.00 | 655.60 | 659.75 | | 659.93 | 0.001908 | 3.73 | 104.35 | 36.28 | 0.32 |
| SOUTH TRIB | 6.942 | 50-YEAR | 506.00 | 655.60 | 660.86 | | 661.10 | 0.001968 | 4.43 | 150.24 | 46.52 | 0.34 |
| SOUTH TRIB | 6.942 | 100-YEAR | 570.00 | 655.60 | 661.17 | | 661.42 | 0.001975 | 4.61 | 164.99 | 49.36 | 0.34 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.956 | 10-YEAR | 314.00 | 655.05 | 659.89 | 658.03 | 660.07 | 0.002456 | 3.52 | 93.49 | 134.67 | 0.34 |
| SOUTH TRIB | 6.956 | 50-YEAR | 506.00 | 655.05 | 661.00 | 658.75 | 661.25 | 0.002515 | 4.10 | 131.10 | 277.51 | 0.36 |

HEC-RAS Plan: Nat - CP&UPRR (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 6.956 | 100-YEAR | 570.00 | 655.05 | 661.30 | 658.95 | 661.57 | 0.002550 | 4.26 | 142.36 | 521.91 | 0.36 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.98 | 10-YEAR | 314.00 | 655.90 | 660.19 | | 660.34 | 0.001549 | 3.43 | 114.33 | 38.27 | 0.29 |
| SOUTH TRIB | 6.98 | 50-YEAR | 506.00 | 655.90 | 661.32 | | 661.52 | 0.001598 | 4.07 | 161.57 | 45.37 | 0.31 |
| SOUTH TRIB | 6.98 | 100-YEAR | 570.00 | 655.90 | 661.64 | | 661.85 | 0.001614 | 4.25 | 176.16 | 47.41 | 0.31 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.999 | 10-YEAR | 314.00 | 656.10 | 660.35 | | 660.50 | 0.001643 | 3.51 | 111.28 | 37.41 | 0.30 |
| SOUTH TRIB | 6.999 | 50-YEAR | 506.00 | 656.10 | 661.48 | | 661.68 | 0.001670 | 4.14 | 157.14 | 43.40 | 0.31 |
| SOUTH TRIB | 6.999 | 100-YEAR | 570.00 | 656.10 | 661.79 | | 662.02 | 0.001771 | 4.43 | 171.61 | 49.42 | 0.33 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.037 | 10-YEAR | 314.00 | 655.90 | 660.63 | | 660.71 | 0.000720 | 2.50 | 152.52 | 44.75 | 0.20 |
| SOUTH TRIB | 7.037 | 50-YEAR | 506.00 | 655.90 | 661.80 | | 661.92 | 0.000795 | 3.04 | 208.56 | 51.24 | 0.22 |
| SOUTH TRIB | 7.037 | 100-YEAR | 570.00 | 655.90 | 662.14 | | 662.26 | 0.000810 | 3.18 | 226.21 | 53.12 | 0.22 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.056 | 10-YEAR | 314.00 | 656.00 | 660.70 | | 660.81 | 0.001107 | 3.08 | 128.47 | 39.70 | 0.25 |
| SOUTH TRIB | 7.056 | 50-YEAR | 506.00 | 656.00 | 661.87 | | 662.03 | 0.001220 | 3.75 | 180.49 | 50.68 | 0.27 |
| SOUTH TRIB | 7.056 | 100-YEAR | 570.00 | 656.00 | 662.20 | | 662.38 | 0.001230 | 3.91 | 198.27 | 54.35 | 0.28 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.075 | 10-YEAR | 314.00 | 656.20 | 660.82 | | 660.92 | 0.001081 | 3.01 | 133.37 | 42.79 | 0.25 |
| SOUTH TRIB | 7.075 | 50-YEAR | 506.00 | 656.20 | 662.00 | | 662.15 | 0.001142 | 3.60 | 189.56 | 53.44 | 0.26 |
| SOUTH TRIB | 7.075 | 100-YEAR | 570.00 | 656.20 | 662.34 | | 662.50 | 0.001148 | 3.75 | 208.43 | 57.19 | 0.27 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.084 | 10-YEAR | 314.00 | 655.01 | 660.86 | 658.14 | 660.98 | 0.001036 | 2.94 | 127.99 | 40.39 | 0.23 |
| SOUTH TRIB | 7.084 | 50-YEAR | 506.00 | 655.01 | 662.04 | 658.94 | 662.21 | 0.001217 | 3.68 | 185.97 | 206.64 | 0.26 |
| SOUTH TRIB | 7.084 | 100-YEAR | 570.00 | 655.01 | 662.46 | 659.16 | 662.55 | 0.000713 | 2.95 | 354.60 | 215.95 | 0.20 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.094 | 10-YEAR | 314.00 | 656.40 | 660.97 | | 661.09 | 0.001246 | 3.21 | 122.75 | 38.76 | 0.26 |
| SOUTH TRIB | 7.094 | 50-YEAR | 506.00 | 656.40 | 662.17 | | 662.34 | 0.001274 | 3.79 | 173.18 | 45.02 | 0.28 |
| SOUTH TRIB | 7.094 | 100-YEAR | 570.00 | 656.40 | 662.49 | | 662.67 | 0.001302 | 3.97 | 187.70 | 46.67 | 0.28 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.132 | 10-YEAR | 314.00 | 655.41 | 661.21 | 658.60 | 661.29 | 0.000889 | 2.74 | 149.16 | 253.53 | 0.21 |
| SOUTH TRIB | 7.132 | 50-YEAR | 506.00 | 655.41 | 662.43 | 659.30 | 662.54 | 0.000895 | 3.17 | 213.16 | 881.84 | 0.22 |
| SOUTH TRIB | 7.132 | 100-YEAR | 570.00 | 655.41 | 662.76 | 659.49 | 662.88 | 0.000908 | 3.30 | 231.85 | 913.20 | 0.22 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.136 | 10-YEAR | 314.00 | 656.30 | 661.19 | | 661.36 | 0.001809 | 3.27 | 98.71 | 29.77 | 0.29 |
| SOUTH TRIB | 7.136 | 50-YEAR | 506.00 | 656.30 | 662.39 | | 662.62 | 0.001844 | 3.93 | 137.79 | 35.56 | 0.30 |
| SOUTH TRIB | 7.136 | 100-YEAR | 570.00 | 656.30 | 662.71 | | 662.96 | 0.001881 | 4.13 | 149.33 | 37.09 | 0.31 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.145 | 10-YEAR | 287.00 | 655.49 | 661.38 | 657.92 | 661.43 | 0.000368 | 1.73 | 166.35 | 54.90 | 0.14 |
| SOUTH TRIB | 7.145 | 50-YEAR | 461.00 | 655.49 | 662.63 | 658.48 | 662.71 | 0.000427 | 2.18 | 211.45 | 62.02 | 0.16 |
| SOUTH TRIB | 7.145 | 100-YEAR | 517.00 | 655.49 | 662.97 | 658.62 | 663.05 | 0.000446 | 2.31 | 223.55 | 63.80 | 0.16 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.156 Thorndale Ave | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.168 | 10-YEAR | 287.00 | 656.61 | 661.46 | 658.60 | 661.52 | 0.000538 | 1.94 | 148.27 | 71.71 | 0.17 |
| SOUTH TRIB | 7.168 | 50-YEAR | 461.00 | 656.61 | 662.92 | 659.07 | 663.00 | 0.000507 | 2.30 | 200.54 | 113.37 | 0.17 |
| SOUTH TRIB | 7.168 | 100-YEAR | 517.00 | 656.61 | 663.34 | 659.20 | 663.43 | 0.000499 | 2.40 | 215.77 | 124.86 | 0.17 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.181 | 10-YEAR | 287.00 | 657.30 | 661.52 | | 661.54 | 0.000368 | 1.23 | 233.03 | 84.54 | 0.13 |
| SOUTH TRIB | 7.181 | 50-YEAR | 461.00 | 657.30 | 662.99 | | 663.02 | 0.000245 | 1.27 | 363.44 | 92.60 | 0.11 |
| SOUTH TRIB | 7.181 | 100-YEAR | 517.00 | 657.30 | 663.42 | | 663.45 | 0.000225 | 1.28 | 403.72 | 94.95 | 0.11 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.191 | 10-YEAR | 287.00 | 655.30 | 661.54 | | 661.57 | 0.000385 | 1.72 | 230.18 | 95.25 | 0.14 |
| SOUTH TRIB | 7.191 | 50-YEAR | 461.00 | 655.30 | 663.01 | | 663.04 | 0.000250 | 1.67 | 376.63 | 104.36 | 0.12 |
| SOUTH TRIB | 7.191 | 100-YEAR | 517.00 | 655.30 | 663.44 | | 663.47 | 0.000227 | 1.67 | 421.94 | 107.03 | 0.12 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.22 | 10-YEAR | 287.00 | 656.50 | 661.62 | | 661.64 | 0.000444 | 1.54 | 230.40 | 85.61 | 0.14 |
| SOUTH TRIB | 7.22 | 50-YEAR | 461.00 | 656.50 | 663.06 | | 663.08 | 0.000301 | 1.47 | 358.73 | 92.64 | 0.12 |
| SOUTH TRIB | 7.22 | 100-YEAR | 517.00 | 656.50 | 663.48 | | 663.51 | 0.000276 | 1.46 | 398.44 | 94.71 | 0.12 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.247 | 10-YEAR | 287.00 | 656.80 | 661.69 | | 661.71 | 0.000533 | 1.55 | 219.09 | 84.37 | 0.15 |
| SOUTH TRIB | 7.247 | 50-YEAR | 461.00 | 656.80 | 663.10 | | 663.13 | 0.000348 | 1.46 | 343.55 | 91.41 | 0.13 |
| SOUTH TRIB | 7.247 | 100-YEAR | 517.00 | 656.80 | 663.52 | | 663.55 | 0.000316 | 1.45 | 382.37 | 93.50 | 0.12 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.259 | 10-YEAR | 287.00 | 657.00 | 661.72 | | 661.74 | 0.000518 | 1.50 | 222.07 | 85.18 | 0.15 |
| SOUTH TRIB | 7.259 | 50-YEAR | 461.00 | 657.00 | 663.12 | | 663.15 | 0.000341 | 1.43 | 346.46 | 91.92 | 0.12 |
| SOUTH TRIB | 7.259 | 100-YEAR | 517.00 | 657.00 | 663.54 | | 663.57 | 0.000311 | 1.42 | 385.30 | 93.92 | 0.12 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.265 | 10-YEAR | 287.00 | 657.38 | 661.70 | | 661.79 | 0.001452 | 2.95 | 136.13 | 65.64 | 0.26 |
| SOUTH TRIB | 7.265 | 50-YEAR | 461.00 | 657.38 | 663.11 | | 663.18 | 0.000818 | 2.70 | 234.56 | 73.95 | 0.20 |
| SOUTH TRIB | 7.265 | 100-YEAR | 517.00 | 657.38 | 663.53 | | 663.60 | 0.000719 | 2.66 | 266.04 | 76.42 | 0.19 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.289 | 10-YEAR | 287.00 | 657.30 | 661.90 | | 662.04 | 0.002399 | 3.45 | 99.60 | 38.41 | 0.33 |
| SOUTH TRIB | 7.289 | 50-YEAR | 461.00 | 657.30 | 663.21 | | 663.35 | 0.001902 | 3.52 | 155.80 | 47.38 | 0.30 |
| SOUTH TRIB | 7.289 | 100-YEAR | 517.00 | 657.30 | 663.61 | | 663.75 | 0.001751 | 3.50 | 175.38 | 50.13 | 0.29 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.314 | 10-YEAR | 287.00 | 657.10 | 662.19 | | 662.26 | 0.001158 | 2.48 | 138.75 | 49.50 | 0.23 |
| SOUTH TRIB | 7.314 | 50-YEAR | 461.00 | 657.10 | 663.46 | | 663.54 | 0.001005 | 2.61 | 207.64 | 58.93 | 0.22 |

HEC-RAS Plan: Nat - CP&UPRR (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.314 | 100-YEAR | 517.00 | 657.10 | 663.84 | | 663.92 | 0.000949 | 2.62 | 231.01 | 61.80 | 0.21 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.331 | 10-YEAR | 287.00 | 657.60 | 662.31 | | 662.60 | 0.005680 | 4.74 | 67.84 | 27.32 | 0.49 |
| SOUTH TRIB | 7.331 | 50-YEAR | 461.00 | 657.60 | 663.53 | | 663.84 | 0.004601 | 4.88 | 105.26 | 33.98 | 0.46 |
| SOUTH TRIB | 7.331 | 100-YEAR | 517.00 | 657.60 | 663.90 | | 664.21 | 0.004245 | 4.86 | 118.36 | 36.02 | 0.44 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.35 | 10-YEAR | 287.00 | 658.10 | 662.83 | | 663.00 | 0.002627 | 3.70 | 89.51 | 31.40 | 0.35 |
| SOUTH TRIB | 7.35 | 50-YEAR | 461.00 | 658.10 | 663.99 | | 664.20 | 0.002567 | 4.12 | 129.44 | 37.43 | 0.35 |
| SOUTH TRIB | 7.35 | 100-YEAR | 517.00 | 658.10 | 664.34 | | 664.55 | 0.002496 | 4.18 | 142.74 | 39.24 | 0.35 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.391 | 10-YEAR | 287.00 | 658.50 | 663.35 | | 663.49 | 0.001984 | 3.35 | 98.23 | 31.96 | 0.30 |
| SOUTH TRIB | 7.391 | 50-YEAR | 461.00 | 658.50 | 664.51 | | 664.70 | 0.002060 | 3.83 | 138.59 | 37.52 | 0.31 |
| SOUTH TRIB | 7.391 | 100-YEAR | 517.00 | 658.50 | 664.85 | | 665.04 | 0.002045 | 3.92 | 153.08 | 52.12 | 0.32 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.399 | 10-YEAR | 287.00 | 657.49 | 663.39 | 660.52 | 663.57 | 0.001267 | 3.61 | 97.00 | 24.85 | 0.27 |
| SOUTH TRIB | 7.399 | 50-YEAR | 461.00 | 657.49 | 664.53 | 661.40 | 664.79 | 0.001582 | 4.58 | 126.84 | 522.67 | 0.31 |
| SOUTH TRIB | 7.399 | 100-YEAR | 517.00 | 657.49 | 664.85 | 661.65 | 665.15 | 0.001650 | 4.83 | 136.01 | 643.74 | 0.32 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.406 | 10-YEAR | 287.00 | 658.60 | 663.42 | | 663.64 | 0.002081 | 4.30 | 84.90 | 25.25 | 0.35 |
| SOUTH TRIB | 7.406 | 50-YEAR | 461.00 | 658.60 | 664.56 | | 664.88 | 0.002319 | 5.23 | 115.86 | 28.77 | 0.38 |
| SOUTH TRIB | 7.406 | 100-YEAR | 517.00 | 658.60 | 664.89 | | 665.24 | 0.002344 | 5.45 | 125.41 | 29.25 | 0.38 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 287.00 | 659.00 | 663.68 | | 664.05 | 0.004022 | 5.58 | 67.59 | 23.95 | 0.47 |
| SOUTH TRIB | 7.431 | 50-YEAR | 461.00 | 659.00 | 664.85 | | 665.31 | 0.003906 | 6.43 | 98.30 | 28.77 | 0.48 |
| SOUTH TRIB | 7.431 | 100-YEAR | 517.00 | 659.00 | 665.18 | | 665.66 | 0.003828 | 6.62 | 108.02 | 29.76 | 0.48 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 287.00 | 658.10 | 664.01 | | 664.13 | 0.001172 | 3.26 | 113.72 | 31.56 | 0.26 |
| SOUTH TRIB | 7.447 | 50-YEAR | 461.00 | 658.10 | 665.23 | | 665.39 | 0.001310 | 3.98 | 154.84 | 36.07 | 0.28 |
| SOUTH TRIB | 7.447 | 100-YEAR | 517.00 | 658.10 | 665.54 | | 665.75 | 0.001525 | 4.44 | 169.26 | 62.16 | 0.31 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 261.00 | 658.10 | 664.07 | 660.99 | 664.17 | 0.000862 | 2.81 | 111.04 | 31.79 | 0.22 |
| SOUTH TRIB | 7.456 | 50-YEAR | 418.00 | 658.10 | 665.31 | 661.71 | 665.44 | 0.001034 | 3.57 | 157.67 | 37.04 | 0.25 |
| SOUTH TRIB | 7.456 | 100-YEAR | 468.00 | 658.10 | 665.64 | 661.91 | 665.80 | 0.001187 | 3.95 | 175.68 | 72.42 | 0.27 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 261.00 | 658.10 | 664.83 | 660.99 | 664.89 | 0.000508 | 2.37 | 130.68 | 34.58 | 0.17 |
| SOUTH TRIB | 7.47 | 50-YEAR | 418.00 | 658.10 | 666.70 | 661.70 | 666.77 | 0.000585 | 3.06 | 369.13 | 299.57 | 0.19 |
| SOUTH TRIB | 7.47 | 100-YEAR | 468.00 | 658.10 | 666.85 | 661.90 | 666.92 | 0.000588 | 3.11 | 419.76 | 334.88 | 0.20 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 261.00 | 655.06 | 664.90 | | 664.90 | 0.000006 | 0.38 | 1056.50 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 50-YEAR | 418.00 | 655.06 | 666.77 | | 666.77 | 0.000006 | 0.43 | 1446.41 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 100-YEAR | 468.00 | 655.06 | 666.93 | | 666.93 | 0.000007 | 0.47 | 1479.11 | 208.30 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 261.00 | 655.05 | 664.90 | | 664.90 | 0.000001 | 0.11 | 4699.90 | 1496.66 | 0.01 |
| SOUTH TRIB | 7.493 | 50-YEAR | 418.00 | 655.05 | 666.77 | | 666.77 | 0.000000 | 0.09 | 7596.54 | 1585.92 | 0.01 |
| SOUTH TRIB | 7.493 | 100-YEAR | 468.00 | 655.05 | 666.93 | | 666.93 | 0.000000 | 0.10 | 7846.63 | 1592.92 | 0.01 |

HEC-RAS Plan: Nat - CP&UPRR

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 4.518 | 10-YEAR | 644.73 | 644.69 | 0.04 | 0.05 | 0.01 | 11.61 | 870.78 | 11.61 | 68.69 |
| MAINSTEM | 4.518 | 50-YEAR | 646.41 | 646.33 | 0.08 | 0.06 | 0.01 | 22.42 | 1414.15 | 22.42 | 70.33 |
| MAINSTEM | 4.518 | 100-YEAR | 647.00 | 646.91 | 0.09 | 0.06 | 0.01 | 27.25 | 1627.50 | 27.25 | 70.91 |
| MAINSTEM | 4.594 | 10-YEAR | 644.77 | 644.73 | 0.04 | 0.04 | 0.00 | 11.67 | 870.66 | 11.67 | 68.73 |
| MAINSTEM | 4.594 | 50-YEAR | 646.48 | 646.40 | 0.08 | 0.07 | 0.00 | 22.57 | 1413.87 | 22.57 | 70.40 |
| MAINSTEM | 4.594 | 100-YEAR | 647.07 | 646.98 | 0.09 | 0.07 | 0.00 | 27.43 | 1627.14 | 27.43 | 70.98 |
| MAINSTEM | 4.675 | 10-YEAR | 644.82 | 644.78 | 0.04 | 0.05 | 0.00 | 11.67 | 870.65 | 11.67 | 68.72 |
| MAINSTEM | 4.675 | 50-YEAR | 646.55 | 646.47 | 0.08 | 0.07 | 0.00 | 22.64 | 1413.71 | 22.64 | 70.41 |
| MAINSTEM | 4.675 | 100-YEAR | 647.15 | 647.06 | 0.09 | 0.08 | 0.00 | 27.55 | 1626.91 | 27.55 | 71.01 |
| MAINSTEM | 4.773 | 10-YEAR | 644.88 | 644.84 | 0.03 | 0.05 | 0.00 | 10.26 | 764.66 | 9.07 | 68.37 |
| MAINSTEM | 4.773 | 50-YEAR | 646.62 | 646.57 | 0.06 | 0.07 | 0.00 | 19.17 | 1190.88 | 16.95 | 70.04 |
| MAINSTEM | 4.773 | 100-YEAR | 647.24 | 647.17 | 0.07 | 0.08 | 0.00 | 24.25 | 1423.32 | 21.43 | 70.63 |
| MAINSTEM | 4.790 | 10-YEAR | 644.93 | 644.81 | 0.12 | 0.01 | 0.04 | | 784.00 | | 68.35 |
| MAINSTEM | 4.790 | 50-YEAR | 646.71 | 646.51 | 0.20 | 0.02 | 0.07 | | 1227.00 | | 69.99 |
| MAINSTEM | 4.790 | 100-YEAR | 647.35 | 647.09 | 0.26 | 0.02 | 0.09 | | 1469.00 | | 70.56 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 645.42 | 645.28 | 0.15 | | | | 784.00 | | 65.50 |
| MAINSTEM | 5.059 | 50-YEAR | 647.81 | 647.60 | 0.21 | | | | 1227.00 | | 67.78 |
| MAINSTEM | 5.059 | 100-YEAR | 648.96 | 648.71 | 0.25 | | | | 1469.00 | | 68.88 |
| MAINSTEM | 5.076 | 10-YEAR | 645.46 | 645.41 | 0.05 | 0.03 | 0.01 | | 784.00 | | 65.48 |
| MAINSTEM | 5.076 | 50-YEAR | 647.85 | 647.79 | 0.07 | 0.03 | 0.01 | | 1227.00 | | 67.85 |
| MAINSTEM | 5.076 | 100-YEAR | 649.00 | 648.93 | 0.07 | 0.03 | 0.02 | | 1469.00 | | 68.98 |
| MAINSTEM | 5.104 | 10-YEAR | 645.51 | 645.41 | 0.10 | 0.03 | 0.02 | | 784.00 | | 65.32 |
| MAINSTEM | 5.104 | 50-YEAR | 647.90 | 647.76 | 0.14 | 0.03 | 0.02 | | 1227.00 | | 67.69 |
| MAINSTEM | 5.104 | 100-YEAR | 649.06 | 648.90 | 0.16 | 0.03 | 0.03 | | 1469.00 | | 68.83 |
| MAINSTEM | 5.109 | 10-YEAR | 645.54 | 645.37 | 0.17 | 0.01 | 0.02 | | 784.00 | | 65.24 |
| MAINSTEM | 5.109 | 50-YEAR | 647.94 | 647.71 | 0.24 | 0.01 | 0.03 | | 1227.00 | | 67.60 |
| MAINSTEM | 5.109 | 100-YEAR | 649.10 | 648.83 | 0.27 | 0.01 | 0.03 | | 1469.00 | | 68.73 |
| MAINSTEM | 5.110 | 10-YEAR | 645.56 | 645.33 | 0.23 | 0.00 | 0.02 | | 784.00 | | 44.59 |
| MAINSTEM | 5.110 | 50-YEAR | 647.98 | 647.64 | 0.34 | 0.00 | 0.03 | | 1227.00 | | 50.16 |
| MAINSTEM | 5.110 | 100-YEAR | 649.14 | 648.75 | 0.40 | 0.00 | 0.04 | | 1469.00 | | 52.83 |
| MAINSTEM | 5.116 | 10-YEAR | 645.57 | 645.33 | 0.24 | 0.01 | 0.00 | | 784.00 | | 25.00 |
| MAINSTEM | 5.116 | 50-YEAR | 647.99 | 647.64 | 0.35 | 0.01 | 0.01 | 0.02 | 1226.96 | 0.02 | 26.44 |
| MAINSTEM | 5.116 | 100-YEAR | 649.16 | 648.75 | 0.41 | 0.01 | 0.01 | 0.25 | 1468.50 | 0.25 | 31.23 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 646.33 | 646.04 | 0.29 | | | | 634.00 | | 25.50 |
| MAINSTEM | 5.606 | 50-YEAR | 649.94 | 649.63 | 0.30 | | | | 1056.00 | | 57.44 |
| MAINSTEM | 5.606 | 100-YEAR | 651.85 | 651.57 | 0.28 | | | | 1227.00 | | 80.97 |
| MAINSTEM | 5.610 | 10-YEAR | 646.36 | 646.34 | 0.02 | 0.00 | 0.03 | | 634.00 | | 125.36 |
| MAINSTEM | 5.610 | 50-YEAR | 649.97 | 649.95 | 0.02 | 0.00 | 0.03 | | 1056.00 | | 145.88 |
| MAINSTEM | 5.610 | 100-YEAR | 651.88 | 651.86 | 0.02 | 0.00 | 0.03 | | 1227.00 | | 156.76 |
| MAINSTEM | 5.629 | 10-YEAR | 646.36 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 215.49 |
| MAINSTEM | 5.629 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 237.14 |
| MAINSTEM | 5.629 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 248.61 |
| MAINSTEM | 5.632 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 411.47 |
| MAINSTEM | 5.632 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 433.12 |
| MAINSTEM | 5.632 | 100-YEAR | 651.88 | 651.88 | 0.00 | 0.00 | 0.00 | | 1227.00 | | 444.58 |
| MAINSTEM | 5.639 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 737.22 |
| MAINSTEM | 5.639 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 758.86 |
| MAINSTEM | 5.639 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 770.33 |
| MAINSTEM | 5.697 | 10-YEAR | 646.41 | 646.37 | 0.04 | 0.03 | 0.01 | | 634.00 | | 311.74 |
| MAINSTEM | 5.697 | 50-YEAR | 649.99 | 649.96 | 0.03 | 0.01 | 0.01 | | 1056.00 | | 333.27 |
| MAINSTEM | 5.697 | 100-YEAR | 651.90 | 651.87 | 0.02 | 0.01 | 0.01 | | 1227.00 | | 344.73 |
| MAINSTEM | 5.720 | 10-YEAR | 646.51 | 646.35 | 0.16 | 0.06 | 0.04 | | 634.00 | | 161.07 |
| MAINSTEM | 5.720 | 50-YEAR | 650.05 | 649.91 | 0.14 | 0.02 | 0.03 | | 1056.00 | | 188.74 |
| MAINSTEM | 5.720 | 100-YEAR | 651.94 | 651.82 | 0.12 | 0.01 | 0.03 | | 1227.00 | | 203.61 |

HEC-RAS Plan: Nat - CP&UPRR (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 5.725 | 10-YEAR | 646.59 | 646.28 | 0.31 | 0.03 | 0.04 | | 634.00 | | 93.92 |
| MAINSTEM | 5.725 | 50-YEAR | 650.10 | 649.82 | 0.28 | 0.01 | 0.04 | | 1056.00 | | 126.73 |
| MAINSTEM | 5.725 | 100-YEAR | 651.99 | 651.74 | 0.25 | 0.01 | 0.04 | | 1227.00 | | 144.48 |
| MAINSTEM | 5.727 | 10-YEAR | 646.68 | 646.23 | 0.45 | 0.02 | 0.07 | | 634.00 | | 25.00 |
| MAINSTEM | 5.727 | 50-YEAR | 650.18 | 649.77 | 0.41 | 0.01 | 0.06 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.727 | 100-YEAR | 652.05 | 651.69 | 0.36 | 0.01 | 0.06 | | 1227.00 | | 27.98 |
| MAINSTEM | 5.732 | 10-YEAR | 646.81 | 646.38 | 0.44 | 0.13 | 0.00 | | 634.00 | | 25.00 |
| MAINSTEM | 5.732 | 50-YEAR | 650.24 | 649.84 | 0.41 | 0.07 | 0.00 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.732 | 100-YEAR | 652.10 | 651.74 | 0.36 | 0.05 | 0.00 | | 1227.00 | | 27.64 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 647.18 | 646.81 | 0.37 | | | | 634.00 | | 26.00 |
| MAINSTEM | 5.757 | 50-YEAR | 650.55 | 650.18 | 0.37 | | | | 1056.00 | | 26.00 |
| MAINSTEM | 5.757 | 100-YEAR | 652.40 | 652.07 | 0.33 | | | | 1227.00 | | 26.00 |
| MAINSTEM | 5.759 | 10-YEAR | 647.22 | 647.20 | 0.03 | 0.01 | 0.03 | | 634.00 | | 100.00 |
| MAINSTEM | 5.759 | 50-YEAR | 650.59 | 650.56 | 0.03 | 0.01 | 0.03 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.759 | 100-YEAR | 652.43 | 652.41 | 0.03 | 0.00 | 0.03 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.810 | 10-YEAR | 647.29 | 647.24 | 0.06 | 0.06 | 0.01 | | 634.00 | | 100.00 |
| MAINSTEM | 5.810 | 50-YEAR | 650.62 | 650.58 | 0.04 | 0.03 | 0.00 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.810 | 100-YEAR | 652.45 | 652.42 | 0.03 | 0.02 | 0.00 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.860 | 10-YEAR | 648.57 | 647.64 | 0.93 | 0.42 | 0.26 | | 634.00 | | 100.00 |
| MAINSTEM | 5.860 | 50-YEAR | 650.83 | 650.43 | 0.40 | 0.10 | 0.11 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.860 | 100-YEAR | 652.58 | 652.31 | 0.28 | 0.06 | 0.07 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.862 | 10-YEAR | 649.70 | 648.45 | 1.26 | 0.73 | 0.16 | | 634.00 | | 28.35 |
| MAINSTEM | 5.862 | 50-YEAR | 651.40 | 650.19 | 1.20 | 0.17 | 0.40 | | 1056.00 | | 28.35 |
| MAINSTEM | 5.862 | 100-YEAR | 652.90 | 652.14 | 0.76 | 0.07 | 0.24 | | 1227.00 | | 28.35 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 651.96 | 651.60 | 0.37 | | | | 634.00 | | 33.00 |
| MAINSTEM | 6.037 | 50-YEAR | 653.74 | 653.22 | 0.52 | | | | 1056.00 | | 33.00 |
| MAINSTEM | 6.037 | 100-YEAR | 654.46 | 653.90 | 0.56 | | | | 1227.00 | | 33.00 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 652.40 | 652.15 | 0.25 | | | | 603.00 | | 34.00 |
| MAINSTEM | 6.190 | 50-YEAR | 654.26 | 653.91 | 0.35 | | | | 996.00 | | 34.00 |
| MAINSTEM | 6.190 | 100-YEAR | 655.00 | 654.62 | 0.38 | | | | 1156.00 | | 34.00 |
| MAINSTEM | 6.194 | 10-YEAR | 652.44 | 652.41 | 0.03 | 0.01 | 0.02 | | 603.00 | | 100.00 |
| MAINSTEM | 6.194 | 50-YEAR | 654.31 | 654.27 | 0.04 | 0.01 | 0.03 | | 996.00 | | 100.00 |
| MAINSTEM | 6.194 | 100-YEAR | 655.04 | 655.00 | 0.04 | 0.01 | 0.03 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.332 | 10-YEAR | 652.55 | 652.52 | 0.03 | 0.11 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.332 | 50-YEAR | 654.41 | 654.37 | 0.04 | 0.10 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.332 | 100-YEAR | 655.14 | 655.10 | 0.04 | 0.10 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.418 | 10-YEAR | 652.63 | 652.61 | 0.03 | 0.09 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.418 | 50-YEAR | 654.49 | 654.45 | 0.04 | 0.08 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.418 | 100-YEAR | 655.22 | 655.18 | 0.04 | 0.08 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.471 | 10-YEAR | 652.73 | 652.65 | 0.08 | 0.08 | 0.02 | | 603.00 | | 55.30 |
| MAINSTEM | 6.471 | 50-YEAR | 654.59 | 654.48 | 0.12 | 0.08 | 0.02 | | 996.00 | | 55.30 |
| MAINSTEM | 6.471 | 100-YEAR | 655.32 | 655.19 | 0.13 | 0.07 | 0.03 | | 1156.00 | | 55.30 |
| MAINSTEM | 6.473 | 10-YEAR | 652.79 | 652.61 | 0.18 | 0.01 | 0.05 | | 603.00 | | 40.00 |
| MAINSTEM | 6.473 | 50-YEAR | 654.67 | 654.42 | 0.25 | 0.01 | 0.07 | | 996.00 | | 40.00 |
| MAINSTEM | 6.473 | 100-YEAR | 655.40 | 655.13 | 0.27 | 0.01 | 0.07 | | 1156.00 | | 40.00 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | |
| MAINSTEM | 6.538 | 10-YEAR | 653.03 | 652.83 | 0.20 | | | | 603.00 | | 38.00 |
| MAINSTEM | 6.538 | 50-YEAR | 654.97 | 654.69 | 0.27 | | | | 996.00 | | 38.00 |
| MAINSTEM | 6.538 | 100-YEAR | 655.72 | 655.42 | 0.29 | | | | 1156.00 | | 38.00 |
| MAINSTEM | 6.540 | 10-YEAR | 653.05 | 653.04 | 0.01 | 0.00 | 0.02 | | 603.00 | | 191.09 |
| MAINSTEM | 6.540 | 50-YEAR | 654.99 | 654.98 | 0.02 | 0.00 | 0.03 | | 996.00 | | 220.15 |
| MAINSTEM | 6.540 | 100-YEAR | 655.75 | 655.73 | 0.02 | 0.00 | 0.03 | | 1156.00 | | 231.41 |

HEC-RAS Plan: Nal - CP&UPRR (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 6.59 | 10-YEAR | 653.07 | 653.06 | 0.01 | 0.02 | 0.00 | | 603.00 | | 196.42 |
| MAINSTEM | 6.59 | 50-YEAR | 655.03 | 655.01 | 0.01 | 0.03 | 0.00 | 0.00 | 996.00 | | 1008.18 |
| MAINSTEM | 6.59 | 100-YEAR | 655.77 | 655.76 | 0.01 | 0.02 | 0.00 | 1.69 | 1154.31 | | 1050.50 |
| | | | | | | | | | | | |
| MAINSTEM | 6.6 | 10-YEAR | 653.08 | 653.07 | 0.01 | 0.01 | 0.00 | | 603.00 | | 200.44 |
| MAINSTEM | 6.6 | 50-YEAR | 655.04 | 655.02 | 0.01 | 0.01 | 0.00 | | 996.00 | | 235.53 |
| MAINSTEM | 6.6 | 100-YEAR | 655.78 | 655.76 | 0.01 | 0.01 | 0.00 | | 1156.00 | | 248.78 |
| | | | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 653.12 | 653.11 | 0.02 | 0.04 | 0.00 | 1.47 | 601.46 | 0.07 | 605.80 |
| MAINSTEM | 6.635 | 50-YEAR | 655.05 | 655.05 | 0.00 | 0.01 | 0.00 | 13.35 | 981.65 | 1.00 | 1229.49 |
| MAINSTEM | 6.635 | 100-YEAR | 655.78 | 655.78 | 0.00 | 0.01 | 0.00 | 18.05 | 1136.49 | 1.47 | 1234.68 |
| | | | | | | | | | | | |
| MAINSTEM | 6.637 | 10-YEAR | 653.12 | 653.11 | 0.02 | 0.00 | 0.00 | 1.49 | 601.45 | 0.07 | 608.83 |
| MAINSTEM | 6.637 | 50-YEAR | 655.05 | 655.05 | 0.00 | 0.00 | 0.00 | 13.35 | 981.65 | 1.00 | 1229.49 |
| MAINSTEM | 6.637 | 100-YEAR | 655.78 | 655.78 | 0.00 | 0.00 | 0.00 | 18.05 | 1136.49 | 1.47 | 1234.68 |
| | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 654.07 | 653.07 | 1.00 | 0.02 | 0.49 | | 603.00 | | 37.54 |
| MAINSTEM | 6.639 | 50-YEAR | 655.43 | 654.67 | 0.76 | 0.00 | 0.38 | | 996.00 | | 46.93 |
| MAINSTEM | 6.639 | 100-YEAR | 656.10 | 655.47 | 0.63 | 0.00 | 0.31 | | 1156.00 | | 51.64 |
| | | | | | | | | | | | |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 655.03 | 654.58 | 0.45 | 0.01 | 0.00 | | 603.00 | | 47.64 |
| MAINSTEM | 6.642 | 50-YEAR | 656.19 | 655.64 | 0.55 | 0.01 | 0.00 | | 996.00 | | 57.98 |
| MAINSTEM | 6.642 | 100-YEAR | 656.67 | 656.15 | 0.53 | 0.01 | 0.00 | | 1156.00 | | 63.05 |
| | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 655.14 | 654.75 | 0.39 | 0.09 | 0.02 | | 603.00 | | 49.22 |
| MAINSTEM | 6.643 | 50-YEAR | 656.30 | 655.81 | 0.49 | 0.09 | 0.02 | | 996.00 | | 59.63 |
| MAINSTEM | 6.643 | 100-YEAR | 656.77 | 656.28 | 0.48 | 0.08 | 0.01 | | 1156.00 | | 64.40 |
| | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 655.39 | 655.39 | 0.00 | 0.01 | 0.23 | 0.30 | 573.68 | 29.01 | 1612.80 |
| MAINSTEM | 6.644 | 50-YEAR | 656.59 | 656.59 | 0.00 | 0.01 | 0.29 | 9.45 | 897.44 | 89.11 | 1793.95 |
| MAINSTEM | 6.644 | 100-YEAR | 657.06 | 657.06 | 0.00 | 0.00 | 0.29 | 17.01 | 1023.06 | 115.93 | 1863.93 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.645 | 10-YEAR | 655.73 | 655.18 | 0.55 | 0.05 | 0.16 | 94.68 | 205.34 | 13.98 | 54.47 |
| SOUTH TRIB | 6.645 | 50-YEAR | 656.69 | 656.43 | 0.26 | 0.02 | 0.08 | 234.67 | 244.23 | 27.10 | 67.10 |
| SOUTH TRIB | 6.645 | 100-YEAR | 657.14 | 656.93 | 0.21 | 0.02 | 0.06 | 282.56 | 254.81 | 32.63 | 72.14 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.664 | 10-YEAR | 656.48 | 656.28 | 0.21 | 0.72 | 0.03 | 105.64 | 190.31 | 18.04 | 49.31 |
| SOUTH TRIB | 6.664 | 50-YEAR | 657.18 | 656.88 | 0.30 | 0.48 | 0.01 | 191.15 | 282.63 | 32.22 | 54.43 |
| SOUTH TRIB | 6.664 | 100-YEAR | 657.52 | 657.24 | 0.29 | 0.36 | 0.02 | 226.47 | 305.26 | 38.27 | 57.47 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.683 | 10-YEAR | 656.90 | 656.63 | 0.26 | 0.40 | 0.02 | 64.85 | 223.48 | 25.67 | 37.11 |
| SOUTH TRIB | 6.683 | 50-YEAR | 657.70 | 657.29 | 0.41 | 0.49 | 0.03 | 118.79 | 340.18 | 47.03 | 41.61 |
| SOUTH TRIB | 6.683 | 100-YEAR | 658.00 | 657.58 | 0.42 | 0.44 | 0.04 | 140.29 | 374.18 | 55.54 | 43.57 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.721 | 10-YEAR | 657.60 | 657.36 | 0.24 | 0.70 | 0.00 | 43.87 | 238.18 | 31.94 | 36.35 |
| SOUTH TRIB | 6.721 | 50-YEAR | 658.55 | 658.20 | 0.35 | 0.84 | 0.01 | 85.48 | 361.04 | 59.49 | 46.74 |
| SOUTH TRIB | 6.721 | 100-YEAR | 658.83 | 658.46 | 0.37 | 0.82 | 0.01 | 103.63 | 397.13 | 69.24 | 49.99 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.759 | 10-YEAR | 658.12 | 657.94 | 0.19 | 0.51 | 0.01 | 51.87 | 227.34 | 34.79 | 36.08 |
| SOUTH TRIB | 6.759 | 50-YEAR | 659.14 | 658.87 | 0.27 | 0.58 | 0.01 | 97.11 | 343.76 | 65.13 | 41.11 |
| SOUTH TRIB | 6.759 | 100-YEAR | 659.43 | 659.14 | 0.29 | 0.59 | 0.01 | 113.41 | 380.53 | 76.06 | 42.54 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.797 | 10-YEAR | 658.55 | 658.41 | 0.14 | 0.43 | 0.00 | | 314.00 | | 36.40 |
| SOUTH TRIB | 6.797 | 50-YEAR | 659.61 | 659.43 | 0.19 | 0.47 | 0.01 | | 506.00 | | 41.67 |
| SOUTH TRIB | 6.797 | 100-YEAR | 659.92 | 659.71 | 0.20 | 0.48 | 0.01 | | 570.00 | | 43.16 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.834 | 10-YEAR | 658.90 | 658.77 | 0.13 | 0.34 | 0.00 | 46.08 | 204.14 | 63.78 | 44.24 |
| SOUTH TRIB | 6.834 | 50-YEAR | 659.98 | 659.81 | 0.17 | 0.37 | 0.00 | 85.37 | 302.47 | 118.16 | 51.56 |
| SOUTH TRIB | 6.834 | 100-YEAR | 660.29 | 660.11 | 0.18 | 0.37 | 0.00 | 99.36 | 333.13 | 137.51 | 53.64 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.872 | 10-YEAR | 659.25 | 659.07 | 0.18 | 0.33 | 0.03 | 43.40 | 235.44 | 35.16 | 33.76 |
| SOUTH TRIB | 6.872 | 50-YEAR | 660.38 | 660.12 | 0.25 | 0.35 | 0.04 | 82.34 | 356.95 | 66.71 | 38.47 |
| SOUTH TRIB | 6.872 | 100-YEAR | 660.70 | 660.42 | 0.28 | 0.36 | 0.05 | 96.40 | 395.50 | 78.10 | 39.80 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.879 Miller Fluids En | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 659.27 | 659.09 | 0.18 | | | 43.56 | 235.16 | 35.29 | 33.85 |
| SOUTH TRIB | 6.886 | 50-YEAR | 660.42 | 660.17 | 0.25 | | | 82.84 | 356.05 | 67.11 | 38.67 |
| SOUTH TRIB | 6.886 | 100-YEAR | 660.74 | 660.47 | 0.27 | | | 97.02 | 394.39 | 78.59 | 40.03 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.904 | 10-YEAR | 659.50 | 659.29 | 0.21 | 0.21 | 0.02 | 39.28 | 242.79 | 31.93 | 33.85 |
| SOUTH TRIB | 6.904 | 50-YEAR | 660.65 | 660.37 | 0.28 | 0.22 | 0.02 | 78.09 | 366.59 | 61.31 | 44.57 |
| SOUTH TRIB | 6.904 | 100-YEAR | 660.98 | 660.68 | 0.30 | 0.22 | 0.02 | 94.99 | 403.46 | 71.55 | 47.60 |
| | | | | | | | | | | | |

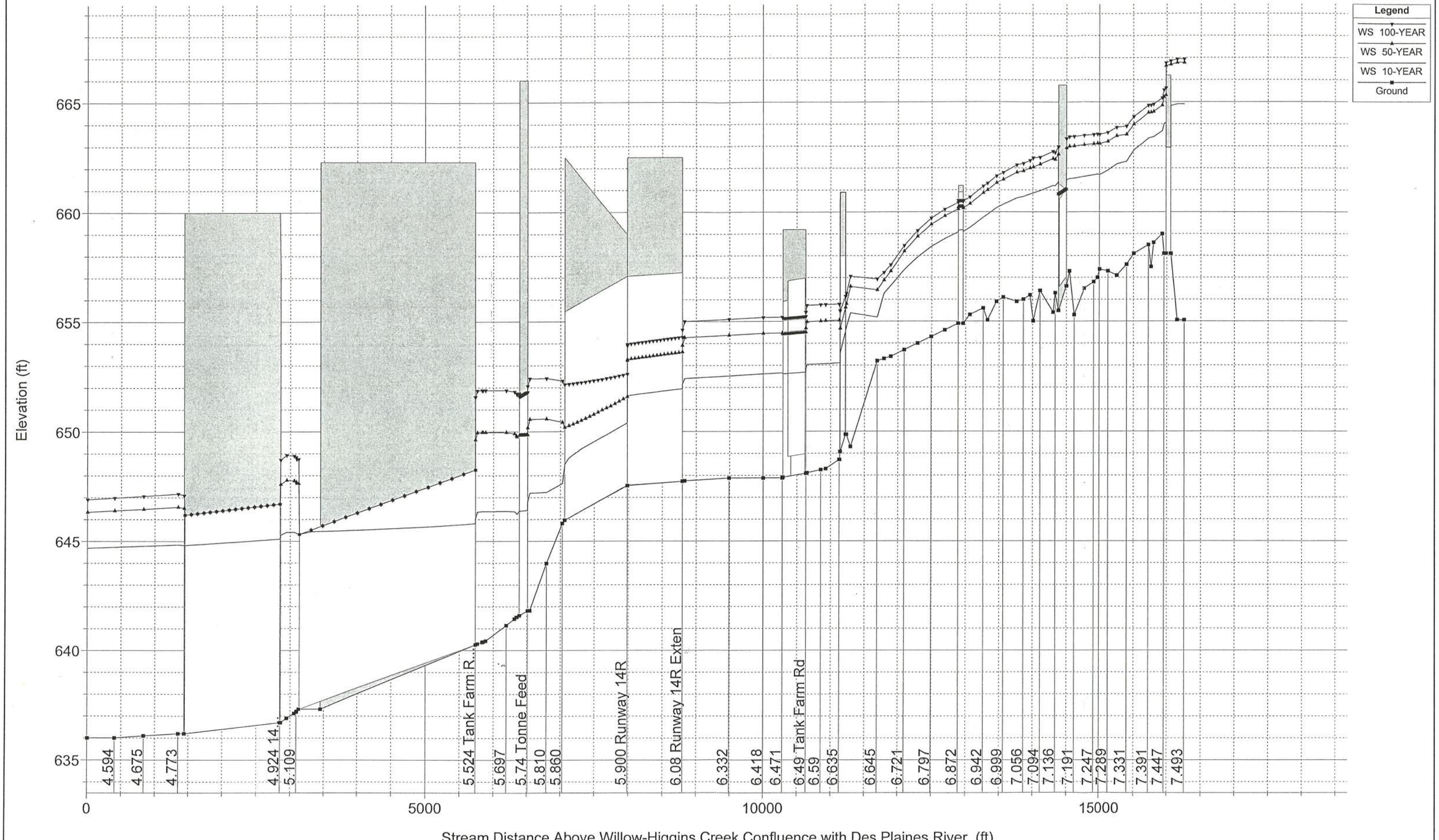
HEC-RAS Plan: Nat - CP&UPRR (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 6.942 | 10-YEAR | 659.93 | 659.75 | 0.17 | 0.43 | 0.00 | 47.22 | 232.29 | 34.49 | 36.28 |
| SOUTH TRIB | 6.942 | 50-YEAR | 661.10 | 660.86 | 0.23 | 0.44 | 0.01 | 90.24 | 349.93 | 65.83 | 46.52 |
| SOUTH TRIB | 6.942 | 100-YEAR | 661.42 | 661.17 | 0.25 | 0.44 | 0.01 | 107.85 | 385.41 | 76.74 | 49.36 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.956 | 10-YEAR | 660.07 | 659.89 | 0.19 | 0.14 | 0.00 | | 298.23 | 15.77 | 134.67 |
| SOUTH TRIB | 6.956 | 50-YEAR | 661.25 | 661.00 | 0.25 | 0.14 | 0.00 | | 468.63 | 37.37 | 277.51 |
| SOUTH TRIB | 6.956 | 100-YEAR | 661.57 | 661.30 | 0.27 | 0.15 | 0.01 | | 524.33 | 45.67 | 521.91 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.98 | 10-YEAR | 660.34 | 660.19 | 0.14 | 0.26 | 0.00 | 58.06 | 220.98 | 34.96 | 38.27 |
| SOUTH TRIB | 6.98 | 50-YEAR | 661.52 | 661.32 | 0.19 | 0.27 | 0.01 | 108.21 | 331.51 | 66.28 | 45.37 |
| SOUTH TRIB | 6.98 | 100-YEAR | 661.85 | 661.64 | 0.21 | 0.27 | 0.01 | 126.50 | 366.06 | 77.43 | 47.41 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.999 | 10-YEAR | 660.50 | 660.35 | 0.15 | 0.16 | 0.00 | 54.70 | 223.55 | 35.75 | 37.41 |
| SOUTH TRIB | 6.999 | 50-YEAR | 661.68 | 661.48 | 0.20 | 0.16 | 0.00 | 103.72 | 334.49 | 67.79 | 43.40 |
| SOUTH TRIB | 6.999 | 100-YEAR | 662.02 | 661.79 | 0.23 | 0.17 | 0.01 | 110.42 | 378.43 | 81.15 | 49.42 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.037 | 10-YEAR | 660.71 | 660.63 | 0.08 | 0.21 | 0.01 | 48.21 | 236.53 | 29.26 | 44.75 |
| SOUTH TRIB | 7.037 | 50-YEAR | 661.92 | 661.80 | 0.11 | 0.22 | 0.01 | 91.79 | 358.87 | 55.34 | 51.24 |
| SOUTH TRIB | 7.037 | 100-YEAR | 662.26 | 662.14 | 0.12 | 0.23 | 0.01 | 107.79 | 397.41 | 64.80 | 53.12 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.056 | 10-YEAR | 660.81 | 660.70 | 0.12 | 0.09 | 0.01 | 43.86 | 217.14 | 53.00 | 39.70 |
| SOUTH TRIB | 7.056 | 50-YEAR | 662.03 | 661.87 | 0.16 | 0.10 | 0.01 | 75.49 | 329.96 | 100.55 | 50.68 |
| SOUTH TRIB | 7.056 | 100-YEAR | 662.38 | 662.20 | 0.17 | 0.10 | 0.02 | 88.91 | 363.82 | 117.27 | 54.35 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.075 | 10-YEAR | 660.92 | 660.82 | 0.11 | 0.11 | 0.00 | 58.87 | 208.35 | 46.78 | 42.79 |
| SOUTH TRIB | 7.075 | 50-YEAR | 662.15 | 662.00 | 0.15 | 0.12 | 0.00 | 103.94 | 313.57 | 88.49 | 53.44 |
| SOUTH TRIB | 7.075 | 100-YEAR | 662.50 | 662.34 | 0.16 | 0.12 | 0.00 | 120.90 | 345.79 | 103.32 | 57.19 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.084 | 10-YEAR | 660.98 | 660.86 | 0.12 | 0.05 | 0.00 | 23.83 | 260.97 | 29.20 | 40.39 |
| SOUTH TRIB | 7.084 | 50-YEAR | 662.21 | 662.04 | 0.18 | 0.06 | 0.01 | 30.98 | 406.08 | 68.94 | 206.64 |
| SOUTH TRIB | 7.084 | 100-YEAR | 662.55 | 662.46 | 0.09 | 0.04 | 0.01 | 155.72 | 347.77 | 66.51 | 215.95 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.094 | 10-YEAR | 661.09 | 660.97 | 0.13 | 0.11 | 0.00 | 55.54 | 219.82 | 38.64 | 38.76 |
| SOUTH TRIB | 7.094 | 50-YEAR | 662.34 | 662.17 | 0.17 | 0.12 | 0.00 | 104.82 | 328.27 | 72.91 | 45.02 |
| SOUTH TRIB | 7.094 | 100-YEAR | 662.67 | 662.49 | 0.18 | 0.09 | 0.03 | 122.20 | 362.80 | 85.00 | 46.67 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.132 | 10-YEAR | 661.29 | 661.21 | 0.09 | 0.20 | 0.00 | 62.21 | 202.32 | 49.47 | 253.53 |
| SOUTH TRIB | 7.132 | 50-YEAR | 662.54 | 662.43 | 0.11 | 0.20 | 0.01 | 118.90 | 289.36 | 97.74 | 881.84 |
| SOUTH TRIB | 7.132 | 100-YEAR | 662.88 | 662.76 | 0.12 | 0.20 | 0.01 | 138.48 | 316.78 | 114.74 | 913.20 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.136 | 10-YEAR | 661.36 | 661.19 | 0.16 | 0.04 | 0.02 | 2.07 | 311.08 | 0.85 | 29.77 |
| SOUTH TRIB | 7.136 | 50-YEAR | 662.62 | 662.39 | 0.23 | 0.04 | 0.04 | 13.31 | 487.24 | 5.45 | 35.56 |
| SOUTH TRIB | 7.136 | 100-YEAR | 662.96 | 662.71 | 0.25 | 0.04 | 0.04 | 18.74 | 543.58 | 7.68 | 37.09 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.145 | 10-YEAR | 661.43 | 661.38 | 0.05 | 0.03 | 0.04 | | 287.00 | | 54.90 |
| SOUTH TRIB | 7.145 | 50-YEAR | 662.71 | 662.63 | 0.07 | 0.04 | 0.05 | | 461.00 | | 62.02 |
| SOUTH TRIB | 7.145 | 100-YEAR | 663.05 | 662.97 | 0.08 | 0.04 | 0.05 | | 517.00 | | 63.80 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.156 Thorndale Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.168 | 10-YEAR | 661.52 | 661.46 | 0.06 | | | | 287.00 | | 71.71 |
| SOUTH TRIB | 7.168 | 50-YEAR | 663.00 | 662.92 | 0.08 | | | | 461.00 | | 113.37 |
| SOUTH TRIB | 7.168 | 100-YEAR | 663.43 | 663.34 | 0.09 | | | | 517.00 | | 124.86 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.181 | 10-YEAR | 661.54 | 661.52 | 0.02 | 0.02 | 0.00 | | 287.00 | | 84.54 |
| SOUTH TRIB | 7.181 | 50-YEAR | 663.02 | 662.99 | 0.02 | 0.01 | 0.01 | | 461.00 | | 92.60 |
| SOUTH TRIB | 7.181 | 100-YEAR | 663.45 | 663.42 | 0.03 | 0.01 | 0.01 | | 517.00 | | 94.95 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.191 | 10-YEAR | 661.57 | 661.54 | 0.03 | 0.03 | 0.00 | 90.53 | 185.85 | 10.62 | 95.25 |
| SOUTH TRIB | 7.191 | 50-YEAR | 663.04 | 663.01 | 0.03 | 0.02 | 0.00 | 199.86 | 238.52 | 22.61 | 104.36 |
| SOUTH TRIB | 7.191 | 100-YEAR | 663.47 | 663.44 | 0.03 | 0.02 | 0.00 | 235.05 | 254.88 | 27.06 | 107.03 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.22 | 10-YEAR | 661.64 | 661.62 | 0.03 | 0.07 | 0.00 | 196.02 | 90.98 | | 85.61 |
| SOUTH TRIB | 7.22 | 50-YEAR | 663.08 | 663.06 | 0.03 | 0.04 | 0.00 | 337.40 | 123.60 | | 92.64 |
| SOUTH TRIB | 7.22 | 100-YEAR | 663.51 | 663.48 | 0.03 | 0.04 | 0.00 | 382.67 | 134.33 | | 94.71 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.247 | 10-YEAR | 661.71 | 661.69 | 0.03 | 0.07 | 0.00 | 219.67 | 67.33 | | 84.37 |
| SOUTH TRIB | 7.247 | 50-YEAR | 663.13 | 663.10 | 0.03 | 0.05 | 0.00 | 368.01 | 92.99 | | 91.41 |
| SOUTH TRIB | 7.247 | 100-YEAR | 663.55 | 663.52 | 0.03 | 0.04 | 0.00 | 415.43 | 101.57 | | 93.50 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.259 | 10-YEAR | 661.74 | 661.72 | 0.03 | 0.03 | 0.00 | 223.65 | 63.35 | | 85.18 |
| SOUTH TRIB | 7.259 | 50-YEAR | 663.15 | 663.12 | 0.03 | 0.02 | 0.00 | 372.17 | 88.83 | | 91.92 |
| SOUTH TRIB | 7.259 | 100-YEAR | 663.57 | 663.54 | 0.03 | 0.02 | 0.00 | 419.68 | 97.32 | | 93.92 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.265 | 10-YEAR | 661.79 | 661.70 | 0.09 | 0.03 | 0.02 | 100.20 | 172.76 | 14.04 | 65.64 |
| SOUTH TRIB | 7.265 | 50-YEAR | 663.18 | 663.11 | 0.07 | 0.02 | 0.01 | 220.15 | 213.47 | 27.38 | 73.95 |

HEC-RAS Plan: Nat - CP&UPRR (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 7.265 | 100-YEAR | 663.60 | 663.53 | 0.07 | 0.01 | 0.01 | 258.41 | 226.34 | 32.25 | 76.42 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.289 | 10-YEAR | 662.04 | 661.90 | 0.14 | 0.24 | 0.01 | 127.02 | 159.98 | | 38.41 |
| SOUTH TRIB | 7.289 | 50-YEAR | 663.35 | 663.21 | 0.15 | 0.15 | 0.02 | 232.02 | 228.98 | | 47.38 |
| SOUTH TRIB | 7.289 | 100-YEAR | 663.75 | 663.61 | 0.14 | 0.14 | 0.02 | 267.87 | 249.14 | | 50.13 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.314 | 10-YEAR | 662.26 | 662.19 | 0.07 | 0.21 | 0.01 | 164.96 | 122.04 | | 49.50 |
| SOUTH TRIB | 7.314 | 50-YEAR | 663.54 | 663.46 | 0.08 | 0.18 | 0.01 | 285.13 | 175.87 | | 58.93 |
| SOUTH TRIB | 7.314 | 100-YEAR | 663.92 | 663.84 | 0.08 | 0.16 | 0.01 | 325.06 | 191.94 | | 61.80 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.331 | 10-YEAR | 662.60 | 662.31 | 0.29 | 0.28 | 0.07 | 113.88 | 173.12 | | 27.32 |
| SOUTH TRIB | 7.331 | 50-YEAR | 663.84 | 663.53 | 0.31 | 0.23 | 0.07 | 199.40 | 261.60 | | 33.98 |
| SOUTH TRIB | 7.331 | 100-YEAR | 664.21 | 663.90 | 0.31 | 0.22 | 0.07 | 228.09 | 288.91 | | 36.02 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.35 | 10-YEAR | 663.00 | 662.83 | 0.17 | 0.39 | 0.01 | 100.71 | 186.29 | | 31.40 |
| SOUTH TRIB | 7.35 | 50-YEAR | 664.20 | 663.99 | 0.21 | 0.35 | 0.01 | 182.91 | 278.09 | | 37.43 |
| SOUTH TRIB | 7.35 | 100-YEAR | 664.55 | 664.34 | 0.22 | 0.34 | 0.01 | 211.22 | 305.78 | | 39.24 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.391 | 10-YEAR | 663.49 | 663.35 | 0.14 | 0.49 | 0.00 | 96.40 | 190.60 | | 31.96 |
| SOUTH TRIB | 7.391 | 50-YEAR | 664.70 | 664.51 | 0.19 | 0.49 | 0.00 | 174.14 | 286.86 | | 37.52 |
| SOUTH TRIB | 7.391 | 100-YEAR | 665.04 | 664.85 | 0.19 | 0.48 | 0.00 | 200.59 | 315.88 | 0.53 | 52.12 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.399 | 10-YEAR | 663.57 | 663.39 | 0.17 | 0.06 | 0.01 | 27.84 | 232.43 | 26.73 | 24.85 |
| SOUTH TRIB | 7.399 | 50-YEAR | 664.79 | 664.53 | 0.27 | 0.07 | 0.02 | 53.48 | 355.88 | 51.64 | 522.67 |
| SOUTH TRIB | 7.399 | 100-YEAR | 665.15 | 664.85 | 0.29 | 0.08 | 0.03 | 62.63 | 393.82 | 60.56 | 643.74 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.406 | 10-YEAR | 663.64 | 663.42 | 0.23 | 0.06 | 0.02 | 43.37 | 207.00 | 36.63 | 25.25 |
| SOUTH TRIB | 7.406 | 50-YEAR | 664.88 | 664.56 | 0.32 | 0.07 | 0.02 | 81.08 | 311.68 | 68.24 | 28.77 |
| SOUTH TRIB | 7.406 | 100-YEAR | 665.24 | 664.89 | 0.35 | 0.08 | 0.02 | 95.11 | 342.71 | 79.18 | 29.25 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 664.05 | 663.68 | 0.37 | 0.37 | 0.04 | 56.75 | 195.73 | 34.52 | 23.95 |
| SOUTH TRIB | 7.431 | 50-YEAR | 665.31 | 664.85 | 0.46 | 0.38 | 0.04 | 104.83 | 285.65 | 70.51 | 28.77 |
| SOUTH TRIB | 7.431 | 100-YEAR | 665.66 | 665.18 | 0.48 | 0.38 | 0.04 | 121.13 | 311.47 | 84.40 | 29.76 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 664.13 | 664.01 | 0.12 | 0.05 | 0.03 | 130.01 | 130.62 | 26.37 | 31.56 |
| SOUTH TRIB | 7.447 | 50-YEAR | 665.39 | 665.23 | 0.16 | 0.05 | 0.03 | 207.10 | 198.28 | 55.62 | 36.07 |
| SOUTH TRIB | 7.447 | 100-YEAR | 665.75 | 665.54 | 0.21 | 0.06 | 0.03 | 245.53 | 232.08 | 39.39 | 62.16 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 664.17 | 664.07 | 0.09 | 0.03 | 0.01 | 122.22 | 114.22 | 24.56 | 31.79 |
| SOUTH TRIB | 7.456 | 50-YEAR | 665.44 | 665.31 | 0.13 | 0.03 | 0.01 | 188.52 | 179.91 | 49.57 | 37.04 |
| SOUTH TRIB | 7.456 | 100-YEAR | 665.80 | 665.64 | 0.16 | 0.04 | 0.01 | 222.82 | 209.78 | 35.40 | 72.42 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 664.89 | 664.83 | 0.07 | | | 122.93 | 110.49 | 27.58 | 34.58 |
| SOUTH TRIB | 7.47 | 50-YEAR | 666.77 | 666.70 | 0.07 | | | 128.32 | 188.54 | 101.13 | 299.57 |
| SOUTH TRIB | 7.47 | 100-YEAR | 666.92 | 666.85 | 0.07 | | | 147.41 | 195.61 | 124.98 | 334.88 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.01 | 58.52 | 112.68 | 89.80 | 208.30 |
| SOUTH TRIB | 7.486 | 50-YEAR | 666.77 | 666.77 | 0.00 | 0.00 | 0.01 | 104.32 | 150.39 | 163.29 | 208.30 |
| SOUTH TRIB | 7.486 | 100-YEAR | 666.93 | 666.93 | 0.00 | 0.00 | 0.01 | 117.49 | 166.37 | 184.15 | 208.30 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.00 | 232.98 | 24.22 | 3.80 | 1496.66 |
| SOUTH TRIB | 7.493 | 50-YEAR | 666.77 | 666.77 | 0.00 | 0.00 | 0.00 | 388.36 | 26.09 | 3.55 | 1585.92 |
| SOUTH TRIB | 7.493 | 100-YEAR | 666.93 | 666.93 | 0.00 | 0.00 | 0.00 | 435.59 | 28.48 | 3.93 | 1592.92 |

Natural Conditions - CP&UPRR




1 in Horiz. = 1300 ft  1 in Vert. = 4 ft

HEC-RAS Plan: Nat-York

| 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) | |
| MAINSTEM | 4.518 | 10-YEAR | 894.00 | 636.00 | 644.69 | | 644.73 | 0.000113 | 1.67 | 558.91 | 68.69 | 0.10 |
| MAINSTEM | 4.518 | 50-YEAR | 1459.00 | 636.00 | 646.33 | | 646.41 | 0.000168 | 2.28 | 673.17 | 70.33 | 0.13 |
| MAINSTEM | 4.518 | 100-YEAR | 1682.00 | 636.00 | 646.91 | | 647.00 | 0.000185 | 2.49 | 713.97 | 70.91 | 0.13 |
| MAINSTEM | 4.594 | 10-YEAR | 894.00 | 636.00 | 644.73 | | 644.77 | 0.000111 | 1.66 | 562.03 | 68.73 | 0.10 |
| MAINSTEM | 4.594 | 50-YEAR | 1459.00 | 636.00 | 646.40 | | 646.48 | 0.000164 | 2.27 | 677.92 | 70.40 | 0.12 |
| MAINSTEM | 4.594 | 100-YEAR | 1682.00 | 636.00 | 646.98 | | 647.07 | 0.000181 | 2.47 | 719.27 | 70.98 | 0.13 |
| MAINSTEM | 4.675 | 10-YEAR | 894.00 | 636.10 | 644.78 | | 644.82 | 0.000114 | 1.67 | 558.61 | 68.72 | 0.10 |
| MAINSTEM | 4.675 | 50-YEAR | 1459.00 | 636.10 | 646.47 | | 646.55 | 0.000166 | 2.27 | 676.07 | 70.41 | 0.12 |
| MAINSTEM | 4.675 | 100-YEAR | 1682.00 | 636.10 | 647.06 | | 647.15 | 0.000182 | 2.47 | 717.95 | 71.01 | 0.13 |
| MAINSTEM | 4.773 | 10-YEAR | 784.00 | 636.20 | 644.84 | | 644.88 | 0.000089 | 1.47 | 554.70 | 68.37 | 0.09 |
| MAINSTEM | 4.773 | 50-YEAR | 1227.00 | 636.20 | 646.57 | | 646.62 | 0.000118 | 1.91 | 673.98 | 70.04 | 0.10 |
| MAINSTEM | 4.773 | 100-YEAR | 1469.00 | 636.20 | 647.17 | | 647.24 | 0.000139 | 2.16 | 716.27 | 70.63 | 0.12 |
| MAINSTEM | 4.790 | 10-YEAR | 784.00 | 636.20 | 644.81 | 638.80 | 644.93 | 0.000312 | 2.76 | 284.23 | 68.35 | 0.17 |
| MAINSTEM | 4.790 | 50-YEAR | 1227.00 | 636.20 | 646.51 | 639.71 | 646.71 | 0.000420 | 3.61 | 340.24 | 69.99 | 0.20 |
| MAINSTEM | 4.790 | 100-YEAR | 1469.00 | 636.20 | 647.09 | 640.14 | 647.35 | 0.000501 | 4.09 | 359.50 | 70.56 | 0.22 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 784.00 | 636.70 | 645.28 | 640.14 | 645.42 | 0.000448 | 3.07 | 255.65 | 65.50 | 0.19 |
| MAINSTEM | 5.059 | 50-YEAR | 1227.00 | 636.70 | 647.60 | 641.04 | 647.81 | 0.000458 | 3.69 | 332.24 | 67.78 | 0.21 |
| MAINSTEM | 5.059 | 100-YEAR | 1469.00 | 636.70 | 648.71 | 641.47 | 648.96 | 0.000462 | 3.98 | 368.99 | 68.88 | 0.21 |
| MAINSTEM | 5.076 | 10-YEAR | 784.00 | 636.90 | 645.41 | | 645.46 | 0.000215 | 1.80 | 435.78 | 65.48 | 0.12 |
| MAINSTEM | 5.076 | 50-YEAR | 1227.00 | 636.90 | 647.79 | | 647.85 | 0.000206 | 2.07 | 594.14 | 67.85 | 0.12 |
| MAINSTEM | 5.076 | 100-YEAR | 1469.00 | 636.90 | 648.93 | | 649.00 | 0.000204 | 2.19 | 672.29 | 68.98 | 0.12 |
| MAINSTEM | 5.104 | 10-YEAR | 784.00 | 637.12 | 645.41 | | 645.51 | 0.000341 | 2.55 | 306.96 | 65.32 | 0.17 |
| MAINSTEM | 5.104 | 50-YEAR | 1227.00 | 637.12 | 647.76 | | 647.90 | 0.000326 | 3.01 | 407.15 | 67.69 | 0.17 |
| MAINSTEM | 5.104 | 100-YEAR | 1469.00 | 637.12 | 648.90 | | 649.06 | 0.000322 | 3.23 | 455.31 | 68.83 | 0.17 |
| MAINSTEM | 5.109 | 10-YEAR | 784.00 | 637.18 | 645.37 | 640.64 | 645.54 | 0.000547 | 3.28 | 239.21 | 65.24 | 0.21 |
| MAINSTEM | 5.109 | 50-YEAR | 1227.00 | 637.18 | 647.71 | 641.55 | 647.94 | 0.000535 | 3.89 | 315.15 | 67.60 | 0.22 |
| MAINSTEM | 5.109 | 100-YEAR | 1469.00 | 637.18 | 648.83 | 642.01 | 649.10 | 0.000532 | 4.18 | 351.63 | 68.73 | 0.22 |
| MAINSTEM | 5.110 | 10-YEAR | 784.00 | 637.22 | 645.33 | | 645.56 | 0.000656 | 3.84 | 204.41 | 44.59 | 0.24 |
| MAINSTEM | 5.110 | 50-YEAR | 1227.00 | 637.22 | 647.64 | | 647.98 | 0.000698 | 4.67 | 262.56 | 50.16 | 0.26 |
| MAINSTEM | 5.110 | 100-YEAR | 1469.00 | 637.22 | 648.75 | | 649.14 | 0.000714 | 5.06 | 290.45 | 52.83 | 0.26 |
| MAINSTEM | 5.116 | 10-YEAR | 784.00 | 637.31 | 645.33 | | 645.57 | 0.000120 | 3.91 | 200.61 | 25.00 | 0.24 |
| MAINSTEM | 5.116 | 50-YEAR | 1227.00 | 637.31 | 647.64 | | 647.99 | 0.000143 | 4.75 | 258.35 | 26.44 | 0.26 |
| MAINSTEM | 5.116 | 100-YEAR | 1469.00 | 637.31 | 648.75 | | 649.16 | 0.000146 | 5.14 | 286.24 | 31.23 | 0.27 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 634.00 | 640.26 | 646.04 | 642.93 | 646.33 | 0.000191 | 4.30 | 147.43 | 25.50 | 0.32 |
| MAINSTEM | 5.606 | 50-YEAR | 1056.00 | 640.26 | 649.63 | 644.01 | 649.94 | 0.000121 | 4.42 | 239.06 | 57.44 | 0.25 |
| MAINSTEM | 5.606 | 100-YEAR | 1227.00 | 640.26 | 651.57 | 644.41 | 651.85 | 0.000087 | 4.25 | 288.43 | 80.97 | 0.22 |
| MAINSTEM | 5.610 | 10-YEAR | 634.00 | 640.30 | 646.34 | | 646.36 | 0.000075 | 1.05 | 603.33 | 125.36 | 0.08 |
| MAINSTEM | 5.610 | 50-YEAR | 1056.00 | 640.30 | 649.95 | | 649.97 | 0.000043 | 1.09 | 970.26 | 145.88 | 0.06 |
| MAINSTEM | 5.610 | 100-YEAR | 1227.00 | 640.30 | 651.86 | | 651.88 | 0.000031 | 1.05 | 1164.78 | 156.76 | 0.05 |
| MAINSTEM | 5.629 | 10-YEAR | 634.00 | 640.37 | 646.36 | | 646.36 | 0.000064 | 0.74 | 854.27 | 215.49 | 0.07 |
| MAINSTEM | 5.629 | 50-YEAR | 1056.00 | 640.37 | 649.97 | | 649.97 | 0.000021 | 0.64 | 1646.96 | 237.14 | 0.04 |
| MAINSTEM | 5.629 | 100-YEAR | 1227.00 | 640.37 | 651.88 | | 651.88 | 0.000014 | 0.59 | 2082.70 | 248.61 | 0.03 |
| MAINSTEM | 5.632 | 10-YEAR | 634.00 | 640.39 | 646.36 | | 646.37 | 0.000056 | 0.70 | 912.18 | 411.47 | 0.06 |
| MAINSTEM | 5.632 | 50-YEAR | 1056.00 | 640.39 | 649.97 | | 649.97 | 0.000019 | 0.60 | 1754.71 | 433.12 | 0.04 |
| MAINSTEM | 5.632 | 100-YEAR | 1227.00 | 640.39 | 651.88 | | 651.88 | 0.000012 | 0.55 | 2216.91 | 444.58 | 0.03 |
| MAINSTEM | 5.639 | 10-YEAR | 634.00 | 640.43 | 646.36 | | 646.37 | 0.000060 | 0.72 | 878.97 | 737.22 | 0.06 |
| MAINSTEM | 5.639 | 50-YEAR | 1056.00 | 640.43 | 649.97 | | 649.97 | 0.000020 | 0.62 | 1695.03 | 758.86 | 0.04 |
| MAINSTEM | 5.639 | 100-YEAR | 1227.00 | 640.43 | 651.88 | | 651.88 | 0.000013 | 0.57 | 2143.32 | 770.33 | 0.03 |
| MAINSTEM | 5.697 | 10-YEAR | 634.00 | 641.14 | 646.37 | | 646.41 | 0.000289 | 1.55 | 408.83 | 311.74 | 0.14 |
| MAINSTEM | 5.697 | 50-YEAR | 1056.00 | 641.14 | 649.96 | | 649.99 | 0.000090 | 1.34 | 788.12 | 333.27 | 0.09 |
| MAINSTEM | 5.697 | 100-YEAR | 1227.00 | 641.14 | 651.87 | | 651.90 | 0.000057 | 1.24 | 989.95 | 344.73 | 0.07 |
| MAINSTEM | 5.720 | 10-YEAR | 634.00 | 641.44 | 646.35 | | 646.51 | 0.000999 | 3.20 | 197.97 | 161.07 | 0.26 |
| MAINSTEM | 5.720 | 50-YEAR | 1056.00 | 641.44 | 649.91 | | 650.05 | 0.000407 | 3.00 | 351.91 | 188.74 | 0.19 |
| MAINSTEM | 5.720 | 100-YEAR | 1227.00 | 641.44 | 651.82 | | 651.94 | 0.000272 | 2.82 | 434.63 | 203.61 | 0.16 |
| MAINSTEM | 5.725 | 10-YEAR | 634.00 | 641.52 | 646.28 | | 646.59 | 0.001791 | 4.45 | 142.63 | 93.92 | 0.36 |
| MAINSTEM | 5.725 | 50-YEAR | 1056.00 | 641.52 | 649.82 | | 650.10 | 0.000777 | 4.24 | 248.84 | 126.73 | 0.26 |
| MAINSTEM | 5.725 | 100-YEAR | 1227.00 | 641.52 | 651.74 | | 651.99 | 0.000525 | 4.01 | 306.31 | 144.48 | 0.22 |
| MAINSTEM | 5.727 | 10-YEAR | 634.00 | 641.52 | 646.23 | | 646.68 | 0.003344 | 5.38 | 117.80 | 25.00 | 0.44 |
| MAINSTEM | 5.727 | 50-YEAR | 1056.00 | 641.52 | 649.77 | | 650.18 | 0.001669 | 5.12 | 206.14 | 25.00 | 0.31 |
| MAINSTEM | 5.727 | 100-YEAR | 1227.00 | 641.52 | 651.69 | | 652.05 | 0.001202 | 4.83 | 254.12 | 27.98 | 0.27 |

HEC-RAS Plan: Nat-York (Continued)

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 5.732 | 10-YEAR | 634.00 | 641.59 | 646.38 | | 646.81 | 0.003878 | 5.29 | 119.74 | 25.00 | 0.43 |
| MAINSTEM | 5.732 | 50-YEAR | 1056.00 | 641.59 | 649.84 | | 650.24 | 0.002242 | 5.12 | 206.18 | 25.00 | 0.31 |
| MAINSTEM | 5.732 | 100-YEAR | 1227.00 | 641.59 | 651.74 | | 652.10 | 0.001699 | 4.84 | 253.74 | 27.64 | 0.27 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 634.00 | 641.81 | 646.81 | 644.45 | 647.18 | 0.003115 | 4.88 | 129.95 | 26.00 | 0.38 |
| MAINSTEM | 5.757 | 50-YEAR | 1056.00 | 641.81 | 650.18 | 645.52 | 650.55 | 0.001947 | 4.85 | 217.65 | 26.00 | 0.30 |
| MAINSTEM | 5.757 | 100-YEAR | 1227.00 | 641.81 | 652.07 | 645.91 | 652.40 | 0.001495 | 4.60 | 266.70 | 26.00 | 0.25 |
| MAINSTEM | 5.759 | 10-YEAR | 634.00 | 641.82 | 647.20 | | 647.22 | 0.000129 | 1.30 | 489.37 | 100.00 | 0.10 |
| MAINSTEM | 5.759 | 50-YEAR | 1056.00 | 641.82 | 650.56 | | 650.59 | 0.000071 | 1.33 | 795.30 | 100.00 | 0.08 |
| MAINSTEM | 5.759 | 100-YEAR | 1227.00 | 641.82 | 652.41 | | 652.43 | 0.000051 | 1.27 | 963.34 | 100.00 | 0.07 |
| MAINSTEM | 5.810 | 10-YEAR | 634.00 | 643.98 | 647.24 | | 647.29 | 0.000620 | 1.95 | 325.50 | 100.00 | 0.19 |
| MAINSTEM | 5.810 | 50-YEAR | 1056.00 | 643.98 | 650.58 | | 650.62 | 0.000177 | 1.60 | 659.72 | 100.00 | 0.11 |
| MAINSTEM | 5.810 | 100-YEAR | 1227.00 | 643.98 | 652.42 | | 652.45 | 0.000110 | 1.45 | 843.86 | 100.00 | 0.09 |
| MAINSTEM | 5.860 | 10-YEAR | 634.00 | 645.81 | 647.64 | 647.64 | 648.57 | 0.019302 | 7.73 | 82.06 | 100.00 | 1.01 |
| MAINSTEM | 5.860 | 50-YEAR | 1056.00 | 645.81 | 650.43 | | 650.83 | 0.002459 | 5.11 | 206.78 | 100.00 | 0.42 |
| MAINSTEM | 5.860 | 100-YEAR | 1227.00 | 645.81 | 652.31 | | 652.58 | 0.001062 | 4.21 | 291.10 | 100.00 | 0.29 |
| MAINSTEM | 5.862 | 10-YEAR | 634.00 | 645.96 | 648.45 | 648.45 | 649.70 | 0.021607 | 9.00 | 70.47 | 28.35 | 1.01 |
| MAINSTEM | 5.862 | 50-YEAR | 1056.00 | 645.96 | 650.19 | | 651.40 | 0.011607 | 8.80 | 120.02 | 28.35 | 0.75 |
| MAINSTEM | 5.862 | 100-YEAR | 1227.00 | 645.96 | 652.14 | | 652.90 | 0.005086 | 7.01 | 175.10 | 28.35 | 0.50 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 634.00 | 647.54 | 651.60 | 649.84 | 651.96 | 0.000320 | 4.85 | 130.71 | 33.00 | 0.42 |
| MAINSTEM | 6.037 | 50-YEAR | 1056.00 | 647.54 | 653.22 | 650.77 | 653.74 | 0.000320 | 5.77 | 183.00 | 33.00 | 0.43 |
| MAINSTEM | 6.037 | 100-YEAR | 1227.00 | 647.54 | 653.90 | 651.10 | 654.46 | 0.000310 | 5.99 | 204.81 | 33.00 | 0.42 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 603.00 | 647.73 | 652.15 | 649.86 | 652.40 | 0.002189 | 4.01 | 150.28 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 50-YEAR | 996.00 | 647.73 | 653.91 | 650.71 | 654.26 | 0.002167 | 4.74 | 210.25 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 100-YEAR | 1156.00 | 647.73 | 654.62 | 651.02 | 655.00 | 0.002121 | 4.94 | 234.15 | 34.00 | 0.33 |
| MAINSTEM | 6.194 | 10-YEAR | 603.00 | 647.75 | 652.41 | | 652.44 | 0.000159 | 1.31 | 461.22 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 50-YEAR | 996.00 | 647.75 | 654.27 | | 654.31 | 0.000142 | 1.54 | 645.30 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 100-YEAR | 1156.00 | 647.75 | 655.00 | | 655.04 | 0.000134 | 1.61 | 717.76 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 10-YEAR | 603.00 | 647.88 | 652.52 | | 652.55 | 0.000178 | 1.30 | 464.06 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 50-YEAR | 996.00 | 647.88 | 654.37 | | 654.41 | 0.000166 | 1.53 | 649.01 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 100-YEAR | 1156.00 | 647.88 | 655.10 | | 655.14 | 0.000160 | 1.60 | 721.72 | 100.00 | 0.11 |
| MAINSTEM | 6.418 | 10-YEAR | 603.00 | 647.88 | 652.61 | | 652.63 | 0.000167 | 1.27 | 472.97 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 50-YEAR | 996.00 | 647.88 | 654.45 | | 654.49 | 0.000159 | 1.52 | 657.40 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 100-YEAR | 1156.00 | 647.88 | 655.18 | | 655.22 | 0.000154 | 1.58 | 729.82 | 100.00 | 0.10 |
| MAINSTEM | 6.471 | 10-YEAR | 603.00 | 647.88 | 652.65 | | 652.73 | 0.000583 | 2.29 | 263.80 | 55.30 | 0.18 |
| MAINSTEM | 6.471 | 50-YEAR | 996.00 | 647.88 | 654.48 | | 654.59 | 0.000581 | 2.73 | 364.71 | 55.30 | 0.19 |
| MAINSTEM | 6.471 | 100-YEAR | 1156.00 | 647.88 | 655.19 | | 655.32 | 0.000571 | 2.86 | 404.33 | 55.30 | 0.19 |
| MAINSTEM | 6.473 | 10-YEAR | 603.00 | 647.91 | 652.61 | | 652.79 | 0.002320 | 3.43 | 175.73 | 40.00 | 0.29 |
| MAINSTEM | 6.473 | 50-YEAR | 996.00 | 647.91 | 654.42 | | 654.67 | 0.002456 | 4.01 | 248.07 | 40.00 | 0.28 |
| MAINSTEM | 6.473 | 100-YEAR | 1156.00 | 647.91 | 655.13 | | 655.40 | 0.002476 | 4.18 | 276.53 | 40.00 | 0.28 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 6.538 | 10-YEAR | 603.00 | 648.09 | 652.83 | 650.40 | 653.03 | 0.002651 | 3.61 | 167.21 | 38.00 | 0.30 |
| MAINSTEM | 6.538 | 50-YEAR | 996.00 | 648.09 | 654.69 | 651.19 | 654.97 | 0.002755 | 4.18 | 238.13 | 38.00 | 0.29 |
| MAINSTEM | 6.538 | 100-YEAR | 1156.00 | 648.09 | 655.42 | 651.48 | 655.72 | 0.002771 | 4.35 | 265.81 | 38.00 | 0.29 |
| MAINSTEM | 6.540 | 10-YEAR | 603.00 | 648.11 | 653.04 | | 653.05 | 0.000088 | 0.92 | 652.36 | 191.09 | 0.08 |
| MAINSTEM | 6.540 | 50-YEAR | 996.00 | 648.11 | 654.98 | | 654.99 | 0.000074 | 1.07 | 933.29 | 220.15 | 0.07 |
| MAINSTEM | 6.540 | 100-YEAR | 1156.00 | 648.11 | 655.73 | | 655.75 | 0.000069 | 1.11 | 1042.18 | 231.41 | 0.07 |
| MAINSTEM | 6.59 | 10-YEAR | 603.00 | 648.25 | 653.06 | | 653.07 | 0.000095 | 0.84 | 715.15 | 196.42 | 0.08 |
| MAINSTEM | 6.59 | 50-YEAR | 996.00 | 648.25 | 655.01 | | 655.03 | 0.000470 | 0.87 | 1143.06 | 1008.18 | 0.14 |
| MAINSTEM | 6.59 | 100-YEAR | 1156.00 | 648.25 | 655.76 | | 655.77 | 0.000119 | 0.61 | 1911.55 | 1050.50 | 0.08 |
| MAINSTEM | 6.6 | 10-YEAR | 603.00 | 648.30 | 653.03 | | 653.14 | 0.000703 | 2.66 | 226.57 | 199.69 | 0.22 |
| MAINSTEM | 6.6 | 50-YEAR | 996.00 | 648.30 | 654.99 | | 655.13 | 0.000567 | 3.05 | 326.52 | 234.83 | 0.21 |
| MAINSTEM | 6.6 | 100-YEAR | 1156.00 | 648.30 | 655.70 | | 655.86 | 0.000537 | 3.18 | 362.99 | 247.66 | 0.21 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 603.00 | 648.71 | 652.11 | 652.11 | 653.45 | 0.017173 | 9.29 | 64.88 | 219.18 | 1.00 |
| MAINSTEM | 6.635 | 50-YEAR | 996.00 | 648.71 | 654.41 | 653.18 | 655.48 | 0.006038 | 8.30 | 119.97 | 1224.97 | 0.65 |
| MAINSTEM | 6.635 | 100-YEAR | 1156.00 | 648.71 | 655.13 | 653.58 | 656.23 | 0.005190 | 8.42 | 137.28 | 1230.05 | 0.62 |

HEC-RAS Plan: Nat-York (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) | |
| MAINSTEM | 6.637 | 10-YEAR | 603.00 | 648.71 | 653.85 | | 653.85 | 0.000147 | 0.47 | 1289.28 | 1208.75 | 0.08 |
| MAINSTEM | 6.637 | 50-YEAR | 996.00 | 648.71 | 655.80 | | 655.80 | 0.000013 | 0.28 | 3673.81 | 1234.77 | 0.03 |
| MAINSTEM | 6.637 | 100-YEAR | 1156.00 | 648.71 | 656.56 | | 656.56 | 0.000008 | 0.26 | 4616.02 | 1240.13 | 0.02 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 603.00 | 649.07 | 653.53 | | 654.18 | 0.012819 | 6.49 | 92.90 | 40.25 | 0.75 |
| MAINSTEM | 6.639 | 50-YEAR | 996.00 | 649.07 | 655.58 | | 656.02 | 0.005078 | 5.31 | 187.61 | 52.26 | 0.49 |
| MAINSTEM | 6.639 | 100-YEAR | 1156.00 | 649.07 | 656.36 | | 656.75 | 0.003926 | 5.02 | 230.40 | 56.86 | 0.44 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 603.00 | 649.86 | 654.59 | | 655.04 | 0.007833 | 5.37 | 112.33 | 47.75 | 0.62 |
| MAINSTEM | 6.642 | 50-YEAR | 996.00 | 649.86 | 656.01 | | 656.44 | 0.005330 | 5.25 | 189.78 | 61.66 | 0.53 |
| MAINSTEM | 6.642 | 100-YEAR | 1156.00 | 649.86 | 656.70 | | 657.08 | 0.004082 | 4.92 | 235.09 | 68.65 | 0.47 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 603.00 | 649.86 | 654.76 | | 655.15 | 0.006483 | 5.00 | 120.53 | 49.30 | 0.56 |
| MAINSTEM | 6.643 | 50-YEAR | 996.00 | 649.86 | 656.11 | | 656.51 | 0.004889 | 5.08 | 196.10 | 62.68 | 0.51 |
| MAINSTEM | 6.643 | 100-YEAR | 1156.00 | 649.86 | 656.77 | | 657.13 | 0.003871 | 4.82 | 239.86 | 69.35 | 0.46 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 603.00 | 649.30 | 655.39 | | 655.39 | 0.000052 | 0.22 | 2799.41 | 1613.38 | 0.03 |
| MAINSTEM | 6.644 | 50-YEAR | 996.00 | 649.30 | 656.75 | | 656.76 | 0.000022 | 0.21 | 5141.73 | 1818.16 | 0.02 |
| MAINSTEM | 6.644 | 100-YEAR | 1156.00 | 649.30 | 657.35 | | 657.35 | 0.000016 | 0.20 | 6255.97 | 1907.87 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.645 | 10-YEAR | 314.00 | 653.20 | 655.18 | 655.18 | 655.73 | 0.017507 | 6.90 | 61.86 | 54.47 | 0.86 |
| SOUTH TRIB | 6.645 | 50-YEAR | 506.00 | 653.20 | 656.62 | | 656.84 | 0.003786 | 4.61 | 150.63 | 69.00 | 0.44 |
| SOUTH TRIB | 6.645 | 100-YEAR | 570.00 | 653.20 | 657.26 | | 657.41 | 0.002283 | 4.01 | 196.34 | 75.35 | 0.35 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.664 | 10-YEAR | 314.00 | 653.30 | 656.28 | 655.36 | 656.48 | 0.003892 | 4.26 | 96.40 | 49.31 | 0.44 |
| SOUTH TRIB | 6.664 | 50-YEAR | 506.00 | 653.30 | 656.97 | | 657.25 | 0.004157 | 5.07 | 132.87 | 55.24 | 0.47 |
| SOUTH TRIB | 6.664 | 100-YEAR | 570.00 | 653.30 | 657.46 | | 657.70 | 0.003115 | 4.77 | 160.87 | 59.40 | 0.41 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.683 | 10-YEAR | 314.00 | 653.40 | 656.63 | | 656.90 | 0.004069 | 4.61 | 84.27 | 37.11 | 0.45 |
| SOUTH TRIB | 6.683 | 50-YEAR | 506.00 | 653.40 | 657.34 | | 657.73 | 0.004831 | 5.73 | 112.27 | 41.95 | 0.51 |
| SOUTH TRIB | 6.683 | 100-YEAR | 570.00 | 653.40 | 657.73 | | 658.11 | 0.004224 | 5.70 | 128.85 | 44.57 | 0.48 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.721 | 10-YEAR | 314.00 | 653.70 | 657.36 | | 657.60 | 0.003055 | 4.34 | 89.65 | 36.35 | 0.40 |
| SOUTH TRIB | 6.721 | 50-YEAR | 506.00 | 653.70 | 658.21 | | 658.56 | 0.003495 | 5.33 | 125.00 | 46.89 | 0.44 |
| SOUTH TRIB | 6.721 | 100-YEAR | 570.00 | 653.70 | 658.51 | | 658.86 | 0.003398 | 5.48 | 139.44 | 50.57 | 0.44 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.759 | 10-YEAR | 314.00 | 654.00 | 657.94 | | 658.12 | 0.002190 | 3.85 | 100.51 | 36.08 | 0.34 |
| SOUTH TRIB | 6.759 | 50-YEAR | 506.00 | 654.00 | 658.88 | | 659.14 | 0.002445 | 4.70 | 136.92 | 41.14 | 0.37 |
| SOUTH TRIB | 6.759 | 100-YEAR | 570.00 | 654.00 | 659.16 | | 659.45 | 0.002476 | 4.91 | 148.81 | 42.66 | 0.38 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.797 | 10-YEAR | 314.00 | 654.30 | 658.41 | | 658.55 | 0.002067 | 2.97 | 105.70 | 36.40 | 0.31 |
| SOUTH TRIB | 6.797 | 50-YEAR | 506.00 | 654.30 | 659.43 | | 659.62 | 0.002234 | 3.48 | 145.37 | 41.69 | 0.33 |
| SOUTH TRIB | 6.797 | 100-YEAR | 570.00 | 654.30 | 659.73 | | 659.93 | 0.002257 | 3.61 | 158.00 | 43.23 | 0.33 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.834 | 10-YEAR | 314.00 | 654.60 | 658.77 | | 658.90 | 0.001455 | 3.26 | 123.53 | 44.24 | 0.28 |
| SOUTH TRIB | 6.834 | 50-YEAR | 506.00 | 654.60 | 659.82 | | 659.98 | 0.001514 | 3.86 | 173.66 | 51.58 | 0.30 |
| SOUTH TRIB | 6.834 | 100-YEAR | 570.00 | 654.60 | 660.12 | | 660.30 | 0.001520 | 4.02 | 189.60 | 53.70 | 0.30 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.872 | 10-YEAR | 314.00 | 654.90 | 659.07 | | 659.25 | 0.001929 | 3.76 | 101.77 | 33.76 | 0.32 |
| SOUTH TRIB | 6.872 | 50-YEAR | 506.00 | 654.90 | 660.13 | | 660.38 | 0.002097 | 4.55 | 139.73 | 38.48 | 0.35 |
| SOUTH TRIB | 6.872 | 100-YEAR | 570.00 | 654.90 | 660.43 | | 660.70 | 0.002135 | 4.77 | 151.53 | 39.83 | 0.36 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.879 Miller Fluids En | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 314.00 | 654.90 | 659.09 | 657.09 | 659.27 | 0.001894 | 3.74 | 102.44 | 33.85 | 0.32 |
| SOUTH TRIB | 6.886 | 50-YEAR | 506.00 | 654.90 | 660.17 | 657.82 | 660.42 | 0.002028 | 4.50 | 141.45 | 38.68 | 0.35 |
| SOUTH TRIB | 6.886 | 100-YEAR | 570.00 | 654.90 | 660.48 | 658.03 | 660.75 | 0.002059 | 4.71 | 153.55 | 40.06 | 0.35 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.904 | 10-YEAR | 314.00 | 655.30 | 659.29 | | 659.50 | 0.002391 | 4.06 | 94.42 | 33.85 | 0.36 |
| SOUTH TRIB | 6.904 | 50-YEAR | 506.00 | 655.30 | 660.37 | | 660.66 | 0.002443 | 4.82 | 136.98 | 44.59 | 0.38 |
| SOUTH TRIB | 6.904 | 100-YEAR | 570.00 | 655.30 | 660.68 | | 660.98 | 0.002425 | 4.99 | 151.30 | 47.66 | 0.38 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.942 | 10-YEAR | 314.00 | 655.60 | 659.75 | | 659.93 | 0.001908 | 3.73 | 104.35 | 36.28 | 0.32 |
| SOUTH TRIB | 6.942 | 50-YEAR | 506.00 | 655.60 | 660.86 | | 661.10 | 0.001967 | 4.43 | 150.29 | 46.52 | 0.34 |
| SOUTH TRIB | 6.942 | 100-YEAR | 570.00 | 655.60 | 661.17 | | 661.42 | 0.001970 | 4.61 | 165.18 | 49.39 | 0.34 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.956 | 10-YEAR | 314.00 | 655.05 | 659.89 | 658.03 | 660.07 | 0.002456 | 3.52 | 93.49 | 134.67 | 0.34 |
| SOUTH TRIB | 6.956 | 50-YEAR | 506.00 | 655.05 | 661.00 | 658.75 | 661.25 | 0.002514 | 4.10 | 131.13 | 277.69 | 0.36 |
| SOUTH TRIB | 6.956 | 100-YEAR | 570.00 | 655.05 | 661.31 | 658.95 | 661.57 | 0.002544 | 4.26 | 142.48 | 524.98 | 0.36 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.98 | 10-YEAR | 314.00 | 655.90 | 660.19 | | 660.34 | 0.001549 | 3.43 | 114.33 | 38.27 | 0.29 |
| SOUTH TRIB | 6.98 | 50-YEAR | 506.00 | 655.90 | 661.32 | | 661.52 | 0.001597 | 4.07 | 161.60 | 45.38 | 0.31 |
| SOUTH TRIB | 6.98 | 100-YEAR | 570.00 | 655.90 | 661.64 | | 661.85 | 0.001611 | 4.25 | 176.29 | 47.43 | 0.31 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.999 | 10-YEAR | 314.00 | 656.10 | 660.35 | | 660.50 | 0.001643 | 3.51 | 111.28 | 37.41 | 0.30 |
| SOUTH TRIB | 6.999 | 50-YEAR | 506.00 | 656.10 | 661.48 | | 661.68 | 0.001669 | 4.14 | 157.17 | 43.41 | 0.31 |
| SOUTH TRIB | 6.999 | 100-YEAR | 570.00 | 656.10 | 661.80 | | 662.02 | 0.001768 | 4.43 | 171.72 | 49.46 | 0.33 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.037 | 10-YEAR | 314.00 | 655.90 | 660.63 | | 660.71 | 0.000720 | 2.50 | 152.52 | 44.75 | 0.20 |
| SOUTH TRIB | 7.037 | 50-YEAR | 506.00 | 655.90 | 661.80 | | 661.92 | 0.000795 | 3.04 | 208.58 | 51.24 | 0.22 |
| SOUTH TRIB | 7.037 | 100-YEAR | 570.00 | 655.90 | 662.14 | | 662.27 | 0.000809 | 3.18 | 226.31 | 53.13 | 0.22 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.056 | 10-YEAR | 314.00 | 656.00 | 660.70 | | 660.81 | 0.001107 | 3.08 | 128.47 | 39.70 | 0.25 |

