HYDRAULIC REPORT
VOLUME 1

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

IL 72 (TOUHY AVENUE), SN: 016-0974,
I-90 (JANE ADDAMS MEMORIAL TOLLWAY), SN: 016-9975 (ISTHA 535) EB,
SN: 016-9869 (ISTHA 536) WB,
AND ELMHURST ROAD, SN: 016-0677
OVER HIGGINS CREEK

I-90 (JANE ADDAMS MEMORIAL TOLLWAY)
OVER HIGGINS CREEK TRIBUTARY A

PROPOSED WEST BYPASS
OVER HIGGINS CREEK AND TOUHY AVENUE RESERVOIR (TAR) CELL 2

COOK COUNTY, ILLINOIS

Prepared For:

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

Prepared By:

Christopher B. Burke Engineering, Ltd.
9575 W. Higgins Road, Suite 600
Rosemont, IL 60018

CBBEL Project No. 07-0404

FINAL – REV. NOVEMBER 2012

CH2MHILL®

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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: I-90 (Jane Addams Tollway)/Higgins Creek Tributary A

   County: Cook

2. Prepared By: ☒ Consultant: Christopher B. Burke Engineering, 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, downstream
   d. ☐ Bridge ☒ Culvert
   e. ☒ New alignment
   f. Work planned below Q100 HWE: ☒ Yes ☐ No

6. Hydrology: ☐ USGS ☒ FIS ☐ Other _____
   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 FIS Flood Elevations
   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: Willow-Higgins Creek
      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 7.0 sq.mi. ☐ 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: Hydrologic Atlas HA-67

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: Ilene Dailey, PE Date: 01/05/12

Signed: (AQ/QC) _____ Date: 5/17/2012

Illinois Department of Transportation

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1. SN 016-0974 (Existing); SN ___-___ (Proposed)
   Route/Stream: IL 72 (Touhy Avenue)/Higgins Creek
   County: Cook

2. Prepared By: ☒ Consultant: Christopher B. Burke Engineering, 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, downstream
   d. ☐ Bridge ☐ Culvert
   e. ☒ New alignment Touhy Ave. will be on new overpass over existing RR culvert.
   f. Work planned below Q100 HWE: ☐ Yes ☒ No

6. Hydrology: ☐ USGS ☒ FIS ☐ Other ____
   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 FIS Flood Elevations
   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: Mount Prospect Road
      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 7.0 sq.mi. ☐ 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: Hydrologic Atlas HA-67

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: Ilene Dailey, PE Date: 01/05/12

Signed: (AQ/QC) _____ Date: 5/17/2012

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1. SN 016-9975/ ISTHA 535(EB) 016-9869/ ISTHA 536(WB) (Existing); SN ___-___ (Proposed)

   Route/Stream: I-90 (Jane Addams Tollway)/Higgins Creek

   County: Cook

2. Prepared By: ☒ Consultant: Christopher B. Burke Engineering, 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
   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, downstream 73' U/S, 78' D/S
   d. ☒ Bridge ☐ Culvert
   e. ☐ New alignment
   f. Work planned below Q100 HWE: ☒ Yes ☐ No

6. Hydrology: ☐ USGS ☒ FIS ☐ Other _____
   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 FIS Flood Elevations
   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: Touhy Avenue/RR, Mount Prospect Road
      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 6.8 sq.mi.; ☐ 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: Ilene Dailey, PE Date: 01/05/12

Signed: (AQ/QC) _____ Date: 5/17/2012

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1. SN 016-0677 (Existing); SN ___-___ (Proposed)
   Route/Stream: Elmhurst Road/Higgins Creek
   County: Cook

2. Prepared By: ☒ Consultant: Christopher B. Burke Engineering, 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
   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, downstream
   d. ☒ Bridge ☒ Culvert *(Alternate)*
   e. ☒ New alignment (vertical alignment profile raise)
   f. Work planned below Q100 HWE: ☒ Yes ☐ No

6. Hydrology: ☐ USGS ☒ FIS ☐ Other _____
   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 FIS Flood Elevations
   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: Wille Road, Kirie entrance
      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 5.4 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 surveyed F/F elevation is 656.96 at a loading dock on the building the low-head dam. Next lowest elevation is 659.68 at the door sill of the building immediately NW of the bridge.

    History of flooding or overtopping problems: Yes ☐ No ☒
    Sources of observed highwater: Hydrologic Atlas HR-67

11. Scour/migration problems: ☐ None/minimal ☐ Significant ☒ Severe
    Comments: Existing structure identified by IDOT as "scour critical". Rip rap added 2011.

    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: Ilene Dailey, PE Date: 05/15/12

Signed: (AQ/QC) _____ Date: 5/17/2012

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1. SN _____ (Existing); SN - _____ (Proposed)

   Route/Stream: I-90 (Jane Addams Tollway)/Higgins Creek Tributary A

   County: Cook

2. Prepared By: ☒ Consultant: Christopher B. Burke Engineering, 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, downstream
   d. ☐ Bridge ☒ Culvert
   e. ☐ New alignment
   f. Work planned below Q100 HWE: ☒ Yes ☐ No

6. Hydrology: ☐ USGS ☒ FIS ☐ Other _____
   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 FIS Flood Elevations
   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: Elmhurst Road, Kirie Entrance, Wille Road
      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 2.3 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: Hydrologic Atlas HA-67

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: Ilene Dailey, PE Date: 05/15/12

Signed: (AQ/QC) _____ Date: 5/17/2012

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. N/A 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)

Tab 1

SECTION 1

NARRATIVE

NARRATIVE

Project Description

The Elgin O'Hare – West Bypass (EOWB) 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 Mannheim 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 the impacted structures located within the Higgins Creek watershed. Separate hydraulic reports for impacted structures within each of the other watersheds are concurrently being completed.

This hydraulic report documents the hydraulic conditions for the following IDOT and Illinois State Toll Highway Authority (ISTHA) structures located in the City of Des Plaines and unincorporated Cook County, Illinois:

- IL 72 (Touhy Avenue) over Higgins Creek
- I-90 (Jane Addams Memorial Tollway) over Higgins Creek
- Elmhurst Road over Higgins Creek
- I-90 (Jane Addams Memorial Tollway) over Higgins Creek Tributary A
- West Bypass over Higgins Creek and Touhy Avenue Reservoir Cell 2

The USGS Hydrologic Investigations Atlas and the Flood Insurance Rate Map included in Section 3 show the locations of these structures. In addition, the hydraulic analysis includes the Higgins Creek structures at Mount Prospect Road, Metropolitan Water Reclamation District of Greater Chicago (MWRD) Touhy Avenue Reservoir (TAR) control structures for TAR Cells 1 and 2, Wille Road, and the entrance to the Kirie Water Reclamation Plant. The low-head dam upstream of Elmhurst Road is also included in the analysis.

Site Description

The Higgins Creek crossing at IL 72 (Touhy Avenue) is composed of a twin 13.5 feet (W) by 8 feet (H) reinforced concrete box culvert (RCBC) and extends under both Touhy Avenue and the railroad. The crossing is located just west of the intersection of Touhy Avenue and Mount Prospect Road. The adjacent land uses include the O'Hare International Airport to the south and east and open space including the Touhy Avenue Reservoir (TAR) Cell 2 to the north and west. The downstream structure is a single 12 feet (W) by 8 feet (H) RCBC under Mount Prospect Road.

The upstream structure is a twin 9 feet (W) by 4 feet (H) RCBC under an access road at TAR Cell 2.

The Higgins Creek crossing at I-90 (Jane Addams Memorial Tollway) is a two-span bridge with a single center pier. The length, abutment to abutment, is 83.6 feet. The crossing is located east of the Elmhurst Road interchange and west of the Des Plaines Tollway Oasis. The adjacent areas are sports fields to the north and a truck-trailer parking lot and mobile home community to the south. The downstream structure is a triple 7 feet (W) by 5 feet (H) RCBCs under an access road at TAR Cell 1. The upstream structure is a single 17 feet (W) by 9 feet (H) RCBC under Wille Road.

The Higgins Creek crossing at Elmhurst Road is a single-span bridge. The length, abutment to abutment, is 25 feet. The crossing is located north of the I-90 interchange and south of the intersection with Oakton Street. The adjacent areas are commercial and industrial to the west and open space to the east. The downstream structure is a single 17 feet (W) by 9 feet (H) RCBC under the entrance to the Kirie Water Reclamation Plant operated by the Metropolitan Water Reclamation District of Greater Chicago (MWRD). The first upstream structure is a small degraded concrete dam. Further upstream is the I-90 crossing of the Higgins Creek Tributary A.

The Higgins Creek Tributary A crossing at I-90 (Jane Addams Memorial Tollway) is composed of a twin 9 feet (W) by 5.75 feet (H) RCBC. The crossing is located just west of Elmhurst Road interchange. The adjacent areas are commercial and industrial to the north and open space including the O'Hare CUP reservoir to the south. The downstream structures are the degraded concrete dam and the Elmhurst Road bridge described above. The next upstream structure is a RCBC under IL 72 (Higgins Road) to the west.

TAR Cell 2 is a flood control reservoir owned and operated by MWRD. It is located southeast of the I-90 Tollway Des Plaines Oasis. Currently there are no crossings of this reservoir.

The locations of the crossings described above are shown on the FIRM Exhibits 4, 5A, and 5 B located in Section 3.

Field Observations

A field visit to the project site was made on November 17, 2010. The visit was completed to photograph and observe surrounding structures within the modeling limits of this study. Photographs of all modeled structures are included in Section 4.

Higgins Creek is highly channelized in the vicinity of the proposed project. No significant rainfall occurred in the days before the field visit, so flow was low.

Downstream of Touhy Avenue, the creek bed drops toward Mount Prospect Road. The channel is lined with riprap. Riffles were observed along the channel bottom.

There was no evidence of scour or deposition visible at this crossing. The TAR Cell 1 and Cell 2 crossings are upstream of Touhy Avenue.

The channel near the I-90 bridge is fully lined. The slopes under the bridge are also lined with concrete. Some cracks with vegetation were observed in the concrete. There was no evidence of scour or deposition visible at this crossing.

There is a U-shaped bend in the channel at the location of the Elmhurst Road bridge. Downstream of the bridge, the channel is fully lined with concrete that appears in good condition. Upstream, the channel is partially lined with riprap. There is evidence of streambank scour upstream of the bridge and deposition under the bridge. According to IDOT, this bridge is "scour critical" and riprap scour countermeasures have been installed in this area.

The small, low-head dam upstream of the Elmhurst Road bridge was carrying a few inches of water at the time of the field visit. It appears that the dam was constructed to create a longitudinal pond, which extends upstream to the confluence with the Higgins Creek Tributary A. This dam does not have significant effect on flood flows greater than the 10-year flood event. The concrete of the dam exhibits large cracks and appears to be in poor condition.

The confluence of the Higgins Creek Tributary A with the Higgins Creek occurs almost immediately downstream of the I-90 culvert crossing. The confluence is at the upper end of the pond described above. In this area the channel is wider than in most areas, and the banks are vegetated. Upstream of the I-90 crossing on the Higgins Creek Tributary A, the channel is more narrow, and is more heavily vegetated. There was no evidence of scour or deposition visible at this crossing, however, from the survey stream profile information, there appears to be scour near the culverts and sedimentation in the downstream pond.

The TAR Cells were inaccessible due to fencing and were observed from a distance to be dry at the time of the field visit. During a later visit on July 24, 2011, the TAR Cells were observed to be mostly full.

Stream Survey

A stream survey of the Higgins Creek was prepared by D.B. Sterlin Consultants, Inc. between November 2009 and March 2010, in accordance with the stream survey requirements in Section 2-600 of the IDOT Drainage Manual. Thirty-eight cross-section locations were surveyed, ranging from the confluence with the Willow Creek downstream of Mount Prospect Road to 1,000 feet upstream of the confluence of the Higgins Creek with the Higgins Creek Tributary A. Four other cross-sections were not used for this analysis, as they were located near Hamilton Road and in the Higgins Creek Tributary B watershed, outside the limits of the study reach. Table 1 following this Narrative provides correlation between the FIS cross section name, the IDOT survey cross section name, and the HEC-RAS model cross section number. For Higgins Creek, the HEC-RAS cross section number is based upon the river mile upstream of the confluence of Willow-Higgins Creek with the Des Plaines River.

The farthest downstream cross section surveyed for this project is located upstream of Mount Prospect Road. This is cross section D1/4.569. Data for the Mount Prospect Road structure and the stream cross sections immediately upstream and downstream of the structure were taken from the O'Hare Completion Phase Willow-Higgins Creek hydraulic model, which is discussed in the Hydraulic Analysis section below. This model reflects changes on the O'Hare Airport property downstream of Touhy Avenue. The cross section at the confluence downstream of Mount Prospect Road is approximately at FIS cross section C/TAR 4/4.485, which has been modified to reflect the current topography.

Higgins Creek reach "Mainstem" begins at cross section C/TAR 4/4.485 and extends upstream to cross section WH 064/6.404. Higgins Creek reach "2" begins upstream of cross section WH 064/6.404 at cross section 6.287, and extends upstream to surveyed cross section D33/6.443 downstream of Hamilton Road. Higgins Creek Tributary A reach "CUP" begins upstream of cross section WH 064/6.404 with cross section 1, and extends upstream to cross section 6 downstream of Higgins Road. The HEC-RAS numbering system for Tributary A is based on the available hydraulic model and is not keyed to the Higgins Creek river miles.

The total distance covered by the IDOT surveyed cross sections along Higgins Creek is 9,815 feet based on the channel length from cross section D1/4.569 to cross section D33/6.443. This length is slightly different than the river mileage, due to the need to interleave the surveyed cross sections between the FIS model cross sections from the previously approved models. An additional 1,593 feet was surveyed along Tributary A from the I-90 culvert to cross section C7/4.1.

Plots of the cross-sections are included in Section 6. The stream survey was based on the IDOT project datum that is same as the NAVD 1988 datum.

The IDOT survey picked up eight structures and their roadway profiles. These are IL 72 (Touhy Avenue), two MWRD crossings near the TAR Cells, I-90, Wille Road, the Kirie Plant entrance, and Elmhurst Road over Higgins Creek, and I-90 over Tributary A. In addition, the low-head dam upstream of Elmhurst Road was surveyed. Detailed survey of the TAR Cells was not undertaken. Reservoir topography is available on 1 foot contour interval mapping. The survey field notes are provided in Section 13, and the survey files are included on the CD-ROM provided in 15.

Datum Correlation

A datum correlation is required between the NAVD 1988 IDOT datum used for the survey and the NGVD 1929 datum used in the original FIS WSP2 models and subsequent LOMR HEC-RAS regulatory models. The IDOT datum, Cook County Flood Insurance Study (FIS) text, FIRM map, stream survey, roadway and stream plans, and final HEC-RAS models included in this report are all based on the NAVD 1988 datum.

The vertical datum conversion factor for this area of I-90 was determined to be -0.295 feet, (-0.3 feet) added to the NGVD 1929 datum in order to equate to the NAVD 1988 elevation datum. The conversion value was calculated using the National Oceanic and Atmospheric Administration (NOAA) National Geodetic Survey (NGS) VERTCON online conversion tool. A copy of the VERTCON output is included in Section 13. The conversion factor was confirmed by the Cook County Flood Insurance Study (FIS) Table 18a – Vertical Datum Conversions, Single Conversion Factor (countywide) Method, Cook County. FIS datum information is included in Section 13.

The Baseline Conditions, Modified Existing Conditions, Natural Conditions, and Proposed Conditions HEC-RAS models and Waterway Information Tables (WITs) in this Report are all based on the NAVD 1988 datum.

Historical Flooding Observations

According to the USGS Hydrologic Investigations Atlas HA-67, Floods in Arlington Heights Quadrangle (1963), the flood of record for the Higgins Creek occurred in July 1957. According to Figure 9 of HA-67, included in Section 3, the flood stage at IL 72 (Touhy Avenue) was approximately elevation 649.1 feet (NGVD 1929), the flood stage at the I-90 bridge was approximately elevation 651.7 feet (NGVD 1929), the flood stage at Elmhurst Road was approximately elevation 656.6 feet (NGVD 1929), and the flood stage at the I-90 Tributary A culvert was approximately elevation 658.8 feet (NGVD 1929).

IDOT Flood Incident Reports, included in Section 14, indicate flooding in 1987 on Touhy Avenue at (old) Mount Prospect Road, in 2001 on Touhy between Elmhurst and Mount Prospect, in 2008 on Touhy near Wolf Road, and in 2009 on Touhy just west of Mount Prospect. In 2001 the eastbound lanes were closed. The Incident Report mentions "recent construction work on this area of roadway", and does not clarify if the flooding is due to an inlet/storm sewer deficiency or to roadway overtopping from Higgins Creek. However, since only the eastbound lanes were closed, and those are on the downstream (south) side of the creek crossing, it seems reasonable that the creek was not overtopping the road from upstream (north). The low point along Touhy Avenue is approximately 600 feet west of the Higgins Creek crossing. This area flooded in July 2011, and a photo from a local newspaper is included in Section 14 following the Incident Reports. Based on the topographic mapping of the area, the high water level was at approximately elevation 652. The 100-year flood elevation on Higgins Creek upstream of Touhy Avenue is only 648.60, while the 500-year elevation is 654.80. Again, there is no indication of the creek overtopping the roadway during the July 2011 event.

No reports of flooding were received for the I-90 or Elmhurst Road crossings.

Information regarding historical flooding was also requested from the Illinois State Toll Highway Authority (ISTHA), Cook County Department of Highways, and the City of Des Plaines. No information was received regarding any of the subject roadway crossings.

Other Studies and Affected Agencies

The only hydraulic studies available for the Higgins Creek and Higgins Creek Tributary A are the O'Hare Modernization Program (OMP) Completion Phase Willow-Higgins Creek model and the Federal Emergency Management Agency (FEMA) FIS and Letter of Map Revision (LOMR) models described below in the Hydraulic Analysis section. The FIS and LOMR flow rates were used for the hydraulic analysis for this project, and include a reduction in flow rates downstream of the TAR Cells due to the storage capacity of these off-line facilities. Therefore no hydrologic modeling is needed.

The OMP Willow-Higgins Creek project, including a new crossing of Mount Prospect Road, received Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR) Permit No. NE2005080 for construction in a floodway. A copy of the Permit is provided in Section 14. At this point in time a LOMR has not been pursued for this project. For areas upstream of the O'Hare International Airport, the approved HEC-RAS models for LOMR 07-05-1665P for the Higgins Creek and for LOMR 07-05-2483P for the Higgins Creek Tributary A were incorporated in the 2008 Cook County FIS. FIS excerpts, including Table 6 confirming this fact, are included in Section 7.

In addition to IDOT and ISTHA, affected agencies include IDNR-OWR, unincorporated Cook County, the City of Des Plaines, and MWRD.

Sensitive Flood Receptors

Three industrial buildings northeast of TAR Cell 2, two buildings southeast of TAR Cell 2, several mobile homes southeast of the I-90/Elmhurst Road interchange, and several commercial and industrial buildings northwest of that interchange are located in the Zone X flood area. Zone X indicates "areas of the 0.2% annual chance flood, areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than one square mile". The two buildings southeast of TAR Cell 2 will be removed for construction of the proposed West Bypass.

Survey shots on the remaining potentially sensitive structures have been received and confirm that the low entry elevations are above the adjacent 100-year flood elevations along Higgins Creek. The only exception to this is the building located southwest of the Elmhurst Road bridge, upstream of the low-head dam. This building has a surveyed F/F elevation of 656.96. The 100-year flood elevation per the Design Proposed Condition Models is 658.1 upstream of the dam. The 100-year flood elevation downstream of the Elmhurst Road bridge is 657.7. Therefore, the tailwater downstream of the bridge controls the 100-year elevation. The proposed enlarged bridge opening will reduce the flood elevations for all events up to and including the 100-year event. The proposed backwater does not exceed the natural high water elevation by more than 0.1 foot for all events up to and including the 100-year event.

Hydraulic Analysis

A hydraulic analysis of the Higgins Creek was performed to develop the existing condition and natural condition flood elevations for determining the effects, if any, of the structures on water surface profiles. The existing structures over the Higgins Creek will be lengthened or replaced to accommodate road widening for an extra lane of traffic and shoulder in both directions. In addition, the proposed EOWB crossing of Higgins Creek and the Touhy Avenue Reservoir will be a new high-level crossing. Compensatory storage is required if the roadway is widened and fill is proposed within the Higgins Creek floodplain or floodway. The analysis performed for this report includes several hydraulic models, which are summarized in the following sections. The flow rates included in the regulatory models were utilized in this analysis. An overall HEC-RAS Cross Section Location and Reach Length exhibit is included in Section 3.

FIS/LOMR Models

To create a continuous model for the Higgins Creek and Higgins Creek Tributary A, several approved models were combined. These models are based on the original FIS WSP-2 models, which were converted to HEC-RAS as part of previous permitting and LOMR processes. All of these models are on the NGVD 1929 datum. The individual permitting model geometric schematic, profiles, and output summary tables are provided in Section 7.

The furthest downstream model is the OMP Completion Phase Willow-Higgins Creek model that reflects changes on the O'Hare Airport property downstream of Touhy Avenue. The O'Hare Airport site changes include the Willow Creek relocation, structures at Mount Prospect Road and Wolf Road, and the lengthy culvert upstream of Lee Street. The upstream end of the Lee Street culvert is approximately 7100 feet downstream of the confluence of Higgins Creek with Willow Creek near Mount Prospect Road. This model begins at the confluence of the Willow-Higgins Creek with the Des Plaines River at cross section 0.019. The model extends upstream through the O'Hare International Airport. Willow-Higgins Creek is formed by the confluence of Willow Creek and Higgins Creek just downstream of Mount Prospect Road. The confluence cross sections are 4.476 on Willow-Higgins Creek, portion of the model and 4.485 on Higgins Creek. Upstream of the confluence, the Higgins Creek portion of the model extends to cross section 4.639, upstream of Touhy Avenue. This model has been accepted by IDOT and IDNR-OWR as the baseline model for the downstream end of the Higgins Creek analysis.

The second model is the approved HEC-RAS model for LOMR 07-05-1665P, which was incorporated in the 2008 Cook County FIS. The downstream portion of this model from Touhy Avenue to the confluence with the Des Plaines River has been superseded by the OMP model described above. The approved LOMR portion of this model extends from old Mt. Prospect Road (now removed) at cross section 4.321 to cross section 5.359 located downstream of the I-90 crossing of the Higgins Creek. An earlier version of this model continues upstream of I-90 to upstream of the confluence with the Higgins Creek Tributary A, covering an area that was not remapped as part of the LOMR. The portion of this model that was used begins

upstream of Touhy Avenue at creek cross section 4.647 (same cross section as 4.639 in the OMP model due to relocation reach length modifications) and extends upstream to cross section 6.404, upstream of the Tributary A confluence. Output from this extended model is also included in Section 7.