HEC-RAS Plan: Nat-York (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.056 | 50-YEAR | 506.00 | 656.00 | 661.87 | | 662.03 | 0.001219 | 3.75 | 180.52 | 50.68 | 0.27 |
| SOUTH TRIB | 7.056 | 100-YEAR | 570.00 | 656.00 | 662.21 | | 662.38 | 0.001228 | 3.91 | 198.37 | 54.37 | 0.28 |
| SOUTH TRIB | 7.075 | 10-YEAR | 314.00 | 656.20 | 660.82 | | 660.92 | 0.001081 | 3.01 | 133.37 | 42.79 | 0.25 |
| SOUTH TRIB | 7.075 | 50-YEAR | 506.00 | 656.20 | 662.00 | | 662.15 | 0.001142 | 3.60 | 189.59 | 53.44 | 0.26 |
| SOUTH TRIB | 7.075 | 100-YEAR | 570.00 | 656.20 | 662.34 | | 662.50 | 0.001147 | 3.75 | 208.52 | 57.21 | 0.27 |
| SOUTH TRIB | 7.084 | 10-YEAR | 314.00 | 655.01 | 660.86 | 658.14 | 660.98 | 0.001036 | 2.94 | 127.99 | 40.39 | 0.23 |
| SOUTH TRIB | 7.084 | 50-YEAR | 506.00 | 655.01 | 662.04 | 658.94 | 662.21 | 0.001217 | 3.68 | 186.01 | 206.70 | 0.26 |
| SOUTH TRIB | 7.084 | 100-YEAR | 570.00 | 655.01 | 662.46 | 659.16 | 662.55 | 0.000711 | 2.94 | 354.96 | 215.96 | 0.20 |
| SOUTH TRIB | 7.094 | 10-YEAR | 314.00 | 656.40 | 660.97 | | 661.09 | 0.001246 | 3.21 | 122.75 | 38.76 | 0.26 |
| SOUTH TRIB | 7.094 | 50-YEAR | 506.00 | 656.40 | 662.17 | | 662.34 | 0.001274 | 3.79 | 173.20 | 45.02 | 0.28 |
| SOUTH TRIB | 7.094 | 100-YEAR | 570.00 | 656.40 | 662.49 | | 662.67 | 0.001301 | 3.97 | 187.77 | 46.67 | 0.28 |
| SOUTH TRIB | 7.132 | 10-YEAR | 314.00 | 655.41 | 661.21 | 658.60 | 661.29 | 0.000889 | 2.74 | 149.16 | 253.53 | 0.21 |
| SOUTH TRIB | 7.132 | 50-YEAR | 506.00 | 655.41 | 662.43 | 659.30 | 662.55 | 0.000894 | 3.17 | 213.18 | 881.88 | 0.22 |
| SOUTH TRIB | 7.132 | 100-YEAR | 570.00 | 655.41 | 662.76 | 659.49 | 662.88 | 0.000907 | 3.30 | 231.92 | 913.31 | 0.22 |
| SOUTH TRIB | 7.136 | 10-YEAR | 314.00 | 656.30 | 661.19 | | 661.36 | 0.001809 | 3.27 | 98.71 | 29.77 | 0.29 |
| SOUTH TRIB | 7.136 | 50-YEAR | 506.00 | 656.30 | 662.39 | | 662.62 | 0.001844 | 3.93 | 137.80 | 35.56 | 0.30 |
| SOUTH TRIB | 7.136 | 100-YEAR | 570.00 | 656.30 | 662.71 | | 662.96 | 0.001879 | 4.13 | 149.38 | 37.10 | 0.31 |
| SOUTH TRIB | 7.145 | 10-YEAR | 287.00 | 655.49 | 661.38 | 657.92 | 661.43 | 0.000368 | 1.73 | 166.35 | 54.90 | 0.14 |
| SOUTH TRIB | 7.145 | 50-YEAR | 461.00 | 655.49 | 662.63 | 658.48 | 662.71 | 0.000427 | 2.18 | 211.46 | 62.02 | 0.16 |
| SOUTH TRIB | 7.145 | 100-YEAR | 517.00 | 655.49 | 662.97 | 658.62 | 663.05 | 0.000446 | 2.31 | 223.59 | 63.80 | 0.16 |
| SOUTH TRIB | 7.156 Thorndale Ave | | Culvert | | | | | | | | | |
| SOUTH TRIB | 7.168 | 10-YEAR | 287.00 | 656.61 | 661.46 | 658.60 | 661.52 | 0.000538 | 1.94 | 148.27 | 71.71 | 0.17 |
| SOUTH TRIB | 7.168 | 50-YEAR | 461.00 | 656.61 | 662.92 | 659.07 | 663.00 | 0.000507 | 2.30 | 200.55 | 113.39 | 0.17 |
| SOUTH TRIB | 7.168 | 100-YEAR | 517.00 | 656.61 | 663.34 | 659.20 | 663.43 | 0.000499 | 2.40 | 215.81 | 124.87 | 0.17 |
| SOUTH TRIB | 7.181 | 10-YEAR | 287.00 | 657.30 | 661.52 | | 661.54 | 0.000368 | 1.23 | 233.03 | 84.54 | 0.13 |
| SOUTH TRIB | 7.181 | 50-YEAR | 461.00 | 657.30 | 662.99 | | 663.02 | 0.000245 | 1.27 | 363.47 | 92.60 | 0.11 |
| SOUTH TRIB | 7.181 | 100-YEAR | 517.00 | 657.30 | 663.42 | | 663.45 | 0.000225 | 1.28 | 403.81 | 94.95 | 0.11 |
| SOUTH TRIB | 7.191 | 10-YEAR | 287.00 | 655.30 | 661.54 | | 661.57 | 0.000385 | 1.72 | 230.18 | 95.25 | 0.14 |
| SOUTH TRIB | 7.191 | 50-YEAR | 461.00 | 655.30 | 663.01 | | 663.04 | 0.000250 | 1.67 | 376.66 | 104.37 | 0.12 |
| SOUTH TRIB | 7.191 | 100-YEAR | 517.00 | 655.30 | 663.44 | | 663.47 | 0.000227 | 1.67 | 422.04 | 107.03 | 0.12 |
| SOUTH TRIB | 7.22 | 10-YEAR | 287.00 | 656.50 | 661.62 | | 661.64 | 0.000444 | 1.54 | 230.40 | 85.61 | 0.14 |
| SOUTH TRIB | 7.22 | 50-YEAR | 461.00 | 656.50 | 663.06 | | 663.08 | 0.000301 | 1.47 | 358.75 | 92.64 | 0.12 |
| SOUTH TRIB | 7.22 | 100-YEAR | 517.00 | 656.50 | 663.48 | | 663.51 | 0.000276 | 1.46 | 398.53 | 94.72 | 0.12 |
| SOUTH TRIB | 7.247 | 10-YEAR | 287.00 | 656.80 | 661.69 | | 661.71 | 0.000533 | 1.55 | 219.09 | 84.37 | 0.15 |
| SOUTH TRIB | 7.247 | 50-YEAR | 461.00 | 656.80 | 663.10 | | 663.13 | 0.000348 | 1.46 | 343.58 | 91.41 | 0.13 |
| SOUTH TRIB | 7.247 | 100-YEAR | 517.00 | 656.80 | 663.52 | | 663.55 | 0.000316 | 1.45 | 382.45 | 93.50 | 0.12 |
| SOUTH TRIB | 7.259 | 10-YEAR | 287.00 | 657.00 | 661.72 | | 661.74 | 0.000518 | 1.50 | 222.07 | 85.18 | 0.15 |
| SOUTH TRIB | 7.259 | 50-YEAR | 461.00 | 657.00 | 663.12 | | 663.15 | 0.000341 | 1.43 | 346.49 | 91.92 | 0.12 |
| SOUTH TRIB | 7.259 | 100-YEAR | 517.00 | 657.00 | 663.54 | | 663.57 | 0.000311 | 1.42 | 385.38 | 93.93 | 0.12 |
| SOUTH TRIB | 7.265 | 10-YEAR | 287.00 | 657.38 | 661.70 | | 661.79 | 0.001452 | 2.95 | 136.13 | 65.64 | 0.26 |
| SOUTH TRIB | 7.265 | 50-YEAR | 461.00 | 657.38 | 663.11 | | 663.18 | 0.000818 | 2.70 | 234.58 | 73.95 | 0.20 |
| SOUTH TRIB | 7.265 | 100-YEAR | 517.00 | 657.38 | 663.53 | | 663.60 | 0.000718 | 2.66 | 266.10 | 76.43 | 0.19 |
| SOUTH TRIB | 7.289 | 10-YEAR | 287.00 | 657.30 | 661.90 | | 662.04 | 0.002399 | 3.45 | 99.60 | 38.41 | 0.33 |
| SOUTH TRIB | 7.289 | 50-YEAR | 461.00 | 657.30 | 663.21 | | 663.36 | 0.001902 | 3.52 | 155.81 | 47.38 | 0.30 |
| SOUTH TRIB | 7.289 | 100-YEAR | 517.00 | 657.30 | 663.61 | | 663.76 | 0.001750 | 3.50 | 175.42 | 50.13 | 0.29 |
| SOUTH TRIB | 7.314 | 10-YEAR | 287.00 | 657.10 | 662.19 | | 662.26 | 0.001158 | 2.48 | 138.75 | 49.50 | 0.23 |
| SOUTH TRIB | 7.314 | 50-YEAR | 461.00 | 657.10 | 663.46 | | 663.54 | 0.001005 | 2.61 | 207.66 | 58.93 | 0.22 |
| SOUTH TRIB | 7.314 | 100-YEAR | 517.00 | 657.10 | 663.84 | | 663.93 | 0.000948 | 2.62 | 231.05 | 61.81 | 0.21 |
| SOUTH TRIB | 7.331 | 10-YEAR | 287.00 | 657.60 | 662.31 | | 662.60 | 0.005680 | 4.74 | 67.84 | 27.32 | 0.49 |
| SOUTH TRIB | 7.331 | 50-YEAR | 461.00 | 657.60 | 663.53 | | 663.84 | 0.004600 | 4.88 | 105.27 | 33.98 | 0.46 |
| SOUTH TRIB | 7.331 | 100-YEAR | 517.00 | 657.60 | 663.90 | | 664.21 | 0.004243 | 4.86 | 118.38 | 36.02 | 0.44 |
| SOUTH TRIB | 7.35 | 10-YEAR | 287.00 | 658.10 | 662.83 | | 663.00 | 0.002627 | 3.70 | 89.51 | 31.40 | 0.35 |
| SOUTH TRIB | 7.35 | 50-YEAR | 461.00 | 658.10 | 663.99 | | 664.20 | 0.002567 | 4.11 | 129.45 | 37.43 | 0.35 |
| SOUTH TRIB | 7.35 | 100-YEAR | 517.00 | 658.10 | 664.34 | | 664.55 | 0.002496 | 4.18 | 142.76 | 39.24 | 0.35 |
| SOUTH TRIB | 7.391 | 10-YEAR | 287.00 | 658.50 | 663.35 | | 663.49 | 0.001984 | 3.35 | 98.23 | 31.96 | 0.30 |
| SOUTH TRIB | 7.391 | 50-YEAR | 461.00 | 658.50 | 664.51 | | 664.70 | 0.002060 | 3.83 | 138.59 | 37.52 | 0.31 |
| SOUTH TRIB | 7.391 | 100-YEAR | 517.00 | 658.50 | 664.85 | | 665.04 | 0.002044 | 3.92 | 153.10 | 52.14 | 0.32 |
| SOUTH TRIB | 7.399 | 10-YEAR | 287.00 | 657.49 | 663.39 | 660.52 | 663.57 | 0.001267 | 3.61 | 97.00 | 24.85 | 0.27 |
| SOUTH TRIB | 7.399 | 50-YEAR | 461.00 | 657.49 | 664.53 | 661.40 | 664.79 | 0.001582 | 4.58 | 126.84 | 522.90 | 0.31 |
| SOUTH TRIB | 7.399 | 100-YEAR | 517.00 | 657.49 | 664.85 | 661.65 | 665.15 | 0.001650 | 4.83 | 136.01 | 643.78 | 0.32 |
| SOUTH TRIB | 7.406 | 10-YEAR | 287.00 | 658.60 | 663.42 | | 663.64 | 0.002081 | 4.30 | 84.90 | 25.25 | 0.35 |
| SOUTH TRIB | 7.406 | 50-YEAR | 461.00 | 658.60 | 664.56 | | 664.88 | 0.002319 | 5.23 | 115.87 | 28.77 | 0.38 |

HEC-RAS Plan: Nat-York (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.406 | 100-YEAR | 517.00 | 658.60 | 664.89 | | 665.24 | 0.002343 | 5.45 | 125.42 | 29.25 | 0.38 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 287.00 | 659.00 | 663.68 | | 664.05 | 0.004022 | 5.58 | 67.59 | 23.95 | 0.47 |
| SOUTH TRIB | 7.431 | 50-YEAR | 461.00 | 659.00 | 664.85 | | 665.31 | 0.003906 | 6.43 | 98.30 | 28.77 | 0.48 |
| SOUTH TRIB | 7.431 | 100-YEAR | 517.00 | 659.00 | 665.18 | | 665.66 | 0.003827 | 6.62 | 108.03 | 29.76 | 0.48 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 287.00 | 658.10 | 664.01 | | 664.13 | 0.001172 | 3.26 | 113.72 | 31.56 | 0.26 |
| SOUTH TRIB | 7.447 | 50-YEAR | 461.00 | 658.10 | 665.23 | | 665.39 | 0.001310 | 3.98 | 154.84 | 36.07 | 0.28 |
| SOUTH TRIB | 7.447 | 100-YEAR | 517.00 | 658.10 | 665.54 | | 665.75 | 0.001525 | 4.44 | 169.26 | 62.17 | 0.31 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 261.00 | 658.10 | 664.07 | 660.99 | 664.17 | 0.000862 | 2.81 | 111.04 | 31.79 | 0.22 |
| SOUTH TRIB | 7.456 | 50-YEAR | 418.00 | 658.10 | 665.31 | 661.71 | 665.44 | 0.001034 | 3.57 | 157.67 | 37.04 | 0.25 |
| SOUTH TRIB | 7.456 | 100-YEAR | 468.00 | 658.10 | 665.64 | 661.91 | 665.80 | 0.001187 | 3.95 | 175.69 | 72.44 | 0.27 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 261.00 | 658.10 | 664.83 | 660.99 | 664.89 | 0.000508 | 2.37 | 130.68 | 34.58 | 0.17 |
| SOUTH TRIB | 7.47 | 50-YEAR | 418.00 | 658.10 | 666.70 | 661.70 | 666.77 | 0.000585 | 3.06 | 369.13 | 299.57 | 0.19 |
| SOUTH TRIB | 7.47 | 100-YEAR | 468.00 | 658.10 | 666.86 | 661.90 | 666.93 | 0.000584 | 3.10 | 421.63 | 336.11 | 0.19 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 261.00 | 655.06 | 664.90 | | 664.90 | 0.000006 | 0.38 | 1056.50 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 50-YEAR | 418.00 | 655.06 | 666.77 | | 666.77 | 0.000006 | 0.43 | 1446.41 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 100-YEAR | 468.00 | 655.06 | 666.93 | | 666.94 | 0.000007 | 0.47 | 1480.13 | 208.30 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 261.00 | 655.05 | 664.90 | | 664.90 | 0.000001 | 0.11 | 4699.90 | 1496.66 | 0.01 |
| SOUTH TRIB | 7.493 | 50-YEAR | 418.00 | 655.05 | 666.77 | | 666.77 | 0.000000 | 0.09 | 7596.54 | 1585.92 | 0.01 |
| SOUTH TRIB | 7.493 | 100-YEAR | 468.00 | 655.05 | 666.94 | | 666.94 | 0.000000 | 0.10 | 7854.41 | 1593.14 | 0.01 |

HEC-RAS Plan: Nat-York

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 4.518 | 10-YEAR | 644.73 | 644.69 | 0.04 | 0.05 | 0.01 | 11.61 | 870.78 | 11.61 | 68.69 |
| MAINSTEM | 4.518 | 50-YEAR | 646.41 | 646.33 | 0.08 | 0.06 | 0.01 | 22.42 | 1414.15 | 22.42 | 70.33 |
| MAINSTEM | 4.518 | 100-YEAR | 647.00 | 646.91 | 0.09 | 0.06 | 0.01 | 27.25 | 1627.50 | 27.25 | 70.91 |
| | | | | | | | | | | | |
| MAINSTEM | 4.594 | 10-YEAR | 644.77 | 644.73 | 0.04 | 0.04 | 0.00 | 11.67 | 870.66 | 11.67 | 68.73 |
| MAINSTEM | 4.594 | 50-YEAR | 646.48 | 646.40 | 0.08 | 0.07 | 0.00 | 22.57 | 1413.87 | 22.57 | 70.40 |
| MAINSTEM | 4.594 | 100-YEAR | 647.07 | 646.98 | 0.09 | 0.07 | 0.00 | 27.43 | 1627.14 | 27.43 | 70.98 |
| | | | | | | | | | | | |
| MAINSTEM | 4.675 | 10-YEAR | 644.82 | 644.78 | 0.04 | 0.05 | 0.00 | 11.67 | 870.65 | 11.67 | 68.72 |
| MAINSTEM | 4.675 | 50-YEAR | 646.55 | 646.47 | 0.08 | 0.07 | 0.00 | 22.64 | 1413.71 | 22.64 | 70.41 |
| MAINSTEM | 4.675 | 100-YEAR | 647.15 | 647.06 | 0.09 | 0.08 | 0.00 | 27.55 | 1626.91 | 27.55 | 71.01 |
| | | | | | | | | | | | |
| MAINSTEM | 4.773 | 10-YEAR | 644.88 | 644.84 | 0.03 | 0.05 | 0.00 | 10.26 | 764.66 | 9.07 | 68.37 |
| MAINSTEM | 4.773 | 50-YEAR | 646.62 | 646.57 | 0.06 | 0.07 | 0.00 | 19.17 | 1190.88 | 16.95 | 70.04 |
| MAINSTEM | 4.773 | 100-YEAR | 647.24 | 647.17 | 0.07 | 0.08 | 0.00 | 24.25 | 1423.32 | 21.43 | 70.63 |
| | | | | | | | | | | | |
| MAINSTEM | 4.790 | 10-YEAR | 644.93 | 644.81 | 0.12 | 0.01 | 0.04 | | 784.00 | | 68.35 |
| MAINSTEM | 4.790 | 50-YEAR | 646.71 | 646.51 | 0.20 | 0.02 | 0.07 | | 1227.00 | | 69.99 |
| MAINSTEM | 4.790 | 100-YEAR | 647.35 | 647.09 | 0.26 | 0.02 | 0.09 | | 1469.00 | | 70.56 |
| | | | | | | | | | | | |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 645.42 | 645.28 | 0.15 | | | | 784.00 | | 65.50 |
| MAINSTEM | 5.059 | 50-YEAR | 647.81 | 647.60 | 0.21 | | | | 1227.00 | | 67.78 |
| MAINSTEM | 5.059 | 100-YEAR | 648.96 | 648.71 | 0.25 | | | | 1469.00 | | 68.88 |
| | | | | | | | | | | | |
| MAINSTEM | 5.076 | 10-YEAR | 645.46 | 645.41 | 0.05 | 0.03 | 0.01 | | 784.00 | | 65.48 |
| MAINSTEM | 5.076 | 50-YEAR | 647.85 | 647.79 | 0.07 | 0.03 | 0.01 | | 1227.00 | | 67.85 |
| MAINSTEM | 5.076 | 100-YEAR | 649.00 | 648.93 | 0.07 | 0.03 | 0.02 | | 1469.00 | | 68.98 |
| | | | | | | | | | | | |
| MAINSTEM | 5.104 | 10-YEAR | 645.51 | 645.41 | 0.10 | 0.03 | 0.02 | | 784.00 | | 65.32 |
| MAINSTEM | 5.104 | 50-YEAR | 647.90 | 647.76 | 0.14 | 0.03 | 0.02 | | 1227.00 | | 67.69 |
| MAINSTEM | 5.104 | 100-YEAR | 649.06 | 648.90 | 0.16 | 0.03 | 0.03 | | 1469.00 | | 68.83 |
| | | | | | | | | | | | |
| MAINSTEM | 5.109 | 10-YEAR | 645.54 | 645.37 | 0.17 | 0.01 | 0.02 | | 784.00 | | 65.24 |
| MAINSTEM | 5.109 | 50-YEAR | 647.94 | 647.71 | 0.24 | 0.01 | 0.03 | | 1227.00 | | 67.60 |
| MAINSTEM | 5.109 | 100-YEAR | 649.10 | 648.83 | 0.27 | 0.01 | 0.03 | | 1469.00 | | 68.73 |
| | | | | | | | | | | | |
| MAINSTEM | 5.110 | 10-YEAR | 645.56 | 645.33 | 0.23 | 0.00 | 0.02 | | 784.00 | | 44.59 |
| MAINSTEM | 5.110 | 50-YEAR | 647.98 | 647.64 | 0.34 | 0.00 | 0.03 | | 1227.00 | | 50.16 |
| MAINSTEM | 5.110 | 100-YEAR | 649.14 | 648.75 | 0.40 | 0.00 | 0.04 | | 1469.00 | | 52.83 |
| | | | | | | | | | | | |
| MAINSTEM | 5.116 | 10-YEAR | 645.57 | 645.33 | 0.24 | 0.01 | 0.00 | | 784.00 | | 25.00 |
| MAINSTEM | 5.116 | 50-YEAR | 647.99 | 647.64 | 0.35 | 0.01 | 0.01 | 0.02 | 1226.96 | 0.02 | 26.44 |
| MAINSTEM | 5.116 | 100-YEAR | 649.16 | 648.75 | 0.41 | 0.01 | 0.01 | 0.25 | 1468.50 | 0.25 | 31.23 |
| | | | | | | | | | | | |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 646.33 | 646.04 | 0.29 | | | | 634.00 | | 25.50 |
| MAINSTEM | 5.606 | 50-YEAR | 649.94 | 649.63 | 0.30 | | | | 1056.00 | | 57.44 |
| MAINSTEM | 5.606 | 100-YEAR | 651.85 | 651.57 | 0.28 | | | | 1227.00 | | 80.97 |
| | | | | | | | | | | | |
| MAINSTEM | 5.610 | 10-YEAR | 646.36 | 646.34 | 0.02 | 0.00 | 0.03 | | 634.00 | | 125.36 |
| MAINSTEM | 5.610 | 50-YEAR | 649.97 | 649.95 | 0.02 | 0.00 | 0.03 | | 1056.00 | | 145.88 |
| MAINSTEM | 5.610 | 100-YEAR | 651.88 | 651.86 | 0.02 | 0.00 | 0.03 | | 1227.00 | | 156.76 |
| | | | | | | | | | | | |
| MAINSTEM | 5.629 | 10-YEAR | 646.36 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 215.49 |
| MAINSTEM | 5.629 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 237.14 |
| MAINSTEM | 5.629 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 248.61 |
| | | | | | | | | | | | |
| MAINSTEM | 5.632 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 411.47 |
| MAINSTEM | 5.632 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 433.12 |
| MAINSTEM | 5.632 | 100-YEAR | 651.88 | 651.88 | 0.00 | 0.00 | 0.00 | | 1227.00 | | 444.58 |
| | | | | | | | | | | | |
| MAINSTEM | 5.639 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 737.22 |
| MAINSTEM | 5.639 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 758.86 |
| MAINSTEM | 5.639 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 770.33 |
| | | | | | | | | | | | |
| MAINSTEM | 5.697 | 10-YEAR | 646.41 | 646.37 | 0.04 | 0.03 | 0.01 | | 634.00 | | 311.74 |
| MAINSTEM | 5.697 | 50-YEAR | 649.99 | 649.96 | 0.03 | 0.01 | 0.01 | | 1056.00 | | 333.27 |
| MAINSTEM | 5.697 | 100-YEAR | 651.90 | 651.87 | 0.02 | 0.01 | 0.01 | | 1227.00 | | 344.73 |
| | | | | | | | | | | | |

HEC-RAS Plan: Nat-York (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 5.720 | 10-YEAR | 646.51 | 646.35 | 0.16 | 0.06 | 0.04 | | 634.00 | | 161.07 |
| MAINSTEM | 5.720 | 50-YEAR | 650.05 | 649.91 | 0.14 | 0.02 | 0.03 | | 1056.00 | | 188.74 |
| MAINSTEM | 5.720 | 100-YEAR | 651.94 | 651.82 | 0.12 | 0.01 | 0.03 | | 1227.00 | | 203.61 |
| | | | | | | | | | | | |
| MAINSTEM | 5.725 | 10-YEAR | 646.59 | 646.28 | 0.31 | 0.03 | 0.04 | | 634.00 | | 93.92 |
| MAINSTEM | 5.725 | 50-YEAR | 650.10 | 649.82 | 0.28 | 0.01 | 0.04 | | 1056.00 | | 126.73 |
| MAINSTEM | 5.725 | 100-YEAR | 651.99 | 651.74 | 0.25 | 0.01 | 0.04 | | 1227.00 | | 144.48 |
| | | | | | | | | | | | |
| MAINSTEM | 5.727 | 10-YEAR | 646.68 | 646.23 | 0.45 | 0.02 | 0.07 | | 634.00 | | 25.00 |
| MAINSTEM | 5.727 | 50-YEAR | 650.18 | 649.77 | 0.41 | 0.01 | 0.06 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.727 | 100-YEAR | 652.05 | 651.69 | 0.36 | 0.01 | 0.06 | | 1227.00 | | 27.98 |
| | | | | | | | | | | | |
| MAINSTEM | 5.732 | 10-YEAR | 646.81 | 646.38 | 0.44 | 0.13 | 0.00 | | 634.00 | | 25.00 |
| MAINSTEM | 5.732 | 50-YEAR | 650.24 | 649.84 | 0.41 | 0.07 | 0.00 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.732 | 100-YEAR | 652.10 | 651.74 | 0.36 | 0.05 | 0.00 | | 1227.00 | | 27.64 |
| | | | | | | | | | | | |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 647.18 | 646.81 | 0.37 | | | | 634.00 | | 26.00 |
| MAINSTEM | 5.757 | 50-YEAR | 650.55 | 650.18 | 0.37 | | | | 1056.00 | | 26.00 |
| MAINSTEM | 5.757 | 100-YEAR | 652.40 | 652.07 | 0.33 | | | | 1227.00 | | 26.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.759 | 10-YEAR | 647.22 | 647.20 | 0.03 | 0.01 | 0.03 | | 634.00 | | 100.00 |
| MAINSTEM | 5.759 | 50-YEAR | 650.59 | 650.56 | 0.03 | 0.01 | 0.03 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.759 | 100-YEAR | 652.43 | 652.41 | 0.03 | 0.00 | 0.03 | | 1227.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.810 | 10-YEAR | 647.29 | 647.24 | 0.06 | 0.06 | 0.01 | | 634.00 | | 100.00 |
| MAINSTEM | 5.810 | 50-YEAR | 650.62 | 650.58 | 0.04 | 0.03 | 0.00 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.810 | 100-YEAR | 652.45 | 652.42 | 0.03 | 0.02 | 0.00 | | 1227.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.860 | 10-YEAR | 648.57 | 647.64 | 0.93 | 0.42 | 0.26 | | 634.00 | | 100.00 |
| MAINSTEM | 5.860 | 50-YEAR | 650.83 | 650.43 | 0.40 | 0.10 | 0.11 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.860 | 100-YEAR | 652.58 | 652.31 | 0.28 | 0.06 | 0.07 | | 1227.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 5.862 | 10-YEAR | 649.70 | 648.45 | 1.26 | 0.73 | 0.16 | | 634.00 | | 28.35 |
| MAINSTEM | 5.862 | 50-YEAR | 651.40 | 650.19 | 1.20 | 0.17 | 0.40 | | 1056.00 | | 28.35 |
| MAINSTEM | 5.862 | 100-YEAR | 652.90 | 652.14 | 0.76 | 0.07 | 0.24 | | 1227.00 | | 28.35 |
| | | | | | | | | | | | |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 651.96 | 651.60 | 0.37 | | | | 634.00 | | 33.00 |
| MAINSTEM | 6.037 | 50-YEAR | 653.74 | 653.22 | 0.52 | | | | 1056.00 | | 33.00 |
| MAINSTEM | 6.037 | 100-YEAR | 654.46 | 653.90 | 0.56 | | | | 1227.00 | | 33.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 652.40 | 652.15 | 0.25 | | | | 603.00 | | 34.00 |
| MAINSTEM | 6.190 | 50-YEAR | 654.26 | 653.91 | 0.35 | | | | 996.00 | | 34.00 |
| MAINSTEM | 6.190 | 100-YEAR | 655.00 | 654.62 | 0.38 | | | | 1156.00 | | 34.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.194 | 10-YEAR | 652.44 | 652.41 | 0.03 | 0.01 | 0.02 | | 603.00 | | 100.00 |
| MAINSTEM | 6.194 | 50-YEAR | 654.31 | 654.27 | 0.04 | 0.01 | 0.03 | | 996.00 | | 100.00 |
| MAINSTEM | 6.194 | 100-YEAR | 655.04 | 655.00 | 0.04 | 0.01 | 0.03 | | 1156.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.332 | 10-YEAR | 652.55 | 652.52 | 0.03 | 0.11 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.332 | 50-YEAR | 654.41 | 654.37 | 0.04 | 0.10 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.332 | 100-YEAR | 655.14 | 655.10 | 0.04 | 0.10 | 0.00 | | 1156.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.418 | 10-YEAR | 652.63 | 652.61 | 0.03 | 0.09 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.418 | 50-YEAR | 654.49 | 654.45 | 0.04 | 0.08 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.418 | 100-YEAR | 655.22 | 655.18 | 0.04 | 0.08 | 0.00 | | 1156.00 | | 100.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.471 | 10-YEAR | 652.73 | 652.65 | 0.08 | 0.08 | 0.02 | | 603.00 | | 55.30 |
| MAINSTEM | 6.471 | 50-YEAR | 654.59 | 654.48 | 0.12 | 0.08 | 0.02 | | 996.00 | | 55.30 |
| MAINSTEM | 6.471 | 100-YEAR | 655.32 | 655.19 | 0.13 | 0.07 | 0.03 | | 1156.00 | | 55.30 |
| | | | | | | | | | | | |
| MAINSTEM | 6.473 | 10-YEAR | 652.79 | 652.61 | 0.18 | 0.01 | 0.05 | | 603.00 | | 40.00 |
| MAINSTEM | 6.473 | 50-YEAR | 654.67 | 654.42 | 0.25 | 0.01 | 0.07 | | 996.00 | | 40.00 |
| MAINSTEM | 6.473 | 100-YEAR | 655.40 | 655.13 | 0.27 | 0.01 | 0.07 | | 1156.00 | | 40.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | |
| | | | | | | | | | | | |

HEC-RAS Plan: Nat-York (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 6.538 | 10-YEAR | 653.03 | 652.83 | 0.20 | | | | 603.00 | | 38.00 |
| MAINSTEM | 6.538 | 50-YEAR | 654.97 | 654.69 | 0.27 | | | | 996.00 | | 38.00 |
| MAINSTEM | 6.538 | 100-YEAR | 655.72 | 655.42 | 0.29 | | | | 1156.00 | | 38.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.540 | 10-YEAR | 653.05 | 653.04 | 0.01 | 0.00 | 0.02 | | 603.00 | | 191.09 |
| MAINSTEM | 6.540 | 50-YEAR | 654.99 | 654.98 | 0.02 | 0.00 | 0.03 | | 996.00 | | 220.15 |
| MAINSTEM | 6.540 | 100-YEAR | 655.75 | 655.73 | 0.02 | 0.00 | 0.03 | | 1156.00 | | 231.41 |
| | | | | | | | | | | | |
| MAINSTEM | 6.59 | 10-YEAR | 653.07 | 653.06 | 0.01 | 0.02 | 0.00 | | 603.00 | | 196.42 |
| MAINSTEM | 6.59 | 50-YEAR | 655.03 | 655.01 | 0.01 | 0.03 | 0.00 | 0.00 | 996.00 | | 1008.18 |
| MAINSTEM | 6.59 | 100-YEAR | 655.77 | 655.76 | 0.01 | 0.02 | 0.00 | 1.69 | 1154.31 | | 1050.50 |
| | | | | | | | | | | | |
| MAINSTEM | 6.6 | 10-YEAR | 653.14 | 653.03 | 0.11 | 0.02 | 0.05 | | 603.00 | | 199.69 |
| MAINSTEM | 6.6 | 50-YEAR | 655.13 | 654.99 | 0.14 | 0.04 | 0.07 | | 996.00 | | 234.83 |
| MAINSTEM | 6.6 | 100-YEAR | 655.86 | 655.70 | 0.16 | 0.02 | 0.08 | | 1156.00 | | 247.66 |
| | | | | | | | | | | | |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 653.45 | 652.11 | 1.34 | | | | 603.00 | | 219.18 |
| MAINSTEM | 6.635 | 50-YEAR | 655.48 | 654.41 | 1.07 | | | | 996.00 | | 1224.97 |
| MAINSTEM | 6.635 | 100-YEAR | 656.23 | 655.13 | 1.10 | | | | 1156.00 | | 1230.05 |
| | | | | | | | | | | | |
| MAINSTEM | 6.637 | 10-YEAR | 653.85 | 653.85 | 0.00 | 0.00 | 0.40 | 5.04 | 597.62 | 0.34 | 1208.75 |
| MAINSTEM | 6.637 | 50-YEAR | 655.80 | 655.80 | 0.00 | 0.00 | 0.32 | 15.58 | 979.15 | 1.27 | 1234.77 |
| MAINSTEM | 6.637 | 100-YEAR | 656.56 | 656.56 | 0.00 | 0.00 | 0.33 | 19.86 | 1134.35 | 1.79 | 1240.13 |
| | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 654.18 | 653.53 | 0.65 | 0.00 | 0.33 | | 603.00 | | 40.25 |
| MAINSTEM | 6.639 | 50-YEAR | 656.02 | 655.58 | 0.44 | 0.00 | 0.22 | | 996.00 | | 52.26 |
| MAINSTEM | 6.639 | 100-YEAR | 656.75 | 656.36 | 0.39 | 0.00 | 0.19 | | 1156.00 | | 56.86 |
| | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 655.04 | 654.59 | 0.45 | 0.79 | 0.06 | | 603.00 | | 47.75 |
| MAINSTEM | 6.642 | 50-YEAR | 656.44 | 656.01 | 0.43 | 0.42 | 0.00 | | 996.00 | | 61.66 |
| MAINSTEM | 6.642 | 100-YEAR | 657.08 | 656.70 | 0.38 | 0.32 | 0.00 | | 1156.00 | | 68.65 |
| | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 655.15 | 654.76 | 0.39 | 0.09 | 0.02 | | 603.00 | | 49.30 |
| MAINSTEM | 6.643 | 50-YEAR | 656.51 | 656.11 | 0.40 | 0.07 | 0.01 | | 996.00 | | 62.68 |
| MAINSTEM | 6.643 | 100-YEAR | 657.13 | 656.77 | 0.36 | 0.05 | 0.00 | | 1156.00 | | 69.35 |
| | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 655.39 | 655.39 | 0.00 | 0.01 | 0.23 | 0.31 | 573.56 | 29.12 | 1613.38 |
| MAINSTEM | 6.644 | 50-YEAR | 656.76 | 656.75 | 0.00 | 0.00 | 0.24 | 11.19 | 891.76 | 93.05 | 1818.16 |
| MAINSTEM | 6.644 | 100-YEAR | 657.35 | 657.35 | 0.00 | 0.00 | 0.22 | 21.09 | 1012.11 | 122.80 | 1907.87 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.645 | 10-YEAR | 655.73 | 655.18 | 0.55 | 0.05 | 0.16 | 94.68 | 205.34 | 13.98 | 54.47 |
| SOUTH TRIB | 6.645 | 50-YEAR | 656.84 | 656.62 | 0.22 | 0.02 | 0.06 | 241.34 | 236.85 | 27.81 | 69.00 |
| SOUTH TRIB | 6.645 | 100-YEAR | 657.41 | 657.26 | 0.16 | 0.01 | 0.05 | 292.00 | 244.04 | 33.95 | 75.35 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.664 | 10-YEAR | 656.48 | 656.28 | 0.21 | 0.72 | 0.03 | 105.64 | 190.31 | 18.04 | 49.31 |
| SOUTH TRIB | 6.664 | 50-YEAR | 657.25 | 656.97 | 0.28 | 0.40 | 0.02 | 193.94 | 279.36 | 32.69 | 55.24 |
| SOUTH TRIB | 6.664 | 100-YEAR | 657.70 | 657.46 | 0.24 | 0.27 | 0.02 | 232.76 | 297.76 | 39.48 | 59.40 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.683 | 10-YEAR | 656.90 | 656.63 | 0.26 | 0.40 | 0.02 | 64.85 | 223.48 | 25.67 | 37.11 |
| SOUTH TRIB | 6.683 | 50-YEAR | 657.73 | 657.34 | 0.39 | 0.45 | 0.03 | 119.83 | 338.74 | 47.44 | 41.95 |
| SOUTH TRIB | 6.683 | 100-YEAR | 658.11 | 657.73 | 0.38 | 0.36 | 0.04 | 143.49 | 369.70 | 56.81 | 44.57 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.721 | 10-YEAR | 657.60 | 657.36 | 0.24 | 0.70 | 0.00 | 43.87 | 238.18 | 31.94 | 36.35 |
| SOUTH TRIB | 6.721 | 50-YEAR | 658.56 | 658.21 | 0.34 | 0.82 | 0.00 | 85.77 | 360.65 | 59.58 | 46.89 |
| SOUTH TRIB | 6.721 | 100-YEAR | 658.86 | 658.51 | 0.36 | 0.76 | 0.00 | 104.98 | 395.40 | 69.61 | 50.57 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.759 | 10-YEAR | 658.12 | 657.94 | 0.19 | 0.51 | 0.01 | 51.87 | 227.34 | 34.79 | 36.08 |
| SOUTH TRIB | 6.759 | 50-YEAR | 659.14 | 658.88 | 0.26 | 0.58 | 0.01 | 97.19 | 343.63 | 65.18 | 41.14 |
| SOUTH TRIB | 6.759 | 100-YEAR | 659.45 | 659.16 | 0.29 | 0.58 | 0.01 | 113.73 | 380.00 | 76.27 | 42.66 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.797 | 10-YEAR | 658.55 | 658.41 | 0.14 | 0.43 | 0.00 | | 314.00 | | 36.40 |
| SOUTH TRIB | 6.797 | 50-YEAR | 659.62 | 659.43 | 0.19 | 0.47 | 0.01 | | 506.00 | | 41.69 |
| SOUTH TRIB | 6.797 | 100-YEAR | 659.93 | 659.73 | 0.20 | 0.47 | 0.01 | | 570.00 | | 43.23 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.834 | 10-YEAR | 658.90 | 658.77 | 0.13 | 0.34 | 0.00 | 46.08 | 204.14 | 63.78 | 44.24 |
| SOUTH TRIB | 6.834 | 50-YEAR | 659.98 | 659.82 | 0.17 | 0.36 | 0.00 | 85.40 | 302.41 | 118.19 | 51.58 |
| SOUTH TRIB | 6.834 | 100-YEAR | 660.30 | 660.12 | 0.18 | 0.37 | 0.00 | 99.46 | 332.89 | 137.65 | 53.70 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.872 | 10-YEAR | 659.25 | 659.07 | 0.18 | 0.33 | 0.03 | 43.40 | 235.44 | 35.16 | 33.76 |
| SOUTH TRIB | 6.872 | 50-YEAR | 660.38 | 660.13 | 0.25 | 0.35 | 0.04 | 82.36 | 356.92 | 66.72 | 38.48 |

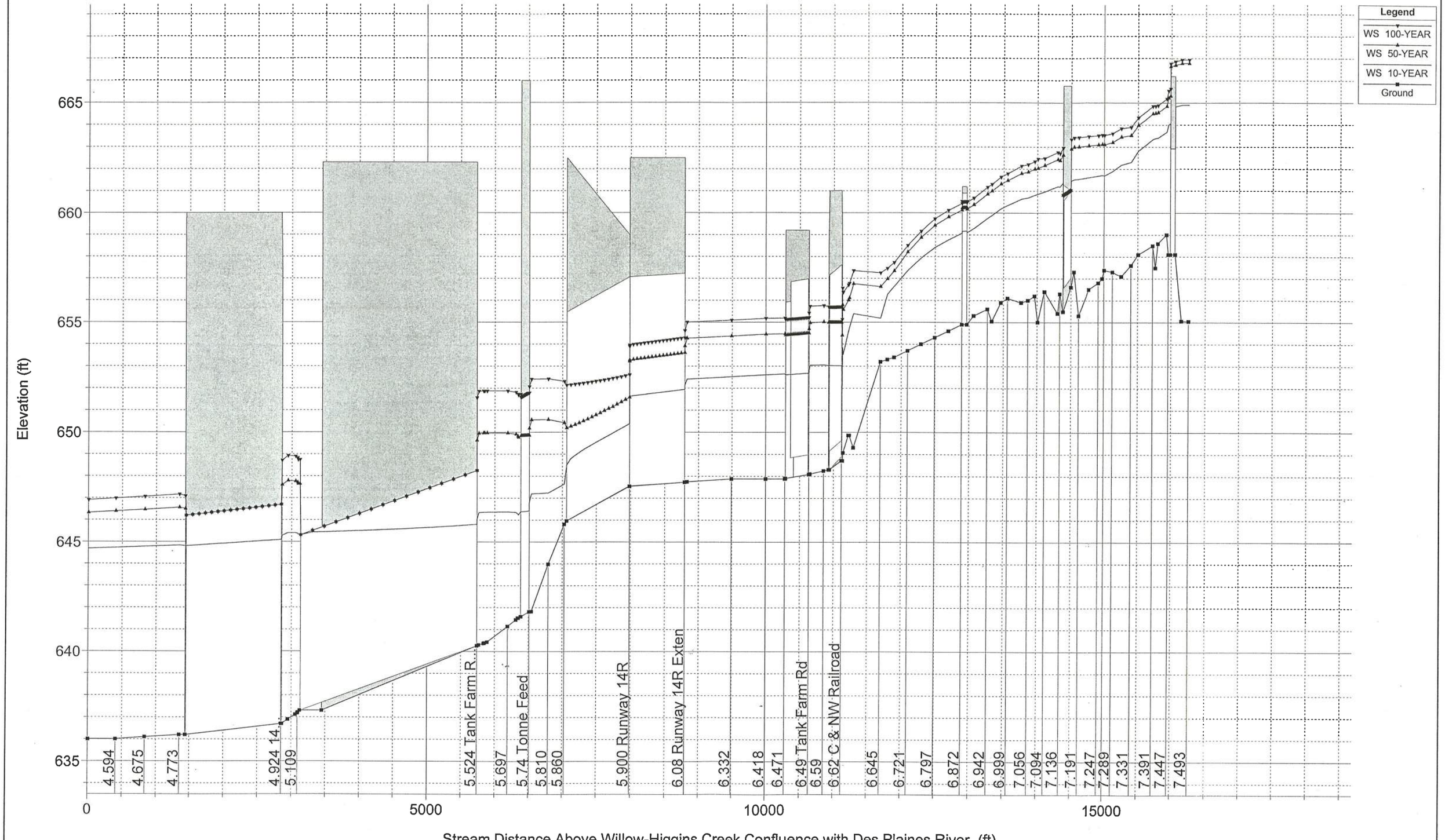
HEC-RAS Plan: Nat-York (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 6.872 | 100-YEAR | 660.70 | 660.43 | 0.28 | 0.36 | 0.05 | 96.49 | 395.34 | 78.17 | 39.83 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.879 Miller Fluids En | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 659.27 | 659.09 | 0.18 | | | 43.56 | 235.16 | 35.29 | 33.85 |
| SOUTH TRIB | 6.886 | 50-YEAR | 660.42 | 660.17 | 0.25 | | | 82.86 | 356.02 | 67.12 | 38.68 |
| SOUTH TRIB | 6.886 | 100-YEAR | 660.75 | 660.48 | 0.27 | | | 97.10 | 394.24 | 78.66 | 40.06 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.904 | 10-YEAR | 659.50 | 659.29 | 0.21 | 0.21 | 0.02 | 39.28 | 242.79 | 31.93 | 33.85 |
| SOUTH TRIB | 6.904 | 50-YEAR | 660.66 | 660.37 | 0.28 | 0.22 | 0.02 | 78.12 | 366.55 | 61.32 | 44.59 |
| SOUTH TRIB | 6.904 | 100-YEAR | 660.98 | 660.68 | 0.30 | 0.22 | 0.02 | 95.13 | 403.27 | 71.60 | 47.66 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.942 | 10-YEAR | 659.93 | 659.75 | 0.17 | 0.43 | 0.00 | 47.22 | 232.29 | 34.49 | 36.28 |
| SOUTH TRIB | 6.942 | 50-YEAR | 661.10 | 660.86 | 0.23 | 0.44 | 0.00 | 90.26 | 349.91 | 65.84 | 46.52 |
| SOUTH TRIB | 6.942 | 100-YEAR | 661.42 | 661.17 | 0.25 | 0.44 | 0.01 | 107.93 | 385.30 | 76.77 | 49.39 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.956 | 10-YEAR | 660.07 | 659.89 | 0.19 | 0.14 | 0.00 | | 298.23 | 15.77 | 134.67 |
| SOUTH TRIB | 6.956 | 50-YEAR | 661.25 | 661.00 | 0.25 | 0.14 | 0.00 | | 468.62 | 37.38 | 277.69 |
| SOUTH TRIB | 6.956 | 100-YEAR | 661.57 | 661.31 | 0.27 | 0.14 | 0.01 | | 524.30 | 45.70 | 524.98 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.98 | 10-YEAR | 660.34 | 660.19 | 0.14 | 0.26 | 0.00 | 58.06 | 220.98 | 34.96 | 38.27 |
| SOUTH TRIB | 6.98 | 50-YEAR | 661.52 | 661.32 | 0.19 | 0.27 | 0.01 | 108.21 | 331.50 | 66.29 | 45.38 |
| SOUTH TRIB | 6.98 | 100-YEAR | 661.85 | 661.64 | 0.21 | 0.27 | 0.01 | 126.54 | 366.00 | 77.46 | 47.43 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.999 | 10-YEAR | 660.50 | 660.35 | 0.15 | 0.16 | 0.00 | 54.70 | 223.55 | 35.75 | 37.41 |
| SOUTH TRIB | 6.999 | 50-YEAR | 661.68 | 661.48 | 0.20 | 0.16 | 0.00 | 103.72 | 334.48 | 67.80 | 43.41 |
| SOUTH TRIB | 6.999 | 100-YEAR | 662.02 | 661.80 | 0.23 | 0.17 | 0.01 | 110.39 | 378.42 | 81.19 | 49.46 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.037 | 10-YEAR | 660.71 | 660.63 | 0.08 | 0.21 | 0.01 | 48.21 | 236.53 | 29.26 | 44.75 |
| SOUTH TRIB | 7.037 | 50-YEAR | 661.92 | 661.80 | 0.11 | 0.22 | 0.01 | 91.80 | 358.86 | 55.34 | 51.24 |
| SOUTH TRIB | 7.037 | 100-YEAR | 662.27 | 662.14 | 0.12 | 0.23 | 0.01 | 107.82 | 397.37 | 64.81 | 53.13 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.056 | 10-YEAR | 660.81 | 660.70 | 0.12 | 0.09 | 0.01 | 43.86 | 217.14 | 53.00 | 39.70 |
| SOUTH TRIB | 7.056 | 50-YEAR | 662.03 | 661.87 | 0.16 | 0.10 | 0.01 | 75.50 | 329.95 | 100.55 | 50.68 |
| SOUTH TRIB | 7.056 | 100-YEAR | 662.38 | 662.21 | 0.17 | 0.10 | 0.02 | 88.93 | 363.78 | 117.29 | 54.37 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.075 | 10-YEAR | 660.92 | 660.82 | 0.11 | 0.11 | 0.00 | 58.87 | 208.35 | 46.78 | 42.79 |
| SOUTH TRIB | 7.075 | 50-YEAR | 662.15 | 662.00 | 0.15 | 0.12 | 0.00 | 103.94 | 313.57 | 88.49 | 53.44 |
| SOUTH TRIB | 7.075 | 100-YEAR | 662.50 | 662.34 | 0.16 | 0.12 | 0.00 | 120.92 | 345.75 | 103.33 | 57.21 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.084 | 10-YEAR | 660.98 | 660.86 | 0.12 | 0.05 | 0.00 | 23.83 | 260.97 | 29.20 | 40.39 |
| SOUTH TRIB | 7.084 | 50-YEAR | 662.21 | 662.04 | 0.18 | 0.06 | 0.01 | 30.99 | 406.06 | 68.95 | 206.70 |
| SOUTH TRIB | 7.084 | 100-YEAR | 662.55 | 662.46 | 0.09 | 0.04 | 0.01 | 155.96 | 347.55 | 66.50 | 215.96 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.094 | 10-YEAR | 661.09 | 660.97 | 0.13 | 0.11 | 0.00 | 55.54 | 219.82 | 38.64 | 38.76 |
| SOUTH TRIB | 7.094 | 50-YEAR | 662.34 | 662.17 | 0.17 | 0.12 | 0.00 | 104.82 | 328.26 | 72.92 | 45.02 |
| SOUTH TRIB | 7.094 | 100-YEAR | 662.67 | 662.49 | 0.18 | 0.09 | 0.03 | 122.22 | 362.76 | 85.02 | 46.67 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.132 | 10-YEAR | 661.29 | 661.21 | 0.09 | 0.20 | 0.00 | 62.21 | 202.32 | 49.47 | 253.53 |
| SOUTH TRIB | 7.132 | 50-YEAR | 662.55 | 662.43 | 0.11 | 0.20 | 0.01 | 118.90 | 289.35 | 97.74 | 881.88 |
| SOUTH TRIB | 7.132 | 100-YEAR | 662.88 | 662.76 | 0.12 | 0.20 | 0.01 | 138.49 | 316.75 | 114.76 | 913.31 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.136 | 10-YEAR | 661.36 | 661.19 | 0.16 | 0.04 | 0.02 | 2.07 | 311.08 | 0.85 | 29.77 |
| SOUTH TRIB | 7.136 | 50-YEAR | 662.62 | 662.39 | 0.23 | 0.04 | 0.04 | 13.31 | 487.24 | 5.45 | 35.56 |
| SOUTH TRIB | 7.136 | 100-YEAR | 662.96 | 662.71 | 0.25 | 0.04 | 0.04 | 18.76 | 543.56 | 7.69 | 37.10 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.145 | 10-YEAR | 661.43 | 661.38 | 0.05 | 0.03 | 0.04 | | 287.00 | | 54.90 |
| SOUTH TRIB | 7.145 | 50-YEAR | 662.71 | 662.63 | 0.07 | 0.04 | 0.05 | | 461.00 | | 62.02 |
| SOUTH TRIB | 7.145 | 100-YEAR | 663.05 | 662.97 | 0.08 | 0.04 | 0.05 | | 517.00 | | 63.80 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.156 Thorndale Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.168 | 10-YEAR | 661.52 | 661.46 | 0.06 | | | | 287.00 | | 71.71 |
| SOUTH TRIB | 7.168 | 50-YEAR | 663.00 | 662.92 | 0.08 | | | | 461.00 | | 113.39 |
| SOUTH TRIB | 7.168 | 100-YEAR | 663.43 | 663.34 | 0.09 | | | | 517.00 | | 124.87 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.181 | 10-YEAR | 661.54 | 661.52 | 0.02 | 0.02 | 0.00 | | 287.00 | | 84.54 |
| SOUTH TRIB | 7.181 | 50-YEAR | 663.02 | 662.99 | 0.02 | 0.01 | 0.01 | | 461.00 | | 92.60 |
| SOUTH TRIB | 7.181 | 100-YEAR | 663.45 | 663.42 | 0.03 | 0.01 | 0.01 | | 517.00 | | 94.95 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.191 | 10-YEAR | 661.57 | 661.54 | 0.03 | 0.03 | 0.00 | 90.53 | 185.85 | 10.62 | 95.25 |
| SOUTH TRIB | 7.191 | 50-YEAR | 663.04 | 663.01 | 0.03 | 0.02 | 0.00 | 199.87 | 238.52 | 22.62 | 104.37 |

HEC-RAS Plan: Nat-York (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 7.191 | 100-YEAR | 663.47 | 663.44 | 0.03 | 0.02 | 0.00 | 235.07 | 254.86 | 27.07 | 107.03 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.22 | 10-YEAR | 661.64 | 661.62 | 0.03 | 0.07 | 0.00 | 196.02 | 90.98 | | 85.61 |
| SOUTH TRIB | 7.22 | 50-YEAR | 663.08 | 663.06 | 0.03 | 0.04 | 0.00 | 337.41 | 123.59 | | 92.64 |
| SOUTH TRIB | 7.22 | 100-YEAR | 663.51 | 663.48 | 0.03 | 0.04 | 0.00 | 382.68 | 134.32 | | 94.72 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.247 | 10-YEAR | 661.71 | 661.69 | 0.03 | 0.07 | 0.00 | 219.67 | 67.33 | | 84.37 |
| SOUTH TRIB | 7.247 | 50-YEAR | 663.13 | 663.10 | 0.03 | 0.05 | 0.00 | 368.01 | 92.99 | | 91.41 |
| SOUTH TRIB | 7.247 | 100-YEAR | 663.55 | 663.52 | 0.03 | 0.04 | 0.00 | 415.44 | 101.56 | | 93.50 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.259 | 10-YEAR | 661.74 | 661.72 | 0.03 | 0.03 | 0.00 | 223.65 | 63.35 | | 85.18 |
| SOUTH TRIB | 7.259 | 50-YEAR | 663.15 | 663.12 | 0.03 | 0.02 | 0.00 | 372.17 | 88.83 | | 91.92 |
| SOUTH TRIB | 7.259 | 100-YEAR | 663.57 | 663.54 | 0.03 | 0.02 | 0.00 | 419.69 | 97.31 | | 93.93 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.265 | 10-YEAR | 661.79 | 661.70 | 0.09 | 0.03 | 0.02 | 100.20 | 172.76 | 14.04 | 65.64 |
| SOUTH TRIB | 7.265 | 50-YEAR | 663.18 | 663.11 | 0.07 | 0.02 | 0.01 | 220.16 | 213.46 | 27.38 | 73.95 |
| SOUTH TRIB | 7.265 | 100-YEAR | 663.60 | 663.53 | 0.07 | 0.01 | 0.01 | 258.43 | 226.32 | 32.25 | 76.43 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.289 | 10-YEAR | 662.04 | 661.90 | 0.14 | 0.24 | 0.01 | 127.02 | 159.98 | | 38.41 |
| SOUTH TRIB | 7.289 | 50-YEAR | 663.36 | 663.21 | 0.15 | 0.15 | 0.02 | 232.03 | 228.97 | | 47.38 |
| SOUTH TRIB | 7.289 | 100-YEAR | 663.76 | 663.61 | 0.14 | 0.14 | 0.02 | 267.88 | 249.12 | | 50.13 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.314 | 10-YEAR | 662.26 | 662.19 | 0.07 | 0.21 | 0.01 | 164.96 | 122.04 | | 49.50 |
| SOUTH TRIB | 7.314 | 50-YEAR | 663.54 | 663.46 | 0.08 | 0.18 | 0.01 | 285.14 | 175.86 | | 58.93 |
| SOUTH TRIB | 7.314 | 100-YEAR | 663.93 | 663.84 | 0.08 | 0.16 | 0.01 | 325.07 | 191.93 | | 61.81 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.331 | 10-YEAR | 662.60 | 662.31 | 0.29 | 0.28 | 0.07 | 113.88 | 173.12 | | 27.32 |
| SOUTH TRIB | 7.331 | 50-YEAR | 663.84 | 663.53 | 0.31 | 0.23 | 0.07 | 199.40 | 261.60 | | 33.98 |
| SOUTH TRIB | 7.331 | 100-YEAR | 664.21 | 663.90 | 0.31 | 0.22 | 0.07 | 228.10 | 288.90 | | 36.02 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.35 | 10-YEAR | 663.00 | 662.83 | 0.17 | 0.39 | 0.01 | 100.71 | 186.29 | | 31.40 |
| SOUTH TRIB | 7.35 | 50-YEAR | 664.20 | 663.99 | 0.21 | 0.35 | 0.01 | 182.91 | 278.09 | | 37.43 |
| SOUTH TRIB | 7.35 | 100-YEAR | 664.55 | 664.34 | 0.22 | 0.34 | 0.01 | 211.22 | 305.78 | | 39.24 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.391 | 10-YEAR | 663.49 | 663.35 | 0.14 | 0.49 | 0.00 | 96.40 | 190.60 | | 31.96 |
| SOUTH TRIB | 7.391 | 50-YEAR | 664.70 | 664.51 | 0.19 | 0.49 | 0.00 | 174.14 | 286.86 | | 37.52 |
| SOUTH TRIB | 7.391 | 100-YEAR | 665.04 | 664.85 | 0.19 | 0.48 | 0.00 | 200.60 | 315.87 | 0.53 | 52.14 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.399 | 10-YEAR | 663.57 | 663.39 | 0.17 | 0.06 | 0.01 | 27.84 | 232.43 | 26.73 | 24.85 |
| SOUTH TRIB | 7.399 | 50-YEAR | 664.79 | 664.53 | 0.27 | 0.07 | 0.02 | 53.48 | 355.88 | 51.64 | 522.90 |
| SOUTH TRIB | 7.399 | 100-YEAR | 665.15 | 664.85 | 0.29 | 0.08 | 0.03 | 62.63 | 393.81 | 60.56 | 643.78 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.406 | 10-YEAR | 663.64 | 663.42 | 0.23 | 0.06 | 0.02 | 43.37 | 207.00 | 36.63 | 25.25 |
| SOUTH TRIB | 7.406 | 50-YEAR | 664.88 | 664.56 | 0.32 | 0.07 | 0.02 | 81.08 | 311.68 | 68.24 | 28.77 |
| SOUTH TRIB | 7.406 | 100-YEAR | 665.24 | 664.89 | 0.35 | 0.08 | 0.02 | 95.12 | 342.70 | 79.18 | 29.25 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 664.05 | 663.68 | 0.37 | 0.37 | 0.04 | 56.75 | 195.73 | 34.52 | 23.95 |
| SOUTH TRIB | 7.431 | 50-YEAR | 665.31 | 664.85 | 0.46 | 0.38 | 0.04 | 104.83 | 285.65 | 70.51 | 28.77 |
| SOUTH TRIB | 7.431 | 100-YEAR | 665.66 | 665.18 | 0.48 | 0.38 | 0.04 | 121.13 | 311.47 | 84.40 | 29.76 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 664.13 | 664.01 | 0.12 | 0.05 | 0.03 | 130.01 | 130.62 | 26.37 | 31.56 |
| SOUTH TRIB | 7.447 | 50-YEAR | 665.39 | 665.23 | 0.16 | 0.05 | 0.03 | 207.10 | 198.28 | 55.62 | 36.07 |
| SOUTH TRIB | 7.447 | 100-YEAR | 665.75 | 665.54 | 0.21 | 0.06 | 0.03 | 245.53 | 232.08 | 39.39 | 62.17 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 664.17 | 664.07 | 0.09 | 0.03 | 0.01 | 122.22 | 114.22 | 24.56 | 31.79 |
| SOUTH TRIB | 7.456 | 50-YEAR | 665.44 | 665.31 | 0.13 | 0.03 | 0.01 | 188.52 | 179.91 | 49.57 | 37.04 |
| SOUTH TRIB | 7.456 | 100-YEAR | 665.80 | 665.64 | 0.16 | 0.04 | 0.01 | 222.82 | 209.78 | 35.40 | 72.44 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 664.89 | 664.83 | 0.07 | | | 122.93 | 110.49 | 27.58 | 34.58 |
| SOUTH TRIB | 7.47 | 50-YEAR | 666.77 | 666.70 | 0.07 | | | 128.32 | 188.54 | 101.13 | 299.57 |
| SOUTH TRIB | 7.47 | 100-YEAR | 666.93 | 666.86 | 0.07 | | | 147.56 | 195.07 | 125.37 | 336.11 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.01 | 58.52 | 112.68 | 89.80 | 208.30 |
| SOUTH TRIB | 7.486 | 50-YEAR | 666.77 | 666.77 | 0.00 | 0.00 | 0.01 | 104.32 | 150.39 | 163.29 | 208.30 |
| SOUTH TRIB | 7.486 | 100-YEAR | 666.94 | 666.93 | 0.00 | 0.00 | 0.01 | 117.51 | 166.31 | 184.19 | 208.30 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.00 | 232.98 | 24.22 | 3.80 | 1496.66 |
| SOUTH TRIB | 7.493 | 50-YEAR | 666.77 | 666.77 | 0.00 | 0.00 | 0.00 | 388.36 | 26.09 | 3.55 | 1585.92 |
| SOUTH TRIB | 7.493 | 100-YEAR | 666.94 | 666.94 | 0.00 | 0.00 | 0.00 | 435.61 | 28.46 | 3.93 | 1593.14 |

# Natural Conditions - York Rd




1 In Horiz. = 1300 ft  1 in Vert. = 4 ft

HEC-RAS Plan: Natural Miller F

| 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) | |
| MAINSTEM | 4.518 | 10-YEAR | 894.00 | 636.00 | 644.69 | | 644.73 | 0.000113 | 1.67 | 558.91 | 68.69 | 0.10 |
| MAINSTEM | 4.518 | 50-YEAR | 1459.00 | 636.00 | 646.33 | | 646.41 | 0.000168 | 2.28 | 673.17 | 70.33 | 0.13 |
| MAINSTEM | 4.518 | 100-YEAR | 1682.00 | 636.00 | 646.91 | | 647.00 | 0.000185 | 2.49 | 713.97 | 70.91 | 0.13 |
| MAINSTEM | 4.594 | 10-YEAR | 894.00 | 636.00 | 644.73 | | 644.77 | 0.000111 | 1.66 | 562.03 | 68.73 | 0.10 |
| MAINSTEM | 4.594 | 50-YEAR | 1459.00 | 636.00 | 646.40 | | 646.48 | 0.000164 | 2.27 | 677.92 | 70.40 | 0.12 |
| MAINSTEM | 4.594 | 100-YEAR | 1682.00 | 636.00 | 646.98 | | 647.07 | 0.000181 | 2.47 | 719.27 | 70.98 | 0.13 |
| MAINSTEM | 4.675 | 10-YEAR | 894.00 | 636.10 | 644.78 | | 644.82 | 0.000114 | 1.67 | 558.61 | 68.72 | 0.10 |
| MAINSTEM | 4.675 | 50-YEAR | 1459.00 | 636.10 | 646.47 | | 646.55 | 0.000166 | 2.27 | 676.07 | 70.41 | 0.12 |
| MAINSTEM | 4.675 | 100-YEAR | 1682.00 | 636.10 | 647.06 | | 647.15 | 0.000182 | 2.47 | 717.95 | 71.01 | 0.13 |
| MAINSTEM | 4.773 | 10-YEAR | 784.00 | 636.20 | 644.84 | | 644.88 | 0.000089 | 1.47 | 554.70 | 68.37 | 0.09 |
| MAINSTEM | 4.773 | 50-YEAR | 1227.00 | 636.20 | 646.57 | | 646.62 | 0.000118 | 1.91 | 673.98 | 70.04 | 0.10 |
| MAINSTEM | 4.773 | 100-YEAR | 1469.00 | 636.20 | 647.17 | | 647.24 | 0.000139 | 2.16 | 716.27 | 70.63 | 0.12 |
| MAINSTEM | 4.790 | 10-YEAR | 784.00 | 636.20 | 644.81 | 638.80 | 644.93 | 0.000312 | 2.76 | 284.23 | 68.35 | 0.17 |
| MAINSTEM | 4.790 | 50-YEAR | 1227.00 | 636.20 | 646.51 | 639.71 | 646.71 | 0.000420 | 3.61 | 340.24 | 69.99 | 0.20 |
| MAINSTEM | 4.790 | 100-YEAR | 1469.00 | 636.20 | 647.09 | 640.14 | 647.35 | 0.000501 | 4.09 | 359.50 | 70.56 | 0.22 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 784.00 | 636.70 | 645.28 | 640.14 | 645.42 | 0.000448 | 3.07 | 255.65 | 65.50 | 0.19 |
| MAINSTEM | 5.059 | 50-YEAR | 1227.00 | 636.70 | 647.60 | 641.04 | 647.81 | 0.000458 | 3.69 | 332.24 | 67.78 | 0.21 |
| MAINSTEM | 5.059 | 100-YEAR | 1469.00 | 636.70 | 648.71 | 641.47 | 648.96 | 0.000462 | 3.98 | 368.99 | 68.88 | 0.21 |
| MAINSTEM | 5.076 | 10-YEAR | 784.00 | 636.90 | 645.41 | | 645.46 | 0.000215 | 1.80 | 435.78 | 65.48 | 0.12 |
| MAINSTEM | 5.076 | 50-YEAR | 1227.00 | 636.90 | 647.79 | | 647.85 | 0.000206 | 2.07 | 594.14 | 67.85 | 0.12 |
| MAINSTEM | 5.076 | 100-YEAR | 1469.00 | 636.90 | 648.93 | | 649.00 | 0.000204 | 2.19 | 672.29 | 68.98 | 0.12 |
| MAINSTEM | 5.104 | 10-YEAR | 784.00 | 637.12 | 645.41 | | 645.51 | 0.000341 | 2.55 | 306.96 | 65.32 | 0.17 |
| MAINSTEM | 5.104 | 50-YEAR | 1227.00 | 637.12 | 647.76 | | 647.90 | 0.000326 | 3.01 | 407.15 | 67.69 | 0.17 |
| MAINSTEM | 5.104 | 100-YEAR | 1469.00 | 637.12 | 648.90 | | 649.06 | 0.000322 | 3.23 | 455.31 | 68.83 | 0.17 |
| MAINSTEM | 5.109 | 10-YEAR | 784.00 | 637.18 | 645.37 | 640.64 | 645.54 | 0.000547 | 3.28 | 239.21 | 65.24 | 0.21 |
| MAINSTEM | 5.109 | 50-YEAR | 1227.00 | 637.18 | 647.71 | 641.55 | 647.94 | 0.000535 | 3.89 | 315.15 | 67.60 | 0.22 |
| MAINSTEM | 5.109 | 100-YEAR | 1469.00 | 637.18 | 648.83 | 642.01 | 649.10 | 0.000532 | 4.18 | 351.63 | 68.73 | 0.22 |
| MAINSTEM | 5.110 | 10-YEAR | 784.00 | 637.22 | 645.33 | | 645.56 | 0.000656 | 3.84 | 204.41 | 44.59 | 0.24 |
| MAINSTEM | 5.110 | 50-YEAR | 1227.00 | 637.22 | 647.64 | | 647.98 | 0.000698 | 4.67 | 262.56 | 50.16 | 0.26 |
| MAINSTEM | 5.110 | 100-YEAR | 1469.00 | 637.22 | 648.75 | | 649.14 | 0.000714 | 5.06 | 290.45 | 52.83 | 0.26 |
| MAINSTEM | 5.116 | 10-YEAR | 784.00 | 637.31 | 645.33 | | 645.57 | 0.000120 | 3.91 | 200.61 | 25.00 | 0.24 |
| MAINSTEM | 5.116 | 50-YEAR | 1227.00 | 637.31 | 647.64 | | 647.99 | 0.000143 | 4.75 | 258.35 | 26.44 | 0.26 |
| MAINSTEM | 5.116 | 100-YEAR | 1469.00 | 637.31 | 648.75 | | 649.16 | 0.000146 | 5.14 | 286.24 | 31.23 | 0.27 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 634.00 | 640.26 | 646.04 | 642.93 | 646.33 | 0.000191 | 4.30 | 147.43 | 25.50 | 0.32 |
| MAINSTEM | 5.606 | 50-YEAR | 1056.00 | 640.26 | 649.63 | 644.01 | 649.94 | 0.000121 | 4.42 | 239.06 | 57.44 | 0.25 |
| MAINSTEM | 5.606 | 100-YEAR | 1227.00 | 640.26 | 651.57 | 644.41 | 651.85 | 0.000087 | 4.25 | 288.43 | 80.97 | 0.22 |
| MAINSTEM | 5.610 | 10-YEAR | 634.00 | 640.30 | 646.34 | | 646.36 | 0.000075 | 1.05 | 603.33 | 125.36 | 0.08 |
| MAINSTEM | 5.610 | 50-YEAR | 1056.00 | 640.30 | 649.95 | | 649.97 | 0.000043 | 1.09 | 970.26 | 145.88 | 0.06 |
| MAINSTEM | 5.610 | 100-YEAR | 1227.00 | 640.30 | 651.86 | | 651.88 | 0.000031 | 1.05 | 1164.78 | 156.76 | 0.05 |
| MAINSTEM | 5.629 | 10-YEAR | 634.00 | 640.37 | 646.36 | | 646.36 | 0.000064 | 0.74 | 854.27 | 215.49 | 0.07 |
| MAINSTEM | 5.629 | 50-YEAR | 1056.00 | 640.37 | 649.97 | | 649.97 | 0.000021 | 0.64 | 1646.96 | 237.14 | 0.04 |
| MAINSTEM | 5.629 | 100-YEAR | 1227.00 | 640.37 | 651.88 | | 651.88 | 0.000014 | 0.59 | 2082.70 | 248.61 | 0.03 |
| MAINSTEM | 5.632 | 10-YEAR | 634.00 | 640.39 | 646.36 | | 646.37 | 0.000056 | 0.70 | 912.18 | 411.47 | 0.06 |
| MAINSTEM | 5.632 | 50-YEAR | 1056.00 | 640.39 | 649.97 | | 649.97 | 0.000019 | 0.60 | 1754.71 | 433.12 | 0.04 |
| MAINSTEM | 5.632 | 100-YEAR | 1227.00 | 640.39 | 651.88 | | 651.88 | 0.000012 | 0.55 | 2216.91 | 444.58 | 0.03 |
| MAINSTEM | 5.639 | 10-YEAR | 634.00 | 640.43 | 646.36 | | 646.37 | 0.000060 | 0.72 | 878.97 | 737.22 | 0.06 |
| MAINSTEM | 5.639 | 50-YEAR | 1056.00 | 640.43 | 649.97 | | 649.97 | 0.000020 | 0.62 | 1695.03 | 758.86 | 0.04 |
| MAINSTEM | 5.639 | 100-YEAR | 1227.00 | 640.43 | 651.88 | | 651.88 | 0.000013 | 0.57 | 2143.32 | 770.33 | 0.03 |
| MAINSTEM | 5.697 | 10-YEAR | 634.00 | 641.14 | 646.37 | | 646.41 | 0.000289 | 1.55 | 408.83 | 311.74 | 0.14 |
| MAINSTEM | 5.697 | 50-YEAR | 1056.00 | 641.14 | 649.96 | | 649.99 | 0.000090 | 1.34 | 788.12 | 333.27 | 0.09 |
| MAINSTEM | 5.697 | 100-YEAR | 1227.00 | 641.14 | 651.87 | | 651.90 | 0.000057 | 1.24 | 989.95 | 344.73 | 0.07 |
| MAINSTEM | 5.720 | 10-YEAR | 634.00 | 641.44 | 646.35 | | 646.51 | 0.000999 | 3.20 | 197.97 | 161.07 | 0.26 |
| MAINSTEM | 5.720 | 50-YEAR | 1056.00 | 641.44 | 649.91 | | 650.05 | 0.000407 | 3.00 | 351.91 | 188.74 | 0.19 |
| MAINSTEM | 5.720 | 100-YEAR | 1227.00 | 641.44 | 651.82 | | 651.94 | 0.000272 | 2.82 | 434.63 | 203.61 | 0.16 |
| MAINSTEM | 5.725 | 10-YEAR | 634.00 | 641.52 | 646.28 | | 646.59 | 0.001791 | 4.45 | 142.63 | 93.92 | 0.36 |
| MAINSTEM | 5.725 | 50-YEAR | 1056.00 | 641.52 | 649.82 | | 650.10 | 0.000777 | 4.24 | 248.84 | 126.73 | 0.26 |
| MAINSTEM | 5.725 | 100-YEAR | 1227.00 | 641.52 | 651.74 | | 651.99 | 0.000525 | 4.01 | 306.31 | 144.48 | 0.22 |
| MAINSTEM | 5.727 | 10-YEAR | 634.00 | 641.52 | 646.23 | | 646.68 | 0.003344 | 5.38 | 117.80 | 25.00 | 0.44 |
| MAINSTEM | 5.727 | 50-YEAR | 1056.00 | 641.52 | 649.77 | | 650.18 | 0.001669 | 5.12 | 206.14 | 25.00 | 0.31 |
| MAINSTEM | 5.727 | 100-YEAR | 1227.00 | 641.52 | 651.69 | | 652.05 | 0.001202 | 4.83 | 254.12 | 27.98 | 0.27 |

HEC-RAS Plan: Natural Miller F (Continued)

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 5.732 | 10-YEAR | 634.00 | 641.59 | 646.38 | | 646.81 | 0.003878 | 5.29 | 119.74 | 25.00 | 0.43 |
| MAINSTEM | 5.732 | 50-YEAR | 1056.00 | 641.59 | 649.84 | | 650.24 | 0.002242 | 5.12 | 206.18 | 25.00 | 0.31 |
| MAINSTEM | 5.732 | 100-YEAR | 1227.00 | 641.59 | 651.74 | | 652.10 | 0.001699 | 4.84 | 253.74 | 27.64 | 0.27 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 634.00 | 641.81 | 646.81 | 644.45 | 647.18 | 0.003115 | 4.88 | 129.95 | 26.00 | 0.38 |
| MAINSTEM | 5.757 | 50-YEAR | 1056.00 | 641.81 | 650.18 | 645.52 | 650.55 | 0.001947 | 4.85 | 217.65 | 26.00 | 0.30 |
| MAINSTEM | 5.757 | 100-YEAR | 1227.00 | 641.81 | 652.07 | 645.91 | 652.40 | 0.001495 | 4.60 | 266.70 | 26.00 | 0.25 |
| MAINSTEM | 5.759 | 10-YEAR | 634.00 | 641.82 | 647.20 | | 647.22 | 0.000129 | 1.30 | 489.37 | 100.00 | 0.10 |
| MAINSTEM | 5.759 | 50-YEAR | 1056.00 | 641.82 | 650.56 | | 650.59 | 0.000071 | 1.33 | 795.30 | 100.00 | 0.08 |
| MAINSTEM | 5.759 | 100-YEAR | 1227.00 | 641.82 | 652.41 | | 652.43 | 0.000051 | 1.27 | 963.34 | 100.00 | 0.07 |
| MAINSTEM | 5.810 | 10-YEAR | 634.00 | 643.98 | 647.24 | | 647.29 | 0.000620 | 1.95 | 325.50 | 100.00 | 0.19 |
| MAINSTEM | 5.810 | 50-YEAR | 1056.00 | 643.98 | 650.58 | | 650.62 | 0.000177 | 1.60 | 659.72 | 100.00 | 0.11 |
| MAINSTEM | 5.810 | 100-YEAR | 1227.00 | 643.98 | 652.42 | | 652.45 | 0.000110 | 1.45 | 843.86 | 100.00 | 0.09 |
| MAINSTEM | 5.860 | 10-YEAR | 634.00 | 645.81 | 647.64 | 647.64 | 648.57 | 0.019302 | 7.73 | 82.06 | 100.00 | 1.01 |
| MAINSTEM | 5.860 | 50-YEAR | 1056.00 | 645.81 | 650.43 | | 650.83 | 0.002459 | 5.11 | 206.78 | 100.00 | 0.42 |
| MAINSTEM | 5.860 | 100-YEAR | 1227.00 | 645.81 | 652.31 | | 652.58 | 0.001062 | 4.21 | 291.10 | 100.00 | 0.29 |
| MAINSTEM | 5.862 | 10-YEAR | 634.00 | 645.96 | 648.45 | 648.45 | 649.70 | 0.021607 | 9.00 | 70.47 | 28.35 | 1.01 |
| MAINSTEM | 5.862 | 50-YEAR | 1056.00 | 645.96 | 650.19 | | 651.40 | 0.011607 | 8.80 | 120.02 | 28.35 | 0.75 |
| MAINSTEM | 5.862 | 100-YEAR | 1227.00 | 645.96 | 652.14 | | 652.90 | 0.005086 | 7.01 | 175.10 | 28.35 | 0.50 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 634.00 | 647.54 | 651.60 | 649.84 | 651.96 | 0.000320 | 4.85 | 130.71 | 33.00 | 0.42 |
| MAINSTEM | 6.037 | 50-YEAR | 1056.00 | 647.54 | 653.22 | 650.77 | 653.74 | 0.000320 | 5.77 | 183.00 | 33.00 | 0.43 |
| MAINSTEM | 6.037 | 100-YEAR | 1227.00 | 647.54 | 653.90 | 651.10 | 654.46 | 0.000310 | 5.99 | 204.81 | 33.00 | 0.42 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 603.00 | 647.73 | 652.15 | 649.86 | 652.40 | 0.002189 | 4.01 | 150.28 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 50-YEAR | 996.00 | 647.73 | 653.91 | 650.71 | 654.26 | 0.002167 | 4.74 | 210.25 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 100-YEAR | 1156.00 | 647.73 | 654.62 | 651.02 | 655.00 | 0.002121 | 4.94 | 234.15 | 34.00 | 0.33 |
| MAINSTEM | 6.194 | 10-YEAR | 603.00 | 647.75 | 652.41 | | 652.44 | 0.000159 | 1.31 | 461.22 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 50-YEAR | 996.00 | 647.75 | 654.27 | | 654.31 | 0.000142 | 1.54 | 645.30 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 100-YEAR | 1156.00 | 647.75 | 655.00 | | 655.04 | 0.000134 | 1.61 | 717.76 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 10-YEAR | 603.00 | 647.88 | 652.52 | | 652.55 | 0.000178 | 1.30 | 464.06 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 50-YEAR | 996.00 | 647.88 | 654.37 | | 654.41 | 0.000166 | 1.53 | 649.01 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 100-YEAR | 1156.00 | 647.88 | 655.10 | | 655.14 | 0.000160 | 1.60 | 721.72 | 100.00 | 0.11 |
| MAINSTEM | 6.418 | 10-YEAR | 603.00 | 647.88 | 652.61 | | 652.63 | 0.000167 | 1.27 | 472.97 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 50-YEAR | 996.00 | 647.88 | 654.45 | | 654.49 | 0.000159 | 1.52 | 657.40 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 100-YEAR | 1156.00 | 647.88 | 655.18 | | 655.22 | 0.000154 | 1.58 | 729.82 | 100.00 | 0.10 |
| MAINSTEM | 6.471 | 10-YEAR | 603.00 | 647.88 | 652.65 | | 652.73 | 0.000583 | 2.29 | 263.80 | 55.30 | 0.18 |
| MAINSTEM | 6.471 | 50-YEAR | 996.00 | 647.88 | 654.48 | | 654.59 | 0.000581 | 2.73 | 364.71 | 55.30 | 0.19 |
| MAINSTEM | 6.471 | 100-YEAR | 1156.00 | 647.88 | 655.19 | | 655.32 | 0.000571 | 2.86 | 404.33 | 55.30 | 0.19 |
| MAINSTEM | 6.473 | 10-YEAR | 603.00 | 647.91 | 652.61 | | 652.79 | 0.002320 | 3.43 | 175.73 | 40.00 | 0.29 |
| MAINSTEM | 6.473 | 50-YEAR | 996.00 | 647.91 | 654.42 | | 654.67 | 0.002456 | 4.01 | 248.07 | 40.00 | 0.28 |
| MAINSTEM | 6.473 | 100-YEAR | 1156.00 | 647.91 | 655.13 | | 655.40 | 0.002476 | 4.18 | 276.53 | 40.00 | 0.28 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 6.538 | 10-YEAR | 603.00 | 648.09 | 652.83 | 650.40 | 653.03 | 0.002651 | 3.61 | 167.21 | 38.00 | 0.30 |
| MAINSTEM | 6.538 | 50-YEAR | 996.00 | 648.09 | 654.69 | 651.19 | 654.97 | 0.002755 | 4.18 | 238.13 | 38.00 | 0.29 |
| MAINSTEM | 6.538 | 100-YEAR | 1156.00 | 648.09 | 655.42 | 651.48 | 655.72 | 0.002771 | 4.35 | 265.81 | 38.00 | 0.29 |
| MAINSTEM | 6.540 | 10-YEAR | 603.00 | 648.11 | 653.04 | | 653.05 | 0.000088 | 0.92 | 652.36 | 191.09 | 0.08 |
| MAINSTEM | 6.540 | 50-YEAR | 996.00 | 648.11 | 654.98 | | 654.99 | 0.000074 | 1.07 | 933.29 | 220.15 | 0.07 |
| MAINSTEM | 6.540 | 100-YEAR | 1156.00 | 648.11 | 655.73 | | 655.75 | 0.000069 | 1.11 | 1042.18 | 231.41 | 0.07 |
| MAINSTEM | 6.59 | 10-YEAR | 603.00 | 648.25 | 653.06 | | 653.07 | 0.000095 | 0.84 | 715.15 | 196.42 | 0.08 |
| MAINSTEM | 6.59 | 50-YEAR | 996.00 | 648.25 | 655.01 | | 655.03 | 0.000470 | 0.87 | 1143.06 | 1008.18 | 0.14 |
| MAINSTEM | 6.59 | 100-YEAR | 1156.00 | 648.25 | 655.76 | | 655.77 | 0.000119 | 0.61 | 1911.55 | 1050.50 | 0.08 |
| MAINSTEM | 6.6 | 10-YEAR | 603.00 | 648.30 | 653.03 | | 653.14 | 0.000703 | 2.66 | 226.57 | 199.69 | 0.22 |
| MAINSTEM | 6.6 | 50-YEAR | 996.00 | 648.30 | 654.99 | | 655.13 | 0.000567 | 3.05 | 326.52 | 234.83 | 0.21 |
| MAINSTEM | 6.6 | 100-YEAR | 1156.00 | 648.30 | 655.70 | | 655.86 | 0.000537 | 3.18 | 362.99 | 247.66 | 0.21 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 603.00 | 648.71 | 652.11 | 652.11 | 653.45 | 0.017173 | 9.29 | 64.88 | 219.18 | 1.00 |
| MAINSTEM | 6.635 | 50-YEAR | 996.00 | 648.71 | 654.41 | 653.18 | 655.48 | 0.006038 | 8.30 | 119.97 | 1224.97 | 0.65 |
| MAINSTEM | 6.635 | 100-YEAR | 1156.00 | 648.71 | 655.13 | 653.58 | 656.23 | 0.005190 | 8.42 | 137.28 | 1230.05 | 0.62 |

HEC-RAS Plan: Natural Miller F (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) | |
| MAINSTEM | 6.637 | 10-YEAR | 603.00 | 648.71 | 653.85 | | 653.85 | 0.000147 | 0.47 | 1289.28 | 1208.75 | 0.08 |
| MAINSTEM | 6.637 | 50-YEAR | 996.00 | 648.71 | 655.80 | | 655.80 | 0.000013 | 0.28 | 3673.81 | 1234.77 | 0.03 |
| MAINSTEM | 6.637 | 100-YEAR | 1156.00 | 648.71 | 656.56 | | 656.56 | 0.000008 | 0.26 | 4616.02 | 1240.13 | 0.02 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 603.00 | 649.07 | 653.53 | | 654.18 | 0.012819 | 6.49 | 92.90 | 40.25 | 0.75 |
| MAINSTEM | 6.639 | 50-YEAR | 996.00 | 649.07 | 655.58 | | 656.02 | 0.005078 | 5.31 | 187.61 | 52.26 | 0.49 |
| MAINSTEM | 6.639 | 100-YEAR | 1156.00 | 649.07 | 656.36 | | 656.75 | 0.003926 | 5.02 | 230.40 | 56.86 | 0.44 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 603.00 | 649.86 | 654.58 | 653.77 | 655.03 | 0.007927 | 5.39 | 111.84 | 47.66 | 0.62 |
| MAINSTEM | 6.642 | 50-YEAR | 996.00 | 649.86 | 656.01 | 654.62 | 656.43 | 0.005340 | 5.25 | 189.65 | 61.64 | 0.53 |
| MAINSTEM | 6.642 | 100-YEAR | 1156.00 | 649.86 | 656.70 | 654.91 | 657.08 | 0.004086 | 4.92 | 235.01 | 68.64 | 0.47 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 603.00 | 649.86 | 654.75 | | 655.14 | 0.006535 | 5.02 | 120.18 | 49.23 | 0.57 |
| MAINSTEM | 6.643 | 50-YEAR | 996.00 | 649.86 | 656.11 | | 656.51 | 0.004897 | 5.08 | 195.98 | 62.66 | 0.51 |
| MAINSTEM | 6.643 | 100-YEAR | 1156.00 | 649.86 | 656.77 | | 657.13 | 0.003874 | 4.82 | 239.79 | 69.34 | 0.46 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 603.00 | 649.30 | 655.39 | | 655.39 | 0.000052 | 0.22 | 2793.70 | 1612.85 | 0.03 |
| MAINSTEM | 6.644 | 50-YEAR | 996.00 | 649.30 | 656.75 | | 656.75 | 0.000022 | 0.21 | 5139.73 | 1817.99 | 0.02 |
| MAINSTEM | 6.644 | 100-YEAR | 1156.00 | 649.30 | 657.35 | | 657.35 | 0.000016 | 0.20 | 6254.57 | 1907.76 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.645 | 10-YEAR | 314.00 | 653.20 | 655.18 | 655.18 | 655.73 | 0.017507 | 6.90 | 61.86 | 54.47 | 0.86 |
| SOUTH TRIB | 6.645 | 50-YEAR | 506.00 | 653.20 | 656.62 | | 656.84 | 0.003792 | 4.62 | 150.54 | 68.99 | 0.44 |
| SOUTH TRIB | 6.645 | 100-YEAR | 570.00 | 653.20 | 657.25 | | 657.41 | 0.002284 | 4.01 | 196.28 | 75.34 | 0.35 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.664 | 10-YEAR | 314.00 | 653.30 | 656.28 | 655.36 | 656.48 | 0.003892 | 4.26 | 96.40 | 49.31 | 0.44 |
| SOUTH TRIB | 6.664 | 50-YEAR | 506.00 | 653.30 | 656.97 | | 657.25 | 0.004161 | 5.07 | 132.83 | 55.24 | 0.47 |
| SOUTH TRIB | 6.664 | 100-YEAR | 570.00 | 653.30 | 657.46 | | 657.70 | 0.003117 | 4.77 | 160.83 | 59.39 | 0.41 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.683 | 10-YEAR | 314.00 | 653.40 | 656.63 | | 656.90 | 0.004069 | 4.61 | 84.27 | 37.11 | 0.45 |
| SOUTH TRIB | 6.683 | 50-YEAR | 506.00 | 653.40 | 657.34 | | 657.73 | 0.004833 | 5.73 | 112.26 | 41.95 | 0.51 |
| SOUTH TRIB | 6.683 | 100-YEAR | 570.00 | 653.40 | 657.73 | | 658.11 | 0.004226 | 5.70 | 128.83 | 44.57 | 0.48 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.721 | 10-YEAR | 314.00 | 653.70 | 657.36 | | 657.60 | 0.003055 | 4.34 | 89.65 | 36.35 | 0.40 |
| SOUTH TRIB | 6.721 | 50-YEAR | 506.00 | 653.70 | 658.21 | | 658.55 | 0.003495 | 5.33 | 125.00 | 46.89 | 0.44 |
| SOUTH TRIB | 6.721 | 100-YEAR | 570.00 | 653.70 | 658.51 | | 658.86 | 0.003398 | 5.48 | 139.44 | 50.56 | 0.44 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.759 | 10-YEAR | 314.00 | 654.00 | 657.94 | | 658.12 | 0.002190 | 3.85 | 100.51 | 36.08 | 0.34 |
| SOUTH TRIB | 6.759 | 50-YEAR | 506.00 | 654.00 | 658.88 | | 659.14 | 0.002445 | 4.70 | 136.92 | 41.14 | 0.37 |
| SOUTH TRIB | 6.759 | 100-YEAR | 570.00 | 654.00 | 659.16 | | 659.45 | 0.002476 | 4.91 | 148.81 | 42.66 | 0.38 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.797 | 10-YEAR | 314.00 | 654.30 | 658.41 | | 658.55 | 0.002067 | 2.97 | 105.70 | 36.40 | 0.31 |
| SOUTH TRIB | 6.797 | 50-YEAR | 506.00 | 654.30 | 659.43 | | 659.62 | 0.002234 | 3.48 | 145.37 | 41.69 | 0.33 |
| SOUTH TRIB | 6.797 | 100-YEAR | 570.00 | 654.30 | 659.73 | | 659.93 | 0.002257 | 3.61 | 158.00 | 43.23 | 0.33 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.834 | 10-YEAR | 314.00 | 654.60 | 658.77 | | 658.90 | 0.001455 | 3.26 | 123.53 | 44.24 | 0.28 |
| SOUTH TRIB | 6.834 | 50-YEAR | 506.00 | 654.60 | 659.82 | | 659.98 | 0.001514 | 3.86 | 173.66 | 51.58 | 0.30 |
| SOUTH TRIB | 6.834 | 100-YEAR | 570.00 | 654.60 | 660.12 | | 660.30 | 0.001520 | 4.02 | 189.60 | 53.70 | 0.30 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.872 | 10-YEAR | 314.00 | 654.90 | 659.06 | | 659.25 | 0.001948 | 3.77 | 101.42 | 33.71 | 0.33 |
| SOUTH TRIB | 6.872 | 50-YEAR | 506.00 | 654.90 | 660.11 | | 660.36 | 0.002124 | 4.57 | 139.08 | 38.40 | 0.35 |
| SOUTH TRIB | 6.872 | 100-YEAR | 570.00 | 654.90 | 660.41 | | 660.69 | 0.002164 | 4.79 | 150.76 | 39.75 | 0.36 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 314.00 | 654.90 | 659.21 | | 659.38 | 0.001703 | 3.61 | 106.47 | 34.38 | 0.31 |
| SOUTH TRIB | 6.886 | 50-YEAR | 506.00 | 654.90 | 660.28 | | 660.51 | 0.001876 | 4.39 | 145.57 | 39.16 | 0.33 |
| SOUTH TRIB | 6.886 | 100-YEAR | 570.00 | 654.90 | 660.58 | | 660.83 | 0.001917 | 4.60 | 157.66 | 40.52 | 0.34 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.904 | 10-YEAR | 314.00 | 655.30 | 659.38 | | 659.58 | 0.002201 | 3.95 | 97.55 | 34.75 | 0.35 |
| SOUTH TRIB | 6.904 | 50-YEAR | 506.00 | 655.30 | 660.46 | | 660.73 | 0.002285 | 4.71 | 140.73 | 45.41 | 0.37 |
| SOUTH TRIB | 6.904 | 100-YEAR | 570.00 | 655.30 | 660.76 | | 661.05 | 0.002277 | 4.89 | 155.23 | 48.47 | 0.37 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.942 | 10-YEAR | 314.00 | 655.60 | 659.81 | | 659.98 | 0.001813 | 3.67 | 106.46 | 36.81 | 0.31 |
| SOUTH TRIB | 6.942 | 50-YEAR | 506.00 | 655.60 | 660.92 | | 661.14 | 0.001887 | 4.37 | 152.78 | 47.02 | 0.33 |
| SOUTH TRIB | 6.942 | 100-YEAR | 570.00 | 655.60 | 661.23 | | 661.47 | 0.001894 | 4.55 | 167.80 | 49.88 | 0.34 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.956 | 10-YEAR | 314.00 | 655.05 | 659.94 | 658.03 | 660.12 | 0.002342 | 3.47 | 95.10 | 135.51 | 0.33 |
| SOUTH TRIB | 6.956 | 50-YEAR | 506.00 | 655.05 | 661.05 | 658.75 | 661.29 | 0.002427 | 4.05 | 132.84 | 312.94 | 0.35 |
| SOUTH TRIB | 6.956 | 100-YEAR | 570.00 | 655.05 | 661.35 | 658.95 | 661.61 | 0.002461 | 4.21 | 144.25 | 567.85 | 0.36 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.98 | 10-YEAR | 314.00 | 655.90 | 660.23 | | 660.37 | 0.001497 | 3.39 | 115.78 | 38.48 | 0.29 |
| SOUTH TRIB | 6.98 | 50-YEAR | 506.00 | 655.90 | 661.36 | | 661.55 | 0.001555 | 4.04 | 163.25 | 45.61 | 0.30 |
| SOUTH TRIB | 6.98 | 100-YEAR | 570.00 | 655.90 | 661.68 | | 661.88 | 0.001570 | 4.21 | 178.02 | 47.66 | 0.31 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.999 | 10-YEAR | 314.00 | 656.10 | 660.38 | | 660.53 | 0.001595 | 3.48 | 112.50 | 37.58 | 0.30 |
| SOUTH TRIB | 6.999 | 50-YEAR | 506.00 | 656.10 | 661.51 | | 661.71 | 0.001635 | 4.12 | 158.56 | 43.78 | 0.31 |
| SOUTH TRIB | 6.999 | 100-YEAR | 570.00 | 656.10 | 661.83 | | 662.05 | 0.001735 | 4.40 | 173.32 | 50.11 | 0.32 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.037 | 10-YEAR | 314.00 | 655.90 | 660.66 | | 660.74 | 0.000706 | 2.48 | 153.65 | 44.89 | 0.20 |
| SOUTH TRIB | 7.037 | 50-YEAR | 506.00 | 655.90 | 661.83 | | 661.94 | 0.000781 | 3.02 | 209.93 | 51.38 | 0.22 |
| SOUTH TRIB | 7.037 | 100-YEAR | 570.00 | 655.90 | 662.17 | | 662.29 | 0.000795 | 3.17 | 227.70 | 53.27 | 0.22 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.056 | 10-YEAR | 314.00 | 656.00 | 660.72 | | 660.84 | 0.001085 | 3.06 | 129.42 | 39.82 | 0.25 |