The third model is the approved HEC-RAS model for LOMR 07-05-2483P for the Higgins Creek Tributary A. This model extends from the confluence with Higgins Creek up to IL 83 (Busse Road) to the west. The model begins with creek cross section 1 located at the Tributary A confluence downstream of I-90 and extends upstream past cross section 6 at IL 72 (Higgins Road) to cross section 25 downstream of Busse Road. This model does not reflect the creek relocation around the O'Hare Chicagoland Underflow Plan (CUP) Reservoir. Upstream portions match the 2008 Cook County FIS profiles.

Because the individual models were run at different times for different purposes, there were some differences in results. The most recent model, the OMP model created for permitting of the Willow Creek relocation, includes a modified channel length due to the relocation, which resulted in changes to water surface elevations (WSELs) at confluences and changes in cross section station names. The cross section geometry was consistent among all the models. Therefore, when combining the models, as the relocation model is the furthest downstream, the starting WSELs from this model were used at the confluence of Higgins Creek with Willow Creek downstream of Mount Prospect Road. The portions of the models that were used for the approved LOMRs match the FIS profiles in those areas.

Baseline Conditions Model

The models described above were combined into a single, continuous Baseline Conditions Model. The LOMR model cross sections and starting WSELs were converted to the NAVD 1988 datum from the NGVD 1929 datum per the Datum Correlation section above, using the HEC-RAS Datum Adjustment tool. Reach lengths were checked and minor length adjustments made to reflect the relocation of the Higgins Creek Tributary A around the O'Hare CUP Reservoir.

The Baseline Conditions Model has three reaches. The Mainstem reach begins at the new confluence with relocated Willow Creek at Station 4.485 and extends upstream to the confluence with Tributary A at cross section 6.245. The Mainstem reach model includes the OMP model for Willow-Higgins Creek, which was truncated from station 4.485 to 4.537 and was added to the LOMR 07-05-1665 model up to cross section WH 064/6.245. Reach 2 is the continuation of the Higgins Creek from the confluence with Tributary A up to Hamilton Road. This model was developed from an unpublished extension of the LOMR 07-05-1665 model, from cross section WH 064/6.245 to cross section WH 065/6.404. The Tributary A reach called "CUP" was all developed from the LOMR 07-05-2483P model, from cross section 1 to cross section 25. The Baseline Conditions Model profiles match the approved LOMR model profiles within 0.1 feet. The Baseline Conditions Model geometric schematic, profiles, and output summary tables are provided in Section 8.

Starting Water Surface Elevations

All starting water surface elevations were taken from the approved OMP model at cross section 4.485, which is the first cross section on the Higgins Creek upstream of the confluence with the Willow Creek. The following table summarizes the starting water surface elevations:

Flood Event	Starting Water Surface Elevation (NAVD88)
500-year	649.57
100-year	646.62
50-year	646.04
10-year	644.36

Manning's n-values

The Manning's n-values from the accepted models were maintained to prepare the Permit Models. In some places along the Higgins Creek, the current channel and overbank conditions do not support these n-values. Throughout the study area, the Higgins Creek channel has been straightened, relocated, and/or lined. For this reason, Design Models were created to reflect the current conditions. In particular, the Higgins Creek channel is lined with concrete from cross section 5.972 downstream of Elmhurst Road to cross section 5.394 upstream of I-90. Through this reach, the channel n-value was reduced from 0.035 to 0.015. Downstream of I-90, from cross section 5.335 to cross section 4.944, the channel is lined with a gunite-type wavy liner. In this area, the channel n-value was reduced from .035 to .025. Downstream of Touhy Avenue from cross section 4.612 to cross section 4.485, the channel was reconstructed and lined with riprap. In this area the channel n-value was reduced from .04 to .033. In addition, some overbank areas, in particular near Wille Avenue from cross section 5.899 to cross section 5.500, the overbanks are park-like area with mowed vegetation and small landscaping. Manning's n-values were reduced from 0.06 to .045 in these areas.

In addition, three reservoirs are adjacent to the channel. The Chicago Underflow Plan (CUP) reservoir located west of Elmhurst Road is adjacent to Tributary A, but there is no hydraulic connection at any flood event. The two Cells of the Touhy Avenue Reservoir (TAR) are hydraulically connected to the creek by flood control overflow structures. These Cells provide flood storage for events up to and including the 100-year event. For the 500-year event, flood waters would flow over the top of the full Cells. For the Permit models, the Manning's n-value across the top of the TAR Cells was left at either 0.03 or 0.035, matching the values used in the FEMA/LOMR models. For the Design models, the n-value for flow over open water is reduced to 0.02. Section 14 of the Report includes supporting documentation from the Corps of Engineers for this value. Because flow over the top of the TAR Cells only occurs during the 500-year flood event, and the 500-year water surface profile across the Cells is controlled by the overtopping elevation of the downstream railroad embankment and is essentially a level pool, the models are not sensitive to the n-value over the Cells.

The effect of the TAR Cells is reflected by the reduction of flows, per the steady flow data from the LOMR models. A space has been set aside south of TAR Cell 1 to provide compensatory storage volume for possible fill in TAR Cell 2 due to construction of the West Bypass. Because the exact configuration of this compensatory volume area has not been determined, the overbank n-values in this area conservatively were left at their original values and not reduced to 0.02.

For all structures except the I-90 bridge over Higgins Creek, internal cross sections are not used. These structures reflect the n-values of the adjacent cross sections, with the appropriate n-values for concrete box culverts. For the I-90 bridge, in the Permit Modified Existing Condition, the bridge opening was modified to reflect the detailed survey data, but the n-values match those from the Baseline FIS/LOMR values. In the Design Modified Existing Condition, the n-value through the bridge was reduced to reflect the concrete slope walls under the bridge.

Modified Existing Condition Models

Two Modified Existing Condition Models were prepared, Permit and Design, as described below. The Permit Model uses the Manning's n-values found in the FEMA/LOMR models, while the Design Model uses lower Manning's n-values based on current land use and channel conditions. The use of the lower n-values provides results that better match observed flow conditions, particularly at Elmhurst Road, where roadway overtopping has not been observed according to IDOT records. The Permit Model indicates overtopping between the 50- and 100-year events, while the Design Model indicates overtopping of 0.1 foot at the 100-year flood event. Due to the accurate current survey data obtained for this project and due to the field verification of the Manning's n-values throughout the study reach, it was agreed that the Design Models are appropriate to use for permitting purposes. All Waterway Information Tables are based on the Design Models.

The Modified Existing Condition Models were created by adding the IDOT surveyed cross sections to the Baseline Condition Model. Due to the almost complete straightening and lining of the Higgins Creek through the project reach, the surveyed cross sections matched the LOMR cross sections to a great degree. It was discovered that the FIS/LOMR models did not include the culvert crossing of the Kirie Water Reclamation Plant entrance over the Higgins Creek. This entrance is located at cross section 5.911, downstream of Elmhurst Road. The crossing structure is a 17 feet (W) by 9 feet (H) concrete box culvert. The FIS/LOMR models also did not include the low-head dam upstream of Elmhurst Road. These were the only major additions to the model. Another key modification was the use of the railroad grade rather than the Touhy Avenue profile as the overtopping roadway profile at the Touhy Avenue culvert crossing. The railroad grade is higher, and controls overtopping for the 500-year flood event.

After an initial run, it was found that the 500-year flood event was higher than the endpoints of most of the surveyed cross sections. All cross sections were checked and extended as necessary using the one foot contour interval topographic mapping. In many cases this extension resulted in extremely long cross sections, as the 500-

year profile extends across the top of the TAR Cells. As described above, both Permit and Design Models were created. The Permit model uses Manning's n-values from the FIS/LOMR models, which were also used for the adjacent surveyed cross sections. The Design Models use the same geometry with n-value adjustments based on field observations of current channel conditions and ground cover.

Water surface elevation (WSEL) comparisons of the LOMR models and the Permit Modified Existing Condition model are provided in PERMIT Table 1 following this Narrative. Water surface elevation (WSEL) comparisons of the LOMR models and the Design Modified Existing Condition model are provided in DESIGN Table 1 following this Narrative. The Modified Existing Conditions model geometric schematic, profiles, input, and output summary tables are provided in Section 9.

In general, the modified existing WSELs are above the corresponding FIS/LOMR WSELs. For the 500-year event at the downstream end of Higgins Creek, the higher calculated WSEL is due to the railroad grade controlling overtopping for the culvert under IL 72 (Touhy Avenue). For the area near Elmhurst Road, the addition of the Kirie Water Reclamation Plant entrance and low-head dam raises the profiles. Also, the use of all HEC-RAS Bridge Analysis Methods at the Elmhurst Road bridge results in higher WSELs as compared with using the Energy Method only. On Reach 2, upstream of the Higgins Creek Tributary A confluence, the 10-year WSEL for the Modified Existing Condition is slightly lower due to the width of the surveyed cross sections, which are wider than the one FIS cross section in the area (that was copied to create another FIS section in the reach). On Higgins Creek Tributary A, the modified existing model corrects an anomaly in the LOMR model at the downstream side of IL 72 (Higgins Road), where the 10-year profile is higher than all other profiles for a short distance. The Modified Existing Condition model profiles are provided in Section 9.

Natural Conditions Models

A Natural Conditions Permit and Design Models were developed to determine the 'natural' WSELs through the project reach. As described above, the Design Models use lower Manning's n-values than the Permit Models. The Natural Conditions model was created by removing the Mount Prospect Road, IL72/Touhy Avenue, I-90, and Elmhurst Road structures over the Higgins Creek, and the I-90 structure over the Higgins Creek Tributary A from the Modified Existing Conditions Models. All other existing structures (Kirie entrance, Wille Road, MWRD Cells 1 and 2 control structures, and low-head dam) were left in the model. It should be noted that Touhy Avenue, which currently crossed the railroad at-grade on top of the existing culvert, will be raised to pass over the railroad. Thus, the railroad grade will continue to control the overtopping, as flood flows will be able to pass under the new Touhy Avenue bridge. The Natural Conditions Models are based on the NAVD 1988 datum.

All five structures were removed from the models. This resulted in the most 'natural' condition for the overall proposed project.

WSEL comparisons of the modified existing conditions model and the natural conditions models are provided in PERMIT Table 2 and DESIGN Table 2 following this Narrative.

The removal of the structures results in lowered WSELs throughout the study limits. Elimination of the Mount Prospect Road culvert reduces the 500-year WSEL upstream to Wille Road. Similarly, removal of the I-90 culvert on the Higgins Creek Tributary A reduces all WSELs up almost to IL 72 (Higgins Road). At Elmhurst Road, the effects of the Wille Road and Kirie Entrance culverts on WSELs indicate that the 100-year "natural" conditions profile (tailwater) is above the Elmhurst Road overtopping elevation for the Permit conditions with the higher LOMR/FIS n-values. Use of the lower Design conditions n-values show that the tailwater is below the Elmhurst Road overtopping elevation for the 100-year flood event. Based on historic flooding data this seems reasonable, as there have been no roadway overtopping reports or other flooding complaints in this area of Elmhurst Road.

The Natural Condition Models geometric schematic, profiles, input, and output summary tables are provided in Section 10.

Proposed Conditions Models

The Proposed Condition Models reflect the proposed structures, road profiles, and fill and compensatory storage areas due to the proposed construction. As described above, the Design Models use lower Manning's n-values than the Permit Models. These models demonstrate that the proposed structures and compensatory storage volumes are sized properly and that there is no increase in flood stages for all storm events up to and including the 100-year event due to the project.

From downstream to upstream, the proposed roadway changes are described as follows:

- Mount Prospect Road provides a north entrance into the O'Hare International Airport. The roadway will be realigned to the east, but tie back into the existing roadway so that the existing 12 feet span by 8 feet rise concrete box culvert crossing will remain unchanged. This culvert is less than 10-years old and was installed as part of the OMP improvements. There is an existing small culvert to the east that provides local drainage of an existing ditch under a small gravel drive. This culvert will be replaced by twin 10 feet span by 3.5 feet rise reinforced concrete box culverts to provide a relief opening for the 500-year flood event so the 500-year WSEL is not increased by the roadway realignment.

  There is an existing 60" storm sewer running along the existing Mount Prospect Road alignment. This storm sewer is shown on the HEC-RAS Cross Section and Reach Length Exhibit in Section 3. While the roadway pavement will be removed, this 60" storm sewer, which discharges into Willow-Higgins Creek downstream of the confluence with Higgins Creek, will remain in place. Sufficient inlets must be provided to allow water to enter the

60" storm sewer in the event that the 500-year flood overtops the railroad to the west. Without the inlets, the quadrant between the railroad and new Mount Prospect will not have sufficient internal drainage to the downstream floodplain.

- IL 72/Touhy Avenue will be raised to pass over the existing railroad tracks. There will be no change to the existing twin 13.5 feet (W) by 8 feet (H) box culverts, and no change to the railroad grade. All flood events up to and including the 100-year event are contained in the channel at this location. For the 500-year event, the railroad grade controls overtopping. The two buildings in the Zone X floodplain south of IL 72 will be removed in the proposed condition, and the local drainage system along the railroad will be undisturbed and continue to provide local drainage of the area.

- I-90 at Higgins Creek will be widened, and ramps extended for the interchange with Elmhurst Road. The existing two-span bridge has sufficient opening area and will be extended to accommodate the additional roadway width. To minimize environmental impacts, the ramp bridges may be designed to span the channel without center piers. However, for analysis purposes, the more conservative assumption is that the pier will also be extended, and that is how the data was entered into the HEC-RAS model.

- Elmhurst Road will be widened and the profile raised south of the structure, returning to existing grade north of the structure before the intersection with Oakton Avenue. The Permit Models show overtopping of existing Elmhurst Road for the 100-year flood event. When the proposed higher profile is modeled with the existing 25 feet structure opening, the resulting proposed condition 100-year profile exceeds the permittable rise in WSEL of 0.1 foot. Therefore, it is proposed to enlarge the existing bridge by maintaining the location of the current north abutment and constructing a new south abutment so that the opening is 34 feet face-to-face. In addition, the low chord will be raised slightly in conjunction with the raised profile. This enlarged opening still matches well into the downstream concrete channel. Due to the existence of a sensitive structure located upstream of Elmhurst Road, the proposed structure is sized to increase the proposed condition 100-year WSEL by only the allowable 0.1 foot above the natural condition.

  An alternate to the 34 feet slab bridge was also analyzed. The alternate consists of two 12 feet (W) by 9 feet (H) concrete box culverts installed 1 foot below the existing channel, flanked by two 12 feet (W) by 6 feet (H) concrete box culverts with flow lines 2 feet higher than the channel. The 1 foot embedment addresses environmental concerns by allowing the placement of rip-rap to allow natural substrate to colonize the structure's bottom. In HEC-RAS the proposed center culverts are modeled as 12 feet (W) x 9 feet (H) culverts blocked to a depth of one foot, resulting in an effective flow height of 8 feet. To reflect the roughness of the rip-rap embedment, Manning's n-values for the bottoms of the embedded culverts are 0.035. Manning's n-values for the flanking culverts and the top and sides of the embedded

culverts are 0.013 to reflect typical concrete box culvert roughness. The box culvert configuration matches the hydraulic performance of the slab bridge alternate.

Additional design considerations with the box culvert option include construction staging, conflict with the existing driveway to the north, and the possible need for additional right-of-way or construction easements for channel improvements to tie into the upstream bend and downstream concrete channel. Consideration was also given to placing both of the 12 feet (W) by 6 feet (H) concrete box culverts south of the channel. This configuration will require additional overbank grading and channel modification, but eliminates the conflict with the driveway to the north.

The decision on replacement structure type will be made during Phase II, based on ease of constructability, construction cost, ROW requirements, and maintenance considerations.

- I-90 at Tributary A will be widened and new ramps constructed for the interchange with Elmhurst Road. The existing twin 9 feet span by 5.75 feet rise concrete box culverts provide sufficient freeboard to the mainline I-90 pavement, but do not meet the Tollway's HW/D requirement, which requires that the 50-year design headwater (HW) be below the crown of the pipe. The rise/diameter of the pipe is represented as D. To better meet the design requirements with the addition of Ramp Y2 south of the mainline pavement, and to better align with the upstream and downstream channels, the proposed design includes abandoning the existing twin culverts and installing a larger twin 12 feet span by 9 feet rise concrete box culverts on a skew. To address environmental concerns, it is proposed to embed these culverts 12" below the existing channel flowline. The embedment allows the placement of rip-rap to allow natural substrate to colonize the structure's bottom.

It should be noted that the proposed West Bypass will cross Higgins Creek and TAR Cell 2 on high bridges supported on piers located outside of the Creek's floodplain. Therefore, the West Bypass will not impact Higgins Creek. If piers are not constructed within TAR Cell 2 and the West Bypass is constructed on fill, adequate compensatory storage volume will be created in an additional TAR Cell south of TAR Cell 1 before construction begins. This compensatory volume will be coordinated with MWRD.

Other structures along Higgins Creek will remain unchanged. From downstream to upstream, these structures include the MWRD TAR Cell 2 and TAR Cell 1 culvert control crossings, the Wille Road culvert, the Kirie Water Reclamation Plant culvert, and the low-head dam.

WSEL comparisons of the modified existing conditions model and the proposed conditions models are provided in PERMIT Table 3 and DESIGN Table 3 following this Narrative. The Proposed Condition Permit and Design Models geometric schematic, profiles, input, and output summary tables are provided in Section 11.

Scour Analysis

Elmhurst Road Bridge, SN: 016-0677

Because the channel of Higgins Creek is lined with concrete or revetment mat, it is anticipated that similar lining will be provided to provide an armored transition from the new structure at Elmhurst Road and the concrete slope walls under the I-90 bridge. The existing Elmhurst Road bridge has been designated "scour critical" and IDOT recently installed rip-rap scour protection as part of Contract No. C-91-158-10. Excerpts from those plans is included in Section 16. If the existing north abutment is left in place at Elmhurst Road for the proposed slab bridge alternate, then the rip-rap counter measures or other armoring must be reinstated. The new south abutment will require properly designed foundations to handle the expected scour.

The proposed condition HEC-RAS bridge scour results are included in Section 16. At Elmhurst Road, the calculated total 500-year scour depth is 17.98 feet for the left abutment and contraction scour, and 12.08 feet for the right abutment and contraction scour. The worst-case scenario for scour at the Elmhurst Road bridge is when the flood is at the top of the roadway before overtopping occurs. This has been estimated to occur at approximately the 210-year flood event. Using the maximum flows just before overtopping occurs, the calculated total scour depth is 18.61 feet for the left abutment and contraction scour, and 15.09 feet for the right abutment and contraction scour.

I-90 Bridges, SN: 016-9975 (ISTHA 535) EB and 016-9869 (ISTHA 536) WB

Scour studies for the I-90 bridges over Higgins Creek were completed for the Tollway in 2008 and are included in Section 16. The studies stated that the bridges are considered stable for the calculated scour conditions, and recommended that the National Bridge Inventory (NBI) Item 113 be coded 5.

For modeling purposes, the two bridges are considered a single bridge, as there is no space between them and the center pier is continuous. At the I-90 bridge over Higgins Creek there is negligible contraction scour because the bridge spans the channel. Similarly, the spill-through abutments do not extend into the channel and do not create significant abutment scour. Some calculated pier scour was determined for the I-90 crossing over Higgins Creek. The calculated 500-year total scour depth at the I-90 bridge pier is 5.25 feet, which is a minimum of 0.5 feet above the top of the pile supported abutment footings per the Tollway scour report.

Just northeast of the I-90 bridge, an existing ditch enters Higgins Creek from the east. The south bend of this ditch is hard-armored at the confluence. This ditch will be maintained within the existing ROW by construction of a retaining wall running along the north side of the widened I-90 pavement. Proper armoring must be reinstated to provide a smooth transition where the ditch, retaining wall, and bridge spill-through slopes intersect. Additional information concerning this ditch is provided in a separate Drainage Investigation.

Compensatory Storage Requirement

Since the total drainage areas at the roadway crossings are all greater than 1 square mile, permits are required form the Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR). The proposed ramps along I-90 near Elmhurst Road will result in longitudinal filling of the floodplain and floodway. Three compensatory storage areas will be provided, including one in the northwest corner of the I-90 and Elmhurst Road interchange, adjacent to the existing pond. Both IDOT and Tollway compensatory storage requirements were considered for this project. IDOT compensates for fill in the floodway at a 1:1 ratio. The Tollway attempts to meet local ordinance requirements, and compensatory storage for fill in the floodway is calculated at a 1:1 ratio, while compensatory storage for fill in the floodplain is calculated at a 1.5:1 ratio.

For the Higgins Creek watershed, the floodway fill volume is 1.25 acre-feet between normal and 10-year WSELs, and 1.35 acre-feet between 10-year and 100-year WSELs. The floodplain fill volume is 2.78 acre-feet between normal and 10-year WSELs, and 7.14 acre-feet between 10-year and 100-year WSELs. Sufficient volume will be provided to compensate for the proposed floodway and floodplain fill volumes at the ratios described above. The proposed fill and cut sections, based on preliminary proposed roadway geometry, are modeled in the proposed condition HEC-RAS analyses. A "Permit Summary for Floodway Construction in Northeastern Illinois" for each proposed crossing, along with supporting calculations and detailed roadway cross sections showing cut and fill areas and floodway limits, are included in Section 12 of this report.

Conclusions and Design Recommendations

In order to facilitate the review, IDOT Hydraulic Report Outlines for each structure are included at the beginning of the report. Preliminary Waterway Information Tables and Hydraulic Report Data Sheets including the existing and natural condition results are included in Section 2.

No changes are proposed to the existing culvert carrying Mount Prospect Road over Higgins Creek. Mount Prospect Road will be realigned to the east of the existing crossing, and a relief culvert will be installed in an existing ditch to provide a flow path for local drainage and for the 500-year floodplain flow.

No changes are proposed to the existing culvert carrying IL 72/Touhy Avenue over Higgins Creek. Touhy Avenue will be elevated on an overpass to go over the existing railroad and culvert.

The proposed I-90 bridge extension over Higgins Creek meets the following criteria:

- The existing 2-span bridge will be extended upstream and downstream to accommodate proposed roadway widening and ramp construction. For

modeling purposes the existing bridges with extensions are considered a single bridge.

- The 50-year headwater elevation of 651.53 feet (NAVD 1988) is 8.25 feet lower than the proposed edge of pavement (EOP) elevation of 659.78 feet (NAVD 1988), meeting the freeboard requirement.
- The 500-year headwater elevation of 654.98 feet (NAVD 1988) is 4.80 feet lower than the proposed edge of pavement (EOP) elevation of 659.78 feet (NAVD 1988), meeting the freeboard requirement.
- The clearance from the worst-case proposed low beam elevation of 655.51 feet (NAVD 1988) to the 50-year natural headwater elevation of 651.71 feet (NAVD 1988) is 3.80 feet, meeting the clearance requirement.

The proposed Elmhurst Road bridge crossing expansion does not meet the freeboard and clearance criteria due to geometric constraints. A design exception has been requested.

- The existing single span bridge will be widened to accommodate proposed roadway widening and ramp construction. The bridge will also be lengthened from 25 feet to 34 feet to meet IDNR-OWR permitting requirements to not increase upstream water surface elevations more than 0.1 foot for all events up to and including the 100-year flood event. Alternatively, a four-cell concrete box culvert structure may be constructed, consisting of two 12 feet (W) by 9 feet (H) concrete box culverts embedded 12 inches below the channel elevation, flanked by two 12 feet (W) by 6 feet (H) concrete box culverts with flow lines 2 feet higher than the channel elevation.
- The 50-year headwater elevation of 656.49 feet (NAVD 1988) is 1.52 feet lower than the proposed edge of pavement (EOP) elevation of 658.01 feet (NAVD 1988), which is less than the required freeboard requirement of 3 feet.
- The 500-year headwater elevation of 659.59 feet (NAVD 1988) is 1.58 feet above the proposed edge of pavement (EOP) elevation of 658.01 feet (NAVD 1988), meaning the 500-year flood is anticipated to overtop the road. This is also true in the existing condition.
- The clearance from the worst-case proposed low beam elevation of 656.28 feet (NAVD 1988) to the 50-year natural headwater elevation of 656.53 feet (NAVD 1988) is -0.25 feet, which is less than the clearance requirement of 2 feet.

The proposed I-90 culvert extension over Tributary A has the following design parameters:

- The existing 214 feet long twin 9 feet (W) by 5.75 feet (H) RCBC structure will be abandoned, and a new 320 feet long twin 12 feet (W) by 9 feet (H) RCBC structure will be constructed on a skew to better align upstream and downstream, to accommodate the I-90 roadway widening and ramp construction. The new culverts will be embedded 12 inches below the channel elevation.

- The 50-year headwater elevation of 657.42 feet (NAVD 1988) is 4.03 feet lower than the proposed edge of pavement (EOP) elevation of 661.45 feet (NAVD 1988), meeting the freeboard requirement.
- The 500-year headwater elevation of 660.22 feet (NAVD 1988) is 1.23 feet below the proposed edge of pavement (EOP) elevation of 661.45 feet (NAVD 1988), meeting the freeboard requirement.
- The 50-year headwater elevation of 657.42 feet (NAVD 1988) is 1.08 feet below the culvert crown elevation of 658.50, meeting the requirement that HW/D is less than 1.

Regional compensatory storage basins are proposed to provide the required compensatory floodway storage volumes for all structures as well as for longitudinal encroachments.

CW/IAD/mv
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PERMIT Table 1. **WSEL comparison of FIS Published Data vs. Modified Existing Model**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) PERMIT MODELS																
				500 YR WSEL (ft)			100 YR WSEL (ft)				50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS XSEC	IDOT Survey XSEC	HEC-RAS XSEC	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS Tabular Data	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.
CUP			*6*	*IL 72 (Higgins Road)*												
CUP	*281A*		*5.999*	*664.65*	*664.67*	*0.02*		*664.30*	*664.32*	*0.02*	*664.13*	*664.15*	*0.02*	*663.61*	*663.63*	*0.02*
CUP	*281AA*		*5*	*662.81*	*662.82*	*0.01*		*662.56*	*662.58*	*0.02*	*662.41*	*662.43*	*0.02*	*663.03*	*662.08*	*-0.95*
CUP		*C7*	*4.1*		*660.80*				*659.68*			*658.64*			*656.77*	
CUP	*WHE03*		*4*	*660.46*				*659.01*			*658.15*			*657.52*		
CUP		*C6*	*3.8*		*660.80*				*659.68*			*658.63*			*656.75*	
CUP		*C5*	*3.5*		*660.80*				*659.68*			*658.62*			*656.73*	
CUP		*C4*	*3.1*		*660.79*				*659.67*			*658.61*			*656.69*	
CUP			*3.01**		*660.78*				*659.66*			*658.60*			*656.68*	
CUP	*280*		*3*	*660.46*	*660.77*	*0.31*		*659.00*	*659.65*	*0.65*	*658.13*	*658.58*	*0.45*	*656.07*	*656.65*	*0.58*
CUP			*2.3*		*660.73*				*659.62*			*658.55*			*656.64*	
CUP			*2.001*	*660.27*				*658.81*			*657.91*			*655.55*		
CUP			*2*	*I-90 (Jane Addams Tollway)*												
CUP			*1.999*	*659.61*				*658.47*			*657.70*			*655.72*		
CUP	*"Just d/s of I-90" [1]*	*C1*	*1.7*		*659.95*		*659.00*		*659.14*			*658.18*			*656.46*	
CUP	*280AA*		*1*	*659.67*	*659.96*	*0.29*		*658.53*	*659.14*	*0.61*	*657.75*	*658.18*	*0.43*	*655.78*	*656.44*	*0.66*
2	"Just d/s of Hamilton Road" [1]	D33	6.443		660.23		659.00		659.48			658.72			657.40	
2	WH 065		6.404	659.97	660.12	0.15		659.02	659.34	0.32	658.48	658.50	0.02	657.58	656.93	-0.65
2		D32	6.353		660.01				659.20			658.29			656.47	
2			6.287	659.66	659.94	0.28		658.50	659.11	0.61	657.72	658.13	0.41	655.71	656.07	0.36
Mainstem	WH 064		6.245	659.63	659.96	0.33		658.49	659.15	0.66	657.70	658.18	0.48	655.69	656.44	0.75
Mainstem		D31	6.231		659.97				659.16			658.19			656.45	
Mainstem		D30	6.179		659.86				659.07			658.09			656.33	
Mainstem		D29	6.069		659.84				659.06			658.06			656.27	
Mainstem			6.035		659.82				659.04			658.03			656.19	
Mainstem			6.034		659.72				658.96			657.89			655.24	
Mainstem			6.033		659.78				659.01			657.97			655.70	
Mainstem			6.032		659.82				659.04			658.01			655.79	
Mainstem	WH 062		6.021	659.46	659.72	0.26		658.32	658.98	0.66	657.49	657.93	0.44	655.18	655.64	0.46
Mainstem		D28	6.006		659.72				658.97			657.93			655.65	
Mainstem			5.9994*		659.71				658.96			657.92			655.64	
Mainstem			5.9950*		659.71				658.96			657.62			655.63	
Mainstem			5.9928*		659.71				658.96			657.90			655.63	
Mainstem			5.991	659.43				658.21			657.38			655.08		
Mainstem			5.981	Elmhurst Road - ADDITIONAL BRIDGE ANALYSIS METHODS USED IN MOD. EX. COND.												
Mainstem		D25	5.973		659.69				658.71			657.51			655.02	
Mainstem	WH 061		5.972		659.66				658.69			657.48			654.96	
Mainstem			5.971	658.89				657.65			656.98			654.98		
Mainstem			5.968	658.88				657.64			657.00			654.93		
Mainstem		D24	5.959		659.62				658.65			657.42			654.95	
Mainstem		D23	5.950		659.59				658.63			657.39			654.91	
Mainstem		D22	5.914		659.44				658.53			657.29			654.83	
Mainstem			5.911	Kirie Plant Entrance (not included in FIS/LOMR models)												
Mainstem		D21	5.899		658.50				657.22			656.28			654.27	

PERMIT Table 1. (cont'd)

WSEL comparison of FIS Published Data vs. Modified Existing Model

Higgins Creek Tributary A and Higgins Creek (all NAVD88) PERMIT MODELS																
				500 YR WSEL (ft)			100 YR WSEL (ft)				50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS Tabular Data	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.
Mainstem			5.86375*		658.46				657.26			656.27			654.19	
Mainstem			5.5285*		658.37				657.18			656.17			654.05	
Mainstem			5.79325*		658.28				657.09			656.06			653.92	
Mainstem		D20	5.758		658.19				656.99			655.96			653.80	
Mainstem			5.756	658.04				656.89			656.01			653.88		
Mainstem			5.721	Wille Road												
Mainstem			5.685	656.48				655.49			654.72			653.27		
Mainstem	"Just d/s of Wille Rd." [1]	D19	5.683		656.96		655.00		655.25			654.54			653.10	
Mainstem		D18	5.650		656.81				655.24			654.50			653.03	
Mainstem	WH 056		5.649	656.28	656.80	0.52		655.36	655.23	-0.13	654.63	654.50	-0.13	653.19	653.03	-0.16
Mainstem		D17	5.593		656.66				655.05			654.30			652.88	
Mainstem	TAR 35		5.558	656.24	656.46	0.22		654.91	654.82	-0.09	654.13	654.04	-0.09	652.73	652.63	-0.10
Mainstem		D16	5.500		656.14				654.41			653.57			652.20	
Mainstem	TAR 34		5.496	656.07	656.11	0.04		654.43	654.34	-0.09	653.58	653.49	-0.09	652.24	652.13	-0.11
Mainstem		D15	5.409		655.83				653.90			652.66			651.36	
Mainstem	TAR 33		5.408	655.50	655.82	0.32		653.76	653.74	-0.02	652.72	652.63	-0.09	651.46	651.33	-0.13
Mainstem			5.394*		655.82				653.80			652.68			651.35	
Mainstem			5.378	655.49	655.79	0.30		653.75	653.76	0.01	652.67	652.61	-0.06	651.38	651.28	-0.10
Mainstem		D14	5.377		655.75				653.74			652.60			651.28	
Mainstem			5.364	I-90 (Jane Addams Tollway)												
Mainstem		D13	5.352		655.49				653.47			652.28			651.01	
Mainstem			5.351	655.17	655.50	0.33		653.39	653.48	0.09	652.23	652.28	0.05	650.96	651.00	0.04
Mainstem	J - TAR 32		5.340	655.12	655.46	0.34	653.30	653.30	653.41	0.11	652.10	652.16	0.06	650.83	650.88	0.05
Mainstem			5.335*		655.43				653.35			652.07			650.80	
Mainstem		D12	5.324		655.37				653.27			651.95			650.69	
Mainstem	TAR 31		5.289	655.04	655.34	0.30		653.11	653.21	0.10	651.77	651.83	0.06	650.51	650.56	0.05
Mainstem		D11	5.256		655.24				653.07			651.60			650.35	
Mainstem	I - TAR 30		5.236	654.82	655.17	0.35	652.90	652.88	652.97	0.09	651.38	651.45	0.07	650.15	650.21	0.06
Mainstem	TAR 29		5.184	654.70	655.14	0.44		652.71	652.81	0.10	651.07	651.15	0.08	649.85	649.92	0.07
Mainstem		D10	5.166		655.13				652.76			651.05			649.82	
Mainstem	TAR 28		5.144	654.73	655.11	0.38		652.57	652.69	0.12	650.82	650.91	0.09	649.61	649.70	0.09
Mainstem	H - TAR 27		5.094	654.70	655.08	0.38	652.50	652.46	652.58	0.12	650.58	650.69	0.11	649.40	649.50	0.10
Mainstem		D9	5.049		655.05				652.47			650.49			649.33	
Mainstem	TAR 26		5.045	654.68	655.05	0.37		652.43	652.52	0.09	650.53	650.57	0.04	649.31	649.37	0.06
Mainstem			5.020	654.67	655.04	0.37		652.35	652.44	0.09	650.45	650.49	0.04	649.23	649.29	0.06
Mainstem			5.012	MWRD Crossing at TAR Cell 1												
Mainstem			5.005	654.63	655.05	0.42		650.84	650.93	0.09	649.65	649.68	0.03	648.80	648.86	0.06
Mainstem	TAR 25		4.992	654.63	655.04	0.41		650.87	650.96		649.66	649.70	0.04	648.81	648.86	0.05
Mainstem		D8	4.980		655.03				650.86			649.60			648.77	
Mainstem	TAR 24		4.966	654.59	655.02	0.43		650.61	650.69	0.08	649.42	649.44	0.02	648.58	648.62	0.04
Mainstem	TAR 23		4.944	654.62	655.02	0.40		650.67	650.57	-0.10	649.29	649.31	0.02	648.46	648.50	0.04
Mainstem		D7	4.928		655.00				650.51			649.24			648.43	

PERMIT Table 1. (cont'd) **WSEL comparison of FIS Published Data vs. Modified Existing Model**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) PERMIT MODELS																	
				500 YR WSEL (ft)			100 YR WSEL (ft)				50 YR WSEL (ft)			10 YR WSEL (ft)			
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS Tabular Data	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	
Mainstem	**G - TAR 22**		**4.925**	654.57	655.00	0.43	650.50	650.40	650.46	0.06	649.16	649.18	0.02	648.32	648.38	0.06	
Mainstem	**F - TAR 21**		**4.915**	654.50	655.00	0.50	650.50	650.44	650.50	0.06	649.18	649.21	0.03	648.33	648.38	0.05	
Mainstem	**TAR 20**		**4.885**	654.46	654.99	0.53		650.35	650.38	0.03	649.07	649.07	0.00	648.21	648.25	0.04	
Mainstem	**TAR 19**		**4.866**	654.43	654.98	0.55		650.28	650.30	0.02	648.99	648.97	-0.02	648.12	648.15	0.03	
Mainstem	**TAR 18**		**4.847**	654.40	654.97	0.57		650.21	650.24	0.03	648.92	648.90	-0.02	648.04	648.07	0.03	
Mainstem	**E - TAR 17**		**4.828**	654.37	654.96	0.59	650.20	650.15	650.19	0.04	648.85	648.85	0.00	647.97	648.01	0.04	
Mainstem	**TAR 16**		**4.801**	654.33	654.94	0.61		650.05	650.07	0.02	648.71	648.70	-0.01	647.82	647.86	0.04	
Mainstem	**TAR 15**		**4.783**	654.30	654.93	0.63		649.98	650.01	0.03	648.64	648.62	-0.02	647.73	647.78	0.05	
Mainstem	**TAR 14**		**4.774**	654.28	654.93	0.65		649.94	649.96	0.02	648.58	648.57	-0.01	647.67	647.71	0.04	
Mainstem		**D6**	**4.771**		654.92				649.95			648.56			647.71		
Mainstem	**TAR 13**		**4.760**	654.27	654.91	0.64		649.90	649.90	0.00	648.53	648.50	-0.03	647.61	647.65	0.04	
Mainstem	**TAR 12**		**4.742**	654.24	654.90	0.66		649.82	649.84	0.02	648.43	648.41	-0.02	647.50	647.55	0.05	
Mainstem	**TAR 11**		**4.713**	654.19	654.89	0.70		649.68	649.71	0.03	648.24	648.22	-0.02	647.27	647.33	0.06	
Mainstem	**D - TAR 10**		**4.698**	654.16	654.89	0.73	649.70	649.62	649.68	0.06	648.16	648.17	0.01	647.16	647.25	0.09	
Mainstem		**D5**	**4.694**		654.87				649.58			648.08			647.19		
Mainstem	**TAR 9**		**4.683**	654.22	654.89	0.67		649.70	649.68	-0.02	648.22	648.17	-0.05	647.20	647.26	0.06	
Mainstem			**4.678**	654.22	654.89	0.67		649.65	649.60	-0.05	648.17	648.07	-0.10	647.15	647.15	0.00	
Mainstem			**4.673**	**MWRD Crossing at TAR Cell 2**													
Mainstem			**4.668**	654.15	654.89	0.74		648.65	648.65	0.00	647.29	647.21	-0.08	646.37	646.20	-0.17	
Mainstem	**TAR 8**		**4.664**	654.09	654.84	0.75		648.69	648.61	-0.08	647.30	647.23	-0.07	646.38	646.23	-0.15	
Mainstem		**D4**	**4.659**		654.85				648.65			647.26			646.26		
Mainstem			**4.639**	654.07	654.82	0.75		648.63	648.60	-0.03	647.25	647.21	-0.04	646.30	646.19	-0.11	
Mainstem		**D3**	**4.638**		654.80				648.60			647.21			646.19		
Mainstem			**4.626**	**IL 72 (Touhy Avenue) / RR - RR PROFILE CONTROLS OT IN MOD. EX. COND.**													
Mainstem			**4.612**	653.46	653.44	-0.02		648.22	648.13	-0.09	646.89	646.82	-0.07	645.69	645.48	-0.21	
Mainstem		**D2**	**4.611**		653.46				648.17			646.84			645.51		
Mainstem	**TAR 7**		**4.588**	653.40	653.40	0.00		648.06	648.09	0.03	646.71	646.74	0.03	645.04	645.12	0.08	
Mainstem		**D1**	**4.569**		653.42				648.10			646.75			645.16		
Mainstem	**TAR 6**		**4.542**	653.40	653.41	0.01		648.09	648.09	0.00	646.74	646.74	0.00	645.14	645.14	0.00	
Mainstem			**4.537**	653.37	653.37	0.00		648.02	648.02	0.00	646.69	646.69	0.00	645.08	645.08	0.00	
Mainstem			**4.521**	**Mt. Prospect Road / O'Hare Employee Entrance**													
Mainstem			**4.505**	649.55	649.55	0.00		646.58	646.58	0.00	646.02	646.02	0.00	644.33	644.33	0.00	
Mainstem	C[2]		**4.485**	649.57	649.57	0.00	647.4 [2]	646.62	646.62	0.00	646.04	646.04	0.00	644.36	644.36	0.00	

Notes:

1. From Federal Register, Vol. 73, No. 47 / Monday, March 10, 2008, p. 12648. See Section 7 of Report.
2. The FIS profile does not reflect the recent realignment of Mt. Prospect Road and relocation of Willow Creek. The HEC-RAS model accepted for this Hydraulic Report does.

"*" indicates that the cross section was interpolated

DESIGN Table 1. **WSEL comparison of FIS Published Data vs. Modified Existing Model - DESIGN**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) DESIGN MODELS																
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS XSEC	IDOT Survey XSEC	HEC-RAS XSEC	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.
CUP			6	IL 72 (Higgins Road)											
CUP	281A		5.999	664.65	664.67	0.02	664.30	664.32	0.02	664.13	664.15	0.02	663.61	663.63	0.02
CUP	281AA		5	662.81	662.82	0.01	662.56	662.58	0.02	662.41	662.43	0.02	663.03	662.08	-0.95
CUP		C7	4.1		660.61			659.15			657.94			656.77	
CUP	WHE03		4	660.46			659.01			658.15			657.52		
CUP		C6	3.8		660.61			659.15			657.93			656.75	
CUP		C5	3.5		660.60			659.14			657.92			656.73	
CUP		C4	3.1		660.59			659.13			657.90			656.69	
CUP			3.01*		660.59			659.12			657.88			656.67	
CUP	280		3	660.46	660.57	0.11	659.00	659.10	0.10	658.13	657.86	-0.27	656.07	656.65	0.58
CUP			2.3		660.53			659.07			657.83			656.64	
CUP			2.001	660.27			658.81			657.91			655.55		
CUP			2	I-90 (Jane Addams Tollway)											
CUP			1.999	659.61			658.47			657.70			655.72		
CUP	"Just d/s of I-90" [1]	C1	1.7		659.75			658.60			657.46			656.46	
CUP	280AA		1	659.67	659.76	0.09	658.53	658.60	0.07	657.75	657.45	-0.30	655.78	656.44	0.66
2	"Just d/s of Hamilton Road" [1]	D33	6.443		660.12			659.16			658.39			657.52	
2	WH 065		6.404	659.97	660.00	0.03	659.02	658.97	-0.05	658.48	658.07	-0.41	657.58	657.12	-0.46
2		D32	6.353		659.87			658.77			657.75			656.77	
2			6.287	659.66	659.80	0.14	658.50	658.63	0.13	657.72	657.49	-0.23	655.71	656.47	0.76
Mainstem	WH 064		6.245	659.63	659.76	0.13	658.49	658.60	0.11	657.70	657.45	-0.25	655.69	656.43	0.74
Mainstem		D31	6.231		659.77			658.61			657.46			656.44	
Mainstem		D30	6.179		659.65			658.51			657.32			656.33	
Mainstem		D29	6.069		659.62			658.48			657.27			656.27	
Mainstem			6.035		659.61			658.46			657.20			656.19	
Mainstem			6.034		659.49			658.33			657.79			655.25	
Mainstem			6.033		659.56			658.40			657.04			654.60	
Mainstem			6.032		659.60			658.44			657.11			654.82	
Mainstem	WH 062		6.021	659.46	659.51	0.05	658.32	658.36	0.04	657.49	656.97	-0.52	655.18	654.54	-0.64
Mainstem		D28	6.006		659.50			658.35			656.97			654.54	
Mainstem			5.9994*		659.49			658.34			656.96			654.52	
Mainstem			5.9950*		659.49			658.34			656.95			654.51	
Mainstem			5.9928*		659.49			658.34			656.93			654.51	
Mainstem			5.991	659.43			658.21			657.38			655.08		
Mainstem			5.981	Elmhurst Road - ADDITIONAL BRIDGE ANALYSIS METHODS USED IN MOD. EX. COND.											
Mainstem		D25	5.973		659.43			657.83			656.57			653.88	
Mainstem	WH 061		5.972		659.33			657.73			656.41			653.75	
Mainstem			5.971	658.89			657.65			656.98			654.98		
Mainstem			5.968	658.88			657.64			657.00			654.98		
Mainstem		D24	5.959		659.28			657.71			656.44			653.77	
Mainstem		D23	5.950		659.25			657.69			656.42			653.74	
Mainstem		D22	5.914		659.19			657.66			656.40			653.71	
Mainstem			5.911	Kirie Plant Entrance (not included in FIS/LOMR models)											
Mainstem		D21	5.899		657.74			656.12			655.03			652.85	