HEC-RAS Plan: Natural Miller F (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.056 | 50-YEAR | 506.00 | 656.00 | 661.89 | | 662.05 | 0.001199 | 3.73 | 181.79 | 50.95 | 0.27 |
| SOUTH TRIB | 7.056 | 100-YEAR | 570.00 | 656.00 | 662.23 | | 662.40 | 0.001208 | 3.89 | 199.73 | 54.65 | 0.27 |
| SOUTH TRIB | 7.075 | 10-YEAR | 314.00 | 656.20 | 660.84 | | 660.94 | 0.001061 | 2.99 | 134.29 | 42.92 | 0.24 |
| SOUTH TRIB | 7.075 | 50-YEAR | 506.00 | 656.20 | 662.02 | | 662.17 | 0.001124 | 3.58 | 190.80 | 53.69 | 0.26 |
| SOUTH TRIB | 7.075 | 100-YEAR | 570.00 | 656.20 | 662.37 | | 662.52 | 0.001130 | 3.73 | 209.82 | 57.46 | 0.26 |
| SOUTH TRIB | 7.084 | 10-YEAR | 314.00 | 655.01 | 660.88 | 658.14 | 661.00 | 0.001018 | 2.92 | 128.82 | 40.52 | 0.23 |
| SOUTH TRIB | 7.084 | 50-YEAR | 506.00 | 655.01 | 662.06 | 658.94 | 662.23 | 0.001198 | 3.66 | 187.91 | 210.04 | 0.26 |
| SOUTH TRIB | 7.084 | 100-YEAR | 570.00 | 655.01 | 662.48 | 659.16 | 662.57 | 0.000691 | 2.91 | 359.89 | 216.04 | 0.20 |
| SOUTH TRIB | 7.094 | 10-YEAR | 314.00 | 656.40 | 660.99 | | 661.11 | 0.001226 | 3.19 | 123.48 | 38.85 | 0.26 |
| SOUTH TRIB | 7.094 | 50-YEAR | 506.00 | 656.40 | 662.19 | | 662.36 | 0.001256 | 3.77 | 174.09 | 45.12 | 0.28 |
| SOUTH TRIB | 7.094 | 100-YEAR | 570.00 | 656.40 | 662.51 | | 662.69 | 0.001284 | 3.95 | 188.70 | 46.78 | 0.28 |
| SOUTH TRIB | 7.132 | 10-YEAR | 314.00 | 655.41 | 661.22 | 658.60 | 661.31 | 0.000878 | 2.73 | 149.90 | 276.75 | 0.21 |
| SOUTH TRIB | 7.132 | 50-YEAR | 506.00 | 655.41 | 662.45 | 659.30 | 662.56 | 0.000884 | 3.16 | 214.11 | 883.46 | 0.22 |
| SOUTH TRIB | 7.132 | 100-YEAR | 570.00 | 655.41 | 662.78 | 659.49 | 662.90 | 0.000897 | 3.29 | 232.90 | 914.91 | 0.22 |
| SOUTH TRIB | 7.136 | 10-YEAR | 314.00 | 656.30 | 661.21 | | 661.37 | 0.001785 | 3.25 | 99.16 | 29.84 | 0.29 |
| SOUTH TRIB | 7.136 | 50-YEAR | 506.00 | 656.30 | 662.41 | | 662.64 | 0.001822 | 3.92 | 138.40 | 35.64 | 0.30 |
| SOUTH TRIB | 7.136 | 100-YEAR | 570.00 | 656.30 | 662.73 | | 662.98 | 0.001858 | 4.11 | 150.01 | 37.18 | 0.31 |
| SOUTH TRIB | 7.145 | 10-YEAR | 287.00 | 655.49 | 661.39 | 657.92 | 661.44 | 0.000364 | 1.72 | 166.83 | 54.97 | 0.14 |
| SOUTH TRIB | 7.145 | 50-YEAR | 461.00 | 655.49 | 662.65 | 658.48 | 662.72 | 0.000423 | 2.17 | 211.98 | 62.10 | 0.16 |
| SOUTH TRIB | 7.145 | 100-YEAR | 517.00 | 655.49 | 662.99 | 658.62 | 663.07 | 0.000442 | 2.31 | 224.11 | 63.87 | 0.16 |
| SOUTH TRIB | 7.156 Thorndale Ave | | Culvert | | | | | | | | | |
| SOUTH TRIB | 7.168 | 10-YEAR | 287.00 | 656.61 | 661.48 | 658.60 | 661.54 | 0.000532 | 1.93 | 148.77 | 71.99 | 0.17 |
| SOUTH TRIB | 7.168 | 50-YEAR | 461.00 | 656.61 | 662.93 | 659.07 | 663.01 | 0.000502 | 2.29 | 201.09 | 114.36 | 0.17 |
| SOUTH TRIB | 7.168 | 100-YEAR | 517.00 | 656.61 | 663.36 | 659.20 | 663.44 | 0.000495 | 2.39 | 216.35 | 125.14 | 0.17 |
| SOUTH TRIB | 7.181 | 10-YEAR | 287.00 | 657.30 | 661.53 | | 661.56 | 0.000363 | 1.23 | 234.16 | 84.61 | 0.13 |
| SOUTH TRIB | 7.181 | 50-YEAR | 461.00 | 657.30 | 663.01 | | 663.03 | 0.000243 | 1.26 | 364.81 | 92.68 | 0.11 |
| SOUTH TRIB | 7.181 | 100-YEAR | 517.00 | 657.30 | 663.44 | | 663.46 | 0.000223 | 1.28 | 405.19 | 95.03 | 0.11 |
| SOUTH TRIB | 7.191 | 10-YEAR | 287.00 | 655.30 | 661.55 | | 661.59 | 0.000379 | 1.71 | 231.43 | 95.34 | 0.14 |
| SOUTH TRIB | 7.191 | 50-YEAR | 461.00 | 655.30 | 663.02 | | 663.05 | 0.000247 | 1.67 | 378.17 | 104.46 | 0.12 |
| SOUTH TRIB | 7.191 | 100-YEAR | 517.00 | 655.30 | 663.45 | | 663.48 | 0.000225 | 1.66 | 423.59 | 107.12 | 0.12 |
| SOUTH TRIB | 7.22 | 10-YEAR | 287.00 | 656.50 | 661.63 | | 661.65 | 0.000439 | 1.53 | 231.43 | 85.67 | 0.14 |
| SOUTH TRIB | 7.22 | 50-YEAR | 461.00 | 656.50 | 663.07 | | 663.10 | 0.000298 | 1.47 | 360.03 | 92.71 | 0.12 |
| SOUTH TRIB | 7.22 | 100-YEAR | 517.00 | 656.50 | 663.49 | | 663.52 | 0.000273 | 1.46 | 399.85 | 94.78 | 0.12 |
| SOUTH TRIB | 7.247 | 10-YEAR | 287.00 | 656.80 | 661.70 | | 661.72 | 0.000526 | 1.54 | 220.03 | 84.42 | 0.15 |
| SOUTH TRIB | 7.247 | 50-YEAR | 461.00 | 656.80 | 663.11 | | 663.14 | 0.000344 | 1.46 | 344.80 | 91.48 | 0.13 |
| SOUTH TRIB | 7.247 | 100-YEAR | 517.00 | 656.80 | 663.54 | | 663.56 | 0.000313 | 1.44 | 383.73 | 93.57 | 0.12 |
| SOUTH TRIB | 7.259 | 10-YEAR | 287.00 | 657.00 | 661.73 | | 661.75 | 0.000512 | 1.50 | 222.98 | 85.23 | 0.15 |
| SOUTH TRIB | 7.259 | 50-YEAR | 461.00 | 657.00 | 663.14 | | 663.16 | 0.000338 | 1.43 | 347.69 | 91.98 | 0.12 |
| SOUTH TRIB | 7.259 | 100-YEAR | 517.00 | 657.00 | 663.55 | | 663.58 | 0.000308 | 1.41 | 386.64 | 93.99 | 0.12 |
| SOUTH TRIB | 7.265 | 10-YEAR | 287.00 | 657.38 | 661.71 | | 661.80 | 0.001431 | 2.93 | 136.85 | 65.70 | 0.26 |
| SOUTH TRIB | 7.265 | 50-YEAR | 461.00 | 657.38 | 663.12 | | 663.19 | 0.000808 | 2.69 | 235.56 | 74.03 | 0.20 |
| SOUTH TRIB | 7.265 | 100-YEAR | 517.00 | 657.38 | 663.54 | | 663.61 | 0.000710 | 2.65 | 267.14 | 76.51 | 0.19 |
| SOUTH TRIB | 7.289 | 10-YEAR | 287.00 | 657.30 | 661.91 | | 662.05 | 0.002379 | 3.44 | 99.92 | 38.46 | 0.33 |
| SOUTH TRIB | 7.289 | 50-YEAR | 461.00 | 657.30 | 663.22 | | 663.37 | 0.001884 | 3.50 | 156.37 | 47.46 | 0.30 |
| SOUTH TRIB | 7.289 | 100-YEAR | 517.00 | 657.30 | 663.62 | | 663.77 | 0.001733 | 3.48 | 176.05 | 50.22 | 0.29 |
| SOUTH TRIB | 7.314 | 10-YEAR | 287.00 | 657.10 | 662.19 | | 662.26 | 0.001151 | 2.47 | 139.05 | 49.55 | 0.23 |
| SOUTH TRIB | 7.314 | 50-YEAR | 461.00 | 657.10 | 663.47 | | 663.55 | 0.000998 | 2.60 | 208.22 | 59.00 | 0.22 |
| SOUTH TRIB | 7.314 | 100-YEAR | 517.00 | 657.10 | 663.85 | | 663.94 | 0.000941 | 2.61 | 231.69 | 61.89 | 0.21 |
| SOUTH TRIB | 7.331 | 10-YEAR | 287.00 | 657.60 | 662.31 | | 662.60 | 0.005649 | 4.73 | 67.98 | 27.35 | 0.49 |
| SOUTH TRIB | 7.331 | 50-YEAR | 461.00 | 657.60 | 663.54 | | 663.85 | 0.004565 | 4.87 | 105.57 | 34.03 | 0.46 |
| SOUTH TRIB | 7.331 | 100-YEAR | 517.00 | 657.60 | 663.91 | | 664.22 | 0.004210 | 4.84 | 118.73 | 36.07 | 0.44 |
| SOUTH TRIB | 7.35 | 10-YEAR | 287.00 | 658.10 | 662.83 | | 663.00 | 0.002621 | 3.70 | 89.59 | 31.42 | 0.34 |
| SOUTH TRIB | 7.35 | 50-YEAR | 461.00 | 658.10 | 663.99 | | 664.21 | 0.002556 | 4.11 | 129.66 | 37.46 | 0.35 |
| SOUTH TRIB | 7.35 | 100-YEAR | 517.00 | 658.10 | 664.34 | | 664.56 | 0.002484 | 4.17 | 143.02 | 39.27 | 0.35 |
| SOUTH TRIB | 7.391 | 10-YEAR | 287.00 | 658.50 | 663.35 | | 663.50 | 0.001981 | 3.35 | 98.28 | 31.97 | 0.30 |
| SOUTH TRIB | 7.391 | 50-YEAR | 461.00 | 658.50 | 664.51 | | 664.70 | 0.002054 | 3.82 | 138.73 | 37.54 | 0.31 |
| SOUTH TRIB | 7.391 | 100-YEAR | 517.00 | 658.50 | 664.85 | | 665.05 | 0.002038 | 3.92 | 153.32 | 52.38 | 0.31 |
| SOUTH TRIB | 7.399 | 10-YEAR | 287.00 | 657.49 | 663.40 | 660.52 | 663.57 | 0.001265 | 3.61 | 97.03 | 24.86 | 0.27 |
| SOUTH TRIB | 7.399 | 50-YEAR | 461.00 | 657.49 | 664.53 | 661.40 | 664.80 | 0.001579 | 4.58 | 126.94 | 529.36 | 0.31 |
| SOUTH TRIB | 7.399 | 100-YEAR | 517.00 | 657.49 | 664.86 | 661.65 | 665.15 | 0.001646 | 4.83 | 136.13 | 644.54 | 0.32 |
| SOUTH TRIB | 7.406 | 10-YEAR | 287.00 | 658.60 | 663.42 | | 663.65 | 0.002079 | 4.30 | 84.94 | 25.25 | 0.34 |
| SOUTH TRIB | 7.406 | 50-YEAR | 461.00 | 658.60 | 664.57 | | 664.89 | 0.002313 | 5.22 | 115.97 | 28.77 | 0.38 |

HEC-RAS Plan: Natural Miller F (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.406 | 100-YEAR | 517.00 | 658.60 | 664.90 | | 665.24 | 0.002337 | 5.44 | 125.54 | 29.26 | 0.38 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 287.00 | 659.00 | 663.69 | | 664.05 | 0.004018 | 5.58 | 67.62 | 23.95 | 0.47 |
| SOUTH TRIB | 7.431 | 50-YEAR | 461.00 | 659.00 | 664.85 | | 665.31 | 0.003898 | 6.43 | 98.38 | 28.79 | 0.48 |
| SOUTH TRIB | 7.431 | 100-YEAR | 517.00 | 659.00 | 665.18 | | 665.66 | 0.003818 | 6.62 | 108.13 | 29.77 | 0.48 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 287.00 | 658.10 | 664.01 | | 664.13 | 0.001172 | 3.26 | 113.75 | 31.57 | 0.26 |
| SOUTH TRIB | 7.447 | 50-YEAR | 461.00 | 658.10 | 665.23 | | 665.39 | 0.001308 | 3.98 | 154.91 | 36.08 | 0.28 |
| SOUTH TRIB | 7.447 | 100-YEAR | 517.00 | 658.10 | 665.54 | | 665.75 | 0.001523 | 4.43 | 169.41 | 62.42 | 0.31 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 261.00 | 658.10 | 664.07 | 660.99 | 664.17 | 0.000861 | 2.81 | 111.06 | 31.79 | 0.22 |
| SOUTH TRIB | 7.456 | 50-YEAR | 418.00 | 658.10 | 665.31 | 661.71 | 665.44 | 0.001035 | 3.57 | 157.73 | 37.21 | 0.25 |
| SOUTH TRIB | 7.456 | 100-YEAR | 468.00 | 658.10 | 665.64 | 661.91 | 665.80 | 0.001185 | 3.95 | 175.86 | 72.69 | 0.27 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 261.00 | 658.10 | 664.83 | 660.99 | 664.89 | 0.000507 | 2.37 | 130.70 | 34.59 | 0.17 |
| SOUTH TRIB | 7.47 | 50-YEAR | 418.00 | 658.10 | 666.70 | 661.70 | 666.77 | 0.000583 | 3.06 | 370.05 | 300.24 | 0.19 |
| SOUTH TRIB | 7.47 | 100-YEAR | 468.00 | 658.10 | 666.87 | 661.90 | 666.93 | 0.000580 | 3.09 | 423.27 | 337.19 | 0.19 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 261.00 | 655.06 | 664.90 | | 664.90 | 0.000006 | 0.38 | 1056.66 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 50-YEAR | 418.00 | 655.06 | 666.78 | | 666.78 | 0.000006 | 0.43 | 1446.97 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 100-YEAR | 468.00 | 655.06 | 666.94 | | 666.94 | 0.000007 | 0.47 | 1481.02 | 208.30 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 261.00 | 655.05 | 664.90 | | 664.90 | 0.000001 | 0.11 | 4701.09 | 1496.80 | 0.01 |
| SOUTH TRIB | 7.493 | 50-YEAR | 418.00 | 655.05 | 666.78 | | 666.78 | 0.000000 | 0.09 | 7600.80 | 1586.04 | 0.01 |
| SOUTH TRIB | 7.493 | 100-YEAR | 468.00 | 655.05 | 666.94 | | 666.94 | 0.000000 | 0.10 | 7861.22 | 1593.33 | 0.01 |

HEC-RAS Plan: Natural Miller F

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 4.518 | 10-YEAR | 644.73 | 644.69 | 0.04 | 0.05 | 0.01 | 11.61 | 870.78 | 11.61 | 68.69 |
| MAINSTEM | 4.518 | 50-YEAR | 646.41 | 646.33 | 0.08 | 0.06 | 0.01 | 22.42 | 1414.15 | 22.42 | 70.33 |
| MAINSTEM | 4.518 | 100-YEAR | 647.00 | 646.91 | 0.09 | 0.06 | 0.01 | 27.25 | 1627.50 | 27.25 | 70.91 |
| MAINSTEM | 4.594 | 10-YEAR | 644.77 | 644.73 | 0.04 | 0.04 | 0.00 | 11.67 | 870.66 | 11.67 | 68.73 |
| MAINSTEM | 4.594 | 50-YEAR | 646.48 | 646.40 | 0.08 | 0.07 | 0.00 | 22.57 | 1413.87 | 22.57 | 70.40 |
| MAINSTEM | 4.594 | 100-YEAR | 647.07 | 646.98 | 0.09 | 0.07 | 0.00 | 27.43 | 1627.14 | 27.43 | 70.98 |
| MAINSTEM | 4.675 | 10-YEAR | 644.82 | 644.78 | 0.04 | 0.05 | 0.00 | 11.67 | 870.65 | 11.67 | 68.72 |
| MAINSTEM | 4.675 | 50-YEAR | 646.55 | 646.47 | 0.08 | 0.07 | 0.00 | 22.64 | 1413.71 | 22.64 | 70.41 |
| MAINSTEM | 4.675 | 100-YEAR | 647.15 | 647.06 | 0.09 | 0.08 | 0.00 | 27.55 | 1626.91 | 27.55 | 71.01 |
| MAINSTEM | 4.773 | 10-YEAR | 644.88 | 644.84 | 0.03 | 0.05 | 0.00 | 10.26 | 764.66 | 9.07 | 68.37 |
| MAINSTEM | 4.773 | 50-YEAR | 646.62 | 646.57 | 0.06 | 0.07 | 0.00 | 19.17 | 1190.88 | 16.95 | 70.04 |
| MAINSTEM | 4.773 | 100-YEAR | 647.24 | 647.17 | 0.07 | 0.08 | 0.00 | 24.25 | 1423.32 | 21.43 | 70.63 |
| MAINSTEM | 4.790 | 10-YEAR | 644.93 | 644.81 | 0.12 | 0.01 | 0.04 | | 784.00 | | 68.35 |
| MAINSTEM | 4.790 | 50-YEAR | 646.71 | 646.51 | 0.20 | 0.02 | 0.07 | | 1227.00 | | 69.99 |
| MAINSTEM | 4.790 | 100-YEAR | 647.35 | 647.09 | 0.26 | 0.02 | 0.09 | | 1469.00 | | 70.56 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 645.42 | 645.28 | 0.15 | | | | 784.00 | | 65.50 |
| MAINSTEM | 5.059 | 50-YEAR | 647.81 | 647.60 | 0.21 | | | | 1227.00 | | 67.78 |
| MAINSTEM | 5.059 | 100-YEAR | 648.96 | 648.71 | 0.25 | | | | 1469.00 | | 68.86 |
| MAINSTEM | 5.076 | 10-YEAR | 645.46 | 645.41 | 0.05 | 0.03 | 0.01 | | 784.00 | | 65.48 |
| MAINSTEM | 5.076 | 50-YEAR | 647.85 | 647.79 | 0.07 | 0.03 | 0.01 | | 1227.00 | | 67.85 |
| MAINSTEM | 5.076 | 100-YEAR | 649.00 | 648.93 | 0.07 | 0.03 | 0.02 | | 1469.00 | | 68.98 |
| MAINSTEM | 5.104 | 10-YEAR | 645.51 | 645.41 | 0.10 | 0.03 | 0.02 | | 784.00 | | 65.32 |
| MAINSTEM | 5.104 | 50-YEAR | 647.90 | 647.76 | 0.14 | 0.03 | 0.02 | | 1227.00 | | 67.69 |
| MAINSTEM | 5.104 | 100-YEAR | 649.06 | 648.90 | 0.16 | 0.03 | 0.03 | | 1469.00 | | 68.83 |
| MAINSTEM | 5.109 | 10-YEAR | 645.54 | 645.37 | 0.17 | 0.01 | 0.02 | | 784.00 | | 65.24 |
| MAINSTEM | 5.109 | 50-YEAR | 647.94 | 647.71 | 0.24 | 0.01 | 0.03 | | 1227.00 | | 67.60 |
| MAINSTEM | 5.109 | 100-YEAR | 649.10 | 648.83 | 0.27 | 0.01 | 0.03 | | 1469.00 | | 68.73 |
| MAINSTEM | 5.110 | 10-YEAR | 645.56 | 645.33 | 0.23 | 0.00 | 0.02 | | 784.00 | | 44.59 |
| MAINSTEM | 5.110 | 50-YEAR | 647.98 | 647.64 | 0.34 | 0.00 | 0.03 | | 1227.00 | | 50.16 |
| MAINSTEM | 5.110 | 100-YEAR | 649.14 | 648.75 | 0.40 | 0.00 | 0.04 | | 1469.00 | | 52.83 |
| MAINSTEM | 5.116 | 10-YEAR | 645.57 | 645.33 | 0.24 | 0.01 | 0.00 | | 784.00 | | 25.00 |
| MAINSTEM | 5.116 | 50-YEAR | 647.99 | 647.64 | 0.35 | 0.01 | 0.01 | 0.02 | 1226.96 | 0.02 | 26.44 |
| MAINSTEM | 5.116 | 100-YEAR | 649.16 | 648.75 | 0.41 | 0.01 | 0.01 | 0.25 | 1468.50 | 0.25 | 31.23 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 646.33 | 646.04 | 0.29 | | | | 634.00 | | 25.50 |
| MAINSTEM | 5.606 | 50-YEAR | 649.94 | 649.63 | 0.30 | | | | 1056.00 | | 57.44 |
| MAINSTEM | 5.606 | 100-YEAR | 651.85 | 651.57 | 0.28 | | | | 1227.00 | | 80.97 |
| MAINSTEM | 5.610 | 10-YEAR | 646.36 | 646.34 | 0.02 | 0.00 | 0.03 | | 634.00 | | 125.36 |
| MAINSTEM | 5.610 | 50-YEAR | 649.97 | 649.95 | 0.02 | 0.00 | 0.03 | | 1056.00 | | 145.88 |
| MAINSTEM | 5.610 | 100-YEAR | 651.88 | 651.86 | 0.02 | 0.00 | 0.03 | | 1227.00 | | 156.76 |
| MAINSTEM | 5.629 | 10-YEAR | 646.36 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 215.49 |
| MAINSTEM | 5.629 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 237.14 |
| MAINSTEM | 5.629 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 248.61 |
| MAINSTEM | 5.632 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 411.47 |
| MAINSTEM | 5.632 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 433.12 |
| MAINSTEM | 5.632 | 100-YEAR | 651.88 | 651.88 | 0.00 | 0.00 | 0.00 | | 1227.00 | | 444.58 |
| MAINSTEM | 5.639 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 737.22 |
| MAINSTEM | 5.639 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 758.86 |
| MAINSTEM | 5.639 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 770.33 |
| MAINSTEM | 5.697 | 10-YEAR | 646.41 | 646.37 | 0.04 | 0.03 | 0.01 | | 634.00 | | 311.74 |
| MAINSTEM | 5.697 | 50-YEAR | 649.99 | 649.96 | 0.03 | 0.01 | 0.01 | | 1056.00 | | 333.27 |
| MAINSTEM | 5.697 | 100-YEAR | 651.90 | 651.87 | 0.02 | 0.01 | 0.01 | | 1227.00 | | 344.73 |
| MAINSTEM | 5.720 | 10-YEAR | 646.51 | 646.35 | 0.16 | 0.06 | 0.04 | | 634.00 | | 161.07 |
| MAINSTEM | 5.720 | 50-YEAR | 650.05 | 649.91 | 0.14 | 0.02 | 0.03 | | 1056.00 | | 188.74 |
| MAINSTEM | 5.720 | 100-YEAR | 651.94 | 651.82 | 0.12 | 0.01 | 0.03 | | 1227.00 | | 203.61 |

HEC-RAS Plan: Natural Miller F (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 5.725 | 10-YEAR | 646.59 | 646.28 | 0.31 | 0.03 | 0.04 | | 634.00 | | 93.92 |
| MAINSTEM | 5.725 | 50-YEAR | 650.10 | 649.82 | 0.28 | 0.01 | 0.04 | | 1056.00 | | 126.73 |
| MAINSTEM | 5.725 | 100-YEAR | 651.99 | 651.74 | 0.25 | 0.01 | 0.04 | | 1227.00 | | 144.48 |
| MAINSTEM | 5.727 | 10-YEAR | 646.68 | 646.23 | 0.45 | 0.02 | 0.07 | | 634.00 | | 25.00 |
| MAINSTEM | 5.727 | 50-YEAR | 650.18 | 649.77 | 0.41 | 0.01 | 0.06 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.727 | 100-YEAR | 652.05 | 651.69 | 0.36 | 0.01 | 0.06 | | 1227.00 | | 27.98 |
| MAINSTEM | 5.732 | 10-YEAR | 646.81 | 646.38 | 0.44 | 0.13 | 0.00 | | 634.00 | | 25.00 |
| MAINSTEM | 5.732 | 50-YEAR | 650.24 | 649.84 | 0.41 | 0.07 | 0.00 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.732 | 100-YEAR | 652.10 | 651.74 | 0.36 | 0.05 | 0.00 | | 1227.00 | | 27.64 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 647.18 | 646.81 | 0.37 | | | | 634.00 | | 26.00 |
| MAINSTEM | 5.757 | 50-YEAR | 650.55 | 650.18 | 0.37 | | | | 1056.00 | | 26.00 |
| MAINSTEM | 5.757 | 100-YEAR | 652.40 | 652.07 | 0.33 | | | | 1227.00 | | 26.00 |
| MAINSTEM | 5.759 | 10-YEAR | 647.22 | 647.20 | 0.03 | 0.01 | 0.03 | | 634.00 | | 100.00 |
| MAINSTEM | 5.759 | 50-YEAR | 650.59 | 650.56 | 0.03 | 0.01 | 0.03 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.759 | 100-YEAR | 652.43 | 652.41 | 0.03 | 0.00 | 0.03 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.810 | 10-YEAR | 647.29 | 647.24 | 0.06 | 0.06 | 0.01 | | 634.00 | | 100.00 |
| MAINSTEM | 5.810 | 50-YEAR | 650.62 | 650.58 | 0.04 | 0.03 | 0.00 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.810 | 100-YEAR | 652.45 | 652.42 | 0.03 | 0.02 | 0.00 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.860 | 10-YEAR | 648.57 | 647.64 | 0.93 | 0.42 | 0.26 | | 634.00 | | 100.00 |
| MAINSTEM | 5.860 | 50-YEAR | 650.83 | 650.43 | 0.40 | 0.10 | 0.11 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.860 | 100-YEAR | 652.58 | 652.31 | 0.28 | 0.06 | 0.07 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.862 | 10-YEAR | 649.70 | 648.45 | 1.26 | 0.73 | 0.16 | | 634.00 | | 28.35 |
| MAINSTEM | 5.862 | 50-YEAR | 651.40 | 650.19 | 1.20 | 0.17 | 0.40 | | 1056.00 | | 28.35 |
| MAINSTEM | 5.862 | 100-YEAR | 652.90 | 652.14 | 0.76 | 0.07 | 0.24 | | 1227.00 | | 28.35 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 651.96 | 651.60 | 0.37 | | | | 634.00 | | 33.00 |
| MAINSTEM | 6.037 | 50-YEAR | 653.74 | 653.22 | 0.52 | | | | 1056.00 | | 33.00 |
| MAINSTEM | 6.037 | 100-YEAR | 654.46 | 653.90 | 0.56 | | | | 1227.00 | | 33.00 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 652.40 | 652.15 | 0.25 | | | | 603.00 | | 34.00 |
| MAINSTEM | 6.190 | 50-YEAR | 654.26 | 653.91 | 0.35 | | | | 996.00 | | 34.00 |
| MAINSTEM | 6.190 | 100-YEAR | 655.00 | 654.62 | 0.38 | | | | 1156.00 | | 34.00 |
| MAINSTEM | 6.194 | 10-YEAR | 652.44 | 652.41 | 0.03 | 0.01 | 0.02 | | 603.00 | | 100.00 |
| MAINSTEM | 6.194 | 50-YEAR | 654.31 | 654.27 | 0.04 | 0.01 | 0.03 | | 996.00 | | 100.00 |
| MAINSTEM | 6.194 | 100-YEAR | 655.04 | 655.00 | 0.04 | 0.01 | 0.03 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.332 | 10-YEAR | 652.55 | 652.52 | 0.03 | 0.11 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.332 | 50-YEAR | 654.41 | 654.37 | 0.04 | 0.10 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.332 | 100-YEAR | 655.14 | 655.10 | 0.04 | 0.10 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.418 | 10-YEAR | 652.63 | 652.61 | 0.03 | 0.09 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.418 | 50-YEAR | 654.49 | 654.45 | 0.04 | 0.08 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.418 | 100-YEAR | 655.22 | 655.18 | 0.04 | 0.08 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.471 | 10-YEAR | 652.73 | 652.65 | 0.08 | 0.08 | 0.02 | | 603.00 | | 55.30 |
| MAINSTEM | 6.471 | 50-YEAR | 654.59 | 654.48 | 0.12 | 0.08 | 0.02 | | 996.00 | | 55.30 |
| MAINSTEM | 6.471 | 100-YEAR | 655.32 | 655.19 | 0.13 | 0.07 | 0.03 | | 1156.00 | | 55.30 |
| MAINSTEM | 6.473 | 10-YEAR | 652.79 | 652.61 | 0.18 | 0.01 | 0.05 | | 603.00 | | 40.00 |
| MAINSTEM | 6.473 | 50-YEAR | 654.67 | 654.42 | 0.25 | 0.01 | 0.07 | | 996.00 | | 40.00 |
| MAINSTEM | 6.473 | 100-YEAR | 655.40 | 655.13 | 0.27 | 0.01 | 0.07 | | 1156.00 | | 40.00 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | |
| MAINSTEM | 6.538 | 10-YEAR | 653.03 | 652.83 | 0.20 | | | | 603.00 | | 38.00 |
| MAINSTEM | 6.538 | 50-YEAR | 654.97 | 654.69 | 0.27 | | | | 996.00 | | 38.00 |
| MAINSTEM | 6.538 | 100-YEAR | 655.72 | 655.42 | 0.29 | | | | 1156.00 | | 38.00 |
| MAINSTEM | 6.540 | 10-YEAR | 653.05 | 653.04 | 0.01 | 0.00 | 0.02 | | 603.00 | | 191.09 |
| MAINSTEM | 6.540 | 50-YEAR | 654.99 | 654.98 | 0.02 | 0.00 | 0.03 | | 996.00 | | 220.15 |
| MAINSTEM | 6.540 | 100-YEAR | 655.75 | 655.73 | 0.02 | 0.00 | 0.03 | | 1156.00 | | 231.41 |

HEC-RAS Plan: Natural Miller F (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 6.59 | 10-YEAR | 653.07 | 653.06 | 0.01 | 0.02 | 0.00 | | 603.00 | | 196.42 |
| MAINSTEM | 6.59 | 50-YEAR | 655.03 | 655.01 | 0.01 | 0.03 | 0.00 | 0.00 | 996.00 | | 1008.18 |
| MAINSTEM | 6.59 | 100-YEAR | 655.77 | 655.76 | 0.01 | 0.02 | 0.00 | 1.69 | 1154.31 | | 1050.50 |
| | | | | | | | | | | | |
| MAINSTEM | 6.6 | 10-YEAR | 653.14 | 653.03 | 0.11 | 0.02 | 0.05 | | 603.00 | | 199.69 |
| MAINSTEM | 6.6 | 50-YEAR | 655.13 | 654.99 | 0.14 | 0.04 | 0.07 | | 996.00 | | 234.83 |
| MAINSTEM | 6.6 | 100-YEAR | 655.86 | 655.70 | 0.16 | 0.02 | 0.08 | | 1156.00 | | 247.66 |
| | | | | | | | | | | | |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 653.45 | 652.11 | 1.34 | | | | 603.00 | | 219.18 |
| MAINSTEM | 6.635 | 50-YEAR | 655.48 | 654.41 | 1.07 | | | | 996.00 | | 1224.97 |
| MAINSTEM | 6.635 | 100-YEAR | 656.23 | 655.13 | 1.10 | | | | 1156.00 | | 1230.05 |
| | | | | | | | | | | | |
| MAINSTEM | 6.637 | 10-YEAR | 653.85 | 653.85 | 0.00 | 0.00 | 0.40 | 5.04 | 597.62 | 0.34 | 1208.75 |
| MAINSTEM | 6.637 | 50-YEAR | 655.80 | 655.80 | 0.00 | 0.00 | 0.32 | 15.58 | 979.15 | 1.27 | 1234.77 |
| MAINSTEM | 6.637 | 100-YEAR | 656.56 | 656.56 | 0.00 | 0.00 | 0.33 | 19.86 | 1134.35 | 1.79 | 1240.13 |
| | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 654.18 | 653.53 | 0.65 | 0.00 | 0.33 | | 603.00 | | 40.25 |
| MAINSTEM | 6.639 | 50-YEAR | 656.02 | 655.58 | 0.44 | 0.00 | 0.22 | | 996.00 | | 52.26 |
| MAINSTEM | 6.639 | 100-YEAR | 656.75 | 656.36 | 0.39 | 0.00 | 0.19 | | 1156.00 | | 56.86 |
| | | | | | | | | | | | |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 655.03 | 654.58 | 0.45 | 0.01 | 0.00 | | 603.00 | | 47.66 |
| MAINSTEM | 6.642 | 50-YEAR | 656.43 | 656.01 | 0.43 | 0.01 | 0.00 | | 996.00 | | 61.64 |
| MAINSTEM | 6.642 | 100-YEAR | 657.08 | 656.70 | 0.38 | 0.00 | 0.00 | | 1156.00 | | 68.64 |
| | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 655.14 | 654.75 | 0.39 | 0.09 | 0.02 | | 603.00 | | 49.23 |
| MAINSTEM | 6.643 | 50-YEAR | 656.51 | 656.11 | 0.40 | 0.07 | 0.01 | | 996.00 | | 62.66 |
| MAINSTEM | 6.643 | 100-YEAR | 657.13 | 656.77 | 0.36 | 0.05 | 0.00 | | 1156.00 | | 69.34 |
| | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 655.39 | 655.39 | 0.00 | 0.01 | 0.23 | 0.31 | 573.67 | 29.02 | 1612.85 |
| MAINSTEM | 6.644 | 50-YEAR | 656.75 | 656.75 | 0.00 | 0.00 | 0.24 | 11.18 | 891.80 | 93.03 | 1817.99 |
| MAINSTEM | 6.644 | 100-YEAR | 657.35 | 657.35 | 0.00 | 0.00 | 0.22 | 21.08 | 1012.14 | 122.78 | 1907.76 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.645 | 10-YEAR | 655.73 | 655.18 | 0.55 | 0.05 | 0.16 | 94.68 | 205.34 | 13.98 | 54.47 |
| SOUTH TRIB | 6.645 | 50-YEAR | 656.84 | 656.62 | 0.22 | 0.02 | 0.06 | 241.30 | 236.90 | 27.80 | 68.99 |
| SOUTH TRIB | 6.645 | 100-YEAR | 657.41 | 657.25 | 0.16 | 0.01 | 0.05 | 291.98 | 244.07 | 33.95 | 75.34 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.664 | 10-YEAR | 656.48 | 656.28 | 0.21 | 0.72 | 0.03 | 105.64 | 190.31 | 18.04 | 49.31 |
| SOUTH TRIB | 6.664 | 50-YEAR | 657.25 | 656.97 | 0.28 | 0.40 | 0.02 | 193.92 | 279.39 | 32.69 | 55.24 |
| SOUTH TRIB | 6.664 | 100-YEAR | 657.70 | 657.46 | 0.24 | 0.27 | 0.02 | 232.74 | 297.78 | 39.48 | 59.39 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.683 | 10-YEAR | 656.90 | 656.63 | 0.26 | 0.40 | 0.02 | 64.85 | 223.48 | 25.67 | 37.11 |
| SOUTH TRIB | 6.683 | 50-YEAR | 657.73 | 657.34 | 0.39 | 0.45 | 0.03 | 119.82 | 338.75 | 47.44 | 41.95 |
| SOUTH TRIB | 6.683 | 100-YEAR | 658.11 | 657.73 | 0.38 | 0.36 | 0.04 | 143.48 | 369.72 | 56.80 | 44.57 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.721 | 10-YEAR | 657.60 | 657.36 | 0.24 | 0.70 | 0.00 | 43.87 | 238.18 | 31.94 | 36.35 |
| SOUTH TRIB | 6.721 | 50-YEAR | 658.55 | 658.21 | 0.34 | 0.82 | 0.00 | 85.76 | 360.65 | 59.58 | 46.89 |
| SOUTH TRIB | 6.721 | 100-YEAR | 658.86 | 658.51 | 0.36 | 0.76 | 0.00 | 104.98 | 395.41 | 69.61 | 50.56 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.759 | 10-YEAR | 658.12 | 657.94 | 0.19 | 0.51 | 0.01 | 51.87 | 227.34 | 34.79 | 36.08 |
| SOUTH TRIB | 6.759 | 50-YEAR | 659.14 | 658.88 | 0.26 | 0.58 | 0.01 | 97.19 | 343.63 | 65.18 | 41.14 |
| SOUTH TRIB | 6.759 | 100-YEAR | 659.45 | 659.16 | 0.29 | 0.58 | 0.01 | 113.73 | 380.00 | 76.27 | 42.66 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.797 | 10-YEAR | 658.55 | 658.41 | 0.14 | 0.43 | 0.00 | | 314.00 | | 36.40 |
| SOUTH TRIB | 6.797 | 50-YEAR | 659.62 | 659.43 | 0.19 | 0.47 | 0.01 | | 506.00 | | 41.69 |
| SOUTH TRIB | 6.797 | 100-YEAR | 659.93 | 659.73 | 0.20 | 0.47 | 0.01 | | 570.00 | | 43.23 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.834 | 10-YEAR | 658.90 | 658.77 | 0.13 | 0.34 | 0.00 | 46.08 | 204.14 | 63.78 | 44.24 |
| SOUTH TRIB | 6.834 | 50-YEAR | 659.98 | 659.82 | 0.17 | 0.36 | 0.00 | 85.40 | 302.41 | 118.19 | 51.58 |
| SOUTH TRIB | 6.834 | 100-YEAR | 660.30 | 660.12 | 0.18 | 0.37 | 0.00 | 99.46 | 332.89 | 137.65 | 53.70 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.872 | 10-YEAR | 659.25 | 659.06 | 0.18 | 0.33 | 0.02 | 43.32 | 235.58 | 35.10 | 33.71 |
| SOUTH TRIB | 6.872 | 50-YEAR | 660.36 | 660.11 | 0.26 | 0.35 | 0.03 | 82.17 | 357.26 | 66.57 | 38.40 |
| SOUTH TRIB | 6.872 | 100-YEAR | 660.69 | 660.41 | 0.28 | 0.36 | 0.03 | 96.26 | 395.76 | 77.98 | 39.75 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 659.38 | 659.21 | 0.17 | 0.13 | 0.00 | 44.47 | 233.51 | 36.02 | 34.38 |
| SOUTH TRIB | 6.886 | 50-YEAR | 660.51 | 660.28 | 0.23 | 0.14 | 0.00 | 84.02 | 353.92 | 68.07 | 39.16 |
| SOUTH TRIB | 6.886 | 100-YEAR | 660.83 | 660.58 | 0.26 | 0.15 | 0.00 | 98.32 | 392.02 | 79.65 | 40.52 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.904 | 10-YEAR | 659.58 | 659.38 | 0.20 | 0.19 | 0.01 | 39.57 | 241.90 | 32.54 | 34.75 |
| SOUTH TRIB | 6.904 | 50-YEAR | 660.73 | 660.46 | 0.27 | 0.20 | 0.01 | 79.77 | 364.28 | 61.95 | 45.41 |
| SOUTH TRIB | 6.904 | 100-YEAR | 661.05 | 660.76 | 0.29 | 0.21 | 0.01 | 97.09 | 400.69 | 72.22 | 48.47 |

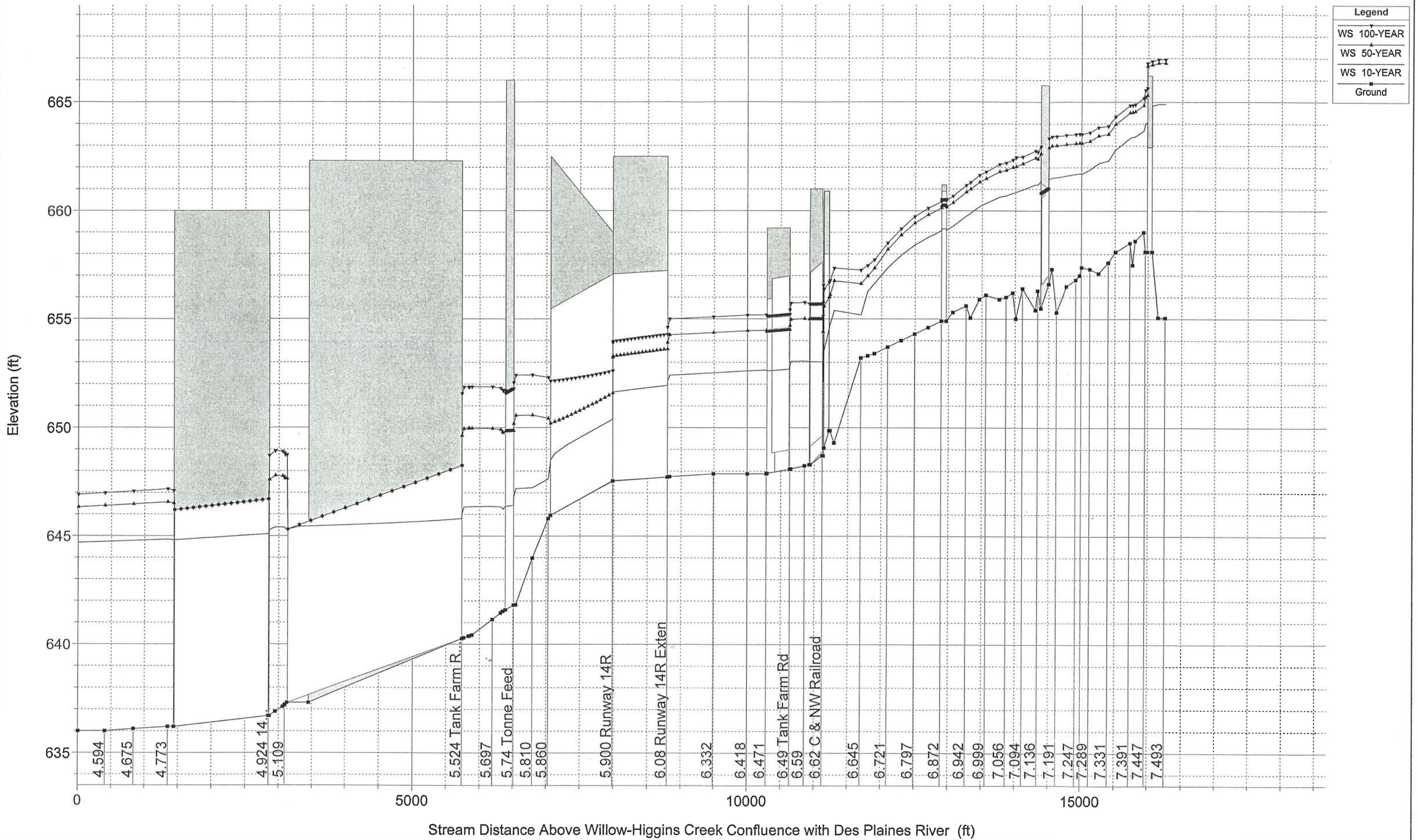
HEC-RAS Plan: Natural Miller F (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 6.942 | 10-YEAR | 659.98 | 659.81 | 0.17 | 0.40 | 0.00 | 47.43 | 231.69 | 34.88 | 36.81 |
| SOUTH TRIB | 6.942 | 50-YEAR | 661.14 | 660.92 | 0.23 | 0.41 | 0.00 | 91.18 | 348.57 | 66.25 | 47.02 |
| SOUTH TRIB | 6.942 | 100-YEAR | 661.47 | 661.23 | 0.24 | 0.41 | 0.00 | 109.03 | 383.77 | 77.19 | 49.88 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.956 | 10-YEAR | 660.12 | 659.94 | 0.18 | 0.13 | 0.00 | | 297.88 | 16.12 | 135.51 |
| SOUTH TRIB | 6.956 | 50-YEAR | 661.29 | 661.05 | 0.24 | 0.14 | 0.00 | | 468.13 | 37.87 | 312.94 |
| SOUTH TRIB | 6.956 | 100-YEAR | 661.61 | 661.35 | 0.26 | 0.14 | 0.01 | | 523.75 | 46.25 | 567.85 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.98 | 10-YEAR | 660.37 | 660.23 | 0.14 | 0.25 | 0.00 | 58.42 | 220.41 | 35.18 | 38.48 |
| SOUTH TRIB | 6.98 | 50-YEAR | 661.55 | 661.36 | 0.19 | 0.26 | 0.01 | 108.69 | 330.74 | 66.58 | 45.61 |
| SOUTH TRIB | 6.98 | 100-YEAR | 661.88 | 661.68 | 0.20 | 0.26 | 0.01 | 127.08 | 365.15 | 77.77 | 47.66 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.999 | 10-YEAR | 660.53 | 660.38 | 0.15 | 0.15 | 0.00 | 54.99 | 223.06 | 35.95 | 37.58 |
| SOUTH TRIB | 6.999 | 50-YEAR | 661.71 | 661.51 | 0.20 | 0.16 | 0.00 | 103.51 | 334.32 | 68.17 | 43.78 |
| SOUTH TRIB | 6.999 | 100-YEAR | 662.05 | 661.83 | 0.23 | 0.16 | 0.01 | 110.08 | 378.31 | 81.62 | 50.11 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.037 | 10-YEAR | 660.74 | 660.66 | 0.08 | 0.20 | 0.01 | 48.40 | 236.22 | 29.38 | 44.89 |
| SOUTH TRIB | 7.037 | 50-YEAR | 661.94 | 661.83 | 0.11 | 0.22 | 0.01 | 92.11 | 358.38 | 55.51 | 51.38 |
| SOUTH TRIB | 7.037 | 100-YEAR | 662.29 | 662.17 | 0.12 | 0.23 | 0.01 | 108.15 | 396.85 | 65.00 | 53.27 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.056 | 10-YEAR | 660.84 | 660.72 | 0.11 | 0.09 | 0.01 | 44.02 | 216.80 | 53.18 | 39.82 |
| SOUTH TRIB | 7.056 | 50-YEAR | 662.05 | 661.89 | 0.16 | 0.10 | 0.01 | 75.71 | 329.46 | 100.83 | 50.95 |
| SOUTH TRIB | 7.056 | 100-YEAR | 662.40 | 662.23 | 0.17 | 0.10 | 0.01 | 89.26 | 363.17 | 117.56 | 54.65 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.075 | 10-YEAR | 660.94 | 660.84 | 0.11 | 0.11 | 0.00 | 59.05 | 208.03 | 46.92 | 42.92 |
| SOUTH TRIB | 7.075 | 50-YEAR | 662.17 | 662.02 | 0.14 | 0.12 | 0.00 | 104.14 | 313.14 | 88.72 | 53.69 |
| SOUTH TRIB | 7.075 | 100-YEAR | 662.52 | 662.37 | 0.15 | 0.12 | 0.00 | 121.21 | 345.24 | 103.56 | 57.46 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.084 | 10-YEAR | 661.00 | 660.88 | 0.11 | 0.05 | 0.00 | 23.99 | 260.60 | 29.41 | 40.52 |
| SOUTH TRIB | 7.084 | 50-YEAR | 662.23 | 662.06 | 0.17 | 0.06 | 0.01 | 31.31 | 405.40 | 69.29 | 210.04 |
| SOUTH TRIB | 7.084 | 100-YEAR | 662.57 | 662.48 | 0.09 | 0.04 | 0.01 | 159.21 | 344.48 | 66.31 | 216.04 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.094 | 10-YEAR | 661.11 | 660.99 | 0.12 | 0.11 | 0.00 | 55.70 | 219.55 | 38.75 | 38.85 |
| SOUTH TRIB | 7.094 | 50-YEAR | 662.36 | 662.19 | 0.17 | 0.12 | 0.00 | 105.06 | 327.87 | 73.08 | 45.12 |
| SOUTH TRIB | 7.094 | 100-YEAR | 662.69 | 662.51 | 0.18 | 0.09 | 0.03 | 122.47 | 362.33 | 85.20 | 46.78 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.132 | 10-YEAR | 661.31 | 661.22 | 0.09 | 0.19 | 0.00 | 62.36 | 202.00 | 49.63 | 276.75 |
| SOUTH TRIB | 7.132 | 50-YEAR | 662.56 | 662.45 | 0.11 | 0.20 | 0.01 | 119.11 | 288.93 | 97.96 | 883.46 |
| SOUTH TRIB | 7.132 | 100-YEAR | 662.90 | 662.78 | 0.12 | 0.20 | 0.01 | 138.72 | 316.30 | 114.99 | 914.91 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.136 | 10-YEAR | 661.37 | 661.21 | 0.16 | 0.04 | 0.02 | 2.13 | 311.00 | 0.87 | 29.84 |
| SOUTH TRIB | 7.136 | 50-YEAR | 662.64 | 662.41 | 0.23 | 0.04 | 0.04 | 13.48 | 487.00 | 5.52 | 35.64 |
| SOUTH TRIB | 7.136 | 100-YEAR | 662.98 | 662.73 | 0.25 | 0.04 | 0.04 | 18.96 | 543.27 | 7.77 | 37.18 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.145 | 10-YEAR | 661.44 | 661.39 | 0.05 | 0.03 | 0.04 | | 287.00 | | 54.97 |
| SOUTH TRIB | 7.145 | 50-YEAR | 662.72 | 662.65 | 0.07 | 0.04 | 0.05 | | 461.00 | | 62.10 |
| SOUTH TRIB | 7.145 | 100-YEAR | 663.07 | 662.99 | 0.08 | 0.04 | 0.05 | | 517.00 | | 63.87 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.156 Thorndale Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.168 | 10-YEAR | 661.54 | 661.48 | 0.06 | | | | 287.00 | | 71.99 |
| SOUTH TRIB | 7.168 | 50-YEAR | 663.01 | 662.93 | 0.08 | | | | 461.00 | | 114.36 |
| SOUTH TRIB | 7.168 | 100-YEAR | 663.44 | 663.36 | 0.09 | | | | 517.00 | | 125.14 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.181 | 10-YEAR | 661.56 | 661.53 | 0.02 | 0.02 | 0.00 | | 287.00 | | 84.61 |
| SOUTH TRIB | 7.181 | 50-YEAR | 663.03 | 663.01 | 0.02 | 0.01 | 0.01 | | 461.00 | | 92.68 |
| SOUTH TRIB | 7.181 | 100-YEAR | 663.46 | 663.44 | 0.03 | 0.01 | 0.01 | | 517.00 | | 95.03 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.191 | 10-YEAR | 661.59 | 661.55 | 0.03 | 0.03 | 0.00 | 90.97 | 185.38 | 10.65 | 95.34 |
| SOUTH TRIB | 7.191 | 50-YEAR | 663.05 | 663.02 | 0.03 | 0.02 | 0.00 | 200.23 | 238.11 | 22.67 | 104.46 |
| SOUTH TRIB | 7.191 | 100-YEAR | 663.48 | 663.45 | 0.03 | 0.02 | 0.00 | 235.41 | 254.47 | 27.12 | 107.12 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.22 | 10-YEAR | 661.65 | 661.63 | 0.03 | 0.07 | 0.00 | 196.20 | 90.80 | | 85.67 |
| SOUTH TRIB | 7.22 | 50-YEAR | 663.10 | 663.07 | 0.03 | 0.04 | 0.00 | 337.54 | 123.46 | | 92.71 |
| SOUTH TRIB | 7.22 | 100-YEAR | 663.52 | 663.49 | 0.03 | 0.04 | 0.00 | 382.80 | 134.20 | | 94.78 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.247 | 10-YEAR | 661.72 | 661.70 | 0.03 | 0.07 | 0.00 | 219.78 | 67.22 | | 84.42 |
| SOUTH TRIB | 7.247 | 50-YEAR | 663.14 | 663.11 | 0.03 | 0.05 | 0.00 | 368.10 | 92.90 | | 91.48 |
| SOUTH TRIB | 7.247 | 100-YEAR | 663.56 | 663.54 | 0.03 | 0.04 | 0.00 | 415.51 | 101.49 | | 93.57 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.259 | 10-YEAR | 661.75 | 661.73 | 0.03 | 0.03 | 0.00 | 223.74 | 63.26 | | 85.23 |
| SOUTH TRIB | 7.259 | 50-YEAR | 663.16 | 663.14 | 0.03 | 0.02 | 0.00 | 372.24 | 88.76 | | 91.98 |
| SOUTH TRIB | 7.259 | 100-YEAR | 663.58 | 663.55 | 0.03 | 0.02 | 0.00 | 419.75 | 97.25 | | 93.99 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.265 | 10-YEAR | 661.80 | 661.71 | 0.09 | 0.03 | 0.02 | 100.63 | 172.30 | 14.07 | 65.70 |
| SOUTH TRIB | 7.265 | 50-YEAR | 663.19 | 663.12 | 0.07 | 0.02 | 0.01 | 220.51 | 213.06 | 27.43 | 74.03 |

HEC-RAS Plan: Natural Miller F (Continued)

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SOUTH TRIB | 7.265 | 100-YEAR | 663.61 | 663.54 | 0.07 | 0.01 | 0.01 | 258.77 | 225.94 | 32.30 | 76.51 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.289 | 10-YEAR | 662.05 | 661.91 | 0.14 | 0.23 | 0.01 | 127.15 | 159.85 | | 38.46 |
| SOUTH TRIB | 7.289 | 50-YEAR | 663.37 | 663.22 | 0.15 | 0.15 | 0.02 | 232.24 | 228.76 | | 47.46 |
| SOUTH TRIB | 7.289 | 100-YEAR | 663.77 | 663.62 | 0.14 | 0.14 | 0.02 | 268.11 | 248.89 | | 50.22 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.314 | 10-YEAR | 662.26 | 662.19 | 0.07 | 0.21 | 0.01 | 165.03 | 121.97 | | 49.55 |
| SOUTH TRIB | 7.314 | 50-YEAR | 663.55 | 663.47 | 0.08 | 0.17 | 0.01 | 285.26 | 175.74 | | 59.00 |
| SOUTH TRIB | 7.314 | 100-YEAR | 663.94 | 663.85 | 0.08 | 0.16 | 0.01 | 325.21 | 191.79 | | 61.89 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.331 | 10-YEAR | 662.60 | 662.31 | 0.29 | 0.27 | 0.07 | 113.93 | 173.07 | | 27.35 |
| SOUTH TRIB | 7.331 | 50-YEAR | 663.85 | 663.54 | 0.31 | 0.23 | 0.07 | 199.50 | 261.50 | | 34.03 |
| SOUTH TRIB | 7.331 | 100-YEAR | 664.22 | 663.91 | 0.31 | 0.22 | 0.07 | 228.21 | 288.79 | | 36.07 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.35 | 10-YEAR | 663.00 | 662.83 | 0.17 | 0.39 | 0.01 | 100.75 | 186.25 | | 31.42 |
| SOUTH TRIB | 7.35 | 50-YEAR | 664.21 | 663.99 | 0.21 | 0.35 | 0.01 | 183.00 | 278.00 | | 37.46 |
| SOUTH TRIB | 7.35 | 100-YEAR | 664.56 | 664.34 | 0.22 | 0.33 | 0.01 | 211.33 | 305.67 | | 39.27 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.391 | 10-YEAR | 663.50 | 663.35 | 0.14 | 0.49 | 0.00 | 96.42 | 190.58 | | 31.97 |
| SOUTH TRIB | 7.391 | 50-YEAR | 664.70 | 664.51 | 0.19 | 0.49 | 0.00 | 174.19 | 286.81 | | 37.54 |
| SOUTH TRIB | 7.391 | 100-YEAR | 665.05 | 664.85 | 0.19 | 0.48 | 0.00 | 200.66 | 315.79 | 0.56 | 52.38 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.399 | 10-YEAR | 663.57 | 663.40 | 0.17 | 0.06 | 0.01 | 27.85 | 232.42 | 26.74 | 24.86 |
| SOUTH TRIB | 7.399 | 50-YEAR | 664.80 | 664.53 | 0.27 | 0.07 | 0.02 | 53.50 | 355.83 | 51.67 | 529.36 |
| SOUTH TRIB | 7.399 | 100-YEAR | 665.15 | 664.86 | 0.29 | 0.07 | 0.03 | 62.66 | 393.74 | 60.59 | 644.54 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.406 | 10-YEAR | 663.65 | 663.42 | 0.23 | 0.06 | 0.02 | 43.38 | 206.99 | 36.63 | 25.25 |
| SOUTH TRIB | 7.406 | 50-YEAR | 664.89 | 664.57 | 0.32 | 0.07 | 0.02 | 81.12 | 311.61 | 68.27 | 28.77 |
| SOUTH TRIB | 7.406 | 100-YEAR | 665.24 | 664.90 | 0.35 | 0.08 | 0.02 | 95.16 | 342.62 | 79.22 | 29.26 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 664.05 | 663.69 | 0.37 | 0.37 | 0.04 | 56.76 | 195.71 | 34.53 | 23.95 |
| SOUTH TRIB | 7.431 | 50-YEAR | 665.31 | 664.85 | 0.46 | 0.38 | 0.04 | 104.86 | 285.59 | 70.55 | 28.79 |
| SOUTH TRIB | 7.431 | 100-YEAR | 665.66 | 665.18 | 0.48 | 0.38 | 0.04 | 121.17 | 311.38 | 84.46 | 29.77 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 664.13 | 664.01 | 0.12 | 0.05 | 0.03 | 130.00 | 130.61 | 26.38 | 31.57 |
| SOUTH TRIB | 7.447 | 50-YEAR | 665.39 | 665.23 | 0.16 | 0.05 | 0.03 | 207.10 | 198.26 | 55.64 | 36.08 |
| SOUTH TRIB | 7.447 | 100-YEAR | 665.75 | 665.54 | 0.21 | 0.06 | 0.03 | 245.56 | 232.08 | 39.36 | 62.42 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 664.17 | 664.07 | 0.09 | 0.03 | 0.01 | 122.22 | 114.22 | 24.56 | 31.79 |
| SOUTH TRIB | 7.456 | 50-YEAR | 665.44 | 665.31 | 0.13 | 0.03 | 0.01 | 188.71 | 180.07 | 49.22 | 37.21 |
| SOUTH TRIB | 7.456 | 100-YEAR | 665.80 | 665.64 | 0.16 | 0.04 | 0.01 | 222.82 | 209.76 | 35.42 | 72.69 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 664.89 | 664.83 | 0.07 | | | 122.93 | 110.49 | 27.58 | 34.59 |
| SOUTH TRIB | 7.47 | 50-YEAR | 666.77 | 666.70 | 0.07 | | | 128.38 | 188.28 | 101.34 | 300.24 |
| SOUTH TRIB | 7.47 | 100-YEAR | 666.93 | 666.87 | 0.07 | | | 147.68 | 194.60 | 125.72 | 337.19 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.01 | 58.53 | 112.67 | 89.80 | 208.30 |
| SOUTH TRIB | 7.486 | 50-YEAR | 666.78 | 666.78 | 0.00 | 0.00 | 0.01 | 104.33 | 150.36 | 163.31 | 208.30 |
| SOUTH TRIB | 7.486 | 100-YEAR | 666.94 | 666.94 | 0.00 | 0.00 | 0.01 | 117.53 | 166.25 | 184.22 | 208.30 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.00 | 232.98 | 24.22 | 3.80 | 1496.80 |
| SOUTH TRIB | 7.493 | 50-YEAR | 666.78 | 666.78 | 0.00 | 0.00 | 0.00 | 388.37 | 26.08 | 3.55 | 1586.04 |
| SOUTH TRIB | 7.493 | 100-YEAR | 666.94 | 666.94 | 0.00 | 0.00 | 0.00 | 435.63 | 28.44 | 3.93 | 1593.33 |

# Natural Conditions - Miller Fluids




1 in Horiz. = 1300 ft  1 in Vert. = 4 ft

HEC-RAS Plan: Nat - Thorndale

| 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) | |
| MAINSTEM | 4.518 | 10-YEAR | 894.00 | 636.00 | 644.69 | | 644.73 | 0.000113 | 1.67 | 558.91 | 68.69 | 0.10 |
| MAINSTEM | 4.518 | 50-YEAR | 1459.00 | 636.00 | 646.33 | | 646.41 | 0.000168 | 2.28 | 673.17 | 70.33 | 0.13 |
| MAINSTEM | 4.518 | 100-YEAR | 1682.00 | 636.00 | 646.91 | | 647.00 | 0.000185 | 2.49 | 713.97 | 70.91 | 0.13 |
| MAINSTEM | 4.594 | 10-YEAR | 894.00 | 636.00 | 644.73 | | 644.77 | 0.000111 | 1.66 | 562.03 | 68.73 | 0.10 |
| MAINSTEM | 4.594 | 50-YEAR | 1459.00 | 636.00 | 646.40 | | 646.48 | 0.000164 | 2.27 | 677.92 | 70.40 | 0.12 |
| MAINSTEM | 4.594 | 100-YEAR | 1682.00 | 636.00 | 646.98 | | 647.07 | 0.000181 | 2.47 | 719.27 | 70.98 | 0.13 |
| MAINSTEM | 4.675 | 10-YEAR | 894.00 | 636.10 | 644.78 | | 644.82 | 0.000114 | 1.67 | 558.61 | 68.72 | 0.10 |
| MAINSTEM | 4.675 | 50-YEAR | 1459.00 | 636.10 | 646.47 | | 646.55 | 0.000166 | 2.27 | 676.07 | 70.41 | 0.12 |
| MAINSTEM | 4.675 | 100-YEAR | 1682.00 | 636.10 | 647.06 | | 647.15 | 0.000182 | 2.47 | 717.95 | 71.01 | 0.13 |
| MAINSTEM | 4.773 | 10-YEAR | 784.00 | 636.20 | 644.84 | | 644.88 | 0.000089 | 1.47 | 554.70 | 68.37 | 0.09 |
| MAINSTEM | 4.773 | 50-YEAR | 1227.00 | 636.20 | 646.57 | | 646.62 | 0.000118 | 1.91 | 673.98 | 70.04 | 0.10 |
| MAINSTEM | 4.773 | 100-YEAR | 1469.00 | 636.20 | 647.17 | | 647.24 | 0.000139 | 2.16 | 716.27 | 70.63 | 0.12 |
| MAINSTEM | 4.790 | 10-YEAR | 784.00 | 636.20 | 644.81 | 638.80 | 644.93 | 0.000312 | 2.76 | 284.23 | 68.35 | 0.17 |
| MAINSTEM | 4.790 | 50-YEAR | 1227.00 | 636.20 | 646.51 | 639.71 | 646.71 | 0.000420 | 3.61 | 340.24 | 69.99 | 0.20 |
| MAINSTEM | 4.790 | 100-YEAR | 1469.00 | 636.20 | 647.09 | 640.14 | 647.35 | 0.000501 | 4.09 | 359.50 | 70.56 | 0.22 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 784.00 | 636.70 | 645.28 | 640.14 | 645.42 | 0.000448 | 3.07 | 255.65 | 65.50 | 0.19 |
| MAINSTEM | 5.059 | 50-YEAR | 1227.00 | 636.70 | 647.60 | 641.04 | 647.81 | 0.000458 | 3.69 | 332.24 | 67.78 | 0.21 |
| MAINSTEM | 5.059 | 100-YEAR | 1469.00 | 636.70 | 648.71 | 641.47 | 648.96 | 0.000462 | 3.98 | 368.99 | 68.88 | 0.21 |
| MAINSTEM | 5.076 | 10-YEAR | 784.00 | 636.90 | 645.41 | | 645.46 | 0.000215 | 1.80 | 435.78 | 65.48 | 0.12 |
| MAINSTEM | 5.076 | 50-YEAR | 1227.00 | 636.90 | 647.79 | | 647.85 | 0.000206 | 2.07 | 594.14 | 67.85 | 0.12 |
| MAINSTEM | 5.076 | 100-YEAR | 1469.00 | 636.90 | 648.93 | | 649.00 | 0.000204 | 2.19 | 672.29 | 68.98 | 0.12 |
| MAINSTEM | 5.104 | 10-YEAR | 784.00 | 637.12 | 645.41 | | 645.51 | 0.000341 | 2.55 | 306.96 | 65.32 | 0.17 |
| MAINSTEM | 5.104 | 50-YEAR | 1227.00 | 637.12 | 647.76 | | 647.90 | 0.000326 | 3.01 | 407.15 | 67.69 | 0.17 |
| MAINSTEM | 5.104 | 100-YEAR | 1469.00 | 637.12 | 648.90 | | 649.06 | 0.000322 | 3.23 | 455.31 | 68.83 | 0.17 |
| MAINSTEM | 5.109 | 10-YEAR | 784.00 | 637.18 | 645.37 | 640.64 | 645.54 | 0.000547 | 3.28 | 239.21 | 65.24 | 0.21 |
| MAINSTEM | 5.109 | 50-YEAR | 1227.00 | 637.18 | 647.71 | 641.55 | 647.94 | 0.000535 | 3.89 | 315.15 | 67.60 | 0.22 |
| MAINSTEM | 5.109 | 100-YEAR | 1469.00 | 637.18 | 648.83 | 642.01 | 649.10 | 0.000532 | 4.18 | 351.63 | 68.73 | 0.22 |
| MAINSTEM | 5.110 | 10-YEAR | 784.00 | 637.22 | 645.33 | | 645.56 | 0.000656 | 3.84 | 204.41 | 44.59 | 0.24 |
| MAINSTEM | 5.110 | 50-YEAR | 1227.00 | 637.22 | 647.64 | | 647.98 | 0.000698 | 4.67 | 262.56 | 50.16 | 0.26 |
| MAINSTEM | 5.110 | 100-YEAR | 1469.00 | 637.22 | 648.75 | | 649.14 | 0.000714 | 5.06 | 290.45 | 52.83 | 0.26 |
| MAINSTEM | 5.116 | 10-YEAR | 784.00 | 637.31 | 645.33 | | 645.57 | 0.000120 | 3.91 | 200.61 | 25.00 | 0.24 |
| MAINSTEM | 5.116 | 50-YEAR | 1227.00 | 637.31 | 647.64 | | 647.99 | 0.000143 | 4.75 | 258.35 | 26.44 | 0.26 |
| MAINSTEM | 5.116 | 100-YEAR | 1469.00 | 637.31 | 648.75 | | 649.16 | 0.000146 | 5.14 | 286.24 | 31.23 | 0.27 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 634.00 | 640.26 | 646.04 | 642.93 | 646.33 | 0.000191 | 4.30 | 147.48 | 25.50 | 0.32 |
| MAINSTEM | 5.606 | 50-YEAR | 1056.00 | 640.26 | 649.64 | 644.01 | 649.94 | 0.000121 | 4.41 | 239.21 | 57.51 | 0.25 |
| MAINSTEM | 5.606 | 100-YEAR | 1227.00 | 640.26 | 651.58 | 644.41 | 651.86 | 0.000087 | 4.25 | 288.63 | 81.07 | 0.22 |
| MAINSTEM | 5.610 | 10-YEAR | 634.00 | 640.30 | 646.34 | | 646.36 | 0.000075 | 1.05 | 603.50 | 125.37 | 0.08 |
| MAINSTEM | 5.610 | 50-YEAR | 1056.00 | 640.30 | 649.96 | | 649.97 | 0.000043 | 1.09 | 970.83 | 145.92 | 0.06 |
| MAINSTEM | 5.610 | 100-YEAR | 1227.00 | 640.30 | 651.87 | | 651.89 | 0.000031 | 1.05 | 1165.53 | 156.80 | 0.05 |
| MAINSTEM | 5.629 | 10-YEAR | 634.00 | 640.37 | 646.36 | | 646.37 | 0.000064 | 0.74 | 854.62 | 215.50 | 0.07 |
| MAINSTEM | 5.629 | 50-YEAR | 1056.00 | 640.37 | 649.97 | | 649.98 | 0.000021 | 0.64 | 1648.22 | 237.17 | 0.04 |
| MAINSTEM | 5.629 | 100-YEAR | 1227.00 | 640.37 | 651.88 | | 651.89 | 0.000014 | 0.59 | 2084.41 | 248.65 | 0.03 |
| MAINSTEM | 5.632 | 10-YEAR | 634.00 | 640.39 | 646.36 | | 646.37 | 0.000055 | 0.69 | 912.56 | 411.48 | 0.06 |
| MAINSTEM | 5.632 | 50-YEAR | 1056.00 | 640.39 | 649.97 | | 649.98 | 0.000019 | 0.60 | 1756.05 | 433.15 | 0.04 |
| MAINSTEM | 5.632 | 100-YEAR | 1227.00 | 640.39 | 651.89 | | 651.89 | 0.000012 | 0.55 | 2218.72 | 444.63 | 0.03 |
| MAINSTEM | 5.639 | 10-YEAR | 634.00 | 640.43 | 646.36 | | 646.37 | 0.000060 | 0.72 | 879.33 | 737.23 | 0.06 |
| MAINSTEM | 5.639 | 50-YEAR | 1056.00 | 640.43 | 649.97 | | 649.98 | 0.000020 | 0.62 | 1696.33 | 758.89 | 0.04 |
| MAINSTEM | 5.639 | 100-YEAR | 1227.00 | 640.43 | 651.89 | | 651.89 | 0.000013 | 0.57 | 2145.07 | 770.37 | 0.03 |
| MAINSTEM | 5.697 | 10-YEAR | 634.00 | 641.14 | 646.38 | | 646.41 | 0.000289 | 1.55 | 409.00 | 311.75 | 0.14 |
| MAINSTEM | 5.697 | 50-YEAR | 1056.00 | 641.14 | 649.97 | | 650.00 | 0.000090 | 1.34 | 788.72 | 333.31 | 0.09 |
| MAINSTEM | 5.697 | 100-YEAR | 1227.00 | 641.14 | 651.88 | | 651.90 | 0.000057 | 1.24 | 990.73 | 344.77 | 0.07 |
| MAINSTEM | 5.720 | 10-YEAR | 634.00 | 641.44 | 646.35 | | 646.51 | 0.000998 | 3.20 | 198.04 | 161.09 | 0.26 |
| MAINSTEM | 5.720 | 50-YEAR | 1056.00 | 641.44 | 649.91 | | 650.05 | 0.000406 | 3.00 | 352.15 | 188.79 | 0.19 |
| MAINSTEM | 5.720 | 100-YEAR | 1227.00 | 641.44 | 651.82 | | 651.95 | 0.000271 | 2.82 | 434.95 | 203.67 | 0.16 |
| MAINSTEM | 5.725 | 10-YEAR | 634.00 | 641.52 | 646.28 | | 646.59 | 0.001789 | 4.44 | 142.68 | 93.94 | 0.36 |
| MAINSTEM | 5.725 | 50-YEAR | 1056.00 | 641.52 | 649.83 | | 650.11 | 0.000775 | 4.24 | 249.01 | 126.79 | 0.26 |
| MAINSTEM | 5.725 | 100-YEAR | 1227.00 | 641.52 | 651.75 | | 651.99 | 0.000524 | 4.00 | 306.54 | 144.55 | 0.22 |
| MAINSTEM | 5.727 | 10-YEAR | 634.00 | 641.52 | 646.24 | | 646.69 | 0.003340 | 5.38 | 117.84 | 25.00 | 0.44 |
| MAINSTEM | 5.727 | 50-YEAR | 1056.00 | 641.52 | 649.77 | | 650.18 | 0.001665 | 5.12 | 206.29 | 25.00 | 0.31 |
| MAINSTEM | 5.727 | 100-YEAR | 1227.00 | 641.52 | 651.70 | | 652.06 | 0.001199 | 4.82 | 254.31 | 28.12 | 0.27 |

HEC-RAS Plan: Nat - Thorndale (Continued)

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 5.732 | 10-YEAR | 634.00 | 641.59 | 646.38 | | 646.82 | 0.003875 | 5.29 | 119.77 | 25.00 | 0.43 |
| MAINSTEM | 5.732 | 50-YEAR | 1056.00 | 641.59 | 649.84 | | 650.25 | 0.002238 | 5.12 | 206.32 | 25.00 | 0.31 |
| MAINSTEM | 5.732 | 100-YEAR | 1227.00 | 641.59 | 651.75 | | 652.11 | 0.001694 | 4.83 | 253.93 | 27.77 | 0.27 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 634.00 | 641.81 | 646.81 | 644.45 | 647.18 | 0.003112 | 4.88 | 129.98 | 26.00 | 0.38 |
| MAINSTEM | 5.757 | 50-YEAR | 1056.00 | 641.81 | 650.19 | 645.52 | 650.55 | 0.001944 | 4.85 | 217.78 | 26.00 | 0.30 |
| MAINSTEM | 5.757 | 100-YEAR | 1227.00 | 641.81 | 652.08 | 645.91 | 652.40 | 0.001491 | 4.60 | 266.91 | 26.00 | 0.25 |
| MAINSTEM | 5.759 | 10-YEAR | 634.00 | 641.82 | 647.20 | | 647.22 | 0.000129 | 1.30 | 489.46 | 100.00 | 0.10 |
| MAINSTEM | 5.759 | 50-YEAR | 1056.00 | 641.82 | 650.56 | | 650.59 | 0.000071 | 1.33 | 795.72 | 100.00 | 0.08 |
| MAINSTEM | 5.759 | 100-YEAR | 1227.00 | 641.82 | 652.41 | | 652.44 | 0.000050 | 1.27 | 964.04 | 100.00 | 0.07 |
| MAINSTEM | 5.810 | 10-YEAR | 634.00 | 643.98 | 647.24 | | 647.29 | 0.000619 | 1.95 | 325.60 | 100.00 | 0.19 |
| MAINSTEM | 5.810 | 50-YEAR | 1056.00 | 643.98 | 650.58 | | 650.62 | 0.000177 | 1.60 | 660.19 | 100.00 | 0.11 |
| MAINSTEM | 5.810 | 100-YEAR | 1227.00 | 643.98 | 652.43 | | 652.46 | 0.000109 | 1.45 | 844.62 | 100.00 | 0.09 |
| MAINSTEM | 5.860 | 10-YEAR | 634.00 | 645.81 | 647.64 | 647.64 | 648.57 | 0.019302 | 7.73 | 82.06 | 100.00 | 1.01 |
| MAINSTEM | 5.860 | 50-YEAR | 1056.00 | 645.81 | 650.43 | | 650.83 | 0.002450 | 5.10 | 207.00 | 100.00 | 0.42 |
| MAINSTEM | 5.860 | 100-YEAR | 1227.00 | 645.81 | 652.32 | | 652.59 | 0.001057 | 4.21 | 291.46 | 100.00 | 0.29 |
| MAINSTEM | 5.862 | 10-YEAR | 634.00 | 645.96 | 648.45 | 648.45 | 649.70 | 0.021607 | 9.00 | 70.47 | 28.35 | 1.01 |
| MAINSTEM | 5.862 | 50-YEAR | 1056.00 | 645.96 | 650.20 | | 651.40 | 0.011562 | 8.79 | 120.17 | 28.35 | 0.75 |
| MAINSTEM | 5.862 | 100-YEAR | 1227.00 | 645.96 | 652.14 | | 652.91 | 0.005066 | 7.00 | 175.33 | 28.35 | 0.50 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 634.00 | 647.54 | 651.60 | 649.84 | 651.96 | 0.000320 | 4.85 | 130.71 | 33.00 | 0.42 |
| MAINSTEM | 6.037 | 50-YEAR | 1056.00 | 647.54 | 653.22 | 650.77 | 653.74 | 0.000320 | 5.77 | 183.00 | 33.00 | 0.43 |
| MAINSTEM | 6.037 | 100-YEAR | 1227.00 | 647.54 | 653.90 | 651.10 | 654.46 | 0.000309 | 5.99 | 204.87 | 33.00 | 0.42 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 603.00 | 647.73 | 652.15 | 649.86 | 652.40 | 0.002189 | 4.01 | 150.28 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 50-YEAR | 996.00 | 647.73 | 653.91 | 650.71 | 654.26 | 0.002167 | 4.74 | 210.25 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 100-YEAR | 1156.00 | 647.73 | 654.62 | 651.02 | 655.00 | 0.002120 | 4.94 | 234.20 | 34.00 | 0.33 |
| MAINSTEM | 6.194 | 10-YEAR | 603.00 | 647.75 | 652.41 | | 652.44 | 0.000159 | 1.31 | 461.22 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 50-YEAR | 996.00 | 647.75 | 654.27 | | 654.31 | 0.000142 | 1.54 | 645.30 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 100-YEAR | 1156.00 | 647.75 | 655.00 | | 655.04 | 0.000134 | 1.61 | 717.88 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 10-YEAR | 603.00 | 647.88 | 652.52 | | 652.55 | 0.000178 | 1.30 | 464.06 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 50-YEAR | 996.00 | 647.88 | 654.37 | | 654.41 | 0.000166 | 1.53 | 649.01 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 100-YEAR | 1156.00 | 647.88 | 655.10 | | 655.14 | 0.000159 | 1.60 | 721.84 | 100.00 | 0.11 |
| MAINSTEM | 6.418 | 10-YEAR | 603.00 | 647.88 | 652.61 | | 652.63 | 0.000167 | 1.27 | 472.97 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 50-YEAR | 996.00 | 647.88 | 654.45 | | 654.49 | 0.000159 | 1.52 | 657.40 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 100-YEAR | 1156.00 | 647.88 | 655.18 | | 655.22 | 0.000154 | 1.58 | 729.93 | 100.00 | 0.10 |
| MAINSTEM | 6.471 | 10-YEAR | 603.00 | 647.88 | 652.65 | | 652.73 | 0.000583 | 2.29 | 263.80 | 55.30 | 0.18 |
| MAINSTEM | 6.471 | 50-YEAR | 996.00 | 647.88 | 654.48 | | 654.59 | 0.000581 | 2.73 | 364.71 | 55.30 | 0.19 |
| MAINSTEM | 6.471 | 100-YEAR | 1156.00 | 647.88 | 655.19 | | 655.32 | 0.000570 | 2.86 | 404.39 | 55.30 | 0.19 |
| MAINSTEM | 6.473 | 10-YEAR | 603.00 | 647.91 | 652.61 | | 652.79 | 0.002320 | 3.43 | 175.73 | 40.00 | 0.29 |
| MAINSTEM | 6.473 | 50-YEAR | 996.00 | 647.91 | 654.42 | | 654.67 | 0.002456 | 4.01 | 248.07 | 40.00 | 0.28 |
| MAINSTEM | 6.473 | 100-YEAR | 1156.00 | 647.91 | 655.13 | | 655.40 | 0.002474 | 4.18 | 276.58 | 40.00 | 0.28 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 6.538 | 10-YEAR | 603.00 | 648.09 | 652.83 | 650.40 | 653.03 | 0.002651 | 3.61 | 167.21 | 38.00 | 0.30 |
| MAINSTEM | 6.538 | 50-YEAR | 996.00 | 648.09 | 654.69 | 651.19 | 654.97 | 0.002755 | 4.18 | 238.13 | 38.00 | 0.29 |
| MAINSTEM | 6.538 | 100-YEAR | 1156.00 | 648.09 | 655.42 | 651.48 | 655.72 | 0.002770 | 4.35 | 265.85 | 38.00 | 0.29 |
| MAINSTEM | 6.540 | 10-YEAR | 603.00 | 648.11 | 653.04 | | 653.05 | 0.000088 | 0.92 | 652.36 | 191.09 | 0.08 |
| MAINSTEM | 6.540 | 50-YEAR | 996.00 | 648.11 | 654.98 | | 654.99 | 0.000074 | 1.07 | 933.29 | 220.15 | 0.07 |
| MAINSTEM | 6.540 | 100-YEAR | 1156.00 | 648.11 | 655.73 | | 655.75 | 0.000069 | 1.11 | 1042.33 | 231.43 | 0.07 |
| MAINSTEM | 6.59 | 10-YEAR | 603.00 | 648.25 | 653.06 | | 653.07 | 0.000095 | 0.84 | 715.15 | 196.42 | 0.08 |
| MAINSTEM | 6.59 | 50-YEAR | 996.00 | 648.25 | 655.01 | | 655.03 | 0.000470 | 0.87 | 1143.06 | 1008.18 | 0.14 |
| MAINSTEM | 6.59 | 100-YEAR | 1156.00 | 648.25 | 655.76 | | 655.77 | 0.000118 | 0.61 | 1912.58 | 1050.55 | 0.08 |
| MAINSTEM | 6.6 | 10-YEAR | 603.00 | 648.30 | 653.03 | | 653.14 | 0.000703 | 2.66 | 226.57 | 199.69 | 0.22 |
| MAINSTEM | 6.6 | 50-YEAR | 996.00 | 648.30 | 654.99 | | 655.13 | 0.000567 | 3.05 | 326.52 | 234.83 | 0.21 |
| MAINSTEM | 6.6 | 100-YEAR | 1156.00 | 648.30 | 655.70 | | 655.86 | 0.000537 | 3.18 | 363.04 | 247.67 | 0.21 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 603.00 | 648.71 | 652.11 | 652.11 | 653.45 | 0.017173 | 9.29 | 64.88 | 219.18 | 1.00 |
| MAINSTEM | 6.635 | 50-YEAR | 996.00 | 648.71 | 654.41 | 653.18 | 655.48 | 0.006038 | 8.30 | 119.97 | 1224.97 | 0.65 |
| MAINSTEM | 6.635 | 100-YEAR | 1156.00 | 648.71 | 655.13 | 653.58 | 656.23 | 0.005186 | 8.42 | 137.31 | 1230.06 | 0.62 |

HEC-RAS Plan: Nat - Thorndale (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) | |
| MAINSTEM | 6.637 | 10-YEAR | 603.00 | 648.71 | 653.85 | | 653.85 | 0.000147 | 0.47 | 1289.28 | 1208.75 | 0.08 |
| MAINSTEM | 6.637 | 50-YEAR | 996.00 | 648.71 | 655.80 | | 655.80 | 0.000013 | 0.28 | 3673.81 | 1234.77 | 0.03 |
| MAINSTEM | 6.637 | 100-YEAR | 1156.00 | 648.71 | 656.56 | | 656.56 | 0.000008 | 0.26 | 4616.85 | 1240.14 | 0.02 |
| MAINSTEM | 6.639 | 10-YEAR | 603.00 | 649.07 | 653.53 | | 654.18 | 0.012819 | 6.49 | 92.90 | 40.25 | 0.75 |
| MAINSTEM | 6.639 | 50-YEAR | 996.00 | 649.07 | 655.58 | | 656.02 | 0.005078 | 5.31 | 187.61 | 52.26 | 0.49 |
| MAINSTEM | 6.639 | 100-YEAR | 1156.00 | 649.07 | 656.36 | | 656.75 | 0.003924 | 5.02 | 230.44 | 56.86 | 0.44 |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 603.00 | 649.86 | 654.58 | 653.77 | 655.03 | 0.007927 | 5.39 | 111.84 | 47.66 | 0.62 |
| MAINSTEM | 6.642 | 50-YEAR | 996.00 | 649.86 | 656.01 | 654.62 | 656.43 | 0.005340 | 5.25 | 189.65 | 61.64 | 0.53 |
| MAINSTEM | 6.642 | 100-YEAR | 1156.00 | 649.86 | 656.70 | 654.91 | 657.08 | 0.004084 | 4.92 | 235.05 | 68.64 | 0.47 |
| MAINSTEM | 6.643 | 10-YEAR | 603.00 | 649.86 | 654.75 | | 655.14 | 0.006535 | 5.02 | 120.18 | 49.23 | 0.57 |
| MAINSTEM | 6.643 | 50-YEAR | 996.00 | 649.86 | 656.11 | | 656.51 | 0.004897 | 5.08 | 195.98 | 62.66 | 0.51 |
| MAINSTEM | 6.643 | 100-YEAR | 1156.00 | 649.86 | 656.77 | | 657.13 | 0.003872 | 4.82 | 239.83 | 69.34 | 0.46 |
| MAINSTEM | 6.644 | 10-YEAR | 603.00 | 649.30 | 655.39 | | 655.39 | 0.000052 | 0.22 | 2793.70 | 1612.85 | 0.03 |
| MAINSTEM | 6.644 | 50-YEAR | 996.00 | 649.30 | 656.75 | | 656.75 | 0.000022 | 0.21 | 5139.73 | 1817.99 | 0.02 |
| MAINSTEM | 6.644 | 100-YEAR | 1156.00 | 649.30 | 657.35 | | 657.35 | 0.000016 | 0.20 | 6255.27 | 1907.82 | 0.02 |
| SOUTH TRIB | 6.645 | 10-YEAR | 314.00 | 653.20 | 655.18 | 655.18 | 655.73 | 0.017507 | 6.90 | 61.86 | 54.47 | 0.86 |
| SOUTH TRIB | 6.645 | 50-YEAR | 506.00 | 653.20 | 656.62 | | 656.84 | 0.003792 | 4.62 | 150.54 | 68.99 | 0.44 |
| SOUTH TRIB | 6.645 | 100-YEAR | 570.00 | 653.20 | 657.25 | | 657.41 | 0.002284 | 4.01 | 196.31 | 75.35 | 0.35 |
| SOUTH TRIB | 6.664 | 10-YEAR | 314.00 | 653.30 | 656.28 | 655.36 | 656.48 | 0.003892 | 4.26 | 96.40 | 49.31 | 0.44 |
| SOUTH TRIB | 6.664 | 50-YEAR | 506.00 | 653.30 | 656.97 | | 657.25 | 0.004161 | 5.07 | 132.83 | 55.24 | 0.47 |
| SOUTH TRIB | 6.664 | 100-YEAR | 570.00 | 653.30 | 657.46 | | 657.70 | 0.003116 | 4.77 | 160.85 | 59.40 | 0.41 |
| SOUTH TRIB | 6.683 | 10-YEAR | 314.00 | 653.40 | 656.63 | | 656.90 | 0.004069 | 4.61 | 84.27 | 37.11 | 0.45 |
| SOUTH TRIB | 6.683 | 50-YEAR | 506.00 | 653.40 | 657.34 | | 657.73 | 0.004833 | 5.73 | 112.26 | 41.95 | 0.51 |
| SOUTH TRIB | 6.683 | 100-YEAR | 570.00 | 653.40 | 657.73 | | 658.11 | 0.004225 | 5.70 | 128.84 | 44.57 | 0.48 |
| SOUTH TRIB | 6.721 | 10-YEAR | 314.00 | 653.70 | 657.36 | | 657.60 | 0.003055 | 4.34 | 89.65 | 36.35 | 0.40 |
| SOUTH TRIB | 6.721 | 50-YEAR | 506.00 | 653.70 | 658.21 | | 658.55 | 0.003495 | 5.33 | 125.00 | 46.89 | 0.44 |
| SOUTH TRIB | 6.721 | 100-YEAR | 570.00 | 653.70 | 658.51 | | 658.86 | 0.003398 | 5.48 | 139.44 | 50.57 | 0.44 |
| SOUTH TRIB | 6.759 | 10-YEAR | 314.00 | 654.00 | 657.94 | | 658.12 | 0.002190 | 3.85 | 100.51 | 36.08 | 0.34 |
| SOUTH TRIB | 6.759 | 50-YEAR | 506.00 | 654.00 | 658.88 | | 659.14 | 0.002445 | 4.70 | 136.92 | 41.14 | 0.37 |
| SOUTH TRIB | 6.759 | 100-YEAR | 570.00 | 654.00 | 659.16 | | 659.45 | 0.002476 | 4.91 | 148.81 | 42.66 | 0.38 |
| SOUTH TRIB | 6.797 | 10-YEAR | 314.00 | 654.30 | 658.41 | | 658.55 | 0.002067 | 2.97 | 105.70 | 36.40 | 0.31 |
| SOUTH TRIB | 6.797 | 50-YEAR | 506.00 | 654.30 | 659.43 | | 659.62 | 0.002234 | 3.48 | 145.37 | 41.69 | 0.33 |
| SOUTH TRIB | 6.797 | 100-YEAR | 570.00 | 654.30 | 659.73 | | 659.93 | 0.002257 | 3.61 | 158.00 | 43.23 | 0.33 |
| SOUTH TRIB | 6.834 | 10-YEAR | 314.00 | 654.60 | 658.77 | | 658.90 | 0.001455 | 3.26 | 123.53 | 44.24 | 0.28 |
| SOUTH TRIB | 6.834 | 50-YEAR | 506.00 | 654.60 | 659.82 | | 659.98 | 0.001514 | 3.86 | 173.66 | 51.58 | 0.30 |
| SOUTH TRIB | 6.834 | 100-YEAR | 570.00 | 654.60 | 660.12 | | 660.30 | 0.001520 | 4.02 | 189.60 | 53.70 | 0.30 |
| SOUTH TRIB | 6.872 | 10-YEAR | 314.00 | 654.90 | 659.07 | | 659.25 | 0.001929 | 3.76 | 101.77 | 33.76 | 0.32 |
| SOUTH TRIB | 6.872 | 50-YEAR | 506.00 | 654.90 | 660.13 | | 660.38 | 0.002097 | 4.55 | 139.73 | 38.48 | 0.35 |
| SOUTH TRIB | 6.872 | 100-YEAR | 570.00 | 654.90 | 660.43 | | 660.70 | 0.002135 | 4.77 | 151.53 | 39.83 | 0.36 |
| SOUTH TRIB | 6.879 Miller Fluids En | | Culvert | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 314.00 | 654.90 | 659.09 | 657.09 | 659.27 | 0.001894 | 3.74 | 102.44 | 33.85 | 0.32 |
| SOUTH TRIB | 6.886 | 50-YEAR | 506.00 | 654.90 | 660.17 | 657.82 | 660.42 | 0.002028 | 4.50 | 141.45 | 38.68 | 0.35 |
| SOUTH TRIB | 6.886 | 100-YEAR | 570.00 | 654.90 | 660.48 | 658.03 | 660.75 | 0.002059 | 4.71 | 153.55 | 40.06 | 0.35 |
| SOUTH TRIB | 6.904 | 10-YEAR | 314.00 | 655.30 | 659.29 | | 659.50 | 0.002391 | 4.06 | 94.42 | 33.85 | 0.36 |
| SOUTH TRIB | 6.904 | 50-YEAR | 506.00 | 655.30 | 660.37 | | 660.66 | 0.002443 | 4.82 | 136.98 | 44.59 | 0.38 |
| SOUTH TRIB | 6.904 | 100-YEAR | 570.00 | 655.30 | 660.68 | | 660.98 | 0.002425 | 4.99 | 151.30 | 47.66 | 0.38 |
| SOUTH TRIB | 6.942 | 10-YEAR | 314.00 | 655.60 | 659.75 | | 659.93 | 0.001908 | 3.73 | 104.35 | 36.28 | 0.32 |
| SOUTH TRIB | 6.942 | 50-YEAR | 506.00 | 655.60 | 660.86 | | 661.10 | 0.001967 | 4.43 | 150.29 | 46.52 | 0.34 |
| SOUTH TRIB | 6.942 | 100-YEAR | 570.00 | 655.60 | 661.17 | | 661.42 | 0.001970 | 4.61 | 165.18 | 49.39 | 0.34 |
| SOUTH TRIB | 6.956 | 10-YEAR | 314.00 | 655.05 | 659.89 | 658.03 | 660.07 | 0.002456 | 3.52 | 93.49 | 134.67 | 0.34 |
| SOUTH TRIB | 6.956 | 50-YEAR | 506.00 | 655.05 | 661.00 | 658.75 | 661.25 | 0.002514 | 4.10 | 131.13 | 277.69 | 0.36 |
| SOUTH TRIB | 6.956 | 100-YEAR | 570.00 | 655.05 | 661.31 | 658.95 | 661.57 | 0.002544 | 4.26 | 142.48 | 524.98 | 0.36 |
| SOUTH TRIB | 6.98 | 10-YEAR | 314.00 | 655.90 | 660.19 | | 660.34 | 0.001549 | 3.43 | 114.33 | 38.27 | 0.29 |
| SOUTH TRIB | 6.98 | 50-YEAR | 506.00 | 655.90 | 661.32 | | 661.52 | 0.001597 | 4.07 | 161.60 | 45.38 | 0.31 |
| SOUTH TRIB | 6.98 | 100-YEAR | 570.00 | 655.90 | 661.64 | | 661.85 | 0.001611 | 4.25 | 176.29 | 47.43 | 0.31 |
| SOUTH TRIB | 6.999 | 10-YEAR | 314.00 | 656.10 | 660.35 | | 660.50 | 0.001643 | 3.51 | 111.28 | 37.41 | 0.30 |
| SOUTH TRIB | 6.999 | 50-YEAR | 506.00 | 656.10 | 661.48 | | 661.68 | 0.001669 | 4.14 | 157.17 | 43.41 | 0.31 |
| SOUTH TRIB | 6.999 | 100-YEAR | 570.00 | 656.10 | 661.80 | | 662.02 | 0.001768 | 4.43 | 171.72 | 49.46 | 0.33 |
| SOUTH TRIB | 7.037 | 10-YEAR | 314.00 | 655.90 | 660.63 | | 660.71 | 0.000720 | 2.50 | 152.52 | 44.75 | 0.20 |
| SOUTH TRIB | 7.037 | 50-YEAR | 506.00 | 655.90 | 661.80 | | 661.92 | 0.000795 | 3.04 | 208.58 | 51.24 | 0.22 |
| SOUTH TRIB | 7.037 | 100-YEAR | 570.00 | 655.90 | 662.14 | | 662.27 | 0.000809 | 3.18 | 226.31 | 53.13 | 0.22 |