DESIGN Table 1. (cont'd) **WSEL comparison of FIS Published Data vs. Modified Existing Model - DESIGN**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) DESIGN MODELS															
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.
Mainstem			5.86375*		657.81			656.29			655.16			652.88	
Mainstem			5.5285*		657.80			656.26			655.13			652.83	
Mainstem			5.79325*		657.78			656.24			655.10			652.78	
Mainstem		D20	5.758		657.75			656.22			655.07			652.74	
Mainstem			5.756	658.04			656.89			656.01			653.88		
Mainstem			5.721	Wille Road											
Mainstem			5.685	656.48			655.49			654.72			653.27		
Mainstem	"Just d/s of Wille Rd." [1]	D19	5.683		655.43			653.57			652.66			651.51	
Mainstem		D18	5.650		655.68			653.70			652.74			651.52	
Mainstem	WH 056		5.649	656.28	655.68	-0.60	655.36	653.71	-1.65	654.63	652.75	-1.88	653.19	651.52	-1.67
Mainstem		D17	5.593		655.65			653.65			652.68			651.47	
Mainstem	TAR 35		5.558	656.24	655.50	-0.74	654.91	653.44	-1.47	654.13	652.37	-1.76	652.73	651.15	-1.58
Mainstem		D16	5.500		655.38			653.22			652.06			650.89	
Mainstem	TAR 34		5.496	656.07	655.34	-0.73	654.43	653.14	-1.29	653.58	651.92	-1.66	652.24	650.75	-1.49
Mainstem		D15	5.409		655.33			653.02			651.72			650.55	
Mainstem	TAR 33		5.408	655.50	655.33	-0.17	653.76	653.00	-0.76	652.72	651.66	-1.06	651.46	650.49	-0.97
Mainstem			5.394*		655.40			653.11			651.80			650.58	
Mainstem			5.378	655.49	655.35	-0.14	653.75	653.02	-0.73	652.67	651.63	-1.04	651.38	650.42	-0.96
Mainstem		D14	5.377		655.31			653.00			651.63			650.42	
Mainstem			5.364	I-90 (Jane Addams Tollway)											
Mainstem		D13	5.352		655.18			652.89			651.49			650.30	
Mainstem			5.351	655.17	655.19	0.02	653.39	652.90	-0.49	652.23	651.50	-0.73	650.96	650.30	-0.66
Mainstem	J - TAR 32		5.340	655.12	655.18	0.06	653.30	652.87	-0.43	652.10	651.44	-0.66	650.83	650.24	-0.59
Mainstem			5.335*		655.17			652.85			651.40			650.20	
Mainstem		D12	5.324		655.12			652.78			651.28			650.09	
Mainstem	TAR 31		5.289	655.04	655.12	0.08	653.11	652.76	-0.35	651.77	651.21	-0.56	650.51	650.01	-0.50
Mainstem		D11	5.256		655.05			652.65			651.00			649.82	
Mainstem	I - TAR 30		5.236	654.82	655.00	0.18	652.88	652.58	-0.30	651.38	650.87	-0.51	650.15	649.69	-0.46
Mainstem	TAR 29		5.184	654.70	655.01	0.31	652.71	652.49	-0.22	651.07	650.69	-0.38	649.85	649.51	-0.34
Mainstem		D10	5.166		655.01			652.47			650.62			649.45	
Mainstem	TAR 28		5.144	654.73	655.01	0.28	652.57	652.42	-0.15	650.82	650.53	-0.29	649.61	649.37	-0.24
Mainstem	H - TAR 27		5.094	654.70	655.00	0.30	652.46	652.38	-0.08	650.58	650.43	-0.15	649.40	649.27	-0.13
Mainstem		D9	5.049		654.99			652.32			650.31			649.17	
Mainstem	TAR 26		5.045	654.68	654.99	0.31	652.43	652.37	-0.06	650.53	650.40	-0.13	649.31	649.22	-0.09
Mainstem			5.020	654.67	654.98	0.31	652.35	652.30	-0.05	650.45	650.34	-0.11	649.23	649.17	-0.06
Mainstem			5.012	MWRD Crossing at TAR Cell 1											
Mainstem			5.005	654.63	654.99	0.36	650.84	650.80	-0.04	649.65	649.54	-0.11	648.80	648.72	-0.08
Mainstem	TAR 25		4.992	654.63	654.99	0.36	650.87	650.83		649.66	649.57	-0.09	648.81	648.74	-0.07
Mainstem		D8	4.980		654.98			650.74			649.47			648.65	
Mainstem	TAR 24		4.966	654.59	654.97	0.38	650.61	650.59	-0.02	649.42	649.33	-0.09	648.58	648.52	-0.06
Mainstem	TAR 23		4.944	654.62	654.97	0.35	650.67	650.53	-0.14	649.29	649.27	-0.02	648.46	648.47	0.01
Mainstem		D7	4.928		654.97			650.49			649.22			648.42	

DESIGN Table 1. (cont'd) **WSEL comparison of FIS Published Data vs. Modified Existing Model - DESIGN**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) DESIGN MODELS														
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.	FIS/LOMR Models	Mod. Ex. Cond.	Diff.
Mainstem	G - TAR 22		4.925	654.57	654.97	0.40	650.40	650.44	0.04	649.16	649.16	0.00	648.32	648.36	0.04
Mainstem	F - TAR 21		4.915	654.50	654.96	0.46	650.44	650.48	0.04	649.18	649.19	0.01	648.33	648.37	0.04
Mainstem	TAR 20		4.885	654.46	654.96	0.50	650.35	650.36	0.01	649.07	649.05	-0.02	648.21	648.23	0.02
Mainstem	TAR 19		4.866	654.43	654.95	0.52	650.28	650.28	0.00	648.99	648.95	-0.04	648.12	648.14	0.02
Mainstem	TAR 18		4.847	654.40	654.94	0.54	650.21	650.22	0.01	648.92	648.87	-0.05	648.04	648.05	0.01
Mainstem	E - TAR 17		4.828	654.37	654.94	0.57	650.15	650.17	0.02	648.85	648.83	-0.02	647.97	648.00	0.03
Mainstem	TAR 16		4.801	654.33	654.93	0.60	650.05	650.04	-0.01	648.71	648.68	-0.03	647.82	647.85	0.03
Mainstem	TAR 15		4.783	654.30	654.92	0.62	649.98	649.98	0.00	648.64	648.60	-0.04	647.73	647.76	0.03
Mainstem	TAR 14		4.774	654.28	654.91	0.63	649.94	649.93	-0.01	648.58	648.54	-0.04	647.67	647.70	0.03
Mainstem		D6	4.771		654.91			649.92			648.53			647.69	
Mainstem	TAR 13		4.760	654.27	654.91	0.64	649.90	649.87	-0.03	648.53	648.47	-0.06	647.61	647.63	0.02
Mainstem	TAR 12		4.742	654.24	654.90	0.66	649.82	649.81	-0.01	648.43	648.38	-0.05	647.50	647.53	0.03
Mainstem	TAR 11		4.713	654.19	654.89	0.70	649.68	649.67	-0.01	648.24	648.18	-0.06	647.27	647.31	0.04
Mainstem	D - TAR 10		4.698	654.16	654.89	0.73	649.62	649.64	0.02	648.16	648.13	-0.03	647.16	647.22	0.06
Mainstem		D5	4.694		654.87			649.54			648.04			647.17	
Mainstem	TAR 9		4.683	654.22	654.89	0.67	649.70	649.65	-0.05	648.22	648.13	-0.09	647.20	647.23	0.03
Mainstem			4.678	654.22	654.89	0.67	649.65	649.57	-0.08	648.17	648.03	-0.14	647.15	647.12	-0.03
Mainstem			4.673	MWRD Crossing at TAR Cell 2											
Mainstem			4.668	654.15	654.88	0.73	648.69	648.62	-0.07	647.29	647.17	-0.12	646.37	646.13	-0.24
Mainstem	TAR 8		4.664	654.09	654.84	0.75	648.69	648.57	-0.12	647.30	647.19	-0.11	646.38	646.16	-0.22
Mainstem		D4	4.659		654.84			648.62			647.22			646.20	
Mainstem			4.639	654.07	654.81	0.74	648.63	648.56	-0.07	647.25	647.17	-0.08	646.30	646.11	-0.19
Mainstem		D3	4.638		654.80			648.56			647.17			646.12	
Mainstem			4.626	IL 72 (Touhy Avenue) / RR - RR PROFILE CONTROLS OT IN MOD. EX. COND.											
Mainstem			4.612	653.46	653.43	-0.03	648.22	648.09	-0.13	646.89	646.77	-0.12	645.69	645.34	-0.35
Mainstem		D2	4.611		653.45			648.13			646.80			645.37	
Mainstem	TAR 7		4.588	653.40	653.40	0.00	648.06	648.07	0.01	646.71	646.72	0.01	645.04	645.08	0.04
Mainstem		D1	4.569		653.41			648.09			646.74			645.15	
Mainstem	TAR 6		4.542	653.40	653.41	0.01	648.09	648.09	0.00	646.74	646.74	0.00	645.14	645.14	0.00
Mainstem			4.537	653.37	653.37	0.00	648.02	648.01	-0.01	646.69	646.69	0.00	645.08	645.08	0.00
Mainstem			4.521	Mt. Prospect Road / O'Hare Employee Entrance											
Mainstem			4.505	649.55	649.54	-0.01	646.58	646.58	0.00	646.02	646.02	0.00	644.33	644.33	0.00
Mainstem	C[2]		4.485	649.57	649.57	0.00	646.62	646.62	0.00	646.04	646.04	0.00	644.36	644.36	0.00

Notes:

1. From Federal Register, Vol. 73, No. 47 / Monday, March 10, 2008, p. 12648. See Section 7 of Report.
2. The FIS profile does not reflect the recent realignment of Mt. Prospect Road and relocation of Willow Creek. The HEC-RAS model accepted for this Hydraulic Report does.

"*" indicates that the cross section was interpolated

PERMIT Table 2. **WSEL comparison of Modified Existing Model vs. 'Natural' Model**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) PERMIT MODELS														
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS XSEC	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.
CUP			*6*	*IL 72 (Higgins Road)*											
CUP	*281A*		*5.999*	*664.67*	*664.67*	*0.00*	*664.32*	*664.32*	*0.00*	*664.15*	*664.15*	*0.00*	*663.63*	*663.64*	*0.01*
CUP	*281AA*		*5*	*662.82*	*662.82*	*0.00*	*662.58*	*662.58*	*0.00*	*662.43*	*662.43*	*0.00*	*662.08*	*662.08*	*0.00*
CUP		*C7*	*4.1*	*660.80*	*659.96*	*-0.84*	*659.68*	*658.93*	*-0.75*	*658.64*	*657.91*	*-0.73*	*656.77*	*656.59*	*-0.18*
CUP		*C6*	*3.8*	*660.80*	*659.96*	*-0.84*	*659.68*	*658.92*	*-0.76*	*658.63*	*657.90*	*-0.73*	*656.75*	*656.57*	*-0.18*
CUP		*C5*	*3.5*	*660.80*	*659.95*	*-0.85*	*659.68*	*658.91*	*-0.77*	*658.62*	*657.88*	*-0.74*	*656.73*	*656.54*	*-0.19*
CUP		*C4*	*3.1*	*660.79*	*659.94*	*-0.85*	*659.67*	*658.90*	*-0.77*	*658.61*	*657.86*	*-0.75*	*656.69*	*656.50*	*-0.19*
cup			*3.01**	*660.78*	*659.93*	*-0.85*	*659.66*	*658.89*	*-0.77*	*658.60*	*657.84*	*-0.76*	*656.68*	*656.48*	*-0.20*
CUP	*280*		*3*	*660.77*			*659.65*			*658.58*			*656.65*		
CUP			*2.3*	*660.73*			*659.62*			*658.55*			*656.64*		
CUP			*2*	*I-90 (Jane Addams Tollway) - REMOVED FOR NATURAL CONDITION*											
CUP	*"Just d/s of I-90" [1]*		*1.7*	*659.95*			*659.14*			*658.18*			*656.46*		
CUP	*280AA*		*1*	*659.96*	*659.94*	*-0.02*	*659.14*	*658.90*	*-0.24*	*658.18*	*657.85*	*-0.33*	*656.44*	*656.48*	*0.04*
2	"Just d/s of Hamilton Road" [1]	D33	6.443	660.23	660.19	-0.04	659.48	659.30	-0.18	658.72	658.51	-0.21	657.40	657.33	-0.07
2	WH 065		6.404	660.12	660.07	-0.05	659.34	659.13	-0.21	658.50	658.23	-0.27	656.93	656.81	-0.12
2		D32	6.353	660.01	659.95	-0.06	659.20	658.96	-0.24	658.29	657.97	-0.32	656.47	656.25	-0.22
2			6.287	659.94	659.88	-0.06	659.11	658.85	-0.26	658.13	657.76	-0.37	656.07	655.71	-0.36
Mainstem	WH 064		6.245	659.96	659.90	-0.06	659.15	658.86	-0.29	658.18	657.81	-0.37	656.44	656.44	0.00
Mainstem		D31	6.231	659.97	659.90	-0.07	659.16	658.87	-0.29	658.19	657.81	-0.38	656.45	656.45	0.00
Mainstem		D30	6.179	659.86	659.79	-0.07	659.07	658.78	-0.29	658.09	657.70	-0.39	656.33	656.33	0.00
Mainstem		D29	6.069	659.84	659.77	-0.07	659.06	658.75	-0.31	658.06	657.66	-0.40	656.27	656.27	0.00
Mainstem			6.035	659.82	659.75	-0.07	659.04	658.74	-0.30	658.03	657.62	-0.41	656.19	656.19	0.00
Mainstem			6.034	659.72	659.64	-0.08	658.96	658.63	-0.33	657.89	657.40	-0.49	655.24	655.24	0.00
Mainstem			6.033	659.78	659.70	-0.08	659.01	658.69	-0.32	657.97	657.53	-0.44	655.70	655.06	-0.64
Mainstem			6.032	659.82	659.75	-0.07	659.04	658.73	-0.31	658.01	657.58	-0.43	655.79	655.27	-0.52
Mainstem	WH 062		6.021	659.72	659.65	-0.07	658.98	658.66	-0.32	657.93	657.47	-0.46	655.64	655.06	-0.58
Mainstem		D28	6.006	659.72	659.65	-0.07	658.97	658.65	-0.32	657.93	657.47	-0.46	655.65	655.07	-0.58
Mainstem			5.9994*	659.71	659.64	-0.07	658.96	658.64	-0.32	657.92	657.46	-0.46	655.64	655.05	-0.59
Mainstem			5.9950*	659.71	659.64	-0.07	658.96	658.64	-0.32	657.62	657.46	-0.16	655.63	655.05	-0.58
Mainstem			5.9928*	659.71			658.96			657.90			655.63		
Mainstem			5.981	Elmhurst Road - REMOVED FOR NATURAL CONDITION											
Mainstem		D25	5.973	659.69			658.71			657.51			655.02		
Mainstem	WH 061		5.972	659.66	659.64	-0.02	658.69	658.64	-0.05	657.48	657.44	-0.04	654.96	654.95	-0.01
Mainstem		D24	5.959	659.62	659.60	-0.02	658.65	658.60	-0.05	657.42	657.40	-0.02	654.95	654.93	-0.02
Mainstem		D23	5.950	659.59	659.58	-0.01	658.63	658.58	-0.05	657.39	657.36	-0.03	654.91	654.89	-0.02
Mainstem		D22	5.914	659.44	659.43	-0.01	658.53	658.48	-0.05	657.29	657.27	-0.02	654.83	654.81	-0.02
Mainstem			5.911	Kirie Plant Entrance											
Mainstem		D21	5.899	658.50	658.41	-0.09	657.22	657.14	-0.08	656.25	656.24	-0.01	654.27	654.25	-0.02
Mainstem			5.86375*	658.46	658.38	-0.08	657.26	657.18	-0.08	656.27	656.24	-0.03	654.19	654.16	-0.03
Mainstem			5.5285*	658.37	658.28	-0.09	657.18	657.09	-0.09	656.17	656.13	-0.04	654.05	654.03	-0.02
Mainstem			5.79325*	658.28	658.18	-0.10	657.09	656.99	-0.10	656.06	656.03	-0.03	653.92	653.90	-0.02
Mainstem		D20	5.758	658.19	658.08	-0.11	656.99	656.89	-0.10	655.96	655.92	-0.04	653.80	653.77	-0.03
Mainstem			5.721	Wille Road											

PERMIT Table 2. (cont'd)

WSEL comparison of Modified Existing Model vs. 'Natural' Model

Higgins Creek Tributary A and Higgins Creek (all NAVD88) PERMIT MODELS															
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.
Mainstem	"Just d/s of Wille Rd." [1]	D19	5.683	656.96	656.59	-0.37	655.25	655.12	-0.13	654.54	654.47	-0.07	653.10	653.06	-0.04
Mainstem		D18	5.650	656.81	656.40	-0.41	655.24	655.10	-0.14	654.50	654.43	-0.07	653.03	652.99	-0.04
Mainstem	WH 056		5.649	656.80	656.39	-0.41	655.23	655.10	-0.13	654.50	654.43	-0.07	653.03	652.99	-0.04
Mainstem		D17	5.593	656.66	656.20	-0.46	655.05	654.90	-0.15	654.30	654.23	-0.07	652.88	652.83	-0.05
Mainstem	TAR 35		5.558	656.46	655.95	-0.51	654.82	654.65	-0.17	654.04	653.95	-0.09	652.63	652.57	-0.06
Mainstem		D16	5.500	656.14	655.53	-0.61	654.41	654.19	-0.22	653.57	653.45	-0.12	652.20	652.12	-0.08
Mainstem	TAR 34		5.496	656.11	655.48	-0.63	654.34	654.11	-0.23	653.49	653.36	-0.13	652.13	652.05	-0.08
Mainstem		D15	5.409	655.83	655.04	-0.79	653.90	653.33	-0.57	652.66	652.43	-0.23	651.36	651.21	-0.15
Mainstem	TAR 33		5.408	655.82	655.03	-0.79	653.74	653.30	-0.44	652.63	652.39	-0.24	651.33	651.17	-0.16
			5.394*	655.82	655.03	-0.79	653.80	653.36	-0.44	652.68	652.44	-0.24	651.35	651.18	-0.17
Mainstem			5.378	655.79			653.76			652.61			651.28		
Mainstem		D14	5.377	655.75			653.74			652.60			651.28		
Mainstem			5.364	I-90 (Jane Addams Tollway) - REMOVED FOR NATURAL CONDITION											
Mainstem		D13	5.352	655.49			653.47			652.28			651.01		
Mainstem			5.351	655.50			653.48			652.28			651.00		
Mainstem	J - TAR 33		5.340	655.46			653.41			652.16			650.88		
			5.335*	655.43	654.81	-0.62	653.35	653.06	-0.29	652.07	652.01	-0.06	650.80	650.79	-0.01
Mainstem		D12	5.324	655.37	654.73	-0.64	653.27	652.97	-0.30	651.95	651.88	-0.07	650.69	650.67	-0.02
Mainstem	TAR 31		5.289	655.34	654.69	-0.65	653.21	652.88	-0.33	651.83	651.75	-0.08	650.56	650.55	-0.01
Mainstem		D11	5.256	655.24	654.55	-0.69	653.07	652.71	-0.36	651.60	651.51	-0.09	650.35	650.34	-0.01
Mainstem	I - TAR 30		5.236	655.17	654.46	-0.71	652.97	652.60	-0.37	651.45	651.34	-0.11	650.21	650.19	-0.02
Mainstem	TAR 29		5.184	655.14	654.36	-0.78	652.81	652.40	-0.41	651.15	651.02	-0.13	649.92	649.89	-0.03
Mainstem		D10	5.166	655.13	654.33	-0.80	652.76	652.33	-0.43	651.05	650.91	-0.14	649.82	649.80	-0.02
Mainstem	TAR 28		5.144	655.11	654.28	-0.83	652.69	652.24	-0.45	650.91	650.76	-0.15	649.70	649.67	-0.03
Mainstem	H - TAR 27		5.094	655.08	654.20	-0.88	652.58	652.10	-0.48	650.69	650.52	-0.17	649.50	649.47	-0.03
Mainstem		D9	5.049	655.05	654.13	-0.92	652.47	651.97	-0.50	650.49	650.29	-0.20	649.33	649.29	-0.04
Mainstem	TAR 26		5.045	655.05	654.13	-0.92	652.52	652.02	-0.50	650.57	650.37	-0.20	649.37	649.33	-0.04
Mainstem			5.020	655.04	654.09	-0.95	652.44	651.93	-0.51	650.49	650.29	-0.20	649.29	649.25	-0.04
Mainstem			5.012	MWRD TAR Crossing at Cell 1											
Mainstem			5.005	655.05	653.25	-1.80	650.93	650.44	-0.49	649.68	649.49	-0.19	648.86	648.81	-0.05
Mainstem	TAR 25		4.992	655.04	653.24	-1.80	650.96	650.47	-0.49	649.70	649.51	-0.19	648.86	648.82	-0.04
Mainstem		D8	4.980	655.03	653.07	-1.96	650.86	650.34	-0.52	649.60	649.40	-0.20	648.77	648.73	-0.04
Mainstem	TAR 24		4.966	655.02	653.92	-1.10	650.69	650.11	-0.58	649.44	649.21	-0.23	648.62	648.57	-0.05
Mainstem	TAR 23		4.944	655.02	653.78	-1.24	650.57	649.95	-0.62	649.31	649.06	-0.25	648.50	648.45	-0.05
Mainstem		D7	4.928	655.00	653.74	-1.26	650.51	649.86	-0.65	649.24	648.98	-0.26	648.43	648.38	-0.05
Mainstem	G - TAR 22		4.925	655.00	652.67	-2.33	650.46	649.78	-0.68	649.18	648.91	-0.27	648.38	648.32	-0.06
Mainstem	F - TAR 21		4.915	655.00	653.76	-1.24	650.50	649.82	-0.68	649.21	648.93	-0.28	648.38	648.32	-0.06
Mainstem	TAR 20		4.885	654.99	653.70	-1.29	650.38	649.64	-0.74	649.07	648.77	-0.30	648.25	648.18	-0.07
Mainstem	TAR 19		4.866	654.98	652.64	-2.34	650.30	649.51	-0.79	648.97	648.64	-0.33	648.15	648.08	-0.07
Mainstem	TAR 18		4.847	654.97	652.61	-2.36	650.24	649.40	-0.84	648.90	648.54	-0.36	648.07	647.99	-0.08
Mainstem	E - TAR 17		4.828	654.96	652.57	-2.39	650.19	649.33	-0.86	648.85	648.48	-0.37	648.01	647.93	-0.08
Mainstem	TAR 16		4.801	654.94	652.48	-2.46	650.07	649.11	-0.96	648.70	648.29	-0.41	647.86	647.77	-0.09

PERMIT Table 2. (cont'd)

WSEL comparison of Modified Existing Model vs. 'Natural' Model

Higgins Creek Tributary A and Higgins Creek (all NAVD88) PERMIT MODELS														
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.
Mainstem	TAR 15		4.783	654.93	652.43	-2.50	650.01	648.99	-1.02	648.62	648.18	-0.44	647.78	647.68	-0.10
Mainstem	TAR 14		4.774	654.93	652.40	-2.53	649.96	648.91	-1.05	648.57	648.10	-0.47	647.71	647.61	-0.10
Mainstem		D6	4.771	654.92	652.37	-2.55	649.95	648.89	-1.06	648.56	648.09	-0.47	647.71	647.61	-0.10
Mainstem	TAR 13		4.76	654.91	652.34	-2.57	649.90	648.79	-1.11	648.50	648.00	-0.50	647.65	647.54	-0.11
Mainstem	TAR 12		4.742	654.90	652.29	-2.61	649.84	648.66	-1.18	648.41	647.87	-0.54	647.55	647.43	-0.12
Mainstem	TAR 11		4.713	654.89	652.20	-2.69	649.71	648.31	-1.40	648.22	647.55	-0.67	647.33	647.18	-0.15
Mainstem	D - TAR 10		4.698	654.89	652.19	-2.70	649.68	648.21	-1.47	648.17	647.43	-0.74	647.25	647.09	-0.16
Mainstem		D5	4.694	654.87	652.06	-2.81	649.58	648.03	-1.55	648.08	647.32	-0.76	647.19	647.03	-0.16
Mainstem	TAR 9		4.683	654.89	652.20	-2.69	649.68	648.23	-1.45	648.17	647.45	-0.72	647.26	647.10	-0.16
Mainstem			4.678	654.89	652.11	-2.78	649.60	648.13	-1.47	648.07	647.33	-0.74	647.15	646.98	-0.17
Mainstem			4.673	MWRD Crossing at TAR Cell 2											
Mainstem			4.668	654.89	650.44	-4.45	648.65	647.20	-1.45	647.21	646.42	-0.79	646.20	645.62	-0.58
Mainstem	TAR 8		4.664	654.84	649.87	-4.97	648.61	647.13	-1.48	647.23	646.44	-0.79	646.23	645.65	-0.58
Mainstem		D4	4.659	654.85	650.04	-4.81	648.65	647.20	-1.45	647.26	646.49	-0.77	646.26	645.69	-0.57
Mainstem			4.639	654.82	649.99	-4.83	648.60	647.09	-1.51	647.21	646.40	-0.81	646.19	645.68	-0.51
Mainstem		D3	4.638	654.80	649.99	-4.81	648.60	647.10	-1.50	647.21	646.41	-0.80	646.19	645.59	-0.60
Mainstem			4.626	IL 72 (Touhy Avenue) / RR - REMOVED FOR NATURAL CONDITION											
Mainstem			4.612	653.44	649.55	-3.89	648.13	646.81	-1.32	646.82	646.20	-0.62	645.48	645.22	-0.26
Mainstem		D2	4.611	653.46	649.78	-3.68	648.17	646.86	-1.31	646.84	646.22	-0.62	645.51	645.19	-0.32
Mainstem	TAR 7		4.588	653.40	649.54	-3.86	648.09	646.61	-1.48	646.74	646.03	-0.71	645.12	644.29	-0.83
Mainstem		D1	4.569	653.42	649.58	-3.84	648.10	646.64	-1.46	646.75	646.05	-0.70	645.16	644.40	-0.76
Mainstem	TAR 6		4.542	653.41	649.55	-3.86	648.09	646.62	-1.47	646.74	646.04	-0.70	645.14	644.37	-0.77
Mainstem			4.537	653.37	649.54	-3.83	648.02	646.61	-1.41	646.69	646.04	-0.65	645.08	644.36	-0.72
Mainstem			4.521	Mt. Prospect Road / O'Hare Employee Entrance - REMOVED FOR NATURAL CONDITION											
Mainstem			4.505	649.55	649.54	-0.01	646.58	646.61	0.03	646.02	646.03	0.01	644.33	644.35	0.02
Mainstem	C[2]		4.485	649.57	649.57	0.00	646.62	646.62	0.00	646.04	646.04	0.00	644.36	644.36	0.00

Notes:

1. From Federal Register, Vol. 73, No. 47 / Monday, March 10, 2008, p. 12648. See Section 7 of Report.

"*" indicates that the cross section was interpolated

DESIGN Table 2. **WSEL comparison of Modified Existing Model vs. 'Natural' Model - DESIGN**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) DESIGN MODELS																
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS XSEC	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.
CUP			*6*	*IL 72 (Higgins Road)*											
CUP	*281A*		*5.999*	*664.67*	*664.67*	*0.00*	*664.32*	*664.32*	*0.00*	*664.15*	*664.15*	*0.00*	*663.63*	*663.64*	*0.01*
CUP	*281AA*		*5*	*662.82*	*662.82*	*0.00*	*662.58*	*662.58*	*0.00*	*662.43*	*662.44*	*0.01*	*662.08*	*662.08*	*0.00*
CUP		*C7*	*4.1*	*660.61*	*659.70*	*-0.91*	*659.15*	*658.21*	*-0.94*	*657.94*	*657.39*	*-0.55*	*656.77*	*656.59*	*-0.18*
CUP		*C6*	*3.8*	*660.61*	*659.70*	*-0.91*	*659.15*	*658.21*	*-0.94*	*657.93*	*657.37*	*-0.56*	*656.75*	*656.57*	*-0.18*
CUP		*C5*	*3.5*	*660.60*	*659.69*	*-0.91*	*659.14*	*658.19*	*-0.95*	*657.92*	*657.35*	*-0.57*	*656.73*	*656.54*	*-0.19*
CUP		*C4*	*3.1*	*660.59*	*659.67*	*-0.92*	*659.13*	*658.17*	*-0.96*	*657.90*	*657.31*	*-0.59*	*656.69*	*656.50*	*-0.19*
CUP			*3.01**	*660.59*	*659.66*	*-0.93*	*659.12*	*658.15*	*-0.97*	*657.88*	*657.29*	*-0.59*	*656.67*	*656.48*	*-0.19*
CUP	*280*		*3*	*660.57*			*659.10*			*657.86*			*656.65*		
CUP			*2.3*	*660.53*			*659.07*			*657.83*			*656.64*		
CUP			*2*	*I-90 (Jane Addams Tollway) - REMOVED FOR NATURAL COND.*											
CUP	*"Just d/s of I-90" [1]*		*1.7*	*659.75*			*658.60*			*657.46*			*656.46*		
CUP	*280AA*		*1*	*659.76*	*659.67*	*-0.09*	*658.60*	*658.16*	*-0.44*	*657.45*	*657.29*	*-0.16*	*656.44*	*656.48*	*0.04*
2	**"Just d/s of Hamilton Road" [1]**	**D33**	**6.443**	660.12	660.01	-0.11	659.16	658.87	-0.29	658.39	658.30	-0.09	657.52	657.52	0.00
2	**WH 065**		**6.404**	660.00	659.88	-0.12	658.97	658.62	-0.35	658.07	657.95	-0.12	657.12	657.12	0.00
2		**D32**	**6.353**	659.87	659.75	-0.12	658.77	658.35	-0.42	657.75	657.59	-0.16	656.77	656.77	0.00
2			**6.287**	659.80	659.67	-0.13	658.63	658.15	-0.48	657.49	657.29	-0.20	656.47	656.47	0.00
Mainstem	**WH 064**		**6.245**	659.76	659.63	-0.13	658.60	658.11	-0.49	657.45	657.24	-0.21	656.43	656.43	0.00
Mainstem		**D31**	**6.231**	659.77	659.63	-0.14	658.61	658.12	-0.49	657.46	657.25	-0.21	656.44	656.44	0.00
Mainstem		**D30**	**6.179**	659.65	659.51	-0.14	658.51	657.99	-0.52	657.32	657.09	-0.23	656.33	656.33	0.00
Mainstem		**D29**	**6.069**	659.62	659.48	-0.14	658.48	657.95	-0.53	657.27	657.03	-0.24	656.27	656.27	0.00
Mainstem			**6.035**	659.61	659.46	-0.15	658.46	657.91	-0.55	657.20	656.94	-0.26	656.19	656.19	0.00
Mainstem			**6.034**	659.49	659.33	-0.16	658.33	657.70	-0.63	657.79	656.18	-1.61	655.25	655.25	0.00
Mainstem			**6.033**	659.56	659.40	-0.16	658.40	657.83	-0.57	657.04	656.64	-0.40	654.60	654.60	0.00
Mainstem			**6.032**	659.60	659.45	-0.15	658.44	657.88	-0.56	657.11	656.73	-0.38	654.82	654.32	-0.50
Mainstem	**WH 062**		**6.021**	659.51	659.35	-0.16	658.36	657.77	-0.59	656.97	656.54	-0.43	654.54	653.91	-0.63
Mainstem		**D28**	**6.006**	659.50	659.34	-0.16	658.35	657.76	-0.59	656.97	656.55	-0.42	654.54	653.91	-0.63
Mainstem			**5.9994***	659.49	659.33	-0.16	658.34	657.75	-0.59	656.96	656.54	-0.42	654.52	653.88	-0.64
Mainstem			**5.9950***	659.49	659.33	-0.16	658.34	657.75	-0.59	656.95	656.53	-0.42	654.51	653.87	-0.64
Mainstem			**5.9928***	659.49			658.34			656.93			654.51		
Mainstem			**5.981**	**Elmhurst Road - REMOVED FOR NATURAL CONDITION**											
Mainstem		**D25**	**5.973**	659.43			657.83			656.57			653.88		
Mainstem	**WH 061**		**5.972**	659.33	659.31	-0.02	657.73	657.72	-0.01	656.41	656.45	0.04	653.75	653.74	-0.01
Mainstem		**D24**	**5.959**	659.28	659.26	-0.02	657.71	657.68	-0.03	656.44	656.44	0.00	653.77	653.76	-0.01
Mainstem		**D23**	**5.950**	659.25	659.23	-0.02	657.69	657.66	-0.03	656.42	656.41	-0.01	653.74	653.74	0.00
Mainstem		**D22**	**5.914**	659.19	659.15	-0.04	657.66	657.62	-0.04	656.40	656.40	0.00	653.71	653.71	0.00
Mainstem			**5.911**	**Kirie Plant Entrance**											
Mainstem		**D21**	**5.899**	657.74	657.62	-0.12	656.12	656.06	-0.06	655.03	655.02	-0.01	652.85	652.84	-0.01
Mainstem			**5.86375***	657.81	657.69	-0.12	656.29	656.22	-0.07	655.16	655.15	-0.01	652.88	652.87	-0.01
Mainstem			**5.5285***	657.80	657.67	-0.13	656.26	656.20	-0.06	655.13	655.12	-0.01	652.83	652.82	-0.01
Mainstem			**5.79325***	657.78	657.65	-0.13	656.24	656.18	-0.06	655.10	655.09	-0.01	652.78	652.78	0.00
Mainstem		**D20**	**5.758**	657.75	657.63	-0.12	656.22	656.16	-0.06	655.07	655.06	-0.01	652.74	652.74	0.00
Mainstem			**5.721**	**Wille Road**											

DESIGN Table 2. (cont'd) **WSEL comparison of Modified Existing Model vs. 'Natural' Model - DESIGN**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) DESIGN MODELS															
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.
Mainstem	"Just d/s of Wille Rd." [1]	D19	5.683	655.43	654.82	-0.61	653.57	653.33	-0.24	652.66	652.62	-0.04	651.51	651.50	-0.01
Mainstem		D18	5.650	655.68	655.09	-0.59	653.70	653.46	-0.24	652.74	652.70	-0.04	651.52	651.51	-0.01
Mainstem	WH 056		5.649	655.68	655.09	-0.59	653.71	653.46	-0.25	652.75	652.71	-0.04	651.52	651.51	-0.01
Mainstem		D17	5.593	655.65	655.04	-0.61	653.65	653.40	-0.25	652.68	652.64	-0.04	651.47	651.46	-0.01
Mainstem	TAR 35		5.558	655.50	654.86	-0.64	653.44	653.15	-0.29	652.37	652.32	-0.05	651.15	651.13	-0.02
Mainstem		D16	5.500	655.38	654.63	-0.75	653.22	652.88	-0.34	652.06	652.00	-0.06	650.89	650.87	-0.02
Mainstem	TAR 34		5.496	655.34	654.55	-0.79	653.14	652.78	-0.36	651.92	651.84	-0.08	650.75	650.73	-0.02
Mainstem		D15	5.409	655.33	654.55	-0.78	653.02	652.63	-0.39	651.72	651.62	-0.10	650.55	650.52	-0.03
Mainstem	TAR 33		5.408	655.33	654.54	-0.79	653.00	652.59	-0.41	651.66	651.56	-0.10	650.49	650.46	-0.03
Mainstem			5.394*	655.40	654.63	-0.77	653.11	652.73	-0.38	651.80	651.71	-0.09	650.58	650.56	-0.02
Mainstem			5.378	655.35			653.02			651.63			650.42		
Mainstem		D14	5.377	655.31			653.00			651.63			650.42		
Mainstem			5.364	I-90 (Jane Addams Tollway) - REMOVED FOR NATURAL CONDITION											
Mainstem		D13	5.352	655.18			652.89			651.49			650.30		
Mainstem			5.351	655.19			652.90			651.50			650.30		
Mainstem	J - TAR 33		5.340	655.18			652.87			651.44			650.24		
Mainstem			5.335*	655.17	654.48	-0.69	652.85	652.45	-0.40	651.40	651.30	-0.10	650.20	650.18	-0.02
Mainstem		D12	5.324	655.12	654.41	-0.71	652.78	652.37	-0.41	651.28	651.17	-0.11	650.09	650.06	-0.03
Mainstem	TAR 31		5.289	655.12	654.40	-0.72	652.76	652.33	-0.43	651.21	651.10	-0.11	650.01	649.99	-0.02
Mainstem		D11	5.256	655.05	654.31	-0.74	652.65	652.18	-0.47	651.00	650.87	-0.13	649.82	649.79	-0.03
Mainstem	I - TAR 30		5.236	655.00	654.24	-0.76	652.58	652.10	-0.48	650.87	650.73	-0.14	649.69	649.66	-0.03
Mainstem	TAR 29		5.184	655.01	654.19	-0.82	652.49	651.99	-0.50	650.69	650.52	-0.17	649.51	649.47	-0.04
Mainstem		D10	5.166	655.01	654.18	-0.83	652.47	651.95	-0.52	650.62	650.45	-0.17	649.45	649.40	-0.05
Mainstem	TAR 28		5.144	655.01	654.15	-0.86	652.42	651.89	-0.53	650.53	650.35	-0.18	649.37	649.32	-0.05
Mainstem	H - TAR 27		5.094	655.00	654.12	-0.88	652.38	651.83	-0.55	650.43	650.23	-0.20	649.27	649.21	-0.06
Mainstem		D9	5.049	654.99	654.08	-0.91	652.32	651.76	-0.56	650.31	650.09	-0.22	649.17	649.11	-0.06
Mainstem	TAR 26		5.045	654.99	654.08	-0.91	652.37	651.82	-0.55	650.40	650.19	-0.21	649.22	649.16	-0.06
Mainstem			5.020	654.98	654.06	-0.92	652.30	651.74	-0.56	650.34	650.13	-0.21	649.17	649.11	-0.06
Mainstem			5.012	MWRD TAR Crossing at Cell 1											
Mainstem			5.005	654.99	653.08	-1.91	650.80	650.25	-0.55	649.54	649.33	-0.21	648.72	648.68	-0.04
Mainstem	TAR 25		4.992	654.99	653.07	-1.92	650.83	650.29	-0.54	649.57	649.36	-0.21	648.74	648.70	-0.04
Mainstem		D8	4.980	654.98	652.91	-2.07	650.74	650.17	-0.57	649.47	649.26	-0.21	648.65	648.61	-0.04
Mainstem	TAR 24		4.966	654.97	652.78	-2.19	650.59	649.97	-0.62	649.33	649.09	-0.24	648.52	648.48	-0.04
Mainstem	TAR 23		4.944	654.97	652.69	-2.28	650.53	649.89	-0.64	649.27	649.02	-0.25	648.47	648.42	-0.05
Mainstem		D7	4.928	654.97	652.68	-2.29	650.49	649.83	-0.66	649.22	648.97	-0.25	648.42	648.37	-0.05
Mainstem	G - TAR 22		4.925	654.97	652.61	-2.36	650.44	649.74	-0.70	649.16	648.90	-0.26	648.36	648.31	-0.05
Mainstem	F - TAR 21		4.915	654.96	652.70	-2.26	650.48	649.79	-0.69	649.19	648.92	-0.27	648.37	648.32	-0.05
Mainstem	TAR 20		4.885	654.96	652.64	-2.32	650.36	649.61	-0.75	649.05	648.75	-0.30	648.23	648.17	-0.06
Mainstem	TAR 19		4.866	654.95	652.57	-2.38	650.28	649.47	-0.81	648.95	648.63	-0.32	648.14	648.07	-0.07
Mainstem	TAR 18		4.847	654.94	652.54	-2.40	650.22	649.36	-0.86	648.87	648.53	-0.34	648.05	647.98	-0.07
Mainstem	E - TAR 17		4.828	654.94	652.50	-2.44	650.17	649.28	-0.89	648.83	648.47	-0.36	648.00	647.93	-0.07
Mainstem	TAR 16		4.801	654.93	652.41	-2.52	650.04	649.06	-0.98	648.68	648.27	-0.41	647.85	647.76	-0.09

DESIGN Table 2. (cont'd) **WSEL comparison of Modified Existing Model vs. 'Natural' Model - DESIGN**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) DESIGN MODELS														
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.	Mod. Ex. Cond.	Natural Cond.	Diff.
Mainstem	TAR 15		4.783	654.92	652.35	-2.57	649.98	648.94	-1.04	648.60	648.16	-0.44	647.76	647.67	-0.09
Mainstem	TAR 14		4.774	654.91	652.31	-2.60	649.93	648.85	-1.08	648.54	648.07	-0.47	647.70	647.60	-0.10
Mainstem		D6	4.771	654.91	652.29	-2.62	649.92	648.83	-1.09	648.53	648.06	-0.47	647.69	647.60	-0.09
Mainstem	TAR 13		4.76	654.91	652.26	-2.65	649.87	648.73	-1.14	648.47	647.98	-0.49	647.63	647.53	-0.10
Mainstem	TAR 12		4.742	654.90	652.20	-2.70	649.81	648.59	-1.22	648.38	647.84	-0.54	647.53	647.42	-0.11
Mainstem	TAR 11		4.713	654.89	652.11	-2.78	649.67	648.22	-1.45	648.18	647.51	-0.67	647.31	647.17	-0.14
Mainstem	D - TAR 10		4.698	654.89	652.10	-2.79	649.64	648.11	-1.53	648.13	647.39	-0.74	647.22	647.07	-0.15
Mainstem		D5	4.694	654.87	651.96	-2.91	649.54	647.92	-1.62	648.04	647.28	-0.76	647.17	647.02	-0.15
Mainstem	TAR 9		4.683	654.89	652.11	-2.78	649.65	648.13	-1.52	648.13	647.42	-0.71	647.23	647.09	-0.14
Mainstem			4.678	654.89	652.01	-2.88	649.57	648.02	-1.55	648.03	647.30	-0.73	647.12	646.97	-0.15
Mainstem			4.673	MWRD Crossing at TAR Cell 2											
Mainstem			4.668	654.88	650.34	-4.54	648.62	647.10	-1.52	647.17	646.34	-0.83	646.13	645.48	-0.65
Mainstem	TAR 8		4.664	654.84	649.76	-5.08	648.57	647.02	-1.55	647.19	646.36	-0.83	646.16	645.51	-0.65
Mainstem		D4	4.659	654.84	649.94	-4.90	648.62	647.10	-1.52	647.22	646.40	-0.82	646.20	645.56	-0.64
Mainstem			4.639	654.81	649.88	-4.93	648.56	646.98	-1.58	647.17	646.32	-0.85	646.11	645.43	-0.68
Mainstem		D3	4.638	654.80	649.88	-4.92	648.56	646.99	-1.57	647.17	646.68	-0.49	646.12	645.44	-0.68
Mainstem			4.626	IL 72 (Touhy Avenue) / RR - REMOVED FOR NATURAL CONDITION											
Mainstem			4.612	653.43	649.45	-3.98	648.09	646.69	-1.40	646.77	646.11	-0.66	645.34	645.02	-0.32
Mainstem		D2	4.611	653.45	649.68	-3.77	648.13	646.76	-1.37	646.80	646.15	-0.65	645.37	645.01	-0.36
Mainstem	TAR 7		4.588	653.40	649.49	-3.91	648.07	646.57	-1.50	646.72	646.00	-0.72	645.08	644.18	-0.90
Mainstem		D1	4.569	653.41	649.54	-3.87	648.09	646.62	-1.47	646.74	646.04	-0.70	645.15	644.37	-0.78
Mainstem	TAR 6		4.542	653.41	649.53	-3.88	648.09	646.61	-1.48	646.74	646.03	-0.71	645.14	644.35	-0.79
Mainstem			4.537	653.37	649.52	-3.85	648.01	646.60	-1.41	646.69	646.03	-0.66	645.08	644.35	-0.73
Mainstem			4.521	Mt. Prospect Road / O'Hare Employee Entrance - REMOVED FOR NATURAL CONDITION											
Mainstem			4.505	649.54	649.53	-0.01	646.58	646.60	0.02	646.02	646.03	0.01	644.33	644.35	0.02
Mainstem	C[2]		4.485	649.57	649.57	0.00	646.62	646.62	0.00	646.04	646.04	0.00	644.36	644.36	0.00

Notes:

1. From Federal Register, Vol. 73, No. 47 / Monday, March 10, 2008, p. 12648. See Section 7 of Report.

"*" indicates that the cross section was interpolated

PERMIT Table 3. **WSEL comparison of Modified Existing Model vs. Proposed Model**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) PERMIT MODELS																
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)			
Creek Reach	FIS XSEC	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	
CUP			*6*	*IL 72 (Higgins Road)*												
CUP	*281A*		*5.999*	*664.67*	*664.67*	*0.00*	*664.32*	*664.32*	*0.00*	*664.15*	*664.15*	*0.00*	*663.63*	*663.63*	*0.00*	
CUP	*281AA*		*5*	*662.82*	*662.82*	*0.00*	*662.58*	*662.58*	*0.00*	*662.43*	*662.43*	*0.00*	*662.08*	*662.08*	*0.00*	
CUP		*C7*	*4.1*	*660.80*	*660.49*	*-0.31*	*659.68*	*659.40*	*-0.28*	*658.64*	*658.16*	*-0.48*	*656.77*	*656.68*	*-0.09*	
CUP		*C6*	*3.8*	*660.80*	*660.49*	*-0.31*	*659.68*	*659.39*	*-0.29*	*658.63*	*658.16*	*-0.47*	*656.75*	*656.66*	*-0.09*	
CUP		*C5*	*3.5*	*660.80*	*660.48*	*-0.32*	*659.68*	*659.38*	*-0.30*	*658.62*	*658.14*	*-0.48*	*656.73*	*656.64*	*-0.09*	
CUP		*C4*	*3.1*	*660.79*	*660.46*	*-0.33*	*659.67*	*659.36*	*-0.31*	*658.61*	*658.11*	*-0.50*	*656.69*	*656.59*	*-0.10*	
cup			*3.01**	*660.78*	*660.40*	*-0.38*	*659.66*	*659.31*	*-0.35*	*658.60*	*658.05*	*-0.55*	*656.68*	*656.52*	*-0.16*	
CUP	*280*		*3*	*660.77*			*659.65*			*658.58*			*656.65*			
CUP			*2.3*	*660.73*			*659.62*			*658.55*			*656.64*			
CUP			*2*	*I-90 (Jane Addams Tollway) - TWIN CULVERTS REPLACED*												
CUP	*"Just d/s of I-90" [1]*		*1.7*	*659.95*			*659.14*			*658.18*			*656.46*			
CUP	*280AA*		*1*	*659.96*	*660.13*	*0.17*	*659.14*	*659.16*	*0.02*	*658.18*	*657.93*	*-0.25*	*656.44*	*656.42*	*-0.02*	
2	"Just d/s of Hamilton Road" [1]	D33	6.443	660.23	660.47	0.24	659.48	659.58	0.10	658.72	658.67	-0.05	657.40	657.56	0.16	
2	WH 065		6.404	660.12	660.35	0.23	659.34	659.43	0.09	658.50	658.40	-0.10	656.93	657.13	0.20	
2		D32	6.353	660.01	660.25	0.24	659.20	659.30	0.10	658.29	658.17	-0.12	656.47	656.78	0.31	
2			6.287	659.94	660.20	0.26	659.11	659.21	0.10	658.13	658.00	-0.13	656.07	656.49	0.42	
Mainstem	WH 064		6.245	659.96	660.16	0.20	659.15	659.18	0.03	658.18	657.95	-0.23	656.44	656.43	-0.01	
Mainstem		D31	6.231	659.97	660.16	0.19	659.16	659.18	0.02	658.19	657.96	-0.23	656.45	656.44	-0.01	
Mainstem		D30	6.179	659.86	660.11	0.25	659.07	659.13	0.06	658.09	657.86	-0.23	656.33	656.33	0.00	
Mainstem		D29	6.069	659.84	660.06	0.22	659.06	659.10	0.04	658.06	657.82	-0.24	656.27	656.27	0.00	
Mainstem			6.035	659.82	660.02	0.20	659.04	659.07	0.03	658.03	657.76	-0.27	656.19	656.19	0.00	
Mainstem			6.034	659.72	659.86	0.14	658.96	658.94	-0.02	657.89	657.53	-0.36	655.24	655.24	0.00	
Mainstem			6.033	659.78	659.90	0.12	659.01	658.97	-0.04	657.97	657.61	-0.36	655.70	655.00	-0.70	
Mainstem			6.032	659.82	660.00	0.18	659.04	659.04	0.00	658.01	657.72	-0.29	655.79	655.39	-0.40	
Mainstem	WH 062		6.021	659.72	659.87	0.15	658.98	658.96	-0.02	657.93	657.59	-0.34	655.64	655.20	-0.44	
Mainstem		D28	6.006	659.72	659.87	0.15	658.97	658.96	-0.01	657.93	657.60	-0.33	655.65	655.20	-0.45	
Mainstem			5.9994*	659.71	659.85	0.14	658.96	658.94	-0.02	657.92	657.59	-0.33	655.64	655.19	-0.45	
Mainstem			5.9950*	659.71	659.86	0.15	658.96	658.95	-0.01	657.62	657.57	-0.05	655.63	655.18	-0.45	
Mainstem			5.9928*	659.71			658.96			657.90			655.63			
Mainstem			5.981	Elmhurst Road - EXISTING BRIDGE REPLACED												
Mainstem		D25	5.973	659.69			658.71			657.51			655.02			
Mainstem	WH 061		5.972	659.66	659.64	-0.02	658.69	658.67	-0.02	657.48	657.40	-0.08	654.96	654.95	-0.01	
Mainstem		D24	5.959	659.62	659.56	-0.06	658.65	658.62	-0.03	657.42	657.43	0.01	654.95	654.95	0.00	
Mainstem		D23	5.950	659.59	659.55	-0.04	658.63	658.60	-0.03	657.39	657.41	0.02	654.91	654.92	0.01	
Mainstem		D22	5.914	659.44	659.44	0.00	658.53	658.54	0.01	657.29	657.33	0.04	654.83	654.83	0.00	
Mainstem			5.911	Kirie Plant Entrance												
Mainstem		D21	5.899	658.50	658.50	0.00	657.22	657.23	0.01	656.25	656.28	0.03	654.27	654.28	0.01	
Mainstem			5.86375*	658.46	658.47	0.01	657.26	657.28	0.02	656.27	656.27	0.00	654.19	654.19	0.00	
Mainstem			5.5285*	658.37	658.37	0.00	657.18	657.19	0.01	656.17	656.17	0.00	654.05	654.06	0.01	
Mainstem			5.79325*	658.28	658.28	0.00	657.09	657.11	0.02	656.06	656.07	0.01	653.92	653.93	0.01	
Mainstem		D20	5.758	658.19	658.19	0.00	655.99	657.02	1.03	655.96	655.96	0.00	653.80	653.81	0.01	
Mainstem			5.721	Wille Road												

PERMIT Table 3. (cont'd)

WSEL comparison of Modified Existing Model vs. 'Proposed' Model

Higgins Creek Tributary A and Higgins Creek (all NAVD88) PERMIT MODELS																
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.
Mainstem	"Just d/s of Wille Rd." [1]	D19	5.683	656.96	657.03	0.07	655.25	655.27	0.02	654.54	654.54	0.00	653.10	653.10	0.00
Mainstem		D18	5.650	656.81	656.88	0.07	655.24	655.26	0.02	654.50	654.50	0.00	652.03	653.04	1.01
Mainstem	WH 056		5.649	656.80	656.88	0.08	655.23	655.26	0.03	654.50	654.50	0.00	653.03	653.04	0.01
Mainstem		D17	5.593	656.66	656.70	0.04	655.05	655.08	0.03	654.30	654.31	0.01	652.88	652.89	0.01
Mainstem	TAR 35		5.558	656.46	656.50	0.04	654.82	654.85	0.03	654.04	654.05	0.01	652.63	652.64	0.01
Mainstem		D16	5.500	656.14	656.12	-0.02	654.41	654.45	0.04	653.57	653.58	0.01	652.20	652.21	0.01
Mainstem	TAR 34		5.496	656.11	656.07	-0.04	654.34	654.38	0.04	653.49	653.50	0.01	652.13	652.14	0.01
Mainstem		D15	5.409	655.83	655.57	-0.26	653.90	653.76	-0.14	652.66	652.68	0.02	651.36	651.39	0.03
Mainstem	TAR 33		5.408	655.82	655.56	-0.26	653.74	653.74	0.00	652.63	652.64	0.01	651.33	651.36	0.03
			5.394*	655.82	655.69	-0.13	653.80	653.85	0.05	652.68	652.75	0.07	651.35	651.42	0.07
Mainstem			5.378	655.79			653.76			652.61			651.28		
Mainstem		D14	5.377	655.75			653.74			652.60			651.28		
Mainstem			5.364	I-90 (Jane Addams Tollway) - EXISTING BRIDGE EXTENDED											
Mainstem		D13	5.352	655.49			653.47			652.28			651.01		
Mainstem			5.351	655.50			653.48			652.28			651.00		
Mainstem	J - TAR 33		5.340	655.46			653.41			652.16			650.88		
			5.335*	655.43	655.27	-0.16	653.35	653.35	0.00	652.07	652.08	0.01	650.80	650.81	0.01
Mainstem		D12	5.324	655.37	655.22	-0.15	653.27	653.27	0.00	651.95	651.95	0.00	650.69	650.69	0.00
Mainstem	TAR 31		5.289	655.34	655.19	-0.15	653.21	653.21	0.00	651.83	651.83	0.00	650.56	650.56	0.00
Mainstem		D11	5.256	655.24	655.08	-0.16	653.07	653.07	0.00	651.60	651.60	0.00	650.35	650.35	0.00
Mainstem	I - TAR 30		5.236	655.17	655.01	-0.16	652.97	652.97	0.00	651.45	651.45	0.00	650.21	650.21	0.00
Mainstem	TAR 29		5.184	655.14	654.97	-0.17	652.81	652.81	0.00	651.15	651.15	0.00	649.92	649.92	0.00
Mainstem		D10	5.166	655.13	654.95	-0.18	652.76	652.76	0.00	651.05	651.05	0.00	649.82	649.83	0.01
Mainstem	TAR 28		5.144	655.11	654.93	-0.18	652.69	652.69	0.00	650.91	650.91	0.00	649.70	649.70	0.00
Mainstem	H - TAR 27		5.094	655.08	654.89	-0.19	652.58	652.58	0.00	650.69	650.69	0.00	649.50	649.50	0.00
Mainstem		D9	5.049	655.05	654.86	-0.19	652.47	652.47	0.00	650.49	650.49	0.00	649.33	649.33	0.00
Mainstem	TAR 26		5.045	655.05	654.86	-0.19	652.52	652.52	0.00	650.57	650.57	0.00	649.37	649.37	0.00
Mainstem			5.020	655.04	654.85	-0.19	652.44	652.44	0.00	650.49	650.49	0.00	649.29	649.29	0.00
Mainstem			5.012	MWRD TAR Crossing at Cell 1											
Mainstem			5.005	655.05	654.85	-0.20	650.93	650.93	0.00	649.68	649.68	0.00	648.86	648.86	0.00
Mainstem	TAR 25		4.992	655.04	654.84	-0.20	650.96	650.96	0.00	649.70	649.70	0.00	648.86	648.86	0.00
Mainstem		D8	4.980	655.03	654.82	-0.21	650.86	650.86	0.00	649.60	649.60	0.00	648.77	648.77	0.00
Mainstem	TAR 24		4.966	655.02	654.81	-0.21	650.69	650.69	0.00	649.44	649.44	0.00	648.62	648.62	0.00
Mainstem	TAR 23		4.944	655.02	654.80	-0.22	650.57	650.57	0.00	649.31	649.31	0.00	648.50	648.50	0.00
Mainstem		D7	4.928	655.00	654.78	-0.22	650.51	650.51	0.00	649.24	649.24	0.00	648.43	648.43	0.00
Mainstem	G - TAR 22		4.925	655.00	654.78	-0.22	650.46	650.46	0.00	649.18	649.18	0.00	648.38	648.38	0.00
Mainstem	F - TAR 21		4.915	655.00	654.78	-0.22	650.50	650.50	0.00	649.21	649.21	0.00	648.38	648.38	0.00
Mainstem	TAR 20		4.885	654.99	654.77	-0.22	650.38	650.38	0.00	649.07	649.07	0.00	648.25	648.25	0.00
Mainstem	TAR 19		4.866	654.98	654.75	-0.23	650.30	650.30	0.00	648.97	648.97	0.00	648.15	648.15	0.00
Mainstem	TAR 18		4.847	654.97	654.74	-0.23	650.24	650.24	0.00	648.90	648.90	0.00	648.07	648.07	0.00
Mainstem	E - TAR 17		4.828	654.96	654.73	-0.23	650.19	650.19	0.00	648.85	648.85	0.00	648.01	648.01	0.00
Mainstem	TAR 16		4.801	654.94	654.71	-0.23	650.07	650.07	0.00	648.70	648.70	0.00	647.86	647.86	0.00

PERMIT Table 3. (cont'd)

WSEL comparison of Modified Existing Model vs. 'Proposed' Model

Higgins Creek Tributary A and Higgins Creek (all NAVD88) PERMIT MODELS															
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.
Mainstem	TAR 15		4.783	654.93	654.70	-0.23	650.01	650.01	0.00	648.62	648.62	0.00	647.78	647.78	0.00
Mainstem	TAR 14		4.774	654.93	654.69	-0.24	649.96	649.96	0.00	648.57	648.57	0.00	647.71	647.72	0.01
Mainstem		D6	4.771	654.92	654.68	-0.24	649.95	649.95	0.00	648.56	648.56	0.00	647.71	647.71	0.00
Mainstem	TAR 13		4.76	654.91	654.67	-0.24	649.90	649.90	0.00	648.50	648.50	0.00	647.65	647.65	0.00
Mainstem	TAR 12		4.742	654.90	654.66	-0.24	649.84	649.84	0.00	648.41	648.41	0.00	647.55	647.55	0.00
Mainstem	TAR 11		4.713	654.89	654.65	-0.24	649.71	649.71	0.00	648.22	648.22	0.00	647.33	647.33	0.00
Mainstem	D - TAR 10		4.698	654.89	654.63	-0.26	649.68	649.68	0.00	648.17	648.17	0.00	647.25	647.25	0.00
Mainstem		D5	4.694	654.87	654.62	-0.25	649.58	649.58	0.00	648.08	648.08	0.00	647.19	647.19	0.00
Mainstem	TAR 9		4.683	654.89	654.65	-0.24	649.68	649.68	0.00	648.17	648.17	0.00	647.26	647.26	0.00
Mainstem			4.678	654.89	654.65	-0.24	649.60	649.61	0.01	648.07	648.07	0.00	647.15	647.15	0.00
Mainstem			4.673	MWRD Crossing at TAR Cell 2											
Mainstem			4.668	654.89	654.64	-0.25	648.65	648.65	0.00	647.21	647.21	0.00	646.20	646.20	0.00
Mainstem	TAR 8		4.664	654.84	654.59	-0.25	648.61	648.61	0.00	647.23	647.23	0.00	646.23	646.23	0.00
Mainstem		D4	4.659	654.85	654.60	-0.25	648.65	648.65	0.00	647.26	647.26	0.00	646.26	646.26	0.00
Mainstem			4.639	654.82	654.56	-0.26	648.60	648.60	0.00	647.21	647.21	0.00	646.19	646.19	0.00
Mainstem		D3	4.638	654.80	654.54	-0.26	648.60	648.60	0.00	647.21	647.21	0.00	646.19	646.19	0.00
Mainstem			4.626	IL 72 (Touhy Avenue) / RR - No change to RR OT or culvert. Touhy Ave. will be on an overpass.											
Mainstem			4.612	653.44	653.11	-0.33	648.13	648.14	0.01	646.82	646.82	0.00	645.48	645.49	0.01
Mainstem		D2	4.611	653.46	653.13	-0.33	648.17	648.18	0.01	646.84	646.84	0.00	645.51	645.51	0.00
Mainstem	TAR 7		4.588	653.40	653.07	-0.33	648.09	648.09	0.00	646.74	646.74	0.00	645.12	645.12	0.00
Mainstem		D1	4.569	653.42	653.09	-0.33	648.10	648.11	0.01	646.75	646.75	0.00	645.16	645.16	0.00
Mainstem	TAR 6		4.542	653.41	653.08	-0.33	648.09	648.10	0.01	646.74	646.74	0.00	645.14	645.14	0.00
Mainstem			4.537	653.37	652.95	-0.42	648.02	648.00	-0.02	646.69	646.68	-0.01	645.08	645.07	-0.01
Mainstem			4.521	Mt. Prospect Road / O'Hare Employee Entrance - EXISTING CULVERT, NEW PROFILE AND RELIEF CULVERT TO THE EAST											
Mainstem			4.505	649.55	649.44	-0.11	646.58	646.58	0.00	646.02	646.02	0.00	644.33	644.33	0.00
Mainstem	C[2]		4.485	649.57	649.57	0.00	646.62	646.62	0.00	646.04	646.04	0.00	644.36	644.36	0.00

Notes:

1. From Federal Register, Vol. 73, No. 47 / Monday, March 10, 2008, p. 12648. See Section 7 of Report.

"*" indicates that the cross section was interpolated

DESIGN Table 3. **WSEL comparison of Modified Existing Model vs. Proposed Model - DESIGN**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) DESIGN MODELS																
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS XSEC	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.
CUP			*6*	*IL 72 (Higgins Road)*											
CUP	*281A*		*5.999*	*664.67*	*664.67*	*0.00*	*664.32*	*664.32*	*0.00*	*664.15*	*664.15*	*0.00*	*663.63*	*663.63*	*0.00*
CUP	*281AA*		*5*	*662.82*	*662.83*	*0.01*	*662.58*	*662.58*	*0.00*	*662.43*	*662.44*	*0.01*	*662.08*	*662.08*	*0.00*
CUP		*C7*	*4.1*	*660.61*	*660.26*	*-0.35*	*659.15*	*658.49*	*-0.66*	*657.94*	*657.53*	*-0.41*	*656.77*	*656.68*	*-0.09*
CUP		*C6*	*3.8*	*660.61*	*660.26*	*-0.35*	*659.15*	*658.49*	*-0.66*	*657.93*	*657.52*	*-0.41*	*656.75*	*656.67*	*-0.08*
CUP		*C5*	*3.5*	*660.60*	*660.25*	*-0.35*	*659.14*	*658.47*	*-0.67*	*657.92*	*657.50*	*-0.42*	*656.73*	*656.64*	*-0.09*
CUP		*C4*	*3.1*	*660.59*	*660.23*	*-0.36*	*659.13*	*658.44*	*-0.69*	*657.90*	*657.44*	*-0.46*	*656.69*	*656.59*	*-0.10*
CUP			*3.01**	*660.59*	*660.16*	*-0.43*	*659.12*	*658.37*	*-0.75*	*657.88*	*657.36*	*-0.52*	*656.67*	*656.52*	*-0.15*
CUP	*280*		*3*	*660.57*			*659.10*			*657.86*			*656.65*		
CUP			*2.3*	*660.53*			*659.07*			*657.83*			*656.64*		
CUP			*2*	*I-90 (Jane Addams Tollway) - TWIN CULVERTS REPLACED*											
CUP	*"Just d/s of I-90" [1]*		*1.7*	*659.75*			*658.60*			*657.46*			*656.46*		
CUP	*280AA*		*1*	*659.76*	*659.90*	*0.14*	*658.60*	*658.23*	*-0.37*	*657.45*	*657.21*	*-0.24*	*656.44*	*656.42*	*-0.02*
2	"Just d/s of Hamilton Road" [1]	D33	6.443	660.12	660.28	0.16	659.16	658.99	-0.17	658.39	658.35	-0.04	657.52	657.56	0.04
2	WH 065		6.404	660.00	660.15	0.15	658.97	658.73	-0.24	658.07	657.96	-0.11	657.12	657.13	0.01
2		D32	6.353	659.87	660.04	0.17	658.77	658.49	-0.28	657.75	657.61	-0.14	656.77	656.78	0.01
2			6.287	659.80	659.97	0.17	658.63	658.31	-0.32	657.49	657.31	-0.18	656.47	656.49	0.02
Mainstem	WH 064		6.245	659.76	659.92	0.16	658.60	658.25	-0.35	657.45	657.23	-0.22	656.43	656.43	0.00
Mainstem		D31	6.231	659.77	659.93	0.16	658.61	658.26	-0.35	657.46	657.25	-0.21	656.44	656.44	0.00
Mainstem		D30	6.179	659.65	659.87	0.22	658.51	658.16	-0.35	657.32	657.09	-0.23	656.33	656.33	0.00
Mainstem		D29	6.069	659.62	659.82	0.20	658.48	658.12	-0.36	657.27	657.03	-0.24	656.27	656.27	0.00
Mainstem			6.035	659.61	659.77	0.16	658.46	658.06	-0.40	657.20	656.93	-0.27	656.19	656.19	0.00
Mainstem			6.034	659.49	659.59	0.10	658.33	657.81	-0.52	657.79	656.17	-1.62	655.25	655.24	-0.01
Mainstem			6.033	659.56	659.64	0.08	658.40	657.89	-0.51	657.04	656.50	-0.54	654.60	654.76	0.16
Mainstem			6.032	659.60	659.74	0.14	658.44	658.01	-0.43	657.11	656.71	-0.40	654.82	654.37	-0.45
Mainstem	WH 062		6.021	659.51	659.61	0.10	658.36	657.87	-0.49	656.97	656.50	-0.47	654.54	653.99	-0.55
Mainstem		D28	6.006	659.50	659.61	0.11	658.35	657.88	-0.47	656.97	656.51	-0.46	654.54	653.99	-0.55
Mainstem			5.9994*	659.49	659.59	0.10	658.34	657.86	-0.48	656.96	656.50	-0.46	654.52	653.96	-0.56
Mainstem			5.9950*	659.49	659.60	0.11	658.34	657.84	-0.50	656.95	656.44	-0.51	654.51	653.95	-0.56
Mainstem			5.9928*	659.49			658.34			656.93			654.51		
Mainstem			5.981	Elmhurst Road - EXISTING BRIDGE REPLACED											
Mainstem		D25	5.973	659.43			657.83			656.57			653.88		
Mainstem	WH 061		5.972	659.33	659.25	-0.08	657.73	657.61	-0.12	656.41	656.25	-0.16	653.75	653.72	-0.03
Mainstem		D24	5.959	659.28	659.22	-0.06	657.71	657.67	-0.04	656.44	656.42	-0.02	653.77	653.74	-0.03
Mainstem		D23	5.950	659.25	659.20	-0.05	657.69	657.66	-0.03	656.42	656.40	-0.02	653.74	653.72	-0.02
Mainstem		D22	5.914	659.19	659.18	-0.01	657.66	657.63	-0.03	656.40	656.39	-0.01	653.71	653.69	-0.02
Mainstem			5.911	Kirie Plant Entrance											
Mainstem		D21	5.899	657.74	657.68	-0.06	656.12	656.09	-0.03	655.03	655.00	-0.03	652.85	652.81	-0.04
Mainstem			5.86375*	657.81	657.76	-0.05	656.29	656.25	-0.04	655.16	655.13	-0.03	652.88	652.84	-0.04
Mainstem			5.5285*	657.80	657.74	-0.06	656.26	656.23	-0.03	655.13	655.10	-0.03	652.83	652.79	-0.04
Mainstem			5.79325*	657.78	657.72	-0.06	656.24	656.21	-0.03	655.10	655.07	-0.03	652.78	652.74	-0.04
Mainstem		D20	5.758	657.75	657.70	-0.05	656.22	656.19	-0.03	655.07	655.04	-0.03	652.74	652.70	-0.04
Mainstem			5.721	Wille Road											