HEC-RAS Plan: Nat - Thorndale (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.056 | 10-YEAR | 314.00 | 656.00 | 660.70 | | 660.81 | 0.001107 | 3.08 | 128.47 | 39.70 | 0.25 |
| SOUTH TRIB | 7.056 | 50-YEAR | 506.00 | 656.00 | 661.87 | | 662.03 | 0.001219 | 3.75 | 180.52 | 50.68 | 0.27 |
| SOUTH TRIB | 7.056 | 100-YEAR | 570.00 | 656.00 | 662.21 | | 662.38 | 0.001228 | 3.91 | 198.37 | 54.37 | 0.28 |
| SOUTH TRIB | 7.075 | 10-YEAR | 314.00 | 656.20 | 660.82 | | 660.92 | 0.001081 | 3.01 | 133.37 | 42.79 | 0.25 |
| SOUTH TRIB | 7.075 | 50-YEAR | 506.00 | 656.20 | 662.00 | | 662.15 | 0.001142 | 3.60 | 189.59 | 53.44 | 0.26 |
| SOUTH TRIB | 7.075 | 100-YEAR | 570.00 | 656.20 | 662.34 | | 662.50 | 0.001147 | 3.75 | 208.52 | 57.21 | 0.27 |
| SOUTH TRIB | 7.084 | 10-YEAR | 314.00 | 655.01 | 660.86 | 658.14 | 660.98 | 0.001036 | 2.94 | 127.99 | 40.39 | 0.23 |
| SOUTH TRIB | 7.084 | 50-YEAR | 506.00 | 655.01 | 662.04 | 658.94 | 662.21 | 0.001217 | 3.68 | 186.01 | 206.70 | 0.26 |
| SOUTH TRIB | 7.084 | 100-YEAR | 570.00 | 655.01 | 662.46 | 659.16 | 662.55 | 0.000711 | 2.94 | 354.96 | 215.96 | 0.20 |
| SOUTH TRIB | 7.094 | 10-YEAR | 314.00 | 656.40 | 660.97 | | 661.09 | 0.001246 | 3.21 | 122.75 | 38.76 | 0.26 |
| SOUTH TRIB | 7.094 | 50-YEAR | 506.00 | 656.40 | 662.17 | | 662.34 | 0.001274 | 3.79 | 173.20 | 45.02 | 0.28 |
| SOUTH TRIB | 7.094 | 100-YEAR | 570.00 | 656.40 | 662.49 | | 662.67 | 0.001301 | 3.97 | 187.77 | 46.67 | 0.28 |
| SOUTH TRIB | 7.132 | 10-YEAR | 314.00 | 655.41 | 661.21 | 658.60 | 661.29 | 0.000889 | 2.74 | 149.16 | 253.53 | 0.21 |
| SOUTH TRIB | 7.132 | 50-YEAR | 506.00 | 655.41 | 662.43 | 659.30 | 662.55 | 0.000894 | 3.17 | 213.18 | 881.88 | 0.22 |
| SOUTH TRIB | 7.132 | 100-YEAR | 570.00 | 655.41 | 662.76 | 659.49 | 662.88 | 0.000907 | 3.30 | 231.92 | 913.31 | 0.22 |
| SOUTH TRIB | 7.136 | 10-YEAR | 314.00 | 656.30 | 661.19 | | 661.36 | 0.001809 | 3.27 | 98.71 | 29.77 | 0.29 |
| SOUTH TRIB | 7.136 | 50-YEAR | 506.00 | 656.30 | 662.39 | | 662.62 | 0.001844 | 3.93 | 137.80 | 35.56 | 0.30 |
| SOUTH TRIB | 7.136 | 100-YEAR | 570.00 | 656.30 | 662.71 | | 662.96 | 0.001879 | 4.13 | 149.38 | 37.10 | 0.31 |
| SOUTH TRIB | 7.145 | 10-YEAR | 287.00 | 655.49 | 661.37 | | 661.41 | 0.000373 | 1.46 | 197.13 | 54.85 | 0.14 |
| SOUTH TRIB | 7.145 | 50-YEAR | 461.00 | 655.49 | 662.63 | | 662.68 | 0.000396 | 1.70 | 270.74 | 62.01 | 0.14 |
| SOUTH TRIB | 7.145 | 100-YEAR | 517.00 | 655.49 | 662.97 | | 663.02 | 0.000399 | 1.77 | 292.12 | 63.81 | 0.15 |
| SOUTH TRIB | 7.168 | 10-YEAR | 287.00 | 656.61 | 661.42 | | 661.45 | 0.000426 | 1.46 | 199.50 | 70.82 | 0.14 |
| SOUTH TRIB | 7.168 | 50-YEAR | 461.00 | 656.61 | 662.69 | | 662.72 | 0.000372 | 1.61 | 305.59 | 98.49 | 0.14 |
| SOUTH TRIB | 7.168 | 100-YEAR | 517.00 | 656.61 | 663.03 | | 663.07 | 0.000363 | 1.66 | 342.94 | 119.26 | 0.14 |
| SOUTH TRIB | 7.181 | 10-YEAR | 287.00 | 657.30 | 661.45 | | 661.47 | 0.000400 | 1.27 | 226.81 | 84.13 | 0.14 |
| SOUTH TRIB | 7.181 | 50-YEAR | 461.00 | 657.30 | 662.71 | | 662.74 | 0.000307 | 1.37 | 337.51 | 91.05 | 0.13 |
| SOUTH TRIB | 7.181 | 100-YEAR | 517.00 | 657.30 | 663.05 | | 663.08 | 0.000295 | 1.40 | 368.87 | 92.92 | 0.12 |
| SOUTH TRIB | 7.191 | 10-YEAR | 287.00 | 655.30 | 661.47 | | 661.50 | 0.000418 | 1.78 | 223.33 | 94.81 | 0.15 |
| SOUTH TRIB | 7.191 | 50-YEAR | 461.00 | 655.30 | 662.73 | | 662.76 | 0.000314 | 1.82 | 347.75 | 102.63 | 0.13 |
| SOUTH TRIB | 7.191 | 100-YEAR | 517.00 | 655.30 | 663.07 | | 663.11 | 0.000300 | 1.84 | 383.08 | 104.75 | 0.13 |
| SOUTH TRIB | 7.22 | 10-YEAR | 287.00 | 656.50 | 661.55 | | 661.58 | 0.000479 | 1.59 | 224.79 | 85.29 | 0.15 |
| SOUTH TRIB | 7.22 | 50-YEAR | 461.00 | 656.50 | 662.79 | | 662.82 | 0.000372 | 1.60 | 334.21 | 91.34 | 0.13 |
| SOUTH TRIB | 7.22 | 100-YEAR | 517.00 | 656.50 | 663.13 | | 663.16 | 0.000358 | 1.62 | 365.32 | 92.99 | 0.13 |
| SOUTH TRIB | 7.247 | 10-YEAR | 287.00 | 656.80 | 661.62 | | 661.65 | 0.000572 | 1.60 | 214.02 | 84.07 | 0.16 |
| SOUTH TRIB | 7.247 | 50-YEAR | 461.00 | 656.80 | 662.85 | | 662.88 | 0.000430 | 1.59 | 320.35 | 90.14 | 0.14 |
| SOUTH TRIB | 7.247 | 100-YEAR | 517.00 | 656.80 | 663.18 | | 663.21 | 0.000410 | 1.60 | 350.84 | 91.80 | 0.14 |
| SOUTH TRIB | 7.259 | 10-YEAR | 287.00 | 657.00 | 661.66 | | 661.69 | 0.000556 | 1.54 | 217.15 | 84.90 | 0.15 |
| SOUTH TRIB | 7.259 | 50-YEAR | 461.00 | 657.00 | 662.87 | | 662.90 | 0.000420 | 1.55 | 323.59 | 90.72 | 0.14 |
| SOUTH TRIB | 7.259 | 100-YEAR | 517.00 | 657.00 | 663.21 | | 663.24 | 0.000402 | 1.57 | 354.15 | 92.32 | 0.14 |
| SOUTH TRIB | 7.265 | 10-YEAR | 287.00 | 657.38 | 661.64 | | 661.74 | 0.001570 | 3.03 | 132.24 | 65.29 | 0.27 |
| SOUTH TRIB | 7.265 | 50-YEAR | 461.00 | 657.38 | 662.85 | | 662.94 | 0.001034 | 2.94 | 215.98 | 72.46 | 0.23 |
| SOUTH TRIB | 7.265 | 100-YEAR | 517.00 | 657.38 | 663.19 | | 663.27 | 0.000958 | 2.95 | 240.52 | 74.43 | 0.22 |
| SOUTH TRIB | 7.289 | 10-YEAR | 287.00 | 657.30 | 661.86 | | 662.00 | 0.002507 | 3.51 | 97.96 | 38.11 | 0.33 |
| SOUTH TRIB | 7.289 | 50-YEAR | 461.00 | 657.30 | 662.99 | | 663.15 | 0.002282 | 3.77 | 145.41 | 45.85 | 0.33 |
| SOUTH TRIB | 7.289 | 100-YEAR | 517.00 | 657.30 | 663.31 | | 663.48 | 0.002215 | 3.83 | 160.42 | 48.04 | 0.32 |
| SOUTH TRIB | 7.314 | 10-YEAR | 287.00 | 657.10 | 662.15 | | 662.23 | 0.001194 | 2.51 | 137.19 | 49.27 | 0.23 |
| SOUTH TRIB | 7.314 | 50-YEAR | 461.00 | 657.10 | 663.28 | | 663.37 | 0.001155 | 2.75 | 197.24 | 57.61 | 0.23 |
| SOUTH TRIB | 7.314 | 100-YEAR | 517.00 | 657.10 | 663.59 | | 663.69 | 0.001139 | 2.81 | 215.85 | 59.96 | 0.23 |
| SOUTH TRIB | 7.331 | 10-YEAR | 287.00 | 657.60 | 662.28 | | 662.58 | 0.005843 | 4.80 | 67.12 | 27.17 | 0.50 |
| SOUTH TRIB | 7.331 | 50-YEAR | 461.00 | 657.60 | 663.37 | | 663.71 | 0.005291 | 5.15 | 99.83 | 33.09 | 0.49 |
| SOUTH TRIB | 7.331 | 100-YEAR | 517.00 | 657.60 | 663.67 | | 664.03 | 0.005122 | 5.22 | 110.23 | 34.77 | 0.49 |
| SOUTH TRIB | 7.35 | 10-YEAR | 287.00 | 658.10 | 662.81 | | 662.99 | 0.002661 | 3.72 | 89.08 | 31.33 | 0.35 |
| SOUTH TRIB | 7.35 | 50-YEAR | 461.00 | 658.10 | 663.89 | | 664.11 | 0.002769 | 4.24 | 125.76 | 36.92 | 0.36 |
| SOUTH TRIB | 7.35 | 100-YEAR | 517.00 | 658.10 | 664.19 | | 664.43 | 0.002779 | 4.36 | 137.04 | 38.47 | 0.36 |
| SOUTH TRIB | 7.391 | 10-YEAR | 287.00 | 658.50 | 663.34 | | 663.49 | 0.001998 | 3.36 | 97.98 | 31.92 | 0.30 |
| SOUTH TRIB | 7.391 | 50-YEAR | 461.00 | 658.50 | 664.45 | | 664.64 | 0.002153 | 3.89 | 136.28 | 37.23 | 0.32 |
| SOUTH TRIB | 7.391 | 100-YEAR | 517.00 | 658.50 | 664.75 | | 664.96 | 0.002184 | 4.02 | 148.43 | 46.73 | 0.33 |
| SOUTH TRIB | 7.399 | 10-YEAR | 287.00 | 657.49 | 663.39 | 660.52 | 663.56 | 0.001273 | 3.62 | 96.81 | 24.83 | 0.27 |
| SOUTH TRIB | 7.399 | 50-YEAR | 461.00 | 657.49 | 664.47 | 661.40 | 664.74 | 0.001639 | 4.63 | 125.20 | 462.81 | 0.32 |
| SOUTH TRIB | 7.399 | 100-YEAR | 517.00 | 657.49 | 664.76 | 661.65 | 665.07 | 0.001737 | 4.91 | 133.44 | 627.44 | 0.33 |
| SOUTH TRIB | 7.406 | 10-YEAR | 287.00 | 658.60 | 663.41 | | 663.64 | 0.002094 | 4.31 | 84.72 | 25.23 | 0.35 |
| SOUTH TRIB | 7.406 | 50-YEAR | 461.00 | 658.60 | 664.50 | | 664.84 | 0.002414 | 5.30 | 114.19 | 28.68 | 0.38 |

HEC-RAS Plan: Nat - Thorndale (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.406 | 100-YEAR | 517.00 | 658.60 | 664.80 | | 665.16 | 0.002483 | 5.55 | 122.83 | 29.12 | 0.39 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 287.00 | 659.00 | 663.68 | | 664.05 | 0.004043 | 5.59 | 67.46 | 23.93 | 0.47 |
| SOUTH TRIB | 7.431 | 50-YEAR | 461.00 | 659.00 | 664.80 | | 665.28 | 0.004044 | 6.51 | 97.00 | 28.59 | 0.49 |
| SOUTH TRIB | 7.431 | 100-YEAR | 517.00 | 659.00 | 665.11 | | 665.61 | 0.004034 | 6.74 | 105.94 | 29.62 | 0.49 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 287.00 | 658.10 | 664.01 | | 664.12 | 0.001176 | 3.26 | 113.59 | 31.55 | 0.26 |
| SOUTH TRIB | 7.447 | 50-YEAR | 461.00 | 658.10 | 665.20 | | 665.36 | 0.001338 | 4.01 | 153.64 | 35.94 | 0.28 |
| SOUTH TRIB | 7.447 | 100-YEAR | 517.00 | 658.10 | 665.49 | | 665.70 | 0.001559 | 4.46 | 166.32 | 56.85 | 0.31 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 261.00 | 658.10 | 664.07 | 660.99 | 664.16 | 0.000864 | 2.82 | 110.94 | 31.77 | 0.22 |
| SOUTH TRIB | 7.456 | 50-YEAR | 418.00 | 658.10 | 665.28 | 661.71 | 665.41 | 0.001046 | 3.57 | 156.53 | 36.24 | 0.25 |
| SOUTH TRIB | 7.456 | 100-YEAR | 468.00 | 658.10 | 665.59 | 661.91 | 665.75 | 0.001220 | 3.99 | 172.26 | 67.15 | 0.27 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 261.00 | 658.10 | 664.82 | 660.99 | 664.89 | 0.000509 | 2.37 | 130.58 | 34.57 | 0.17 |
| SOUTH TRIB | 7.47 | 50-YEAR | 418.00 | 658.10 | 666.68 | 661.70 | 666.75 | 0.000599 | 3.09 | 363.86 | 295.65 | 0.20 |
| SOUTH TRIB | 7.47 | 100-YEAR | 468.00 | 658.10 | 666.85 | 661.90 | 666.92 | 0.000588 | 3.11 | 419.74 | 334.86 | 0.20 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 261.00 | 655.06 | 664.90 | | 664.90 | 0.000006 | 0.38 | 1055.67 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 50-YEAR | 418.00 | 655.06 | 666.76 | | 666.76 | 0.000006 | 0.43 | 1443.18 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 100-YEAR | 468.00 | 655.06 | 666.93 | | 666.93 | 0.000007 | 0.47 | 1479.10 | 208.30 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 261.00 | 655.05 | 664.90 | | 664.90 | 0.000001 | 0.11 | 4693.96 | 1495.92 | 0.01 |
| SOUTH TRIB | 7.493 | 50-YEAR | 418.00 | 655.05 | 666.76 | | 666.76 | 0.000000 | 0.09 | 7571.96 | 1585.23 | 0.01 |
| SOUTH TRIB | 7.493 | 100-YEAR | 468.00 | 655.05 | 666.93 | | 666.93 | 0.000000 | 0.10 | 7846.54 | 1592.92 | 0.01 |

HEC-RAS Plan: Nat - Thorndale

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 4.518 | 10-YEAR | 644.73 | 644.69 | 0.04 | 0.05 | 0.01 | 11.61 | 870.78 | 11.61 | 68.69 |
| MAINSTEM | 4.518 | 50-YEAR | 646.41 | 646.33 | 0.08 | 0.06 | 0.01 | 22.42 | 1414.15 | 22.42 | 70.33 |
| MAINSTEM | 4.518 | 100-YEAR | 647.00 | 646.91 | 0.09 | 0.06 | 0.01 | 27.25 | 1627.50 | 27.25 | 70.91 |
| | | | | | | | | | | | |
| MAINSTEM | 4.594 | 10-YEAR | 644.77 | 644.73 | 0.04 | 0.04 | 0.00 | 11.67 | 870.66 | 11.67 | 68.73 |
| MAINSTEM | 4.594 | 50-YEAR | 646.48 | 646.40 | 0.08 | 0.07 | 0.00 | 22.57 | 1413.87 | 22.57 | 70.40 |
| MAINSTEM | 4.594 | 100-YEAR | 647.07 | 646.98 | 0.09 | 0.07 | 0.00 | 27.43 | 1627.14 | 27.43 | 70.98 |
| | | | | | | | | | | | |
| MAINSTEM | 4.675 | 10-YEAR | 644.82 | 644.78 | 0.04 | 0.05 | 0.00 | 11.67 | 870.65 | 11.67 | 68.72 |
| MAINSTEM | 4.675 | 50-YEAR | 646.55 | 646.47 | 0.08 | 0.07 | 0.00 | 22.64 | 1413.71 | 22.64 | 70.41 |
| MAINSTEM | 4.675 | 100-YEAR | 647.15 | 647.06 | 0.09 | 0.08 | 0.00 | 27.55 | 1626.91 | 27.55 | 71.01 |
| | | | | | | | | | | | |
| MAINSTEM | 4.773 | 10-YEAR | 644.88 | 644.84 | 0.03 | 0.05 | 0.00 | 10.26 | 764.66 | 9.07 | 68.37 |
| MAINSTEM | 4.773 | 50-YEAR | 646.62 | 646.57 | 0.06 | 0.07 | 0.00 | 19.17 | 1190.88 | 16.95 | 70.04 |
| MAINSTEM | 4.773 | 100-YEAR | 647.24 | 647.17 | 0.07 | 0.08 | 0.00 | 24.25 | 1423.32 | 21.43 | 70.63 |
| | | | | | | | | | | | |
| MAINSTEM | 4.790 | 10-YEAR | 644.93 | 644.81 | 0.12 | 0.01 | 0.04 | | 784.00 | | 68.35 |
| MAINSTEM | 4.790 | 50-YEAR | 646.71 | 646.51 | 0.20 | 0.02 | 0.07 | | 1227.00 | | 69.99 |
| MAINSTEM | 4.790 | 100-YEAR | 647.35 | 647.09 | 0.26 | 0.02 | 0.09 | | 1469.00 | | 70.56 |
| | | | | | | | | | | | |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 645.42 | 645.28 | 0.15 | | | | 784.00 | | 65.50 |
| MAINSTEM | 5.059 | 50-YEAR | 647.81 | 647.60 | 0.21 | | | | 1227.00 | | 67.78 |
| MAINSTEM | 5.059 | 100-YEAR | 648.96 | 648.71 | 0.25 | | | | 1469.00 | | 68.88 |
| | | | | | | | | | | | |
| MAINSTEM | 5.076 | 10-YEAR | 645.46 | 645.41 | 0.05 | 0.03 | 0.01 | | 784.00 | | 65.48 |
| MAINSTEM | 5.076 | 50-YEAR | 647.85 | 647.79 | 0.07 | 0.03 | 0.01 | | 1227.00 | | 67.85 |
| MAINSTEM | 5.076 | 100-YEAR | 649.00 | 648.93 | 0.07 | 0.03 | 0.02 | | 1469.00 | | 68.98 |
| | | | | | | | | | | | |
| MAINSTEM | 5.104 | 10-YEAR | 645.51 | 645.41 | 0.10 | 0.03 | 0.02 | | 784.00 | | 65.32 |
| MAINSTEM | 5.104 | 50-YEAR | 647.90 | 647.76 | 0.14 | 0.03 | 0.02 | | 1227.00 | | 67.69 |
| MAINSTEM | 5.104 | 100-YEAR | 649.06 | 648.90 | 0.16 | 0.03 | 0.03 | | 1469.00 | | 68.83 |
| | | | | | | | | | | | |
| MAINSTEM | 5.109 | 10-YEAR | 645.54 | 645.37 | 0.17 | 0.01 | 0.02 | | 784.00 | | 65.24 |
| MAINSTEM | 5.109 | 50-YEAR | 647.94 | 647.71 | 0.24 | 0.01 | 0.03 | | 1227.00 | | 67.60 |
| MAINSTEM | 5.109 | 100-YEAR | 649.10 | 648.83 | 0.27 | 0.01 | 0.03 | | 1469.00 | | 68.73 |
| | | | | | | | | | | | |
| MAINSTEM | 5.110 | 10-YEAR | 645.56 | 645.33 | 0.23 | 0.00 | 0.02 | | 784.00 | | 44.59 |
| MAINSTEM | 5.110 | 50-YEAR | 647.98 | 647.64 | 0.34 | 0.00 | 0.03 | | 1227.00 | | 50.16 |
| MAINSTEM | 5.110 | 100-YEAR | 649.14 | 648.75 | 0.40 | 0.00 | 0.04 | | 1469.00 | | 52.83 |
| | | | | | | | | | | | |
| MAINSTEM | 5.116 | 10-YEAR | 645.57 | 645.33 | 0.24 | 0.01 | 0.00 | | 784.00 | | 25.00 |
| MAINSTEM | 5.116 | 50-YEAR | 647.99 | 647.64 | 0.35 | 0.01 | 0.01 | 0.02 | 1226.96 | 0.02 | 26.44 |
| MAINSTEM | 5.116 | 100-YEAR | 649.16 | 648.75 | 0.41 | 0.01 | 0.01 | 0.25 | 1468.50 | 0.25 | 31.23 |
| | | | | | | | | | | | |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 646.33 | 646.04 | 0.29 | | | | 634.00 | | 25.50 |
| MAINSTEM | 5.606 | 50-YEAR | 649.94 | 649.64 | 0.30 | | | | 1056.00 | | 57.51 |
| MAINSTEM | 5.606 | 100-YEAR | 651.86 | 651.58 | 0.28 | | | | 1227.00 | | 81.07 |
| | | | | | | | | | | | |
| MAINSTEM | 5.610 | 10-YEAR | 646.36 | 646.34 | 0.02 | 0.00 | 0.03 | | 634.00 | | 125.37 |
| MAINSTEM | 5.610 | 50-YEAR | 649.97 | 649.96 | 0.02 | 0.00 | 0.03 | | 1056.00 | | 145.92 |
| MAINSTEM | 5.610 | 100-YEAR | 651.89 | 651.87 | 0.02 | 0.00 | 0.03 | | 1227.00 | | 156.80 |
| | | | | | | | | | | | |
| MAINSTEM | 5.629 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 215.50 |
| MAINSTEM | 5.629 | 50-YEAR | 649.98 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 237.17 |
| MAINSTEM | 5.629 | 100-YEAR | 651.89 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 248.65 |
| | | | | | | | | | | | |
| MAINSTEM | 5.632 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 411.48 |
| MAINSTEM | 5.632 | 50-YEAR | 649.98 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 433.15 |
| MAINSTEM | 5.632 | 100-YEAR | 651.89 | 651.89 | 0.00 | 0.00 | 0.00 | | 1227.00 | | 444.63 |
| | | | | | | | | | | | |
| MAINSTEM | 5.639 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 737.23 |
| MAINSTEM | 5.639 | 50-YEAR | 649.98 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 758.89 |
| MAINSTEM | 5.639 | 100-YEAR | 651.89 | 651.89 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 770.37 |
| | | | | | | | | | | | |
| MAINSTEM | 5.697 | 10-YEAR | 646.41 | 646.38 | 0.04 | 0.03 | 0.01 | | 634.00 | | 311.75 |
| MAINSTEM | 5.697 | 50-YEAR | 650.00 | 649.97 | 0.03 | 0.01 | 0.01 | | 1056.00 | | 333.31 |
| MAINSTEM | 5.697 | 100-YEAR | 651.90 | 651.88 | 0.02 | 0.01 | 0.01 | | 1227.00 | | 344.77 |
| | | | | | | | | | | | |

HEC-RAS Plan: Nat - Thorndale (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 5.720 | 10-YEAR | 646.51 | 646.35 | 0.16 | 0.06 | 0.04 | | 634.00 | | 161.09 |
| MAINSTEM | 5.720 | 50-YEAR | 650.05 | 649.91 | 0.14 | 0.02 | 0.03 | | 1056.00 | | 188.79 |
| MAINSTEM | 5.720 | 100-YEAR | 651.95 | 651.82 | 0.12 | 0.01 | 0.03 | | 1227.00 | | 203.67 |
| MAINSTEM | 5.725 | 10-YEAR | 646.59 | 646.28 | 0.31 | 0.03 | 0.04 | | 634.00 | | 93.94 |
| MAINSTEM | 5.725 | 50-YEAR | 650.11 | 649.83 | 0.28 | 0.01 | 0.04 | | 1056.00 | | 126.79 |
| MAINSTEM | 5.725 | 100-YEAR | 651.99 | 651.75 | 0.25 | 0.01 | 0.04 | | 1227.00 | | 144.55 |
| MAINSTEM | 5.727 | 10-YEAR | 646.69 | 646.24 | 0.45 | 0.02 | 0.07 | | 634.00 | | 25.00 |
| MAINSTEM | 5.727 | 50-YEAR | 650.18 | 649.77 | 0.41 | 0.01 | 0.06 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.727 | 100-YEAR | 652.06 | 651.70 | 0.36 | 0.01 | 0.06 | | 1227.00 | | 28.12 |
| MAINSTEM | 5.732 | 10-YEAR | 646.82 | 646.38 | 0.44 | 0.13 | 0.00 | | 634.00 | | 25.00 |
| MAINSTEM | 5.732 | 50-YEAR | 650.25 | 649.84 | 0.41 | 0.07 | 0.00 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.732 | 100-YEAR | 652.11 | 651.75 | 0.36 | 0.05 | 0.00 | | 1227.00 | | 27.77 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 647.18 | 646.81 | 0.37 | | | | 634.00 | | 26.00 |
| MAINSTEM | 5.757 | 50-YEAR | 650.55 | 650.19 | 0.37 | | | | 1056.00 | | 26.00 |
| MAINSTEM | 5.757 | 100-YEAR | 652.40 | 652.08 | 0.33 | | | | 1227.00 | | 26.00 |
| MAINSTEM | 5.759 | 10-YEAR | 647.22 | 647.20 | 0.03 | 0.01 | 0.03 | | 634.00 | | 100.00 |
| MAINSTEM | 5.759 | 50-YEAR | 650.59 | 650.56 | 0.03 | 0.01 | 0.03 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.759 | 100-YEAR | 652.44 | 652.41 | 0.03 | 0.00 | 0.03 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.810 | 10-YEAR | 647.29 | 647.24 | 0.06 | 0.06 | 0.01 | | 634.00 | | 100.00 |
| MAINSTEM | 5.810 | 50-YEAR | 650.62 | 650.58 | 0.04 | 0.03 | 0.00 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.810 | 100-YEAR | 652.46 | 652.43 | 0.03 | 0.02 | 0.00 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.860 | 10-YEAR | 648.57 | 647.64 | 0.93 | 0.42 | 0.26 | | 634.00 | | 100.00 |
| MAINSTEM | 5.860 | 50-YEAR | 650.83 | 650.43 | 0.40 | 0.10 | 0.11 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.860 | 100-YEAR | 652.59 | 652.32 | 0.28 | 0.06 | 0.07 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.862 | 10-YEAR | 649.70 | 648.45 | 1.26 | 0.73 | 0.16 | | 634.00 | | 28.35 |
| MAINSTEM | 5.862 | 50-YEAR | 651.40 | 650.20 | 1.20 | 0.16 | 0.40 | | 1056.00 | | 28.35 |
| MAINSTEM | 5.862 | 100-YEAR | 652.91 | 652.14 | 0.76 | 0.07 | 0.24 | | 1227.00 | | 28.35 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 651.96 | 651.60 | 0.37 | | | | 634.00 | | 33.00 |
| MAINSTEM | 6.037 | 50-YEAR | 653.74 | 653.22 | 0.52 | | | | 1056.00 | | 33.00 |
| MAINSTEM | 6.037 | 100-YEAR | 654.46 | 653.90 | 0.56 | | | | 1227.00 | | 33.00 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 652.40 | 652.15 | 0.25 | | | | 603.00 | | 34.00 |
| MAINSTEM | 6.190 | 50-YEAR | 654.26 | 653.91 | 0.35 | | | | 996.00 | | 34.00 |
| MAINSTEM | 6.190 | 100-YEAR | 655.00 | 654.62 | 0.38 | | | | 1156.00 | | 34.00 |
| MAINSTEM | 6.194 | 10-YEAR | 652.44 | 652.41 | 0.03 | 0.01 | 0.02 | | 603.00 | | 100.00 |
| MAINSTEM | 6.194 | 50-YEAR | 654.31 | 654.27 | 0.04 | 0.01 | 0.03 | | 996.00 | | 100.00 |
| MAINSTEM | 6.194 | 100-YEAR | 655.04 | 655.00 | 0.04 | 0.01 | 0.03 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.332 | 10-YEAR | 652.55 | 652.52 | 0.03 | 0.11 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.332 | 50-YEAR | 654.41 | 654.37 | 0.04 | 0.10 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.332 | 100-YEAR | 655.14 | 655.10 | 0.04 | 0.10 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.418 | 10-YEAR | 652.63 | 652.61 | 0.03 | 0.09 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.418 | 50-YEAR | 654.49 | 654.45 | 0.04 | 0.08 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.418 | 100-YEAR | 655.22 | 655.18 | 0.04 | 0.08 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.471 | 10-YEAR | 652.73 | 652.65 | 0.08 | 0.08 | 0.02 | | 603.00 | | 55.30 |
| MAINSTEM | 6.471 | 50-YEAR | 654.59 | 654.48 | 0.12 | 0.08 | 0.02 | | 996.00 | | 55.30 |
| MAINSTEM | 6.471 | 100-YEAR | 655.32 | 655.19 | 0.13 | 0.07 | 0.03 | | 1156.00 | | 55.30 |
| MAINSTEM | 6.473 | 10-YEAR | 652.79 | 652.61 | 0.18 | 0.01 | 0.05 | | 603.00 | | 40.00 |
| MAINSTEM | 6.473 | 50-YEAR | 654.67 | 654.42 | 0.25 | 0.01 | 0.07 | | 996.00 | | 40.00 |
| MAINSTEM | 6.473 | 100-YEAR | 655.40 | 655.13 | 0.27 | 0.01 | 0.07 | | 1156.00 | | 40.00 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | |

HEC-RAS Plan: Nat - Thorndale (Continued)

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 6.538 | 10-YEAR | 653.03 | 652.83 | 0.20 | | | | 603.00 | | 38.00 |
| MAINSTEM | 6.538 | 50-YEAR | 654.97 | 654.69 | 0.27 | | | | 996.00 | | 38.00 |
| MAINSTEM | 6.538 | 100-YEAR | 655.72 | 655.42 | 0.29 | | | | 1156.00 | | 38.00 |
| | | | | | | | | | | | |
| MAINSTEM | 6.540 | 10-YEAR | 653.05 | 653.04 | 0.01 | 0.00 | 0.02 | | 603.00 | | 191.09 |
| MAINSTEM | 6.540 | 50-YEAR | 654.99 | 654.98 | 0.02 | 0.00 | 0.03 | | 996.00 | | 220.15 |
| MAINSTEM | 6.540 | 100-YEAR | 655.75 | 655.73 | 0.02 | 0.00 | 0.03 | | 1156.00 | | 231.43 |
| | | | | | | | | | | | |
| MAINSTEM | 6.59 | 10-YEAR | 653.07 | 653.06 | 0.01 | 0.02 | 0.00 | | 603.00 | | 196.42 |
| MAINSTEM | 6.59 | 50-YEAR | 655.03 | 655.01 | 0.01 | 0.03 | 0.00 | 0.00 | 996.00 | | 1008.18 |
| MAINSTEM | 6.59 | 100-YEAR | 655.77 | 655.76 | 0.01 | 0.02 | 0.00 | 1.69 | 1154.31 | | 1050.55 |
| | | | | | | | | | | | |
| MAINSTEM | 6.6 | 10-YEAR | 653.14 | 653.03 | 0.11 | 0.02 | 0.05 | | 603.00 | | 199.69 |
| MAINSTEM | 6.6 | 50-YEAR | 655.13 | 654.99 | 0.14 | 0.04 | 0.07 | | 996.00 | | 234.83 |
| MAINSTEM | 6.6 | 100-YEAR | 655.86 | 655.70 | 0.16 | 0.02 | 0.08 | | 1156.00 | | 247.67 |
| | | | | | | | | | | | |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 653.45 | 652.11 | 1.34 | | | | 603.00 | | 219.18 |
| MAINSTEM | 6.635 | 50-YEAR | 655.48 | 654.41 | 1.07 | | | | 996.00 | | 1224.97 |
| MAINSTEM | 6.635 | 100-YEAR | 656.23 | 655.13 | 1.10 | | | | 1156.00 | | 1230.06 |
| | | | | | | | | | | | |
| MAINSTEM | 6.637 | 10-YEAR | 653.85 | 653.85 | 0.00 | 0.00 | 0.40 | 5.04 | 597.62 | 0.34 | 1208.75 |
| MAINSTEM | 6.637 | 50-YEAR | 655.80 | 655.80 | 0.00 | 0.00 | 0.32 | 15.58 | 979.15 | 1.27 | 1234.77 |
| MAINSTEM | 6.637 | 100-YEAR | 656.56 | 656.56 | 0.00 | 0.00 | 0.33 | 19.86 | 1134.35 | 1.79 | 1240.14 |
| | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 654.18 | 653.53 | 0.65 | 0.00 | 0.33 | | 603.00 | | 40.25 |
| MAINSTEM | 6.639 | 50-YEAR | 656.02 | 655.58 | 0.44 | 0.00 | 0.22 | | 996.00 | | 52.26 |
| MAINSTEM | 6.639 | 100-YEAR | 656.75 | 656.36 | 0.39 | 0.00 | 0.19 | | 1156.00 | | 56.86 |
| | | | | | | | | | | | |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 655.03 | 654.58 | 0.45 | 0.01 | 0.00 | | 603.00 | | 47.66 |
| MAINSTEM | 6.642 | 50-YEAR | 656.43 | 656.01 | 0.43 | 0.01 | 0.00 | | 996.00 | | 61.64 |
| MAINSTEM | 6.642 | 100-YEAR | 657.08 | 656.70 | 0.38 | 0.00 | 0.00 | | 1156.00 | | 68.64 |
| | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 655.14 | 654.75 | 0.39 | 0.09 | 0.02 | | 603.00 | | 49.23 |
| MAINSTEM | 6.643 | 50-YEAR | 656.51 | 656.11 | 0.40 | 0.07 | 0.01 | | 996.00 | | 62.66 |
| MAINSTEM | 6.643 | 100-YEAR | 657.13 | 656.77 | 0.36 | 0.05 | 0.00 | | 1156.00 | | 69.34 |
| | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 655.39 | 655.39 | 0.00 | 0.01 | 0.23 | 0.31 | 573.67 | 29.02 | 1612.85 |
| MAINSTEM | 6.644 | 50-YEAR | 656.75 | 656.75 | 0.00 | 0.00 | 0.24 | 11.18 | 891.80 | 93.03 | 1817.99 |
| MAINSTEM | 6.644 | 100-YEAR | 657.35 | 657.35 | 0.00 | 0.00 | 0.22 | 21.08 | 1012.13 | 122.79 | 1907.82 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.645 | 10-YEAR | 655.73 | 655.18 | 0.55 | 0.05 | 0.16 | 94.68 | 205.34 | 13.98 | 54.47 |
| SOUTH TRIB | 6.645 | 50-YEAR | 656.84 | 656.62 | 0.22 | 0.02 | 0.06 | 241.30 | 236.90 | 27.80 | 68.99 |
| SOUTH TRIB | 6.645 | 100-YEAR | 657.41 | 657.25 | 0.16 | 0.01 | 0.05 | 291.99 | 244.06 | 33.95 | 75.35 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.664 | 10-YEAR | 656.48 | 656.28 | 0.21 | 0.72 | 0.03 | 105.64 | 190.31 | 18.04 | 49.31 |
| SOUTH TRIB | 6.664 | 50-YEAR | 657.25 | 656.97 | 0.28 | 0.40 | 0.02 | 193.92 | 279.39 | 32.69 | 55.24 |
| SOUTH TRIB | 6.664 | 100-YEAR | 657.70 | 657.46 | 0.24 | 0.27 | 0.02 | 232.75 | 297.77 | 39.48 | 59.40 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.683 | 10-YEAR | 656.90 | 656.63 | 0.26 | 0.40 | 0.02 | 64.85 | 223.48 | 25.67 | 37.11 |
| SOUTH TRIB | 6.683 | 50-YEAR | 657.73 | 657.34 | 0.39 | 0.45 | 0.03 | 119.82 | 338.75 | 47.44 | 41.95 |
| SOUTH TRIB | 6.683 | 100-YEAR | 658.11 | 657.73 | 0.38 | 0.36 | 0.04 | 143.48 | 369.71 | 56.81 | 44.57 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.721 | 10-YEAR | 657.60 | 657.36 | 0.24 | 0.70 | 0.00 | 43.87 | 238.18 | 31.94 | 36.35 |
| SOUTH TRIB | 6.721 | 50-YEAR | 658.55 | 658.21 | 0.34 | 0.82 | 0.00 | 85.76 | 360.65 | 59.58 | 46.89 |
| SOUTH TRIB | 6.721 | 100-YEAR | 658.86 | 658.51 | 0.36 | 0.76 | 0.00 | 104.98 | 395.40 | 69.61 | 50.57 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.759 | 10-YEAR | 658.12 | 657.94 | 0.19 | 0.51 | 0.01 | 51.87 | 227.34 | 34.79 | 36.08 |
| SOUTH TRIB | 6.759 | 50-YEAR | 659.14 | 658.88 | 0.26 | 0.58 | 0.01 | 97.19 | 343.63 | 65.18 | 41.14 |
| SOUTH TRIB | 6.759 | 100-YEAR | 659.45 | 659.16 | 0.29 | 0.58 | 0.01 | 113.73 | 380.00 | 76.27 | 42.66 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.797 | 10-YEAR | 658.55 | 658.41 | 0.14 | 0.43 | 0.00 | | 314.00 | | 36.40 |
| SOUTH TRIB | 6.797 | 50-YEAR | 659.62 | 659.43 | 0.19 | 0.47 | 0.01 | | 506.00 | | 41.69 |
| SOUTH TRIB | 6.797 | 100-YEAR | 659.93 | 659.73 | 0.20 | 0.47 | 0.01 | | 570.00 | | 43.23 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.834 | 10-YEAR | 658.90 | 658.77 | 0.13 | 0.34 | 0.00 | 46.08 | 204.14 | 63.78 | 44.24 |
| SOUTH TRIB | 6.834 | 50-YEAR | 659.98 | 659.82 | 0.17 | 0.36 | 0.00 | 85.40 | 302.41 | 118.19 | 51.58 |
| SOUTH TRIB | 6.834 | 100-YEAR | 660.30 | 660.12 | 0.18 | 0.37 | 0.00 | 99.46 | 332.89 | 137.65 | 53.70 |
| | | | | | | | | | | | |

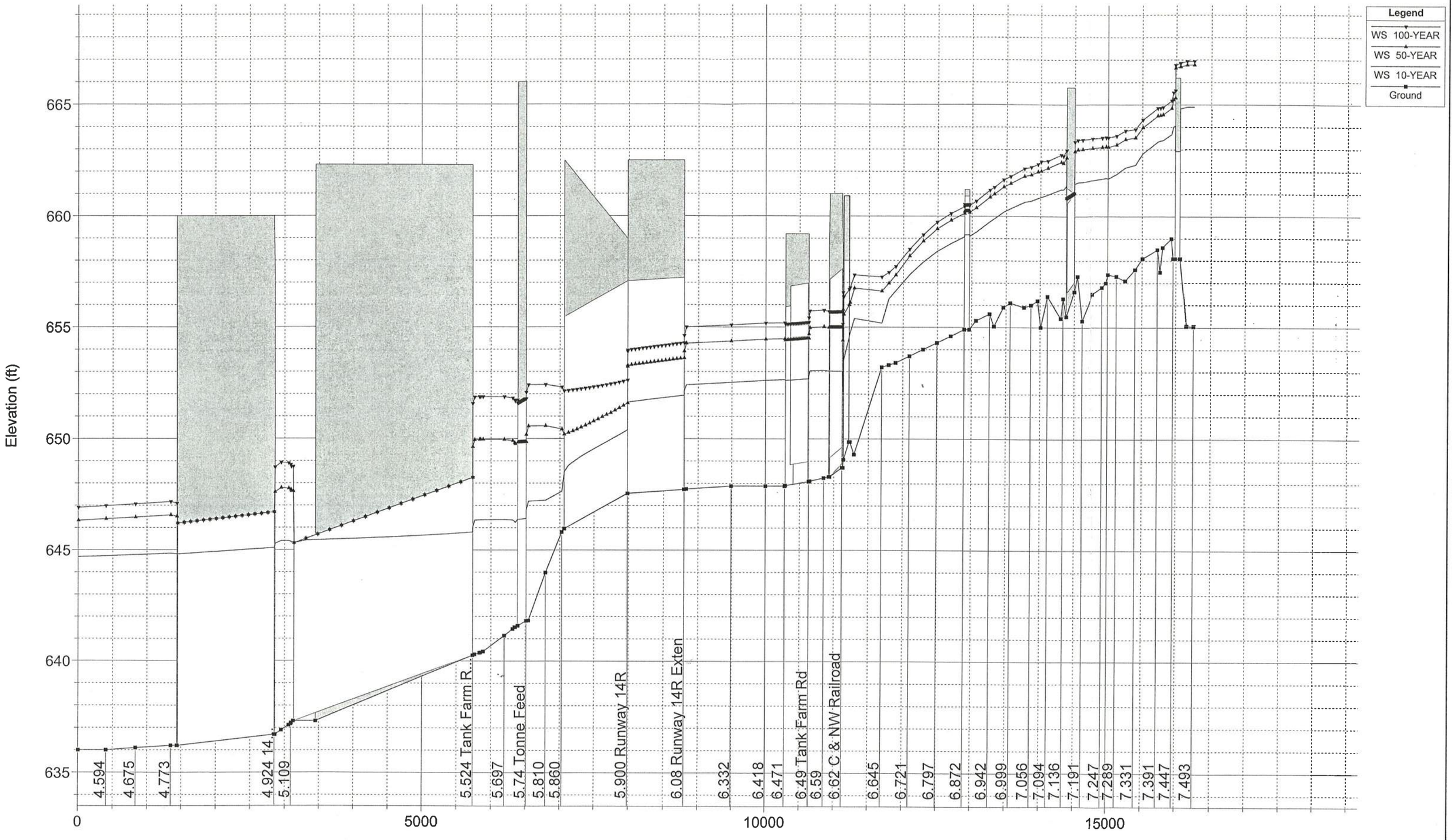
HEC-RAS Plan: Nat - Thorndale (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 6.872 | 10-YEAR | 659.25 | 659.07 | 0.18 | 0.33 | 0.03 | 43.40 | 235.44 | 35.16 | 33.76 |
| SOUTH TRIB | 6.872 | 50-YEAR | 660.38 | 660.13 | 0.25 | 0.35 | 0.04 | 82.36 | 356.92 | 66.72 | 38.48 |
| SOUTH TRIB | 6.872 | 100-YEAR | 660.70 | 660.43 | 0.28 | 0.36 | 0.05 | 96.49 | 395.34 | 78.17 | 39.83 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.879 Miller Fluids En | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.886 | 10-YEAR | 659.27 | 659.09 | 0.18 | | | 43.56 | 235.16 | 35.29 | 33.85 |
| SOUTH TRIB | 6.886 | 50-YEAR | 660.42 | 660.17 | 0.25 | | | 82.86 | 356.02 | 67.12 | 38.68 |
| SOUTH TRIB | 6.886 | 100-YEAR | 660.75 | 660.48 | 0.27 | | | 97.10 | 394.24 | 78.66 | 40.06 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.904 | 10-YEAR | 659.50 | 659.29 | 0.21 | 0.21 | 0.02 | 39.28 | 242.79 | 31.93 | 33.85 |
| SOUTH TRIB | 6.904 | 50-YEAR | 660.66 | 660.37 | 0.28 | 0.22 | 0.02 | 78.12 | 366.55 | 61.32 | 44.59 |
| SOUTH TRIB | 6.904 | 100-YEAR | 660.98 | 660.68 | 0.30 | 0.22 | 0.02 | 95.13 | 403.27 | 71.60 | 47.66 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.942 | 10-YEAR | 659.93 | 659.75 | 0.17 | 0.43 | 0.00 | 47.22 | 232.29 | 34.49 | 36.28 |
| SOUTH TRIB | 6.942 | 50-YEAR | 661.10 | 660.86 | 0.23 | 0.44 | 0.00 | 90.26 | 349.91 | 65.84 | 46.52 |
| SOUTH TRIB | 6.942 | 100-YEAR | 661.42 | 661.17 | 0.25 | 0.44 | 0.01 | 107.93 | 385.30 | 76.77 | 49.39 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.956 | 10-YEAR | 660.07 | 659.89 | 0.19 | 0.14 | 0.00 | | 298.23 | 15.77 | 134.67 |
| SOUTH TRIB | 6.956 | 50-YEAR | 661.25 | 661.00 | 0.25 | 0.14 | 0.00 | | 468.62 | 37.38 | 277.69 |
| SOUTH TRIB | 6.956 | 100-YEAR | 661.57 | 661.31 | 0.27 | 0.14 | 0.01 | | 524.30 | 45.70 | 524.98 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.98 | 10-YEAR | 660.34 | 660.19 | 0.14 | 0.26 | 0.00 | 58.06 | 220.98 | 34.96 | 38.27 |
| SOUTH TRIB | 6.98 | 50-YEAR | 661.52 | 661.32 | 0.19 | 0.27 | 0.01 | 108.21 | 331.50 | 66.29 | 45.38 |
| SOUTH TRIB | 6.98 | 100-YEAR | 661.85 | 661.64 | 0.21 | 0.27 | 0.01 | 126.54 | 366.00 | 77.46 | 47.43 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.999 | 10-YEAR | 660.50 | 660.35 | 0.15 | 0.16 | 0.00 | 54.70 | 223.55 | 35.75 | 37.41 |
| SOUTH TRIB | 6.999 | 50-YEAR | 661.68 | 661.48 | 0.20 | 0.16 | 0.00 | 103.72 | 334.48 | 67.80 | 43.41 |
| SOUTH TRIB | 6.999 | 100-YEAR | 662.02 | 661.80 | 0.23 | 0.17 | 0.01 | 110.39 | 378.42 | 81.19 | 49.46 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.037 | 10-YEAR | 660.71 | 660.63 | 0.08 | 0.21 | 0.01 | 48.21 | 236.53 | 29.26 | 44.75 |
| SOUTH TRIB | 7.037 | 50-YEAR | 661.92 | 661.80 | 0.11 | 0.22 | 0.01 | 91.80 | 358.86 | 55.34 | 51.24 |
| SOUTH TRIB | 7.037 | 100-YEAR | 662.27 | 662.14 | 0.12 | 0.23 | 0.01 | 107.82 | 397.37 | 64.81 | 53.13 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.056 | 10-YEAR | 660.81 | 660.70 | 0.12 | 0.09 | 0.01 | 43.86 | 217.14 | 53.00 | 39.70 |
| SOUTH TRIB | 7.056 | 50-YEAR | 662.03 | 661.87 | 0.16 | 0.10 | 0.01 | 75.50 | 329.95 | 100.55 | 50.68 |
| SOUTH TRIB | 7.056 | 100-YEAR | 662.38 | 662.21 | 0.17 | 0.10 | 0.02 | 88.93 | 363.78 | 117.29 | 54.37 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.075 | 10-YEAR | 660.92 | 660.82 | 0.11 | 0.11 | 0.00 | 58.87 | 208.35 | 46.78 | 42.79 |
| SOUTH TRIB | 7.075 | 50-YEAR | 662.15 | 662.00 | 0.15 | 0.12 | 0.00 | 103.94 | 313.57 | 88.49 | 53.44 |
| SOUTH TRIB | 7.075 | 100-YEAR | 662.50 | 662.34 | 0.16 | 0.12 | 0.00 | 120.92 | 345.75 | 103.33 | 57.21 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.084 | 10-YEAR | 660.98 | 660.86 | 0.12 | 0.05 | 0.00 | 23.83 | 260.97 | 29.20 | 40.39 |
| SOUTH TRIB | 7.084 | 50-YEAR | 662.21 | 662.04 | 0.18 | 0.06 | 0.01 | 30.99 | 406.06 | 68.95 | 206.70 |
| SOUTH TRIB | 7.084 | 100-YEAR | 662.55 | 662.46 | 0.09 | 0.04 | 0.01 | 155.96 | 347.55 | 66.50 | 215.96 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.094 | 10-YEAR | 661.09 | 660.97 | 0.13 | 0.11 | 0.00 | 55.54 | 219.82 | 38.64 | 38.76 |
| SOUTH TRIB | 7.094 | 50-YEAR | 662.34 | 662.17 | 0.17 | 0.12 | 0.00 | 104.82 | 328.26 | 72.92 | 45.02 |
| SOUTH TRIB | 7.094 | 100-YEAR | 662.67 | 662.49 | 0.18 | 0.09 | 0.03 | 122.22 | 362.76 | 85.02 | 46.67 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.132 | 10-YEAR | 661.29 | 661.21 | 0.09 | 0.20 | 0.00 | 62.21 | 202.32 | 49.47 | 253.53 |
| SOUTH TRIB | 7.132 | 50-YEAR | 662.55 | 662.43 | 0.11 | 0.20 | 0.01 | 118.90 | 289.35 | 97.74 | 881.88 |
| SOUTH TRIB | 7.132 | 100-YEAR | 662.88 | 662.76 | 0.12 | 0.20 | 0.01 | 138.49 | 316.75 | 114.76 | 913.31 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.136 | 10-YEAR | 661.36 | 661.19 | 0.16 | 0.04 | 0.02 | 2.07 | 311.08 | 0.85 | 29.77 |
| SOUTH TRIB | 7.136 | 50-YEAR | 662.62 | 662.39 | 0.23 | 0.04 | 0.04 | 13.31 | 487.24 | 5.45 | 35.56 |
| SOUTH TRIB | 7.136 | 100-YEAR | 662.96 | 662.71 | 0.25 | 0.04 | 0.04 | 18.76 | 543.56 | 7.69 | 37.10 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.145 | 10-YEAR | 661.41 | 661.37 | 0.03 | 0.03 | 0.01 | | 287.00 | | 54.85 |
| SOUTH TRIB | 7.145 | 50-YEAR | 662.68 | 662.63 | 0.05 | 0.04 | 0.02 | | 461.00 | | 62.01 |
| SOUTH TRIB | 7.145 | 100-YEAR | 663.02 | 662.97 | 0.05 | 0.04 | 0.02 | 0.00 | 517.00 | | 63.81 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.168 | 10-YEAR | 661.45 | 661.42 | 0.03 | 0.05 | 0.00 | 0.99 | 286.01 | | 70.82 |
| SOUTH TRIB | 7.168 | 50-YEAR | 662.72 | 662.69 | 0.04 | 0.05 | 0.00 | 15.95 | 445.05 | | 98.49 |
| SOUTH TRIB | 7.168 | 100-YEAR | 663.07 | 663.03 | 0.04 | 0.05 | 0.00 | 22.51 | 494.49 | | 119.26 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.181 | 10-YEAR | 661.47 | 661.45 | 0.02 | 0.02 | 0.00 | | 287.00 | | 84.13 |
| SOUTH TRIB | 7.181 | 50-YEAR | 662.74 | 662.71 | 0.03 | 0.01 | 0.00 | | 461.00 | | 91.05 |
| SOUTH TRIB | 7.181 | 100-YEAR | 663.08 | 663.05 | 0.03 | 0.01 | 0.00 | | 517.00 | | 92.92 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.191 | 10-YEAR | 661.50 | 661.47 | 0.04 | 0.03 | 0.00 | 88.05 | 188.52 | 10.44 | 94.81 |
| SOUTH TRIB | 7.191 | 50-YEAR | 662.76 | 662.73 | 0.03 | 0.02 | 0.00 | 192.41 | 246.98 | 21.61 | 102.63 |

HEC-RAS Plan: Nat - Thorndale (Continued)

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SOUTH TRIB | 7.191 | 100-YEAR | 663.11 | 663.07 | 0.04 | 0.02 | 0.00 | 225.84 | 265.55 | 25.61 | 104.75 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.22 | 10-YEAR | 661.58 | 661.55 | 0.03 | 0.07 | 0.00 | 195.01 | 91.99 | | 85.29 |
| SOUTH TRIB | 7.22 | 50-YEAR | 662.82 | 662.79 | 0.03 | 0.06 | 0.00 | 334.54 | 126.46 | | 91.34 |
| SOUTH TRIB | 7.22 | 100-YEAR | 663.16 | 663.13 | 0.03 | 0.05 | 0.00 | 379.17 | 137.83 | | 92.99 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.247 | 10-YEAR | 661.65 | 661.62 | 0.03 | 0.08 | 0.00 | 219.01 | 67.99 | | 84.07 |
| SOUTH TRIB | 7.247 | 50-YEAR | 662.88 | 662.85 | 0.03 | 0.06 | 0.00 | 366.22 | 94.79 | | 90.14 |
| SOUTH TRIB | 7.247 | 100-YEAR | 663.21 | 663.18 | 0.03 | 0.06 | 0.00 | 413.28 | 103.72 | | 91.80 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.259 | 10-YEAR | 661.69 | 661.66 | 0.03 | 0.03 | 0.00 | 223.10 | 63.90 | | 84.90 |
| SOUTH TRIB | 7.259 | 50-YEAR | 662.90 | 662.87 | 0.03 | 0.03 | 0.00 | 370.66 | 90.34 | | 90.72 |
| SOUTH TRIB | 7.259 | 100-YEAR | 663.24 | 663.21 | 0.03 | 0.02 | 0.00 | 417.89 | 99.11 | | 92.32 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.265 | 10-YEAR | 661.74 | 661.64 | 0.10 | 0.03 | 0.02 | 97.79 | 175.30 | 13.91 | 65.29 |
| SOUTH TRIB | 7.265 | 50-YEAR | 662.94 | 662.85 | 0.09 | 0.02 | 0.02 | 212.77 | 221.70 | 26.54 | 72.46 |
| SOUTH TRIB | 7.265 | 100-YEAR | 663.27 | 663.19 | 0.09 | 0.02 | 0.02 | 249.29 | 236.71 | 31.01 | 74.43 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.289 | 10-YEAR | 662.00 | 661.86 | 0.15 | 0.25 | 0.01 | 126.33 | 160.67 | | 38.11 |
| SOUTH TRIB | 7.289 | 50-YEAR | 663.15 | 662.99 | 0.17 | 0.19 | 0.02 | 227.93 | 233.07 | | 45.85 |
| SOUTH TRIB | 7.289 | 100-YEAR | 663.48 | 663.31 | 0.17 | 0.18 | 0.03 | 262.12 | 254.88 | | 48.04 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.314 | 10-YEAR | 662.23 | 662.15 | 0.07 | 0.22 | 0.01 | 164.57 | 122.43 | | 49.27 |
| SOUTH TRIB | 7.314 | 50-YEAR | 663.37 | 663.28 | 0.09 | 0.21 | 0.01 | 282.78 | 178.23 | | 57.61 |
| SOUTH TRIB | 7.314 | 100-YEAR | 663.69 | 663.59 | 0.09 | 0.20 | 0.01 | 321.72 | 195.28 | | 59.96 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.331 | 10-YEAR | 662.58 | 662.28 | 0.30 | 0.28 | 0.07 | 113.61 | 173.39 | | 27.17 |
| SOUTH TRIB | 7.331 | 50-YEAR | 663.71 | 663.37 | 0.34 | 0.27 | 0.08 | 197.54 | 263.46 | | 33.09 |
| SOUTH TRIB | 7.331 | 100-YEAR | 664.03 | 663.67 | 0.36 | 0.26 | 0.08 | 225.40 | 291.60 | | 34.77 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.35 | 10-YEAR | 662.99 | 662.81 | 0.18 | 0.40 | 0.01 | 100.54 | 186.46 | | 31.33 |
| SOUTH TRIB | 7.35 | 50-YEAR | 664.11 | 663.89 | 0.23 | 0.39 | 0.01 | 181.29 | 279.71 | | 36.92 |
| SOUTH TRIB | 7.35 | 100-YEAR | 664.43 | 664.19 | 0.24 | 0.39 | 0.01 | 208.69 | 308.31 | | 38.47 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.391 | 10-YEAR | 663.49 | 663.34 | 0.15 | 0.49 | 0.00 | 96.31 | 190.69 | | 31.92 |
| SOUTH TRIB | 7.391 | 50-YEAR | 664.64 | 664.45 | 0.19 | 0.52 | 0.00 | 173.20 | 287.80 | | 37.23 |
| SOUTH TRIB | 7.391 | 100-YEAR | 664.96 | 664.75 | 0.20 | 0.53 | 0.00 | 199.23 | 317.62 | 0.15 | 46.73 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.399 | 10-YEAR | 663.56 | 663.39 | 0.17 | 0.06 | 0.01 | 27.80 | 232.50 | 26.69 | 24.83 |
| SOUTH TRIB | 7.399 | 50-YEAR | 664.74 | 664.47 | 0.27 | 0.08 | 0.02 | 53.04 | 356.75 | 51.21 | 462.81 |
| SOUTH TRIB | 7.399 | 100-YEAR | 665.07 | 664.76 | 0.31 | 0.08 | 0.03 | 61.90 | 395.27 | 59.83 | 627.44 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.406 | 10-YEAR | 663.64 | 663.41 | 0.23 | 0.06 | 0.02 | 43.33 | 207.09 | 36.59 | 25.23 |
| SOUTH TRIB | 7.406 | 50-YEAR | 664.84 | 664.50 | 0.33 | 0.08 | 0.02 | 80.34 | 312.84 | 67.83 | 28.68 |
| SOUTH TRIB | 7.406 | 100-YEAR | 665.16 | 664.80 | 0.36 | 0.08 | 0.02 | 94.07 | 344.47 | 78.47 | 29.12 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 664.05 | 663.68 | 0.37 | 0.37 | 0.04 | 56.71 | 195.82 | 34.47 | 23.93 |
| SOUTH TRIB | 7.431 | 50-YEAR | 665.28 | 664.80 | 0.47 | 0.40 | 0.04 | 104.35 | 286.69 | 69.96 | 28.59 |
| SOUTH TRIB | 7.431 | 100-YEAR | 665.61 | 665.11 | 0.50 | 0.41 | 0.04 | 120.43 | 313.40 | 83.17 | 29.62 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 664.12 | 664.01 | 0.12 | 0.05 | 0.03 | 130.01 | 130.64 | 26.35 | 31.55 |
| SOUTH TRIB | 7.447 | 50-YEAR | 665.36 | 665.20 | 0.17 | 0.05 | 0.03 | 207.14 | 198.58 | 55.27 | 35.94 |
| SOUTH TRIB | 7.447 | 100-YEAR | 665.70 | 665.49 | 0.21 | 0.06 | 0.03 | 244.67 | 231.73 | 40.60 | 56.85 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 664.16 | 664.07 | 0.09 | 0.03 | 0.01 | 122.21 | 114.25 | 24.54 | 31.77 |
| SOUTH TRIB | 7.456 | 50-YEAR | 665.41 | 665.28 | 0.13 | 0.04 | 0.01 | 187.74 | 179.39 | 50.87 | 36.24 |
| SOUTH TRIB | 7.456 | 100-YEAR | 665.75 | 665.59 | 0.17 | 0.04 | 0.01 | 222.66 | 210.06 | 35.28 | 67.15 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 664.89 | 664.82 | 0.07 | | | 122.93 | 110.51 | 27.57 | 34.57 |
| SOUTH TRIB | 7.47 | 50-YEAR | 666.75 | 666.68 | 0.07 | | | 128.00 | 190.07 | 99.93 | 295.65 |
| SOUTH TRIB | 7.47 | 100-YEAR | 666.92 | 666.85 | 0.07 | | | 147.41 | 195.61 | 124.97 | 334.86 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.01 | 58.50 | 112.73 | 89.76 | 208.30 |
| SOUTH TRIB | 7.486 | 50-YEAR | 666.76 | 666.76 | 0.00 | 0.00 | 0.01 | 104.25 | 150.57 | 163.17 | 208.30 |
| SOUTH TRIB | 7.486 | 100-YEAR | 666.93 | 666.93 | 0.00 | 0.00 | 0.01 | 117.49 | 166.37 | 184.15 | 208.30 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 664.90 | 664.90 | 0.00 | 0.00 | 0.00 | 232.96 | 24.25 | 3.80 | 1495.92 |
| SOUTH TRIB | 7.493 | 50-YEAR | 666.76 | 666.76 | 0.00 | 0.00 | 0.00 | 388.28 | 26.16 | 3.56 | 1585.23 |
| SOUTH TRIB | 7.493 | 100-YEAR | 666.93 | 666.93 | 0.00 | 0.00 | 0.00 | 435.59 | 28.48 | 3.93 | 1592.92 |

Natural Conditions - Thorndale Ave




Stream Distance Above Willow-Higgins Creek Confluence with Des Plaines River (ft)

1 in Horiz. = 1300 ft  1 in Vert. = 4 ft

HEC-RAS Plan: Nat - Ramp Q5

| 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) | |
| MAINSTEM | 4.518 | 10-YEAR | 894.00 | 636.00 | 644.69 | | 644.73 | 0.000113 | 1.67 | 558.91 | 68.69 | 0.10 |
| MAINSTEM | 4.518 | 50-YEAR | 1459.00 | 636.00 | 646.33 | | 646.41 | 0.000168 | 2.28 | 673.17 | 70.33 | 0.13 |
| MAINSTEM | 4.518 | 100-YEAR | 1682.00 | 636.00 | 646.91 | | 647.00 | 0.000185 | 2.49 | 713.97 | 70.91 | 0.13 |
| MAINSTEM | 4.594 | 10-YEAR | 894.00 | 636.00 | 644.73 | | 644.77 | 0.000111 | 1.66 | 562.03 | 68.73 | 0.10 |
| MAINSTEM | 4.594 | 50-YEAR | 1459.00 | 636.00 | 646.40 | | 646.48 | 0.000164 | 2.27 | 677.92 | 70.40 | 0.12 |
| MAINSTEM | 4.594 | 100-YEAR | 1682.00 | 636.00 | 646.98 | | 647.07 | 0.000181 | 2.47 | 719.27 | 70.98 | 0.13 |
| MAINSTEM | 4.675 | 10-YEAR | 894.00 | 636.10 | 644.78 | | 644.82 | 0.000114 | 1.67 | 558.61 | 68.72 | 0.10 |
| MAINSTEM | 4.675 | 50-YEAR | 1459.00 | 636.10 | 646.47 | | 646.55 | 0.000166 | 2.27 | 676.07 | 70.41 | 0.12 |
| MAINSTEM | 4.675 | 100-YEAR | 1682.00 | 636.10 | 647.06 | | 647.15 | 0.000182 | 2.47 | 717.95 | 71.01 | 0.13 |
| MAINSTEM | 4.773 | 10-YEAR | 784.00 | 636.20 | 644.84 | | 644.88 | 0.000089 | 1.47 | 554.70 | 68.37 | 0.09 |
| MAINSTEM | 4.773 | 50-YEAR | 1227.00 | 636.20 | 646.57 | | 646.62 | 0.000118 | 1.91 | 673.98 | 70.04 | 0.10 |
| MAINSTEM | 4.773 | 100-YEAR | 1469.00 | 636.20 | 647.17 | | 647.24 | 0.000139 | 2.16 | 716.27 | 70.63 | 0.12 |
| MAINSTEM | 4.790 | 10-YEAR | 784.00 | 636.20 | 644.81 | 638.80 | 644.93 | 0.000312 | 2.76 | 284.23 | 68.35 | 0.17 |
| MAINSTEM | 4.790 | 50-YEAR | 1227.00 | 636.20 | 646.51 | 639.71 | 646.71 | 0.000420 | 3.61 | 340.24 | 69.99 | 0.20 |
| MAINSTEM | 4.790 | 100-YEAR | 1469.00 | 636.20 | 647.09 | 640.14 | 647.35 | 0.000501 | 4.09 | 359.50 | 70.56 | 0.22 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 784.00 | 636.70 | 645.28 | 640.14 | 645.42 | 0.000448 | 3.07 | 255.65 | 65.50 | 0.19 |
| MAINSTEM | 5.059 | 50-YEAR | 1227.00 | 636.70 | 647.60 | 641.04 | 647.81 | 0.000458 | 3.69 | 332.24 | 67.78 | 0.21 |
| MAINSTEM | 5.059 | 100-YEAR | 1469.00 | 636.70 | 648.71 | 641.47 | 648.96 | 0.000462 | 3.98 | 368.99 | 68.88 | 0.21 |
| MAINSTEM | 5.076 | 10-YEAR | 784.00 | 636.90 | 645.41 | | 645.46 | 0.000215 | 1.80 | 435.78 | 65.48 | 0.12 |
| MAINSTEM | 5.076 | 50-YEAR | 1227.00 | 636.90 | 647.79 | | 647.85 | 0.000206 | 2.07 | 594.14 | 67.85 | 0.12 |
| MAINSTEM | 5.076 | 100-YEAR | 1469.00 | 636.90 | 648.93 | | 649.00 | 0.000204 | 2.19 | 672.29 | 68.98 | 0.12 |
| MAINSTEM | 5.104 | 10-YEAR | 784.00 | 637.12 | 645.41 | | 645.51 | 0.000341 | 2.55 | 306.96 | 65.32 | 0.17 |
| MAINSTEM | 5.104 | 50-YEAR | 1227.00 | 637.12 | 647.76 | | 647.90 | 0.000326 | 3.01 | 407.15 | 67.69 | 0.17 |
| MAINSTEM | 5.104 | 100-YEAR | 1469.00 | 637.12 | 648.90 | | 649.06 | 0.000322 | 3.23 | 455.31 | 68.83 | 0.17 |
| MAINSTEM | 5.109 | 10-YEAR | 784.00 | 637.18 | 645.37 | 640.64 | 645.54 | 0.000547 | 3.28 | 239.21 | 65.24 | 0.21 |
| MAINSTEM | 5.109 | 50-YEAR | 1227.00 | 637.18 | 647.71 | 641.55 | 647.94 | 0.000535 | 3.89 | 315.15 | 67.60 | 0.22 |
| MAINSTEM | 5.109 | 100-YEAR | 1469.00 | 637.18 | 648.83 | 642.01 | 649.10 | 0.000532 | 4.18 | 351.63 | 68.73 | 0.22 |
| MAINSTEM | 5.110 | 10-YEAR | 784.00 | 637.22 | 645.33 | | 645.56 | 0.000656 | 3.84 | 204.41 | 44.59 | 0.24 |
| MAINSTEM | 5.110 | 50-YEAR | 1227.00 | 637.22 | 647.64 | | 647.98 | 0.000698 | 4.67 | 262.56 | 50.16 | 0.26 |
| MAINSTEM | 5.110 | 100-YEAR | 1469.00 | 637.22 | 648.75 | | 649.14 | 0.000714 | 5.06 | 290.45 | 52.83 | 0.26 |
| MAINSTEM | 5.116 | 10-YEAR | 784.00 | 637.31 | 645.33 | | 645.57 | 0.000120 | 3.91 | 200.61 | 25.00 | 0.24 |
| MAINSTEM | 5.116 | 50-YEAR | 1227.00 | 637.31 | 647.64 | | 647.99 | 0.000143 | 4.75 | 258.35 | 26.44 | 0.26 |
| MAINSTEM | 5.116 | 100-YEAR | 1469.00 | 637.31 | 648.75 | | 649.16 | 0.000146 | 5.14 | 286.24 | 31.23 | 0.27 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 634.00 | 640.26 | 646.04 | 642.93 | 646.33 | 0.000191 | 4.30 | 147.43 | 25.50 | 0.32 |
| MAINSTEM | 5.606 | 50-YEAR | 1056.00 | 640.26 | 649.63 | 644.01 | 649.94 | 0.000121 | 4.42 | 239.06 | 57.44 | 0.25 |
| MAINSTEM | 5.606 | 100-YEAR | 1227.00 | 640.26 | 651.57 | 644.41 | 651.85 | 0.000087 | 4.25 | 288.43 | 80.97 | 0.22 |
| MAINSTEM | 5.610 | 10-YEAR | 634.00 | 640.30 | 646.34 | | 646.36 | 0.000075 | 1.05 | 603.33 | 125.36 | 0.08 |
| MAINSTEM | 5.610 | 50-YEAR | 1056.00 | 640.30 | 649.95 | | 649.97 | 0.000043 | 1.09 | 970.26 | 145.88 | 0.06 |
| MAINSTEM | 5.610 | 100-YEAR | 1227.00 | 640.30 | 651.86 | | 651.88 | 0.000031 | 1.05 | 1164.78 | 156.76 | 0.05 |
| MAINSTEM | 5.629 | 10-YEAR | 634.00 | 640.37 | 646.36 | | 646.36 | 0.000064 | 0.74 | 854.27 | 215.49 | 0.07 |
| MAINSTEM | 5.629 | 50-YEAR | 1056.00 | 640.37 | 649.97 | | 649.97 | 0.000021 | 0.64 | 1646.96 | 237.14 | 0.04 |
| MAINSTEM | 5.629 | 100-YEAR | 1227.00 | 640.37 | 651.88 | | 651.88 | 0.000014 | 0.59 | 2082.70 | 248.61 | 0.03 |
| MAINSTEM | 5.632 | 10-YEAR | 634.00 | 640.39 | 646.36 | | 646.37 | 0.000056 | 0.70 | 912.18 | 411.47 | 0.06 |
| MAINSTEM | 5.632 | 50-YEAR | 1056.00 | 640.39 | 649.97 | | 649.97 | 0.000019 | 0.60 | 1754.71 | 433.12 | 0.04 |
| MAINSTEM | 5.632 | 100-YEAR | 1227.00 | 640.39 | 651.88 | | 651.88 | 0.000012 | 0.55 | 2216.91 | 444.58 | 0.03 |
| MAINSTEM | 5.639 | 10-YEAR | 634.00 | 640.43 | 646.36 | | 646.37 | 0.000060 | 0.72 | 878.97 | 737.22 | 0.06 |
| MAINSTEM | 5.639 | 50-YEAR | 1056.00 | 640.43 | 649.97 | | 649.97 | 0.000020 | 0.62 | 1695.03 | 758.86 | 0.04 |
| MAINSTEM | 5.639 | 100-YEAR | 1227.00 | 640.43 | 651.88 | | 651.88 | 0.000013 | 0.57 | 2143.32 | 770.33 | 0.03 |
| MAINSTEM | 5.697 | 10-YEAR | 634.00 | 641.14 | 646.37 | | 646.41 | 0.000289 | 1.55 | 408.83 | 311.74 | 0.14 |
| MAINSTEM | 5.697 | 50-YEAR | 1056.00 | 641.14 | 649.96 | | 649.99 | 0.000090 | 1.34 | 788.12 | 333.27 | 0.09 |
| MAINSTEM | 5.697 | 100-YEAR | 1227.00 | 641.14 | 651.87 | | 651.90 | 0.000057 | 1.24 | 989.95 | 344.73 | 0.07 |
| MAINSTEM | 5.720 | 10-YEAR | 634.00 | 641.44 | 646.35 | | 646.51 | 0.000999 | 3.20 | 197.97 | 161.07 | 0.26 |
| MAINSTEM | 5.720 | 50-YEAR | 1056.00 | 641.44 | 649.91 | | 650.05 | 0.000407 | 3.00 | 351.91 | 188.74 | 0.19 |
| MAINSTEM | 5.720 | 100-YEAR | 1227.00 | 641.44 | 651.82 | | 651.94 | 0.000272 | 2.82 | 434.63 | 203.61 | 0.16 |
| MAINSTEM | 5.725 | 10-YEAR | 634.00 | 641.52 | 646.28 | | 646.59 | 0.001791 | 4.45 | 142.63 | 93.92 | 0.36 |
| MAINSTEM | 5.725 | 50-YEAR | 1056.00 | 641.52 | 649.82 | | 650.10 | 0.000777 | 4.24 | 248.84 | 126.73 | 0.26 |
| MAINSTEM | 5.725 | 100-YEAR | 1227.00 | 641.52 | 651.74 | | 651.99 | 0.000525 | 4.01 | 306.31 | 144.48 | 0.22 |
| MAINSTEM | 5.727 | 10-YEAR | 634.00 | 641.52 | 646.23 | | 646.68 | 0.003344 | 5.38 | 117.80 | 25.00 | 0.44 |
| MAINSTEM | 5.727 | 50-YEAR | 1056.00 | 641.52 | 649.77 | | 650.18 | 0.001669 | 5.12 | 206.14 | 25.00 | 0.31 |
| MAINSTEM | 5.727 | 100-YEAR | 1227.00 | 641.52 | 651.69 | | 652.05 | 0.001202 | 4.83 | 254.12 | 27.98 | 0.27 |

HEC-RAS Plan: Nat - Ramp Q5 (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) | |
| MAINSTEM | 5.732 | 10-YEAR | 634.00 | 641.59 | 646.38 | | 646.81 | 0.003878 | 5.29 | 119.74 | 25.00 | 0.43 |
| MAINSTEM | 5.732 | 50-YEAR | 1056.00 | 641.59 | 649.84 | | 650.24 | 0.002242 | 5.12 | 206.18 | 25.00 | 0.31 |
| MAINSTEM | 5.732 | 100-YEAR | 1227.00 | 641.59 | 651.74 | | 652.10 | 0.001699 | 4.84 | 253.74 | 27.64 | 0.27 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 634.00 | 641.81 | 646.81 | 644.45 | 647.18 | 0.003115 | 4.88 | 129.95 | 26.00 | 0.38 |
| MAINSTEM | 5.757 | 50-YEAR | 1056.00 | 641.81 | 650.18 | 645.52 | 650.55 | 0.001947 | 4.85 | 217.65 | 26.00 | 0.30 |
| MAINSTEM | 5.757 | 100-YEAR | 1227.00 | 641.81 | 652.07 | 645.91 | 652.40 | 0.001495 | 4.60 | 266.70 | 26.00 | 0.25 |
| MAINSTEM | 5.759 | 10-YEAR | 634.00 | 641.82 | 647.20 | | 647.22 | 0.000129 | 1.30 | 489.37 | 100.00 | 0.10 |
| MAINSTEM | 5.759 | 50-YEAR | 1056.00 | 641.82 | 650.56 | | 650.59 | 0.000071 | 1.33 | 795.30 | 100.00 | 0.08 |
| MAINSTEM | 5.759 | 100-YEAR | 1227.00 | 641.82 | 652.41 | | 652.43 | 0.000051 | 1.27 | 963.34 | 100.00 | 0.07 |
| MAINSTEM | 5.810 | 10-YEAR | 634.00 | 643.98 | 647.24 | | 647.29 | 0.000620 | 1.95 | 325.50 | 100.00 | 0.19 |
| MAINSTEM | 5.810 | 50-YEAR | 1056.00 | 643.98 | 650.58 | | 650.62 | 0.000177 | 1.60 | 659.72 | 100.00 | 0.11 |
| MAINSTEM | 5.810 | 100-YEAR | 1227.00 | 643.98 | 652.42 | | 652.45 | 0.000110 | 1.45 | 843.86 | 100.00 | 0.09 |
| MAINSTEM | 5.860 | 10-YEAR | 634.00 | 645.81 | 647.64 | 647.64 | 648.57 | 0.019302 | 7.73 | 82.06 | 100.00 | 1.01 |
| MAINSTEM | 5.860 | 50-YEAR | 1056.00 | 645.81 | 650.43 | | 650.83 | 0.002459 | 5.11 | 206.78 | 100.00 | 0.42 |
| MAINSTEM | 5.860 | 100-YEAR | 1227.00 | 645.81 | 652.31 | | 652.58 | 0.001062 | 4.21 | 291.10 | 100.00 | 0.29 |
| MAINSTEM | 5.862 | 10-YEAR | 634.00 | 645.96 | 648.45 | 648.45 | 649.70 | 0.021607 | 9.00 | 70.47 | 28.35 | 1.01 |
| MAINSTEM | 5.862 | 50-YEAR | 1056.00 | 645.96 | 650.19 | | 651.40 | 0.011607 | 8.80 | 120.02 | 28.35 | 0.75 |
| MAINSTEM | 5.862 | 100-YEAR | 1227.00 | 645.96 | 652.14 | | 652.90 | 0.005086 | 7.01 | 175.10 | 28.35 | 0.50 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 634.00 | 647.54 | 651.60 | 649.84 | 651.96 | 0.000320 | 4.85 | 130.71 | 33.00 | 0.42 |
| MAINSTEM | 6.037 | 50-YEAR | 1056.00 | 647.54 | 653.22 | 650.77 | 653.74 | 0.000320 | 5.77 | 183.00 | 33.00 | 0.43 |
| MAINSTEM | 6.037 | 100-YEAR | 1227.00 | 647.54 | 653.90 | 651.10 | 654.46 | 0.000310 | 5.99 | 204.81 | 33.00 | 0.42 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 603.00 | 647.73 | 652.15 | 649.86 | 652.40 | 0.002189 | 4.01 | 150.28 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 50-YEAR | 996.00 | 647.73 | 653.91 | 650.71 | 654.26 | 0.002167 | 4.74 | 210.25 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 100-YEAR | 1156.00 | 647.73 | 654.62 | 651.02 | 655.00 | 0.002121 | 4.94 | 234.15 | 34.00 | 0.33 |
| MAINSTEM | 6.194 | 10-YEAR | 603.00 | 647.75 | 652.41 | | 652.44 | 0.000159 | 1.31 | 461.22 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 50-YEAR | 996.00 | 647.75 | 654.27 | | 654.31 | 0.000142 | 1.54 | 645.30 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 100-YEAR | 1156.00 | 647.75 | 655.00 | | 655.04 | 0.000134 | 1.61 | 717.76 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 10-YEAR | 603.00 | 647.88 | 652.52 | | 652.55 | 0.000178 | 1.30 | 464.06 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 50-YEAR | 996.00 | 647.88 | 654.37 | | 654.41 | 0.000166 | 1.53 | 649.01 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 100-YEAR | 1156.00 | 647.88 | 655.10 | | 655.14 | 0.000160 | 1.60 | 721.72 | 100.00 | 0.11 |
| MAINSTEM | 6.418 | 10-YEAR | 603.00 | 647.88 | 652.61 | | 652.63 | 0.000167 | 1.27 | 472.97 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 50-YEAR | 996.00 | 647.88 | 654.45 | | 654.49 | 0.000159 | 1.52 | 657.40 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 100-YEAR | 1156.00 | 647.88 | 655.18 | | 655.22 | 0.000154 | 1.58 | 729.82 | 100.00 | 0.10 |
| MAINSTEM | 6.471 | 10-YEAR | 603.00 | 647.88 | 652.65 | | 652.73 | 0.000583 | 2.29 | 263.80 | 55.30 | 0.18 |
| MAINSTEM | 6.471 | 50-YEAR | 996.00 | 647.88 | 654.48 | | 654.59 | 0.000581 | 2.73 | 364.71 | 55.30 | 0.19 |
| MAINSTEM | 6.471 | 100-YEAR | 1156.00 | 647.88 | 655.19 | | 655.32 | 0.000571 | 2.86 | 404.33 | 55.30 | 0.19 |
| MAINSTEM | 6.473 | 10-YEAR | 603.00 | 647.91 | 652.61 | | 652.79 | 0.002320 | 3.43 | 175.73 | 40.00 | 0.29 |
| MAINSTEM | 6.473 | 50-YEAR | 996.00 | 647.91 | 654.42 | | 654.67 | 0.002456 | 4.01 | 248.07 | 40.00 | 0.28 |
| MAINSTEM | 6.473 | 100-YEAR | 1156.00 | 647.91 | 655.13 | | 655.40 | 0.002476 | 4.18 | 276.53 | 40.00 | 0.28 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 6.597 | 10-YEAR | 603.00 | 648.23 | 653.04 | 650.28 | 653.12 | 0.000581 | 2.29 | 263.40 | 120.63 | 0.20 |
| MAINSTEM | 6.597 | 50-YEAR | 996.00 | 648.23 | 654.96 | 650.85 | 655.06 | 0.000450 | 2.59 | 384.16 | 1005.08 | 0.19 |
| MAINSTEM | 6.597 | 100-YEAR | 1156.00 | 648.23 | 655.70 | 651.04 | 655.82 | 0.000413 | 2.68 | 431.02 | 1022.24 | 0.18 |
| MAINSTEM | 6.6 | 10-YEAR | 603.00 | 648.30 | 653.04 | | 653.15 | 0.000695 | 2.65 | 227.34 | 199.96 | 0.22 |
| MAINSTEM | 6.6 | 50-YEAR | 996.00 | 648.30 | 654.95 | | 655.09 | 0.000578 | 3.07 | 324.63 | 234.17 | 0.21 |
| MAINSTEM | 6.6 | 100-YEAR | 1156.00 | 648.30 | 655.69 | | 655.85 | 0.000540 | 3.19 | 362.41 | 247.45 | 0.21 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 603.00 | 648.71 | 652.11 | 652.11 | 653.45 | 0.017113 | 9.28 | 64.95 | 219.64 | 0.99 |
| MAINSTEM | 6.635 | 50-YEAR | 996.00 | 648.71 | 654.35 | 653.18 | 655.44 | 0.006269 | 8.40 | 118.62 | 1223.86 | 0.67 |
| MAINSTEM | 6.635 | 100-YEAR | 1156.00 | 648.71 | 655.11 | 653.58 | 656.22 | 0.005239 | 8.44 | 136.89 | 1229.94 | 0.62 |
| MAINSTEM | 6.637 | 10-YEAR | 603.00 | 648.71 | 653.85 | | 653.85 | 0.000148 | 0.47 | 1288.25 | 1208.72 | 0.08 |
| MAINSTEM | 6.637 | 50-YEAR | 996.00 | 648.71 | 655.77 | | 655.77 | 0.000013 | 0.28 | 3643.66 | 1234.59 | 0.03 |
| MAINSTEM | 6.637 | 100-YEAR | 1156.00 | 648.71 | 656.55 | | 656.55 | 0.000008 | 0.26 | 4606.17 | 1240.08 | 0.02 |
| MAINSTEM | 6.639 | 10-YEAR | 603.00 | 649.07 | 653.53 | | 654.18 | 0.012838 | 6.49 | 92.85 | 40.24 | 0.75 |
| MAINSTEM | 6.639 | 50-YEAR | 996.00 | 649.07 | 655.55 | | 656.00 | 0.005186 | 5.35 | 186.16 | 52.10 | 0.50 |
| MAINSTEM | 6.639 | 100-YEAR | 1156.00 | 649.07 | 656.35 | | 656.75 | 0.003949 | 5.03 | 229.90 | 56.81 | 0.44 |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | | |

HEC-RAS Plan: Nat - Ramp Q5 (Continued)

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 6.642 | 10-YEAR | 603.00 | 649.86 | 654.58 | 653.77 | 655.03 | 0.007925 | 5.39 | 111.84 | 47.66 | 0.62 |
| MAINSTEM | 6.642 | 50-YEAR | 996.00 | 649.86 | 655.99 | 654.62 | 656.42 | 0.005422 | 5.28 | 188.55 | 61.45 | 0.53 |
| MAINSTEM | 6.642 | 100-YEAR | 1156.00 | 649.86 | 656.70 | 654.89 | 657.07 | 0.004106 | 4.93 | 234.58 | 68.58 | 0.47 |
| MAINSTEM | 6.643 | 10-YEAR | 603.00 | 649.86 | 654.72 | | 655.12 | 0.006791 | 5.09 | 118.47 | 48.91 | 0.58 |
| MAINSTEM | 6.643 | 50-YEAR | 996.00 | 649.86 | 656.06 | | 656.48 | 0.005079 | 5.15 | 193.29 | 62.23 | 0.52 |
| MAINSTEM | 6.643 | 100-YEAR | 1156.00 | 649.86 | 656.75 | | 657.12 | 0.003939 | 4.85 | 238.30 | 69.12 | 0.46 |
| MAINSTEM | 6.6435 | 10-YEAR | 603.00 | 649.86 | 655.24 | | 655.24 | 0.000015 | 0.31 | 1967.94 | 613.85 | 0.03 |
| MAINSTEM | 6.6435 | 50-YEAR | 996.00 | 649.86 | 656.60 | | 656.60 | 0.000012 | 0.35 | 2810.00 | 623.44 | 0.03 |
| MAINSTEM | 6.6435 | 100-YEAR | 1156.00 | 649.86 | 657.22 | | 657.23 | 0.000011 | 0.36 | 3200.53 | 627.83 | 0.03 |
| MAINSTEM | 6.644 | 10-YEAR | 603.00 | 650.75 | 655.24 | | 655.24 | 0.000035 | 0.25 | 2386.38 | 752.52 | 0.03 |
| MAINSTEM | 6.644 | 50-YEAR | 996.00 | 650.75 | 656.60 | | 656.60 | 0.000030 | 0.29 | 3419.47 | 765.39 | 0.02 |
| MAINSTEM | 6.644 | 100-YEAR | 1156.00 | 650.75 | 657.23 | | 657.23 | 0.000026 | 0.30 | 3899.03 | 771.29 | 0.02 |
| MAINSTEM | 6.645 | 10-YEAR | 603.00 | 650.30 | 655.25 | | 655.25 | 0.000064 | 0.25 | 2464.97 | 1397.34 | 0.03 |
| MAINSTEM | 6.645 | 50-YEAR | 996.00 | 650.30 | 656.61 | | 656.61 | 0.000028 | 0.23 | 4528.81 | 1640.89 | 0.02 |
| MAINSTEM | 6.645 | 100-YEAR | 1156.00 | 650.30 | 657.23 | | 657.23 | 0.000021 | 0.22 | 5586.57 | 1761.90 | 0.02 |
| SOUTH TRIB | 6.647 | 10-YEAR | 314.00 | 652.50 | 655.20 | | 655.27 | 0.001082 | 2.11 | 161.17 | 70.16 | 0.23 |
| SOUTH TRIB | 6.647 | 50-YEAR | 506.00 | 652.50 | 656.56 | | 656.63 | 0.000654 | 2.15 | 264.63 | 82.19 | 0.19 |
| SOUTH TRIB | 6.647 | 100-YEAR | 570.00 | 652.50 | 657.19 | | 657.25 | 0.000489 | 2.05 | 318.02 | 87.76 | 0.17 |
| SOUTH TRIB | 6.648 | 10-YEAR | 314.00 | 653.00 | 655.34 | | 655.36 | 0.000637 | 1.16 | 271.32 | 166.52 | 0.16 |
| SOUTH TRIB | 6.648 | 50-YEAR | 506.00 | 653.00 | 656.65 | | 656.67 | 0.000230 | 1.03 | 493.73 | 172.09 | 0.11 |
| SOUTH TRIB | 6.648 | 100-YEAR | 570.00 | 653.00 | 657.27 | | 657.28 | 0.000155 | 0.96 | 600.07 | 175.45 | 0.09 |
| SOUTH TRIB | 6.649 | 10-YEAR | 314.00 | 653.50 | 655.40 | 654.98 | 655.47 | 0.005056 | 2.57 | 153.67 | 232.42 | 0.42 |
| SOUTH TRIB | 6.649 | 50-YEAR | 506.00 | 653.50 | 656.67 | 655.18 | 656.70 | 0.000719 | 1.59 | 375.98 | 240.03 | 0.18 |
| SOUTH TRIB | 6.649 | 100-YEAR | 570.00 | 653.50 | 657.28 | 655.23 | 657.30 | 0.000401 | 1.38 | 485.37 | 243.66 | 0.14 |
| SOUTH TRIB | 6.650 | 10-YEAR | 314.00 | 653.50 | 655.66 | 655.37 | 655.85 | 0.009525 | 4.04 | 95.08 | 268.97 | 0.60 |
| SOUTH TRIB | 6.650 | 50-YEAR | 506.00 | 653.50 | 656.67 | 655.66 | 656.79 | 0.002899 | 3.20 | 188.20 | 275.04 | 0.36 |
| SOUTH TRIB | 6.650 | 100-YEAR | 570.00 | 653.50 | 657.27 | 655.72 | 657.36 | 0.001602 | 2.75 | 245.58 | 278.60 | 0.28 |
| SOUTH TRIB | 6.651 | 10-YEAR | 314.00 | 653.50 | 656.21 | 654.99 | 656.25 | 0.001494 | 1.99 | 207.34 | 344.26 | 0.25 |
| SOUTH TRIB | 6.651 | 50-YEAR | 506.00 | 653.50 | 656.95 | 654.99 | 656.99 | 0.000963 | 1.98 | 324.52 | 348.72 | 0.21 |
| SOUTH TRIB | 6.651 | 100-YEAR | 570.00 | 653.50 | 657.44 | 654.99 | 657.48 | 0.000615 | 1.77 | 403.68 | 351.67 | 0.17 |
| SOUTH TRIB | 6.652 | 10-YEAR | 314.00 | 653.50 | 656.41 | 654.99 | 656.42 | 0.000574 | 1.32 | 325.67 | 287.44 | 0.16 |
| SOUTH TRIB | 6.652 | 50-YEAR | 506.00 | 653.50 | 657.10 | 654.99 | 657.12 | 0.000426 | 1.37 | 484.27 | 291.59 | 0.14 |
| SOUTH TRIB | 6.652 | 100-YEAR | 570.00 | 653.50 | 657.54 | 654.99 | 657.56 | 0.000292 | 1.24 | 587.98 | 294.26 | 0.12 |
| SOUTH TRIB | 6.653 | 10-YEAR | 314.00 | 653.50 | 656.47 | 654.55 | 656.54 | 0.000874 | 2.02 | 156.95 | 77.84 | 0.21 |
| SOUTH TRIB | 6.653 | 50-YEAR | 506.00 | 653.50 | 657.14 | 654.93 | 657.25 | 0.001157 | 2.66 | 192.15 | 81.83 | 0.25 |
| SOUTH TRIB | 6.653 | 100-YEAR | 570.00 | 653.50 | 657.56 | 655.04 | 657.67 | 0.001017 | 2.68 | 214.50 | 84.36 | 0.23 |
| SOUTH TRIB | 6.654 Ramp P5,O4,Q5 | | Culvert | | | | | | | | | |
| SOUTH TRIB | 6.655 | 10-YEAR | 314.00 | 654.50 | 656.96 | 655.54 | 657.05 | 0.001631 | 2.43 | 130.12 | 123.80 | 0.27 |
| SOUTH TRIB | 6.655 | 50-YEAR | 506.00 | 654.50 | 657.75 | 655.93 | 657.88 | 0.001679 | 2.97 | 171.74 | 142.95 | 0.29 |
| SOUTH TRIB | 6.655 | 100-YEAR | 570.00 | 654.50 | 658.13 | 656.03 | 658.26 | 0.001473 | 2.99 | 191.86 | 147.50 | 0.28 |
| SOUTH TRIB | 6.656 | 10-YEAR | 314.00 | 655.00 | 657.31 | 657.18 | 657.64 | 0.013009 | 5.05 | 75.38 | 220.68 | 0.71 |
| SOUTH TRIB | 6.656 | 50-YEAR | 506.00 | 655.00 | 658.09 | 657.51 | 658.35 | 0.006323 | 4.61 | 129.56 | 268.51 | 0.53 |
| SOUTH TRIB | 6.656 | 100-YEAR | 570.00 | 655.00 | 658.41 | 657.61 | 658.65 | 0.004754 | 4.36 | 152.55 | 270.48 | 0.47 |
| SOUTH TRIB | 6.657 | 10-YEAR | 314.00 | 655.00 | 658.06 | 657.15 | 658.10 | 0.001131 | 1.94 | 221.60 | 323.37 | 0.22 |
| SOUTH TRIB | 6.657 | 50-YEAR | 506.00 | 655.00 | 658.66 | 657.42 | 658.71 | 0.001000 | 2.12 | 311.48 | 326.97 | 0.22 |
| SOUTH TRIB | 6.657 | 100-YEAR | 570.00 | 655.00 | 658.91 | 657.49 | 658.95 | 0.000887 | 2.11 | 348.16 | 328.43 | 0.21 |
| SOUTH TRIB | 6.658 | 10-YEAR | 314.00 | 655.00 | 658.18 | 657.16 | 658.20 | 0.000642 | 1.51 | 295.55 | 314.07 | 0.17 |
| SOUTH TRIB | 6.658 | 50-YEAR | 506.00 | 655.00 | 658.77 | 657.37 | 658.80 | 0.000580 | 1.66 | 412.83 | 317.63 | 0.17 |
| SOUTH TRIB | 6.658 | 100-YEAR | 570.00 | 655.00 | 659.01 | 657.43 | 659.03 | 0.000522 | 1.65 | 459.62 | 319.04 | 0.16 |
| SOUTH TRIB | 7.12 | 10-YEAR | 287.00 | 655.00 | 658.24 | 656.16 | 658.32 | 0.000935 | 2.21 | 129.73 | 54.46 | 0.22 |
| SOUTH TRIB | 7.12 | 50-YEAR | 461.00 | 655.00 | 658.82 | 656.61 | 658.96 | 0.001404 | 3.02 | 152.61 | 57.89 | 0.27 |
| SOUTH TRIB | 7.12 | 100-YEAR | 517.00 | 655.00 | 659.04 | 656.73 | 659.20 | 0.001463 | 3.20 | 161.46 | 59.22 | 0.28 |
| SOUTH TRIB | 7.16 Ramps P1, P2, P8 | | Culvert | | | | | | | | | |
| SOUTH TRIB | 7.21 | 10-YEAR | 287.00 | 656.10 | 658.82 | 657.83 | 659.07 | 0.005044 | 4.01 | 72.37 | 51.06 | 0.46 |
| SOUTH TRIB | 7.21 | 50-YEAR | 461.00 | 656.10 | 659.67 | 658.42 | 660.00 | 0.004693 | 4.63 | 100.90 | 77.33 | 0.47 |
| SOUTH TRIB | 7.21 | 100-YEAR | 517.00 | 656.10 | 659.97 | 658.57 | 660.31 | 0.004359 | 4.70 | 111.29 | 79.53 | 0.46 |
| SOUTH TRIB | 7.22 | 10-YEAR | 287.00 | 656.50 | 659.40 | 659.40 | 659.91 | 0.018342 | 6.78 | 59.06 | 56.92 | 0.85 |
| SOUTH TRIB | 7.22 | 50-YEAR | 461.00 | 656.50 | 659.98 | | 660.44 | 0.014363 | 6.82 | 96.72 | 74.40 | 0.77 |
| SOUTH TRIB | 7.22 | 100-YEAR | 517.00 | 656.50 | 660.30 | | 660.64 | 0.009674 | 5.95 | 121.81 | 79.17 | 0.64 |
| SOUTH TRIB | 7.247 | 10-YEAR | 287.00 | 656.80 | 660.63 | | 660.71 | 0.002450 | 2.85 | 133.22 | 79.15 | 0.31 |
| SOUTH TRIB | 7.247 | 50-YEAR | 461.00 | 656.80 | 661.14 | | 661.26 | 0.002789 | 3.30 | 174.00 | 81.67 | 0.34 |
| SOUTH TRIB | 7.247 | 100-YEAR | 517.00 | 656.80 | 661.25 | | 661.38 | 0.003000 | 3.48 | 183.10 | 82.22 | 0.35 |