DESIGN Table 3. (cont'd) **WSEL comparison of Modified Existing Model vs. Proposed Model - DESIGN**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) DESIGN MODELS															
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.
Mainstem	"Just d/s of Wille Rd." [1]	D19	5.683	655.43	655.16	-0.27	653.57	653.45	-0.12	652.66	652.55	-0.11	651.51	651.43	-0.08
Mainstem		D18	5.650	655.68	655.42	-0.26	653.70	653.58	-0.12	652.74	652.63	-0.11	651.52	651.44	-0.08
Mainstem	WH 056		5.649	655.68	655.42	-0.26	653.71	653.58	-0.13	652.75	652.63	-0.12	651.52	651.44	-0.08
Mainstem		D17	5.593	655.65	655.38	-0.27	653.65	653.52	-0.13	652.68	652.56	-0.12	651.47	651.38	-0.09
Mainstem	TAR 35		5.558	655.50	655.23	-0.27	653.44	653.29	-0.15	652.37	652.23	-0.14	651.15	651.03	-0.12
Mainstem		D16	5.500	655.38	655.03	-0.35	653.22	653.05	-0.17	652.06	651.87	-0.19	650.89	650.74	-0.15
Mainstem	TAR 34		5.496	655.34	654.97	-0.37	653.14	652.95	-0.19	651.92	651.69	-0.23	650.75	650.57	-0.18
Mainstem		D15	5.409	655.33	654.90	-0.43	653.02	652.82	-0.20	651.72	651.44	-0.28	650.55	650.31	-0.24
Mainstem	TAR 33		5.408	655.33	654.89	-0.44	653.00	652.79	-0.21	651.66	651.36	-0.30	650.49	650.23	-0.26
Mainstem			5.394*	655.40	655.08	-0.32	653.11	652.99	-0.12	651.80	651.63	-0.17	650.58	650.42	-0.16
Mainstem			5.378	655.35			653.02			651.63			650.42		
Mainstem		D14	5.377	655.31			653.00			651.63			650.42		
Mainstem			5.364	I-90 (Jane Addams Tollway) - EXISTING BRIDGE EXTENDED											
Mainstem		D13	5.352	655.18			652.89			651.49			650.30		
Mainstem			5.351	655.19			652.90			651.50			650.30		
Mainstem	J - TAR 33		5.340	655.18			652.87			651.44			650.24		
Mainstem			5.335*	655.17	654.98	-0.19	652.85	652.86	0.01	651.40	651.41	0.01	650.20	650.21	0.01
Mainstem		D12	5.324	655.12	654.94	-0.18	652.78	652.78	0.00	651.28	651.28	0.00	650.09	650.09	0.00
Mainstem	TAR 31		5.289	655.12	654.94	-0.18	652.76	652.76	0.00	651.21	651.21	0.00	650.01	650.01	0.00
Mainstem		D11	5.256	655.05	654.86	-0.19	652.65	652.65	0.00	651.00	651.00	0.00	649.82	649.82	0.00
Mainstem	I - TAR 30		5.236	655.00	654.81	-0.19	652.58	652.58	0.00	650.87	650.87	0.00	649.69	649.69	0.00
Mainstem	TAR 29		5.184	655.01	654.80	-0.21	652.49	652.49	0.00	650.69	650.69	0.00	649.51	649.51	0.00
Mainstem		D10	5.166	655.01	654.80	-0.21	652.47	652.47	0.00	650.62	650.62	0.00	649.45	649.45	0.00
Mainstem	TAR 28		5.144	655.01	654.78	-0.23	652.42	652.42	0.00	650.53	650.53	0.00	649.37	649.37	0.00
Mainstem	H - TAR 27		5.094	655.00	654.77	-0.23	652.38	652.38	0.00	650.43	650.43	0.00	649.27	649.27	0.00
Mainstem		D9	5.049	654.99	654.75	-0.24	652.32	652.32	0.00	650.31	650.31	0.00	649.17	649.17	0.00
Mainstem	TAR 26		5.045	654.99	654.75	-0.24	652.37	652.37	0.00	650.40	650.40	0.00	649.22	649.22	0.00
Mainstem			5.020	654.98	654.74	-0.24	652.30	652.30	0.00	650.34	650.34	0.00	649.17	649.17	0.00
Mainstem			5.012	MWRD TAR Crossing at Cell 1											
Mainstem			5.005	654.99	654.76	-0.23	650.80	650.80	0.00	649.54	649.54	0.00	648.72	648.72	0.00
Mainstem	TAR 25		4.992	654.99	654.76	-0.23	650.83	650.83	0.00	649.57	649.57	0.00	648.74	648.74	0.00
Mainstem		D8	4.980	654.98	654.74	-0.24	650.74	650.74	0.00	649.47	649.47	0.00	648.65	648.65	0.00
Mainstem	TAR 24		4.966	654.97	654.74	-0.23	650.59	650.59	0.00	649.33	649.33	0.00	648.52	648.52	0.00
Mainstem	TAR 23		4.944	654.97	654.74	-0.23	650.53	650.53	0.00	649.27	649.27	0.00	648.47	648.47	0.00
Mainstem		D7	4.928	654.97	654.73	-0.24	650.49	650.49	0.00	649.22	649.23	0.01	648.42	648.42	0.00
Mainstem	G - TAR 22		4.925	654.97	654.73	-0.24	650.44	650.44	0.00	649.16	649.16	0.00	648.36	648.36	0.00
Mainstem	F - TAR 21		4.915	654.96	654.73	-0.23	650.48	650.48	0.00	649.19	649.19	0.00	648.37	648.37	0.00
Mainstem	TAR 20		4.885	654.96	654.71	-0.25	650.36	650.36	0.00	649.05	649.05	0.00	648.23	648.23	0.00
Mainstem	TAR 19		4.866	654.95	654.70	-0.25	650.28	650.28	0.00	648.95	648.95	0.00	648.14	648.14	0.00
Mainstem	TAR 18		4.847	654.94	654.70	-0.24	650.22	650.22	0.00	648.87	648.87	0.00	648.05	648.05	0.00
Mainstem	E - TAR 17		4.828	654.94	654.69	-0.25	650.17	650.17	0.00	648.83	648.83	0.00	648.00	648.00	0.00
Mainstem	TAR 16		4.801	654.93	654.67	-0.26	650.04	650.04	0.00	648.68	648.68	0.00	647.85	647.85	0.00

DESIGN Table 3. (cont'd) **WSEL comparison of Modified Existing Model vs. Proposed Model - DESIGN**

Higgins Creek Tributary A and Higgins Creek (all NAVD88) DESIGN MODELS															
				500 YR WSEL (ft)			100 YR WSEL (ft)			50 YR WSEL (ft)			10 YR WSEL (ft)		
Creek Reach	FIS Location	IDOT Survey XSEC	HEC-RAS XSEC	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.	Mod. Ex. Cond.	Proposed Cond.	Diff.
Mainstem	TAR 15		4.783	654.92	654.66	-0.26	649.98	649.98	0.00	648.60	648.60	0.00	647.76	647.76	0.00
Mainstem	TAR 14		4.774	654.91	654.66	-0.25	649.93	649.94	0.01	648.54	648.54	0.00	647.70	647.70	0.00
Mainstem		D6	4.771	654.91	654.65	-0.26	649.92	649.92	0.00	648.53	648.53	0.00	647.69	647.69	0.00
Mainstem	TAR 13		4.76	654.91	654.65	-0.26	649.87	649.87	0.00	648.47	648.47	0.00	647.63	647.63	0.00
Mainstem	TAR 12		4.742	654.90	654.64	-0.26	649.81	649.81	0.00	648.38	648.38	0.00	647.53	647.53	0.00
Mainstem	TAR 11		4.713	654.89	654.62	-0.27	649.67	649.67	0.00	648.18	648.18	0.00	647.31	647.31	0.00
Mainstem	D - TAR 10		4.698	654.89	654.62	-0.27	649.64	649.64	0.00	648.13	648.13	0.00	647.22	647.22	0.00
Mainstem		D5	4.694	654.87	654.60	-0.27	649.54	649.54	0.00	648.04	648.04	0.00	647.17	647.17	0.00
Mainstem	TAR 9		4.683	654.89	654.62	-0.27	649.65	649.65	0.00	648.13	648.13	0.00	647.23	647.23	0.00
Mainstem			4.678	654.89	654.62	-0.27	649.57	649.57	0.00	648.03	648.03	0.00	647.12	647.12	0.00
Mainstem			4.673	MWRD Crossing at TAR Cell 2											
Mainstem			4.668	654.88	654.61	-0.27	648.62	648.62	0.00	647.17	647.17	0.00	646.13	646.13	0.00
Mainstem	TAR 8		4.664	654.84	654.56	-0.28	648.57	648.57	0.00	647.19	647.19	0.00	646.16	646.16	0.00
Mainstem		D4	4.659	654.84	654.57	-0.27	648.62	648.62	0.00	647.22	647.22	0.00	646.20	646.20	0.00
Mainstem			4.639	654.81	654.53	-0.28	648.56	648.56	0.00	647.17	647.17	0.00	646.11	646.12	0.01
Mainstem		D3	4.638	654.80	654.51	-0.29	648.56	648.57	0.01	647.17	647.17	0.00	646.12	646.12	0.00
Mainstem			4.626	IL 72 (Touhy Avenue) / RR - No change to RR OT or culvert. Touhy Ave. will be on an overpass.											
Mainstem			4.612	653.43	653.09	-0.34	648.09	648.09	0.00	646.77	646.77	0.00	645.34	645.34	0.00
Mainstem		D2	4.611	653.45	653.12	-0.33	648.13	648.13	0.00	646.80	646.80	0.00	645.37	645.38	0.01
Mainstem	TAR 7		4.588	653.40	653.06	-0.34	648.07	648.07	0.00	646.72	646.72	0.00	645.08	645.08	0.00
Mainstem		D1	4.569	653.41	653.07	-0.34	648.09	648.09	0.00	646.74	646.74	0.00	645.15	645.15	0.00
Mainstem	TAR 6		4.542	653.41	653.07	-0.34	648.09	648.09	0.00	646.74	646.74	0.00	645.14	645.14	0.00
Mainstem			4.537	653.37	652.94	-0.43	648.01	648.00	-0.01	646.69	646.68	-0.01	645.08	645.07	-0.01
Mainstem			4.521	Mt. Prospect Road / O'Hare Employee Entrance - EXISTING CULVERT, NEW PROFILE AND RELIEF CULVERT TO THE EAST											
Mainstem			4.505	649.54	649.44	-0.10	646.58	646.58	0.00	646.02	646.02	0.00	644.33	644.33	0.00
Mainstem	C[2]		4.485	649.57	649.57	0.00	646.62	646.62	0.00	646.04	646.04	0.00	644.36	644.36	0.00

Notes:

1. From Federal Register, Vol. 73, No. 47 / Monday, March 10, 2008, p. 12648. See Section 7 of Report.

"*" indicates that the cross section was interpolated

Tab 2

SECTION 2

WATERWAY INFORMATION TABLES
HYDRAULIC REPORT DATA SHEETS

Illinois Department of Transportation

Elgin O'Hare – West Bypass

Culvert Waterway Information Table
DESIGN - Based on NAVD 1988 Datum

Route: I-90 S.N. Exist: Computed by: ETA Date: 7-11-12
Section: S.N. Prop: Checked by: ID Date: 7-11-12
County: Cook Waterway: Higgins Creek Tributary A
Station: 3840+40

Drainage Area = 2.3 Square Miles
Existing Overtopping Elevation: 662.5 ft. @ Sta 3844+40
Proposed Overtopping Evaluation: 662.5 ft. @ Sta 3839+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	224	104	144	656.5	0.2	0.1	656.7	656.6
Design	50	407	104	163	657.3	0.6	0.1	657.9	657.4
Base	100	452	104	184	658.2	0.9	0.2	659.1	658.4
OVT(E)	> 500-Yr								
OVT(P)	> 500-Yr								
Max Calc	500	574	104	192	659.7	0.9	0.5	660.6	660.2

10-Year Outlet Velocity from Existing Structure = 2.2 fps
10-Year Outlet Velocity from Proposed Structure = 1.5 fps

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

DATUM: FIS and IDOT survey datum are both NAVD 1988
ALL-TIME H.W.E. & DATE: ± 658.8 in July 1957 (creek has been realigned)

SCOPE OF WORK: Replace culverts to meet Tollway hydraulic requirements and better align with the channel.

EXISTING STRUCTURE

Bridge or Culvert Type:	Twin RCBC
Cell Dimensions (W x H):	9' x 5.75'
# of spans \ cells:	2
Length:	168.75'
U/S Flowline:	650.38
D/S Flowline:	650.16
Skew:	0
Low EOP:	662.0

PROPOSED STRUCTURE

Culvert Type:	Twin RCBC	
Cell Dimensions (W x H):	12' x 9'	Embed 12"
# of cells:	2	
Length:	320	
U/S Flowline:	650.50	Channel Flowline
D/S Flowline:	650.00	Channel Flowline
Skew:	15	
Low EOP:	661.45 Ramp Y2 Sta 138+50 Proj. C/ 238+50 FB	

EXISTING DROPBOX

Dimensions:	N/A
Drop:	N/A
Weir Elevation:	N/A

PROPOSED DROPBOX

Dimensions:	N/A
Drop:	N/A
Weir Elevation:	N/A

NOTE(S): The changes in WSEL are due to the downstream effects of bridge widening and raised profile at the Elmhurst Road structure, as well as modification of an upstream restricting cross section.

DESIGN BACK-UP CALCULATIONS FOR WIT

Route: I-90 | Computed: ETA | Date: 7/11/2012
Waterway: Higgins Creek Tributary A | Checked: ID | Date: 7/11/2012

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. (55' U/S)	U/S Face of Structure	Approach Sect. (55' U/S)	U/S Face of Structure	Approach Sect. (55' U/S)	Existing	Proposed
10-year	656.48	656.50	**656.67**	656.69	**656.57**	656.59	**0.19**	**0.09**
50-year	657.29	657.31	**657.88**	657.90	**657.42**	657.44	**0.59**	**0.13**
100-year	658.15	658.17	**659.11**	659.13	**658.42**	658.44	**0.96**	**0.27**
500-year	659.66	659.67	**660.58**	660.59	**660.22**	660.23	**0.92**	**0.56**

(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

I-90 culvert is HEC-RAS Sta. 2 on Higgins Trib A. Natural approach section is Sta. 3.1, U/S Face of proposed structure is Sta. 3.01

CALCULATE FREEBOARD AND CLEARANCE

Low Road Elevation (ft)[3]			
Existing	Station	Proposed	Station
662.00		661.45	138+50
Low Beam Elevation (ft)			
Existing	Station	Proposed	Station
656.13		658.50	141+00
Proposed Freeboard (ft)			
10-year	50-year[4]	100-year	500-year
4.88	4.03	3.03	1.23
Proposed Clearance (ft)			
10-year	50-year[5]	100-year	500-year
2.02	1.21	0.35	-1.16

(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
9.0	5.75	12.0	8.0
Structure Invert Elevation (ft)			
Existing		Proposed	
U/S	D/S	U/S	D/S
650.38	650.16	650.50	650.00

Waterway Opening Area (ft^2)			# of Culverts
Frequency	Existing	Proposed	2
10-year	103.50	143.52	
50-year	103.50	162.96	
100-year	103.50	183.60	
500-year	103.50	192.00	

(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

Waterway Information Table

Elgin O'Hare – West Bypass

DESIGN - Based on NAVD 1988

Route: Elmhurst Road

Section: (Bridge design)

County: Cook

Date: 10-23-12

Existing SN: 016-0677

Proposed SN:

Waterway: Higgins Creek

Prepared by: ETA

Existing Overtopping Elev. = 658.1 at Sta. 111+75 S

Drainage Area = 5.4 sq. mi. Proposed Overtopping Elev. = 658.73 at Sta. 111+00 N

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	564	149	163	653.9	0.6	0.1	654.5	654.0
Design	50	810	185	246	656.5	0.5	0.0	657.0	656.5
Overtop Existing	< 100-Yr								
Base	100	915	185	247	657.8	0.5	0.1	658.3	657.9
Overtop Proposed	~210-Yr	1009							658.7
Max. Calc.	500	1258	185	247	659.3	0.2	0.3	659.5	659.6

10 YEAR VELOCITY THROUGH EXISTING BRIDGE = 3.8 ft/s

10 YEAR VELOCITY THROUGH PROPOSED BRIDGE = 3.5 ft/s

ALL–TIME H.W.E. & DATE: 656.6 in July 1957

FIS and IDOT survey datum are both NAVD 1988

Scope of Work: Replace existing bridge with a larger bridge for roadway widening and improved hydraulics. Channel shape is maintained.

EXISTING STRUCTURE

TYPE: Concrete Slab, closed abutments

LENGTH: 25' abut. to abut. face, 70' wide deck

SPANS: 1

LOW BEAM: 655.92

SKEW: 0

LOW E.O.P.: 658.0

PROPOSED STRUCTURE

TYPE: Concrete Slab, closed abutments

LENGTH: 34' abut. to abut. face, 114' wide deck

SPANS: 1

LOW BEAM: 656.28 (N), 656.46 (S)

SKEW: 0

LOW E.O.P.: 658.01

NOTE: PROPOSED STRUCTURE DETAILS ARE PRELIMINARY; SUBJECT TO REFINEMENT IN TSL STAGE.

Openings listed do not include roadway OT. 185 sft. is the max. area of the ex. bridge opening, 247 sft. is max. opening of the pr. bridge opening.

BRIDGE DESIGN BACK-UP CALCULATIONS FOR WIT

Route: Elmhurst Road | Computed: ETA | Date: 7/11/2012
Waterway: Higgins Creek | Checked: ID | Rev. | Date: 10/4/2012

Calculate Created Head

Frequency (year)	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. (23' U/S)	U/S Face of Structure	Approach Sect. (23' U/S)	U/S Face of Structure	Approach Sect. (23' U/S)	Existing	Proposed
10	653.87	653.88	**654.51**	654.52	**653.95**	653.96	**0.64**	**0.08**
50	656.53	656.54	**656.95**	656.96	**656.49**	656.50	**0.42**	**-0.04**
100	657.75	657.75	**658.34**	658.34	**657.86**	657.86	**0.59**	**0.11**
500	659.33	659.33	**659.49**	659.49	**659.59**	659.59	**0.16**	**0.26**

(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

Elmhurst Road bridge is HEC-RAS Sta. 5.981 on Higgins Mainstem. Approach section is Sta. 5.9994, U/S Face of proposed structure is Sta. 5.9950

CALCULATE FREEBOARD AND CLEARANCE

Low Road Elevation (ft)[3]			
Existing	Station	Proposed	Station
658.00		658.01	138+50
Low Beam Elevation (ft)			
Existing	Station	Proposed	Station
655.92		656.28	141+00
Proposed Freeboard (ft)			
10-year	50-year[4]	100-year	500-year
4.06	1.52	0.15	-1.58
Proposed Clearance (ft)			
10-year	50-year[5]	100-year	500-year
2.41	-0.25	-1.47	-3.05

CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR BRIDGE

Structure Length (ft)		U/S Invert Elevation (ft)	
Existing	Proposed	Existing	Proposed
25.0	34.0	648.13	648.21

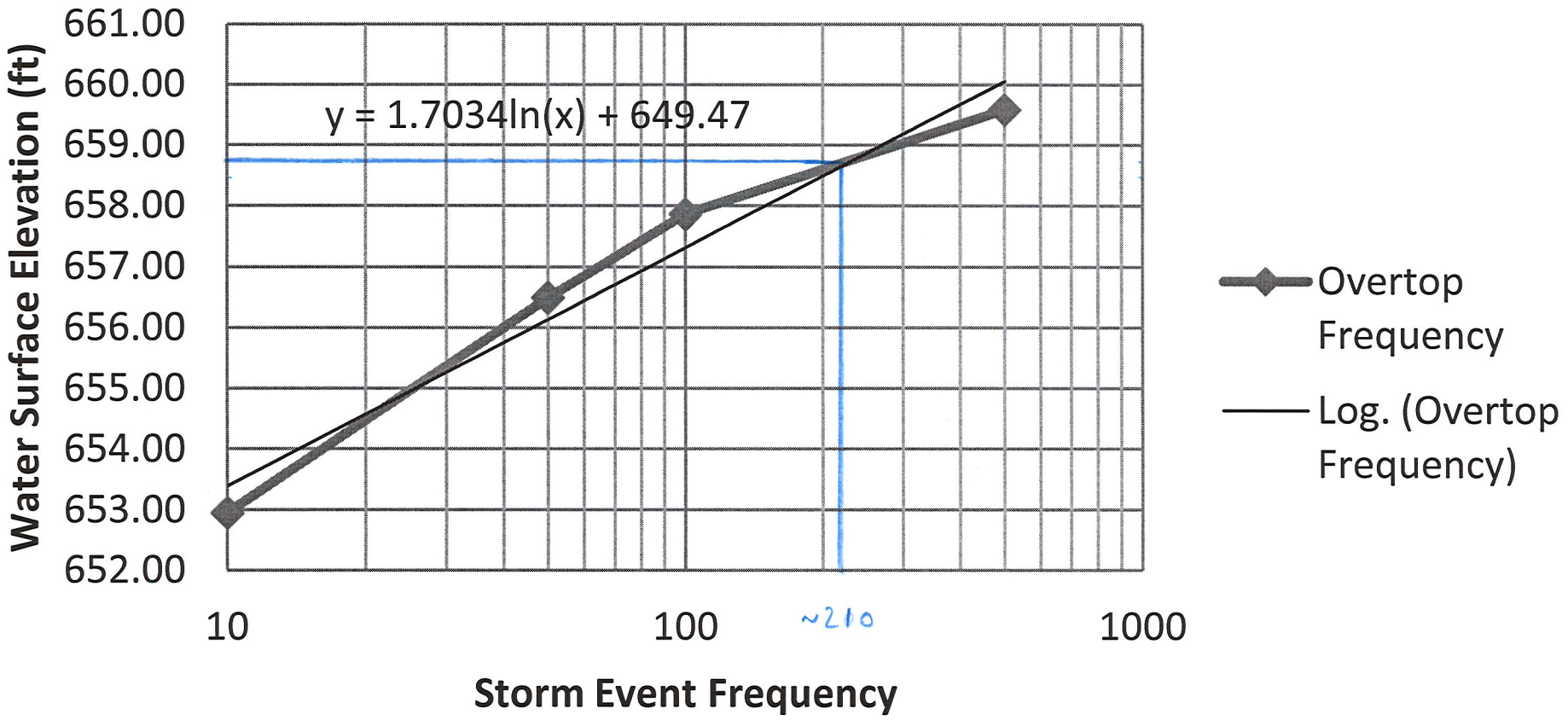
Waterway Opening Area (ft^2)		
Frequency	Existing	Proposed
10-year	149	163
50-year	185	246
100-year	185	247
500-year	185	247

(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)

Bridge Proposed Overtop Frequency



Illinois Department of Transportation

Elgin O'Hare – West Bypass

Waterway Information Table
DESIGN - Based on NAVD 1988

Route: Elmhurst Road
Section: (Culvert design)
County: Cook
Date: 07-11-12

Existing SN: 016-0677
Proposed SN:
Waterway: Higgins Creek
Prepared by: ETA

Existing Overtopping Elev. = 658.1 at Sta. 111+75 S

Drainage Area = 5.4 sq. mi. Proposed Overtopping Elev. = 658.73 at Sta. 111+00 N

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	564	185	176	653.9	0.6	0.0	654.5	653.9
Design	50	810	185	336	656.5	0.5	0.1	657.0	656.6
Overtop Existing	< 100-Yr								
Base	100	915	185	336	657.8	0.5	0.1	658.3	657.9
Overtop Proposed	~230-Yr	1026							658.7
Max. Calc.	500	1258	185	336	659.3	0.2	0.2	659.5	659.5

10 YEAR VELOCITY THROUGH EXISTING BRIDGE = 3.0 ft/s

10 YEAR VELOCITY THROUGH PROPOSED CULVERT = 3.2 ft/s

ALL–TIME H.W.E. & DATE: 656.6 in July 1957

Datum Correlation: FIS and IDOT survey datum are both NAVD 1988

Scope of Work: Replace existing bridge with a larger structure for roadway widening and improved hydraulics. Overbank transitions required.