HEC-RAS Plan: Nat - Ramp Q5 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.259 | 10-YEAR | 287.00 | 657.00 | 660.78 | | 660.85 | 0.001962 | 2.53 | 144.42 | 80.68 | 0.28 |
| SOUTH TRIB | 7.259 | 50-YEAR | 461.00 | 657.00 | 661.31 | | 661.41 | 0.002244 | 2.95 | 187.86 | 83.23 | 0.31 |
| SOUTH TRIB | 7.259 | 100-YEAR | 517.00 | 657.00 | 661.44 | | 661.54 | 0.002389 | 3.10 | 198.26 | 83.82 | 0.32 |
| SOUTH TRIB | 7.265 | 10-YEAR | 287.00 | 657.38 | 660.67 | | 661.05 | 0.007073 | 5.36 | 72.08 | 59.60 | 0.54 |
| SOUTH TRIB | 7.265 | 50-YEAR | 461.00 | 657.38 | 661.19 | | 661.64 | 0.007742 | 6.22 | 103.37 | 62.62 | 0.58 |
| SOUTH TRIB | 7.265 | 100-YEAR | 517.00 | 657.38 | 661.30 | | 661.79 | 0.008192 | 6.54 | 110.56 | 63.30 | 0.60 |
| SOUTH TRIB | 7.289 | 10-YEAR | 287.00 | 657.30 | 661.50 | | 661.70 | 0.003653 | 4.05 | 84.93 | 35.69 | 0.40 |
| SOUTH TRIB | 7.289 | 50-YEAR | 461.00 | 657.30 | 662.12 | | 662.43 | 0.004941 | 5.08 | 108.49 | 39.96 | 0.47 |
| SOUTH TRIB | 7.289 | 100-YEAR | 517.00 | 657.30 | 662.29 | | 662.64 | 0.005287 | 5.35 | 115.34 | 41.12 | 0.49 |
| SOUTH TRIB | 7.314 | 10-YEAR | 287.00 | 657.10 | 661.91 | | 662.00 | 0.001517 | 2.75 | 125.60 | 47.49 | 0.26 |
| SOUTH TRIB | 7.314 | 50-YEAR | 461.00 | 657.10 | 662.70 | | 662.82 | 0.001872 | 3.32 | 164.92 | 53.28 | 0.29 |
| SOUTH TRIB | 7.314 | 100-YEAR | 517.00 | 657.10 | 662.91 | | 663.05 | 0.001961 | 3.47 | 176.47 | 54.86 | 0.30 |
| SOUTH TRIB | 7.331 | 10-YEAR | 287.00 | 657.60 | 662.09 | | 662.44 | 0.007196 | 5.20 | 62.01 | 26.13 | 0.55 |
| SOUTH TRIB | 7.331 | 50-YEAR | 461.00 | 657.60 | 662.87 | | 663.36 | 0.008289 | 6.12 | 84.21 | 30.41 | 0.61 |
| SOUTH TRIB | 7.331 | 100-YEAR | 517.00 | 657.60 | 663.09 | | 663.61 | 0.008549 | 6.36 | 90.79 | 31.57 | 0.62 |
| SOUTH TRIB | 7.35 | 10-YEAR | 287.00 | 658.10 | 662.72 | | 662.91 | 0.002898 | 3.84 | 86.24 | 30.86 | 0.36 |
| SOUTH TRIB | 7.35 | 50-YEAR | 461.00 | 658.10 | 663.65 | | 663.91 | 0.003348 | 4.55 | 117.00 | 35.67 | 0.40 |
| SOUTH TRIB | 7.35 | 100-YEAR | 517.00 | 658.10 | 663.90 | | 664.18 | 0.003462 | 4.74 | 126.05 | 36.96 | 0.41 |
| SOUTH TRIB | 7.391 | 10-YEAR | 287.00 | 658.50 | 663.29 | | 663.44 | 0.002089 | 3.42 | 96.35 | 31.68 | 0.31 |
| SOUTH TRIB | 7.391 | 50-YEAR | 461.00 | 658.50 | 664.31 | | 664.52 | 0.002383 | 4.04 | 131.14 | 36.56 | 0.34 |
| SOUTH TRIB | 7.391 | 100-YEAR | 517.00 | 658.50 | 664.58 | | 664.81 | 0.002460 | 4.21 | 141.34 | 37.87 | 0.34 |
| SOUTH TRIB | 7.399 | 10-YEAR | 287.00 | 657.49 | 663.34 | 660.52 | 663.52 | 0.001317 | 3.66 | 95.62 | 24.71 | 0.28 |
| SOUTH TRIB | 7.399 | 50-YEAR | 461.00 | 657.49 | 664.34 | 661.40 | 664.63 | 0.001774 | 4.75 | 121.57 | 177.82 | 0.33 |
| SOUTH TRIB | 7.399 | 100-YEAR | 517.00 | 657.49 | 664.60 | 661.65 | 664.93 | 0.001906 | 5.06 | 128.89 | 596.90 | 0.35 |
| SOUTH TRIB | 7.406 | 10-YEAR | 287.00 | 658.60 | 663.36 | | 663.60 | 0.002176 | 4.36 | 83.53 | 25.08 | 0.35 |
| SOUTH TRIB | 7.406 | 50-YEAR | 461.00 | 658.60 | 664.37 | | 664.73 | 0.002637 | 5.46 | 110.49 | 28.28 | 0.40 |
| SOUTH TRIB | 7.406 | 100-YEAR | 517.00 | 658.60 | 664.64 | | 665.03 | 0.002758 | 5.75 | 118.23 | 28.89 | 0.41 |
| SOUTH TRIB | 7.431 | 10-YEAR | 287.00 | 659.00 | 663.64 | | 664.02 | 0.004180 | 5.65 | 66.61 | 23.78 | 0.48 |
| SOUTH TRIB | 7.431 | 50-YEAR | 461.00 | 659.00 | 664.70 | | 665.21 | 0.004367 | 6.68 | 94.17 | 28.17 | 0.51 |
| SOUTH TRIB | 7.431 | 100-YEAR | 517.00 | 659.00 | 664.99 | | 665.53 | 0.004423 | 6.96 | 102.36 | 29.35 | 0.51 |
| SOUTH TRIB | 7.447 | 10-YEAR | 287.00 | 658.10 | 663.98 | | 664.10 | 0.001200 | 3.28 | 112.77 | 31.45 | 0.26 |
| SOUTH TRIB | 7.447 | 50-YEAR | 461.00 | 658.10 | 665.12 | | 665.30 | 0.001400 | 4.07 | 151.07 | 35.68 | 0.29 |
| SOUTH TRIB | 7.447 | 100-YEAR | 517.00 | 658.10 | 665.41 | | 665.62 | 0.001600 | 4.48 | 162.11 | 48.24 | 0.31 |
| SOUTH TRIB | 7.456 | 10-YEAR | 261.00 | 658.10 | 664.04 | 660.99 | 664.14 | 0.000881 | 2.84 | 110.29 | 31.68 | 0.22 |
| SOUTH TRIB | 7.456 | 50-YEAR | 418.00 | 658.10 | 665.21 | 661.71 | 665.34 | 0.001091 | 3.62 | 154.07 | 35.99 | 0.26 |
| SOUTH TRIB | 7.456 | 100-YEAR | 468.00 | 658.10 | 665.50 | 661.91 | 665.67 | 0.001270 | 4.03 | 167.12 | 58.34 | 0.28 |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 261.00 | 658.10 | 664.80 | 660.99 | 664.87 | 0.000518 | 2.38 | 129.91 | 34.47 | 0.17 |
| SOUTH TRIB | 7.47 | 50-YEAR | 418.00 | 658.10 | 666.67 | 661.70 | 666.74 | 0.000609 | 3.12 | 360.27 | 292.95 | 0.20 |
| SOUTH TRIB | 7.47 | 100-YEAR | 468.00 | 658.10 | 666.84 | 661.90 | 666.91 | 0.000598 | 3.14 | 415.85 | 332.28 | 0.20 |
| SOUTH TRIB | 7.486 | 10-YEAR | 261.00 | 655.06 | 664.87 | | 664.87 | 0.000006 | 0.38 | 1050.51 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 50-YEAR | 418.00 | 655.06 | 666.75 | | 666.75 | 0.000006 | 0.43 | 1440.95 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 100-YEAR | 468.00 | 655.06 | 666.92 | | 666.92 | 0.000007 | 0.47 | 1476.97 | 208.30 | 0.02 |
| SOUTH TRIB | 7.493 | 10-YEAR | 261.00 | 655.05 | 664.87 | | 664.87 | 0.000001 | 0.11 | 4657.04 | 1491.36 | 0.01 |
| SOUTH TRIB | 7.493 | 50-YEAR | 418.00 | 655.05 | 666.75 | | 666.75 | 0.000000 | 0.09 | 7555.03 | 1584.75 | 0.01 |
| SOUTH TRIB | 7.493 | 100-YEAR | 468.00 | 655.05 | 666.92 | | 666.92 | 0.000000 | 0.10 | 7830.30 | 1592.47 | 0.01 |

HEC-RAS Plan: Nat - Ramp Q5

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 4.518 | 10-YEAR | 644.73 | 644.69 | 0.04 | 0.05 | 0.01 | 11.61 | 870.78 | 11.61 | 68.69 |
| MAINSTEM | 4.518 | 50-YEAR | 646.41 | 646.33 | 0.08 | 0.06 | 0.01 | 22.42 | 1414.15 | 22.42 | 70.33 |
| MAINSTEM | 4.518 | 100-YEAR | 647.00 | 646.91 | 0.09 | 0.06 | 0.01 | 27.25 | 1627.50 | 27.25 | 70.91 |
| MAINSTEM | 4.594 | 10-YEAR | 644.77 | 644.73 | 0.04 | 0.04 | 0.00 | 11.67 | 870.66 | 11.67 | 68.73 |
| MAINSTEM | 4.594 | 50-YEAR | 646.48 | 646.40 | 0.08 | 0.07 | 0.00 | 22.57 | 1413.87 | 22.57 | 70.40 |
| MAINSTEM | 4.594 | 100-YEAR | 647.07 | 646.98 | 0.09 | 0.07 | 0.00 | 27.43 | 1627.14 | 27.43 | 70.98 |
| MAINSTEM | 4.675 | 10-YEAR | 644.82 | 644.78 | 0.04 | 0.05 | 0.00 | 11.67 | 870.65 | 11.67 | 68.72 |
| MAINSTEM | 4.675 | 50-YEAR | 646.55 | 646.47 | 0.08 | 0.07 | 0.00 | 22.64 | 1413.71 | 22.64 | 70.41 |
| MAINSTEM | 4.675 | 100-YEAR | 647.15 | 647.06 | 0.09 | 0.08 | 0.00 | 27.55 | 1626.91 | 27.55 | 71.01 |
| MAINSTEM | 4.773 | 10-YEAR | 644.88 | 644.84 | 0.03 | 0.05 | 0.00 | 10.26 | 764.66 | 9.07 | 68.37 |
| MAINSTEM | 4.773 | 50-YEAR | 646.62 | 646.57 | 0.06 | 0.07 | 0.00 | 19.17 | 1190.88 | 16.95 | 70.04 |
| MAINSTEM | 4.773 | 100-YEAR | 647.24 | 647.17 | 0.07 | 0.08 | 0.00 | 24.25 | 1423.32 | 21.43 | 70.63 |
| MAINSTEM | 4.790 | 10-YEAR | 644.93 | 644.81 | 0.12 | 0.01 | 0.04 | | 784.00 | | 68.35 |
| MAINSTEM | 4.790 | 50-YEAR | 646.71 | 646.51 | 0.20 | 0.02 | 0.07 | | 1227.00 | | 69.99 |
| MAINSTEM | 4.790 | 100-YEAR | 647.35 | 647.09 | 0.26 | 0.02 | 0.09 | | 1469.00 | | 70.56 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 645.42 | 645.28 | 0.15 | | | | 784.00 | | 65.50 |
| MAINSTEM | 5.059 | 50-YEAR | 647.81 | 647.60 | 0.21 | | | | 1227.00 | | 67.78 |
| MAINSTEM | 5.059 | 100-YEAR | 648.96 | 648.71 | 0.25 | | | | 1469.00 | | 68.88 |
| MAINSTEM | 5.076 | 10-YEAR | 645.46 | 645.41 | 0.05 | 0.03 | 0.01 | | 784.00 | | 65.48 |
| MAINSTEM | 5.076 | 50-YEAR | 647.85 | 647.79 | 0.07 | 0.03 | 0.01 | | 1227.00 | | 67.85 |
| MAINSTEM | 5.076 | 100-YEAR | 649.00 | 648.93 | 0.07 | 0.03 | 0.02 | | 1469.00 | | 68.98 |
| MAINSTEM | 5.104 | 10-YEAR | 645.51 | 645.41 | 0.10 | 0.03 | 0.02 | | 784.00 | | 65.32 |
| MAINSTEM | 5.104 | 50-YEAR | 647.90 | 647.76 | 0.14 | 0.03 | 0.02 | | 1227.00 | | 67.69 |
| MAINSTEM | 5.104 | 100-YEAR | 649.06 | 648.90 | 0.16 | 0.03 | 0.03 | | 1469.00 | | 68.83 |
| MAINSTEM | 5.109 | 10-YEAR | 645.54 | 645.37 | 0.17 | 0.01 | 0.02 | | 784.00 | | 65.24 |
| MAINSTEM | 5.109 | 50-YEAR | 647.94 | 647.71 | 0.24 | 0.01 | 0.03 | | 1227.00 | | 67.60 |
| MAINSTEM | 5.109 | 100-YEAR | 649.10 | 648.83 | 0.27 | 0.01 | 0.03 | | 1469.00 | | 68.73 |
| MAINSTEM | 5.110 | 10-YEAR | 645.56 | 645.33 | 0.23 | 0.00 | 0.02 | | 784.00 | | 44.59 |
| MAINSTEM | 5.110 | 50-YEAR | 647.98 | 647.64 | 0.34 | 0.00 | 0.03 | | 1227.00 | | 50.16 |
| MAINSTEM | 5.110 | 100-YEAR | 649.14 | 648.75 | 0.40 | 0.00 | 0.04 | | 1469.00 | | 52.83 |
| MAINSTEM | 5.116 | 10-YEAR | 645.57 | 645.33 | 0.24 | 0.01 | 0.00 | | 784.00 | | 25.00 |
| MAINSTEM | 5.116 | 50-YEAR | 647.99 | 647.64 | 0.35 | 0.01 | 0.01 | 0.02 | 1226.96 | 0.02 | 26.44 |
| MAINSTEM | 5.116 | 100-YEAR | 649.16 | 648.75 | 0.41 | 0.01 | 0.01 | 0.25 | 1468.50 | 0.25 | 31.23 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 646.33 | 646.04 | 0.29 | | | | 634.00 | | 25.50 |
| MAINSTEM | 5.606 | 50-YEAR | 649.94 | 649.63 | 0.30 | | | | 1056.00 | | 57.44 |
| MAINSTEM | 5.606 | 100-YEAR | 651.85 | 651.57 | 0.28 | | | | 1227.00 | | 80.97 |
| MAINSTEM | 5.610 | 10-YEAR | 646.36 | 646.34 | 0.02 | 0.00 | 0.03 | | 634.00 | | 125.36 |
| MAINSTEM | 5.610 | 50-YEAR | 649.97 | 649.95 | 0.02 | 0.00 | 0.03 | | 1056.00 | | 145.88 |
| MAINSTEM | 5.610 | 100-YEAR | 651.88 | 651.86 | 0.02 | 0.00 | 0.03 | | 1227.00 | | 156.76 |
| MAINSTEM | 5.629 | 10-YEAR | 646.36 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 215.49 |
| MAINSTEM | 5.629 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 237.14 |
| MAINSTEM | 5.629 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 248.61 |
| MAINSTEM | 5.632 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 411.47 |
| MAINSTEM | 5.632 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 433.12 |
| MAINSTEM | 5.632 | 100-YEAR | 651.88 | 651.88 | 0.00 | 0.00 | 0.00 | | 1227.00 | | 444.58 |
| MAINSTEM | 5.639 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 737.22 |
| MAINSTEM | 5.639 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 758.86 |
| MAINSTEM | 5.639 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 770.33 |
| MAINSTEM | 5.697 | 10-YEAR | 646.41 | 646.37 | 0.04 | 0.03 | 0.01 | | 634.00 | | 311.74 |
| MAINSTEM | 5.697 | 50-YEAR | 649.99 | 649.96 | 0.03 | 0.01 | 0.01 | | 1056.00 | | 333.27 |
| MAINSTEM | 5.697 | 100-YEAR | 651.90 | 651.87 | 0.02 | 0.01 | 0.01 | | 1227.00 | | 344.73 |
| MAINSTEM | 5.720 | 10-YEAR | 646.51 | 646.35 | 0.16 | 0.06 | 0.04 | | 634.00 | | 161.07 |
| MAINSTEM | 5.720 | 50-YEAR | 650.05 | 649.91 | 0.14 | 0.02 | 0.03 | | 1056.00 | | 188.74 |
| MAINSTEM | 5.720 | 100-YEAR | 651.94 | 651.82 | 0.12 | 0.01 | 0.03 | | 1227.00 | | 203.61 |
| MAINSTEM | 5.725 | 10-YEAR | 646.59 | 646.28 | 0.31 | 0.03 | 0.04 | | 634.00 | | 93.92 |
| MAINSTEM | 5.725 | 50-YEAR | 650.10 | 649.82 | 0.28 | 0.01 | 0.04 | | 1056.00 | | 126.73 |
| MAINSTEM | 5.725 | 100-YEAR | 651.99 | 651.74 | 0.25 | 0.01 | 0.04 | | 1227.00 | | 144.48 |

HEC-RAS Plan: Nat - Ramp Q5 (Continued)

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 5.727 | 10-YEAR | 646.68 | 646.23 | 0.45 | 0.02 | 0.07 | | 634.00 | | 25.00 |
| MAINSTEM | 5.727 | 50-YEAR | 650.18 | 649.77 | 0.41 | 0.01 | 0.06 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.727 | 100-YEAR | 652.05 | 651.69 | 0.36 | 0.01 | 0.06 | | 1227.00 | | 27.98 |
| MAINSTEM | 5.732 | 10-YEAR | 646.81 | 646.38 | 0.44 | 0.13 | 0.00 | | 634.00 | | 25.00 |
| MAINSTEM | 5.732 | 50-YEAR | 650.24 | 649.84 | 0.41 | 0.07 | 0.00 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.732 | 100-YEAR | 652.10 | 651.74 | 0.36 | 0.05 | 0.00 | | 1227.00 | | 27.64 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 647.18 | 646.81 | 0.37 | | | | 634.00 | | 26.00 |
| MAINSTEM | 5.757 | 50-YEAR | 650.55 | 650.18 | 0.37 | | | | 1056.00 | | 26.00 |
| MAINSTEM | 5.757 | 100-YEAR | 652.40 | 652.07 | 0.33 | | | | 1227.00 | | 26.00 |
| MAINSTEM | 5.759 | 10-YEAR | 647.22 | 647.20 | 0.03 | 0.01 | 0.03 | | 634.00 | | 100.00 |
| MAINSTEM | 5.759 | 50-YEAR | 650.59 | 650.56 | 0.03 | 0.01 | 0.03 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.759 | 100-YEAR | 652.43 | 652.41 | 0.03 | 0.00 | 0.03 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.810 | 10-YEAR | 647.29 | 647.24 | 0.06 | 0.06 | 0.01 | | 634.00 | | 100.00 |
| MAINSTEM | 5.810 | 50-YEAR | 650.62 | 650.58 | 0.04 | 0.03 | 0.00 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.810 | 100-YEAR | 652.45 | 652.42 | 0.03 | 0.02 | 0.00 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.860 | 10-YEAR | 648.57 | 647.64 | 0.93 | 0.42 | 0.26 | | 634.00 | | 100.00 |
| MAINSTEM | 5.860 | 50-YEAR | 650.83 | 650.43 | 0.40 | 0.10 | 0.11 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.860 | 100-YEAR | 652.58 | 652.31 | 0.28 | 0.06 | 0.07 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.862 | 10-YEAR | 649.70 | 648.45 | 1.26 | 0.73 | 0.16 | | 634.00 | | 28.35 |
| MAINSTEM | 5.862 | 50-YEAR | 651.40 | 650.19 | 1.20 | 0.17 | 0.40 | | 1056.00 | | 28.35 |
| MAINSTEM | 5.862 | 100-YEAR | 652.90 | 652.14 | 0.76 | 0.07 | 0.24 | | 1227.00 | | 28.35 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 651.96 | 651.60 | 0.37 | | | | 634.00 | | 33.00 |
| MAINSTEM | 6.037 | 50-YEAR | 653.74 | 653.22 | 0.52 | | | | 1056.00 | | 33.00 |
| MAINSTEM | 6.037 | 100-YEAR | 654.46 | 653.90 | 0.56 | | | | 1227.00 | | 33.00 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 652.40 | 652.15 | 0.25 | | | | 603.00 | | 34.00 |
| MAINSTEM | 6.190 | 50-YEAR | 654.26 | 653.91 | 0.35 | | | | 996.00 | | 34.00 |
| MAINSTEM | 6.190 | 100-YEAR | 655.00 | 654.62 | 0.38 | | | | 1156.00 | | 34.00 |
| MAINSTEM | 6.194 | 10-YEAR | 652.44 | 652.41 | 0.03 | 0.01 | 0.02 | | 603.00 | | 100.00 |
| MAINSTEM | 6.194 | 50-YEAR | 654.31 | 654.27 | 0.04 | 0.01 | 0.03 | | 996.00 | | 100.00 |
| MAINSTEM | 6.194 | 100-YEAR | 655.04 | 655.00 | 0.04 | 0.01 | 0.03 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.332 | 10-YEAR | 652.55 | 652.52 | 0.03 | 0.11 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.332 | 50-YEAR | 654.41 | 654.37 | 0.04 | 0.10 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.332 | 100-YEAR | 655.14 | 655.10 | 0.04 | 0.10 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.418 | 10-YEAR | 652.63 | 652.61 | 0.03 | 0.09 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.418 | 50-YEAR | 654.49 | 654.45 | 0.04 | 0.08 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.418 | 100-YEAR | 655.22 | 655.18 | 0.04 | 0.08 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.471 | 10-YEAR | 652.73 | 652.65 | 0.08 | 0.08 | 0.02 | | 603.00 | | 55.30 |
| MAINSTEM | 6.471 | 50-YEAR | 654.59 | 654.48 | 0.12 | 0.08 | 0.02 | | 996.00 | | 55.30 |
| MAINSTEM | 6.471 | 100-YEAR | 655.32 | 655.19 | 0.13 | 0.07 | 0.03 | | 1156.00 | | 55.30 |
| MAINSTEM | 6.473 | 10-YEAR | 652.79 | 652.61 | 0.18 | 0.01 | 0.05 | | 603.00 | | 40.00 |
| MAINSTEM | 6.473 | 50-YEAR | 654.67 | 654.42 | 0.25 | 0.01 | 0.07 | | 996.00 | | 40.00 |
| MAINSTEM | 6.473 | 100-YEAR | 655.40 | 655.13 | 0.27 | 0.01 | 0.07 | | 1156.00 | | 40.00 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | |
| MAINSTEM | 6.597 | 10-YEAR | 653.12 | 653.04 | 0.08 | | | | 603.00 | | 120.63 |
| MAINSTEM | 6.597 | 50-YEAR | 655.06 | 654.96 | 0.10 | | | | 996.00 | | 1005.08 |
| MAINSTEM | 6.597 | 100-YEAR | 655.82 | 655.70 | 0.11 | | | | 1156.00 | | 1022.24 |
| MAINSTEM | 6.6 | 10-YEAR | 653.15 | 653.04 | 0.11 | 0.01 | 0.01 | | 603.00 | | 199.96 |
| MAINSTEM | 6.6 | 50-YEAR | 655.09 | 654.95 | 0.15 | 0.01 | 0.02 | | 996.00 | | 234.17 |
| MAINSTEM | 6.6 | 100-YEAR | 655.85 | 655.69 | 0.16 | 0.01 | 0.02 | | 1156.00 | | 247.45 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 653.45 | 652.11 | 1.34 | | | | 603.00 | | 219.64 |
| MAINSTEM | 6.635 | 50-YEAR | 655.44 | 654.35 | 1.09 | | | | 996.00 | | 1223.86 |
| MAINSTEM | 6.635 | 100-YEAR | 656.22 | 655.11 | 1.11 | | | | 1156.00 | | 1229.94 |

HEC-RAS Plan: Nal - Ramp Q5 (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 6.637 | 10-YEAR | 653.85 | 653.85 | 0.00 | 0.00 | 0.40 | 5.04 | 597.62 | 0.34 | 1208.72 |
| MAINSTEM | 6.637 | 50-YEAR | 655.77 | 655.77 | 0.00 | 0.00 | 0.33 | 15.52 | 979.22 | 1.26 | 1234.59 |
| MAINSTEM | 6.637 | 100-YEAR | 656.55 | 656.55 | 0.00 | 0.00 | 0.33 | 19.84 | 1134.37 | 1.79 | 1240.08 |
| | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 654.18 | 653.53 | 0.65 | 0.00 | 0.33 | | 603.00 | | 40.24 |
| MAINSTEM | 6.639 | 50-YEAR | 656.00 | 655.55 | 0.44 | 0.00 | 0.22 | | 996.00 | | 52.10 |
| MAINSTEM | 6.639 | 100-YEAR | 656.75 | 656.35 | 0.39 | 0.00 | 0.20 | | 1156.00 | | 56.81 |
| | | | | | | | | | | | |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 655.03 | 654.58 | 0.45 | 0.01 | 0.00 | | 603.00 | | 47.66 |
| MAINSTEM | 6.642 | 50-YEAR | 656.42 | 655.99 | 0.43 | 0.01 | 0.00 | | 996.00 | | 61.45 |
| MAINSTEM | 6.642 | 100-YEAR | 657.07 | 656.70 | 0.38 | 0.00 | 0.00 | | 1156.00 | | 68.58 |
| | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 655.12 | 654.72 | 0.40 | 0.07 | 0.01 | | 603.00 | | 48.91 |
| MAINSTEM | 6.643 | 50-YEAR | 656.48 | 656.06 | 0.41 | 0.05 | 0.01 | | 996.00 | | 62.23 |
| MAINSTEM | 6.643 | 100-YEAR | 657.12 | 656.75 | 0.37 | 0.04 | 0.00 | | 1156.00 | | 69.12 |
| | | | | | | | | | | | |
| MAINSTEM | 6.6435 | 10-YEAR | 655.24 | 655.24 | 0.00 | 0.00 | 0.12 | | 603.00 | | 613.85 |
| MAINSTEM | 6.6435 | 50-YEAR | 656.60 | 656.60 | 0.00 | 0.00 | 0.12 | | 996.00 | | 623.44 |
| MAINSTEM | 6.6435 | 100-YEAR | 657.23 | 657.22 | 0.00 | 0.00 | 0.11 | | 1156.00 | | 627.83 |
| | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 655.24 | 655.24 | 0.00 | 0.00 | 0.00 | | 603.00 | | 752.52 |
| MAINSTEM | 6.644 | 50-YEAR | 656.60 | 656.60 | 0.00 | 0.00 | 0.00 | | 996.00 | | 765.39 |
| MAINSTEM | 6.644 | 100-YEAR | 657.23 | 657.23 | 0.00 | 0.00 | 0.00 | | 1156.00 | | 771.29 |
| | | | | | | | | | | | |
| MAINSTEM | 6.645 | 10-YEAR | 655.25 | 655.25 | 0.00 | 0.01 | 0.00 | 0.11 | 578.57 | 24.32 | 1397.34 |
| MAINSTEM | 6.645 | 50-YEAR | 656.61 | 656.61 | 0.00 | 0.01 | 0.00 | 10.16 | 891.27 | 94.58 | 1640.89 |
| MAINSTEM | 6.645 | 100-YEAR | 657.23 | 657.23 | 0.00 | 0.00 | 0.00 | 20.89 | 1005.68 | 129.43 | 1761.90 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.647 | 10-YEAR | 655.27 | 655.20 | 0.06 | 0.00 | 0.02 | 26.68 | 285.16 | 2.16 | 70.16 |
| SOUTH TRIB | 6.647 | 50-YEAR | 656.63 | 656.56 | 0.06 | 0.00 | 0.02 | 64.37 | 436.67 | 4.96 | 82.19 |
| SOUTH TRIB | 6.647 | 100-YEAR | 657.25 | 657.19 | 0.06 | 0.00 | 0.02 | 83.53 | 480.17 | 6.29 | 87.76 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.648 | 10-YEAR | 655.36 | 655.34 | 0.02 | 0.08 | 0.00 | 0.04 | 313.96 | 0.00 | 166.52 |
| SOUTH TRIB | 6.648 | 50-YEAR | 656.67 | 656.65 | 0.02 | 0.04 | 0.00 | 1.57 | 504.37 | 0.06 | 172.09 |
| SOUTH TRIB | 6.648 | 100-YEAR | 657.28 | 657.27 | 0.01 | 0.03 | 0.00 | 2.99 | 566.66 | 0.35 | 175.45 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.649 | 10-YEAR | 655.47 | 655.40 | 0.07 | 0.10 | 0.01 | 224.76 | 89.07 | 0.17 | 232.42 |
| SOUTH TRIB | 6.649 | 50-YEAR | 656.70 | 656.67 | 0.03 | 0.03 | 0.00 | 387.48 | 115.65 | 2.86 | 240.03 |
| SOUTH TRIB | 6.649 | 100-YEAR | 657.30 | 657.28 | 0.02 | 0.02 | 0.00 | 439.97 | 125.16 | 4.87 | 243.66 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.650 | 10-YEAR | 655.85 | 655.66 | 0.19 | 0.34 | 0.04 | 141.89 | 171.23 | 0.88 | 268.97 |
| SOUTH TRIB | 6.650 | 50-YEAR | 656.79 | 656.67 | 0.12 | 0.07 | 0.03 | 267.70 | 232.53 | 5.77 | 275.04 |
| SOUTH TRIB | 6.650 | 100-YEAR | 657.36 | 657.27 | 0.09 | 0.04 | 0.02 | 311.46 | 248.91 | 9.62 | 278.60 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.651 | 10-YEAR | 656.25 | 656.21 | 0.04 | 0.38 | 0.01 | 177.69 | 117.06 | 19.24 | 344.26 |
| SOUTH TRIB | 6.651 | 50-YEAR | 656.99 | 656.95 | 0.04 | 0.19 | 0.01 | 294.41 | 160.68 | 50.91 | 348.72 |
| SOUTH TRIB | 6.651 | 100-YEAR | 657.48 | 657.44 | 0.03 | 0.12 | 0.01 | 333.93 | 169.63 | 66.45 | 351.67 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.652 | 10-YEAR | 656.42 | 656.41 | 0.02 | 0.17 | 0.00 | 195.73 | 85.20 | 33.06 | 287.44 |
| SOUTH TRIB | 6.652 | 50-YEAR | 657.12 | 657.10 | 0.02 | 0.12 | 0.00 | 316.06 | 116.70 | 73.24 | 291.59 |
| SOUTH TRIB | 6.652 | 100-YEAR | 657.56 | 657.54 | 0.02 | 0.08 | 0.00 | 355.58 | 122.96 | 91.46 | 294.26 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.653 | 10-YEAR | 656.54 | 656.47 | 0.06 | 0.09 | 0.02 | 6.21 | 300.16 | 7.63 | 77.84 |
| SOUTH TRIB | 6.653 | 50-YEAR | 657.25 | 657.14 | 0.11 | 0.08 | 0.04 | 10.40 | 483.19 | 12.41 | 81.83 |
| SOUTH TRIB | 6.653 | 100-YEAR | 657.67 | 657.56 | 0.11 | 0.06 | 0.05 | 11.92 | 544.04 | 14.04 | 84.36 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.654 Ramp P5,O4,Q5 | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.655 | 10-YEAR | 657.05 | 656.96 | 0.09 | | | 7.20 | 298.90 | 7.90 | 123.80 |
| SOUTH TRIB | 6.655 | 50-YEAR | 657.88 | 657.75 | 0.14 | | | 11.89 | 481.32 | 12.79 | 142.95 |
| SOUTH TRIB | 6.655 | 100-YEAR | 658.26 | 658.13 | 0.14 | | | 13.51 | 542.07 | 14.43 | 147.50 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.656 | 10-YEAR | 657.64 | 657.31 | 0.33 | 0.52 | 0.07 | 35.48 | 236.65 | 41.87 | 220.68 |
| SOUTH TRIB | 6.656 | 50-YEAR | 658.35 | 658.09 | 0.26 | 0.43 | 0.04 | 87.99 | 322.74 | 95.27 | 268.51 |
| SOUTH TRIB | 6.656 | 100-YEAR | 658.65 | 658.41 | 0.24 | 0.36 | 0.03 | 107.17 | 348.45 | 114.38 | 270.48 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.657 | 10-YEAR | 658.10 | 658.06 | 0.04 | 0.44 | 0.03 | 79.49 | 134.24 | 100.26 | 323.37 |
| SOUTH TRIB | 6.657 | 50-YEAR | 658.71 | 658.66 | 0.05 | 0.33 | 0.02 | 151.98 | 185.33 | 168.69 | 326.97 |
| SOUTH TRIB | 6.657 | 100-YEAR | 658.95 | 658.91 | 0.05 | 0.28 | 0.02 | 178.44 | 199.62 | 191.94 | 328.43 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.658 | 10-YEAR | 658.20 | 658.18 | 0.02 | 0.10 | 0.00 | 59.00 | 109.78 | 145.22 | 314.07 |
| SOUTH TRIB | 6.658 | 50-YEAR | 658.80 | 658.77 | 0.03 | 0.09 | 0.00 | 110.73 | 150.14 | 245.13 | 317.63 |
| SOUTH TRIB | 6.658 | 100-YEAR | 659.03 | 659.01 | 0.03 | 0.08 | 0.00 | 129.47 | 161.41 | 279.12 | 319.04 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.12 | 10-YEAR | 658.32 | 658.24 | 0.08 | 0.09 | 0.03 | | 287.00 | | 54.46 |
| SOUTH TRIB | 7.12 | 50-YEAR | 658.96 | 658.82 | 0.14 | 0.10 | 0.06 | | 461.00 | | 57.89 |
| SOUTH TRIB | 7.12 | 100-YEAR | 659.20 | 659.04 | 0.16 | 0.10 | 0.07 | | 517.00 | | 59.22 |

HEC-RAS Plan: Nat - Ramp Q5 (Continued)

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SOUTH TRIB | 7.16 Ramps P1, P2, P8 | | Culvert | | | | | | | | |
| SOUTH TRIB | 7.21 | 10-YEAR | 659.07 | 658.82 | 0.25 | | | 2.14 | 284.86 | | 51.06 |
| SOUTH TRIB | 7.21 | 50-YEAR | 660.00 | 659.67 | 0.33 | | | 8.15 | 452.85 | | 77.33 |
| SOUTH TRIB | 7.21 | 100-YEAR | 660.31 | 659.97 | 0.34 | | | 10.64 | 506.36 | | 79.53 |
| SOUTH TRIB | 7.22 | 10-YEAR | 659.91 | 659.40 | 0.51 | 0.45 | 0.08 | 109.05 | 177.95 | | 56.92 |
| SOUTH TRIB | 7.22 | 50-YEAR | 660.44 | 659.98 | 0.47 | 0.40 | 0.04 | 228.59 | 232.41 | | 74.40 |
| SOUTH TRIB | 7.22 | 100-YEAR | 660.64 | 660.30 | 0.35 | 0.33 | 0.00 | 287.05 | 229.95 | | 79.17 |
| SOUTH TRIB | 7.247 | 10-YEAR | 660.71 | 660.63 | 0.08 | 0.76 | 0.04 | 200.86 | 86.14 | | 79.15 |
| SOUTH TRIB | 7.247 | 50-YEAR | 661.26 | 661.14 | 0.11 | 0.78 | 0.04 | 341.01 | 119.99 | | 81.67 |
| SOUTH TRIB | 7.247 | 100-YEAR | 661.38 | 661.25 | 0.13 | 0.72 | 0.02 | 385.69 | 131.31 | | 82.22 |
| SOUTH TRIB | 7.259 | 10-YEAR | 660.85 | 660.78 | 0.07 | 0.13 | 0.00 | 210.11 | 76.89 | | 80.68 |
| SOUTH TRIB | 7.259 | 50-YEAR | 661.41 | 661.31 | 0.10 | 0.15 | 0.00 | 352.09 | 108.91 | | 83.23 |
| SOUTH TRIB | 7.259 | 100-YEAR | 661.54 | 661.44 | 0.11 | 0.16 | 0.00 | 397.62 | 119.38 | | 83.82 |
| SOUTH TRIB | 7.265 | 10-YEAR | 661.05 | 660.67 | 0.37 | 0.11 | 0.09 | 40.94 | 234.63 | 11.43 | 59.60 |
| SOUTH TRIB | 7.265 | 50-YEAR | 661.64 | 661.19 | 0.45 | 0.12 | 0.11 | 121.74 | 318.62 | 20.64 | 62.62 |
| SOUTH TRIB | 7.265 | 100-YEAR | 661.79 | 661.30 | 0.49 | 0.13 | 0.11 | 147.79 | 345.56 | 23.64 | 63.30 |
| SOUTH TRIB | 7.289 | 10-YEAR | 661.70 | 661.50 | 0.20 | 0.63 | 0.02 | 120.29 | 166.71 | | 35.69 |
| SOUTH TRIB | 7.289 | 50-YEAR | 662.43 | 662.12 | 0.31 | 0.78 | 0.01 | 209.64 | 251.36 | | 39.96 |
| SOUTH TRIB | 7.289 | 100-YEAR | 662.64 | 662.29 | 0.34 | 0.83 | 0.01 | 239.54 | 277.46 | | 41.12 |
| SOUTH TRIB | 7.314 | 10-YEAR | 662.00 | 661.91 | 0.09 | 0.29 | 0.01 | 161.45 | 125.55 | | 47.49 |
| SOUTH TRIB | 7.314 | 50-YEAR | 662.82 | 662.70 | 0.13 | 0.37 | 0.02 | 274.10 | 186.90 | | 53.28 |
| SOUTH TRIB | 7.314 | 100-YEAR | 663.05 | 662.91 | 0.14 | 0.39 | 0.02 | 311.17 | 205.83 | | 54.86 |
| SOUTH TRIB | 7.331 | 10-YEAR | 662.44 | 662.09 | 0.35 | 0.36 | 0.08 | 111.59 | 175.41 | | 26.13 |
| SOUTH TRIB | 7.331 | 50-YEAR | 663.36 | 662.87 | 0.49 | 0.43 | 0.11 | 191.33 | 269.67 | | 30.41 |
| SOUTH TRIB | 7.331 | 100-YEAR | 663.61 | 663.09 | 0.53 | 0.45 | 0.12 | 217.70 | 299.30 | | 31.57 |
| SOUTH TRIB | 7.35 | 10-YEAR | 662.91 | 662.72 | 0.19 | 0.46 | 0.02 | 99.36 | 187.64 | | 30.86 |
| SOUTH TRIB | 7.35 | 50-YEAR | 663.91 | 663.65 | 0.26 | 0.53 | 0.02 | 177.21 | 283.79 | | 35.67 |
| SOUTH TRIB | 7.35 | 100-YEAR | 664.18 | 663.90 | 0.28 | 0.54 | 0.02 | 203.46 | 313.54 | | 36.96 |
| SOUTH TRIB | 7.391 | 10-YEAR | 663.44 | 663.29 | 0.15 | 0.53 | 0.00 | 95.72 | 191.28 | | 31.68 |
| SOUTH TRIB | 7.391 | 50-YEAR | 664.52 | 664.31 | 0.21 | 0.60 | 0.01 | 171.07 | 289.93 | | 36.56 |
| SOUTH TRIB | 7.391 | 100-YEAR | 664.81 | 664.58 | 0.22 | 0.62 | 0.01 | 196.51 | 320.49 | | 37.87 |
| SOUTH TRIB | 7.399 | 10-YEAR | 663.52 | 663.34 | 0.18 | 0.07 | 0.01 | 27.56 | 232.99 | 26.45 | 24.71 |
| SOUTH TRIB | 7.399 | 50-YEAR | 664.63 | 664.34 | 0.29 | 0.08 | 0.02 | 52.06 | 358.72 | 50.23 | 177.82 |
| SOUTH TRIB | 7.399 | 100-YEAR | 664.93 | 664.60 | 0.33 | 0.09 | 0.03 | 60.58 | 397.90 | 58.52 | 596.90 |
| SOUTH TRIB | 7.406 | 10-YEAR | 663.60 | 663.36 | 0.23 | 0.06 | 0.02 | 43.02 | 207.66 | 36.32 | 25.08 |
| SOUTH TRIB | 7.406 | 50-YEAR | 664.73 | 664.37 | 0.35 | 0.08 | 0.02 | 79.12 | 315.07 | 66.81 | 28.28 |
| SOUTH TRIB | 7.406 | 100-YEAR | 665.03 | 664.64 | 0.39 | 0.09 | 0.02 | 92.05 | 347.76 | 77.19 | 28.89 |
| SOUTH TRIB | 7.431 | 10-YEAR | 664.02 | 663.64 | 0.38 | 0.38 | 0.04 | 56.41 | 196.42 | 34.17 | 23.78 |
| SOUTH TRIB | 7.431 | 50-YEAR | 665.21 | 664.70 | 0.50 | 0.43 | 0.04 | 103.29 | 288.99 | 68.72 | 28.17 |
| SOUTH TRIB | 7.431 | 100-YEAR | 665.53 | 664.99 | 0.54 | 0.45 | 0.04 | 119.19 | 316.82 | 80.99 | 29.35 |
| SOUTH TRIB | 7.447 | 10-YEAR | 664.10 | 663.98 | 0.12 | 0.05 | 0.03 | 130.04 | 130.80 | 26.16 | 31.45 |
| SOUTH TRIB | 7.447 | 50-YEAR | 665.30 | 665.12 | 0.17 | 0.06 | 0.03 | 207.23 | 199.25 | 54.53 | 35.68 |
| SOUTH TRIB | 7.447 | 100-YEAR | 665.62 | 665.41 | 0.21 | 0.06 | 0.03 | 241.98 | 229.94 | 45.07 | 48.24 |
| SOUTH TRIB | 7.456 | 10-YEAR | 664.14 | 664.04 | 0.09 | 0.03 | 0.01 | 122.18 | 114.39 | 24.43 | 31.68 |
| SOUTH TRIB | 7.456 | 50-YEAR | 665.34 | 665.21 | 0.14 | 0.04 | 0.01 | 187.81 | 179.96 | 50.23 | 35.99 |
| SOUTH TRIB | 7.456 | 100-YEAR | 665.67 | 665.50 | 0.17 | 0.04 | 0.01 | 221.74 | 209.90 | 36.36 | 58.34 |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 664.87 | 664.80 | 0.07 | | | 122.91 | 110.62 | 27.48 | 34.47 |
| SOUTH TRIB | 7.47 | 50-YEAR | 666.74 | 666.67 | 0.07 | | | 127.79 | 191.12 | 99.09 | 292.95 |
| SOUTH TRIB | 7.47 | 100-YEAR | 666.91 | 666.84 | 0.07 | | | 147.11 | 196.74 | 124.14 | 332.28 |
| SOUTH TRIB | 7.486 | 10-YEAR | 664.87 | 664.87 | 0.00 | 0.00 | 0.01 | 58.38 | 113.08 | 89.54 | 208.30 |
| SOUTH TRIB | 7.486 | 50-YEAR | 666.75 | 666.75 | 0.00 | 0.00 | 0.01 | 104.21 | 150.70 | 163.09 | 208.30 |
| SOUTH TRIB | 7.486 | 100-YEAR | 666.92 | 666.92 | 0.00 | 0.00 | 0.01 | 117.44 | 166.50 | 184.06 | 208.30 |
| SOUTH TRIB | 7.493 | 10-YEAR | 664.87 | 664.87 | 0.00 | 0.00 | 0.00 | 232.81 | 24.38 | 3.81 | 1491.36 |
| SOUTH TRIB | 7.493 | 50-YEAR | 666.75 | 666.75 | 0.00 | 0.00 | 0.00 | 388.23 | 26.20 | 3.57 | 1584.75 |
| SOUTH TRIB | 7.493 | 100-YEAR | 666.92 | 666.92 | 0.00 | 0.00 | 0.00 | 435.54 | 28.53 | 3.93 | 1592.47 |

Willow Creek  Plan: Natural Conditions - Ramp Q5  11/26/2012

WILLOW CREEK MAINSTEM

WILLOW CREEK SOUTH TRIB

Legend

WS 100-YEAR

WS 50-YEAR

WS 10-YEAR

Ground

Elevation (ft)

665

660

655

650

645

640

635

4.594

4.675

4.773

4.924 1400' C...

5.104

5.524 Tank Farm Rd

5.639

5.697

5.725

5.74 Tonne Feed

5.810

5.860

5.900 Runway 14R

6.08 Runway 14R Exten

6.332

6.418

6.471

6.49 Tank Farm Rd

6.62 C & NW Railroad

6.644

6.645

6.649

6.651

6.652

6.654 Ramp P5,O4,Q5

6.656

6.657

7.12

7.16 Ramps P1, P2, P8

7.247

7.289

7.331

7.391

7.431

7.486

0

2000

4000

6000

8000

10000

12000

14000

16000

Stream Distance Above Willow-Higgins Creek Confluence with Des Plaines River (ft)

1 in Horiz. = 1200 ft  1 in Vert. = 4 ft

HEC-RAS Plan: Nat - P5,O4,Q5

| 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) | |
| MAINSTEM | 4.518 | 10-YEAR | 894.00 | 636.00 | 644.69 | | 644.73 | 0.000113 | 1.67 | 558.91 | 68.69 | 0.10 |
| MAINSTEM | 4.518 | 50-YEAR | 1459.00 | 636.00 | 646.33 | | 646.41 | 0.000168 | 2.28 | 673.17 | 70.33 | 0.13 |
| MAINSTEM | 4.518 | 100-YEAR | 1682.00 | 636.00 | 646.91 | | 647.00 | 0.000185 | 2.49 | 713.97 | 70.91 | 0.13 |
| MAINSTEM | 4.594 | 10-YEAR | 894.00 | 636.00 | 644.73 | | 644.77 | 0.000111 | 1.66 | 562.03 | 68.73 | 0.10 |
| MAINSTEM | 4.594 | 50-YEAR | 1459.00 | 636.00 | 646.40 | | 646.48 | 0.000164 | 2.27 | 677.92 | 70.40 | 0.12 |
| MAINSTEM | 4.594 | 100-YEAR | 1682.00 | 636.00 | 646.98 | | 647.07 | 0.000181 | 2.47 | 719.27 | 70.98 | 0.13 |
| MAINSTEM | 4.675 | 10-YEAR | 894.00 | 636.10 | 644.78 | | 644.82 | 0.000114 | 1.67 | 558.61 | 68.72 | 0.10 |
| MAINSTEM | 4.675 | 50-YEAR | 1459.00 | 636.10 | 646.47 | | 646.55 | 0.000166 | 2.27 | 676.07 | 70.41 | 0.12 |
| MAINSTEM | 4.675 | 100-YEAR | 1682.00 | 636.10 | 647.06 | | 647.15 | 0.000182 | 2.47 | 717.95 | 71.01 | 0.13 |
| MAINSTEM | 4.773 | 10-YEAR | 784.00 | 636.20 | 644.84 | | 644.88 | 0.000089 | 1.47 | 554.70 | 68.37 | 0.09 |
| MAINSTEM | 4.773 | 50-YEAR | 1227.00 | 636.20 | 646.57 | | 646.62 | 0.000118 | 1.91 | 673.98 | 70.04 | 0.10 |
| MAINSTEM | 4.773 | 100-YEAR | 1469.00 | 636.20 | 647.17 | | 647.24 | 0.000139 | 2.16 | 716.27 | 70.63 | 0.12 |
| MAINSTEM | 4.790 | 10-YEAR | 784.00 | 636.20 | 644.81 | 638.80 | 644.93 | 0.000312 | 2.76 | 284.23 | 68.35 | 0.17 |
| MAINSTEM | 4.790 | 50-YEAR | 1227.00 | 636.20 | 646.51 | 639.71 | 646.71 | 0.000420 | 3.61 | 340.24 | 69.99 | 0.20 |
| MAINSTEM | 4.790 | 100-YEAR | 1469.00 | 636.20 | 647.09 | 640.14 | 647.35 | 0.000501 | 4.09 | 359.50 | 70.56 | 0.22 |
| MAINSTEM | 4.924 1400' Culvert on | | | Culvert | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 784.00 | 636.70 | 645.28 | 640.14 | 645.42 | 0.000448 | 3.07 | 255.65 | 65.50 | 0.19 |
| MAINSTEM | 5.059 | 50-YEAR | 1227.00 | 636.70 | 647.60 | 641.04 | 647.81 | 0.000458 | 3.69 | 332.24 | 67.78 | 0.21 |
| MAINSTEM | 5.059 | 100-YEAR | 1469.00 | 636.70 | 648.71 | 641.47 | 648.96 | 0.000462 | 3.98 | 368.99 | 68.88 | 0.21 |
| MAINSTEM | 5.076 | 10-YEAR | 784.00 | 636.90 | 645.41 | | 645.46 | 0.000215 | 1.80 | 435.78 | 65.48 | 0.12 |
| MAINSTEM | 5.076 | 50-YEAR | 1227.00 | 636.90 | 647.79 | | 647.85 | 0.000206 | 2.07 | 594.14 | 67.85 | 0.12 |
| MAINSTEM | 5.076 | 100-YEAR | 1469.00 | 636.90 | 648.93 | | 649.00 | 0.000204 | 2.19 | 672.29 | 68.98 | 0.12 |
| MAINSTEM | 5.104 | 10-YEAR | 784.00 | 637.12 | 645.41 | | 645.51 | 0.000341 | 2.55 | 306.96 | 65.32 | 0.17 |
| MAINSTEM | 5.104 | 50-YEAR | 1227.00 | 637.12 | 647.76 | | 647.90 | 0.000326 | 3.01 | 407.15 | 67.69 | 0.17 |
| MAINSTEM | 5.104 | 100-YEAR | 1469.00 | 637.12 | 648.90 | | 649.06 | 0.000322 | 3.23 | 455.31 | 68.83 | 0.17 |
| MAINSTEM | 5.109 | 10-YEAR | 784.00 | 637.18 | 645.37 | 640.64 | 645.54 | 0.000547 | 3.28 | 239.21 | 65.24 | 0.21 |
| MAINSTEM | 5.109 | 50-YEAR | 1227.00 | 637.18 | 647.71 | 641.55 | 647.94 | 0.000535 | 3.89 | 315.15 | 67.60 | 0.22 |
| MAINSTEM | 5.109 | 100-YEAR | 1469.00 | 637.18 | 648.83 | 642.01 | 649.10 | 0.000532 | 4.18 | 351.63 | 68.73 | 0.22 |
| MAINSTEM | 5.110 | 10-YEAR | 784.00 | 637.22 | 645.33 | | 645.56 | 0.000656 | 3.84 | 204.41 | 44.59 | 0.24 |
| MAINSTEM | 5.110 | 50-YEAR | 1227.00 | 637.22 | 647.64 | | 647.98 | 0.000698 | 4.67 | 262.56 | 50.16 | 0.26 |
| MAINSTEM | 5.110 | 100-YEAR | 1469.00 | 637.22 | 648.75 | | 649.14 | 0.000714 | 5.06 | 290.45 | 52.83 | 0.26 |
| MAINSTEM | 5.116 | 10-YEAR | 784.00 | 637.31 | 645.33 | | 645.57 | 0.000120 | 3.91 | 200.61 | 25.00 | 0.24 |
| MAINSTEM | 5.116 | 50-YEAR | 1227.00 | 637.31 | 647.64 | | 647.99 | 0.000143 | 4.75 | 258.35 | 26.44 | 0.26 |
| MAINSTEM | 5.116 | 100-YEAR | 1469.00 | 637.31 | 648.75 | | 649.16 | 0.000146 | 5.14 | 286.24 | 31.23 | 0.27 |
| MAINSTEM | 5.524 Tank Farm Rd | | | Culvert | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 634.00 | 640.26 | 646.04 | 642.93 | 646.33 | 0.000191 | 4.30 | 147.43 | 25.50 | 0.32 |
| MAINSTEM | 5.606 | 50-YEAR | 1056.00 | 640.26 | 649.63 | 644.01 | 649.94 | 0.000121 | 4.42 | 239.06 | 57.44 | 0.25 |
| MAINSTEM | 5.606 | 100-YEAR | 1227.00 | 640.26 | 651.57 | 644.41 | 651.85 | 0.000087 | 4.25 | 288.43 | 80.97 | 0.22 |
| MAINSTEM | 5.610 | 10-YEAR | 634.00 | 640.30 | 646.34 | | 646.36 | 0.000075 | 1.05 | 603.33 | 125.36 | 0.08 |
| MAINSTEM | 5.610 | 50-YEAR | 1056.00 | 640.30 | 649.95 | | 649.97 | 0.000043 | 1.09 | 970.26 | 145.88 | 0.06 |
| MAINSTEM | 5.610 | 100-YEAR | 1227.00 | 640.30 | 651.86 | | 651.88 | 0.000031 | 1.05 | 1164.78 | 156.76 | 0.05 |
| MAINSTEM | 5.629 | 10-YEAR | 634.00 | 640.37 | 646.36 | | 646.36 | 0.000064 | 0.74 | 854.27 | 215.49 | 0.07 |
| MAINSTEM | 5.629 | 50-YEAR | 1056.00 | 640.37 | 649.97 | | 649.97 | 0.000021 | 0.64 | 1646.96 | 237.14 | 0.04 |
| MAINSTEM | 5.629 | 100-YEAR | 1227.00 | 640.37 | 651.88 | | 651.88 | 0.000014 | 0.59 | 2082.70 | 248.61 | 0.03 |
| MAINSTEM | 5.632 | 10-YEAR | 634.00 | 640.39 | 646.36 | | 646.37 | 0.000056 | 0.70 | 912.18 | 411.47 | 0.06 |
| MAINSTEM | 5.632 | 50-YEAR | 1056.00 | 640.39 | 649.97 | | 649.97 | 0.000019 | 0.60 | 1754.71 | 433.12 | 0.04 |
| MAINSTEM | 5.632 | 100-YEAR | 1227.00 | 640.39 | 651.88 | | 651.88 | 0.000012 | 0.55 | 2216.91 | 444.58 | 0.03 |
| MAINSTEM | 5.639 | 10-YEAR | 634.00 | 640.43 | 646.36 | | 646.37 | 0.000060 | 0.72 | 878.97 | 737.22 | 0.06 |
| MAINSTEM | 5.639 | 50-YEAR | 1056.00 | 640.43 | 649.97 | | 649.97 | 0.000020 | 0.62 | 1695.03 | 758.86 | 0.04 |
| MAINSTEM | 5.639 | 100-YEAR | 1227.00 | 640.43 | 651.88 | | 651.88 | 0.000013 | 0.57 | 2143.32 | 770.33 | 0.03 |
| MAINSTEM | 5.697 | 10-YEAR | 634.00 | 641.14 | 646.37 | | 646.41 | 0.000289 | 1.55 | 408.83 | 311.74 | 0.14 |
| MAINSTEM | 5.697 | 50-YEAR | 1056.00 | 641.14 | 649.96 | | 649.99 | 0.000090 | 1.34 | 788.12 | 333.27 | 0.09 |
| MAINSTEM | 5.697 | 100-YEAR | 1227.00 | 641.14 | 651.87 | | 651.90 | 0.000057 | 1.24 | 989.95 | 344.73 | 0.07 |
| MAINSTEM | 5.720 | 10-YEAR | 634.00 | 641.44 | 646.35 | | 646.51 | 0.000999 | 3.20 | 197.97 | 161.07 | 0.26 |
| MAINSTEM | 5.720 | 50-YEAR | 1056.00 | 641.44 | 649.91 | | 650.05 | 0.000407 | 3.00 | 351.91 | 188.74 | 0.19 |
| MAINSTEM | 5.720 | 100-YEAR | 1227.00 | 641.44 | 651.82 | | 651.94 | 0.000272 | 2.82 | 434.63 | 203.61 | 0.16 |
| MAINSTEM | 5.725 | 10-YEAR | 634.00 | 641.52 | 646.28 | | 646.59 | 0.001791 | 4.45 | 142.63 | 93.92 | 0.36 |
| MAINSTEM | 5.725 | 50-YEAR | 1056.00 | 641.52 | 649.82 | | 650.10 | 0.000777 | 4.24 | 248.84 | 126.73 | 0.26 |
| MAINSTEM | 5.725 | 100-YEAR | 1227.00 | 641.52 | 651.74 | | 651.99 | 0.000525 | 4.01 | 306.31 | 144.48 | 0.22 |
| MAINSTEM | 5.727 | 10-YEAR | 634.00 | 641.52 | 646.23 | | 646.68 | 0.003344 | 5.38 | 117.80 | 25.00 | 0.44 |
| MAINSTEM | 5.727 | 50-YEAR | 1056.00 | 641.52 | 649.77 | | 650.18 | 0.001669 | 5.12 | 206.14 | 25.00 | 0.31 |
| MAINSTEM | 5.727 | 100-YEAR | 1227.00 | 641.52 | 651.69 | | 652.05 | 0.001202 | 4.83 | 254.12 | 27.98 | 0.27 |

HEC-RAS Plan: Nat - P5,O4,Q5 (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) | |
| MAINSTEM | 5.732 | 10-YEAR | 634.00 | 641.59 | 646.38 | | 646.81 | 0.003878 | 5.29 | 119.74 | 25.00 | 0.43 |
| MAINSTEM | 5.732 | 50-YEAR | 1056.00 | 641.59 | 649.84 | | 650.24 | 0.002242 | 5.12 | 206.18 | 25.00 | 0.31 |
| MAINSTEM | 5.732 | 100-YEAR | 1227.00 | 641.59 | 651.74 | | 652.10 | 0.001699 | 4.84 | 253.74 | 27.64 | 0.27 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 634.00 | 641.81 | 646.81 | 644.45 | 647.18 | 0.003115 | 4.88 | 129.95 | 26.00 | 0.38 |
| MAINSTEM | 5.757 | 50-YEAR | 1056.00 | 641.81 | 650.18 | 645.52 | 650.55 | 0.001947 | 4.85 | 217.65 | 26.00 | 0.30 |
| MAINSTEM | 5.757 | 100-YEAR | 1227.00 | 641.81 | 652.07 | 645.91 | 652.40 | 0.001495 | 4.60 | 266.70 | 26.00 | 0.25 |
| MAINSTEM | 5.759 | 10-YEAR | 634.00 | 641.82 | 647.20 | | 647.22 | 0.000129 | 1.30 | 489.37 | 100.00 | 0.10 |
| MAINSTEM | 5.759 | 50-YEAR | 1056.00 | 641.82 | 650.56 | | 650.59 | 0.000071 | 1.33 | 795.30 | 100.00 | 0.08 |
| MAINSTEM | 5.759 | 100-YEAR | 1227.00 | 641.82 | 652.41 | | 652.43 | 0.000051 | 1.27 | 963.34 | 100.00 | 0.07 |
| MAINSTEM | 5.810 | 10-YEAR | 634.00 | 643.98 | 647.24 | | 647.29 | 0.000620 | 1.95 | 325.50 | 100.00 | 0.19 |
| MAINSTEM | 5.810 | 50-YEAR | 1056.00 | 643.98 | 650.58 | | 650.62 | 0.000177 | 1.60 | 659.72 | 100.00 | 0.11 |
| MAINSTEM | 5.810 | 100-YEAR | 1227.00 | 643.98 | 652.42 | | 652.45 | 0.000110 | 1.45 | 843.86 | 100.00 | 0.09 |
| MAINSTEM | 5.860 | 10-YEAR | 634.00 | 645.81 | 647.64 | 647.64 | 648.57 | 0.019302 | 7.73 | 82.06 | 100.00 | 1.01 |
| MAINSTEM | 5.860 | 50-YEAR | 1056.00 | 645.81 | 650.43 | | 650.83 | 0.002459 | 5.11 | 206.78 | 100.00 | 0.42 |
| MAINSTEM | 5.860 | 100-YEAR | 1227.00 | 645.81 | 652.31 | | 652.58 | 0.001062 | 4.21 | 291.10 | 100.00 | 0.29 |
| MAINSTEM | 5.862 | 10-YEAR | 634.00 | 645.96 | 648.45 | 648.45 | 649.70 | 0.021607 | 9.00 | 70.47 | 28.35 | 1.01 |
| MAINSTEM | 5.862 | 50-YEAR | 1056.00 | 645.96 | 650.19 | | 651.40 | 0.011607 | 8.80 | 120.02 | 28.35 | 0.75 |
| MAINSTEM | 5.862 | 100-YEAR | 1227.00 | 645.96 | 652.14 | | 652.90 | 0.005086 | 7.01 | 175.10 | 28.35 | 0.50 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 634.00 | 647.54 | 651.60 | 649.84 | 651.96 | 0.000320 | 4.85 | 130.71 | 33.00 | 0.42 |
| MAINSTEM | 6.037 | 50-YEAR | 1056.00 | 647.54 | 653.22 | 650.77 | 653.74 | 0.000320 | 5.77 | 183.00 | 33.00 | 0.43 |
| MAINSTEM | 6.037 | 100-YEAR | 1227.00 | 647.54 | 653.90 | 651.10 | 654.46 | 0.000310 | 5.99 | 204.81 | 33.00 | 0.42 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 603.00 | 647.73 | 652.15 | 649.86 | 652.40 | 0.002189 | 4.01 | 150.28 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 50-YEAR | 996.00 | 647.73 | 653.91 | 650.71 | 654.26 | 0.002167 | 4.74 | 210.25 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 100-YEAR | 1156.00 | 647.73 | 654.62 | 651.02 | 655.00 | 0.002121 | 4.94 | 234.15 | 34.00 | 0.33 |
| MAINSTEM | 6.194 | 10-YEAR | 603.00 | 647.75 | 652.41 | | 652.44 | 0.000159 | 1.31 | 461.22 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 50-YEAR | 996.00 | 647.75 | 654.27 | | 654.31 | 0.000142 | 1.54 | 645.30 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 100-YEAR | 1156.00 | 647.75 | 655.00 | | 655.04 | 0.000134 | 1.61 | 717.76 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 10-YEAR | 603.00 | 647.88 | 652.52 | | 652.55 | 0.000178 | 1.30 | 464.06 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 50-YEAR | 996.00 | 647.88 | 654.37 | | 654.41 | 0.000166 | 1.53 | 649.01 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 100-YEAR | 1156.00 | 647.88 | 655.10 | | 655.14 | 0.000160 | 1.60 | 721.72 | 100.00 | 0.11 |
| MAINSTEM | 6.418 | 10-YEAR | 603.00 | 647.88 | 652.61 | | 652.63 | 0.000167 | 1.27 | 472.97 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 50-YEAR | 996.00 | 647.88 | 654.45 | | 654.49 | 0.000159 | 1.52 | 657.40 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 100-YEAR | 1156.00 | 647.88 | 655.18 | | 655.22 | 0.000154 | 1.58 | 729.82 | 100.00 | 0.10 |
| MAINSTEM | 6.471 | 10-YEAR | 603.00 | 647.88 | 652.65 | | 652.73 | 0.000583 | 2.29 | 263.80 | 55.30 | 0.18 |
| MAINSTEM | 6.471 | 50-YEAR | 996.00 | 647.88 | 654.48 | | 654.59 | 0.000581 | 2.73 | 364.71 | 55.30 | 0.19 |
| MAINSTEM | 6.471 | 100-YEAR | 1156.00 | 647.88 | 655.19 | | 655.32 | 0.000571 | 2.86 | 404.33 | 55.30 | 0.19 |
| MAINSTEM | 6.473 | 10-YEAR | 603.00 | 647.91 | 652.61 | | 652.79 | 0.002320 | 3.43 | 175.73 | 40.00 | 0.29 |
| MAINSTEM | 6.473 | 50-YEAR | 996.00 | 647.91 | 654.42 | | 654.67 | 0.002456 | 4.01 | 248.07 | 40.00 | 0.28 |
| MAINSTEM | 6.473 | 100-YEAR | 1156.00 | 647.91 | 655.13 | | 655.40 | 0.002476 | 4.18 | 276.53 | 40.00 | 0.28 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 6.597 | 10-YEAR | 603.00 | 648.23 | 653.04 | 650.28 | 653.12 | 0.000581 | 2.29 | 263.40 | 120.63 | 0.20 |
| MAINSTEM | 6.597 | 50-YEAR | 996.00 | 648.23 | 654.96 | 650.85 | 655.06 | 0.000450 | 2.59 | 384.16 | 1005.08 | 0.19 |
| MAINSTEM | 6.597 | 100-YEAR | 1156.00 | 648.23 | 655.70 | 651.04 | 655.82 | 0.000413 | 2.68 | 431.02 | 1022.24 | 0.18 |
| MAINSTEM | 6.6 | 10-YEAR | 603.00 | 648.30 | 653.04 | | 653.15 | 0.000695 | 2.65 | 227.34 | 199.96 | 0.22 |
| MAINSTEM | 6.6 | 50-YEAR | 996.00 | 648.30 | 654.95 | | 655.09 | 0.000578 | 3.07 | 324.63 | 234.17 | 0.21 |
| MAINSTEM | 6.6 | 100-YEAR | 1156.00 | 648.30 | 655.69 | | 655.85 | 0.000540 | 3.19 | 362.41 | 247.45 | 0.21 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 603.00 | 648.71 | 652.11 | 652.11 | 653.45 | 0.017113 | 9.28 | 64.95 | 219.64 | 0.99 |
| MAINSTEM | 6.635 | 50-YEAR | 996.00 | 648.71 | 654.35 | 653.18 | 655.44 | 0.006269 | 8.40 | 118.62 | 1223.86 | 0.67 |
| MAINSTEM | 6.635 | 100-YEAR | 1156.00 | 648.71 | 655.11 | 653.58 | 656.22 | 0.005239 | 8.44 | 136.89 | 1229.94 | 0.62 |
| MAINSTEM | 6.637 | 10-YEAR | 603.00 | 648.71 | 653.85 | | 653.85 | 0.000148 | 0.47 | 1288.25 | 1208.72 | 0.08 |
| MAINSTEM | 6.637 | 50-YEAR | 996.00 | 648.71 | 655.77 | | 655.77 | 0.000013 | 0.28 | 3643.66 | 1234.59 | 0.03 |
| MAINSTEM | 6.637 | 100-YEAR | 1156.00 | 648.71 | 656.55 | | 656.55 | 0.000008 | 0.26 | 4606.17 | 1240.08 | 0.02 |
| MAINSTEM | 6.639 | 10-YEAR | 603.00 | 649.07 | 653.53 | | 654.18 | 0.012838 | 6.49 | 92.85 | 40.24 | 0.75 |
| MAINSTEM | 6.639 | 50-YEAR | 996.00 | 649.07 | 655.55 | | 656.00 | 0.005186 | 5.35 | 186.16 | 52.10 | 0.50 |
| MAINSTEM | 6.639 | 100-YEAR | 1156.00 | 649.07 | 656.35 | | 656.75 | 0.003949 | 5.03 | 229.90 | 56.81 | 0.44 |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | | |

HEC-RAS Plan: Nat - P5,O4,Q5 (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) | |
| MAINSTEM | 6.642 | 10-YEAR | 603.00 | 649.86 | 654.58 | 653.77 | 655.03 | 0.007925 | 5.39 | 111.84 | 47.66 | 0.62 |
| MAINSTEM | 6.642 | 50-YEAR | 996.00 | 649.86 | 655.99 | 654.62 | 656.42 | 0.005422 | 5.28 | 188.55 | 61.45 | 0.53 |
| MAINSTEM | 6.642 | 100-YEAR | 1156.00 | 649.86 | 656.70 | 654.89 | 657.07 | 0.004106 | 4.93 | 234.58 | 68.58 | 0.47 |
| MAINSTEM | 6.643 | 10-YEAR | 603.00 | 649.86 | 654.72 | | 655.12 | 0.006791 | 5.09 | 118.47 | 48.91 | 0.58 |
| MAINSTEM | 6.643 | 50-YEAR | 996.00 | 649.86 | 656.06 | | 656.48 | 0.005079 | 5.15 | 193.29 | 62.23 | 0.52 |
| MAINSTEM | 6.643 | 100-YEAR | 1156.00 | 649.86 | 656.75 | | 657.12 | 0.003939 | 4.85 | 238.30 | 69.12 | 0.46 |
| MAINSTEM | 6.6435 | 10-YEAR | 603.00 | 649.86 | 655.24 | | 655.24 | 0.000015 | 0.31 | 1967.94 | 613.85 | 0.03 |
| MAINSTEM | 6.6435 | 50-YEAR | 996.00 | 649.86 | 656.60 | | 656.60 | 0.000012 | 0.35 | 2810.00 | 623.44 | 0.03 |
| MAINSTEM | 6.6435 | 100-YEAR | 1156.00 | 649.86 | 657.22 | | 657.23 | 0.000011 | 0.36 | 3200.53 | 627.83 | 0.03 |
| MAINSTEM | 6.644 | 10-YEAR | 603.00 | 650.75 | 655.24 | | 655.24 | 0.000035 | 0.25 | 2386.38 | 752.52 | 0.03 |
| MAINSTEM | 6.644 | 50-YEAR | 996.00 | 650.75 | 656.60 | | 656.60 | 0.000030 | 0.29 | 3419.47 | 765.39 | 0.02 |
| MAINSTEM | 6.644 | 100-YEAR | 1156.00 | 650.75 | 657.23 | | 657.23 | 0.000026 | 0.30 | 3899.03 | 771.29 | 0.02 |
| MAINSTEM | 6.645 | 10-YEAR | 603.00 | 650.30 | 655.25 | | 655.25 | 0.000064 | 0.25 | 2464.97 | 1397.34 | 0.03 |
| MAINSTEM | 6.645 | 50-YEAR | 996.00 | 650.30 | 656.61 | | 656.61 | 0.000028 | 0.23 | 4528.81 | 1640.89 | 0.02 |
| MAINSTEM | 6.645 | 100-YEAR | 1156.00 | 650.30 | 657.23 | | 657.23 | 0.000021 | 0.22 | 5586.57 | 1761.90 | 0.02 |
| SOUTH TRIB | 6.647 | 10-YEAR | 314.00 | 652.50 | 655.21 | 653.55 | 655.29 | 0.001220 | 2.24 | 141.92 | 70.22 | 0.24 |
| SOUTH TRIB | 6.647 | 50-YEAR | 506.00 | 652.50 | 656.56 | 653.95 | 656.65 | 0.000816 | 2.40 | 213.63 | 82.20 | 0.21 |
| SOUTH TRIB | 6.647 | 100-YEAR | 570.00 | 652.50 | 657.19 | 654.06 | 657.27 | 0.000641 | 2.34 | 246.78 | 87.74 | 0.19 |
| SOUTH TRIB | 6.6475 Ramp Q5 | | Culvert | | | | | | | | | |
| SOUTH TRIB | 6.648 | 10-YEAR | 314.00 | 653.00 | 655.41 | 654.05 | 655.51 | 0.001821 | 2.53 | 124.05 | 166.74 | 0.29 |
| SOUTH TRIB | 6.648 | 50-YEAR | 506.00 | 653.00 | 656.74 | 654.45 | 656.85 | 0.001088 | 2.62 | 193.40 | 172.58 | 0.24 |
| SOUTH TRIB | 6.648 | 100-YEAR | 570.00 | 653.00 | 657.45 | 654.56 | 657.54 | 0.000776 | 2.49 | 230.70 | 176.45 | 0.21 |
| SOUTH TRIB | 6.649 | 10-YEAR | 314.00 | 653.50 | 655.62 | 654.98 | 655.67 | 0.002464 | 2.02 | 191.72 | 233.75 | 0.30 |
| SOUTH TRIB | 6.649 | 50-YEAR | 506.00 | 653.50 | 656.89 | 655.18 | 656.91 | 0.000524 | 1.44 | 414.75 | 241.33 | 0.16 |
| SOUTH TRIB | 6.649 | 100-YEAR | 570.00 | 653.50 | 657.56 | 655.23 | 657.58 | 0.000287 | 1.24 | 538.20 | 245.39 | 0.12 |
| SOUTH TRIB | 6.650 | 10-YEAR | 314.00 | 653.50 | 655.74 | 655.37 | 655.91 | 0.007542 | 3.74 | 102.44 | 269.47 | 0.54 |
| SOUTH TRIB | 6.650 | 50-YEAR | 506.00 | 653.50 | 656.88 | 655.66 | 656.98 | 0.002111 | 2.88 | 208.26 | 276.30 | 0.31 |
| SOUTH TRIB | 6.650 | 100-YEAR | 570.00 | 653.50 | 657.55 | 655.72 | 657.63 | 0.001139 | 2.46 | 274.12 | 280.32 | 0.24 |
| SOUTH TRIB | 6.651 | 10-YEAR | 314.00 | 653.50 | 656.23 | 654.99 | 656.27 | 0.001433 | 1.96 | 210.18 | 344.36 | 0.25 |
| SOUTH TRIB | 6.651 | 50-YEAR | 506.00 | 653.50 | 657.10 | 654.99 | 657.14 | 0.000772 | 1.84 | 348.17 | 349.61 | 0.19 |
| SOUTH TRIB | 6.651 | 100-YEAR | 570.00 | 653.50 | 657.69 | 654.99 | 657.71 | 0.000458 | 1.60 | 443.34 | 353.12 | 0.15 |
| SOUTH TRIB | 6.652 | 10-YEAR | 314.00 | 653.50 | 656.42 | 654.99 | 656.44 | 0.000559 | 1.30 | 328.34 | 287.52 | 0.16 |
| SOUTH TRIB | 6.652 | 50-YEAR | 506.00 | 653.50 | 657.22 | 654.99 | 657.24 | 0.000356 | 1.28 | 512.64 | 292.32 | 0.13 |
| SOUTH TRIB | 6.652 | 100-YEAR | 570.00 | 653.50 | 657.76 | 654.99 | 657.78 | 0.000223 | 1.14 | 639.57 | 295.58 | 0.11 |
| SOUTH TRIB | 6.653 | 10-YEAR | 314.00 | 653.50 | 656.48 | | 656.52 | 0.000695 | 1.80 | 192.76 | 77.87 | 0.18 |
| SOUTH TRIB | 6.653 | 50-YEAR | 506.00 | 653.50 | 657.25 | | 657.32 | 0.000779 | 2.22 | 254.61 | 82.49 | 0.20 |
| SOUTH TRIB | 6.653 | 100-YEAR | 570.00 | 653.50 | 657.77 | | 657.84 | 0.000613 | 2.15 | 298.61 | 85.64 | 0.18 |
| SOUTH TRIB | 6.655 | 10-YEAR | 314.00 | 654.50 | 656.91 | | 656.95 | 0.000971 | 1.85 | 207.60 | 122.29 | 0.21 |
| SOUTH TRIB | 6.655 | 50-YEAR | 506.00 | 654.50 | 657.69 | | 657.74 | 0.000817 | 2.04 | 311.57 | 142.26 | 0.20 |
| SOUTH TRIB | 6.655 | 100-YEAR | 570.00 | 654.50 | 658.12 | | 658.16 | 0.000610 | 1.92 | 373.48 | 147.39 | 0.18 |
| SOUTH TRIB | 6.656 | 10-YEAR | 314.00 | 655.00 | 657.18 | 657.18 | 657.61 | 0.018976 | 5.76 | 66.26 | 190.07 | 0.85 |
| SOUTH TRIB | 6.656 | 50-YEAR | 506.00 | 655.00 | 657.76 | 657.51 | 658.16 | 0.011610 | 5.65 | 106.90 | 266.57 | 0.70 |
| SOUTH TRIB | 6.656 | 100-YEAR | 570.00 | 655.00 | 658.16 | 657.61 | 658.47 | 0.007064 | 4.97 | 134.83 | 268.96 | 0.56 |
| SOUTH TRIB | 6.657 | 10-YEAR | 314.00 | 655.00 | 658.08 | 657.15 | 658.12 | 0.001089 | 1.91 | 224.30 | 323.48 | 0.22 |
| SOUTH TRIB | 6.657 | 50-YEAR | 506.00 | 655.00 | 658.58 | 657.42 | 658.63 | 0.001145 | 2.23 | 298.60 | 326.45 | 0.23 |
| SOUTH TRIB | 6.657 | 100-YEAR | 570.00 | 655.00 | 658.80 | 657.49 | 658.85 | 0.001035 | 2.23 | 331.88 | 327.78 | 0.22 |
| SOUTH TRIB | 6.658 | 10-YEAR | 314.00 | 655.00 | 658.19 | 657.16 | 658.21 | 0.000623 | 1.49 | 298.34 | 314.16 | 0.17 |
| SOUTH TRIB | 6.658 | 50-YEAR | 506.00 | 655.00 | 658.70 | 657.37 | 658.73 | 0.000649 | 1.72 | 398.57 | 317.20 | 0.18 |
| SOUTH TRIB | 6.658 | 100-YEAR | 570.00 | 655.00 | 658.91 | 657.43 | 658.94 | 0.000596 | 1.73 | 440.94 | 318.48 | 0.17 |
| SOUTH TRIB | 7.12 | 10-YEAR | 287.00 | 655.00 | 658.26 | 656.16 | 658.33 | 0.000923 | 2.20 | 130.22 | 54.53 | 0.22 |
| SOUTH TRIB | 7.12 | 50-YEAR | 461.00 | 655.00 | 658.75 | 656.61 | 658.90 | 0.001484 | 3.07 | 150.08 | 57.51 | 0.28 |
| SOUTH TRIB | 7.12 | 100-YEAR | 517.00 | 655.00 | 658.95 | 656.73 | 659.12 | 0.001570 | 3.27 | 158.07 | 58.71 | 0.29 |
| SOUTH TRIB | 7.16 Ramps P1, P2, P8 | | Culvert | | | | | | | | | |
| SOUTH TRIB | 7.21 | 10-YEAR | 287.00 | 656.10 | 658.83 | 657.83 | 659.07 | 0.005000 | 4.00 | 72.57 | 51.25 | 0.46 |
| SOUTH TRIB | 7.21 | 50-YEAR | 461.00 | 656.10 | 659.64 | 658.42 | 659.98 | 0.004830 | 4.67 | 99.96 | 76.50 | 0.47 |
| SOUTH TRIB | 7.21 | 100-YEAR | 517.00 | 656.10 | 659.91 | 658.57 | 660.26 | 0.004643 | 4.80 | 109.04 | 79.22 | 0.47 |
| SOUTH TRIB | 7.22 | 10-YEAR | 287.00 | 656.50 | 659.39 | 659.39 | 659.91 | 0.018953 | 6.86 | 58.25 | 56.49 | 0.86 |
| SOUTH TRIB | 7.22 | 50-YEAR | 461.00 | 656.50 | 659.95 | | 660.44 | 0.014951 | 6.93 | 95.15 | 73.76 | 0.79 |
| SOUTH TRIB | 7.22 | 100-YEAR | 517.00 | 656.50 | 660.25 | | 660.62 | 0.010631 | 6.18 | 117.91 | 78.93 | 0.67 |
| SOUTH TRIB | 7.247 | 10-YEAR | 287.00 | 656.80 | 660.64 | | 660.72 | 0.002412 | 2.83 | 133.91 | 79.19 | 0.31 |
| SOUTH TRIB | 7.247 | 50-YEAR | 461.00 | 656.80 | 661.15 | | 661.26 | 0.002774 | 3.29 | 174.32 | 81.69 | 0.34 |
| SOUTH TRIB | 7.247 | 100-YEAR | 517.00 | 656.80 | 661.26 | | 661.39 | 0.002985 | 3.47 | 183.40 | 82.24 | 0.35 |

HEC-RAS Plan: Nat - P5,O4,Q5 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.259 | 10-YEAR | 287.00 | 657.00 | 660.79 | | 660.85 | 0.001940 | 2.52 | 144.94 | 80.71 | 0.28 |
| SOUTH TRIB | 7.259 | 50-YEAR | 461.00 | 657.00 | 661.31 | | 661.41 | 0.002234 | 2.95 | 188.11 | 83.24 | 0.30 |
| SOUTH TRIB | 7.259 | 100-YEAR | 517.00 | 657.00 | 661.44 | | 661.55 | 0.002380 | 3.10 | 198.49 | 83.84 | 0.32 |
| SOUTH TRIB | 7.265 | 10-YEAR | 287.00 | 657.38 | 660.68 | | 661.05 | 0.006967 | 5.33 | 72.58 | 59.65 | 0.54 |
| SOUTH TRIB | 7.265 | 50-YEAR | 461.00 | 657.38 | 661.19 | | 661.64 | 0.007696 | 6.21 | 103.61 | 62.65 | 0.58 |
| SOUTH TRIB | 7.265 | 100-YEAR | 517.00 | 657.38 | 661.30 | | 661.79 | 0.008148 | 6.52 | 110.78 | 63.32 | 0.60 |
| SOUTH TRIB | 7.289 | 10-YEAR | 287.00 | 657.30 | 661.50 | | 661.70 | 0.003657 | 4.05 | 84.90 | 35.69 | 0.40 |
| SOUTH TRIB | 7.289 | 50-YEAR | 461.00 | 657.30 | 662.12 | | 662.43 | 0.004944 | 5.08 | 108.46 | 39.95 | 0.47 |
| SOUTH TRIB | 7.289 | 100-YEAR | 517.00 | 657.30 | 662.29 | | 662.63 | 0.005290 | 5.36 | 115.31 | 41.11 | 0.49 |
| SOUTH TRIB | 7.314 | 10-YEAR | 287.00 | 657.10 | 661.91 | | 662.00 | 0.001518 | 2.75 | 125.57 | 47.48 | 0.26 |
| SOUTH TRIB | 7.314 | 50-YEAR | 461.00 | 657.10 | 662.69 | | 662.82 | 0.001873 | 3.32 | 164.90 | 53.28 | 0.29 |
| SOUTH TRIB | 7.314 | 100-YEAR | 517.00 | 657.10 | 662.91 | | 663.05 | 0.001962 | 3.47 | 176.45 | 54.86 | 0.30 |
| SOUTH TRIB | 7.331 | 10-YEAR | 287.00 | 657.60 | 662.09 | | 662.44 | 0.007200 | 5.20 | 62.00 | 26.13 | 0.55 |
| SOUTH TRIB | 7.331 | 50-YEAR | 461.00 | 657.60 | 662.87 | | 663.36 | 0.008291 | 6.12 | 84.20 | 30.41 | 0.61 |
| SOUTH TRIB | 7.331 | 100-YEAR | 517.00 | 657.60 | 663.09 | | 663.61 | 0.008551 | 6.36 | 90.78 | 31.57 | 0.62 |
| SOUTH TRIB | 7.35 | 10-YEAR | 287.00 | 658.10 | 662.72 | | 662.91 | 0.002898 | 3.84 | 86.24 | 30.86 | 0.36 |
| SOUTH TRIB | 7.35 | 50-YEAR | 461.00 | 658.10 | 663.65 | | 663.91 | 0.003349 | 4.55 | 117.00 | 35.66 | 0.40 |
| SOUTH TRIB | 7.35 | 100-YEAR | 517.00 | 658.10 | 663.90 | | 664.18 | 0.003462 | 4.74 | 126.05 | 36.96 | 0.41 |
| SOUTH TRIB | 7.391 | 10-YEAR | 287.00 | 658.50 | 663.29 | | 663.44 | 0.002089 | 3.42 | 96.35 | 31.68 | 0.31 |
| SOUTH TRIB | 7.391 | 50-YEAR | 461.00 | 658.50 | 664.31 | | 664.52 | 0.002383 | 4.04 | 131.14 | 36.56 | 0.34 |
| SOUTH TRIB | 7.391 | 100-YEAR | 517.00 | 658.50 | 664.58 | | 664.81 | 0.002460 | 4.21 | 141.34 | 37.87 | 0.34 |
| SOUTH TRIB | 7.399 | 10-YEAR | 287.00 | 657.49 | 663.34 | 660.52 | 663.52 | 0.001317 | 3.66 | 95.62 | 24.71 | 0.28 |
| SOUTH TRIB | 7.399 | 50-YEAR | 461.00 | 657.49 | 664.34 | 661.40 | 664.63 | 0.001774 | 4.75 | 121.57 | 177.78 | 0.33 |
| SOUTH TRIB | 7.399 | 100-YEAR | 517.00 | 657.49 | 664.60 | 661.65 | 664.93 | 0.001906 | 5.06 | 128.89 | 596.90 | 0.35 |
| SOUTH TRIB | 7.406 | 10-YEAR | 287.00 | 658.60 | 663.36 | | 663.60 | 0.002176 | 4.36 | 83.53 | 25.08 | 0.35 |
| SOUTH TRIB | 7.406 | 50-YEAR | 461.00 | 658.60 | 664.37 | | 664.73 | 0.002637 | 5.46 | 110.49 | 28.28 | 0.40 |
| SOUTH TRIB | 7.406 | 100-YEAR | 517.00 | 658.60 | 664.64 | | 665.03 | 0.002758 | 5.75 | 118.23 | 28.89 | 0.41 |
| SOUTH TRIB | 7.431 | 10-YEAR | 287.00 | 659.00 | 663.64 | | 664.02 | 0.004181 | 5.65 | 66.60 | 23.78 | 0.48 |
| SOUTH TRIB | 7.431 | 50-YEAR | 461.00 | 659.00 | 664.70 | | 665.21 | 0.004367 | 6.68 | 94.17 | 28.17 | 0.51 |
| SOUTH TRIB | 7.431 | 100-YEAR | 517.00 | 659.00 | 664.99 | | 665.53 | 0.004423 | 6.96 | 102.36 | 29.35 | 0.51 |
| SOUTH TRIB | 7.447 | 10-YEAR | 287.00 | 658.10 | 663.98 | | 664.10 | 0.001200 | 3.28 | 112.76 | 31.45 | 0.26 |
| SOUTH TRIB | 7.447 | 50-YEAR | 461.00 | 658.10 | 665.12 | | 665.30 | 0.001400 | 4.07 | 151.07 | 35.68 | 0.29 |
| SOUTH TRIB | 7.447 | 100-YEAR | 517.00 | 658.10 | 665.41 | | 665.62 | 0.001600 | 4.48 | 162.11 | 48.24 | 0.31 |
| SOUTH TRIB | 7.456 | 10-YEAR | 261.00 | 658.10 | 664.04 | 660.99 | 664.14 | 0.000881 | 2.84 | 110.29 | 31.68 | 0.22 |
| SOUTH TRIB | 7.456 | 50-YEAR | 418.00 | 658.10 | 665.21 | 661.71 | 665.34 | 0.001091 | 3.62 | 154.07 | 35.99 | 0.26 |
| SOUTH TRIB | 7.456 | 100-YEAR | 468.00 | 658.10 | 665.50 | 661.91 | 665.67 | 0.001270 | 4.03 | 167.12 | 58.34 | 0.28 |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 261.00 | 658.10 | 664.80 | 660.99 | 664.87 | 0.000518 | 2.38 | 129.91 | 34.47 | 0.17 |
| SOUTH TRIB | 7.47 | 50-YEAR | 418.00 | 658.10 | 666.67 | 661.70 | 666.74 | 0.000609 | 3.12 | 360.27 | 292.95 | 0.20 |
| SOUTH TRIB | 7.47 | 100-YEAR | 468.00 | 658.10 | 666.84 | 661.90 | 666.91 | 0.000598 | 3.14 | 415.85 | 332.28 | 0.20 |
| SOUTH TRIB | 7.486 | 10-YEAR | 261.00 | 655.06 | 664.87 | | 664.87 | 0.000006 | 0.38 | 1050.48 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 50-YEAR | 418.00 | 655.06 | 666.75 | | 666.75 | 0.000006 | 0.43 | 1440.95 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 100-YEAR | 468.00 | 655.06 | 666.92 | | 666.92 | 0.000007 | 0.47 | 1476.97 | 208.30 | 0.02 |
| SOUTH TRIB | 7.493 | 10-YEAR | 261.00 | 655.05 | 664.87 | | 664.87 | 0.000001 | 0.11 | 4656.86 | 1491.34 | 0.01 |
| SOUTH TRIB | 7.493 | 50-YEAR | 418.00 | 655.05 | 666.75 | | 666.75 | 0.000000 | 0.09 | 7555.03 | 1584.75 | 0.01 |
| SOUTH TRIB | 7.493 | 100-YEAR | 468.00 | 655.05 | 666.92 | | 666.92 | 0.000000 | 0.10 | 7830.30 | 1592.47 | 0.01 |

HEC-RAS Plan: Nat - P5,O4,Q5

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 4.518 | 10-YEAR | 644.73 | 644.69 | 0.04 | 0.05 | 0.01 | 11.61 | 870.78 | 11.61 | 68.69 |
| MAINSTEM | 4.518 | 50-YEAR | 646.41 | 646.33 | 0.08 | 0.06 | 0.01 | 22.42 | 1414.15 | 22.42 | 70.33 |
| MAINSTEM | 4.518 | 100-YEAR | 647.00 | 646.91 | 0.09 | 0.06 | 0.01 | 27.25 | 1627.50 | 27.25 | 70.91 |
| | | | | | | | | | | | |
| MAINSTEM | 4.594 | 10-YEAR | 644.77 | 644.73 | 0.04 | 0.04 | 0.00 | 11.67 | 870.66 | 11.67 | 68.73 |
| MAINSTEM | 4.594 | 50-YEAR | 646.48 | 646.40 | 0.08 | 0.07 | 0.00 | 22.57 | 1413.87 | 22.57 | 70.40 |
| MAINSTEM | 4.594 | 100-YEAR | 647.07 | 646.98 | 0.09 | 0.07 | 0.00 | 27.43 | 1627.14 | 27.43 | 70.98 |
| | | | | | | | | | | | |
| MAINSTEM | 4.675 | 10-YEAR | 644.82 | 644.78 | 0.04 | 0.05 | 0.00 | 11.67 | 870.65 | 11.67 | 68.72 |
| MAINSTEM | 4.675 | 50-YEAR | 646.55 | 646.47 | 0.08 | 0.07 | 0.00 | 22.64 | 1413.71 | 22.64 | 70.41 |
| MAINSTEM | 4.675 | 100-YEAR | 647.15 | 647.06 | 0.09 | 0.08 | 0.00 | 27.55 | 1626.91 | 27.55 | 71.01 |
| | | | | | | | | | | | |
| MAINSTEM | 4.773 | 10-YEAR | 644.88 | 644.84 | 0.03 | 0.05 | 0.00 | 10.26 | 764.66 | 9.07 | 68.37 |
| MAINSTEM | 4.773 | 50-YEAR | 646.62 | 646.57 | 0.06 | 0.07 | 0.00 | 19.17 | 1190.88 | 16.95 | 70.04 |
| MAINSTEM | 4.773 | 100-YEAR | 647.24 | 647.17 | 0.07 | 0.08 | 0.00 | 24.25 | 1423.32 | 21.43 | 70.63 |
| | | | | | | | | | | | |
| MAINSTEM | 4.790 | 10-YEAR | 644.93 | 644.81 | 0.12 | 0.01 | 0.04 | | 784.00 | | 68.35 |
| MAINSTEM | 4.790 | 50-YEAR | 646.71 | 646.51 | 0.20 | 0.02 | 0.07 | | 1227.00 | | 69.99 |
| MAINSTEM | 4.790 | 100-YEAR | 647.35 | 647.09 | 0.26 | 0.02 | 0.09 | | 1469.00 | | 70.56 |
| | | | | | | | | | | | |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 645.42 | 645.28 | 0.15 | | | | 784.00 | | 65.50 |
| MAINSTEM | 5.059 | 50-YEAR | 647.81 | 647.60 | 0.21 | | | | 1227.00 | | 67.78 |
| MAINSTEM | 5.059 | 100-YEAR | 648.96 | 648.71 | 0.25 | | | | 1469.00 | | 68.88 |
| | | | | | | | | | | | |
| MAINSTEM | 5.076 | 10-YEAR | 645.46 | 645.41 | 0.05 | 0.03 | 0.01 | | 784.00 | | 65.48 |
| MAINSTEM | 5.076 | 50-YEAR | 647.85 | 647.79 | 0.07 | 0.03 | 0.01 | | 1227.00 | | 67.85 |
| MAINSTEM | 5.076 | 100-YEAR | 649.00 | 648.93 | 0.07 | 0.03 | 0.02 | | 1469.00 | | 68.98 |
| | | | | | | | | | | | |
| MAINSTEM | 5.104 | 10-YEAR | 645.51 | 645.41 | 0.10 | 0.03 | 0.02 | | 784.00 | | 65.32 |
| MAINSTEM | 5.104 | 50-YEAR | 647.90 | 647.76 | 0.14 | 0.03 | 0.02 | | 1227.00 | | 67.69 |
| MAINSTEM | 5.104 | 100-YEAR | 649.06 | 648.90 | 0.16 | 0.03 | 0.03 | | 1469.00 | | 68.83 |
| | | | | | | | | | | | |
| MAINSTEM | 5.109 | 10-YEAR | 645.54 | 645.37 | 0.17 | 0.01 | 0.02 | | 784.00 | | 65.24 |
| MAINSTEM | 5.109 | 50-YEAR | 647.94 | 647.71 | 0.24 | 0.01 | 0.03 | | 1227.00 | | 67.60 |
| MAINSTEM | 5.109 | 100-YEAR | 649.10 | 648.83 | 0.27 | 0.01 | 0.03 | | 1469.00 | | 68.73 |
| | | | | | | | | | | | |
| MAINSTEM | 5.110 | 10-YEAR | 645.56 | 645.33 | 0.23 | 0.00 | 0.02 | | 784.00 | | 44.59 |
| MAINSTEM | 5.110 | 50-YEAR | 647.98 | 647.64 | 0.34 | 0.00 | 0.03 | | 1227.00 | | 50.16 |
| MAINSTEM | 5.110 | 100-YEAR | 649.14 | 648.75 | 0.40 | 0.00 | 0.04 | | 1469.00 | | 52.83 |
| | | | | | | | | | | | |
| MAINSTEM | 5.116 | 10-YEAR | 645.57 | 645.33 | 0.24 | 0.01 | 0.00 | | 784.00 | | 25.00 |
| MAINSTEM | 5.116 | 50-YEAR | 647.99 | 647.64 | 0.35 | 0.01 | 0.01 | 0.02 | 1226.96 | 0.02 | 26.44 |
| MAINSTEM | 5.116 | 100-YEAR | 649.16 | 648.75 | 0.41 | 0.01 | 0.01 | 0.25 | 1468.50 | 0.25 | 31.23 |
| | | | | | | | | | | | |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 646.33 | 646.04 | 0.29 | | | | 634.00 | | 25.50 |
| MAINSTEM | 5.606 | 50-YEAR | 649.94 | 649.63 | 0.30 | | | | 1056.00 | | 57.44 |
| MAINSTEM | 5.606 | 100-YEAR | 651.85 | 651.57 | 0.28 | | | | 1227.00 | | 80.97 |
| | | | | | | | | | | | |
| MAINSTEM | 5.610 | 10-YEAR | 646.36 | 646.34 | 0.02 | 0.00 | 0.03 | | 634.00 | | 125.36 |
| MAINSTEM | 5.610 | 50-YEAR | 649.97 | 649.95 | 0.02 | 0.00 | 0.03 | | 1056.00 | | 145.88 |
| MAINSTEM | 5.610 | 100-YEAR | 651.88 | 651.86 | 0.02 | 0.00 | 0.03 | | 1227.00 | | 156.76 |
| | | | | | | | | | | | |
| MAINSTEM | 5.629 | 10-YEAR | 646.36 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 215.49 |
| MAINSTEM | 5.629 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 237.14 |
| MAINSTEM | 5.629 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 248.61 |
| | | | | | | | | | | | |
| MAINSTEM | 5.632 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 411.47 |
| MAINSTEM | 5.632 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 433.12 |
| MAINSTEM | 5.632 | 100-YEAR | 651.88 | 651.88 | 0.00 | 0.00 | 0.00 | | 1227.00 | | 444.58 |
| | | | | | | | | | | | |
| MAINSTEM | 5.639 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 737.22 |
| MAINSTEM | 5.639 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 758.86 |
| MAINSTEM | 5.639 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 770.33 |
| | | | | | | | | | | | |
| MAINSTEM | 5.697 | 10-YEAR | 646.41 | 646.37 | 0.04 | 0.03 | 0.01 | | 634.00 | | 311.74 |
| MAINSTEM | 5.697 | 50-YEAR | 649.99 | 649.96 | 0.03 | 0.01 | 0.01 | | 1056.00 | | 333.27 |
| MAINSTEM | 5.697 | 100-YEAR | 651.90 | 651.87 | 0.02 | 0.01 | 0.01 | | 1227.00 | | 344.73 |
| | | | | | | | | | | | |
| MAINSTEM | 5.720 | 10-YEAR | 646.51 | 646.35 | 0.16 | 0.06 | 0.04 | | 634.00 | | 161.07 |
| MAINSTEM | 5.720 | 50-YEAR | 650.05 | 649.91 | 0.14 | 0.02 | 0.03 | | 1056.00 | | 188.74 |
| MAINSTEM | 5.720 | 100-YEAR | 651.94 | 651.82 | 0.12 | 0.01 | 0.03 | | 1227.00 | | 203.61 |
| | | | | | | | | | | | |
| MAINSTEM | 5.725 | 10-YEAR | 646.59 | 646.28 | 0.31 | 0.03 | 0.04 | | 634.00 | | 93.92 |
| MAINSTEM | 5.725 | 50-YEAR | 650.10 | 649.82 | 0.28 | 0.01 | 0.04 | | 1056.00 | | 126.73 |
| MAINSTEM | 5.725 | 100-YEAR | 651.99 | 651.74 | 0.25 | 0.01 | 0.04 | | 1227.00 | | 144.48 |

HEC-RAS Plan: Nat - P5,O4,Q5 (Continued)

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 5.727 | 10-YEAR | 646.68 | 646.23 | 0.45 | 0.02 | 0.07 | | 634.00 | | 25.00 |
| MAINSTEM | 5.727 | 50-YEAR | 650.18 | 649.77 | 0.41 | 0.01 | 0.06 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.727 | 100-YEAR | 652.05 | 651.69 | 0.36 | 0.01 | 0.06 | | 1227.00 | | 27.98 |
| MAINSTEM | 5.732 | 10-YEAR | 646.81 | 646.38 | 0.44 | 0.13 | 0.00 | | 634.00 | | 25.00 |
| MAINSTEM | 5.732 | 50-YEAR | 650.24 | 649.84 | 0.41 | 0.07 | 0.00 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.732 | 100-YEAR | 652.10 | 651.74 | 0.36 | 0.05 | 0.00 | | 1227.00 | | 27.64 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 647.18 | 646.81 | 0.37 | | | | 634.00 | | 26.00 |
| MAINSTEM | 5.757 | 50-YEAR | 650.55 | 650.18 | 0.37 | | | | 1056.00 | | 26.00 |
| MAINSTEM | 5.757 | 100-YEAR | 652.40 | 652.07 | 0.33 | | | | 1227.00 | | 26.00 |
| MAINSTEM | 5.759 | 10-YEAR | 647.22 | 647.20 | 0.03 | 0.01 | 0.03 | | 634.00 | | 100.00 |
| MAINSTEM | 5.759 | 50-YEAR | 650.59 | 650.56 | 0.03 | 0.01 | 0.03 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.759 | 100-YEAR | 652.43 | 652.41 | 0.03 | 0.00 | 0.03 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.810 | 10-YEAR | 647.29 | 647.24 | 0.06 | 0.06 | 0.01 | | 634.00 | | 100.00 |
| MAINSTEM | 5.810 | 50-YEAR | 650.62 | 650.58 | 0.04 | 0.03 | 0.00 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.810 | 100-YEAR | 652.45 | 652.42 | 0.03 | 0.02 | 0.00 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.860 | 10-YEAR | 648.57 | 647.64 | 0.93 | 0.42 | 0.26 | | 634.00 | | 100.00 |
| MAINSTEM | 5.860 | 50-YEAR | 650.83 | 650.43 | 0.40 | 0.10 | 0.11 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.860 | 100-YEAR | 652.58 | 652.31 | 0.28 | 0.06 | 0.07 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.862 | 10-YEAR | 649.70 | 648.45 | 1.26 | 0.73 | 0.16 | | 634.00 | | 28.35 |
| MAINSTEM | 5.862 | 50-YEAR | 651.40 | 650.19 | 1.20 | 0.17 | 0.40 | | 1056.00 | | 28.35 |
| MAINSTEM | 5.862 | 100-YEAR | 652.90 | 652.14 | 0.76 | 0.07 | 0.24 | | 1227.00 | | 28.35 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 651.96 | 651.60 | 0.37 | | | | 634.00 | | 33.00 |
| MAINSTEM | 6.037 | 50-YEAR | 653.74 | 653.22 | 0.52 | | | | 1056.00 | | 33.00 |
| MAINSTEM | 6.037 | 100-YEAR | 654.46 | 653.90 | 0.56 | | | | 1227.00 | | 33.00 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 652.40 | 652.15 | 0.25 | | | | 603.00 | | 34.00 |
| MAINSTEM | 6.190 | 50-YEAR | 654.26 | 653.91 | 0.35 | | | | 996.00 | | 34.00 |
| MAINSTEM | 6.190 | 100-YEAR | 655.00 | 654.62 | 0.38 | | | | 1156.00 | | 34.00 |
| MAINSTEM | 6.194 | 10-YEAR | 652.44 | 652.41 | 0.03 | 0.01 | 0.02 | | 603.00 | | 100.00 |
| MAINSTEM | 6.194 | 50-YEAR | 654.31 | 654.27 | 0.04 | 0.01 | 0.03 | | 996.00 | | 100.00 |
| MAINSTEM | 6.194 | 100-YEAR | 655.04 | 655.00 | 0.04 | 0.01 | 0.03 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.332 | 10-YEAR | 652.55 | 652.52 | 0.03 | 0.11 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.332 | 50-YEAR | 654.41 | 654.37 | 0.04 | 0.10 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.332 | 100-YEAR | 655.14 | 655.10 | 0.04 | 0.10 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.418 | 10-YEAR | 652.63 | 652.61 | 0.03 | 0.09 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.418 | 50-YEAR | 654.49 | 654.45 | 0.04 | 0.08 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.418 | 100-YEAR | 655.22 | 655.18 | 0.04 | 0.08 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.471 | 10-YEAR | 652.73 | 652.65 | 0.08 | 0.08 | 0.02 | | 603.00 | | 55.30 |
| MAINSTEM | 6.471 | 50-YEAR | 654.59 | 654.48 | 0.12 | 0.08 | 0.02 | | 996.00 | | 55.30 |
| MAINSTEM | 6.471 | 100-YEAR | 655.32 | 655.19 | 0.13 | 0.07 | 0.03 | | 1156.00 | | 55.30 |
| MAINSTEM | 6.473 | 10-YEAR | 652.79 | 652.61 | 0.18 | 0.01 | 0.05 | | 603.00 | | 40.00 |
| MAINSTEM | 6.473 | 50-YEAR | 654.67 | 654.42 | 0.25 | 0.01 | 0.07 | | 996.00 | | 40.00 |
| MAINSTEM | 6.473 | 100-YEAR | 655.40 | 655.13 | 0.27 | 0.01 | 0.07 | | 1156.00 | | 40.00 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | |
| MAINSTEM | 6.597 | 10-YEAR | 653.12 | 653.04 | 0.08 | | | | 603.00 | | 120.63 |
| MAINSTEM | 6.597 | 50-YEAR | 655.06 | 654.96 | 0.10 | | | | 996.00 | | 1005.08 |
| MAINSTEM | 6.597 | 100-YEAR | 655.82 | 655.70 | 0.11 | | | | 1156.00 | | 1022.24 |
| MAINSTEM | 6.6 | 10-YEAR | 653.15 | 653.04 | 0.11 | 0.01 | 0.01 | | 603.00 | | 199.96 |
| MAINSTEM | 6.6 | 50-YEAR | 655.09 | 654.95 | 0.15 | 0.01 | 0.02 | | 996.00 | | 234.17 |
| MAINSTEM | 6.6 | 100-YEAR | 655.85 | 655.69 | 0.16 | 0.01 | 0.02 | | 1156.00 | | 247.45 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 653.45 | 652.11 | 1.34 | | | | 603.00 | | 219.64 |
| MAINSTEM | 6.635 | 50-YEAR | 655.44 | 654.35 | 1.09 | | | | 996.00 | | 1223.86 |
| MAINSTEM | 6.635 | 100-YEAR | 656.22 | 655.11 | 1.11 | | | | 1156.00 | | 1229.94 |

HEC-RAS Plan: Nat - P5,O4,Q5 (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 6.637 | 10-YEAR | 653.85 | 653.85 | 0.00 | 0.00 | 0.40 | 5.04 | 597.62 | 0.34 | 1208.72 |
| MAINSTEM | 6.637 | 50-YEAR | 655.77 | 655.77 | 0.00 | 0.00 | 0.33 | 15.52 | 979.22 | 1.26 | 1234.59 |
| MAINSTEM | 6.637 | 100-YEAR | 656.55 | 656.55 | 0.00 | 0.00 | 0.33 | 19.84 | 1134.37 | 1.79 | 1240.08 |
| | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 654.18 | 653.53 | 0.65 | 0.00 | 0.33 | | 603.00 | | 40.24 |
| MAINSTEM | 6.639 | 50-YEAR | 656.00 | 655.55 | 0.44 | 0.00 | 0.22 | | 996.00 | | 52.10 |
| MAINSTEM | 6.639 | 100-YEAR | 656.75 | 656.35 | 0.39 | 0.00 | 0.20 | | 1156.00 | | 56.81 |
| | | | | | | | | | | | |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 655.03 | 654.58 | 0.45 | 0.01 | 0.00 | | 603.00 | | 47.66 |
| MAINSTEM | 6.642 | 50-YEAR | 656.42 | 655.99 | 0.43 | 0.01 | 0.00 | | 996.00 | | 61.45 |
| MAINSTEM | 6.642 | 100-YEAR | 657.07 | 656.70 | 0.38 | 0.00 | 0.00 | | 1156.00 | | 68.58 |
| | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 655.12 | 654.72 | 0.40 | 0.07 | 0.01 | | 603.00 | | 48.91 |
| MAINSTEM | 6.643 | 50-YEAR | 656.48 | 656.06 | 0.41 | 0.05 | 0.01 | | 996.00 | | 62.23 |
| MAINSTEM | 6.643 | 100-YEAR | 657.12 | 656.75 | 0.37 | 0.04 | 0.00 | | 1156.00 | | 69.12 |
| | | | | | | | | | | | |
| MAINSTEM | 6.6435 | 10-YEAR | 655.24 | 655.24 | 0.00 | 0.00 | 0.12 | | 603.00 | | 613.85 |
| MAINSTEM | 6.6435 | 50-YEAR | 656.60 | 656.60 | 0.00 | 0.00 | 0.12 | | 996.00 | | 623.44 |
| MAINSTEM | 6.6435 | 100-YEAR | 657.23 | 657.22 | 0.00 | 0.00 | 0.11 | | 1156.00 | | 627.83 |
| | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 655.24 | 655.24 | 0.00 | 0.00 | 0.00 | | 603.00 | | 752.52 |
| MAINSTEM | 6.644 | 50-YEAR | 656.60 | 656.60 | 0.00 | 0.00 | 0.00 | | 996.00 | | 765.39 |
| MAINSTEM | 6.644 | 100-YEAR | 657.23 | 657.23 | 0.00 | 0.00 | 0.00 | | 1156.00 | | 771.29 |
| | | | | | | | | | | | |
| MAINSTEM | 6.645 | 10-YEAR | 655.25 | 655.25 | 0.00 | 0.01 | 0.00 | 0.11 | 578.57 | 24.32 | 1397.34 |
| MAINSTEM | 6.645 | 50-YEAR | 656.61 | 656.61 | 0.00 | 0.01 | 0.00 | 10.16 | 891.27 | 94.58 | 1640.89 |
| MAINSTEM | 6.645 | 100-YEAR | 657.23 | 657.23 | 0.00 | 0.00 | 0.00 | 20.89 | 1005.68 | 129.43 | 1761.90 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.647 | 10-YEAR | 655.29 | 655.21 | 0.08 | 0.00 | 0.04 | 7.55 | 303.95 | 2.50 | 70.22 |
| SOUTH TRIB | 6.647 | 50-YEAR | 656.65 | 656.56 | 0.09 | 0.00 | 0.04 | 12.43 | 488.03 | 5.54 | 82.20 |
| SOUTH TRIB | 6.647 | 100-YEAR | 657.27 | 657.19 | 0.08 | 0.00 | 0.04 | 14.08 | 549.19 | 6.73 | 87.74 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.6475 Ramp Q5 | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.648 | 10-YEAR | 655.51 | 655.41 | 0.10 | | | | 314.00 | 0.00 | 166.74 |
| SOUTH TRIB | 6.648 | 50-YEAR | 656.85 | 656.74 | 0.11 | | | | 505.81 | 0.19 | 172.58 |
| SOUTH TRIB | 6.648 | 100-YEAR | 657.54 | 657.45 | 0.10 | | | | 569.24 | 0.76 | 176.45 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.649 | 10-YEAR | 655.67 | 655.62 | 0.04 | 0.15 | 0.01 | 230.33 | 83.28 | 0.38 | 233.75 |
| SOUTH TRIB | 6.649 | 50-YEAR | 656.91 | 656.89 | 0.02 | 0.05 | 0.01 | 388.83 | 113.79 | 3.38 | 241.33 |
| SOUTH TRIB | 6.649 | 100-YEAR | 657.58 | 657.56 | 0.02 | 0.03 | 0.01 | 440.96 | 123.37 | 5.67 | 245.39 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.650 | 10-YEAR | 655.91 | 655.74 | 0.16 | 0.20 | 0.04 | 145.43 | 167.50 | 1.07 | 269.47 |
| SOUTH TRIB | 6.650 | 50-YEAR | 656.98 | 656.88 | 0.10 | 0.05 | 0.02 | 271.38 | 227.87 | 6.74 | 276.30 |
| SOUTH TRIB | 6.650 | 100-YEAR | 657.63 | 657.55 | 0.07 | 0.03 | 0.02 | 314.68 | 244.17 | 11.15 | 280.32 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.651 | 10-YEAR | 656.27 | 656.23 | 0.04 | 0.35 | 0.01 | 177.91 | 116.43 | 19.65 | 344.36 |
| SOUTH TRIB | 6.651 | 50-YEAR | 657.14 | 657.10 | 0.04 | 0.15 | 0.01 | 295.16 | 157.21 | 53.63 | 349.61 |
| SOUTH TRIB | 6.651 | 100-YEAR | 657.71 | 657.69 | 0.03 | 0.08 | 0.00 | 334.62 | 165.38 | 69.99 | 353.12 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.652 | 10-YEAR | 656.44 | 656.42 | 0.02 | 0.17 | 0.00 | 195.76 | 84.89 | 33.35 | 287.52 |
| SOUTH TRIB | 6.652 | 50-YEAR | 657.24 | 657.22 | 0.02 | 0.10 | 0.00 | 315.97 | 114.33 | 75.69 | 292.32 |
| SOUTH TRIB | 6.652 | 100-YEAR | 657.78 | 657.76 | 0.01 | 0.06 | 0.00 | 355.30 | 119.75 | 94.96 | 295.58 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.653 | 10-YEAR | 656.52 | 656.48 | 0.05 | 0.08 | 0.01 | 9.20 | 268.21 | 36.58 | 77.87 |
| SOUTH TRIB | 6.653 | 50-YEAR | 657.32 | 657.25 | 0.07 | 0.06 | 0.02 | 18.32 | 416.84 | 70.84 | 82.49 |
| SOUTH TRIB | 6.653 | 100-YEAR | 657.84 | 657.77 | 0.06 | 0.04 | 0.02 | 23.50 | 459.79 | 86.70 | 85.64 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.655 | 10-YEAR | 656.95 | 656.91 | 0.04 | 0.43 | 0.00 | 15.54 | 222.88 | 75.58 | 122.29 |
| SOUTH TRIB | 6.655 | 50-YEAR | 657.74 | 657.69 | 0.05 | 0.42 | 0.00 | 29.92 | 325.98 | 150.10 | 142.26 |
| SOUTH TRIB | 6.655 | 100-YEAR | 658.16 | 658.12 | 0.04 | 0.32 | 0.00 | 35.99 | 347.34 | 186.67 | 147.39 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.656 | 10-YEAR | 657.61 | 657.18 | 0.43 | 0.39 | 0.12 | 30.03 | 247.20 | 36.78 | 190.07 |
| SOUTH TRIB | 6.656 | 50-YEAR | 658.16 | 657.76 | 0.40 | 0.32 | 0.10 | 78.31 | 341.02 | 86.67 | 266.57 |
| SOUTH TRIB | 6.656 | 100-YEAR | 658.47 | 658.16 | 0.31 | 0.23 | 0.08 | 101.19 | 359.67 | 109.14 | 268.96 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.657 | 10-YEAR | 658.12 | 658.08 | 0.04 | 0.46 | 0.04 | 80.09 | 133.45 | 100.46 | 323.48 |
| SOUTH TRIB | 6.657 | 50-YEAR | 658.63 | 658.58 | 0.05 | 0.43 | 0.03 | 149.38 | 188.65 | 167.97 | 326.45 |
| SOUTH TRIB | 6.657 | 100-YEAR | 658.85 | 658.80 | 0.05 | 0.35 | 0.03 | 175.41 | 203.43 | 191.15 | 327.78 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.658 | 10-YEAR | 658.21 | 658.19 | 0.02 | 0.10 | 0.00 | 59.31 | 109.23 | 145.45 | 314.16 |
| SOUTH TRIB | 6.658 | 50-YEAR | 658.73 | 658.70 | 0.03 | 0.10 | 0.00 | 109.27 | 152.55 | 244.17 | 317.20 |
| SOUTH TRIB | 6.658 | 100-YEAR | 658.94 | 658.91 | 0.03 | 0.09 | 0.00 | 127.69 | 164.29 | 278.02 | 318.48 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.12 | 10-YEAR | 658.33 | 658.26 | 0.08 | 0.09 | 0.03 | | 287.00 | | 54.53 |
| SOUTH TRIB | 7.12 | 50-YEAR | 658.90 | 658.75 | 0.15 | 0.11 | 0.06 | | 461.00 | | 57.51 |
| SOUTH TRIB | 7.12 | 100-YEAR | 659.12 | 658.95 | 0.17 | 0.11 | 0.07 | | 517.00 | | 58.71 |

HEC-RAS Plan: Nat - P5,O4,Q5 (Continued)

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SOUTH TRIB | 7.16 Ramps P1, P2, P8 | | Culvert | | | | | | | | |
| SOUTH TRIB | 7.21 | 10-YEAR | 659.07 | 658.83 | 0.25 | | | 2.16 | 284.84 | | 51.25 |
| SOUTH TRIB | 7.21 | 50-YEAR | 659.98 | 659.64 | 0.33 | | | 8.03 | 452.97 | | 76.50 |
| SOUTH TRIB | 7.21 | 100-YEAR | 660.26 | 659.91 | 0.35 | | | 10.33 | 506.67 | | 79.22 |
| SOUTH TRIB | 7.22 | 10-YEAR | 659.91 | 659.39 | 0.52 | 0.46 | 0.08 | 108.06 | 178.94 | | 56.49 |
| SOUTH TRIB | 7.22 | 50-YEAR | 660.44 | 659.95 | 0.48 | 0.41 | 0.04 | 226.93 | 234.07 | | 73.76 |
| SOUTH TRIB | 7.22 | 100-YEAR | 660.62 | 660.25 | 0.37 | 0.36 | 0.01 | 282.45 | 234.55 | | 78.93 |
| SOUTH TRIB | 7.247 | 10-YEAR | 660.72 | 660.64 | 0.08 | 0.76 | 0.04 | 201.11 | 85.89 | | 79.19 |
| SOUTH TRIB | 7.247 | 50-YEAR | 661.26 | 661.15 | 0.11 | 0.79 | 0.04 | 341.12 | 119.88 | | 81.69 |
| SOUTH TRIB | 7.247 | 100-YEAR | 661.39 | 661.26 | 0.13 | 0.74 | 0.02 | 385.80 | 131.20 | | 82.24 |
| SOUTH TRIB | 7.259 | 10-YEAR | 660.85 | 660.79 | 0.06 | 0.13 | 0.00 | 210.25 | 76.75 | | 80.71 |
| SOUTH TRIB | 7.259 | 50-YEAR | 661.41 | 661.31 | 0.10 | 0.15 | 0.00 | 352.15 | 108.85 | | 83.24 |
| SOUTH TRIB | 7.259 | 100-YEAR | 661.55 | 661.44 | 0.11 | 0.16 | 0.00 | 397.68 | 119.32 | | 83.84 |
| SOUTH TRIB | 7.265 | 10-YEAR | 661.05 | 660.68 | 0.37 | 0.11 | 0.09 | 41.60 | 233.95 | 11.45 | 59.65 |
| SOUTH TRIB | 7.265 | 50-YEAR | 661.64 | 661.19 | 0.45 | 0.12 | 0.11 | 122.10 | 318.25 | 20.65 | 62.65 |
| SOUTH TRIB | 7.265 | 100-YEAR | 661.79 | 661.30 | 0.49 | 0.13 | 0.11 | 148.13 | 345.21 | 23.66 | 63.32 |
| SOUTH TRIB | 7.289 | 10-YEAR | 661.70 | 661.50 | 0.20 | 0.63 | 0.02 | 120.27 | 166.73 | | 35.69 |
| SOUTH TRIB | 7.289 | 50-YEAR | 662.43 | 662.12 | 0.31 | 0.78 | 0.01 | 209.63 | 251.37 | | 39.95 |
| SOUTH TRIB | 7.289 | 100-YEAR | 662.63 | 662.29 | 0.34 | 0.83 | 0.01 | 239.52 | 277.48 | | 41.11 |
| SOUTH TRIB | 7.314 | 10-YEAR | 662.00 | 661.91 | 0.09 | 0.29 | 0.01 | 161.44 | 125.56 | | 47.48 |
| SOUTH TRIB | 7.314 | 50-YEAR | 662.82 | 662.69 | 0.13 | 0.37 | 0.02 | 274.09 | 186.91 | | 53.28 |
| SOUTH TRIB | 7.314 | 100-YEAR | 663.05 | 662.91 | 0.14 | 0.39 | 0.02 | 311.17 | 205.83 | | 54.86 |
| SOUTH TRIB | 7.331 | 10-YEAR | 662.44 | 662.09 | 0.35 | 0.36 | 0.08 | 111.59 | 175.41 | | 26.13 |
| SOUTH TRIB | 7.331 | 50-YEAR | 663.36 | 662.87 | 0.49 | 0.43 | 0.11 | 191.33 | 269.67 | | 30.41 |
| SOUTH TRIB | 7.331 | 100-YEAR | 663.61 | 663.09 | 0.53 | 0.45 | 0.12 | 217.70 | 299.30 | | 31.57 |
| SOUTH TRIB | 7.35 | 10-YEAR | 662.91 | 662.72 | 0.19 | 0.46 | 0.02 | 99.36 | 187.64 | | 30.86 |
| SOUTH TRIB | 7.35 | 50-YEAR | 663.91 | 663.65 | 0.26 | 0.53 | 0.02 | 177.21 | 283.79 | | 35.66 |
| SOUTH TRIB | 7.35 | 100-YEAR | 664.18 | 663.90 | 0.28 | 0.54 | 0.02 | 203.46 | 313.55 | | 36.96 |
| SOUTH TRIB | 7.391 | 10-YEAR | 663.44 | 663.29 | 0.15 | 0.53 | 0.00 | 95.72 | 191.28 | | 31.68 |
| SOUTH TRIB | 7.391 | 50-YEAR | 664.52 | 664.31 | 0.21 | 0.60 | 0.01 | 171.07 | 289.93 | | 36.56 |
| SOUTH TRIB | 7.391 | 100-YEAR | 664.81 | 664.58 | 0.22 | 0.62 | 0.01 | 196.51 | 320.49 | | 37.87 |
| SOUTH TRIB | 7.399 | 10-YEAR | 663.52 | 663.34 | 0.18 | 0.07 | 0.01 | 27.56 | 232.99 | 26.45 | 24.71 |
| SOUTH TRIB | 7.399 | 50-YEAR | 664.63 | 664.34 | 0.29 | 0.08 | 0.02 | 52.06 | 358.72 | 50.23 | 177.78 |
| SOUTH TRIB | 7.399 | 100-YEAR | 664.93 | 664.60 | 0.33 | 0.09 | 0.03 | 60.58 | 397.90 | 58.52 | 596.90 |
| SOUTH TRIB | 7.406 | 10-YEAR | 663.60 | 663.36 | 0.23 | 0.06 | 0.02 | 43.02 | 207.66 | 36.32 | 25.08 |
| SOUTH TRIB | 7.406 | 50-YEAR | 664.73 | 664.37 | 0.35 | 0.08 | 0.02 | 79.12 | 315.07 | 66.81 | 28.28 |
| SOUTH TRIB | 7.406 | 100-YEAR | 665.03 | 664.64 | 0.39 | 0.09 | 0.02 | 92.05 | 347.76 | 77.19 | 28.89 |
| SOUTH TRIB | 7.431 | 10-YEAR | 664.02 | 663.64 | 0.38 | 0.38 | 0.04 | 56.41 | 196.42 | 34.17 | 23.78 |
| SOUTH TRIB | 7.431 | 50-YEAR | 665.21 | 664.70 | 0.50 | 0.43 | 0.04 | 103.29 | 288.99 | 68.72 | 28.17 |
| SOUTH TRIB | 7.431 | 100-YEAR | 665.53 | 664.99 | 0.54 | 0.45 | 0.04 | 119.19 | 316.82 | 80.99 | 29.35 |
| SOUTH TRIB | 7.447 | 10-YEAR | 664.10 | 663.98 | 0.12 | 0.05 | 0.03 | 130.04 | 130.80 | 26.16 | 31.45 |
| SOUTH TRIB | 7.447 | 50-YEAR | 665.30 | 665.12 | 0.17 | 0.06 | 0.03 | 207.23 | 199.25 | 54.53 | 35.68 |
| SOUTH TRIB | 7.447 | 100-YEAR | 665.62 | 665.41 | 0.21 | 0.06 | 0.03 | 241.98 | 229.94 | 45.07 | 48.24 |
| SOUTH TRIB | 7.456 | 10-YEAR | 664.14 | 664.04 | 0.09 | 0.03 | 0.01 | 122.18 | 114.39 | 24.43 | 31.68 |
| SOUTH TRIB | 7.456 | 50-YEAR | 665.34 | 665.21 | 0.14 | 0.04 | 0.01 | 187.81 | 179.96 | 50.23 | 35.99 |
| SOUTH TRIB | 7.456 | 100-YEAR | 665.67 | 665.50 | 0.17 | 0.04 | 0.01 | 221.74 | 209.90 | 36.36 | 58.34 |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 664.87 | 664.80 | 0.07 | | | 122.91 | 110.62 | 27.48 | 34.47 |
| SOUTH TRIB | 7.47 | 50-YEAR | 666.74 | 666.67 | 0.07 | | | 127.79 | 191.12 | 99.09 | 292.95 |
| SOUTH TRIB | 7.47 | 100-YEAR | 666.91 | 666.84 | 0.07 | | | 147.11 | 196.74 | 124.14 | 332.28 |
| SOUTH TRIB | 7.486 | 10-YEAR | 664.87 | 664.87 | 0.00 | 0.00 | 0.01 | 58.38 | 113.08 | 89.54 | 208.30 |
| SOUTH TRIB | 7.486 | 50-YEAR | 666.75 | 666.75 | 0.00 | 0.00 | 0.01 | 104.21 | 150.70 | 163.09 | 208.30 |
| SOUTH TRIB | 7.486 | 100-YEAR | 666.92 | 666.92 | 0.00 | 0.00 | 0.01 | 117.44 | 166.50 | 184.06 | 208.30 |
| SOUTH TRIB | 7.493 | 10-YEAR | 664.87 | 664.87 | 0.00 | 0.00 | 0.00 | 232.81 | 24.38 | 3.81 | 1491.34 |
| SOUTH TRIB | 7.493 | 50-YEAR | 666.75 | 666.75 | 0.00 | 0.00 | 0.00 | 388.23 | 26.20 | 3.57 | 1584.75 |
| SOUTH TRIB | 7.493 | 100-YEAR | 666.92 | 666.92 | 0.00 | 0.00 | 0.00 | 435.54 | 28.53 | 3.93 | 1592.47 |

Willow Creek Plan: Natural Conditions - Ramp P5,O4,Q5 11/26/2012

WILLOW CREEK MAINSTEM

WILLOW CREEK SOUTH TRIB

Legend

WS 100-YEAR

WS 50-YEAR

WS 10-YEAR

Ground

Elevation (ft)

665

660

655

650

645

640

635

4.594

4.675

4.773

4.924 1400' C...

5.104

5.524 Tank Farm Rd

5.639

5.697

5.725

5.74 Tonne Feed

5.810

5.860

5.900 Runway 14R

6.08 Runway 14R Exten

6.332

6.418

6.471

6.49 Tank Farm Rd

6.62 C & NW Railroad

6.644

6.645

6.649

6.651

6.652

6.655

6.656

6.657

7.12

7.16 Ramps P1, P2, P8

7.247

7.289

7.331

7.391

7.431

7.486

0

2000

4000

6000

8000

10000

12000

14000

16000

Stream Distance Above Willow-Higgins Creek Confluence with Des Plaines River (ft)

1 in Horiz. = 1200 ft 1 in Vert. = 4 ft

HEC-RAS Plan: Nat - P1,P8,P2

| 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) | |
| MAINSTEM | 4.518 | 10-YEAR | 894.00 | 636.00 | 644.69 | | 644.73 | 0.000113 | 1.67 | 558.91 | 68.69 | 0.10 |
| MAINSTEM | 4.518 | 50-YEAR | 1459.00 | 636.00 | 646.33 | | 646.41 | 0.000168 | 2.28 | 673.17 | 70.33 | 0.13 |
| MAINSTEM | 4.518 | 100-YEAR | 1682.00 | 636.00 | 646.91 | | 647.00 | 0.000185 | 2.49 | 713.97 | 70.91 | 0.13 |
| MAINSTEM | 4.594 | 10-YEAR | 894.00 | 636.00 | 644.73 | | 644.77 | 0.000111 | 1.66 | 562.03 | 68.73 | 0.10 |
| MAINSTEM | 4.594 | 50-YEAR | 1459.00 | 636.00 | 646.40 | | 646.48 | 0.000164 | 2.27 | 677.92 | 70.40 | 0.12 |
| MAINSTEM | 4.594 | 100-YEAR | 1682.00 | 636.00 | 646.98 | | 647.07 | 0.000181 | 2.47 | 719.27 | 70.98 | 0.13 |
| MAINSTEM | 4.675 | 10-YEAR | 894.00 | 636.10 | 644.78 | | 644.82 | 0.000114 | 1.67 | 558.61 | 68.72 | 0.10 |
| MAINSTEM | 4.675 | 50-YEAR | 1459.00 | 636.10 | 646.47 | | 646.55 | 0.000166 | 2.27 | 676.07 | 70.41 | 0.12 |
| MAINSTEM | 4.675 | 100-YEAR | 1682.00 | 636.10 | 647.06 | | 647.15 | 0.000182 | 2.47 | 717.95 | 71.01 | 0.13 |
| MAINSTEM | 4.773 | 10-YEAR | 784.00 | 636.20 | 644.84 | | 644.88 | 0.000089 | 1.47 | 554.70 | 68.37 | 0.09 |
| MAINSTEM | 4.773 | 50-YEAR | 1227.00 | 636.20 | 646.57 | | 646.62 | 0.000118 | 1.91 | 673.98 | 70.04 | 0.10 |
| MAINSTEM | 4.773 | 100-YEAR | 1469.00 | 636.20 | 647.17 | | 647.24 | 0.000139 | 2.16 | 716.27 | 70.63 | 0.12 |
| MAINSTEM | 4.790 | 10-YEAR | 784.00 | 636.20 | 644.81 | 638.80 | 644.93 | 0.000312 | 2.76 | 284.23 | 68.35 | 0.17 |
| MAINSTEM | 4.790 | 50-YEAR | 1227.00 | 636.20 | 646.51 | 639.71 | 646.71 | 0.000420 | 3.61 | 340.24 | 69.99 | 0.20 |
| MAINSTEM | 4.790 | 100-YEAR | 1469.00 | 636.20 | 647.09 | 640.14 | 647.35 | 0.000501 | 4.09 | 359.50 | 70.56 | 0.22 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 784.00 | 636.70 | 645.28 | 640.14 | 645.42 | 0.000448 | 3.07 | 255.65 | 65.50 | 0.19 |
| MAINSTEM | 5.059 | 50-YEAR | 1227.00 | 636.70 | 647.60 | 641.04 | 647.81 | 0.000458 | 3.69 | 332.24 | 67.78 | 0.21 |
| MAINSTEM | 5.059 | 100-YEAR | 1469.00 | 636.70 | 648.71 | 641.47 | 648.96 | 0.000462 | 3.98 | 368.99 | 68.88 | 0.21 |
| MAINSTEM | 5.076 | 10-YEAR | 784.00 | 636.90 | 645.41 | | 645.46 | 0.000215 | 1.80 | 435.78 | 65.48 | 0.12 |
| MAINSTEM | 5.076 | 50-YEAR | 1227.00 | 636.90 | 647.79 | | 647.85 | 0.000206 | 2.07 | 594.14 | 67.85 | 0.12 |
| MAINSTEM | 5.076 | 100-YEAR | 1469.00 | 636.90 | 648.93 | | 649.00 | 0.000204 | 2.19 | 672.29 | 68.98 | 0.12 |
| MAINSTEM | 5.104 | 10-YEAR | 784.00 | 637.12 | 645.41 | | 645.51 | 0.000341 | 2.55 | 306.96 | 65.32 | 0.17 |
| MAINSTEM | 5.104 | 50-YEAR | 1227.00 | 637.12 | 647.76 | | 647.90 | 0.000326 | 3.01 | 407.15 | 67.69 | 0.17 |
| MAINSTEM | 5.104 | 100-YEAR | 1469.00 | 637.12 | 648.90 | | 649.06 | 0.000322 | 3.23 | 455.31 | 68.83 | 0.17 |
| MAINSTEM | 5.109 | 10-YEAR | 784.00 | 637.18 | 645.37 | 640.64 | 645.54 | 0.000547 | 3.28 | 239.21 | 65.24 | 0.21 |
| MAINSTEM | 5.109 | 50-YEAR | 1227.00 | 637.18 | 647.71 | 641.55 | 647.94 | 0.000535 | 3.89 | 315.15 | 67.60 | 0.22 |
| MAINSTEM | 5.109 | 100-YEAR | 1469.00 | 637.18 | 648.83 | 642.01 | 649.10 | 0.000532 | 4.18 | 351.63 | 68.73 | 0.22 |
| MAINSTEM | 5.110 | 10-YEAR | 784.00 | 637.22 | 645.33 | | 645.56 | 0.000656 | 3.84 | 204.41 | 44.59 | 0.24 |
| MAINSTEM | 5.110 | 50-YEAR | 1227.00 | 637.22 | 647.64 | | 647.98 | 0.000698 | 4.67 | 262.56 | 50.16 | 0.26 |
| MAINSTEM | 5.110 | 100-YEAR | 1469.00 | 637.22 | 648.75 | | 649.14 | 0.000714 | 5.06 | 290.45 | 52.83 | 0.26 |
| MAINSTEM | 5.116 | 10-YEAR | 784.00 | 637.31 | 645.33 | | 645.57 | 0.000120 | 3.91 | 200.61 | 25.00 | 0.24 |
| MAINSTEM | 5.116 | 50-YEAR | 1227.00 | 637.31 | 647.64 | | 647.99 | 0.000143 | 4.75 | 258.35 | 26.44 | 0.26 |
| MAINSTEM | 5.116 | 100-YEAR | 1469.00 | 637.31 | 648.75 | | 649.16 | 0.000146 | 5.14 | 286.24 | 31.23 | 0.27 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 634.00 | 640.26 | 646.04 | 642.93 | 646.33 | 0.000191 | 4.30 | 147.43 | 25.50 | 0.32 |
| MAINSTEM | 5.606 | 50-YEAR | 1056.00 | 640.26 | 649.63 | 644.01 | 649.94 | 0.000121 | 4.42 | 239.06 | 57.44 | 0.25 |
| MAINSTEM | 5.606 | 100-YEAR | 1227.00 | 640.26 | 651.57 | 644.41 | 651.85 | 0.000087 | 4.25 | 288.43 | 80.97 | 0.22 |
| MAINSTEM | 5.610 | 10-YEAR | 634.00 | 640.30 | 646.34 | | 646.36 | 0.000075 | 1.05 | 603.33 | 125.36 | 0.08 |
| MAINSTEM | 5.610 | 50-YEAR | 1056.00 | 640.30 | 649.95 | | 649.97 | 0.000043 | 1.09 | 970.26 | 145.88 | 0.06 |
| MAINSTEM | 5.610 | 100-YEAR | 1227.00 | 640.30 | 651.86 | | 651.88 | 0.000031 | 1.05 | 1164.78 | 156.76 | 0.05 |
| MAINSTEM | 5.629 | 10-YEAR | 634.00 | 640.37 | 646.36 | | 646.36 | 0.000064 | 0.74 | 854.27 | 215.49 | 0.07 |
| MAINSTEM | 5.629 | 50-YEAR | 1056.00 | 640.37 | 649.97 | | 649.97 | 0.000021 | 0.64 | 1646.96 | 237.14 | 0.04 |
| MAINSTEM | 5.629 | 100-YEAR | 1227.00 | 640.37 | 651.88 | | 651.88 | 0.000014 | 0.59 | 2082.70 | 248.61 | 0.03 |
| MAINSTEM | 5.632 | 10-YEAR | 634.00 | 640.39 | 646.36 | | 646.37 | 0.000056 | 0.70 | 912.18 | 411.47 | 0.06 |
| MAINSTEM | 5.632 | 50-YEAR | 1056.00 | 640.39 | 649.97 | | 649.97 | 0.000019 | 0.60 | 1754.71 | 433.12 | 0.04 |
| MAINSTEM | 5.632 | 100-YEAR | 1227.00 | 640.39 | 651.88 | | 651.88 | 0.000012 | 0.55 | 2216.91 | 444.58 | 0.03 |
| MAINSTEM | 5.639 | 10-YEAR | 634.00 | 640.43 | 646.36 | | 646.37 | 0.000060 | 0.72 | 878.97 | 737.22 | 0.06 |
| MAINSTEM | 5.639 | 50-YEAR | 1056.00 | 640.43 | 649.97 | | 649.97 | 0.000020 | 0.62 | 1695.03 | 758.86 | 0.04 |
| MAINSTEM | 5.639 | 100-YEAR | 1227.00 | 640.43 | 651.88 | | 651.88 | 0.000013 | 0.57 | 2143.32 | 770.33 | 0.03 |
| MAINSTEM | 5.697 | 10-YEAR | 634.00 | 641.14 | 646.37 | | 646.41 | 0.000289 | 1.55 | 408.83 | 311.74 | 0.14 |
| MAINSTEM | 5.697 | 50-YEAR | 1056.00 | 641.14 | 649.96 | | 649.99 | 0.000090 | 1.34 | 788.12 | 333.27 | 0.09 |
| MAINSTEM | 5.697 | 100-YEAR | 1227.00 | 641.14 | 651.87 | | 651.90 | 0.000057 | 1.24 | 989.95 | 344.73 | 0.07 |
| MAINSTEM | 5.720 | 10-YEAR | 634.00 | 641.44 | 646.35 | | 646.51 | 0.000999 | 3.20 | 197.97 | 161.07 | 0.26 |
| MAINSTEM | 5.720 | 50-YEAR | 1056.00 | 641.44 | 649.91 | | 650.05 | 0.000407 | 3.00 | 351.91 | 188.74 | 0.19 |
| MAINSTEM | 5.720 | 100-YEAR | 1227.00 | 641.44 | 651.82 | | 651.94 | 0.000272 | 2.82 | 434.63 | 203.61 | 0.16 |
| MAINSTEM | 5.725 | 10-YEAR | 634.00 | 641.52 | 646.28 | | 646.59 | 0.001791 | 4.45 | 142.63 | 93.92 | 0.36 |
| MAINSTEM | 5.725 | 50-YEAR | 1056.00 | 641.52 | 649.82 | | 650.10 | 0.000777 | 4.24 | 248.84 | 126.73 | 0.26 |
| MAINSTEM | 5.725 | 100-YEAR | 1227.00 | 641.52 | 651.74 | | 651.99 | 0.000525 | 4.01 | 306.31 | 144.48 | 0.22 |
| MAINSTEM | 5.727 | 10-YEAR | 634.00 | 641.52 | 646.23 | | 646.68 | 0.003344 | 5.38 | 117.80 | 25.00 | 0.44 |
| MAINSTEM | 5.727 | 50-YEAR | 1056.00 | 641.52 | 649.77 | | 650.18 | 0.001669 | 5.12 | 206.14 | 25.00 | 0.31 |
| MAINSTEM | 5.727 | 100-YEAR | 1227.00 | 641.52 | 651.69 | | 652.05 | 0.001202 | 4.83 | 254.12 | 27.98 | 0.27 |

HEC-RAS Plan: Nat - P1,P8,P2 (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) | |
| MAINSTEM | 5.732 | 10-YEAR | 634.00 | 641.59 | 646.38 | | 646.81 | 0.003878 | 5.29 | 119.74 | 25.00 | 0.43 |
| MAINSTEM | 5.732 | 50-YEAR | 1056.00 | 641.59 | 649.84 | | 650.24 | 0.002242 | 5.12 | 206.18 | 25.00 | 0.31 |
| MAINSTEM | 5.732 | 100-YEAR | 1227.00 | 641.59 | 651.74 | | 652.10 | 0.001699 | 4.84 | 253.74 | 27.64 | 0.27 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 634.00 | 641.81 | 646.81 | 644.45 | 647.18 | 0.003115 | 4.88 | 129.95 | 26.00 | 0.38 |
| MAINSTEM | 5.757 | 50-YEAR | 1056.00 | 641.81 | 650.18 | 645.52 | 650.55 | 0.001947 | 4.85 | 217.65 | 26.00 | 0.30 |
| MAINSTEM | 5.757 | 100-YEAR | 1227.00 | 641.81 | 652.07 | 645.91 | 652.40 | 0.001495 | 4.60 | 266.70 | 26.00 | 0.25 |
| MAINSTEM | 5.759 | 10-YEAR | 634.00 | 641.82 | 647.20 | | 647.22 | 0.000129 | 1.30 | 489.37 | 100.00 | 0.10 |
| MAINSTEM | 5.759 | 50-YEAR | 1056.00 | 641.82 | 650.56 | | 650.59 | 0.000071 | 1.33 | 795.30 | 100.00 | 0.08 |
| MAINSTEM | 5.759 | 100-YEAR | 1227.00 | 641.82 | 652.41 | | 652.43 | 0.000051 | 1.27 | 963.34 | 100.00 | 0.07 |
| MAINSTEM | 5.810 | 10-YEAR | 634.00 | 643.98 | 647.24 | | 647.29 | 0.000620 | 1.95 | 325.50 | 100.00 | 0.19 |
| MAINSTEM | 5.810 | 50-YEAR | 1056.00 | 643.98 | 650.58 | | 650.62 | 0.000177 | 1.60 | 659.72 | 100.00 | 0.11 |
| MAINSTEM | 5.810 | 100-YEAR | 1227.00 | 643.98 | 652.42 | | 652.45 | 0.000110 | 1.45 | 843.86 | 100.00 | 0.09 |
| MAINSTEM | 5.860 | 10-YEAR | 634.00 | 645.81 | 647.64 | 647.64 | 648.57 | 0.019302 | 7.73 | 82.06 | 100.00 | 1.01 |
| MAINSTEM | 5.860 | 50-YEAR | 1056.00 | 645.81 | 650.43 | | 650.83 | 0.002459 | 5.11 | 206.78 | 100.00 | 0.42 |
| MAINSTEM | 5.860 | 100-YEAR | 1227.00 | 645.81 | 652.31 | | 652.58 | 0.001062 | 4.21 | 291.10 | 100.00 | 0.29 |
| MAINSTEM | 5.862 | 10-YEAR | 634.00 | 645.96 | 648.45 | 648.45 | 649.70 | 0.021607 | 9.00 | 70.47 | 28.35 | 1.01 |
| MAINSTEM | 5.862 | 50-YEAR | 1056.00 | 645.96 | 650.19 | | 651.40 | 0.011607 | 8.80 | 120.02 | 28.35 | 0.75 |
| MAINSTEM | 5.862 | 100-YEAR | 1227.00 | 645.96 | 652.14 | | 652.90 | 0.005086 | 7.01 | 175.10 | 28.35 | 0.50 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 634.00 | 647.54 | 651.60 | 649.84 | 651.96 | 0.000320 | 4.85 | 130.71 | 33.00 | 0.42 |
| MAINSTEM | 6.037 | 50-YEAR | 1056.00 | 647.54 | 653.22 | 650.77 | 653.74 | 0.000320 | 5.77 | 183.00 | 33.00 | 0.43 |
| MAINSTEM | 6.037 | 100-YEAR | 1227.00 | 647.54 | 653.90 | 651.10 | 654.46 | 0.000310 | 5.99 | 204.81 | 33.00 | 0.42 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 603.00 | 647.73 | 652.15 | 649.86 | 652.40 | 0.002189 | 4.01 | 150.28 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 50-YEAR | 996.00 | 647.73 | 653.91 | 650.71 | 654.26 | 0.002167 | 4.74 | 210.25 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 100-YEAR | 1156.00 | 647.73 | 654.62 | 651.02 | 655.00 | 0.002121 | 4.94 | 234.15 | 34.00 | 0.33 |
| MAINSTEM | 6.194 | 10-YEAR | 603.00 | 647.75 | 652.41 | | 652.44 | 0.000159 | 1.31 | 461.22 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 50-YEAR | 996.00 | 647.75 | 654.27 | | 654.31 | 0.000142 | 1.54 | 645.30 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 100-YEAR | 1156.00 | 647.75 | 655.00 | | 655.04 | 0.000134 | 1.61 | 717.76 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 10-YEAR | 603.00 | 647.88 | 652.52 | | 652.55 | 0.000178 | 1.30 | 464.06 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 50-YEAR | 996.00 | 647.88 | 654.37 | | 654.41 | 0.000166 | 1.53 | 649.01 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 100-YEAR | 1156.00 | 647.88 | 655.10 | | 655.14 | 0.000160 | 1.60 | 721.72 | 100.00 | 0.11 |
| MAINSTEM | 6.418 | 10-YEAR | 603.00 | 647.88 | 652.61 | | 652.63 | 0.000167 | 1.27 | 472.97 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 50-YEAR | 996.00 | 647.88 | 654.45 | | 654.49 | 0.000159 | 1.52 | 657.40 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 100-YEAR | 1156.00 | 647.88 | 655.18 | | 655.22 | 0.000154 | 1.58 | 729.82 | 100.00 | 0.10 |
| MAINSTEM | 6.471 | 10-YEAR | 603.00 | 647.88 | 652.65 | | 652.73 | 0.000583 | 2.29 | 263.80 | 55.30 | 0.18 |
| MAINSTEM | 6.471 | 50-YEAR | 996.00 | 647.88 | 654.48 | | 654.59 | 0.000581 | 2.73 | 364.71 | 55.30 | 0.19 |
| MAINSTEM | 6.471 | 100-YEAR | 1156.00 | 647.88 | 655.19 | | 655.32 | 0.000571 | 2.86 | 404.33 | 55.30 | 0.19 |
| MAINSTEM | 6.473 | 10-YEAR | 603.00 | 647.91 | 652.61 | | 652.79 | 0.002320 | 3.43 | 175.73 | 40.00 | 0.29 |
| MAINSTEM | 6.473 | 50-YEAR | 996.00 | 647.91 | 654.42 | | 654.67 | 0.002456 | 4.01 | 248.07 | 40.00 | 0.28 |
| MAINSTEM | 6.473 | 100-YEAR | 1156.00 | 647.91 | 655.13 | | 655.40 | 0.002476 | 4.18 | 276.53 | 40.00 | 0.28 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 6.597 | 10-YEAR | 603.00 | 648.23 | 653.04 | 650.28 | 653.12 | 0.000581 | 2.29 | 263.40 | 120.63 | 0.20 |
| MAINSTEM | 6.597 | 50-YEAR | 996.00 | 648.23 | 654.96 | 650.85 | 655.06 | 0.000450 | 2.59 | 384.16 | 1005.08 | 0.19 |
| MAINSTEM | 6.597 | 100-YEAR | 1156.00 | 648.23 | 655.70 | 651.04 | 655.82 | 0.000413 | 2.68 | 431.02 | 1022.24 | 0.18 |
| MAINSTEM | 6.6 | 10-YEAR | 603.00 | 648.30 | 653.04 | | 653.15 | 0.000695 | 2.65 | 227.34 | 199.96 | 0.22 |
| MAINSTEM | 6.6 | 50-YEAR | 996.00 | 648.30 | 654.95 | | 655.09 | 0.000578 | 3.07 | 324.63 | 234.17 | 0.21 |
| MAINSTEM | 6.6 | 100-YEAR | 1156.00 | 648.30 | 655.69 | | 655.85 | 0.000540 | 3.19 | 362.41 | 247.45 | 0.21 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 603.00 | 648.71 | 652.11 | 652.11 | 653.45 | 0.017113 | 9.28 | 64.95 | 219.64 | 0.99 |
| MAINSTEM | 6.635 | 50-YEAR | 996.00 | 648.71 | 654.35 | 653.18 | 655.44 | 0.006269 | 8.40 | 118.62 | 1223.86 | 0.67 |
| MAINSTEM | 6.635 | 100-YEAR | 1156.00 | 648.71 | 655.11 | 653.58 | 656.22 | 0.005239 | 8.44 | 136.89 | 1229.94 | 0.62 |
| MAINSTEM | 6.637 | 10-YEAR | 603.00 | 648.71 | 653.85 | | 653.85 | 0.000148 | 0.47 | 1288.25 | 1208.72 | 0.08 |
| MAINSTEM | 6.637 | 50-YEAR | 996.00 | 648.71 | 655.77 | | 655.77 | 0.000013 | 0.28 | 3643.66 | 1234.59 | 0.03 |
| MAINSTEM | 6.637 | 100-YEAR | 1156.00 | 648.71 | 656.55 | | 656.55 | 0.000008 | 0.26 | 4606.17 | 1240.08 | 0.02 |
| MAINSTEM | 6.639 | 10-YEAR | 603.00 | 649.07 | 653.53 | | 654.18 | 0.012838 | 6.49 | 92.85 | 40.24 | 0.75 |
| MAINSTEM | 6.639 | 50-YEAR | 996.00 | 649.07 | 655.55 | | 656.00 | 0.005186 | 5.35 | 186.16 | 52.10 | 0.50 |
| MAINSTEM | 6.639 | 100-YEAR | 1156.00 | 649.07 | 656.35 | | 656.75 | 0.003949 | 5.03 | 229.90 | 56.81 | 0.44 |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | | |

HEC-RAS Plan: Nat - P1,P8,P2 (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) | |
| MAINSTEM | 6.642 | 10-YEAR | 603.00 | 649.86 | 654.58 | 653.77 | 655.03 | 0.007925 | 5.39 | 111.84 | 47.66 | 0.62 |
| MAINSTEM | 6.642 | 50-YEAR | 996.00 | 649.86 | 655.99 | 654.62 | 656.42 | 0.005422 | 5.28 | 188.55 | 61.45 | 0.53 |
| MAINSTEM | 6.642 | 100-YEAR | 1156.00 | 649.86 | 656.70 | 654.89 | 657.07 | 0.004106 | 4.93 | 234.58 | 68.58 | 0.47 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 603.00 | 649.86 | 654.72 | | 655.12 | 0.006791 | 5.09 | 118.47 | 48.91 | 0.58 |
| MAINSTEM | 6.643 | 50-YEAR | 996.00 | 649.86 | 656.06 | | 656.48 | 0.005079 | 5.15 | 193.29 | 62.23 | 0.52 |
| MAINSTEM | 6.643 | 100-YEAR | 1156.00 | 649.86 | 656.75 | | 657.12 | 0.003939 | 4.85 | 238.30 | 69.12 | 0.46 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.6435 | 10-YEAR | 603.00 | 649.86 | 655.24 | | 655.24 | 0.000015 | 0.31 | 1967.94 | 613.85 | 0.03 |
| MAINSTEM | 6.6435 | 50-YEAR | 996.00 | 649.86 | 656.60 | | 656.60 | 0.000012 | 0.35 | 2810.00 | 623.44 | 0.03 |
| MAINSTEM | 6.6435 | 100-YEAR | 1156.00 | 649.86 | 657.22 | | 657.23 | 0.000011 | 0.36 | 3200.53 | 627.83 | 0.03 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 603.00 | 650.75 | 655.24 | | 655.24 | 0.000035 | 0.25 | 2386.38 | 752.52 | 0.03 |
| MAINSTEM | 6.644 | 50-YEAR | 996.00 | 650.75 | 656.60 | | 656.60 | 0.000030 | 0.29 | 3419.47 | 765.39 | 0.02 |
| MAINSTEM | 6.644 | 100-YEAR | 1156.00 | 650.75 | 657.23 | | 657.23 | 0.000026 | 0.30 | 3899.03 | 771.29 | 0.02 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.645 | 10-YEAR | 603.00 | 650.30 | 655.25 | | 655.25 | 0.000064 | 0.25 | 2464.97 | 1397.34 | 0.03 |
| MAINSTEM | 6.645 | 50-YEAR | 996.00 | 650.30 | 656.61 | | 656.61 | 0.000028 | 0.23 | 4528.81 | 1640.89 | 0.02 |
| MAINSTEM | 6.645 | 100-YEAR | 1156.00 | 650.30 | 657.23 | | 657.23 | 0.000021 | 0.22 | 5586.57 | 1761.90 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.647 | 10-YEAR | 314.00 | 652.50 | 655.21 | 653.55 | 655.29 | 0.001220 | 2.24 | 141.92 | 70.22 | 0.24 |
| SOUTH TRIB | 6.647 | 50-YEAR | 506.00 | 652.50 | 656.56 | 653.95 | 656.65 | 0.000816 | 2.40 | 213.63 | 82.20 | 0.21 |
| SOUTH TRIB | 6.647 | 100-YEAR | 570.00 | 652.50 | 657.19 | 654.06 | 657.27 | 0.000641 | 2.34 | 246.78 | 87.74 | 0.19 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.6475 Ramp Q5 | | | Culvert | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.648 | 10-YEAR | 314.00 | 653.00 | 655.41 | 654.05 | 655.51 | 0.001821 | 2.53 | 124.05 | 166.74 | 0.29 |
| SOUTH TRIB | 6.648 | 50-YEAR | 506.00 | 653.00 | 656.74 | 654.45 | 656.85 | 0.001088 | 2.62 | 193.40 | 172.58 | 0.24 |
| SOUTH TRIB | 6.648 | 100-YEAR | 570.00 | 653.00 | 657.45 | 654.56 | 657.54 | 0.000776 | 2.49 | 230.70 | 176.45 | 0.21 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.649 | 10-YEAR | 314.00 | 653.50 | 655.62 | 654.98 | 655.67 | 0.002464 | 2.02 | 191.72 | 233.75 | 0.30 |
| SOUTH TRIB | 6.649 | 50-YEAR | 506.00 | 653.50 | 656.89 | 655.18 | 656.91 | 0.000524 | 1.44 | 414.75 | 241.33 | 0.16 |
| SOUTH TRIB | 6.649 | 100-YEAR | 570.00 | 653.50 | 657.56 | 655.23 | 657.58 | 0.000287 | 1.24 | 538.20 | 245.39 | 0.12 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.650 | 10-YEAR | 314.00 | 653.50 | 655.74 | 655.37 | 655.91 | 0.007542 | 3.74 | 102.44 | 269.47 | 0.54 |
| SOUTH TRIB | 6.650 | 50-YEAR | 506.00 | 653.50 | 656.88 | 655.66 | 656.98 | 0.002111 | 2.88 | 208.26 | 276.30 | 0.31 |
| SOUTH TRIB | 6.650 | 100-YEAR | 570.00 | 653.50 | 657.55 | 655.72 | 657.63 | 0.001139 | 2.46 | 274.12 | 280.32 | 0.24 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.651 | 10-YEAR | 314.00 | 653.50 | 656.23 | 654.99 | 656.27 | 0.001433 | 1.96 | 210.18 | 344.36 | 0.25 |
| SOUTH TRIB | 6.651 | 50-YEAR | 506.00 | 653.50 | 657.10 | 654.99 | 657.14 | 0.000772 | 1.84 | 348.17 | 349.61 | 0.19 |
| SOUTH TRIB | 6.651 | 100-YEAR | 570.00 | 653.50 | 657.69 | 654.99 | 657.71 | 0.000458 | 1.60 | 443.34 | 353.12 | 0.15 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.652 | 10-YEAR | 314.00 | 653.50 | 656.42 | 654.99 | 656.44 | 0.000559 | 1.30 | 328.34 | 287.52 | 0.16 |
| SOUTH TRIB | 6.652 | 50-YEAR | 506.00 | 653.50 | 657.22 | 654.99 | 657.24 | 0.000356 | 1.28 | 512.64 | 292.32 | 0.13 |
| SOUTH TRIB | 6.652 | 100-YEAR | 570.00 | 653.50 | 657.76 | 654.99 | 657.78 | 0.000223 | 1.14 | 639.57 | 295.58 | 0.11 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.653 | 10-YEAR | 314.00 | 653.50 | 656.48 | 654.55 | 656.55 | 0.000864 | 2.01 | 157.49 | 77.90 | 0.21 |
| SOUTH TRIB | 6.653 | 50-YEAR | 506.00 | 653.50 | 657.25 | 654.93 | 657.35 | 0.001045 | 2.58 | 198.12 | 82.50 | 0.23 |
| SOUTH TRIB | 6.653 | 100-YEAR | 570.00 | 653.50 | 657.77 | 655.04 | 657.87 | 0.000859 | 2.55 | 225.66 | 85.62 | 0.22 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.654 Ramp P5,O4,Q5 | | | Culvert | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.655 | 10-YEAR | 314.00 | 654.50 | 656.97 | 655.54 | 657.06 | 0.001618 | 2.42 | 130.42 | 123.97 | 0.27 |
| SOUTH TRIB | 6.655 | 50-YEAR | 506.00 | 654.50 | 657.81 | 655.93 | 657.94 | 0.001575 | 2.91 | 175.09 | 143.70 | 0.28 |
| SOUTH TRIB | 6.655 | 100-YEAR | 570.00 | 654.50 | 658.34 | 656.03 | 658.47 | 0.001211 | 2.82 | 203.46 | 150.13 | 0.25 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.656 | 10-YEAR | 314.00 | 655.00 | 657.31 | 657.18 | 657.64 | 0.012913 | 5.04 | 75.57 | 221.31 | 0.71 |
| SOUTH TRIB | 6.656 | 50-YEAR | 506.00 | 655.00 | 658.13 | 657.51 | 658.38 | 0.005901 | 4.50 | 132.39 | 268.76 | 0.51 |
| SOUTH TRIB | 6.656 | 100-YEAR | 570.00 | 655.00 | 658.58 | 657.61 | 658.78 | 0.003760 | 4.04 | 164.04 | 271.47 | 0.42 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.657 | 10-YEAR | 314.00 | 655.00 | 658.06 | 657.15 | 658.10 | 0.001131 | 1.94 | 221.60 | 323.37 | 0.22 |
| SOUTH TRIB | 6.657 | 50-YEAR | 506.00 | 655.00 | 658.68 | 657.42 | 658.72 | 0.000979 | 2.11 | 313.56 | 327.05 | 0.22 |
| SOUTH TRIB | 6.657 | 100-YEAR | 570.00 | 655.00 | 659.00 | 657.49 | 659.04 | 0.000784 | 2.02 | 361.70 | 328.98 | 0.20 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.658 | 10-YEAR | 314.00 | 655.00 | 658.18 | 657.16 | 658.20 | 0.000642 | 1.51 | 295.55 | 314.07 | 0.17 |
| SOUTH TRIB | 6.658 | 50-YEAR | 506.00 | 655.00 | 658.78 | 657.37 | 658.81 | 0.000569 | 1.65 | 415.17 | 317.70 | 0.17 |
| SOUTH TRIB | 6.658 | 100-YEAR | 570.00 | 655.00 | 659.09 | 657.43 | 659.11 | 0.000468 | 1.59 | 475.55 | 319.52 | 0.15 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.12 | 10-YEAR | 287.00 | 655.00 | 658.24 | | 658.30 | 0.000805 | 1.91 | 151.19 | 54.44 | 0.20 |
| SOUTH TRIB | 7.12 | 50-YEAR | 461.00 | 655.00 | 658.82 | | 658.92 | 0.001133 | 2.56 | 183.98 | 57.94 | 0.24 |
| SOUTH TRIB | 7.12 | 100-YEAR | 517.00 | 655.00 | 659.11 | | 659.22 | 0.001094 | 2.65 | 200.77 | 59.65 | 0.24 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.21 | 10-YEAR | 287.00 | 656.10 | 658.86 | | 659.08 | 0.004569 | 3.86 | 80.28 | 52.33 | 0.44 |
| SOUTH TRIB | 7.21 | 50-YEAR | 461.00 | 656.10 | 659.61 | | 659.87 | 0.004093 | 4.27 | 128.42 | 75.54 | 0.44 |
| SOUTH TRIB | 7.21 | 100-YEAR | 517.00 | 656.10 | 659.86 | | 660.11 | 0.003693 | 4.25 | 147.67 | 78.98 | 0.42 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.22 | 10-YEAR | 287.00 | 656.50 | 659.40 | 659.40 | 659.91 | 0.018342 | 6.78 | 59.06 | 56.92 | 0.85 |
| SOUTH TRIB | 7.22 | 50-YEAR | 461.00 | 656.50 | 659.83 | 659.83 | 660.42 | 0.019054 | 7.63 | 86.17 | 69.95 | 0.88 |
| SOUTH TRIB | 7.22 | 100-YEAR | 517.00 | 656.50 | 660.01 | | 660.56 | 0.017076 | 7.48 | 98.96 | 75.31 | 0.84 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.247 | 10-YEAR | 287.00 | 656.80 | 660.63 | | 660.71 | 0.002451 | 2.85 | 133.21 | 79.15 | 0.31 |
| SOUTH TRIB | 7.247 | 50-YEAR | 461.00 | 656.80 | 661.17 | | 661.29 | 0.002662 | 3.24 | 176.68 | 81.83 | 0.33 |
| SOUTH TRIB | 7.247 | 100-YEAR | 517.00 | 656.80 | 661.30 | | 661.43 | 0.002804 | 3.38 | 187.16 | 82.47 | 0.34 |
| | | | | | | | | | | | | |

HEC-RAS Plan: Nat - P1,P8,P2 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.259 | 10-YEAR | 287.00 | 657.00 | 660.78 | | 660.85 | 0.001963 | 2.53 | 144.40 | 80.68 | 0.28 |
| SOUTH TRIB | 7.259 | 50-YEAR | 461.00 | 657.00 | 661.34 | | 661.43 | 0.002168 | 2.92 | 189.96 | 83.35 | 0.30 |
| SOUTH TRIB | 7.259 | 100-YEAR | 517.00 | 657.00 | 661.47 | | 661.58 | 0.002274 | 3.05 | 201.43 | 84.01 | 0.31 |
| SOUTH TRIB | 7.265 | 10-YEAR | 287.00 | 657.38 | 660.67 | | 661.05 | 0.007076 | 5.36 | 72.07 | 59.60 | 0.54 |
| SOUTH TRIB | 7.265 | 50-YEAR | 461.00 | 657.38 | 661.22 | | 661.65 | 0.007372 | 6.11 | 105.38 | 62.81 | 0.57 |
| SOUTH TRIB | 7.265 | 100-YEAR | 517.00 | 657.38 | 661.35 | | 661.81 | 0.007631 | 6.36 | 113.61 | 63.58 | 0.58 |
| SOUTH TRIB | 7.289 | 10-YEAR | 287.00 | 657.30 | 661.50 | | 661.70 | 0.003653 | 4.05 | 84.94 | 35.70 | 0.40 |
| SOUTH TRIB | 7.289 | 50-YEAR | 461.00 | 657.30 | 662.12 | | 662.43 | 0.004964 | 5.09 | 108.29 | 39.92 | 0.47 |
| SOUTH TRIB | 7.289 | 100-YEAR | 517.00 | 657.30 | 662.29 | | 662.63 | 0.005328 | 5.37 | 115.01 | 41.06 | 0.49 |
| SOUTH TRIB | 7.314 | 10-YEAR | 287.00 | 657.10 | 661.91 | | 662.00 | 0.001517 | 2.75 | 125.60 | 47.49 | 0.26 |
| SOUTH TRIB | 7.314 | 50-YEAR | 461.00 | 657.10 | 662.69 | | 662.82 | 0.001877 | 3.32 | 164.78 | 53.26 | 0.29 |
| SOUTH TRIB | 7.314 | 100-YEAR | 517.00 | 657.10 | 662.90 | | 663.05 | 0.001969 | 3.47 | 176.23 | 54.83 | 0.30 |
| SOUTH TRIB | 7.331 | 10-YEAR | 287.00 | 657.60 | 662.09 | | 662.44 | 0.007196 | 5.20 | 62.01 | 26.13 | 0.55 |
| SOUTH TRIB | 7.331 | 50-YEAR | 461.00 | 657.60 | 662.87 | | 663.36 | 0.008305 | 6.13 | 84.15 | 30.40 | 0.61 |
| SOUTH TRIB | 7.331 | 100-YEAR | 517.00 | 657.60 | 663.08 | | 663.61 | 0.008575 | 6.37 | 90.69 | 31.55 | 0.62 |
| SOUTH TRIB | 7.35 | 10-YEAR | 287.00 | 658.10 | 662.72 | | 662.91 | 0.002898 | 3.84 | 86.24 | 30.86 | 0.36 |
| SOUTH TRIB | 7.35 | 50-YEAR | 461.00 | 658.10 | 663.65 | | 663.91 | 0.003350 | 4.55 | 116.98 | 35.66 | 0.40 |
| SOUTH TRIB | 7.35 | 100-YEAR | 517.00 | 658.10 | 663.90 | | 664.18 | 0.003465 | 4.74 | 126.01 | 36.95 | 0.41 |
| SOUTH TRIB | 7.391 | 10-YEAR | 287.00 | 658.50 | 663.29 | | 663.44 | 0.002089 | 3.42 | 96.35 | 31.68 | 0.31 |
| SOUTH TRIB | 7.391 | 50-YEAR | 461.00 | 658.50 | 664.31 | | 664.52 | 0.002384 | 4.04 | 131.13 | 36.56 | 0.34 |
| SOUTH TRIB | 7.391 | 100-YEAR | 517.00 | 658.50 | 664.58 | | 664.81 | 0.002461 | 4.21 | 141.31 | 37.87 | 0.34 |
| SOUTH TRIB | 7.399 | 10-YEAR | 287.00 | 657.49 | 663.34 | 660.52 | 663.52 | 0.001317 | 3.66 | 95.62 | 24.71 | 0.28 |
| SOUTH TRIB | 7.399 | 50-YEAR | 461.00 | 657.49 | 664.34 | 661.40 | 664.63 | 0.001774 | 4.75 | 121.56 | 177.59 | 0.33 |
| SOUTH TRIB | 7.399 | 100-YEAR | 517.00 | 657.49 | 664.60 | 661.65 | 664.93 | 0.001907 | 5.06 | 128.87 | 596.70 | 0.35 |
| SOUTH TRIB | 7.406 | 10-YEAR | 287.00 | 658.60 | 663.36 | | 663.60 | 0.002176 | 4.36 | 83.53 | 25.08 | 0.35 |
| SOUTH TRIB | 7.406 | 50-YEAR | 461.00 | 658.60 | 664.37 | | 664.73 | 0.002638 | 5.46 | 110.48 | 28.28 | 0.40 |
| SOUTH TRIB | 7.406 | 100-YEAR | 517.00 | 658.60 | 664.64 | | 665.03 | 0.002760 | 5.75 | 118.21 | 28.89 | 0.41 |
| SOUTH TRIB | 7.431 | 10-YEAR | 287.00 | 659.00 | 663.64 | | 664.02 | 0.004180 | 5.65 | 66.61 | 23.78 | 0.48 |
| SOUTH TRIB | 7.431 | 50-YEAR | 461.00 | 659.00 | 664.70 | | 665.21 | 0.004367 | 6.68 | 94.17 | 28.17 | 0.51 |
| SOUTH TRIB | 7.431 | 100-YEAR | 517.00 | 659.00 | 664.99 | | 665.52 | 0.004424 | 6.96 | 102.34 | 29.35 | 0.51 |
| SOUTH TRIB | 7.447 | 10-YEAR | 287.00 | 658.10 | 663.98 | | 664.10 | 0.001200 | 3.28 | 112.77 | 31.45 | 0.26 |
| SOUTH TRIB | 7.447 | 50-YEAR | 461.00 | 658.10 | 665.12 | | 665.30 | 0.001400 | 4.07 | 151.07 | 35.68 | 0.29 |
| SOUTH TRIB | 7.447 | 100-YEAR | 517.00 | 658.10 | 665.41 | | 665.62 | 0.001600 | 4.48 | 162.10 | 48.21 | 0.31 |
| SOUTH TRIB | 7.456 | 10-YEAR | 261.00 | 658.10 | 664.04 | 660.99 | 664.14 | 0.000881 | 2.84 | 110.29 | 31.68 | 0.22 |
| SOUTH TRIB | 7.456 | 50-YEAR | 418.00 | 658.10 | 665.21 | 661.71 | 665.34 | 0.001092 | 3.62 | 154.06 | 35.99 | 0.26 |
| SOUTH TRIB | 7.456 | 100-YEAR | 468.00 | 658.10 | 665.50 | 661.91 | 665.67 | 0.001270 | 4.03 | 167.10 | 58.31 | 0.28 |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 261.00 | 658.10 | 664.80 | 660.99 | 664.87 | 0.000518 | 2.38 | 129.91 | 34.47 | 0.17 |
| SOUTH TRIB | 7.47 | 50-YEAR | 418.00 | 658.10 | 666.66 | 661.70 | 666.74 | 0.000610 | 3.12 | 359.82 | 292.61 | 0.20 |
| SOUTH TRIB | 7.47 | 100-YEAR | 468.00 | 658.10 | 666.84 | 661.90 | 666.91 | 0.000602 | 3.14 | 414.44 | 331.34 | 0.20 |
| SOUTH TRIB | 7.486 | 10-YEAR | 261.00 | 655.06 | 664.87 | | 664.87 | 0.000006 | 0.38 | 1050.51 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 50-YEAR | 418.00 | 655.06 | 666.75 | | 666.75 | 0.000006 | 0.43 | 1440.68 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 100-YEAR | 468.00 | 655.06 | 666.92 | | 666.92 | 0.000007 | 0.47 | 1476.20 | 208.30 | 0.02 |
| SOUTH TRIB | 7.493 | 10-YEAR | 261.00 | 655.05 | 664.87 | | 664.87 | 0.000001 | 0.11 | 4657.04 | 1491.36 | 0.01 |
| SOUTH TRIB | 7.493 | 50-YEAR | 418.00 | 655.05 | 666.75 | | 666.75 | 0.000000 | 0.09 | 7552.90 | 1584.69 | 0.01 |
| SOUTH TRIB | 7.493 | 100-YEAR | 468.00 | 655.05 | 666.92 | | 666.92 | 0.000000 | 0.10 | 7824.37 | 1592.30 | 0.01 |

HEC-RAS Plan: Nat - P1,P8,P2

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 4.518 | 10-YEAR | 644.73 | 644.69 | 0.04 | 0.05 | 0.01 | 11.61 | 870.78 | 11.61 | 68.69 |
| MAINSTEM | 4.518 | 50-YEAR | 646.41 | 646.33 | 0.08 | 0.06 | 0.01 | 22.42 | 1414.15 | 22.42 | 70.33 |
| MAINSTEM | 4.518 | 100-YEAR | 647.00 | 646.91 | 0.09 | 0.06 | 0.01 | 27.25 | 1627.50 | 27.25 | 70.91 |
| MAINSTEM | 4.594 | 10-YEAR | 644.77 | 644.73 | 0.04 | 0.04 | 0.00 | 11.67 | 870.66 | 11.67 | 68.73 |
| MAINSTEM | 4.594 | 50-YEAR | 646.48 | 646.40 | 0.08 | 0.07 | 0.00 | 22.57 | 1413.87 | 22.57 | 70.40 |
| MAINSTEM | 4.594 | 100-YEAR | 647.07 | 646.98 | 0.09 | 0.07 | 0.00 | 27.43 | 1627.14 | 27.43 | 70.98 |
| MAINSTEM | 4.675 | 10-YEAR | 644.82 | 644.78 | 0.04 | 0.05 | 0.00 | 11.67 | 870.65 | 11.67 | 68.72 |
| MAINSTEM | 4.675 | 50-YEAR | 646.55 | 646.47 | 0.08 | 0.07 | 0.00 | 22.64 | 1413.71 | 22.64 | 70.41 |
| MAINSTEM | 4.675 | 100-YEAR | 647.15 | 647.06 | 0.09 | 0.08 | 0.00 | 27.55 | 1626.91 | 27.55 | 71.01 |
| MAINSTEM | 4.773 | 10-YEAR | 644.88 | 644.84 | 0.03 | 0.05 | 0.00 | 10.26 | 764.66 | 9.07 | 68.37 |
| MAINSTEM | 4.773 | 50-YEAR | 646.62 | 646.57 | 0.06 | 0.07 | 0.00 | 19.17 | 1190.88 | 16.95 | 70.04 |
| MAINSTEM | 4.773 | 100-YEAR | 647.24 | 647.17 | 0.07 | 0.08 | 0.00 | 24.25 | 1423.32 | 21.43 | 70.63 |
| MAINSTEM | 4.790 | 10-YEAR | 644.93 | 644.81 | 0.12 | 0.01 | 0.04 | | 784.00 | | 68.35 |
| MAINSTEM | 4.790 | 50-YEAR | 646.71 | 646.51 | 0.20 | 0.02 | 0.07 | | 1227.00 | | 69.99 |
| MAINSTEM | 4.790 | 100-YEAR | 647.35 | 647.09 | 0.26 | 0.02 | 0.09 | | 1469.00 | | 70.56 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 645.42 | 645.28 | 0.15 | | | | 784.00 | | 65.50 |
| MAINSTEM | 5.059 | 50-YEAR | 647.81 | 647.60 | 0.21 | | | | 1227.00 | | 67.78 |
| MAINSTEM | 5.059 | 100-YEAR | 648.96 | 648.71 | 0.25 | | | | 1469.00 | | 68.88 |
| MAINSTEM | 5.076 | 10-YEAR | 645.46 | 645.41 | 0.05 | 0.03 | 0.01 | | 784.00 | | 65.48 |
| MAINSTEM | 5.076 | 50-YEAR | 647.85 | 647.79 | 0.07 | 0.03 | 0.01 | | 1227.00 | | 67.85 |
| MAINSTEM | 5.076 | 100-YEAR | 649.00 | 648.93 | 0.07 | 0.03 | 0.02 | | 1469.00 | | 68.98 |
| MAINSTEM | 5.104 | 10-YEAR | 645.51 | 645.41 | 0.10 | 0.03 | 0.02 | | 784.00 | | 65.32 |
| MAINSTEM | 5.104 | 50-YEAR | 647.90 | 647.76 | 0.14 | 0.03 | 0.02 | | 1227.00 | | 67.69 |
| MAINSTEM | 5.104 | 100-YEAR | 649.06 | 648.90 | 0.16 | 0.03 | 0.03 | | 1469.00 | | 68.83 |
| MAINSTEM | 5.109 | 10-YEAR | 645.54 | 645.37 | 0.17 | 0.01 | 0.02 | | 784.00 | | 65.24 |
| MAINSTEM | 5.109 | 50-YEAR | 647.94 | 647.71 | 0.24 | 0.01 | 0.03 | | 1227.00 | | 67.60 |
| MAINSTEM | 5.109 | 100-YEAR | 649.10 | 648.83 | 0.27 | 0.01 | 0.03 | | 1469.00 | | 68.73 |
| MAINSTEM | 5.110 | 10-YEAR | 645.56 | 645.33 | 0.23 | 0.00 | 0.02 | | 784.00 | | 44.59 |
| MAINSTEM | 5.110 | 50-YEAR | 647.98 | 647.64 | 0.34 | 0.00 | 0.03 | | 1227.00 | | 50.16 |
| MAINSTEM | 5.110 | 100-YEAR | 649.14 | 648.75 | 0.40 | 0.00 | 0.04 | | 1469.00 | | 52.83 |
| MAINSTEM | 5.116 | 10-YEAR | 645.57 | 645.33 | 0.24 | 0.01 | 0.00 | | 784.00 | | 25.00 |
| MAINSTEM | 5.116 | 50-YEAR | 647.99 | 647.64 | 0.35 | 0.01 | 0.01 | 0.02 | 1226.96 | 0.02 | 26.44 |
| MAINSTEM | 5.116 | 100-YEAR | 649.16 | 648.75 | 0.41 | 0.01 | 0.01 | 0.25 | 1468.50 | 0.25 | 31.23 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 646.33 | 646.04 | 0.29 | | | | 634.00 | | 25.50 |
| MAINSTEM | 5.606 | 50-YEAR | 649.94 | 649.63 | 0.30 | | | | 1056.00 | | 57.44 |
| MAINSTEM | 5.606 | 100-YEAR | 651.85 | 651.57 | 0.28 | | | | 1227.00 | | 80.97 |
| MAINSTEM | 5.610 | 10-YEAR | 646.36 | 646.34 | 0.02 | 0.00 | 0.03 | | 634.00 | | 125.36 |
| MAINSTEM | 5.610 | 50-YEAR | 649.97 | 649.95 | 0.02 | 0.00 | 0.03 | | 1056.00 | | 145.88 |
| MAINSTEM | 5.610 | 100-YEAR | 651.88 | 651.86 | 0.02 | 0.00 | 0.03 | | 1227.00 | | 156.76 |
| MAINSTEM | 5.629 | 10-YEAR | 646.36 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 215.49 |
| MAINSTEM | 5.629 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 237.14 |
| MAINSTEM | 5.629 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 248.61 |
| MAINSTEM | 5.632 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 411.47 |
| MAINSTEM | 5.632 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 433.12 |
| MAINSTEM | 5.632 | 100-YEAR | 651.88 | 651.88 | 0.00 | 0.00 | 0.00 | | 1227.00 | | 444.58 |
| MAINSTEM | 5.639 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 737.22 |
| MAINSTEM | 5.639 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 758.86 |
| MAINSTEM | 5.639 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 770.33 |
| MAINSTEM | 5.697 | 10-YEAR | 646.41 | 646.37 | 0.04 | 0.03 | 0.01 | | 634.00 | | 311.74 |
| MAINSTEM | 5.697 | 50-YEAR | 649.99 | 649.96 | 0.03 | 0.01 | 0.01 | | 1056.00 | | 333.27 |
| MAINSTEM | 5.697 | 100-YEAR | 651.90 | 651.87 | 0.02 | 0.01 | 0.01 | | 1227.00 | | 344.73 |
| MAINSTEM | 5.720 | 10-YEAR | 646.51 | 646.35 | 0.16 | 0.06 | 0.04 | | 634.00 | | 161.07 |
| MAINSTEM | 5.720 | 50-YEAR | 650.05 | 649.91 | 0.14 | 0.02 | 0.03 | | 1056.00 | | 188.74 |
| MAINSTEM | 5.720 | 100-YEAR | 651.94 | 651.82 | 0.12 | 0.01 | 0.03 | | 1227.00 | | 203.61 |
| MAINSTEM | 5.725 | 10-YEAR | 646.59 | 646.28 | 0.31 | 0.03 | 0.04 | | 634.00 | | 93.92 |
| MAINSTEM | 5.725 | 50-YEAR | 650.10 | 649.82 | 0.28 | 0.01 | 0.04 | | 1056.00 | | 126.73 |
| MAINSTEM | 5.725 | 100-YEAR | 651.99 | 651.74 | 0.25 | 0.01 | 0.04 | | 1227.00 | | 144.48 |

HEC-RAS Plan: Nat - P1,P8,P2 (Continued)

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 5.727 | 10-YEAR | 646.68 | 646.23 | 0.45 | 0.02 | 0.07 | | 634.00 | | 25.00 |
| MAINSTEM | 5.727 | 50-YEAR | 650.18 | 649.77 | 0.41 | 0.01 | 0.06 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.727 | 100-YEAR | 652.05 | 651.69 | 0.36 | 0.01 | 0.06 | | 1227.00 | | 27.98 |
| MAINSTEM | 5.732 | 10-YEAR | 646.81 | 646.38 | 0.44 | 0.13 | 0.00 | | 634.00 | | 25.00 |
| MAINSTEM | 5.732 | 50-YEAR | 650.24 | 649.84 | 0.41 | 0.07 | 0.00 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.732 | 100-YEAR | 652.10 | 651.74 | 0.36 | 0.05 | 0.00 | | 1227.00 | | 27.64 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 647.18 | 646.81 | 0.37 | | | | 634.00 | | 26.00 |
| MAINSTEM | 5.757 | 50-YEAR | 650.55 | 650.18 | 0.37 | | | | 1056.00 | | 26.00 |
| MAINSTEM | 5.757 | 100-YEAR | 652.40 | 652.07 | 0.33 | | | | 1227.00 | | 26.00 |
| MAINSTEM | 5.759 | 10-YEAR | 647.22 | 647.20 | 0.03 | 0.01 | 0.03 | | 634.00 | | 100.00 |
| MAINSTEM | 5.759 | 50-YEAR | 650.59 | 650.56 | 0.03 | 0.01 | 0.03 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.759 | 100-YEAR | 652.43 | 652.41 | 0.03 | 0.00 | 0.03 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.810 | 10-YEAR | 647.29 | 647.24 | 0.06 | 0.06 | 0.01 | | 634.00 | | 100.00 |
| MAINSTEM | 5.810 | 50-YEAR | 650.62 | 650.58 | 0.04 | 0.03 | 0.00 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.810 | 100-YEAR | 652.45 | 652.42 | 0.03 | 0.02 | 0.00 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.860 | 10-YEAR | 648.57 | 647.64 | 0.93 | 0.42 | 0.26 | | 634.00 | | 100.00 |
| MAINSTEM | 5.860 | 50-YEAR | 650.83 | 650.43 | 0.40 | 0.10 | 0.11 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.860 | 100-YEAR | 652.58 | 652.31 | 0.28 | 0.06 | 0.07 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.862 | 10-YEAR | 649.70 | 648.45 | 1.26 | 0.73 | 0.16 | | 634.00 | | 28.35 |
| MAINSTEM | 5.862 | 50-YEAR | 651.40 | 650.19 | 1.20 | 0.17 | 0.40 | | 1056.00 | | 28.35 |
| MAINSTEM | 5.862 | 100-YEAR | 652.90 | 652.14 | 0.76 | 0.07 | 0.24 | | 1227.00 | | 28.35 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 651.96 | 651.60 | 0.37 | | | | 634.00 | | 33.00 |
| MAINSTEM | 6.037 | 50-YEAR | 653.74 | 653.22 | 0.52 | | | | 1056.00 | | 33.00 |
| MAINSTEM | 6.037 | 100-YEAR | 654.46 | 653.90 | 0.56 | | | | 1227.00 | | 33.00 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 652.40 | 652.15 | 0.25 | | | | 603.00 | | 34.00 |
| MAINSTEM | 6.190 | 50-YEAR | 654.26 | 653.91 | 0.35 | | | | 996.00 | | 34.00 |
| MAINSTEM | 6.190 | 100-YEAR | 655.00 | 654.62 | 0.38 | | | | 1156.00 | | 34.00 |
| MAINSTEM | 6.194 | 10-YEAR | 652.44 | 652.41 | 0.03 | 0.01 | 0.02 | | 603.00 | | 100.00 |
| MAINSTEM | 6.194 | 50-YEAR | 654.31 | 654.27 | 0.04 | 0.01 | 0.03 | | 996.00 | | 100.00 |
| MAINSTEM | 6.194 | 100-YEAR | 655.04 | 655.00 | 0.04 | 0.01 | 0.03 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.332 | 10-YEAR | 652.55 | 652.52 | 0.03 | 0.11 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.332 | 50-YEAR | 654.41 | 654.37 | 0.04 | 0.10 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.332 | 100-YEAR | 655.14 | 655.10 | 0.04 | 0.10 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.418 | 10-YEAR | 652.63 | 652.61 | 0.03 | 0.09 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.418 | 50-YEAR | 654.49 | 654.45 | 0.04 | 0.08 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.418 | 100-YEAR | 655.22 | 655.18 | 0.04 | 0.08 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.471 | 10-YEAR | 652.73 | 652.65 | 0.08 | 0.08 | 0.02 | | 603.00 | | 55.30 |
| MAINSTEM | 6.471 | 50-YEAR | 654.59 | 654.48 | 0.12 | 0.08 | 0.02 | | 996.00 | | 55.30 |
| MAINSTEM | 6.471 | 100-YEAR | 655.32 | 655.19 | 0.13 | 0.07 | 0.03 | | 1156.00 | | 55.30 |
| MAINSTEM | 6.473 | 10-YEAR | 652.79 | 652.61 | 0.18 | 0.01 | 0.05 | | 603.00 | | 40.00 |
| MAINSTEM | 6.473 | 50-YEAR | 654.67 | 654.42 | 0.25 | 0.01 | 0.07 | | 996.00 | | 40.00 |
| MAINSTEM | 6.473 | 100-YEAR | 655.40 | 655.13 | 0.27 | 0.01 | 0.07 | | 1156.00 | | 40.00 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | |
| MAINSTEM | 6.597 | 10-YEAR | 653.12 | 653.04 | 0.08 | | | | 603.00 | | 120.63 |
| MAINSTEM | 6.597 | 50-YEAR | 655.06 | 654.96 | 0.10 | | | | 996.00 | | 1005.08 |
| MAINSTEM | 6.597 | 100-YEAR | 655.82 | 655.70 | 0.11 | | | | 1156.00 | | 1022.24 |
| MAINSTEM | 6.6 | 10-YEAR | 653.15 | 653.04 | 0.11 | 0.01 | 0.01 | | 603.00 | | 199.96 |
| MAINSTEM | 6.6 | 50-YEAR | 655.09 | 654.95 | 0.15 | 0.01 | 0.02 | | 996.00 | | 234.17 |
| MAINSTEM | 6.6 | 100-YEAR | 655.85 | 655.69 | 0.16 | 0.01 | 0.02 | | 1156.00 | | 247.45 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 653.45 | 652.11 | 1.34 | | | | 603.00 | | 219.64 |
| MAINSTEM | 6.635 | 50-YEAR | 655.44 | 654.35 | 1.09 | | | | 996.00 | | 1223.86 |
| MAINSTEM | 6.635 | 100-YEAR | 656.22 | 655.11 | 1.11 | | | | 1156.00 | | 1229.94 |

HEC-RAS Plan: Nat - P1,P8,P2 (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 6.637 | 10-YEAR | 653.85 | 653.85 | 0.00 | 0.00 | 0.40 | 5.04 | 597.62 | 0.34 | 1208.72 |
| MAINSTEM | 6.637 | 50-YEAR | 655.77 | 655.77 | 0.00 | 0.00 | 0.33 | 15.52 | 979.22 | 1.26 | 1234.59 |
| MAINSTEM | 6.637 | 100-YEAR | 656.55 | 656.55 | 0.00 | 0.00 | 0.33 | 19.84 | 1134.37 | 1.79 | 1240.08 |
| | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 654.18 | 653.53 | 0.65 | 0.00 | 0.33 | | 603.00 | | 40.24 |
| MAINSTEM | 6.639 | 50-YEAR | 656.00 | 655.55 | 0.44 | 0.00 | 0.22 | | 996.00 | | 52.10 |
| MAINSTEM | 6.639 | 100-YEAR | 656.75 | 656.35 | 0.39 | 0.00 | 0.20 | | 1156.00 | | 56.81 |
| | | | | | | | | | | | |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 655.03 | 654.58 | 0.45 | 0.01 | 0.00 | | 603.00 | | 47.66 |
| MAINSTEM | 6.642 | 50-YEAR | 656.42 | 655.99 | 0.43 | 0.01 | 0.00 | | 996.00 | | 61.45 |
| MAINSTEM | 6.642 | 100-YEAR | 657.07 | 656.70 | 0.38 | 0.00 | 0.00 | | 1156.00 | | 68.58 |
| | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 655.12 | 654.72 | 0.40 | 0.07 | 0.01 | | 603.00 | | 48.91 |
| MAINSTEM | 6.643 | 50-YEAR | 656.48 | 656.06 | 0.41 | 0.05 | 0.01 | | 996.00 | | 62.23 |
| MAINSTEM | 6.643 | 100-YEAR | 657.12 | 656.75 | 0.37 | 0.04 | 0.00 | | 1156.00 | | 69.12 |
| | | | | | | | | | | | |
| MAINSTEM | 6.6435 | 10-YEAR | 655.24 | 655.24 | 0.00 | 0.00 | 0.12 | | 603.00 | | 613.85 |
| MAINSTEM | 6.6435 | 50-YEAR | 656.60 | 656.60 | 0.00 | 0.00 | 0.12 | | 996.00 | | 623.44 |
| MAINSTEM | 6.6435 | 100-YEAR | 657.23 | 657.22 | 0.00 | 0.00 | 0.11 | | 1156.00 | | 627.83 |
| | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 655.24 | 655.24 | 0.00 | 0.00 | 0.00 | | 603.00 | | 752.52 |
| MAINSTEM | 6.644 | 50-YEAR | 656.60 | 656.60 | 0.00 | 0.00 | 0.00 | | 996.00 | | 765.39 |
| MAINSTEM | 6.644 | 100-YEAR | 657.23 | 657.23 | 0.00 | 0.00 | 0.00 | | 1156.00 | | 771.29 |
| | | | | | | | | | | | |
| MAINSTEM | 6.645 | 10-YEAR | 655.25 | 655.25 | 0.00 | 0.01 | 0.00 | 0.11 | 578.57 | 24.32 | 1397.34 |
| MAINSTEM | 6.645 | 50-YEAR | 656.61 | 656.61 | 0.00 | 0.01 | 0.00 | 10.16 | 891.27 | 94.58 | 1640.89 |
| MAINSTEM | 6.645 | 100-YEAR | 657.23 | 657.23 | 0.00 | 0.00 | 0.00 | 20.89 | 1005.68 | 129.43 | 1761.90 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.647 | 10-YEAR | 655.29 | 655.21 | 0.08 | 0.00 | 0.04 | 7.55 | 303.95 | 2.50 | 70.22 |
| SOUTH TRIB | 6.647 | 50-YEAR | 656.65 | 656.56 | 0.09 | 0.00 | 0.04 | 12.43 | 488.03 | 5.54 | 82.20 |
| SOUTH TRIB | 6.647 | 100-YEAR | 657.27 | 657.19 | 0.08 | 0.00 | 0.04 | 14.08 | 549.19 | 6.73 | 87.74 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.6475 Ramp Q5 | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.648 | 10-YEAR | 655.51 | 655.41 | 0.10 | | | | 314.00 | 0.00 | 166.74 |
| SOUTH TRIB | 6.648 | 50-YEAR | 656.85 | 656.74 | 0.11 | | | | 505.81 | 0.19 | 172.58 |
| SOUTH TRIB | 6.648 | 100-YEAR | 657.54 | 657.45 | 0.10 | | | | 569.24 | 0.76 | 176.45 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.649 | 10-YEAR | 655.67 | 655.62 | 0.04 | 0.15 | 0.01 | 230.33 | 83.28 | 0.38 | 233.75 |
| SOUTH TRIB | 6.649 | 50-YEAR | 656.91 | 656.89 | 0.02 | 0.05 | 0.01 | 388.83 | 113.79 | 3.38 | 241.33 |
| SOUTH TRIB | 6.649 | 100-YEAR | 657.58 | 657.56 | 0.02 | 0.03 | 0.01 | 440.96 | 123.37 | 5.67 | 245.39 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.650 | 10-YEAR | 655.91 | 655.74 | 0.16 | 0.20 | 0.04 | 145.43 | 167.50 | 1.07 | 269.47 |
| SOUTH TRIB | 6.650 | 50-YEAR | 656.98 | 656.88 | 0.10 | 0.05 | 0.02 | 271.38 | 227.87 | 6.74 | 276.30 |
| SOUTH TRIB | 6.650 | 100-YEAR | 657.63 | 657.55 | 0.07 | 0.03 | 0.02 | 314.68 | 244.17 | 11.15 | 280.32 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.651 | 10-YEAR | 656.27 | 656.23 | 0.04 | 0.35 | 0.01 | 177.91 | 116.43 | 19.65 | 344.36 |
| SOUTH TRIB | 6.651 | 50-YEAR | 657.14 | 657.10 | 0.04 | 0.15 | 0.01 | 295.16 | 157.21 | 53.63 | 349.61 |
| SOUTH TRIB | 6.651 | 100-YEAR | 657.71 | 657.69 | 0.03 | 0.08 | 0.00 | 334.62 | 165.38 | 69.99 | 353.12 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.652 | 10-YEAR | 656.44 | 656.42 | 0.02 | 0.17 | 0.00 | 195.76 | 84.89 | 33.35 | 287.52 |
| SOUTH TRIB | 6.652 | 50-YEAR | 657.24 | 657.22 | 0.02 | 0.10 | 0.00 | 315.97 | 114.33 | 75.69 | 292.32 |
| SOUTH TRIB | 6.652 | 100-YEAR | 657.78 | 657.76 | 0.01 | 0.06 | 0.00 | 355.30 | 119.75 | 94.96 | 295.58 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.653 | 10-YEAR | 656.55 | 656.48 | 0.06 | 0.09 | 0.02 | 6.22 | 300.15 | 7.63 | 77.90 |
| SOUTH TRIB | 6.653 | 50-YEAR | 657.35 | 657.25 | 0.10 | 0.07 | 0.04 | 10.45 | 483.12 | 12.42 | 82.50 |
| SOUTH TRIB | 6.653 | 100-YEAR | 657.87 | 657.77 | 0.10 | 0.05 | 0.04 | 12.01 | 543.93 | 14.06 | 85.62 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.654 Ramp P5,O4,Q5 | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.655 | 10-YEAR | 657.06 | 656.97 | 0.09 | | | 7.20 | 298.89 | 7.90 | 123.97 |
| SOUTH TRIB | 6.655 | 50-YEAR | 657.94 | 657.81 | 0.13 | | | 11.91 | 481.30 | 12.79 | 143.70 |
| SOUTH TRIB | 6.655 | 100-YEAR | 658.47 | 658.34 | 0.12 | | | 13.56 | 542.01 | 14.44 | 150.13 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.656 | 10-YEAR | 657.64 | 657.31 | 0.33 | 0.51 | 0.07 | 35.58 | 236.46 | 41.96 | 221.31 |
| SOUTH TRIB | 6.656 | 50-YEAR | 658.38 | 658.13 | 0.25 | 0.40 | 0.04 | 89.00 | 320.85 | 96.15 | 268.76 |
| SOUTH TRIB | 6.656 | 100-YEAR | 658.78 | 658.58 | 0.20 | 0.29 | 0.02 | 110.41 | 342.39 | 117.20 | 271.47 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.657 | 10-YEAR | 658.10 | 658.06 | 0.04 | 0.44 | 0.03 | 79.49 | 134.24 | 100.26 | 323.37 |
| SOUTH TRIB | 6.657 | 50-YEAR | 658.72 | 658.68 | 0.05 | 0.32 | 0.02 | 152.39 | 184.82 | 168.80 | 327.05 |
| SOUTH TRIB | 6.657 | 100-YEAR | 659.04 | 659.00 | 0.04 | 0.24 | 0.02 | 180.75 | 196.71 | 192.53 | 328.98 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.658 | 10-YEAR | 658.20 | 658.18 | 0.02 | 0.10 | 0.00 | 59.00 | 109.78 | 145.22 | 314.07 |
| SOUTH TRIB | 6.658 | 50-YEAR | 658.81 | 658.78 | 0.03 | 0.09 | 0.00 | 110.96 | 149.76 | 245.28 | 317.70 |
| SOUTH TRIB | 6.658 | 100-YEAR | 659.11 | 659.09 | 0.02 | 0.07 | 0.00 | 130.88 | 159.14 | 279.98 | 319.52 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.12 | 10-YEAR | 658.30 | 658.24 | 0.06 | 0.09 | 0.01 | 0.34 | 286.31 | 0.34 | 54.44 |

HEC-RAS Plan: Nat - P1,P8,P2 (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 7.12 | 50-YEAR | 658.92 | 658.82 | 0.10 | 0.09 | 0.02 | 1.93 | 457.15 | 1.93 | 57.94 |
| SOUTH TRIB | 7.12 | 100-YEAR | 659.22 | 659.11 | 0.11 | 0.08 | 0.02 | 3.19 | 510.62 | 3.19 | 59.65 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.21 | 10-YEAR | 659.08 | 658.86 | 0.22 | 0.74 | 0.05 | 8.25 | 278.75 | | 52.33 |
| SOUTH TRIB | 7.21 | 50-YEAR | 659.87 | 659.61 | 0.26 | 0.90 | 0.05 | 50.75 | 410.25 | | 75.54 |
| SOUTH TRIB | 7.21 | 100-YEAR | 660.11 | 659.86 | 0.25 | 0.85 | 0.04 | 75.71 | 441.29 | | 78.98 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.22 | 10-YEAR | 659.91 | 659.40 | 0.51 | 0.43 | 0.08 | 109.05 | 177.95 | | 56.92 |
| SOUTH TRIB | 7.22 | 50-YEAR | 660.42 | 659.83 | 0.60 | 0.40 | 0.10 | 216.70 | 244.30 | | 69.95 |
| SOUTH TRIB | 7.22 | 100-YEAR | 660.56 | 660.01 | 0.56 | 0.36 | 0.09 | 258.94 | 258.06 | | 75.31 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.247 | 10-YEAR | 660.71 | 660.63 | 0.08 | 0.76 | 0.04 | 200.85 | 86.15 | | 79.15 |
| SOUTH TRIB | 7.247 | 50-YEAR | 661.29 | 661.17 | 0.11 | 0.82 | 0.05 | 341.90 | 119.10 | | 81.83 |
| SOUTH TRIB | 7.247 | 100-YEAR | 661.43 | 661.30 | 0.12 | 0.82 | 0.04 | 387.04 | 129.96 | | 82.47 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.259 | 10-YEAR | 660.85 | 660.78 | 0.07 | 0.13 | 0.00 | 210.10 | 76.90 | | 80.68 |
| SOUTH TRIB | 7.259 | 50-YEAR | 661.43 | 661.34 | 0.09 | 0.14 | 0.00 | 352.61 | 108.39 | | 83.35 |
| SOUTH TRIB | 7.259 | 100-YEAR | 661.58 | 661.47 | 0.10 | 0.15 | 0.00 | 398.40 | 118.60 | | 84.01 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.265 | 10-YEAR | 661.05 | 660.67 | 0.37 | 0.11 | 0.09 | 40.92 | 234.65 | 11.42 | 59.60 |
| SOUTH TRIB | 7.265 | 50-YEAR | 661.65 | 661.22 | 0.43 | 0.12 | 0.10 | 124.64 | 315.60 | 20.76 | 62.81 |
| SOUTH TRIB | 7.265 | 100-YEAR | 661.81 | 661.35 | 0.46 | 0.12 | 0.11 | 152.27 | 340.88 | 23.85 | 63.58 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.289 | 10-YEAR | 661.70 | 661.50 | 0.20 | 0.63 | 0.02 | 120.29 | 166.71 | | 35.70 |
| SOUTH TRIB | 7.289 | 50-YEAR | 662.43 | 662.12 | 0.31 | 0.77 | 0.01 | 209.53 | 251.47 | | 39.92 |
| SOUTH TRIB | 7.289 | 100-YEAR | 662.63 | 662.29 | 0.34 | 0.81 | 0.01 | 239.33 | 277.67 | | 41.06 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.314 | 10-YEAR | 662.00 | 661.91 | 0.09 | 0.29 | 0.01 | 161.45 | 125.55 | | 47.49 |
| SOUTH TRIB | 7.314 | 50-YEAR | 662.82 | 662.69 | 0.13 | 0.37 | 0.02 | 274.05 | 186.95 | | 53.26 |
| SOUTH TRIB | 7.314 | 100-YEAR | 663.05 | 662.90 | 0.14 | 0.40 | 0.02 | 311.10 | 205.90 | | 54.83 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.331 | 10-YEAR | 662.44 | 662.09 | 0.35 | 0.36 | 0.08 | 111.59 | 175.41 | | 26.13 |
| SOUTH TRIB | 7.331 | 50-YEAR | 663.36 | 662.87 | 0.49 | 0.43 | 0.11 | 191.31 | 269.69 | | 30.40 |
| SOUTH TRIB | 7.331 | 100-YEAR | 663.61 | 663.08 | 0.53 | 0.45 | 0.12 | 217.66 | 299.34 | | 31.55 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.35 | 10-YEAR | 662.91 | 662.72 | 0.19 | 0.46 | 0.02 | 99.36 | 187.64 | | 30.86 |
| SOUTH TRIB | 7.35 | 50-YEAR | 663.91 | 663.65 | 0.26 | 0.53 | 0.02 | 177.20 | 283.80 | | 35.66 |
| SOUTH TRIB | 7.35 | 100-YEAR | 664.18 | 663.90 | 0.28 | 0.54 | 0.02 | 203.43 | 313.57 | | 36.95 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.391 | 10-YEAR | 663.44 | 663.29 | 0.15 | 0.53 | 0.00 | 95.72 | 191.28 | | 31.68 |
| SOUTH TRIB | 7.391 | 50-YEAR | 664.52 | 664.31 | 0.21 | 0.60 | 0.01 | 171.06 | 289.94 | | 36.56 |
| SOUTH TRIB | 7.391 | 100-YEAR | 664.81 | 664.58 | 0.22 | 0.62 | 0.01 | 196.50 | 320.50 | | 37.87 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.399 | 10-YEAR | 663.52 | 663.34 | 0.18 | 0.07 | 0.01 | 27.56 | 232.99 | 26.45 | 24.71 |
| SOUTH TRIB | 7.399 | 50-YEAR | 664.63 | 664.34 | 0.29 | 0.08 | 0.02 | 52.05 | 358.72 | 50.23 | 177.59 |
| SOUTH TRIB | 7.399 | 100-YEAR | 664.93 | 664.60 | 0.33 | 0.09 | 0.03 | 60.57 | 397.91 | 58.52 | 596.70 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.406 | 10-YEAR | 663.60 | 663.36 | 0.23 | 0.06 | 0.02 | 43.02 | 207.66 | 36.32 | 25.08 |
| SOUTH TRIB | 7.406 | 50-YEAR | 664.73 | 664.37 | 0.35 | 0.08 | 0.02 | 79.12 | 315.08 | 66.81 | 28.28 |
| SOUTH TRIB | 7.406 | 100-YEAR | 665.03 | 664.64 | 0.39 | 0.09 | 0.02 | 92.04 | 347.77 | 77.19 | 28.89 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 664.02 | 663.64 | 0.38 | 0.38 | 0.04 | 56.41 | 196.42 | 34.17 | 23.78 |
| SOUTH TRIB | 7.431 | 50-YEAR | 665.21 | 664.70 | 0.50 | 0.43 | 0.04 | 103.28 | 288.99 | 68.72 | 28.17 |
| SOUTH TRIB | 7.431 | 100-YEAR | 665.52 | 664.99 | 0.54 | 0.45 | 0.04 | 119.19 | 316.83 | 80.98 | 29.35 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 664.10 | 663.98 | 0.12 | 0.05 | 0.03 | 130.04 | 130.80 | 26.16 | 31.45 |
| SOUTH TRIB | 7.447 | 50-YEAR | 665.30 | 665.12 | 0.17 | 0.06 | 0.03 | 207.23 | 199.25 | 54.52 | 35.68 |
| SOUTH TRIB | 7.447 | 100-YEAR | 665.62 | 665.41 | 0.21 | 0.06 | 0.03 | 241.97 | 229.93 | 45.09 | 48.21 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 664.14 | 664.04 | 0.09 | 0.03 | 0.01 | 122.18 | 114.39 | 24.43 | 31.68 |
| SOUTH TRIB | 7.456 | 50-YEAR | 665.34 | 665.21 | 0.14 | 0.04 | 0.01 | 187.81 | 179.96 | 50.23 | 35.99 |
| SOUTH TRIB | 7.456 | 100-YEAR | 665.67 | 665.50 | 0.17 | 0.04 | 0.01 | 221.74 | 209.89 | 36.37 | 58.31 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 664.87 | 664.80 | 0.07 | | | 122.91 | 110.62 | 27.48 | 34.47 |
| SOUTH TRIB | 7.47 | 50-YEAR | 666.74 | 666.66 | 0.07 | | | 127.77 | 191.25 | 98.99 | 292.61 |
| SOUTH TRIB | 7.47 | 100-YEAR | 666.91 | 666.84 | 0.07 | | | 147.00 | 197.16 | 123.84 | 331.34 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 664.87 | 664.87 | 0.00 | 0.00 | 0.01 | 58.38 | 113.08 | 89.54 | 208.30 |
| SOUTH TRIB | 7.486 | 50-YEAR | 666.75 | 666.75 | 0.00 | 0.00 | 0.01 | 104.21 | 150.71 | 163.08 | 208.30 |
| SOUTH TRIB | 7.486 | 100-YEAR | 666.92 | 666.92 | 0.00 | 0.00 | 0.01 | 117.43 | 166.54 | 184.03 | 208.30 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 664.87 | 664.87 | 0.00 | 0.00 | 0.00 | 232.81 | 24.38 | 3.81 | 1491.36 |
| SOUTH TRIB | 7.493 | 50-YEAR | 666.75 | 666.75 | 0.00 | 0.00 | 0.00 | 388.22 | 26.21 | 3.57 | 1584.69 |
| SOUTH TRIB | 7.493 | 100-YEAR | 666.92 | 666.92 | 0.00 | 0.00 | 0.00 | 435.52 | 28.54 | 3.93 | 1592.30 |

Willow Creek  Plan: Natural Conditions - Ramp P1,P8,P2  11/26/2012

WILLOW CREEK MAINSTEM

WILLOW CREEK SOUTH TRIB

Legend

WS 100-YEAR

WS 50-YEAR

WS 10-YEAR

Ground

Elevation (ft)

665

660

655

650

645

640

635

4.594

4.675

4.773

4.924 1400' C...

5.104

5.524 Tank Farm Rd

5.639

5.697

5.725

5.74 Tonne Feed

5.810

5.860

5.900 Runway 14R

6.08 Runway 14R Exten

6.332

6.418

6.471

6.49 Tank Farm Rd

6.62 C.& NW Railroad

6.644

6.645

6.649

6.651

6.652

6.654 Ramp P5,O4,Q5

6.656

6.657

7.12

7.21

7.247

7.289

7.331

7.391

7.431

7.486

0

2000

4000

6000

8000

10000

12000

14000

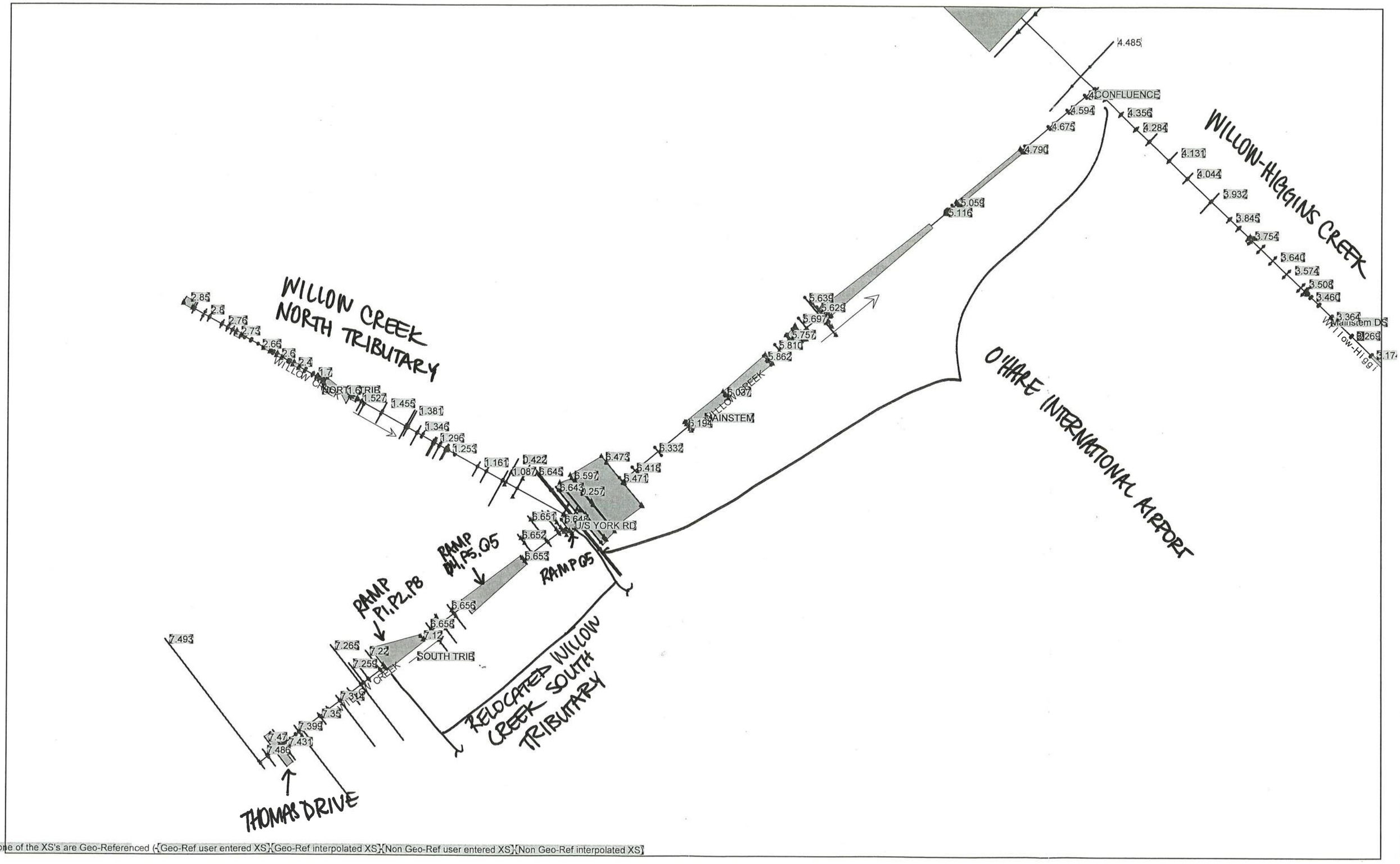
16000

Stream Distance Above Willow-Higgins Creek Confluence with Des Plaines River (ft)

1 in Horiz. = 1200 ft  1 in Vert. = 4 ft

# SECTION 11

## PROPOSED CONDITIONS ANALYSIS




None of the XS's are Geo-Referenced ({Geo-Ref user entered XS}{Geo-Ref interpolated XS}{Non Geo-Ref user entered XS}{Non Geo-Ref interpolated XS})

HEC-RAS Plan: November 2012

| 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) | |
| MAINSTEM | 4.518 | 10-YEAR | 894.00 | 636.00 | 644.69 | | 644.73 | 0.000113 | 1.67 | 558.91 | 68.69 | 0.10 |
| MAINSTEM | 4.518 | 50-YEAR | 1459.00 | 636.00 | 646.33 | | 646.41 | 0.000168 | 2.28 | 673.17 | 70.33 | 0.13 |
| MAINSTEM | 4.518 | 100-YEAR | 1682.00 | 636.00 | 646.91 | | 647.00 | 0.000185 | 2.49 | 713.97 | 70.91 | 0.13 |
| MAINSTEM | 4.594 | 10-YEAR | 894.00 | 636.00 | 644.73 | | 644.77 | 0.000111 | 1.66 | 562.03 | 68.73 | 0.10 |
| MAINSTEM | 4.594 | 50-YEAR | 1459.00 | 636.00 | 646.40 | | 646.48 | 0.000164 | 2.27 | 677.92 | 70.40 | 0.12 |
| MAINSTEM | 4.594 | 100-YEAR | 1682.00 | 636.00 | 646.98 | | 647.07 | 0.000181 | 2.47 | 719.27 | 70.98 | 0.13 |
| MAINSTEM | 4.675 | 10-YEAR | 894.00 | 636.10 | 644.78 | | 644.82 | 0.000114 | 1.67 | 558.61 | 68.72 | 0.10 |
| MAINSTEM | 4.675 | 50-YEAR | 1459.00 | 636.10 | 646.47 | | 646.55 | 0.000166 | 2.27 | 676.07 | 70.41 | 0.12 |
| MAINSTEM | 4.675 | 100-YEAR | 1682.00 | 636.10 | 647.06 | | 647.15 | 0.000182 | 2.47 | 717.95 | 71.01 | 0.13 |
| MAINSTEM | 4.773 | 10-YEAR | 784.00 | 636.20 | 644.84 | | 644.88 | 0.000089 | 1.47 | 554.70 | 68.37 | 0.09 |
| MAINSTEM | 4.773 | 50-YEAR | 1227.00 | 636.20 | 646.57 | | 646.62 | 0.000118 | 1.91 | 673.98 | 70.04 | 0.10 |
| MAINSTEM | 4.773 | 100-YEAR | 1469.00 | 636.20 | 647.17 | | 647.24 | 0.000139 | 2.16 | 716.27 | 70.63 | 0.12 |
| MAINSTEM | 4.790 | 10-YEAR | 784.00 | 636.20 | 644.81 | 638.80 | 644.93 | 0.000312 | 2.76 | 284.23 | 68.35 | 0.17 |
| MAINSTEM | 4.790 | 50-YEAR | 1227.00 | 636.20 | 646.51 | 639.71 | 646.71 | 0.000420 | 3.61 | 340.24 | 69.99 | 0.20 |
| MAINSTEM | 4.790 | 100-YEAR | 1469.00 | 636.20 | 647.09 | 640.14 | 647.35 | 0.000501 | 4.09 | 359.50 | 70.56 | 0.22 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 784.00 | 636.70 | 645.28 | 640.14 | 645.42 | 0.000448 | 3.07 | 255.65 | 65.50 | 0.19 |
| MAINSTEM | 5.059 | 50-YEAR | 1227.00 | 636.70 | 647.60 | 641.04 | 647.81 | 0.000458 | 3.69 | 332.24 | 67.78 | 0.21 |
| MAINSTEM | 5.059 | 100-YEAR | 1469.00 | 636.70 | 648.71 | 641.47 | 648.96 | 0.000462 | 3.98 | 368.99 | 68.88 | 0.21 |
| MAINSTEM | 5.076 | 10-YEAR | 784.00 | 636.90 | 645.41 | | 645.46 | 0.000215 | 1.80 | 435.78 | 65.48 | 0.12 |
| MAINSTEM | 5.076 | 50-YEAR | 1227.00 | 636.90 | 647.79 | | 647.85 | 0.000206 | 2.07 | 594.14 | 67.85 | 0.12 |
| MAINSTEM | 5.076 | 100-YEAR | 1469.00 | 636.90 | 648.93 | | 649.00 | 0.000204 | 2.19 | 672.29 | 68.98 | 0.12 |
| MAINSTEM | 5.104 | 10-YEAR | 784.00 | 637.12 | 645.41 | | 645.51 | 0.000341 | 2.55 | 306.96 | 65.32 | 0.17 |
| MAINSTEM | 5.104 | 50-YEAR | 1227.00 | 637.12 | 647.76 | | 647.90 | 0.000326 | 3.01 | 407.15 | 67.69 | 0.17 |
| MAINSTEM | 5.104 | 100-YEAR | 1469.00 | 637.12 | 648.90 | | 649.06 | 0.000322 | 3.23 | 455.31 | 68.83 | 0.17 |
| MAINSTEM | 5.109 | 10-YEAR | 784.00 | 637.18 | 645.37 | 640.64 | 645.54 | 0.000547 | 3.28 | 239.21 | 65.24 | 0.21 |
| MAINSTEM | 5.109 | 50-YEAR | 1227.00 | 637.18 | 647.71 | 641.55 | 647.94 | 0.000535 | 3.89 | 315.15 | 67.60 | 0.22 |
| MAINSTEM | 5.109 | 100-YEAR | 1469.00 | 637.18 | 648.83 | 642.01 | 649.10 | 0.000532 | 4.18 | 351.63 | 68.73 | 0.22 |
| MAINSTEM | 5.110 | 10-YEAR | 784.00 | 637.22 | 645.33 | | 645.56 | 0.000656 | 3.84 | 204.41 | 44.59 | 0.24 |
| MAINSTEM | 5.110 | 50-YEAR | 1227.00 | 637.22 | 647.64 | | 647.98 | 0.000698 | 4.67 | 262.56 | 50.16 | 0.26 |
| MAINSTEM | 5.110 | 100-YEAR | 1469.00 | 637.22 | 648.75 | | 649.14 | 0.000714 | 5.06 | 290.45 | 52.83 | 0.26 |
| MAINSTEM | 5.116 | 10-YEAR | 784.00 | 637.31 | 645.33 | | 645.57 | 0.000120 | 3.91 | 200.61 | 25.00 | 0.24 |
| MAINSTEM | 5.116 | 50-YEAR | 1227.00 | 637.31 | 647.64 | | 647.99 | 0.000143 | 4.75 | 258.35 | 26.44 | 0.26 |
| MAINSTEM | 5.116 | 100-YEAR | 1469.00 | 637.31 | 648.75 | | 649.16 | 0.000146 | 5.14 | 286.24 | 31.23 | 0.27 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 634.00 | 640.26 | 646.04 | 642.93 | 646.33 | 0.000191 | 4.30 | 147.43 | 25.50 | 0.32 |
| MAINSTEM | 5.606 | 50-YEAR | 1056.00 | 640.26 | 649.63 | 644.01 | 649.94 | 0.000121 | 4.42 | 239.06 | 57.44 | 0.25 |
| MAINSTEM | 5.606 | 100-YEAR | 1227.00 | 640.26 | 651.57 | 644.41 | 651.85 | 0.000087 | 4.25 | 288.43 | 80.97 | 0.22 |
| MAINSTEM | 5.610 | 10-YEAR | 634.00 | 640.30 | 646.34 | | 646.36 | 0.000075 | 1.05 | 603.33 | 125.36 | 0.08 |
| MAINSTEM | 5.610 | 50-YEAR | 1056.00 | 640.30 | 649.95 | | 649.97 | 0.000043 | 1.09 | 970.26 | 145.88 | 0.06 |
| MAINSTEM | 5.610 | 100-YEAR | 1227.00 | 640.30 | 651.86 | | 651.88 | 0.000031 | 1.05 | 1164.78 | 156.76 | 0.05 |
| MAINSTEM | 5.629 | 10-YEAR | 634.00 | 640.37 | 646.36 | | 646.36 | 0.000064 | 0.74 | 854.27 | 215.49 | 0.07 |
| MAINSTEM | 5.629 | 50-YEAR | 1056.00 | 640.37 | 649.97 | | 649.97 | 0.000021 | 0.64 | 1646.96 | 237.14 | 0.04 |
| MAINSTEM | 5.629 | 100-YEAR | 1227.00 | 640.37 | 651.88 | | 651.88 | 0.000014 | 0.59 | 2082.70 | 248.61 | 0.03 |
| MAINSTEM | 5.632 | 10-YEAR | 634.00 | 640.39 | 646.36 | | 646.37 | 0.000056 | 0.70 | 912.18 | 411.47 | 0.06 |
| MAINSTEM | 5.632 | 50-YEAR | 1056.00 | 640.39 | 649.97 | | 649.97 | 0.000019 | 0.60 | 1754.71 | 433.12 | 0.04 |
| MAINSTEM | 5.632 | 100-YEAR | 1227.00 | 640.39 | 651.88 | | 651.88 | 0.000012 | 0.55 | 2216.91 | 444.58 | 0.03 |
| MAINSTEM | 5.639 | 10-YEAR | 634.00 | 640.43 | 646.36 | | 646.37 | 0.000060 | 0.72 | 878.97 | 737.22 | 0.06 |
| MAINSTEM | 5.639 | 50-YEAR | 1056.00 | 640.43 | 649.97 | | 649.97 | 0.000020 | 0.62 | 1695.03 | 758.86 | 0.04 |
| MAINSTEM | 5.639 | 100-YEAR | 1227.00 | 640.43 | 651.88 | | 651.88 | 0.000013 | 0.57 | 2143.32 | 770.33 | 0.03 |
| MAINSTEM | 5.697 | 10-YEAR | 634.00 | 641.14 | 646.37 | | 646.41 | 0.000289 | 1.55 | 408.83 | 311.74 | 0.14 |
| MAINSTEM | 5.697 | 50-YEAR | 1056.00 | 641.14 | 649.96 | | 649.99 | 0.000090 | 1.34 | 788.12 | 333.27 | 0.09 |
| MAINSTEM | 5.697 | 100-YEAR | 1227.00 | 641.14 | 651.87 | | 651.90 | 0.000057 | 1.24 | 989.95 | 344.73 | 0.07 |
| MAINSTEM | 5.720 | 10-YEAR | 634.00 | 641.44 | 646.35 | | 646.51 | 0.000999 | 3.20 | 197.97 | 161.07 | 0.26 |
| MAINSTEM | 5.720 | 50-YEAR | 1056.00 | 641.44 | 649.91 | | 650.05 | 0.000407 | 3.00 | 351.91 | 188.74 | 0.19 |
| MAINSTEM | 5.720 | 100-YEAR | 1227.00 | 641.44 | 651.82 | | 651.94 | 0.000272 | 2.82 | 434.63 | 203.61 | 0.16 |
| MAINSTEM | 5.725 | 10-YEAR | 634.00 | 641.52 | 646.28 | | 646.59 | 0.001791 | 4.45 | 142.63 | 93.92 | 0.36 |
| MAINSTEM | 5.725 | 50-YEAR | 1056.00 | 641.52 | 649.82 | | 650.10 | 0.000777 | 4.24 | 248.84 | 126.73 | 0.26 |
| MAINSTEM | 5.725 | 100-YEAR | 1227.00 | 641.52 | 651.74 | | 651.99 | 0.000525 | 4.01 | 306.31 | 144.48 | 0.22 |
| MAINSTEM | 5.727 | 10-YEAR | 634.00 | 641.52 | 646.23 | | 646.68 | 0.003344 | 5.38 | 117.80 | 25.00 | 0.44 |
| MAINSTEM | 5.727 | 50-YEAR | 1056.00 | 641.52 | 649.77 | | 650.18 | 0.001669 | 5.12 | 206.14 | 25.00 | 0.31 |
| MAINSTEM | 5.727 | 100-YEAR | 1227.00 | 641.52 | 651.69 | | 652.05 | 0.001202 | 4.83 | 254.12 | 27.98 | 0.27 |

HEC-RAS Plan: November 2012 (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) | |
| MAINSTEM | 5.732 | 10-YEAR | 634.00 | 641.59 | 646.38 | | 646.81 | 0.003878 | 5.29 | 119.74 | 25.00 | 0.43 |
| MAINSTEM | 5.732 | 50-YEAR | 1056.00 | 641.59 | 649.84 | | 650.24 | 0.002242 | 5.12 | 206.18 | 25.00 | 0.31 |
| MAINSTEM | 5.732 | 100-YEAR | 1227.00 | 641.59 | 651.74 | | 652.10 | 0.001699 | 4.84 | 253.74 | 27.64 | 0.27 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 634.00 | 641.81 | 646.81 | 644.45 | 647.18 | 0.003115 | 4.88 | 129.95 | 26.00 | 0.38 |
| MAINSTEM | 5.757 | 50-YEAR | 1056.00 | 641.81 | 650.18 | 645.52 | 650.55 | 0.001947 | 4.85 | 217.65 | 26.00 | 0.30 |
| MAINSTEM | 5.757 | 100-YEAR | 1227.00 | 641.81 | 652.07 | 645.91 | 652.40 | 0.001495 | 4.60 | 266.70 | 26.00 | 0.25 |
| MAINSTEM | 5.759 | 10-YEAR | 634.00 | 641.82 | 647.20 | | 647.22 | 0.000129 | 1.30 | 489.37 | 100.00 | 0.10 |
| MAINSTEM | 5.759 | 50-YEAR | 1056.00 | 641.82 | 650.56 | | 650.59 | 0.000071 | 1.33 | 795.30 | 100.00 | 0.08 |
| MAINSTEM | 5.759 | 100-YEAR | 1227.00 | 641.82 | 652.41 | | 652.43 | 0.000051 | 1.27 | 963.34 | 100.00 | 0.07 |
| MAINSTEM | 5.810 | 10-YEAR | 634.00 | 643.98 | 647.24 | | 647.29 | 0.000620 | 1.95 | 325.50 | 100.00 | 0.19 |
| MAINSTEM | 5.810 | 50-YEAR | 1056.00 | 643.98 | 650.58 | | 650.62 | 0.000177 | 1.60 | 659.72 | 100.00 | 0.11 |
| MAINSTEM | 5.810 | 100-YEAR | 1227.00 | 643.98 | 652.42 | | 652.45 | 0.000110 | 1.45 | 843.86 | 100.00 | 0.09 |
| MAINSTEM | 5.860 | 10-YEAR | 634.00 | 645.81 | 647.64 | 647.64 | 648.57 | 0.019302 | 7.73 | 82.06 | 100.00 | 1.01 |
| MAINSTEM | 5.860 | 50-YEAR | 1056.00 | 645.81 | 650.43 | | 650.83 | 0.002459 | 5.11 | 206.78 | 100.00 | 0.42 |
| MAINSTEM | 5.860 | 100-YEAR | 1227.00 | 645.81 | 652.31 | | 652.58 | 0.001062 | 4.21 | 291.10 | 100.00 | 0.29 |
| MAINSTEM | 5.862 | 10-YEAR | 634.00 | 645.96 | 648.45 | 648.45 | 649.70 | 0.021607 | 9.00 | 70.47 | 28.35 | 1.01 |
| MAINSTEM | 5.862 | 50-YEAR | 1056.00 | 645.96 | 650.19 | | 651.40 | 0.011607 | 8.80 | 120.02 | 28.35 | 0.75 |
| MAINSTEM | 5.862 | 100-YEAR | 1227.00 | 645.96 | 652.14 | | 652.90 | 0.005086 | 7.01 | 175.10 | 28.35 | 0.50 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 634.00 | 647.54 | 651.60 | 649.84 | 651.96 | 0.000320 | 4.85 | 130.71 | 33.00 | 0.42 |
| MAINSTEM | 6.037 | 50-YEAR | 1056.00 | 647.54 | 653.22 | 650.77 | 653.74 | 0.000320 | 5.77 | 183.00 | 33.00 | 0.43 |
| MAINSTEM | 6.037 | 100-YEAR | 1227.00 | 647.54 | 653.90 | 651.10 | 654.46 | 0.000310 | 5.99 | 204.81 | 33.00 | 0.42 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 603.00 | 647.73 | 652.15 | 649.86 | 652.40 | 0.002189 | 4.01 | 150.28 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 50-YEAR | 996.00 | 647.73 | 653.91 | 650.71 | 654.26 | 0.002167 | 4.74 | 210.25 | 34.00 | 0.34 |
| MAINSTEM | 6.190 | 100-YEAR | 1156.00 | 647.73 | 654.62 | 651.02 | 655.00 | 0.002121 | 4.94 | 234.15 | 34.00 | 0.33 |
| MAINSTEM | 6.194 | 10-YEAR | 603.00 | 647.75 | 652.41 | | 652.44 | 0.000159 | 1.31 | 461.22 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 50-YEAR | 996.00 | 647.75 | 654.27 | | 654.31 | 0.000142 | 1.54 | 645.30 | 100.00 | 0.11 |
| MAINSTEM | 6.194 | 100-YEAR | 1156.00 | 647.75 | 655.00 | | 655.04 | 0.000134 | 1.61 | 717.76 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 10-YEAR | 603.00 | 647.88 | 652.52 | | 652.55 | 0.000178 | 1.30 | 464.06 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 50-YEAR | 996.00 | 647.88 | 654.37 | | 654.41 | 0.000166 | 1.53 | 649.01 | 100.00 | 0.11 |
| MAINSTEM | 6.332 | 100-YEAR | 1156.00 | 647.88 | 655.10 | | 655.14 | 0.000160 | 1.60 | 721.72 | 100.00 | 0.11 |
| MAINSTEM | 6.418 | 10-YEAR | 603.00 | 647.88 | 652.61 | | 652.63 | 0.000167 | 1.27 | 472.97 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 50-YEAR | 996.00 | 647.88 | 654.45 | | 654.49 | 0.000159 | 1.52 | 657.40 | 100.00 | 0.10 |
| MAINSTEM | 6.418 | 100-YEAR | 1156.00 | 647.88 | 655.18 | | 655.22 | 0.000154 | 1.58 | 729.82 | 100.00 | 0.10 |
| MAINSTEM | 6.471 | 10-YEAR | 603.00 | 647.88 | 652.65 | | 652.73 | 0.000583 | 2.29 | 263.80 | 55.30 | 0.18 |
| MAINSTEM | 6.471 | 50-YEAR | 996.00 | 647.88 | 654.48 | | 654.59 | 0.000581 | 2.73 | 364.71 | 55.30 | 0.19 |
| MAINSTEM | 6.471 | 100-YEAR | 1156.00 | 647.88 | 655.19 | | 655.32 | 0.000571 | 2.86 | 404.33 | 55.30 | 0.19 |
| MAINSTEM | 6.473 | 10-YEAR | 603.00 | 647.91 | 652.61 | | 652.79 | 0.002320 | 3.43 | 175.73 | 40.00 | 0.29 |
| MAINSTEM | 6.473 | 50-YEAR | 996.00 | 647.91 | 654.42 | | 654.67 | 0.002456 | 4.01 | 248.07 | 40.00 | 0.28 |
| MAINSTEM | 6.473 | 100-YEAR | 1156.00 | 647.91 | 655.13 | | 655.40 | 0.002476 | 4.18 | 276.53 | 40.00 | 0.28 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | | |
| MAINSTEM | 6.597 | 10-YEAR | 603.00 | 648.23 | 653.04 | 650.28 | 653.12 | 0.000581 | 2.29 | 263.40 | 120.63 | 0.20 |
| MAINSTEM | 6.597 | 50-YEAR | 996.00 | 648.23 | 654.96 | 650.85 | 655.06 | 0.000450 | 2.59 | 384.16 | 1005.08 | 0.19 |
| MAINSTEM | 6.597 | 100-YEAR | 1156.00 | 648.23 | 655.70 | 651.04 | 655.82 | 0.000413 | 2.68 | 431.02 | 1022.24 | 0.18 |
| MAINSTEM | 6.6 | 10-YEAR | 603.00 | 648.30 | 653.04 | | 653.15 | 0.000695 | 2.65 | 227.34 | 199.96 | 0.22 |
| MAINSTEM | 6.6 | 50-YEAR | 996.00 | 648.30 | 654.95 | | 655.09 | 0.000578 | 3.07 | 324.63 | 234.17 | 0.21 |
| MAINSTEM | 6.6 | 100-YEAR | 1156.00 | 648.30 | 655.69 | | 655.85 | 0.000540 | 3.19 | 362.41 | 247.45 | 0.21 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 603.00 | 648.71 | 652.11 | 652.11 | 653.45 | 0.017113 | 9.28 | 64.95 | 219.64 | 0.99 |
| MAINSTEM | 6.635 | 50-YEAR | 996.00 | 648.71 | 654.35 | 653.18 | 655.44 | 0.006269 | 8.40 | 118.62 | 1223.86 | 0.67 |
| MAINSTEM | 6.635 | 100-YEAR | 1156.00 | 648.71 | 655.11 | 653.58 | 656.22 | 0.005239 | 8.44 | 136.89 | 1229.94 | 0.62 |
| MAINSTEM | 6.637 | 10-YEAR | 603.00 | 648.71 | 653.85 | | 653.85 | 0.000148 | 0.47 | 1288.25 | 1208.72 | 0.08 |
| MAINSTEM | 6.637 | 50-YEAR | 996.00 | 648.71 | 655.77 | | 655.77 | 0.000013 | 0.28 | 3643.66 | 1234.59 | 0.03 |
| MAINSTEM | 6.637 | 100-YEAR | 1156.00 | 648.71 | 656.55 | | 656.55 | 0.000008 | 0.26 | 4606.17 | 1240.08 | 0.02 |
| MAINSTEM | 6.639 | 10-YEAR | 603.00 | 649.07 | 653.53 | | 654.18 | 0.012838 | 6.49 | 92.85 | 40.24 | 0.75 |
| MAINSTEM | 6.639 | 50-YEAR | 996.00 | 649.07 | 655.55 | | 656.00 | 0.005186 | 5.35 | 186.16 | 52.10 | 0.50 |
| MAINSTEM | 6.639 | 100-YEAR | 1156.00 | 649.07 | 656.35 | | 656.75 | 0.003949 | 5.03 | 229.90 | 56.81 | 0.44 |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | | |

HEC-RAS Plan: November 2012 (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) | |
| MAINSTEM | 6.642 | 10-YEAR | 603.00 | 649.86 | 654.58 | 653.77 | 655.03 | 0.007925 | 5.39 | 111.84 | 47.66 | 0.62 |
| MAINSTEM | 6.642 | 50-YEAR | 996.00 | 649.86 | 655.99 | 654.62 | 656.42 | 0.005422 | 5.28 | 188.55 | 61.45 | 0.53 |
| MAINSTEM | 6.642 | 100-YEAR | 1156.00 | 649.86 | 656.70 | 654.89 | 657.07 | 0.004106 | 4.93 | 234.58 | 68.58 | 0.47 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 603.00 | 649.86 | 654.72 | | 655.12 | 0.006791 | 5.09 | 118.47 | 48.91 | 0.58 |
| MAINSTEM | 6.643 | 50-YEAR | 996.00 | 649.86 | 656.06 | | 656.48 | 0.005079 | 5.15 | 193.29 | 62.23 | 0.52 |
| MAINSTEM | 6.643 | 100-YEAR | 1156.00 | 649.86 | 656.75 | | 657.12 | 0.003939 | 4.85 | 238.30 | 69.12 | 0.46 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.6435 | 10-YEAR | 603.00 | 649.86 | 655.24 | | 655.24 | 0.000015 | 0.31 | 1967.94 | 613.85 | 0.03 |
| MAINSTEM | 6.6435 | 50-YEAR | 996.00 | 649.86 | 656.60 | | 656.60 | 0.000012 | 0.35 | 2810.00 | 623.44 | 0.03 |
| MAINSTEM | 6.6435 | 100-YEAR | 1156.00 | 649.86 | 657.22 | | 657.23 | 0.000011 | 0.36 | 3200.53 | 627.83 | 0.03 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 603.00 | 650.75 | 655.24 | | 655.24 | 0.000035 | 0.25 | 2386.38 | 752.52 | 0.03 |
| MAINSTEM | 6.644 | 50-YEAR | 996.00 | 650.75 | 656.60 | | 656.60 | 0.000030 | 0.29 | 3419.47 | 765.39 | 0.02 |
| MAINSTEM | 6.644 | 100-YEAR | 1156.00 | 650.75 | 657.23 | | 657.23 | 0.000026 | 0.30 | 3899.03 | 771.29 | 0.02 |
| | | | | | | | | | | | | |
| MAINSTEM | 6.645 | 10-YEAR | 603.00 | 650.30 | 655.25 | | 655.25 | 0.000064 | 0.25 | 2464.97 | 1397.34 | 0.03 |
| MAINSTEM | 6.645 | 50-YEAR | 996.00 | 650.30 | 656.61 | | 656.61 | 0.000028 | 0.23 | 4528.81 | 1640.89 | 0.02 |
| MAINSTEM | 6.645 | 100-YEAR | 1156.00 | 650.30 | 657.23 | | 657.23 | 0.000021 | 0.22 | 5586.57 | 1761.90 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.647 | 10-YEAR | 314.00 | 652.50 | 655.21 | 653.55 | 655.29 | 0.001220 | 2.24 | 141.92 | 70.22 | 0.24 |
| SOUTH TRIB | 6.647 | 50-YEAR | 506.00 | 652.50 | 656.56 | 653.95 | 656.65 | 0.000816 | 2.40 | 213.63 | 82.20 | 0.21 |
| SOUTH TRIB | 6.647 | 100-YEAR | 570.00 | 652.50 | 657.19 | 654.06 | 657.27 | 0.000641 | 2.34 | 246.78 | 87.74 | 0.19 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.6475 Ramp Q5 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.648 | 10-YEAR | 314.00 | 653.00 | 655.41 | 654.05 | 655.51 | 0.001821 | 2.53 | 124.05 | 166.74 | 0.29 |
| SOUTH TRIB | 6.648 | 50-YEAR | 506.00 | 653.00 | 656.74 | 654.45 | 656.85 | 0.001088 | 2.62 | 193.40 | 172.58 | 0.24 |
| SOUTH TRIB | 6.648 | 100-YEAR | 570.00 | 653.00 | 657.45 | 654.56 | 657.54 | 0.000776 | 2.49 | 230.70 | 176.45 | 0.21 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.649 | 10-YEAR | 314.00 | 653.50 | 655.62 | 654.98 | 655.67 | 0.002464 | 2.02 | 191.72 | 233.75 | 0.30 |
| SOUTH TRIB | 6.649 | 50-YEAR | 506.00 | 653.50 | 656.89 | 655.18 | 656.91 | 0.000524 | 1.44 | 414.75 | 241.33 | 0.16 |
| SOUTH TRIB | 6.649 | 100-YEAR | 570.00 | 653.50 | 657.56 | 655.23 | 657.58 | 0.000287 | 1.24 | 538.20 | 245.39 | 0.12 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.650 | 10-YEAR | 314.00 | 653.50 | 655.74 | 655.37 | 655.91 | 0.007542 | 3.74 | 102.44 | 269.47 | 0.54 |
| SOUTH TRIB | 6.650 | 50-YEAR | 506.00 | 653.50 | 656.88 | 655.66 | 656.98 | 0.002111 | 2.88 | 208.26 | 276.30 | 0.31 |
| SOUTH TRIB | 6.650 | 100-YEAR | 570.00 | 653.50 | 657.55 | 655.72 | 657.63 | 0.001139 | 2.46 | 274.12 | 280.32 | 0.24 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.651 | 10-YEAR | 314.00 | 653.50 | 656.23 | 654.99 | 656.27 | 0.001433 | 1.96 | 210.18 | 344.36 | 0.25 |
| SOUTH TRIB | 6.651 | 50-YEAR | 506.00 | 653.50 | 657.10 | 654.99 | 657.14 | 0.000772 | 1.84 | 348.17 | 349.61 | 0.19 |
| SOUTH TRIB | 6.651 | 100-YEAR | 570.00 | 653.50 | 657.69 | 654.99 | 657.71 | 0.000458 | 1.60 | 443.34 | 353.12 | 0.15 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.652 | 10-YEAR | 314.00 | 653.50 | 656.42 | 654.99 | 656.44 | 0.000559 | 1.30 | 328.34 | 287.52 | 0.16 |
| SOUTH TRIB | 6.652 | 50-YEAR | 506.00 | 653.50 | 657.22 | 654.99 | 657.24 | 0.000356 | 1.28 | 512.64 | 292.32 | 0.13 |
| SOUTH TRIB | 6.652 | 100-YEAR | 570.00 | 653.50 | 657.76 | 654.99 | 657.78 | 0.000223 | 1.14 | 639.57 | 295.58 | 0.11 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.653 | 10-YEAR | 314.00 | 653.50 | 656.48 | 654.55 | 656.55 | 0.000864 | 2.01 | 157.49 | 77.90 | 0.21 |
| SOUTH TRIB | 6.653 | 50-YEAR | 506.00 | 653.50 | 657.25 | 654.93 | 657.35 | 0.001045 | 2.58 | 198.12 | 82.50 | 0.23 |
| SOUTH TRIB | 6.653 | 100-YEAR | 570.00 | 653.50 | 657.77 | 655.04 | 657.87 | 0.000859 | 2.55 | 225.66 | 85.62 | 0.22 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.654 Ramp P5,O4,Q5 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.655 | 10-YEAR | 314.00 | 654.50 | 656.97 | 655.54 | 657.06 | 0.001618 | 2.42 | 130.42 | 123.97 | 0.27 |
| SOUTH TRIB | 6.655 | 50-YEAR | 506.00 | 654.50 | 657.81 | 655.93 | 657.94 | 0.001575 | 2.91 | 175.09 | 143.70 | 0.28 |
| SOUTH TRIB | 6.655 | 100-YEAR | 570.00 | 654.50 | 658.34 | 656.03 | 658.47 | 0.001211 | 2.82 | 203.46 | 150.13 | 0.25 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.656 | 10-YEAR | 314.00 | 655.00 | 657.31 | 657.18 | 657.64 | 0.012913 | 5.04 | 75.57 | 221.31 | 0.71 |
| SOUTH TRIB | 6.656 | 50-YEAR | 506.00 | 655.00 | 658.13 | 657.51 | 658.38 | 0.005901 | 4.50 | 132.39 | 268.76 | 0.51 |
| SOUTH TRIB | 6.656 | 100-YEAR | 570.00 | 655.00 | 658.58 | 657.61 | 658.78 | 0.003760 | 4.04 | 164.04 | 271.47 | 0.42 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.657 | 10-YEAR | 314.00 | 655.00 | 658.06 | 657.15 | 658.10 | 0.001131 | 1.94 | 221.60 | 323.37 | 0.22 |
| SOUTH TRIB | 6.657 | 50-YEAR | 506.00 | 655.00 | 658.68 | 657.42 | 658.72 | 0.000979 | 2.11 | 313.56 | 327.05 | 0.22 |
| SOUTH TRIB | 6.657 | 100-YEAR | 570.00 | 655.00 | 659.00 | 657.49 | 659.04 | 0.000784 | 2.02 | 361.70 | 328.98 | 0.20 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 6.658 | 10-YEAR | 314.00 | 655.00 | 658.18 | 657.16 | 658.20 | 0.000642 | 1.51 | 295.55 | 314.07 | 0.17 |
| SOUTH TRIB | 6.658 | 50-YEAR | 506.00 | 655.00 | 658.78 | 657.37 | 658.81 | 0.000569 | 1.65 | 415.17 | 317.70 | 0.17 |
| SOUTH TRIB | 6.658 | 100-YEAR | 570.00 | 655.00 | 659.09 | 657.43 | 659.11 | 0.000468 | 1.59 | 475.55 | 319.52 | 0.15 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.12 | 10-YEAR | 287.00 | 655.00 | 658.24 | 656.16 | 658.32 | 0.000935 | 2.21 | 129.73 | 54.46 | 0.22 |
| SOUTH TRIB | 7.12 | 50-YEAR | 461.00 | 655.00 | 658.83 | 656.61 | 658.97 | 0.001391 | 3.01 | 153.03 | 57.96 | 0.27 |
| SOUTH TRIB | 7.12 | 100-YEAR | 517.00 | 655.00 | 659.11 | 656.73 | 659.26 | 0.001378 | 3.15 | 164.38 | 59.66 | 0.27 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.16 Ramps P1, P2, P8 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.21 | 10-YEAR | 287.00 | 656.10 | 658.82 | 657.83 | 659.07 | 0.005044 | 4.01 | 72.37 | 51.06 | 0.46 |
| SOUTH TRIB | 7.21 | 50-YEAR | 461.00 | 656.10 | 659.68 | 658.42 | 660.00 | 0.004670 | 4.62 | 101.06 | 77.47 | 0.47 |
| SOUTH TRIB | 7.21 | 100-YEAR | 517.00 | 656.10 | 660.08 | 658.57 | 660.40 | 0.003941 | 4.55 | 114.98 | 80.06 | 0.44 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.22 | 10-YEAR | 287.00 | 656.50 | 659.40 | 659.40 | 659.91 | 0.018342 | 6.78 | 59.06 | 56.92 | 0.85 |
| SOUTH TRIB | 7.22 | 50-YEAR | 461.00 | 656.50 | 659.98 | | 660.44 | 0.014262 | 6.80 | 96.99 | 74.51 | 0.77 |
| SOUTH TRIB | 7.22 | 100-YEAR | 517.00 | 656.50 | 660.39 | | 660.69 | 0.008210 | 5.56 | 128.86 | 79.60 | 0.59 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.247 | 10-YEAR | 287.00 | 656.80 | 660.63 | | 660.71 | 0.002450 | 2.85 | 133.22 | 79.15 | 0.31 |
| SOUTH TRIB | 7.247 | 50-YEAR | 461.00 | 656.80 | 661.14 | | 661.26 | 0.002792 | 3.30 | 173.95 | 81.67 | 0.34 |

HEC-RAS Plan: November 2012 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| SOUTH TRIB | 7.247 | 100-YEAR | 517.00 | 656.80 | 661.25 | | 661.38 | 0.002998 | 3.47 | 183.14 | 82.22 | 0.35 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.259 | 10-YEAR | 287.00 | 657.00 | 660.78 | | 660.85 | 0.001962 | 2.53 | 144.42 | 80.68 | 0.28 |
| SOUTH TRIB | 7.259 | 50-YEAR | 461.00 | 657.00 | 661.31 | | 661.41 | 0.002245 | 2.96 | 187.82 | 83.22 | 0.31 |
| SOUTH TRIB | 7.259 | 100-YEAR | 517.00 | 657.00 | 661.44 | | 661.54 | 0.002388 | 3.10 | 198.29 | 83.83 | 0.32 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.265 | 10-YEAR | 287.00 | 657.38 | 660.67 | | 661.05 | 0.007073 | 5.36 | 72.08 | 59.60 | 0.54 |
| SOUTH TRIB | 7.265 | 50-YEAR | 461.00 | 657.38 | 661.18 | | 661.64 | 0.007749 | 6.22 | 103.34 | 62.62 | 0.58 |
| SOUTH TRIB | 7.265 | 100-YEAR | 517.00 | 657.38 | 661.30 | | 661.79 | 0.008186 | 6.53 | 110.59 | 63.30 | 0.60 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.289 | 10-YEAR | 287.00 | 657.30 | 661.50 | | 661.70 | 0.003653 | 4.05 | 84.93 | 35.69 | 0.40 |
| SOUTH TRIB | 7.289 | 50-YEAR | 461.00 | 657.30 | 662.12 | | 662.43 | 0.004940 | 5.08 | 108.49 | 39.96 | 0.47 |
| SOUTH TRIB | 7.289 | 100-YEAR | 517.00 | 657.30 | 662.29 | | 662.64 | 0.005287 | 5.35 | 115.34 | 41.11 | 0.49 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.314 | 10-YEAR | 287.00 | 657.10 | 661.91 | | 662.00 | 0.001517 | 2.75 | 125.60 | 47.49 | 0.26 |
| SOUTH TRIB | 7.314 | 50-YEAR | 461.00 | 657.10 | 662.70 | | 662.82 | 0.001872 | 3.32 | 164.92 | 53.28 | 0.29 |
| SOUTH TRIB | 7.314 | 100-YEAR | 517.00 | 657.10 | 662.91 | | 663.05 | 0.001961 | 3.47 | 176.46 | 54.86 | 0.30 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.331 | 10-YEAR | 287.00 | 657.60 | 662.09 | | 662.44 | 0.007196 | 5.20 | 62.01 | 26.13 | 0.55 |
| SOUTH TRIB | 7.331 | 50-YEAR | 461.00 | 657.60 | 662.87 | | 663.36 | 0.008288 | 6.12 | 84.22 | 30.41 | 0.61 |
| SOUTH TRIB | 7.331 | 100-YEAR | 517.00 | 657.60 | 663.09 | | 663.61 | 0.008549 | 6.36 | 90.79 | 31.57 | 0.62 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.35 | 10-YEAR | 287.00 | 658.10 | 662.72 | | 662.91 | 0.002898 | 3.84 | 86.24 | 30.86 | 0.36 |
| SOUTH TRIB | 7.35 | 50-YEAR | 461.00 | 658.10 | 663.65 | | 663.91 | 0.003348 | 4.55 | 117.01 | 35.67 | 0.40 |
| SOUTH TRIB | 7.35 | 100-YEAR | 517.00 | 658.10 | 663.90 | | 664.18 | 0.003462 | 4.74 | 126.05 | 36.96 | 0.41 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.391 | 10-YEAR | 287.00 | 658.50 | 663.29 | | 663.44 | 0.002089 | 3.42 | 96.35 | 31.68 | 0.31 |
| SOUTH TRIB | 7.391 | 50-YEAR | 461.00 | 658.50 | 664.31 | | 664.52 | 0.002383 | 4.04 | 131.14 | 36.56 | 0.34 |
| SOUTH TRIB | 7.391 | 100-YEAR | 517.00 | 658.50 | 664.58 | | 664.81 | 0.002460 | 4.21 | 141.34 | 37.87 | 0.34 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.399 | 10-YEAR | 287.00 | 657.49 | 663.34 | 660.52 | 663.52 | 0.001317 | 3.66 | 95.62 | 24.71 | 0.28 |
| SOUTH TRIB | 7.399 | 50-YEAR | 461.00 | 657.49 | 664.34 | 661.40 | 664.63 | 0.001773 | 4.75 | 121.57 | 177.86 | 0.33 |
| SOUTH TRIB | 7.399 | 100-YEAR | 517.00 | 657.49 | 664.60 | 661.65 | 664.93 | 0.001906 | 5.06 | 128.89 | 596.90 | 0.35 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.406 | 10-YEAR | 287.00 | 658.60 | 663.36 | | 663.60 | 0.002176 | 4.36 | 83.53 | 25.08 | 0.35 |
| SOUTH TRIB | 7.406 | 50-YEAR | 461.00 | 658.60 | 664.37 | | 664.73 | 0.002637 | 5.46 | 110.50 | 28.28 | 0.40 |
| SOUTH TRIB | 7.406 | 100-YEAR | 517.00 | 658.60 | 664.64 | | 665.03 | 0.002758 | 5.75 | 118.23 | 28.89 | 0.41 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 287.00 | 659.00 | 663.64 | | 664.02 | 0.004180 | 5.65 | 66.61 | 23.78 | 0.48 |
| SOUTH TRIB | 7.431 | 50-YEAR | 461.00 | 659.00 | 664.70 | | 665.21 | 0.004366 | 6.68 | 94.18 | 28.17 | 0.51 |
| SOUTH TRIB | 7.431 | 100-YEAR | 517.00 | 659.00 | 664.99 | | 665.53 | 0.004423 | 6.96 | 102.36 | 29.35 | 0.51 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 287.00 | 658.10 | 663.98 | | 664.10 | 0.001200 | 3.28 | 112.77 | 31.45 | 0.26 |
| SOUTH TRIB | 7.447 | 50-YEAR | 461.00 | 658.10 | 665.12 | | 665.30 | 0.001400 | 4.07 | 151.07 | 35.68 | 0.29 |
| SOUTH TRIB | 7.447 | 100-YEAR | 517.00 | 658.10 | 665.41 | | 665.62 | 0.001600 | 4.48 | 162.11 | 48.24 | 0.31 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 261.00 | 658.10 | 664.04 | 660.99 | 664.14 | 0.000881 | 2.84 | 110.29 | 31.68 | 0.22 |
| SOUTH TRIB | 7.456 | 50-YEAR | 418.00 | 658.10 | 665.21 | 661.71 | 665.34 | 0.001091 | 3.62 | 154.07 | 35.99 | 0.26 |
| SOUTH TRIB | 7.456 | 100-YEAR | 468.00 | 658.10 | 665.50 | 661.91 | 665.67 | 0.001270 | 4.03 | 167.12 | 58.34 | 0.28 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 261.00 | 658.10 | 664.80 | 660.99 | 664.87 | 0.000518 | 2.38 | 129.91 | 34.47 | 0.17 |
| SOUTH TRIB | 7.47 | 50-YEAR | 418.00 | 658.10 | 666.67 | 661.70 | 666.74 | 0.000609 | 3.12 | 360.27 | 292.95 | 0.20 |
| SOUTH TRIB | 7.47 | 100-YEAR | 468.00 | 658.10 | 666.84 | 661.90 | 666.91 | 0.000598 | 3.14 | 415.85 | 332.28 | 0.20 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 261.00 | 655.06 | 664.87 | | 664.87 | 0.000006 | 0.38 | 1050.51 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 50-YEAR | 418.00 | 655.06 | 666.75 | | 666.75 | 0.000006 | 0.43 | 1440.95 | 208.30 | 0.02 |
| SOUTH TRIB | 7.486 | 100-YEAR | 468.00 | 655.06 | 666.92 | | 666.92 | 0.000007 | 0.47 | 1476.97 | 208.30 | 0.02 |
| | | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 261.00 | 655.05 | 664.87 | | 664.87 | 0.000001 | 0.11 | 4657.04 | 1491.36 | 0.01 |
| SOUTH TRIB | 7.493 | 50-YEAR | 418.00 | 655.05 | 666.75 | | 666.75 | 0.000000 | 0.09 | 7555.03 | 1584.75 | 0.01 |
| SOUTH TRIB | 7.493 | 100-YEAR | 468.00 | 655.05 | 666.92 | | 666.92 | 0.000000 | 0.10 | 7830.30 | 1592.47 | 0.01 |

HEC-RAS Plan: November 2012

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 4.518 | 10-YEAR | 644.73 | 644.69 | 0.04 | 0.05 | 0.01 | 11.61 | 870.78 | 11.61 | 68.69 |
| MAINSTEM | 4.518 | 50-YEAR | 646.41 | 646.33 | 0.08 | 0.06 | 0.01 | 22.42 | 1414.15 | 22.42 | 70.33 |
| MAINSTEM | 4.518 | 100-YEAR | 647.00 | 646.91 | 0.09 | 0.06 | 0.01 | 27.25 | 1627.50 | 27.25 | 70.91 |
| MAINSTEM | 4.594 | 10-YEAR | 644.77 | 644.73 | 0.04 | 0.04 | 0.00 | 11.67 | 870.66 | 11.67 | 68.73 |
| MAINSTEM | 4.594 | 50-YEAR | 646.48 | 646.40 | 0.08 | 0.07 | 0.00 | 22.57 | 1413.87 | 22.57 | 70.40 |
| MAINSTEM | 4.594 | 100-YEAR | 647.07 | 646.98 | 0.09 | 0.07 | 0.00 | 27.43 | 1627.14 | 27.43 | 70.98 |
| MAINSTEM | 4.675 | 10-YEAR | 644.82 | 644.78 | 0.04 | 0.05 | 0.00 | 11.67 | 870.65 | 11.67 | 68.72 |
| MAINSTEM | 4.675 | 50-YEAR | 646.55 | 646.47 | 0.08 | 0.07 | 0.00 | 22.64 | 1413.71 | 22.64 | 70.41 |
| MAINSTEM | 4.675 | 100-YEAR | 647.15 | 647.06 | 0.09 | 0.08 | 0.00 | 27.55 | 1626.91 | 27.55 | 71.01 |
| MAINSTEM | 4.773 | 10-YEAR | 644.88 | 644.84 | 0.03 | 0.05 | 0.00 | 10.26 | 764.66 | 9.07 | 68.37 |
| MAINSTEM | 4.773 | 50-YEAR | 646.62 | 646.57 | 0.06 | 0.07 | 0.00 | 19.17 | 1190.88 | 16.95 | 70.04 |
| MAINSTEM | 4.773 | 100-YEAR | 647.24 | 647.17 | 0.07 | 0.08 | 0.00 | 24.25 | 1423.32 | 21.43 | 70.63 |
| MAINSTEM | 4.790 | 10-YEAR | 644.93 | 644.81 | 0.12 | 0.01 | 0.04 | | 784.00 | | 68.35 |
| MAINSTEM | 4.790 | 50-YEAR | 646.71 | 646.51 | 0.20 | 0.02 | 0.07 | | 1227.00 | | 69.99 |
| MAINSTEM | 4.790 | 100-YEAR | 647.35 | 647.09 | 0.26 | 0.02 | 0.09 | | 1469.00 | | 70.56 |
| MAINSTEM | 4.924 1400' Culvert on | | Culvert | | | | | | | | |
| MAINSTEM | 5.059 | 10-YEAR | 645.42 | 645.28 | 0.15 | | | | 784.00 | | 65.50 |
| MAINSTEM | 5.059 | 50-YEAR | 647.81 | 647.60 | 0.21 | | | | 1227.00 | | 67.78 |
| MAINSTEM | 5.059 | 100-YEAR | 648.96 | 648.71 | 0.25 | | | | 1469.00 | | 68.88 |
| MAINSTEM | 5.076 | 10-YEAR | 645.46 | 645.41 | 0.05 | 0.03 | 0.01 | | 784.00 | | 65.48 |
| MAINSTEM | 5.076 | 50-YEAR | 647.85 | 647.79 | 0.07 | 0.03 | 0.01 | | 1227.00 | | 67.85 |
| MAINSTEM | 5.076 | 100-YEAR | 649.00 | 648.93 | 0.07 | 0.03 | 0.02 | | 1469.00 | | 68.98 |
| MAINSTEM | 5.104 | 10-YEAR | 645.51 | 645.41 | 0.10 | 0.03 | 0.02 | | 784.00 | | 65.32 |
| MAINSTEM | 5.104 | 50-YEAR | 647.90 | 647.76 | 0.14 | 0.03 | 0.02 | | 1227.00 | | 67.69 |
| MAINSTEM | 5.104 | 100-YEAR | 649.06 | 648.90 | 0.16 | 0.03 | 0.03 | | 1469.00 | | 68.83 |
| MAINSTEM | 5.109 | 10-YEAR | 645.54 | 645.37 | 0.17 | 0.01 | 0.02 | | 784.00 | | 65.24 |
| MAINSTEM | 5.109 | 50-YEAR | 647.94 | 647.71 | 0.24 | 0.01 | 0.03 | | 1227.00 | | 67.60 |
| MAINSTEM | 5.109 | 100-YEAR | 649.10 | 648.83 | 0.27 | 0.01 | 0.03 | | 1469.00 | | 68.73 |
| MAINSTEM | 5.110 | 10-YEAR | 645.56 | 645.33 | 0.23 | 0.00 | 0.02 | | 784.00 | | 44.59 |
| MAINSTEM | 5.110 | 50-YEAR | 647.98 | 647.64 | 0.34 | 0.00 | 0.03 | | 1227.00 | | 50.16 |
| MAINSTEM | 5.110 | 100-YEAR | 649.14 | 648.75 | 0.40 | 0.00 | 0.04 | | 1469.00 | | 52.83 |
| MAINSTEM | 5.116 | 10-YEAR | 645.57 | 645.33 | 0.24 | 0.01 | 0.00 | | 784.00 | | 25.00 |
| MAINSTEM | 5.116 | 50-YEAR | 647.99 | 647.64 | 0.35 | 0.01 | 0.01 | 0.02 | 1226.96 | 0.02 | 26.44 |
| MAINSTEM | 5.116 | 100-YEAR | 649.16 | 648.75 | 0.41 | 0.01 | 0.01 | 0.25 | 1468.50 | 0.25 | 31.23 |
| MAINSTEM | 5.524 Tank Farm Rd | | Culvert | | | | | | | | |
| MAINSTEM | 5.606 | 10-YEAR | 646.33 | 646.04 | 0.29 | | | | 634.00 | | 25.50 |
| MAINSTEM | 5.606 | 50-YEAR | 649.94 | 649.63 | 0.30 | | | | 1056.00 | | 57.44 |
| MAINSTEM | 5.606 | 100-YEAR | 651.85 | 651.57 | 0.28 | | | | 1227.00 | | 80.97 |
| MAINSTEM | 5.610 | 10-YEAR | 646.36 | 646.34 | 0.02 | 0.00 | 0.03 | | 634.00 | | 125.36 |
| MAINSTEM | 5.610 | 50-YEAR | 649.97 | 649.95 | 0.02 | 0.00 | 0.03 | | 1056.00 | | 145.88 |
| MAINSTEM | 5.610 | 100-YEAR | 651.88 | 651.86 | 0.02 | 0.00 | 0.03 | | 1227.00 | | 156.76 |
| MAINSTEM | 5.629 | 10-YEAR | 646.36 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 215.49 |
| MAINSTEM | 5.629 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 237.14 |
| MAINSTEM | 5.629 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 248.61 |
| MAINSTEM | 5.632 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 411.47 |
| MAINSTEM | 5.632 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 433.12 |
| MAINSTEM | 5.632 | 100-YEAR | 651.88 | 651.88 | 0.00 | 0.00 | 0.00 | | 1227.00 | | 444.58 |
| MAINSTEM | 5.639 | 10-YEAR | 646.37 | 646.36 | 0.01 | 0.00 | 0.00 | | 634.00 | | 737.22 |
| MAINSTEM | 5.639 | 50-YEAR | 649.97 | 649.97 | 0.01 | 0.00 | 0.00 | | 1056.00 | | 758.86 |
| MAINSTEM | 5.639 | 100-YEAR | 651.88 | 651.88 | 0.01 | 0.00 | 0.00 | | 1227.00 | | 770.33 |
| MAINSTEM | 5.697 | 10-YEAR | 646.41 | 646.37 | 0.04 | 0.03 | 0.01 | | 634.00 | | 311.74 |
| MAINSTEM | 5.697 | 50-YEAR | 649.99 | 649.96 | 0.03 | 0.01 | 0.01 | | 1056.00 | | 333.27 |
| MAINSTEM | 5.697 | 100-YEAR | 651.90 | 651.87 | 0.02 | 0.01 | 0.01 | | 1227.00 | | 344.73 |
| MAINSTEM | 5.720 | 10-YEAR | 646.51 | 646.35 | 0.16 | 0.06 | 0.04 | | 634.00 | | 161.07 |
| MAINSTEM | 5.720 | 50-YEAR | 650.05 | 649.91 | 0.14 | 0.02 | 0.03 | | 1056.00 | | 188.74 |
| MAINSTEM | 5.720 | 100-YEAR | 651.94 | 651.82 | 0.12 | 0.01 | 0.03 | | 1227.00 | | 203.61 |
| MAINSTEM | 5.725 | 10-YEAR | 646.59 | 646.28 | 0.31 | 0.03 | 0.04 | | 634.00 | | 93.92 |
| MAINSTEM | 5.725 | 50-YEAR | 650.10 | 649.82 | 0.28 | 0.01 | 0.04 | | 1056.00 | | 126.73 |
| MAINSTEM | 5.725 | 100-YEAR | 651.99 | 651.74 | 0.25 | 0.01 | 0.04 | | 1227.00 | | 144.48 |

HEC-RAS Plan: November 2012 (Continued)

| Reach | River Sta | Profile | E.G. Elev (ft) | W.S. Elev (ft) | Vel Head (ft) | Frctn Loss (ft) | C & E Loss (ft) | Q Left (cfs) | Q Channel (cfs) | Q Right (cfs) | Top Width (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINSTEM | 5.727 | 10-YEAR | 646.68 | 646.23 | 0.45 | 0.02 | 0.07 | | 634.00 | | 25.00 |
| MAINSTEM | 5.727 | 50-YEAR | 650.18 | 649.77 | 0.41 | 0.01 | 0.06 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.727 | 100-YEAR | 652.05 | 651.69 | 0.36 | 0.01 | 0.06 | | 1227.00 | | 27.98 |
| MAINSTEM | 5.732 | 10-YEAR | 646.81 | 646.38 | 0.44 | 0.13 | 0.00 | | 634.00 | | 25.00 |
| MAINSTEM | 5.732 | 50-YEAR | 650.24 | 649.84 | 0.41 | 0.07 | 0.00 | | 1056.00 | | 25.00 |
| MAINSTEM | 5.732 | 100-YEAR | 652.10 | 651.74 | 0.36 | 0.05 | 0.00 | | 1227.00 | | 27.64 |
| MAINSTEM | 5.74 Tonne Feed | | Culvert | | | | | | | | |
| MAINSTEM | 5.757 | 10-YEAR | 647.18 | 646.81 | 0.37 | | | | 634.00 | | 26.00 |
| MAINSTEM | 5.757 | 50-YEAR | 650.55 | 650.18 | 0.37 | | | | 1056.00 | | 26.00 |
| MAINSTEM | 5.757 | 100-YEAR | 652.40 | 652.07 | 0.33 | | | | 1227.00 | | 26.00 |
| MAINSTEM | 5.759 | 10-YEAR | 647.22 | 647.20 | 0.03 | 0.01 | 0.03 | | 634.00 | | 100.00 |
| MAINSTEM | 5.759 | 50-YEAR | 650.59 | 650.56 | 0.03 | 0.01 | 0.03 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.759 | 100-YEAR | 652.43 | 652.41 | 0.03 | 0.00 | 0.03 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.810 | 10-YEAR | 647.29 | 647.24 | 0.06 | 0.06 | 0.01 | | 634.00 | | 100.00 |
| MAINSTEM | 5.810 | 50-YEAR | 650.62 | 650.58 | 0.04 | 0.03 | 0.00 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.810 | 100-YEAR | 652.45 | 652.42 | 0.03 | 0.02 | 0.00 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.860 | 10-YEAR | 648.57 | 647.64 | 0.93 | 0.42 | 0.26 | | 634.00 | | 100.00 |
| MAINSTEM | 5.860 | 50-YEAR | 650.83 | 650.43 | 0.40 | 0.10 | 0.11 | | 1056.00 | | 100.00 |
| MAINSTEM | 5.860 | 100-YEAR | 652.58 | 652.31 | 0.28 | 0.06 | 0.07 | | 1227.00 | | 100.00 |
| MAINSTEM | 5.862 | 10-YEAR | 649.70 | 648.45 | 1.26 | 0.73 | 0.16 | | 634.00 | | 28.35 |
| MAINSTEM | 5.862 | 50-YEAR | 651.40 | 650.19 | 1.20 | 0.17 | 0.40 | | 1056.00 | | 28.35 |
| MAINSTEM | 5.862 | 100-YEAR | 652.90 | 652.14 | 0.76 | 0.07 | 0.24 | | 1227.00 | | 28.35 |
| MAINSTEM | 5.900 Runway 14R | | Culvert | | | | | | | | |
| MAINSTEM | 6.037 | 10-YEAR | 651.96 | 651.60 | 0.37 | | | | 634.00 | | 33.00 |
| MAINSTEM | 6.037 | 50-YEAR | 653.74 | 653.22 | 0.52 | | | | 1056.00 | | 33.00 |
| MAINSTEM | 6.037 | 100-YEAR | 654.46 | 653.90 | 0.56 | | | | 1227.00 | | 33.00 |
| MAINSTEM | 6.08 Runway 14R Exten | | Culvert | | | | | | | | |
| MAINSTEM | 6.190 | 10-YEAR | 652.40 | 652.15 | 0.25 | | | | 603.00 | | 34.00 |
| MAINSTEM | 6.190 | 50-YEAR | 654.26 | 653.91 | 0.35 | | | | 996.00 | | 34.00 |
| MAINSTEM | 6.190 | 100-YEAR | 655.00 | 654.62 | 0.38 | | | | 1156.00 | | 34.00 |
| MAINSTEM | 6.194 | 10-YEAR | 652.44 | 652.41 | 0.03 | 0.01 | 0.02 | | 603.00 | | 100.00 |
| MAINSTEM | 6.194 | 50-YEAR | 654.31 | 654.27 | 0.04 | 0.01 | 0.03 | | 996.00 | | 100.00 |
| MAINSTEM | 6.194 | 100-YEAR | 655.04 | 655.00 | 0.04 | 0.01 | 0.03 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.332 | 10-YEAR | 652.55 | 652.52 | 0.03 | 0.11 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.332 | 50-YEAR | 654.41 | 654.37 | 0.04 | 0.10 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.332 | 100-YEAR | 655.14 | 655.10 | 0.04 | 0.10 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.418 | 10-YEAR | 652.63 | 652.61 | 0.03 | 0.09 | 0.00 | | 603.00 | | 100.00 |
| MAINSTEM | 6.418 | 50-YEAR | 654.49 | 654.45 | 0.04 | 0.08 | 0.00 | | 996.00 | | 100.00 |
| MAINSTEM | 6.418 | 100-YEAR | 655.22 | 655.18 | 0.04 | 0.08 | 0.00 | | 1156.00 | | 100.00 |
| MAINSTEM | 6.471 | 10-YEAR | 652.73 | 652.65 | 0.08 | 0.08 | 0.02 | | 603.00 | | 55.30 |
| MAINSTEM | 6.471 | 50-YEAR | 654.59 | 654.48 | 0.12 | 0.08 | 0.02 | | 996.00 | | 55.30 |
| MAINSTEM | 6.471 | 100-YEAR | 655.32 | 655.19 | 0.13 | 0.07 | 0.03 | | 1156.00 | | 55.30 |
| MAINSTEM | 6.473 | 10-YEAR | 652.79 | 652.61 | 0.18 | 0.01 | 0.05 | | 603.00 | | 40.00 |
| MAINSTEM | 6.473 | 50-YEAR | 654.67 | 654.42 | 0.25 | 0.01 | 0.07 | | 996.00 | | 40.00 |
| MAINSTEM | 6.473 | 100-YEAR | 655.40 | 655.13 | 0.27 | 0.01 | 0.07 | | 1156.00 | | 40.00 |
| MAINSTEM | 6.49 Tank Farm Rd | | Culvert | | | | | | | | |
| MAINSTEM | 6.597 | 10-YEAR | 653.12 | 653.04 | 0.08 | | | | 603.00 | | 120.63 |
| MAINSTEM | 6.597 | 50-YEAR | 655.06 | 654.96 | 0.10 | | | | 996.00 | | 1005.08 |
| MAINSTEM | 6.597 | 100-YEAR | 655.82 | 655.70 | 0.11 | | | | 1156.00 | | 1022.24 |
| MAINSTEM | 6.6 | 10-YEAR | 653.15 | 653.04 | 0.11 | 0.01 | 0.01 | | 603.00 | | 199.96 |
| MAINSTEM | 6.6 | 50-YEAR | 655.09 | 654.95 | 0.15 | 0.01 | 0.02 | | 996.00 | | 234.17 |
| MAINSTEM | 6.6 | 100-YEAR | 655.85 | 655.69 | 0.16 | 0.01 | 0.02 | | 1156.00 | | 247.45 |
| MAINSTEM | 6.62 C & NW Railroad | | Culvert | | | | | | | | |
| MAINSTEM | 6.635 | 10-YEAR | 653.45 | 652.11 | 1.34 | | | | 603.00 | | 219.64 |
| MAINSTEM | 6.635 | 50-YEAR | 655.44 | 654.35 | 1.09 | | | | 996.00 | | 1223.86 |
| MAINSTEM | 6.635 | 100-YEAR | 656.22 | 655.11 | 1.11 | | | | 1156.00 | | 1229.94 |

HEC-RAS Plan: November 2012 (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| MAINSTEM | 6.637 | 10-YEAR | 653.85 | 653.85 | 0.00 | 0.00 | 0.40 | 5.04 | 597.62 | 0.34 | 1208.72 |
| MAINSTEM | 6.637 | 50-YEAR | 655.77 | 655.77 | 0.00 | 0.00 | 0.33 | 15.52 | 979.22 | 1.26 | 1234.59 |
| MAINSTEM | 6.637 | 100-YEAR | 656.55 | 656.55 | 0.00 | 0.00 | 0.33 | 19.84 | 1134.37 | 1.79 | 1240.08 |
| | | | | | | | | | | | |
| MAINSTEM | 6.639 | 10-YEAR | 654.18 | 653.53 | 0.65 | 0.00 | 0.33 | | 603.00 | | 40.24 |
| MAINSTEM | 6.639 | 50-YEAR | 656.00 | 655.55 | 0.44 | 0.00 | 0.22 | | 996.00 | | 52.10 |
| MAINSTEM | 6.639 | 100-YEAR | 656.75 | 656.35 | 0.39 | 0.00 | 0.20 | | 1156.00 | | 56.81 |
| | | | | | | | | | | | |
| MAINSTEM | 6.641 York Road | | Bridge | | | | | | | | |
| | | | | | | | | | | | |
| MAINSTEM | 6.642 | 10-YEAR | 655.03 | 654.58 | 0.45 | 0.01 | 0.00 | | 603.00 | | 47.66 |
| MAINSTEM | 6.642 | 50-YEAR | 656.42 | 655.99 | 0.43 | 0.01 | 0.00 | | 996.00 | | 61.45 |
| MAINSTEM | 6.642 | 100-YEAR | 657.07 | 656.70 | 0.38 | 0.00 | 0.00 | | 1156.00 | | 68.58 |
| | | | | | | | | | | | |
| MAINSTEM | 6.643 | 10-YEAR | 655.12 | 654.72 | 0.40 | 0.07 | 0.01 | | 603.00 | | 48.91 |
| MAINSTEM | 6.643 | 50-YEAR | 656.48 | 656.06 | 0.41 | 0.05 | 0.01 | | 996.00 | | 62.23 |
| MAINSTEM | 6.643 | 100-YEAR | 657.12 | 656.75 | 0.37 | 0.04 | 0.00 | | 1156.00 | | 69.12 |
| | | | | | | | | | | | |
| MAINSTEM | 6.6435 | 10-YEAR | 655.24 | 655.24 | 0.00 | 0.00 | 0.12 | | 603.00 | | 613.85 |
| MAINSTEM | 6.6435 | 50-YEAR | 656.60 | 656.60 | 0.00 | 0.00 | 0.12 | | 996.00 | | 623.44 |
| MAINSTEM | 6.6435 | 100-YEAR | 657.23 | 657.22 | 0.00 | 0.00 | 0.11 | | 1156.00 | | 627.83 |
| | | | | | | | | | | | |
| MAINSTEM | 6.644 | 10-YEAR | 655.24 | 655.24 | 0.00 | 0.00 | 0.00 | | 603.00 | | 752.52 |
| MAINSTEM | 6.644 | 50-YEAR | 656.60 | 656.60 | 0.00 | 0.00 | 0.00 | | 996.00 | | 765.39 |
| MAINSTEM | 6.644 | 100-YEAR | 657.23 | 657.23 | 0.00 | 0.00 | 0.00 | | 1156.00 | | 771.29 |
| | | | | | | | | | | | |
| MAINSTEM | 6.645 | 10-YEAR | 655.25 | 655.25 | 0.00 | 0.01 | 0.00 | 0.11 | 578.57 | 24.32 | 1397.34 |
| MAINSTEM | 6.645 | 50-YEAR | 656.61 | 656.61 | 0.00 | 0.01 | 0.00 | 10.16 | 891.27 | 94.58 | 1640.89 |
| MAINSTEM | 6.645 | 100-YEAR | 657.23 | 657.23 | 0.00 | 0.00 | 0.00 | 20.89 | 1005.68 | 129.43 | 1761.90 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.647 | 10-YEAR | 655.29 | 655.21 | 0.08 | 0.00 | 0.04 | 7.55 | 303.95 | 2.50 | 70.22 |
| SOUTH TRIB | 6.647 | 50-YEAR | 656.65 | 656.56 | 0.09 | 0.00 | 0.04 | 12.43 | 488.03 | 5.54 | 82.20 |
| SOUTH TRIB | 6.647 | 100-YEAR | 657.27 | 657.19 | 0.08 | 0.00 | 0.04 | 14.08 | 549.19 | 6.73 | 87.74 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.6475 Ramp Q5 | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.648 | 10-YEAR | 655.51 | 655.41 | 0.10 | | | | 314.00 | 0.00 | 166.74 |
| SOUTH TRIB | 6.648 | 50-YEAR | 656.85 | 656.74 | 0.11 | | | | 505.81 | 0.19 | 172.58 |
| SOUTH TRIB | 6.648 | 100-YEAR | 657.54 | 657.45 | 0.10 | | | | 569.24 | 0.76 | 176.45 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.649 | 10-YEAR | 655.67 | 655.62 | 0.04 | 0.15 | 0.01 | 230.33 | 83.28 | 0.38 | 233.75 |
| SOUTH TRIB | 6.649 | 50-YEAR | 656.91 | 656.89 | 0.02 | 0.05 | 0.01 | 388.83 | 113.79 | 3.38 | 241.33 |
| SOUTH TRIB | 6.649 | 100-YEAR | 657.58 | 657.56 | 0.02 | 0.03 | 0.01 | 440.96 | 123.37 | 5.67 | 245.39 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.650 | 10-YEAR | 655.91 | 655.74 | 0.16 | 0.20 | 0.04 | 145.43 | 167.50 | 1.07 | 269.47 |
| SOUTH TRIB | 6.650 | 50-YEAR | 656.98 | 656.88 | 0.10 | 0.05 | 0.02 | 271.38 | 227.87 | 6.74 | 276.30 |
| SOUTH TRIB | 6.650 | 100-YEAR | 657.63 | 657.55 | 0.07 | 0.03 | 0.02 | 314.68 | 244.17 | 11.15 | 280.32 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.651 | 10-YEAR | 656.27 | 656.23 | 0.04 | 0.35 | 0.01 | 177.91 | 116.43 | 19.65 | 344.36 |
| SOUTH TRIB | 6.651 | 50-YEAR | 657.14 | 657.10 | 0.04 | 0.15 | 0.01 | 295.16 | 157.21 | 53.63 | 349.61 |
| SOUTH TRIB | 6.651 | 100-YEAR | 657.71 | 657.69 | 0.03 | 0.08 | 0.00 | 334.62 | 165.38 | 69.99 | 353.12 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.652 | 10-YEAR | 656.44 | 656.42 | 0.02 | 0.17 | 0.00 | 195.76 | 84.89 | 33.35 | 287.52 |
| SOUTH TRIB | 6.652 | 50-YEAR | 657.24 | 657.22 | 0.02 | 0.10 | 0.00 | 315.97 | 114.33 | 75.69 | 292.32 |
| SOUTH TRIB | 6.652 | 100-YEAR | 657.78 | 657.76 | 0.01 | 0.06 | 0.00 | 355.30 | 119.75 | 94.96 | 295.58 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.653 | 10-YEAR | 656.55 | 656.48 | 0.06 | 0.09 | 0.02 | 6.22 | 300.15 | 7.63 | 77.90 |
| SOUTH TRIB | 6.653 | 50-YEAR | 657.35 | 657.25 | 0.10 | 0.07 | 0.04 | 10.45 | 483.12 | 12.42 | 82.50 |
| SOUTH TRIB | 6.653 | 100-YEAR | 657.87 | 657.77 | 0.10 | 0.05 | 0.04 | 12.01 | 543.93 | 14.06 | 85.62 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.654 Ramp P5,O4,Q5 | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.655 | 10-YEAR | 657.06 | 656.97 | 0.09 | | | 7.20 | 298.89 | 7.90 | 123.97 |
| SOUTH TRIB | 6.655 | 50-YEAR | 657.94 | 657.81 | 0.13 | | | 11.91 | 481.30 | 12.79 | 143.70 |
| SOUTH TRIB | 6.655 | 100-YEAR | 658.47 | 658.34 | 0.12 | | | 13.56 | 542.01 | 14.44 | 150.13 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.656 | 10-YEAR | 657.64 | 657.31 | 0.33 | 0.51 | 0.07 | 35.58 | 236.46 | 41.96 | 221.31 |
| SOUTH TRIB | 6.656 | 50-YEAR | 658.38 | 658.13 | 0.25 | 0.40 | 0.04 | 89.00 | 320.85 | 96.15 | 268.76 |
| SOUTH TRIB | 6.656 | 100-YEAR | 658.78 | 658.58 | 0.20 | 0.29 | 0.02 | 110.41 | 342.39 | 117.20 | 271.47 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.657 | 10-YEAR | 658.10 | 658.06 | 0.04 | 0.44 | 0.03 | 79.49 | 134.24 | 100.26 | 323.37 |
| SOUTH TRIB | 6.657 | 50-YEAR | 658.72 | 658.68 | 0.05 | 0.32 | 0.02 | 152.39 | 184.82 | 168.80 | 327.05 |
| SOUTH TRIB | 6.657 | 100-YEAR | 659.04 | 659.00 | 0.04 | 0.24 | 0.02 | 180.75 | 196.71 | 192.53 | 328.98 |
| | | | | | | | | | | | |
| SOUTH TRIB | 6.658 | 10-YEAR | 658.20 | 658.18 | 0.02 | 0.10 | 0.00 | 59.00 | 109.78 | 145.22 | 314.07 |
| SOUTH TRIB | 6.658 | 50-YEAR | 658.81 | 658.78 | 0.03 | 0.09 | 0.00 | 110.96 | 149.76 | 245.28 | 317.70 |
| SOUTH TRIB | 6.658 | 100-YEAR | 659.11 | 659.09 | 0.02 | 0.07 | 0.00 | 130.88 | 159.14 | 279.98 | 319.52 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.12 | 10-YEAR | 658.32 | 658.24 | 0.08 | 0.09 | 0.03 | | 287.00 | | 54.46 |

HEC-RAS Plan: November 2012 (Continued)

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | Q Left | Q Channel | Q Right | Top Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| SOUTH TRIB | 7.12 | 50-YEAR | 658.97 | 658.83 | 0.14 | 0.10 | 0.06 | | 461.00 | | 57.96 |
| SOUTH TRIB | 7.12 | 100-YEAR | 659.26 | 659.11 | 0.15 | 0.09 | 0.06 | | 517.00 | | 59.66 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.16 Ramps P1, P2, P8 | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.21 | 10-YEAR | 659.07 | 658.82 | 0.25 | | | 2.14 | 284.86 | | 51.06 |
| SOUTH TRIB | 7.21 | 50-YEAR | 660.00 | 659.68 | 0.33 | | | 8.18 | 452.82 | | 77.47 |
| SOUTH TRIB | 7.21 | 100-YEAR | 660.40 | 660.08 | 0.32 | | | 11.12 | 505.88 | | 80.06 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.22 | 10-YEAR | 659.91 | 659.40 | 0.51 | 0.45 | 0.08 | 109.05 | 177.95 | | 56.92 |
| SOUTH TRIB | 7.22 | 50-YEAR | 660.44 | 659.98 | 0.46 | 0.40 | 0.04 | 228.88 | 232.12 | | 74.51 |
| SOUTH TRIB | 7.22 | 100-YEAR | 660.69 | 660.39 | 0.30 | 0.29 | 0.00 | 294.68 | 222.32 | | 79.60 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.247 | 10-YEAR | 660.71 | 660.63 | 0.08 | 0.76 | 0.04 | 200.86 | 86.14 | | 79.15 |
| SOUTH TRIB | 7.247 | 50-YEAR | 661.26 | 661.14 | 0.11 | 0.78 | 0.03 | 340.99 | 120.01 | | 81.67 |
| SOUTH TRIB | 7.247 | 100-YEAR | 661.38 | 661.25 | 0.13 | 0.68 | 0.02 | 385.71 | 131.29 | | 82.22 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.259 | 10-YEAR | 660.85 | 660.78 | 0.07 | 0.13 | 0.00 | 210.11 | 76.89 | | 80.68 |
| SOUTH TRIB | 7.259 | 50-YEAR | 661.41 | 661.31 | 0.10 | 0.15 | 0.00 | 352.08 | 108.92 | | 83.22 |
| SOUTH TRIB | 7.259 | 100-YEAR | 661.54 | 661.44 | 0.11 | 0.16 | 0.00 | 397.63 | 119.37 | | 83.83 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.265 | 10-YEAR | 661.05 | 660.67 | 0.37 | 0.11 | 0.09 | 40.94 | 234.63 | 11.43 | 59.60 |
| SOUTH TRIB | 7.265 | 50-YEAR | 661.64 | 661.18 | 0.45 | 0.12 | 0.11 | 121.69 | 318.68 | 20.63 | 62.62 |
| SOUTH TRIB | 7.265 | 100-YEAR | 661.79 | 661.30 | 0.49 | 0.13 | 0.11 | 147.84 | 345.51 | 23.65 | 63.30 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.289 | 10-YEAR | 661.70 | 661.50 | 0.20 | 0.63 | 0.02 | 120.29 | 166.71 | | 35.69 |
| SOUTH TRIB | 7.289 | 50-YEAR | 662.43 | 662.12 | 0.31 | 0.78 | 0.01 | 209.65 | 251.35 | | 39.96 |
| SOUTH TRIB | 7.289 | 100-YEAR | 662.64 | 662.29 | 0.34 | 0.83 | 0.01 | 239.54 | 277.46 | | 41.11 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.314 | 10-YEAR | 662.00 | 661.91 | 0.09 | 0.29 | 0.01 | 161.45 | 125.55 | | 47.49 |
| SOUTH TRIB | 7.314 | 50-YEAR | 662.82 | 662.70 | 0.13 | 0.37 | 0.02 | 274.10 | 186.90 | | 53.28 |
| SOUTH TRIB | 7.314 | 100-YEAR | 663.05 | 662.91 | 0.14 | 0.39 | 0.02 | 311.17 | 205.83 | | 54.86 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.331 | 10-YEAR | 662.44 | 662.09 | 0.35 | 0.36 | 0.08 | 111.59 | 175.41 | | 26.13 |
| SOUTH TRIB | 7.331 | 50-YEAR | 663.36 | 662.87 | 0.49 | 0.43 | 0.11 | 191.34 | 269.66 | | 30.41 |
| SOUTH TRIB | 7.331 | 100-YEAR | 663.61 | 663.09 | 0.53 | 0.45 | 0.12 | 217.70 | 299.30 | | 31.57 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.35 | 10-YEAR | 662.91 | 662.72 | 0.19 | 0.46 | 0.02 | 99.36 | 187.64 | | 30.86 |
| SOUTH TRIB | 7.35 | 50-YEAR | 663.91 | 663.65 | 0.26 | 0.53 | 0.02 | 177.21 | 283.79 | | 35.67 |
| SOUTH TRIB | 7.35 | 100-YEAR | 664.18 | 663.90 | 0.28 | 0.54 | 0.02 | 203.46 | 313.54 | | 36.96 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.391 | 10-YEAR | 663.44 | 663.29 | 0.15 | 0.53 | 0.00 | 95.72 | 191.28 | | 31.68 |
| SOUTH TRIB | 7.391 | 50-YEAR | 664.52 | 664.31 | 0.21 | 0.60 | 0.01 | 171.07 | 289.93 | | 36.56 |
| SOUTH TRIB | 7.391 | 100-YEAR | 664.81 | 664.58 | 0.22 | 0.62 | 0.01 | 196.51 | 320.49 | | 37.87 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.399 | 10-YEAR | 663.52 | 663.34 | 0.18 | 0.07 | 0.01 | 27.56 | 232.99 | 26.45 | 24.71 |
| SOUTH TRIB | 7.399 | 50-YEAR | 664.63 | 664.34 | 0.29 | 0.08 | 0.02 | 52.06 | 358.72 | 50.23 | 177.86 |
| SOUTH TRIB | 7.399 | 100-YEAR | 664.93 | 664.60 | 0.33 | 0.09 | 0.03 | 60.58 | 397.90 | 58.52 | 596.90 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.406 | 10-YEAR | 663.60 | 663.36 | 0.23 | 0.06 | 0.02 | 43.02 | 207.66 | 36.32 | 25.08 |
| SOUTH TRIB | 7.406 | 50-YEAR | 664.73 | 664.37 | 0.35 | 0.08 | 0.02 | 79.12 | 315.07 | 66.81 | 28.28 |
| SOUTH TRIB | 7.406 | 100-YEAR | 665.03 | 664.64 | 0.39 | 0.09 | 0.02 | 92.05 | 347.76 | 77.19 | 28.89 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.431 | 10-YEAR | 664.02 | 663.64 | 0.38 | 0.38 | 0.04 | 56.41 | 196.42 | 34.17 | 23.78 |
| SOUTH TRIB | 7.431 | 50-YEAR | 665.21 | 664.70 | 0.50 | 0.43 | 0.04 | 103.29 | 288.99 | 68.73 | 28.17 |
| SOUTH TRIB | 7.431 | 100-YEAR | 665.53 | 664.99 | 0.54 | 0.45 | 0.04 | 119.19 | 316.82 | 80.99 | 29.35 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.447 | 10-YEAR | 664.10 | 663.98 | 0.12 | 0.05 | 0.03 | 130.04 | 130.80 | 26.16 | 31.45 |
| SOUTH TRIB | 7.447 | 50-YEAR | 665.30 | 665.12 | 0.17 | 0.06 | 0.03 | 207.23 | 199.25 | 54.53 | 35.68 |
| SOUTH TRIB | 7.447 | 100-YEAR | 665.62 | 665.41 | 0.21 | 0.06 | 0.03 | 241.98 | 229.94 | 45.07 | 48.24 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.456 | 10-YEAR | 664.14 | 664.04 | 0.09 | 0.03 | 0.01 | 122.18 | 114.39 | 24.43 | 31.68 |
| SOUTH TRIB | 7.456 | 50-YEAR | 665.34 | 665.21 | 0.14 | 0.04 | 0.01 | 187.81 | 179.96 | 50.23 | 35.99 |
| SOUTH TRIB | 7.456 | 100-YEAR | 665.67 | 665.50 | 0.17 | 0.04 | 0.01 | 221.74 | 209.90 | 36.36 | 58.34 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.463 Thomas Ave | | Culvert | | | | | | | | |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.47 | 10-YEAR | 664.87 | 664.80 | 0.07 | | | 122.91 | 110.62 | 27.48 | 34.47 |
| SOUTH TRIB | 7.47 | 50-YEAR | 666.74 | 666.67 | 0.07 | | | 127.79 | 191.12 | 99.09 | 292.95 |
| SOUTH TRIB | 7.47 | 100-YEAR | 666.91 | 666.84 | 0.07 | | | 147.11 | 196.74 | 124.14 | 332.28 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.486 | 10-YEAR | 664.87 | 664.87 | 0.00 | 0.00 | 0.01 | 58.38 | 113.08 | 89.54 | 208.30 |
| SOUTH TRIB | 7.486 | 50-YEAR | 666.75 | 666.75 | 0.00 | 0.00 | 0.01 | 104.21 | 150.70 | 163.09 | 208.30 |
| SOUTH TRIB | 7.486 | 100-YEAR | 666.92 | 666.92 | 0.00 | 0.00 | 0.01 | 117.44 | 166.50 | 184.06 | 208.30 |
| | | | | | | | | | | | |
| SOUTH TRIB | 7.493 | 10-YEAR | 664.87 | 664.87 | 0.00 | 0.00 | 0.00 | 232.81 | 24.38 | 3.81 | 1491.36 |
| SOUTH TRIB | 7.493 | 50-YEAR | 666.75 | 666.75 | 0.00 | 0.00 | 0.00 | 388.23 | 26.20 | 3.57 | 1584.75 |
| SOUTH TRIB | 7.493 | 100-YEAR | 666.92 | 666.92 | 0.00 | 0.00 | 0.00 | 435.54 | 28.53 | 3.93 | 1592.47 |

Willow Creek Plan: 1) November 2012 11/19/2012

WILLOW CREEK MAINSTEM

WILLOW CREEK SOUTH TRIB

Legend

WS 100-YEAR

WS 50-YEAR

WS 10-YEAR

Ground

Elevation (ft)

665

660

655

650

645

640

635

4.594 4.675 4.773 4.924 1400' C... 5.104 5.524 Tank Farm Rd 5.639 5.697 5.725 5.74 Tonne Feed 5.810 5.860 5.900 Runway 14R 6.08 Runway 14R Exten 6.332 6.418 6.471 6.49 Tank Farm Rd 6.62 C & NW Railroad 6.644 6.645 6.649 6.651 6.652 6.654 Ramp P5,O4,Q5 6.656 6.657 7.12 7.16 Ramps P1, P2, P8 7.247 7.289 7.331 7.391 7.431 7.486

0 2000 4000 6000 8000 10000 12000 14000 16000

Stream Distance Above Willow-Higgins Creek Confluence with Des Plaines River (ft)

1 in Horiz. = 1200 ft 1 in Vert. = 4 ft

# SECTION 12

## IDNR-OWR FLOODWAY PERMIT SUMMARY
## COMPENSATORY STORAGE CALCULATIONS

Illinois Department of Transportation

# Permit Summary for Floodway Construction in Northeast Illinois

| | | | |
|---|---|---|---|
| Applicant Agency: | Illinois Department of Transportation | County: | DuPage |
| Route: | Elgin O'Hare West Bypass | Stream: | Willow Creek South Tributary |
| Section: | Ramps O4, P1, P2, P5, P8, Q1 | SN: | |

General Description (bridge length, bridge width, number of spans, abutment type, proposed scope of work within floodway, etc.):
Existing Facility: There is no structure where Ramps Q5, Ramps Q1, O4, P5 and Ramps P1, P2, P8 are proposed.
Proposed Improvement: Proposed structure consists of:4-11'(span) x 5(rise) reinforced concrete box culverts (RCBC) at Ramp Q5 4–11' (span) x 5' (rise) reinforced concrete box culverts (RCBC) at Ramp Q1, O4, P5 (P5 STA: 550+00), 3-10'(span) x 5'(rise) RCBC at Ramps P1, P2, P8 (P2 STA: 217+30).

1. Is the proposed work classified as repairs such as deck replacement, pavement resurfacing, or the armoring or filling of a scour hole? ☐ Yes ☒ No

2. Does the proposed work only consist of modifications to the existing structure which will occur above the regulatory 100-year flood profile? ☐ Yes ☒ No

Note: If the answer to question 1 or 2 is yes, no permit is required and questions 3 through 12 may be omitted.

3. Does the proposed work below the regulatory 100-year flood profile consist of widening of the existing structure by 12 feet or less? ☐ Yes ☒ No

Note: If yes, Regional Permit No. 2 applies and questions 4 through 9 may be omitted.

4. Is the proposed improvement, including the approach roadway, more restrictive to normal and flood flows than the existing structure? ☐ Yes ☐ No

5. Is a Channel Modification proposed? ☒ Yes ☐ No

6. Are there any buildings or structures located upstream in the 100-year floodplain within the influence of the structure backwater? ☐ Yes ☒ No

   6a. If no, does the backwater of the proposed improvement exceed the backwater of the existing structure by more than 0.1 foot? ☐ Yes ☒ No

   6b. If yes, does the proposed backwater exceed the natural high water elevation by more than 0.1 foot? ☐ Yes ☐ No

7. Are transitions required for this project? ☐ Yes ☒ No

8. Is the flood profile at the project site impacted by backwater from a downstream receiving stream? ☐ Yes ☒ No

   If yes, list frequency of starting elevation for analysis:

9. Is backwater from a downstream structure affecting the flood profile at the project site? ☒ Yes ☐ No

9a. Was the existing downstream structure used in the analysis for determining flood profile at the project site? years? (Attach documentation) ☒ Yes ☐ No

9b. Is the downstream structure scheduled for improvement in the next 5? ☒ Yes ☐ No

9c. Was the proposed downstream improvement used in the analysis? ☒ Yes ☐ No

10. Is a floodway map change required due to the proposed project? ☒ Yes ☐ No

11. Will fill or material be placed in the floodway due to the proposed work? ☒ Yes ☐ No

11a. If yes, is compensatory storage provided at the project location? (Attach a copy of completed Attachment A) ☒ Yes ☐ No

11b. If the answer to 11a is no, is compensatory storage provided at another location? If yes, give location and attach a copy of completed Attachment A. ☐ Yes ☐ No

11c. Has compensatory storage relief been granted? (Attach Documentation) ☐ Yes ☒ No

12. Coordination based on Memorandum of Agreement has occurred with Agency(ies) (Attach documentation):. ☐ Yes ☒ No

---

All engineering analysis has been performed by me or under my direct supervision.

Signature: Jana Jones IL/P.E. #: 062-061210

Date: 11.20.12 P.E. Expiration Date: 11/2013

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**FOR DEPARTMENTAL USE ONLY**

Is a permit required for this project? ☐ Yes ☐ No

If yes, specify type of permit: ☐ Floodway, ☐ Regional 1, ☐ Regional 2

**Permit Summary**
**(Attachment A - Compensatory Storage)**

Part of Permit Summary for Floodway Construction in Northeast Illinois:

☒ Phase I (Preliminary) ☐ Phase II (Final)

| | | | |
|---|---|---|---|
| Applicant Agency: | IDOT | County: | DuPage |
| Route: | Elgin O'Hare West Bypass | Stream: | Willow Creek South Tributary |
| Section: | Ramps O4, P1, P2, P5, P8, Q1 | SN: | |

Provide the following information for Item 11:

a. Flood Water Elevations (Natural): 100-year 655.46-660.13 ft. 10-year 652.80-660.13 ft.
Normal 649.54-657.36 ft.

*Elevations in NAVD 1988

b. Determine the amount of fill or material being placed in the floodway:

1. Between the 100-year and 10-year flood elevation 19,521 cu. yds.
2. Between the 10-year and normal water elevation 21,457 cu. yds.

c. Determine the volume being provided to compensate for above item b:
(i.e. from structures removal, excavation, etc.)

1. Between the 100-year and 10-year flood elevation 40,656 cu. yds.
2. Between the 10-year and normal water elevation 35,816 cu. yds.

d. Mark on the exhibits the location and amount of compensatory storage to be excavated. Also show the location of floodway and floodplain boundaries. (Include a set of plans and cross sections)

Attach copy of calculations and Exhibit(s) reflecting the above finding.

All engineering analysis has been performed by me or under my direct supervision.

Signature: Ileana M Howd IL/P.E. #: 062-061210

Date: 11/20/2012 P.E. Expiration Date: 11/2013

**ELGIN O'HARE WEST BYPASS**
**WILLOW CREEK**
**EXISTING CONDITIONS PROJECT AREA FLOODPLAIN VOLUME SUMMARY**
**HEC-RAS Plan: Willow Creek - Existing Conditions**

**0-10 YEAR INCREMENTAL STORGE VOLUME**

| | XSEC ID | Area (sq. ft) | Distance to D/S XSEC (ft) | Average Area (sq. ft) | Incremental Volume (cu. ft) | Cumulative Volume (cu. ft) | Cumulative Volume (acre-feet) | PROJECT AREA FLOODPLAIN FILL VOLUME: Project Area Cumulative Volume (acre-feet) |
|---|---|---|---|---|---|---|---|---|
| *Willow Mainstem* | 6.473 | 175.7 | 1 | 175.7 | 176 | 176 | 0.0 | |
| *Tank Farm Road* | ***6.49*** | **Culvert** | | ***46120.3*** | 46120 | 46296 | 1.1 | |
| | 6.538 | 167.2 | 0.1 | 167.2 | 17 | 46313 | 1.1 | 0.0 |
| | 6.54 | 724.1 | 15.84 | 445.6 | 7059 | 53372 | 1.2 | 0.1 |
| | 6.59 | 715.2 | 204.06 | 719.6 | 146845 | 200216 | 4.6 | 3.5 |
| | 6.6 | 711.7 | 73.84 | 713.4 | 52677 | 252894 | 5.8 | 4.7 |
| *CN & UPRR* | ***6.62*** | **Culvert** | | ***17109.4*** | 17109 | 270003 | 6.2 | |
| | 6.635 | 263.9 | 10 | 263.9 | 2639 | 272642 | 6.3 | |
| | 6.637 | 1289.3 | 3 | 776.6 | 2330 | 274972 | 6.3 | |
| | 6.639 | 92.9 | 10 | 691.1 | 6911 | 281882 | 6.5 | |
| *York Road* | ***6.641*** | **Bridge** | | ***7999.7*** | 8000 | 289882 | 6.7 | |
| *Willow South Tributary* | 6.642 | 111.8 | 2 | 111.8 | 224 | 290106 | 6.7 | |
| | 6.643 | 120.2 | 13 | 116.0 | 1508 | 291614 | 6.7 | |
| | 6.644 | 2793.7 | 60 | 1456.9 | 87416 | 379030 | 8.7 | |
| | 6.645 | 61.9 | 400 | 1427.8 | 571112 | 950142 | 21.8 | |
| | 6.664 | 96.4 | 100 | 79.1 | 7913 | 958055 | 22.0 | 0.2 |
| | 6.683 | 84.3 | 100 | 90.3 | 9034 | 967089 | 22.2 | 0.4 |
| | 6.721 | 89.7 | 200 | 87.0 | 17392 | 984481 | 22.6 | 0.8 |
| | 6.759 | 100.5 | 200 | 95.1 | 19016 | 1003497 | 23.0 | 1.2 |
| | 6.797 | 105.7 | 200 | 103.1 | 20621 | 1024118 | 23.5 | 1.7 |
| | 6.834 | 123.5 | 200 | 114.6 | 22923 | 1047041 | 24.0 | 2.2 |
| | 6.872 | 101.8 | 199 | 112.7 | 22417 | 1069458 | 24.6 | 2.7 |
| *Miller Fluids Entrance* | ***6.879*** | **Culvert** | | ***8799.0*** | 8799 | 1078257 | 24.8 | 2.9 |
| | 6.886 | 102.4 | 2 | 102.4 | 205 | 1078462 | 24.8 | 2.9 |
| | 6.904 | 94.4 | 99 | 98.4 | 9745 | 1088207 | 25.0 | 3.2 |
| | 6.942 | 104.4 | 200 | 99.4 | 19877 | 1108084 | 25.4 | 3.6 |
| | 6.956 | 140.8 | 65 | 122.6 | 7967 | 1116051 | 25.6 | 3.8 |
| | 6.98 | 114.3 | 135 | 127.6 | 17221 | 1133272 | 26.0 | 4.2 |
| | 6.999 | 111.3 | 100 | 112.8 | 11281 | 1144553 | 26.3 | 4.5 |
| | 7.037 | 152.5 | 200 | 131.9 | 26380 | 1170933 | 26.9 | 5.1 |
| | 7.056 | 128.5 | 100 | 140.5 | 14050 | 1184982 | 27.2 | 5.4 |
| | 7.075 | 133.4 | 100 | 130.9 | 13092 | 1198074 | 27.5 | 5.7 |
| | 7.084 | 128.0 | 48 | 130.7 | 6273 | 1204347 | 27.6 | 5.8 |
| | 7.094 | 122.8 | 100 | 125.4 | 12537 | 1216884 | 27.9 | 6.1 |
| | 7.132 | 166.0 | 189 | 144.4 | 27287 | 1244171 | 28.6 | 6.7 |
| | 7.136 | 98.7 | 33 | 132.4 | 4368 | 1248539 | 28.7 | 6.9 |
| | 7.145 | 197.6 | 47 | 148.2 | 6963 | 1255502 | 28.8 | 7.0 |
| *Thorndale Ave* | ***7.156*** | **Culvert** | | ***13920.0*** | 13920 | 1269422 | 29.1 | 7.3 |
| | 7.168 | 202.6 | 5 | 202.6 | 1013 | 1270435 | 29.2 | 7.4 |
| | 7.181 | 233.0 | 42 | 233.0 | 9787 | 1280222 | 29.4 | 7.6 |
| | 7.191 | 230.2 | 71 | 230.2 | 16343 | 1296565 | 29.8 | 8.0 |
| | 7.220 | 230.4 | 154 | 230.4 | 35482 | 1332046 | 30.6 | 8.8 |

**10-100 YEAR INCREMENTAL STORGE VOLUME**

| | XSEC ID | 100 YR Area (sq. ft) | 10-100 YR Area (sq. ft) | Distance to D/S XSEC (ft) | Average Area (sq. ft) | Incremental Volume (cu. ft) | Cumulative Volume (cu. ft) | Cumulative Volume (acre-feet) | PROJECT AREA FLOODPLAIN FILL VOLUME: Project Area Cumulative Volume (acre-feet) |
|---|---|---|---|---|---|---|---|---|---|
| *Willow Mainstem* | 6.473 | 276.5 | 100.8 | 1 | 100.8 | 101 | 101 | 0.0 | |
| *Tank Farm Road* | ***6.49*** | **Culvert** | | | ***25361.3*** | 25361 | 25462 | 0.6 | |
| | 6.538 | 265.8 | 98.6 | 0.1 | 9.9 | 1 | 25463 | 0.6 | 0.0 |
| | 6.54 | 1292.0 | 567.9 | 15.84 | 333.3 | 5279 | 30742 | 0.7 | 0.1 |
| | 6.59 | 1911.6 | 1196.4 | 204.06 | 882.2 | 180015 | 210757 | 4.8 | 4.2 |
| | 6.6 | 1310.0 | 598.3 | 73.84 | 897.4 | 66261 | 277018 | 6.4 | 5.8 |
| *CN & UPRR* | ***6.62*** | **Culvert** | | | ***19352.2*** | 19352 | 296370 | 6.8 | |
| | 6.635 | 2849.5 | 2585.7 | 10 | 25856.8 | 258568 | 554938 | 12.7 | |
| | 6.637 | 4616.0 | 3326.7 | 3 | 2956.2 | 8869 | 563807 | 12.9 | |
| | 6.639 | 230.4 | 137.5 | 10 | 1732.1 | 17321 | 581128 | 13.3 | |
| *York Road* | ***6.641*** | **Bridge** | | | ***10145.9*** | 10146 | 591274 | 13.6 | |
| *Willow South Tributary* | 6.642 | 235.0 | 123.2 | 2 | 246.3 | 493 | 591767 | 13.6 | |
| | 6.643 | 239.8 | 119.6 | 13 | 121.4 | 1578 | 593345 | 13.6 | |
| | 6.644 | 6254.6 | 3460.9 | 60 | 1790.2 | 107414 | 700759 | 16.1 | |
| | 6.645 | 196.3 | 134.4 | 400 | 1797.6 | 719058 | 1419817 | 32.6 | |
| | 6.664 | 160.8 | 64.4 | 100 | 99.4 | 9943 | 1429759 | 32.8 | 0.2 |
| | 6.683 | 128.8 | 44.6 | 100 | 54.5 | 5450 | 1435209 | 32.9 | 0.4 |
| | 6.721 | 139.4 | 49.8 | 200 | 47.2 | 9435 | 1444644 | 33.2 | 0.6 |
| | 6.759 | 148.8 | 48.3 | 200 | 49.0 | 9809 | 1454453 | 33.4 | 0.8 |
| | 6.797 | 158.0 | 52.3 | 200 | 50.3 | 10060 | 1464513 | 33.6 | 1.0 |
| | 6.834 | 189.6 | 66.1 | 200 | 59.2 | 11837 | 1476350 | 33.9 | 1.3 |
| | 6.872 | 151.5 | 49.8 | 199 | 57.9 | 11525 | 1487875 | 34.2 | 1.6 |
| *Miller Fluids Entrance* | ***6.879*** | Culvert | | | ***2919.0*** | 2919 | 1490794 | 34.2 | 1.6 |
| | 6.886 | 153.6 | 51.1 | 2 | 102.2 | 204 | 1490999 | 34.2 | 1.6 |
| | 6.904 | 151.3 | 56.9 | 99 | 54.0 | 5346 | 1496344 | 34.4 | 1.8 |
| | 6.942 | 165.2 | 60.8 | 200 | 58.9 | 11771 | 1508115 | 34.6 | 2.0 |
| | 6.956 | 465.4 | 324.6 | 65 | 192.7 | 12527 | 1520642 | 34.9 | 2.3 |
| | 6.98 | 176.3 | 62.0 | 135 | 193.3 | 26095 | 1546737 | 35.5 | 2.9 |
| | 6.999 | 171.7 | 60.4 | 100 | 61.2 | 6120 | 1552857 | 35.6 | 3.1 |
| | 7.037 | 226.3 | 73.8 | 200 | 67.1 | 13423 | 1566280 | 36.0 | 3.4 |
| | 7.056 | 198.4 | 69.9 | 100 | 71.8 | 7185 | 1573465 | 36.1 | 3.5 |
| | 7.075 | 208.5 | 75.2 | 100 | 72.5 | 7253 | 1580717 | 36.3 | 3.7 |
| | 7.084 | 355.0 | 227.0 | 48 | 151.1 | 7251 | 1587968 | 36.5 | 3.9 |
| | 7.094 | 187.8 | 65.0 | 100 | 146.0 | 14600 | 1602568 | 36.8 | 4.2 |
| | 7.132 | 1349.4 | 1183.4 | 189 | 624.2 | 117979 | 1720547 | 39.5 | 6.9 |
| | 7.136 | 149.4 | 50.7 | 33 | 617.1 | 20363 | 1740910 | 40.0 | 7.4 |
| | 7.145 | 292.1 | 94.5 | 47 | 72.6 | 3411 | 1744321 | 40.0 | 7.4 |
| *Thorndale Ave* | ***7.156*** | Culvert | | | ***0.0*** | 0 | 1744321 | 40.0 | 7.4 |
| | 7.168 | 381.2 | 178.6 | 5 | 893.1 | 4466 | 1748786 | 40.1 | 7.6 |
| | 7.181 | 403.8 | 170.8 | 42 | 174.7 | 7337 | 1756123 | 40.3 | 7.7 |
| | 7.191 | 422.0 | 191.9 | 71 | 181.3 | 12874 | 1768997 | 40.6 | 8.0 |
| | 7.220 | 398.5 | 168.1 | 154 | 180.0 | 27719 | 1796716 | 41.2 | 8.7 |

**CROSSING SUMMARY**

| Crossing | HEC-RAS XS ID | Culvert Size | Culvert Length (ft) | Culvert Area (sq. ft.) | Culvert Volume (ac-ft) | Total Culvert Volume (cu. ft.) | 0-10-year Avg Depth (ft) | 0-10-year Culvert Volume (cu. ft.) | 100-year Avg Depth (ft) | 100-year Culvert Volume (cu. ft.) | 10-100 year Volume (cu. ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tank Farm Road | 6.49 | 3-12'x8' | 341, 216, 259 | 288 | 1.80 | 78336 | 4.7 | 46120 | 7.3 | 71482 | 25361 |
| C & NW RR | 6.62 | 3-12'x8' | 178 | 288 | 1.18 | 51264 | 2.7 | 17109 | 5.7 | 36462 | 19352 |
| York Rd | 6.641 | BRIDGE | 78 | 335.39 | 0.60 | 26160 | | 8000 | | 18146 | 10146 |
| Miller Fluids | 6.879 | 1-30'x6' | 70 | 180 | 0.29 | 12600 | 4.2 | 8799 | 5.6 | 11718 | 2919 |
| Thorndale Ave | 7.156 | 3-10'x4' | 116 | 120 | 0.32 | 13920 | 4 | 13920 | 4 | 13920 | 0 |

**EXISTING PROJECT AREA FILL SUMMARY**

| Increment | Existing Project Area Fill Volume (ac-ft) |
|---|---|
| 0-10 Yr | 8.8 |
| 10-100 Yr | 8.7 |
| TOTAL | 17.5 |

**ELGIN O'HARE WEST BYPASS**
**WILLOW CREEK**
**PROPOSED CONDITIONS PROJECT AREA FLOODPLAIN VOLUME SUMMARY**
**HEC-RAS Plan: Willow Creek - Proposed**

**0-10 YEAR INCREMENTAL STORGE VOLUME**

| | XSEC ID | Area (sq. ft) | Distance to D/S XSEC (ft) | Average Area (sq. ft) | Incremental Volume (cu. ft) | Cumulative Volume (cu. ft) | Cumulative Volume (acre-feet) | PROJECT AREA FLOODPLAIN FILL VOLUME Project Area Cumulative Volume (acre-feet) |
|---|---|---|---|---|---|---|---|---|
| ***Willow Mainstem*** | 6.473 | 175.7 | 10 | 175.7 | 1757 | 1757 | 0.0 | |
| *EOWB, Tank Farm Road* | ***6.49*** | **Culvert** | | ***95790.2*** | 95790 | 97548 | 2.2 | 1.1 |
| | 6.597 | 351.6 | 1 | 351.6 | 352 | 97899 | 2.2 | 1.1 |
| | 6.6 | 714.7 | 18 | 533.2 | 9597 | 107496 | 2.5 | 1.4 |
| *CN & UPRR* | ***6.62*** | **Culvert** | | ***23068.8*** | 23069 | 130565 | 3.0 | |
| | 6.635 | 264.5 | 10 | 264.5 | 2645 | 133209 | 3.1 | |
| | 6.637 | 1288.3 | 3 | 776.4 | 2329 | 135538 | 3.1 | |
| | 6.639 | 92.9 | 10 | 690.6 | 6906 | 142444 | 3.3 | |
| *York Road* | ***6.641*** | **Bridge** | | ***7998.1*** | 7998 | 150442 | 3.5 | |
| | 6.642 | 111.8 | 1 | 111.8 | 112 | 150554 | 3.5 | 1.4 |
| | 6.643 | 118.5 | 10 | 115.2 | 1152 | 151705 | 3.5 | 1.4 |
| | 6.6435 | 1967.9 | 15 | 1043.2 | 15648 | 167354 | 3.8 | 1.8 |
| | 6.644 | 2386.4 | 58 | 2177.2 | 126275 | 293629 | 6.7 | 4.7 |
| | 6.645 | 2465.0 | 197 | 2425.7 | 477858 | 771487 | 17.7 | 15.7 |
| ***Willow South Tributary*** | 6.647 | 161.6 | 1 | 1313.3 | 1313 | 772800 | 17.7 | 15.7 |
| *EOWB Ramp Q5* | ***6.6475*** | **Culvert** | | ***39780.0*** | 39780 | 812580 | 18.7 | 16.6 |
| | 6.648 | 283.4 | 1 | 283.4 | 283 | 812864 | 18.7 | 16.6 |
| | 6.649 | 229.8 | 52 | 256.6 | 13345 | 826208 | 37.6 | 16.9 |
| | 6.650 | 236.4 | 45 | 233.1 | 10491 | 836699 | 56.8 | 17.2 |
| | 6.651 | 442.2 | 140 | 339.3 | 47502 | 884201 | 77.1 | 18.2 |
| | 6.652 | 413.5 | 187 | 427.8 | 80004 | 964205 | 99.3 | 20.1 |
| | 6.653 | 193.2 | 105 | 303.4 | 31854 | 996059 | 22.9 | 20.8 |
| *EOWB Ramps P5, O4, Q1* | ***6.654*** | **Culvert** | | ***37260.0*** | 37260 | 1033319 | 23.7 | 21.7 |
| | 6.655 | 244.9 | 1 | 244.9 | 245 | 1033564 | 23.7 | 21.7 |
| | 6.656 | 135.1 | 140 | 190.0 | 26597 | 1060161 | 24.3 | 22.3 |
| | 6.657 | 402.1 | 155 | 268.6 | 41627 | 1101788 | 25.3 | 23.2 |
| | 6.658 | 429.7 | 120 | 415.9 | 49906 | 1151693 | 26.4 | 24.4 |
| | 7.12 | 149.4 | 120 | 289.5 | 34745 | 1186438 | 27.2 | 25.2 |
| *EOWB Ramps P1, P2, P8* | ***7.16*** | **Culvert** | | ***0.0*** | 0 | 1186438 | 27.2 | 25.2 |
| | 7.21 | 77.2 | 1 | 77.2 | 77 | 1186515 | 27.2 | 25.2 |
| | 7.22 | 59.1 | 51.34 | 68.1 | 3498 | 1190014 | 27.3 | 25.3 |

**10-100 YEAR INCREMENTAL STORGE VOLUME**

| | XSEC ID | 100 YR Area (sq. ft) | 10-100 YR Area (sq. ft) | Distance to D/S XSEC (ft) | Average Area (sq. ft) | Incremental Volume (cu. ft) | Cumulative Volume (cu. ft) | Cumulative Volume (acre-feet) | PROJECT AREA FLOODPLAIN FILL VOLUME Project Area Cumulative Volume (acre-feet) |
|---|---|---|---|---|---|---|---|---|---|
| ***Willow Mainstem*** | 6.473 | 276.5 | 100.8 | 10 | 100.8 | 1008 | 1008 | 0.0 | |
| *EOWB, Tank Farm Road* | 6.49 | **Culvert** | | | ***53529.8*** | 53530 | 54538 | 1.3 | 0.6 |
| | 6.597 | 2177.6 | 1826.0 | 1 | 1826.0 | 1826 | 56364 | 1.3 | 0.6 |
| | 6.6 | 1307.1 | 592.5 | 18 | 1209.2 | 21766 | 78130 | 1.8 | 1.1 |
| *CN & UPRR* | 6.62 | **Culvert** | | | ***17045.3*** | 17045 | 95175 | 2.2 | |
| | 6.635 | 2829.8 | 2565.3 | 10 | 2565.3 | 25653 | 120828 | 2.8 | |
| | 6.637 | 4606.2 | 3317.9 | 3 | 2941.6 | 8825 | 129653 | 3.0 | |
| | 6.639 | 229.9 | 137.1 | 10 | 1727.5 | 17275 | 146928 | 3.4 | |
| *York Road* | 6.641 | **Bridge** | | | ***10112.7*** | 10113 | 157041 | 3.6 | |
| | 6.642 | 234.6 | 122.7 | 1 | 122.7 | 123 | 157164 | 3.6 | 1.1 |
| | 6.643 | 238.3 | 119.8 | 10 | 121.3 | 1213 | 158376 | 3.6 | 1.1 |
| | 6.6435 | 3200.5 | 1232.6 | 15 | 676.2 | 10143 | 168520 | 3.9 | 1.4 |
| | 6.644 | 3899.0 | 1512.7 | 58 | 1372.6 | 79612 | 248132 | 5.7 | 3.2 |
| | 6.645 | 5586.6 | 3121.6 | 197 | 2317.1 | 456474 | 704605 | 16.2 | 13.7 |
| ***Willow South Tributary*** | 6.647 | 317.9 | 156.3 | 1 | 1638.9 | 1639 | 706244 | 16.2 | 13.7 |
| *EOWB Ramp Q5* | 6.6475 | **Culvert** | | | ***19890.0*** | | 706244 | 16.2 | 13.7 |
| | 6.648 | 631.9 | 348.5 | 1 | 348.5 | 349 | 706593 | 16.2 | 13.7 |
| | 6.649 | 694.7 | 464.8 | 52 | 406.7 | 21147 | 727740 | 16.7 | 14.2 |
| | 6.65 | 733.8 | 497.3 | 45 | 481.1 | 21649 | 749389 | 17.2 | 14.7 |
| | 6.651 | 951.2 | 509.0 | 140 | 503.2 | 70445 | 819834 | 18.8 | 16.3 |
| | 6.652 | 805.4 | 391.9 | 187 | 450.4 | 84233 | 904067 | 20.8 | 18.3 |
| | 6.653 | 298.4 | 105.2 | 105 | 248.5 | 26095 | 930162 | 21.4 | 18.9 |
| *EOWB Ramps P5, O4, Q1* | 6.654 | **Culvert** | | | ***13386.0*** | | 930162 | 21.4 | 18.9 |
| | 6.655 | 477.8 | 232.9 | 1 | 232.9 | 233 | 930395 | 21.4 | 18.9 |
| | 6.656 | 506.4 | 371.4 | 140 | 302.1 | 42295 | 972690 | 22.3 | 19.8 |
| | 6.657 | 739.2 | 337.2 | 155 | 354.3 | 54912 | 1027602 | 23.6 | 21.1 |
| | 6.658 | 749.1 | 319.5 | 120 | 328.3 | 39397 | 1066999 | 24.5 | 22.0 |
| | 7.12 | 199.1 | 49.7 | 120 | 184.6 | 22149 | 1089148 | 25.0 | 22.5 |
| *EOWB Ramps P1, P2, P8* | 7.16 | **Culvert** | | | ***25.3*** | | 1089148 | 25.0 | 22.5 |
| | 7.21 | 161.6 | 84.4 | 1 | 84.4 | 84 | 1089232 | 25.0 | 22.5 |
| | 7.22 | 125.7 | 66.7 | 51.34 | 75.5 | 3877 | 1093109 | 25.1 | 22.6 |

**CROSSING SUMMARY**

| Crossing | HEC-RAS XS ID | Culvert Size | Culvert Length (ft) | Culvert Area (sq. ft.) | Culvert Volume (ac-ft) | Total Culvert Volume (cu. ft.) | 0-10 year Avg Depth (ft) | Culvert Volume (cu. ft.) | 100-year Avg Depth (ft) | Culvert Volume (cu. ft.) | 10-100 year Volume (cu. ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EOWB, Tank Farm Road | 6.49 | 3-12'x8' | 617, 490, 570 | 288 | 3.70 | 160992 | 4.8 | 95790 | 7.4 | 149320 | 53530 |
| CN & UPRR | 6.62 | 3-12'x8' | 178 | 288 | 1.18 | 51264 | 3.6 | 23069 | 6.3 | 40114 | 17045 |
| York Rd | 6.641 | BRIDGE | 78 | 335.39 | 0.60 | 26160 | | 7998 | | 18111 | 10113 |
| EOWB Ramp Q5 | 6.6475 | 3-11'x4' | 100 | 132 | 0.30 | 13200 | 2.3 | 6900 | 4 | 12000 | 5100 |
| EOWB Ramps Q1, O4, P5 | 6.654 | 3-11'x4' | 510 | 132 | 1.55 | 67320 | 2.6 | 39780 | 3.9 | 59670 | 19890 |
| EOWB Ramps P1, P2, P8 | 7.16 | 3-10'x4' | 460 | 120 | 1.27 | 55200 | 2.7 | 37260 | 3.7 | 50646 | 13386 |

**PROPOSED PROJECT AREA FLOODPLAIN CUT SUMMARY**

| Increment | Proposed Project Area Cut Volume (ac-ft) |
|---|---|
| 0-10 Yr | 25.3 |
| 10-100 Yr | 22.6 |
| TOTAL | 47.9 |

| Increment | Floodplain Storage Volume (ac-ft) | | |
|---|---|---|---|
| | Fill | Required Compensatory Storage at 1.5:1 | Proposed Cut |
| 0-10 Yr | 12.0 | 18.1 | 25.3 |
| 10-100 Yr | 13.3 | 20.0 | 22.6 |
| TOTAL | 25.4 | 38.1 | 47.9 |

# SECTION 13

## CORRESPONDENCE AND NOTES

Illinois Department of
**Natural Resources**

One Natural Resources Way Springfield, Illinois 62702-1271
http://dnr.state.il.us

RECEIVED
MAR 31 2012
CHRISTOPHER B. BURKE
ENGINEERING LTD.

Pat Quinn, Governor
Marc Miller, Director

**Office of Water Resources • 2050 West Stearns Road • Bartlett, Illinois 60103**

March 30, 2012

Diane M. O'Keefe, P.E.
Deputy Director of Highways
Region One Engineer
Illinois Dept. of Transportation
210 West Center Ct.
Schaumburg, Illinois 60196-1096

Attention: Peter E. Harmet

Dear Ms. O'Keefe:

**ELGIN-O'HARE EXPRESSWAY WESTERN BY-PASS, WILLOW CREEK FLOOD DISCHARGE CONCURRENCE, DUPAGE COUNTY**

Thank you for your December 14, 2011 letter regarding the proposed Elgin-O'Hare Expressway Western By-Pass project, which includes roadway improvements in the floodways of Willow Creek and its tributaries. You have requested that in-lieu-of using published flood flow data, peak flood discharges from a hydrologic study performed by Christopher B. Burke Engineering Ltd. (CBBEL) be used to analyze the impacts of the proposed roadway improvements. Illinois Department of Natural Resources, Office of Water Resources (IDNR/OWR) concurrence with the flood discharge values is required.

With your letter you submitted a copy of CBBEL's November 2011 report which includes their hydrologic study of Willow Creek. The report indicates that TR-20 was used to compute peak flood discharge values for various flood events. The TR-20 modeling used Bulletin 70 rainfall amounts, Huff distributions and a critical duration storm analysis. Inasmuch as the study was done in accordance with accepted procedures, we hereby certify the peak flood discharge values shown on the attached undated Discharge Concurrence Form. As such, these discharges are acceptable for use in determining compliance with IDNR/OWR Rules for the subject proejct.

Please contact Bill Boyd of my staff at 847/608-3100, ext. 2025 if you have any questions.

Sincerely,

Gary W. Jereb, P.E., Chief
Northeastern Illinois Regulatory Programs Section

GJ/WB:
Enclosure: Discharge Concurrence Form

cc: Donald Dressel, Christopher B. Burke Engineering, Ltd.
Perry Masouridis, IDOT/DOH-District 1

# Discharge Concurrence Form

## Applicant Information

Agency/FIRM: Illinois Department of Transportation  Date: _____
Submitted By: Christopher B. Burke Engineering, Ltd.  Phone: _____
Address: _____
Applicant/Property Owner: _____

## Hydrologic Information

Community or Communities Affected: Village of Bensenville, City of Chicago
County: DuPage  Quadrangle Name (s): Arlington Heights, Elmhurst, River Forest
Stream Name: Willow Creek South Tributary, Willow Creek
Flood Insurance Study and Map Panel: March 2007 Flood Insurance Study; FIRM Panels 0303 and 0306 of 1006
Model Calibration? Yes__X_  No____  Study Models: TR-20

## Discharge Certification Locations

| SECTION NAME | IDENTIFYING LANDMARK* | LEGAL DESCRIPTION (SEC., TWP., RANGE) | DRAINAGE AREA (SQ. MI.) | CERTIFIED DISCHARGES | | OTHER FREQUENCIES | |
|---|---|---|---|---|---|---|---|
| | | | | 100-YEAR (CFS) | 10-YEAR (CFS) | FREQUENCY (YEARS) | FLOW (CFS) |
| Willow Creek South Tributary | Thorndale Avenue | Sec 11, T40N, R11E | 2.10 | 518 | 288 | 500-yr | 683 |
| | | | | | | 50-yr | 462 |
| Willow Creek North Tributary | 1,900 feet upstream of York Road | Sec 12, T40N, R11E | 2.66 | 394 | 188 | 500-yr | 618 |
| | | | | | | 50-yr | 323 |
| Willow Creek North Tributary | Immediately upstream of the confluence with the South Tributary | Sec 12, T40N, R11E | 3.70 | 602 | 291 | 500-yr | 916 |
| | | | | | | 50-yr | 497 |
| Willow Creek | Downstream of York Road | Sec 1, T40N, R11E | 5.96 | 1,085 | 574 | 500-yr | 1,611 |
| | | | | | | 50-yr | 937 |

*Locations should be based on physical landmarks, such as "1000 ft. upstream Main St." Please attach a map showing locations with identifiers.

January 2005

Illinois Department of
**Natural Resources**
One Natural Resources Way Springfield, Illinois 62702-1271
http://dnr.state.il.us

Pat Quinn, Governor
Marc Miller, Director

080471
permit File copy

**Office of Water Resources • 2050 West Stearns Road • Bartlett, Illinois**

RECEIVED
APR 20 2011
CHRISTOPHER B. BURKE
ENGINEERING LTD.

April 15, 2011

SUBJECT: Permit No. NE2011023
Channel Relocation and Stream Enclosures
Willow Creek
Cook and DuPage Counties, Application No. 2011016

Rosemarie S. Andolino
City of Chicago, O'Hare Modernization Program
P.O. Box 66142
10510 W. Zemke Road
Chicago, Illinois 60666

Dear Ms. Andolino:

Enclosed is Illinois Department of Natural Resources, Office of Water Resources Permit No. NE2011023 authorizing the subject project. This permit does not supersede any other federal, state or local authorizations that may be required for the project.

Please be advised that the Illinois Department of Natural Resources, Office of Realty and Environmental Planning (OREP) participates in the regulatory programs of the U.S. Army, Corps of Engineers (USACE) and may review this project if a USACE Section 10 or 404 permit is required. Issuance of a permit by the Office of Water Resources does not preclude OREP's provision of comments and/or recommendations, primarily related to biological effects of the proposed action, to the USACE and other federal agencies concerning your project.

If any changes of the permitted work are found necessary, revised plans should be submitted promptly to this office for review and approval. Also, this permit expires on the date indicated in Condition (13). If unable to complete the work by that date, the permittee may make a written request for a time extension.

Please contact Bill Boyd of my staff at 847/608-3100, ext. 2025 if you have any questions.

Sincerely,

Gary Jereb

Gary W. Jereb, P.E., Chief
Northeastern Illinois Regulatory Programs Section

GJ/WB:crw
Enclosure
cc: Chicago District, U.S. Army Corps of Engineers
Michael Vonlc, BPC Airport Partners
Donald R. Dressel, Christopher B. Burke Engineering, Ltd.
City of Chicago, Department of Environment
City of Chicago, Department of Transportation
Clayton Heffter, DuPage County, EDP

PERMIT NO. NE2011023
DATE: April 15, 2011

# State of Illinois
## Department of Natural Resources, Office of Water Resources

Permission is hereby granted to:

City of Chicago
O'Hare Modernization Program
P.O. Box 66142, 10510 W. Zemke Road
Chicago, Illinois 60666

to relocate 7,400 ft. of the channel and to construct stream enclosure culverts in the floodway of Willow Creek in the West Half of Section 1, Township 40 North, Range 11 East of the Third Principal Meridian in DuPage County and the Southwest Quarter of Section 36, Township 41 North, Range 11 East of the Third Principal Meridian in Cook County,

in accordance with an application dated January 24, 2011, and the plans and specifications entitled:

CITY OF CHICAGO, O'HARE MODERNIZATION PROGRAM, TAXIWAY WK AND NORTHWEST AREA ENABLING PROJECTS, VOLUME 1 OF 2, TITLE SHEET, SHEETS C-550 TO C-554, CG-200 TO CG-206, C-400, C-401, CP-080 AND CP-081, VOLUME 2 OF 2, TITLE SHEET, SHEETS S-101, S-102, S-107, S-108, S-115, S-115A TO S-115D, S-117, S-119, S-120, S-124, S-125, S-127, S-128, S-131, S-135 TO S-140, S-147 TO S-149, S-153A, S-154 TO S-156, S-161 TO S-163, ALL SHEETS DATED JANUARY 5, 2011, ALL SHEETS RECEIVED JANUARY 31, 2011.

Examined and Recommended:

Gary W. Jereb, Chief
Northeastern IL Regulatory
Programs Section

Approval Recommended:

Arlan R. Juhl, Acting Director
Office of Water Resources

Approved:

Marc Miller, Director
Department of Natural Resources

This PERMIT is subject to the terms and special conditions contained herein.

PERMIT NO. NE2011023

## THIS PERMIT IS SUBJECT TO THE FOLLOWING CONDITIONS:

1) This permit is granted in accordance with the Rivers, Lakes and Streams Act "615 ILCS 5."

2) This permit does not convey title to the permittee or recognize title of the permittee to any submerged or other lands, and furthermore, does not convey, lease or provide any right or rights of occupancy or use of the public or private property on which the activity or any part thereof will be located, or otherwise grant to the permittee any right or interest in or to the property, whether the property is owned or possessed by the State of Illinois or by any private or public party or parties.

3) This permit does not release the permittee from liability for damage to persons or property resulting from the work covered by this permit, and does not authorize any injury to private property or invasion of private rights.

4) This permit does not relieve the permittee of the responsibility to obtain other federal, state or local authorizations required for the construction of the permitted activity; and if the permittee is required by law to obtain approvals from any federal or state agency to do the work, this permit is not effective until the federal and state approvals are obtained.

5) The permittee shall, at the permittee's own expense, remove all temporary piling, cofferdams, false work, and material incidental to the construction of the project. If the permittee fails to remove such structures or materials, the Department may have removal made at the expense of the permittee.

6) In public waters, if future need for public navigation or other public interest by the state or federal government necessitates changes in any part of the structure or structures, such changes shall be made by and at the expense of the permittee or the permittee's successors as required by the Department or other properly constituted agency, within sixty (60) days from receipt of written notice of the necessity from the Department or other agency, unless a longer period of time is specifically authorized.

7) The execution and details of the work authorized shall be subject to the review and approval of the Department. Department personnel shall have the right of access to accomplish this purpose.

8) Starting work on the activity authorized will be considered full acceptance by the permittee of the terms and conditions of the permit.

9) The Department in issuing this permit has relied upon the statements and representations made by the permittee; if any substantive statement or representation made by the permittee is found to be false, this permit will be revoked; and when revoked, all rights of the permittee under the permit are voided.

10) In public waters, the permittee and the permittee's successors shall make no claim whatsoever to any interest in any accretions caused by the activity.

11) In issuing this permit, the Department does not ensure the adequacy of the design or structural strength of the structure or improvement.

12) Noncompliance with the conditions of this permit will be considered grounds for revocation.

13) If the construction activity permitted is not completed on or before December 31, 2014 this permit shall cease and be null and void.

## THIS PERMIT IS SUBJECT TO THE FOLLOWING SPECIAL CONDITION:

a) The Permittee shall use riprap or other design measures to prevent scour and erosion where the project has the potential to increase average channel velocities beyond the scour velocity of the predominant soil type.

# SECTION 14

## SURVEY NOTES

Nov. 16, 2010
UG & JG
SUNNY 50°

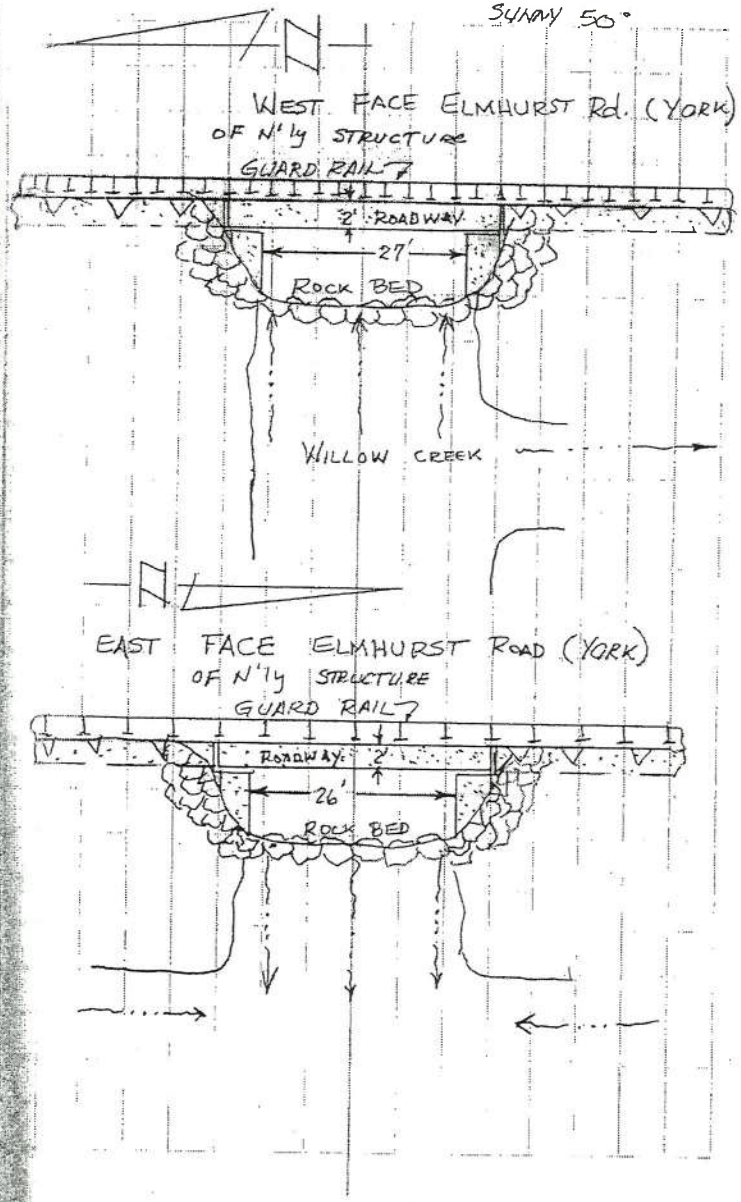
# WILLOW CREEK

file : EOWB WILWCK — UG 111510

USED GPS for co-ordinates on
fnd IR W/cap @ W.L. ELMHURST Rd & fnd
brass monument E ELMHURST Rd over creek
CP# 102 & 103

T@ CP# 102 (103 821) H.I. = 5.245'
N 1938024.072
E 1091190.110
ELEV. = 659.174
BS @ CP# 103 (103 118) Rod Ht. = 5.44'
N 1937986.857
E 1091233.349
ELEV. = 660.448
POINTS # 1031 – 1138

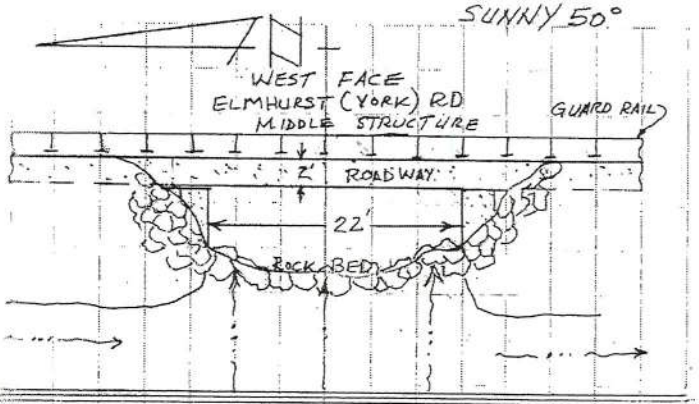
T@ SET WP# 106 (105 770)
N 1937413.468
E 1091241.343
ELEV. = 660.399

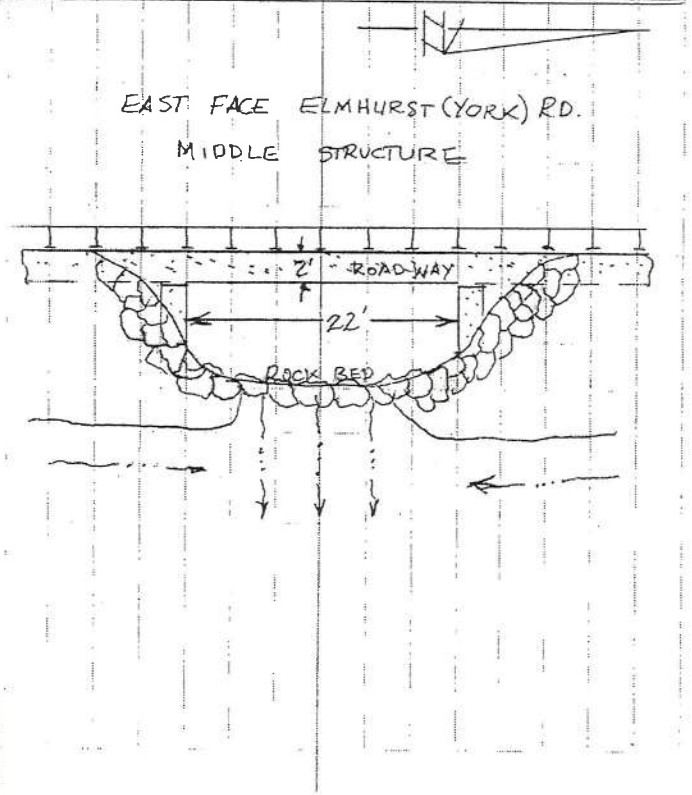


NOV. 15, 2010
UG & JG
SUNNY 50°

File : EOWBWILLWCK_UG 111510
SET CP# 104 & 105 for 500' XS

T@ CP# 104 (103 809) H.I. = 5.30
N 1937944.266
E 1090656.605
ELEV. = 664.493
BS @ CP# 105 (103 770) Rod HI. = 5.44
N 1937852.428
E 1090678.407
ELEV. = 665.676
POINTS #1000 – 1030



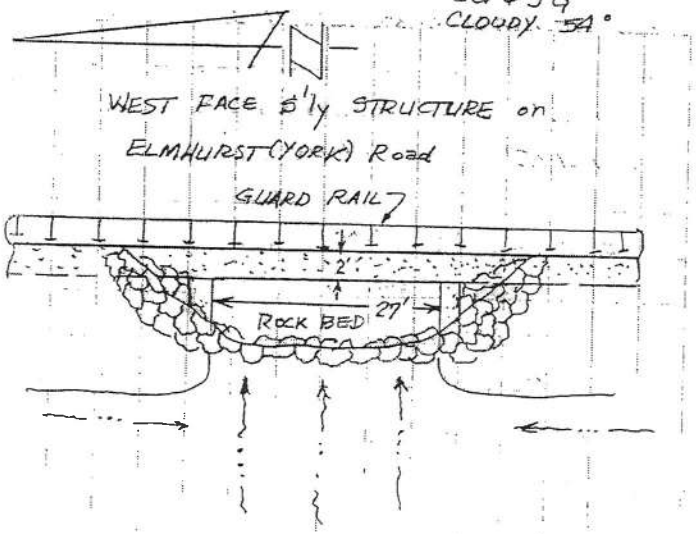



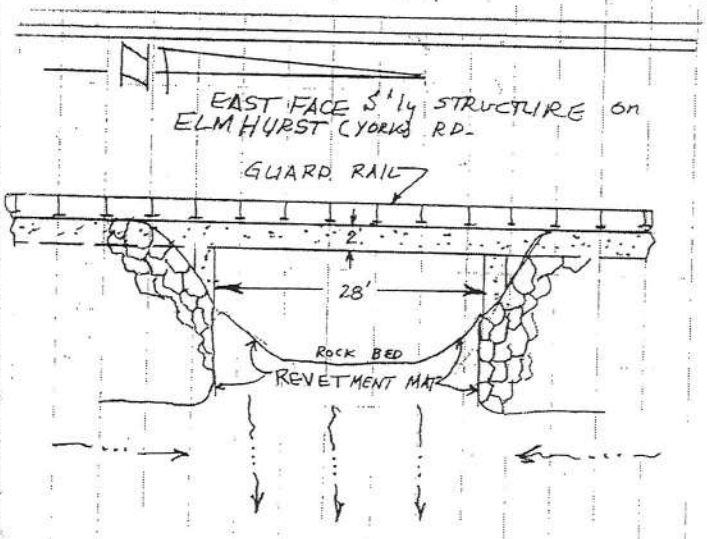
Nov. 16, 2010
UG & JG
CLOUDY. 5A°

file: EOWBWLLWCK_UG111510

T@ WP# 106 (105 770) H.I. = 5.215
N 1937413.468
E 1091241.343
ELEV. = 660.399
BS @ CP# 102 (103 821) TGT. HT. = 4.97
N 1938024.072
E 1091190.110
ELEV. = 659.174
POINTS # 1139 – 1227

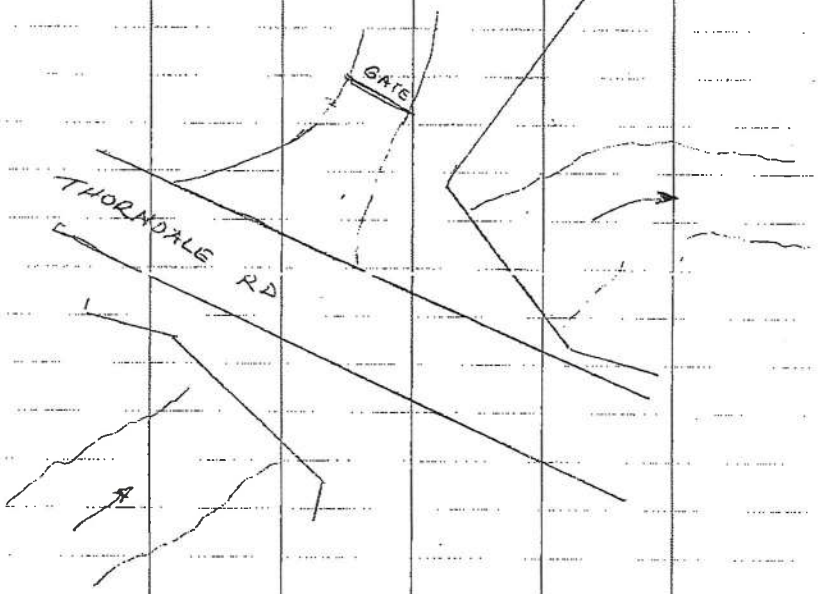
T@ SET WP# 107 (105 770) H.I. = 5.24
N 1936820.954
E 1091249.606
ELEV. = 660.292
BS @ CP# 102 (103 821) TGT. HT. = 4.97'
POINTS # 1228 – 1329



WILLOW CREEK

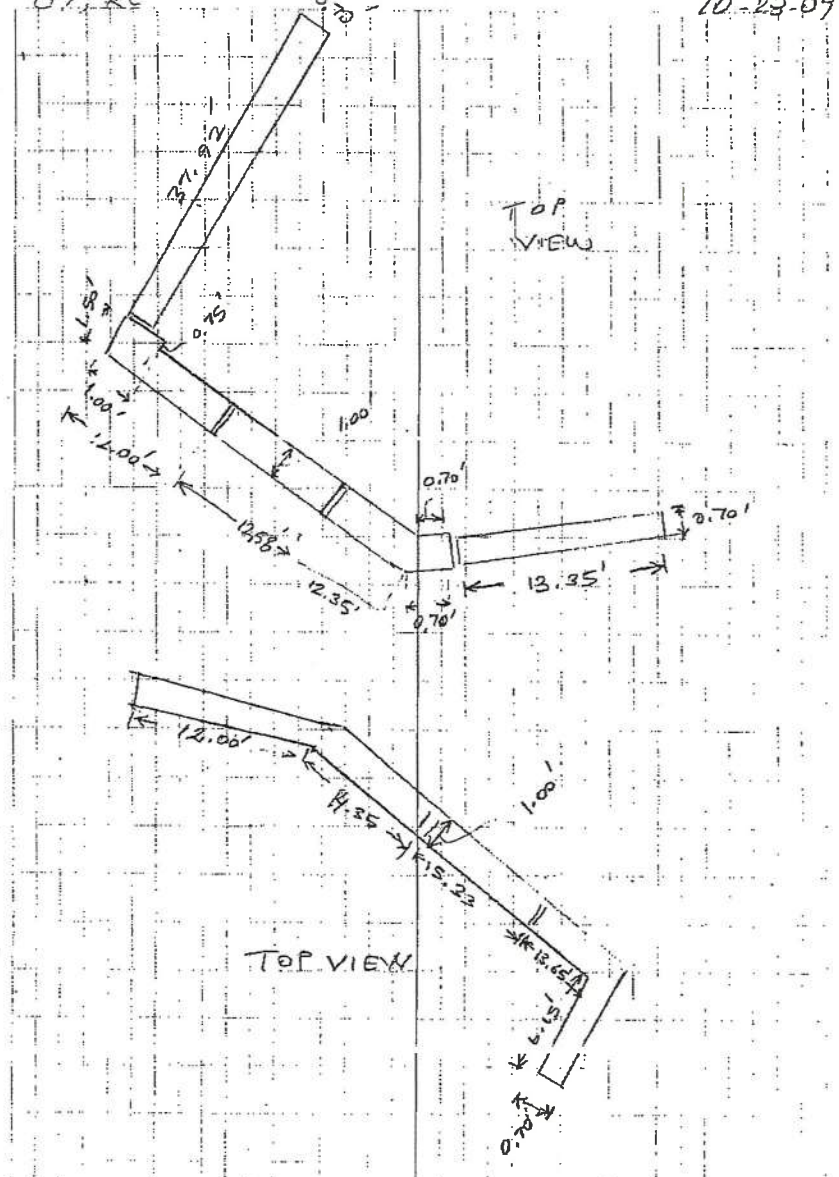
FILE NAME: WILLOW102809.UY




55°F

UY, RC

10-28-09



WILLOW CREEK

55°F

CLOUDY

CLEAR

LY, RC

10-29-09

FILE NAME : WILLOW 10.29.09 4Y

Check CP# 133 - 134

SET π @ CP# 133 HI: 4.97'

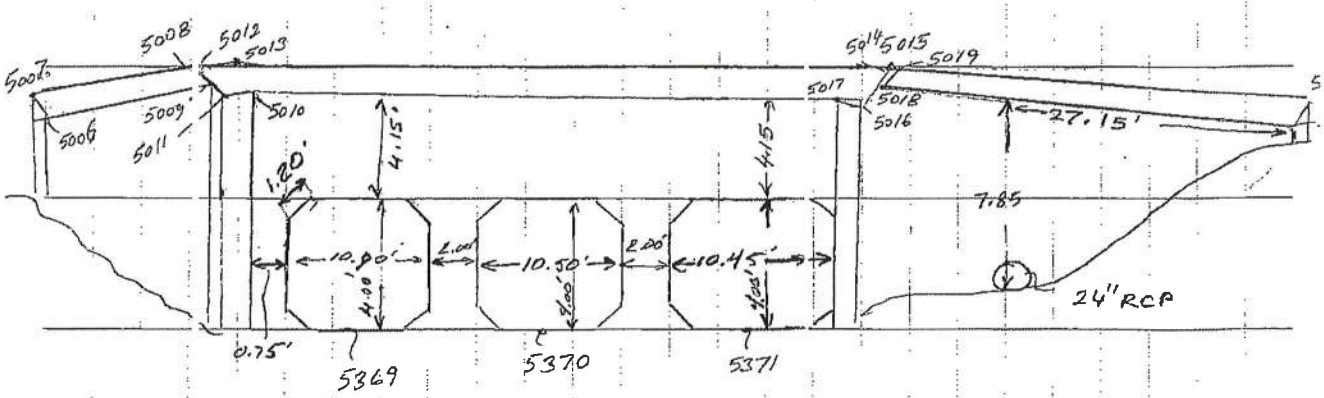
B @ CP# 134 HT: 5.12'

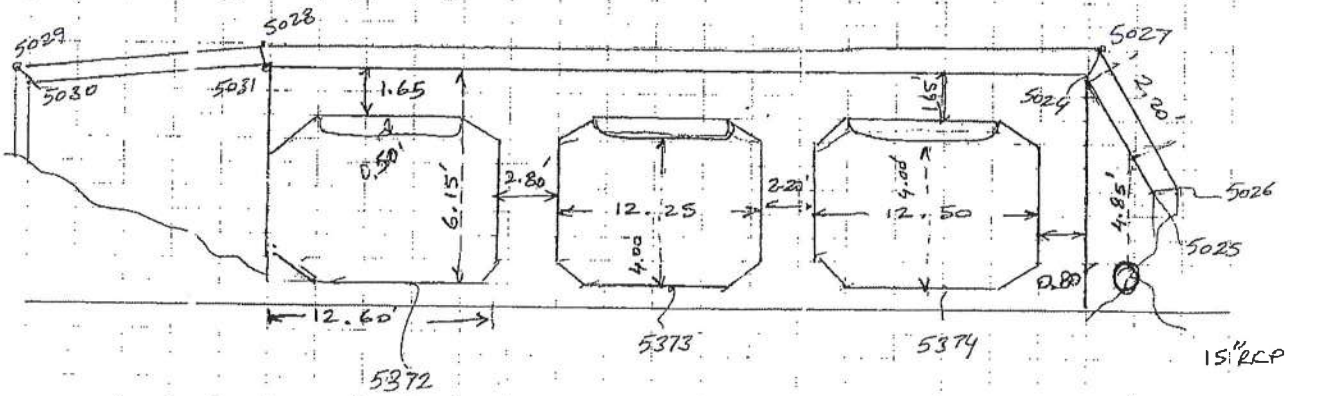
We Nominal Elevation Difference -0.11

ATR -0.21

LEVEL RUN

| STATION | + | HI | - | Elev. |
|---|---|---|---|---|
| CP#133 | | | | 669.140 |
| | 1.565 | | | |
| TP1 | | 670.705 | 5.061 | 665.644 |
| | 4.295 | | | |
| CP#5032 | | 669.939 | 5.290 | 664.649 |
| | 4.712 | | | |
| | | 669.361 | 4.720 | 664.641 |
| | 5.510 | | | |
| CP#134 | | 670.151 | 4.758 | 665.393 |
| | | | | 665.425 |
| | | | | -0.032 |


5008
5012
5013
5007
5006
5009
5011
5010
5014
5015
5019
5017
5018
5016
4.15'
1.20'
10.90'
2.00'
10.50'
2.00'
10.45'
27.15'
7.85
24" RCP
0.75'
5369
5370
5371


5029
5028
5027
5030
5031
1.65
0.50'
6.15'
2.80'
12.25
2.20'
12.50
4.00'
5029
2.20'
5026
4.85'
5025
0.80
12.60'
5372
5373
5374
15" RCP

12

# WILLOW CREEK
## X-SECTIONS

PARTLY SUNNY

47 XS 1 11-02-09

FILE NAME: WILLOW 110209.47

5041 Check CPK 133

ΔN: +0.007 505

ΔE: +0.006 179

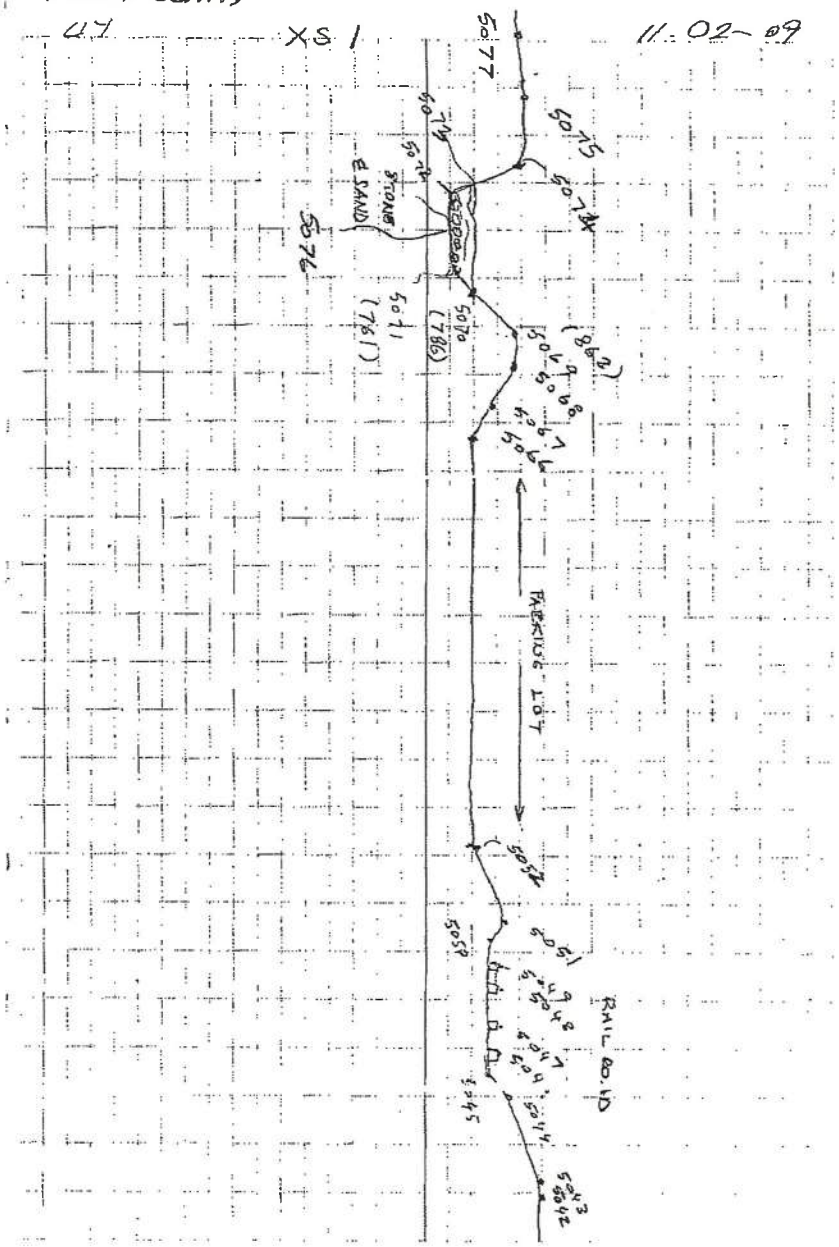
ΔElev: −0.062 078

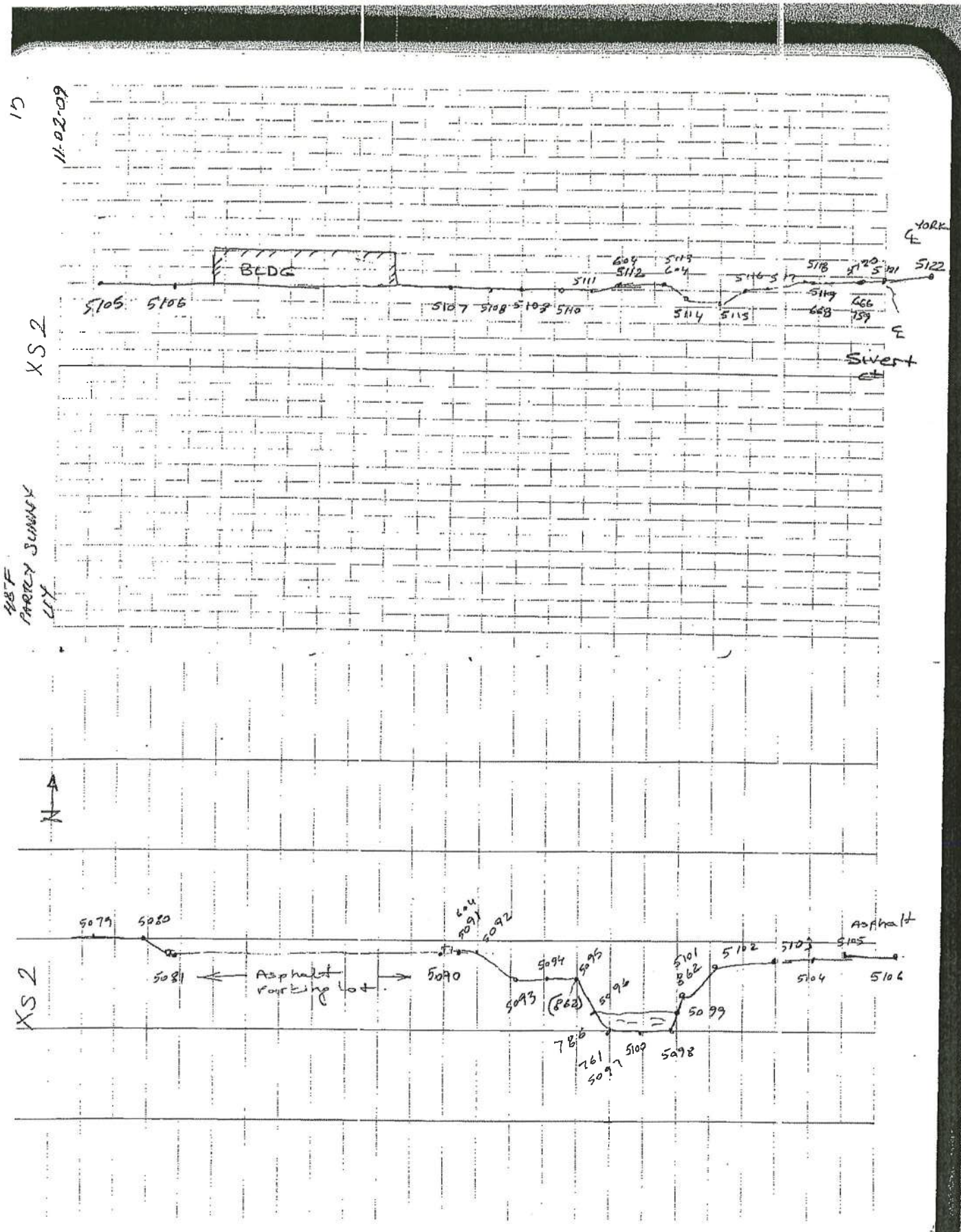
5078 Check RMS

665.316

5123 Check-RMS

665.365




11-02-09
XS 2
48" PARLEY SEWER
BLDG
5105 5106 5107 5108 5109 5110 5111 5112 5113 5114 5115 5116 5117 5118 5119 5120 5121 5122
606
668
466
159
YORK
Sivert
N
XS 2
5079 5080 5081
Asphalt parking lot
5090 5091 5092 5093 5094 5095 5096 5097 5098 5099 5100 5101 5102 5103 5104 5105 5106
604
862
786
761
509
Asphalt

LEVEL LOOP

67°
SUNNY
WY, RC



11-3-09

| Station | + | HI | − | Elevation | | |
|---|---|---|---|---|---|---|
| RM 5 | | | | 665.70 | | |
| | 5.515 | | | | | |
| TP 1 | | 671.215 | 4.935 | 666.280 | | |
| | 3.550 | | | | | |
| TP 2 | | 669.830 | 5.349 | 664.481 | | |
| | 7.210 | | | | | |
| CP# 133 | | 671.691 | 2.310 | 669.381 | 669.140 | Δ Elev: 0.24 |
| | 2.210 | | | | | |
| TP 3 | | 671.591 | 7.115 | 664.476 | | |
| | 5.446 | | | | | |
| TP 4 | | 669.922 | 3.647 | 666.275 | | |
| | 5.158 | | | | | |
| RM 5 | | 671.433 | 5.740 | 665.693 | 665.70 | |
| | | | Error = | 0.007 | | |

29.089

WILLOW CREEK
X-SECTIONS

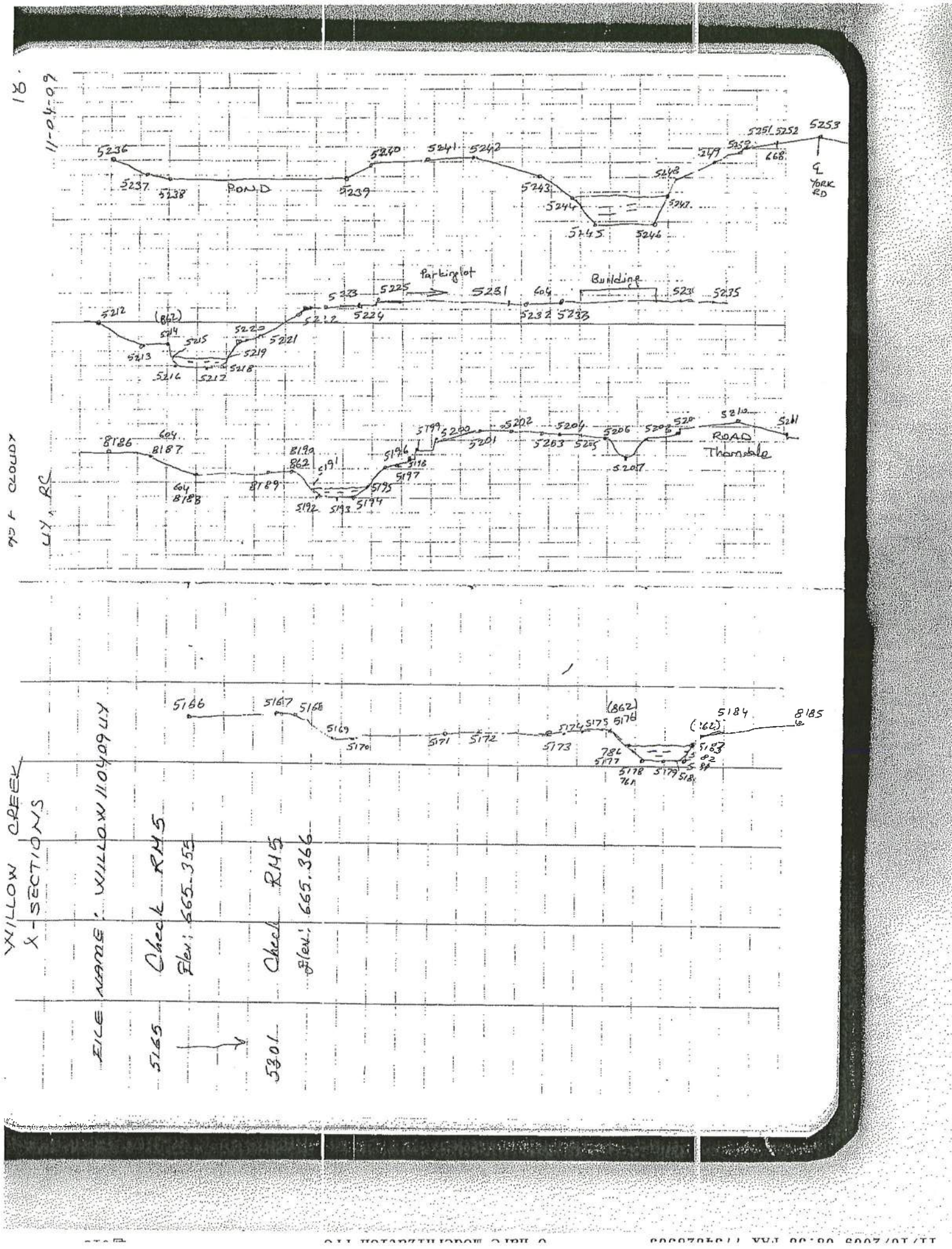
File Name: WILLOW11080909

5184 Check RM5
Elev 665.464

5164 Check RM5
Elev: 665.400

XS-3

11-03-09


18.
11-04-09
5236
5237
5238
POND
5239
5240
5241
5242
5243
5244
5245
5246
5247
5248
5249
5252
5253
℄ YORK RD
Parking lot
5225
5231
Building
5212
(862)
5214
5215
5213
5216
5217
5218
5219
5220
5221
5223
5224
5232
5233
5235
8186
604
8187
8188
8189
8190
862
5191
5192
5193
5194
5195
5196
5197
5198
5199
5200
5201
5202
5203
5204
5205
5206
5207
5208
5209
5210
5211
ROAD
Thorndale
5166
5167
5168
5169
5170
5171
5172
5173
5174
5175
5176
(862)
5177
5178
5179
5180
5181
5182
5183
5184
8185
(862)
WILLOW CREEK
X-SECTIONS
FILE NAME: WILLOW1104091.TXT
Check RMS
Elev: 665.355
5145
Check RMS
Elev: 665.366
5301

WILLOW CREEK
X-SECTION & PROFILE

FILE NAME: WILLOW11060911Y

5302 Check RM5

Elev: 665.403

5335 X-SECTION

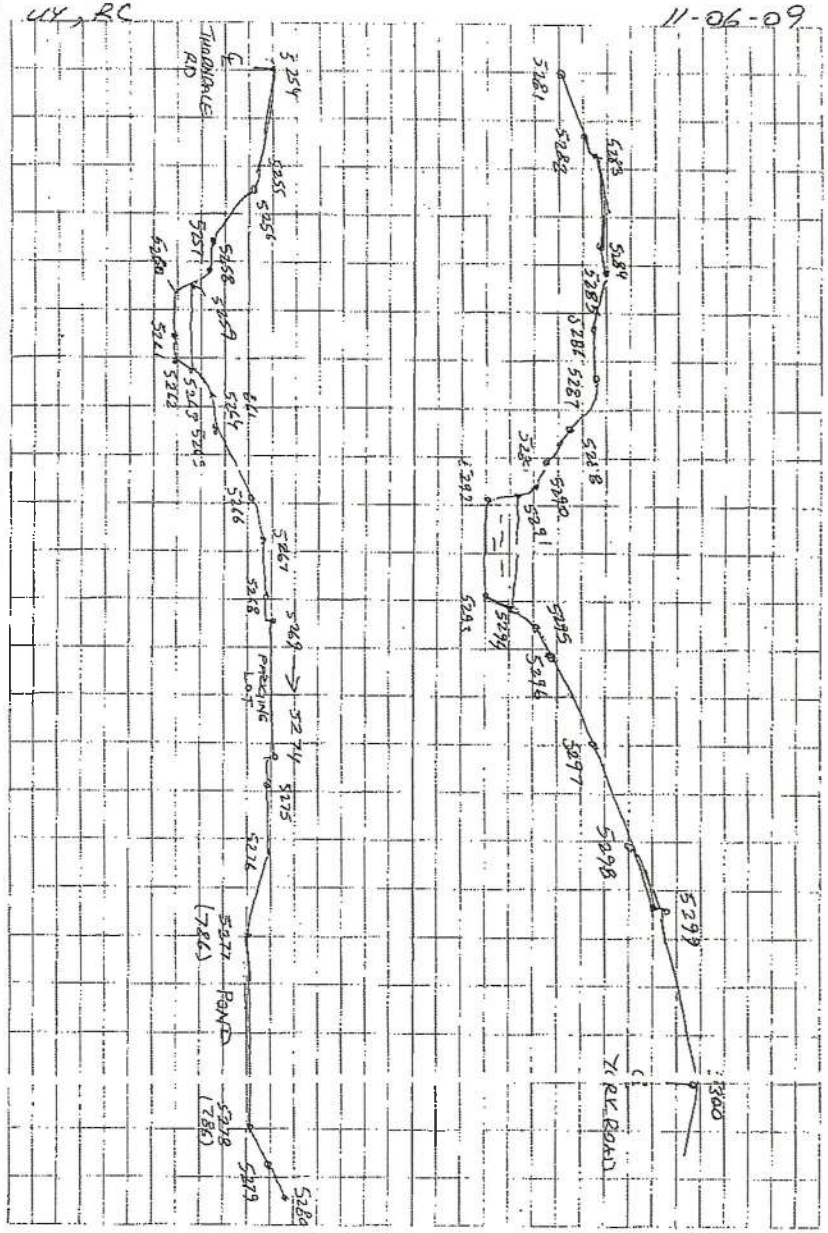
5336 PROFILE

5418 Check RM6

Elev: 665.369

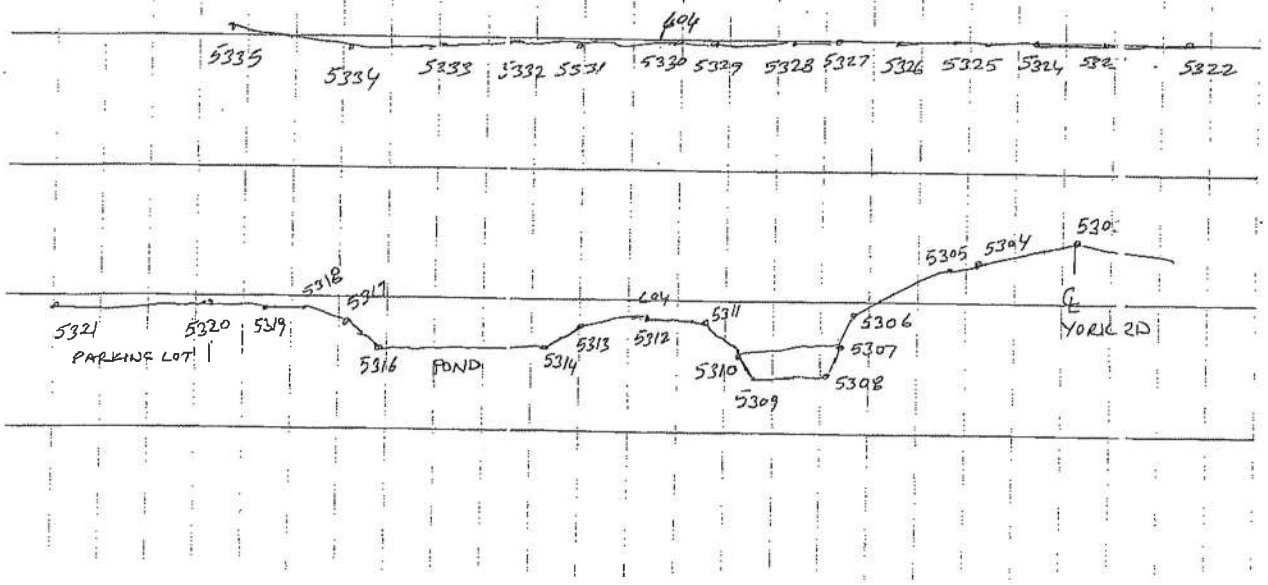
40°
CLOUDY
11Y, RC

11-06-09



11-06-09

CITY OF



## ELEVATION REFERENCE MARKS

| REFERENCE MARK | FLOOD INSURANCE RATE MAP PANEL | ELEVATION (FEET NGVD) | DESCRIPTION OF LOCATION |
|---|---|---|---|
| 1 | 0002 | 665.92 | chiseled square in traffic sig foundation at southwest corner York Road and Thorndale Avenue |
| 2 | 0002 | 663.79 | chiseled square in top center of w headwall of private drive north Thorndale Avenue on South Unna Creek |
| 3 | 0002 | 663.14 | chiseled square in center of no headwall at Thorndale Avenue South Unnamed Creek |
| 4 | 0002 | 666.58 | railroad spike in first power po east of Thomas Drive, 45 feet sou of centerline of Thorndale Avenue |
| 5 | 0002 | 665.70 | chiseled square in south corner east headwall, 30 feet east centerline of Thomas Drive at Sou Unnamed Creek |
| 6 | 0002 | 663.75 | chiseled cross in top of southernmo of two corrugated metal pipes on we side of Chicago and North Weste railroad crossing at South Unnam Creek |
| 7 | 0002 | 666.43 | chiseled square in south end of t of headwall, 30 feet east centerline of Fairway Drive at Sout Unnamed Creek |
| 662.83 south end 8 | 0002 | 659.98 | chiseled square on north end upstream headwall of pipe culvert fo Bensenville Ditch under York Road |
| 9 | 0002 | 662.71 | chiseled cross on upstream end pipe culvert for Bensenville Ditc under Mason Street |
| 10 | 0002 | 666.94 | chiseled square on left upstrea wingwall of Church Street bridge ove Bensenville Ditch |

# SECTION 15

## CD-ROM (MODELING AND SURVEY DATA)