EXISTING STRUCTURE

TYPE: Concrete Slab, closed abutments
LENGTH: 25' abut. to abut. face, 70' wide deck
SPANS: 1
LOW BEAM: 655.92
SKEW: 0
LOW E.O.P.: 658.0

PROPOSED STRUCTURE

Culvert Type: 2 - 12'x9' RCBC embedded 12", 2 - 12'x6' RCBC
Length: 114'
U/S Flowline: 648.2 (channel), 650.2
D/S Flowline: 647.9 (channel), 649.9
Skew: 0
Low EOP: 658.01

NOTE: PROPOSED STRUCTURE DETAILS ARE PRELIMINARY; SUBJECT TO REFINEMENT IN TSL STAGE.
Openings listed do not include roadway OT. 185 sft. is the max. area of the ex. bridge opening, 336 sft. is max. opening of the pr. culvert opening.

CULVERT DESIGN BACK-UP CALCULATIONS FOR WIT

Route: Elmhurst Road | Computed: ETA | Date: 7/11/2012
Waterway: Higgins Creek | Checked: ID | Rev. Date: 10/23/2012

Calculate Created Head

Frequency (year)	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. (23' U/S)	U/S Face of Structure	Approach Sect. (23' U/S)	U/S Face of Structure	Approach Sect. (23' U/S)	Existing	Proposed
10	653.87	653.88	**654.51**	654.52	**653.87**	653.88	**0.64**	**0.00**
50	656.53	656.54	**656.95**	656.96	**656.57**	656.58	**0.42**	**0.04**
100	657.75	657.75	**658.34**	658.34	**657.85**	657.85	**0.59**	**0.10**
500	659.33	659.33	**659.49**	659.49	**659.47**	659.47	**0.16**	**0.14**

(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
658.00		658.01	138+50
Low Beam Elevation (ft)			
Existing	Station	Proposed	Station
655.85		655.90	141+00
Proposed Freeboard (ft)			
10-year	50-year[4]	100-year	500-year
4.14	1.44	0.16	-1.46
Proposed Clearance (ft)			
10-year	50-year[5]	100-year	500-year
2.03	-0.63	-1.85	-3.43

CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR CULVERT

Structure Size (ft x ft)[6]			
Existing Width	Existing Height	Proposed Width	Proposed Height
		12.0	8.0
Channel Invert Elevation (ft)			
Existing		Proposed	
U/S	D/S	U/S	D/S
648.1	648.1	648.2	647.9

Waterway Opening Area (ft^2)			# of Culverts
Frequency	Existing	Proposed	4
10-year	177	224	
50-year	185	336	
100-year	185	336	
500-year	185	336	

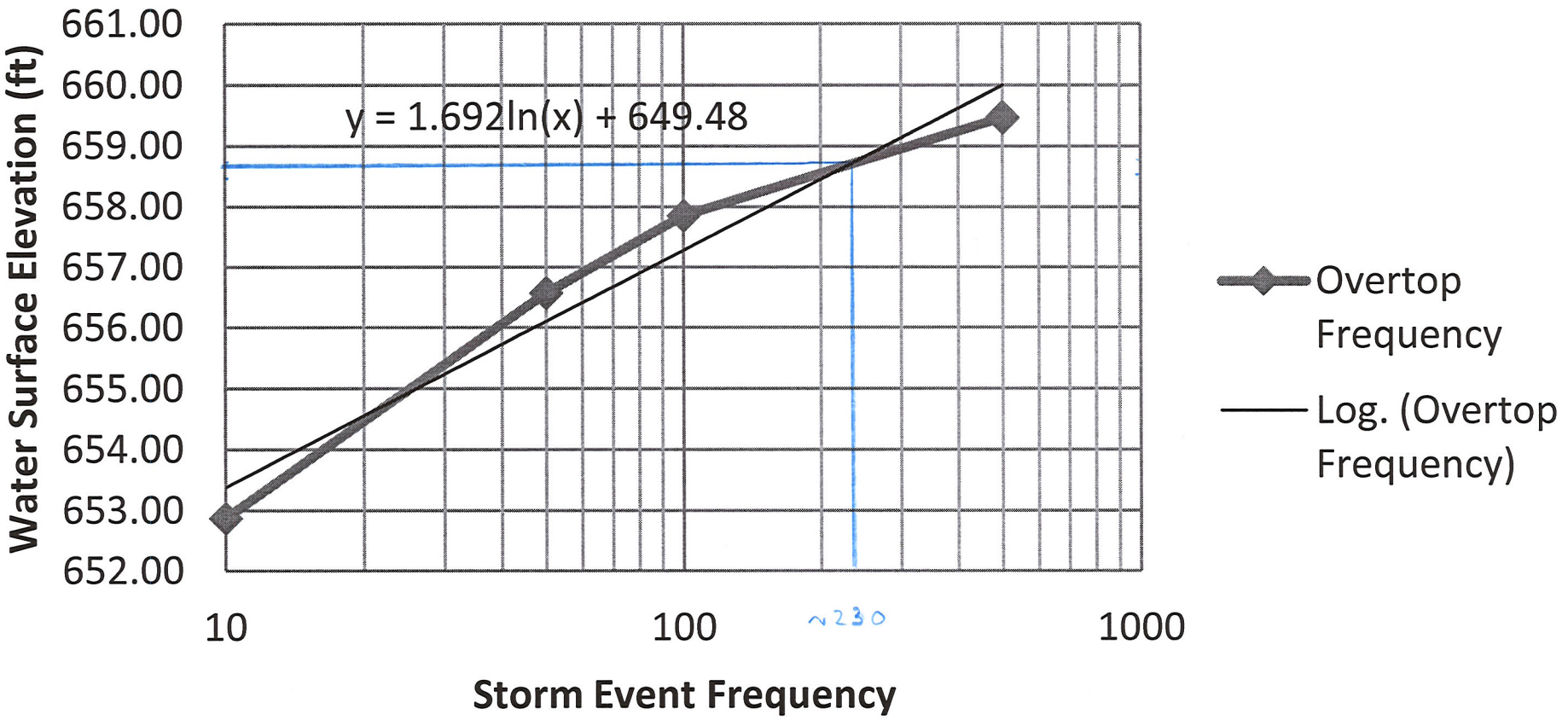
(3) Low road elevation is calculated at the edge of pavement, and on the low side of the roadway.

(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)

(6) Proposed structure is two 12' (W) x 9' (H) box culverts embedded 12", plus two flanking box culverts at 12' (W) x 6' (H). Effective height = 8'. Full area = 2x12x8 + 2x12x6 = 336 sft.

Culvert Proposed Overtop Frequency



Illinois Department of Transportation

Elgin O'Hare – West Bypass

Waterway Information Table
DESIGN - Based on NAVD 1988

Route: I-90 (Jane Addams Tollway)

Section:

County: Cook

Date: 11-05-2012

Existing SN: 016-9975/ISTHA 535 (EB)
016-9869/ISTHA 536 (WB)

Proposed SN:

Waterway: Higgins Creek

Prepared by: ETA

Existing Overtopping Elev. = 659.44 at Sta. 3870+50

Drainage Area = 6.8 sq. mi. Proposed Overtopping Elev. = 660.20 at Sta. 3867+50

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	907	243	243	650.6	0.0	0.0	650.6	650.6
Design	50	1394	318	318	651.7	0.1	0.0	651.8	651.7
Base	100	1623	415	415	652.7	0.4	0.2	653.1	652.9
Overtop Existing	> 500-Yr								
Overtop Proposed	> 500-Yr								
Max. Calc.	500	2270	594	594	654.6	0.8	0.4	655.4	655.0

10 YEAR VELOCITY THROUGH EXISTING BRIDGE = 3.7 ft/s

10 YEAR VELOCITY THROUGH PROPOSED BRIDGE = 3.7 ft/s

ALL–TIME H.W.E. & DATE: ±651.7 in July 1957

FIS and IDOT survey datum are both NAVD 1988

Scope of Work: Widen existing bridge for roadway widening.

EXISTING STRUCTURE

TYPE: Concrete Slab, open abutments

LENGTH: 83.6' abutment to abutment, 125' wide deck

SPANS: 2

LOW BEAM: 656.88 (NE) 655.51 (SE)

SKEW: 10°

LOW E.O.P.: 658.96

PROPOSED STRUCTURE

TYPE: Concrete Slab, open abutments

LENGTH: 83.6' abutment to abutment, 276' wide deck

SPANS: 2

LOW BEAM: 656.88 (NE) 655.51 (SE) (estimated)

SKEW: 10°

LOW E.O.P.: 659.78, Sta. 467+50, Prop. Ramp X4

NOTE: PROP. STRUCT. DETAILS ARE PRELIM.; SUBJECT TO REFINEMENT IN TSL STAGE. U/S WSELS are reduced due to lining a section of unlined channel.

DESIGN BACK-UP CALCULATIONS FOR WIT

Route: I-90 | Computed: ETA | Date: 7/11/2012

Waterway: Higgins Creek | Checked: ID | Rev. | Date: 10/4/2012

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. (78' U/S)	U/S Face of Structure	Approach Sect. (78' U/S)	U/S Face of Structure	Approach Sect. (78' U/S)	Existing	Proposed
10-year	650.56	650.52	**650.59**	650.55	**650.35**	650.31	**0.03**	**-0.21**
50-year	651.71	651.62	**651.81**	651.72	**651.53**	651.44	**0.10**	**-0.18**
100-year	652.73	652.63	**653.12**	653.02	**652.92**	652.82	**0.39**	**0.19**
500-year	654.63	654.55	**655.41**	655.33	**654.98**	654.90	**0.78**	**0.35**

(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

I-90 bridge is HEC-RAS Sta. 5.364 on Higgins Mainstem. Approach section is Sta. 5.409, U/S Face of proposed structure is Sta. 5.394

CALCULATE FREEBOARD AND CLEARANCE

Low Road Elevation (ft)[3]			
Existing	Station	Proposed	Station
658.96		659.78	467+50
Low Beam Elevation (ft)			
Existing	Station	Proposed	Station
655.51		655.51	
Proposed Freeboard (ft)			
10-year	50-year[4]	100-year	500-year
9.43	8.25	6.86	4.80
Proposed Clearance (ft)			
10-year	50-year[5]	100-year	500-year
4.95	3.80	2.78	0.88

CALCULATE EFFECTIVE WATERWAY OPENING AREA FOR BRIDGE

Structure Length (ft)		U/S Invert Elevation (ft)	
Existing	Proposed	Existing	Proposed
83.6	83.6	644.79	645.30

Waterway Opening Area (ft^2)		
Frequency	Existing	Proposed
10-year	243	243
50-year	318	318
100-year	415	415
500-year	594	594

(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)

Illinois Department of Transportation

Elgin O'Hare – West Bypass

Culvert Waterway Information Table
DESIGN - Based on NAVD 1988 Datum

Route: IL 72 (Touhy Ave.) S.N. Exist: 016-0974 Computed by: ETA Date: 07-11-12
Section: S.N. Prop: Checked by: ID Date: 07-11-12
County: Cook Waterway: Higgins Creek
Station: 162+00

Drainage Area = 7.0 Square Miles — Existing Overtopping Elevation: 652.2 ft. @ Sta 155+50 — Proposed Overtopping Evaluation: 659.09 @ WB 395+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	444	85	85	645.4	0.7	0.7	646.1	646.1
Design	50	485	109	109	646.3	0.8	0.8	647.1	647.1
Base	100	700	127	127	647.0	1.5	1.5	648.5	648.5
OVT(E)	500								
OVT(P)									
Max Calc	500	1600	205	205	649.9	4.9	4.6	654.8	654.5

10-Year Outlet Velocity from Existing Structure = 5.2 fps
10-Year Outlet Velocity from Proposed Structure = 5.2 fps

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

DATUM: FIS and IDOT survey datum are both NAVD 1988
ALL-TIME H.W.E. & DATE: 649.1, July 1957

SCOPE OF WORK: No change to existing twin culverts. Touhy Ave. roadway will be on an overpass over the existing RR culvert.

EXISTING STRUCTURE
Bridge or Culvert Type: Twin RCB
Cell Dimensions (W x H): 13.5' x 8'
# of spans \ cells: 2
Length: 124.4'
U/S Flowline: 642.28
D/S Flowline: 642.52
Skew: 0° (culvert has internal bend of ± 30°)
Low EOP: 651.4

PROPOSED STRUCTURE (no change from Existing)
Culvert Type: Twin RCB
Cell Dimensions (W x H): 13.5' x 8'
# of cells: 2
Length: 124.4'
U/S Flowline: 642.28
D/S Flowline: 642.52
Skew: 0°
Low EOP: 658.3, WB Sta. 395+50

EXISTING DROPBOX
Dimensions: N/A
Drop: N/A
Weir Elevation: N/A

PROPOSED DROPBOX
Dimensions: N/A
Drop: N/A
Weir Elevation: N/A

NOTE(S): Railroad grade elevation of 654.5, not IL 72 (Touhy Avenue) elevation of 652.2, controls existing overtopping elevation.
No change to existing twin culverts. The drop in proposed 500-year WSEL is due to downstream relief structure at Mt. Prospect Road.

DESIGN BACK-UP CALCULATIONS FOR WIT

Route: Il 72 (Touhy Ave) Computed: ETA Date: 7/11/2012
Waterway: Higgins Creek Checked: ID Date: 7/11/2012

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. (103' U/S)	U/S Face of Structure	Approach Sect. (103' U/S)	U/S Face of Structure	Approach Sect. (103' U/S)	Existing	Proposed
10-year	645.43	645.56	**646.07**	646.20	**646.07**	646.20	**0.64**	**0.64**
50-year	646.32	646.40	**647.14**	647.22	**647.14**	647.22	**0.82**	**0.82**
100-year	646.98	647.10	**648.50**	648.62	**648.50**	648.62	**1.52**	**1.52**
500-year	649.88	649.94	**654.78**	654.84	**654.51**	654.57	**4.90**	**4.63**

(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

HEC-RAS Approach section Sta. 4.659, U/S Face Sta. 4.639, structure Sta. 4.626

CALCULATE FREEBOARD AND CLEARANCE

Low Road Elevation (ft)[3]			
Existing	Station	Proposed	Station
651.40		658.30	395+50
Low Beam Elevation (ft)			
Existing	Station	Proposed	Station
650.28	162+00	650.28	162+00
Proposed Freeboard (ft)			
10-year	50-year[4]	100-year	500-year
12.23	11.16	9.80	3.79
Proposed Clearance (ft)			
10-year	50-year[5]	100-year	500-year
4.85	3.96	3.30	0.40

(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
13.5	8.0	13.5	8.0
Structure Invert Elevation (ft)			
Existing		Proposed	
U/S	D/S	U/S	D/S
642.28	642.52	642.28	642.52

Waterway Opening Area (ft^2)			# of Culverts
Frequency	Existing	Proposed	2
10-year	85.05	85.05	
50-year	109.08	109.08	
100-year	126.90	126.90	
500-year	205.20	205.20	

Illinois Department of Transportation

MULTIPLE OPENINGS WATERWAY INFORMATION TABLE - DESIGN

Route: Mt. Prospect Rd
Section:
County: Cook
Station: 187+50, Pr. at 190+58, 190+70

SN Existing:
SN Proposed:
Waterway: Higgins Creek

Computed by: ETA Date: 7-11-12
Checked by: ID Date: 7-11-12

Existing Overtopping Elev. = 651.00 at Sta. 192+30
Drainage Area = 7.1 SQ. MI. Proposed Overtopping Elev. = 653.98 at Sta. 196+00

Flood		Discharge (cfs)		Waterway Opening (sq. ft.)		Natural H.W.E.	Head (ft.)		Headwater Elevation	
		Existing	Proposed	Existing	Proposed		Existing	Proposed	Existing	Proposed
10	Main Channel	454	454	69	69	644.4	0.7	0.7	645.1	645.1
	Relief Structure									
	TOTAL	454	454	69	69					
50	Main Channel	503	503	89	89	646.0	0.7	0.7	646.7	646.7
	Relief Structure									
	TOTAL	503	503	89	89					
100	Main Channel	730	730	96	96	646.6	1.5	1.5	648.1	648.1
	Relief Structure									
	TOTAL	730	730	96	96					
Overtopping	Main Channel									
	Relief Structure									
	TOTAL									
500	Main Channel	1666	1101	96	96	649.5	3.9	3.6	653.4	653.1
	Relief Structure		565		28	649.5		3.6		653.1
	TOTAL	1666	1666	96	124	649.5		3.6		653.1

10 Year Velocity Through Existing Structure = 6.6 ft/s

10 Year Velocity Through Proposed Structure = 6.6 ft/s

ALL – TIME H.W.E. & Date: 649.1, July 1957

FIS and IDOT survey datum are both NAVD 1988

Scope of Work: Maintain existing culverts at Higgins Creek and add 500-year flood relief culverts to the east.

EXISTING STRUCTURE

TYPE: 12' x 8' RCBC
LENGTH: 154
U/S Flowline: 638.60
D/S Flowline: 637.09
SKEW: 0
LOW E.O.P.: 651.0

PROPOSED STRUCTURE

TYPE: 12' x 8' RCBC (existing) and twin 10' x 3.5' RCBC
LENGTH: 154
U/S Flowline: 638.60, 648.1
D/S Flowline: 637.09, 648.0
SKEW: 0
LOW E.O.P.: 653.26

NOTE: PROPOSED STRUCTURE DETAILS ARE PRELIMINARY; SUBJECT TO REFINEMENT IN TS&L STAGE.

DESIGN BACK-UP CALCULATIONS FOR WIT

Route: Mt. Prospect Rd | Computed: ETA | Date: 7/11/2012
Waterway: Higgins Creek | Checked: ID | Date: 7/11/2012

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. (23' U/S)	U/S Face of Structure	Approach Sect. (23' U/S)	U/S Face of Structure	Approach Sect. (23' U/S)	Existing	Proposed
10-year	644.35	644.35	**645.14**	645.14	**645.14**	645.14	**0.79**	**0.79**
50-year	646.03	646.03	**646.74**	646.74	**646.74**	646.74	**0.71**	**0.71**
100-year	646.60	646.61	**648.08**	648.09	**648.08**	648.09	**1.48**	**1.48**
500-year	649.52	649.53	**653.40**	653.41	**653.06**	653.07	**3.88**	**3.54**

(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

HEC-RAS Approach section Sta. 4.542, U/S Face Sta. 4.537, structure Sta. 4.521

CALCULATE FREEBOARD AND CLEARANCE

Low Road Elevation (ft)[3]			
Existing	Station	Proposed	Station
651.00		653.98	
Low Beam Elevation (ft)			
Existing	Station	Proposed	Station
646.60		646.60	
Proposed Freeboard (ft)			
10-year	50-year[4]	100-year	500-year
8.84	7.24	5.90	0.92
Proposed Clearance (ft)			
10-year	50-year[5]	100-year	500-year
2.25	0.57	0.00	-2.92

(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
12.0	8.0	12.0	8.0
		10.0	3.5
Structure Invert Elevation (ft)			
Existing		Proposed	
U/S	D/S	U/S	D/S
638.60	637.09	638.60	637.09
		648.1	648
Waterway Opening Area (ft^2)			
Frequency	Existing	Proposed	Proposed #2
10-year	69.00	69.00	0.00
50-year	89.16	89.16	0.00
100-year	96.00	96.00	0.00
500-year	96.00	96.00	28.60

(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 I-90 (Jane Addams Tollway) P or D # P-91-443-06
Section PTB #
County Cook
Exist SN
Prop SN

General Information

1. Name of the Stream: Higgins Creek Tributary A

2. Location of the Structure: SE ¼ of the NE ¼ of Section 26 , Township 41 N, Range 11 E 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.): 2.3

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:
Design WIT based on current survey data of all existing structures and field-verified lower n-values, to best match observed conditions.

Hydrologic & Hydraulic Analysis

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

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: FIS Flood Profiles
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: Elmhurst Road, Kirie Entrance, Wille Road

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 (X:1)
Contraction 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:
Hydrologic Atlas HA-67

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: New twin 12'Wx9'H RCBC Length (ft): 320'
Upstream invert elevation (ft): 650.5 (channel) Entrance type: Wingwalls flared
Downstream invert elevation (ft): 650.0 (channel) Skew (degrees): 15°
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): 4.03'

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

	Higgins Rd. Structure U/S	I-90 Tributary A Subject Structure	Elmhurst Rd. Structure D/S
23. Distance from proposed structure: (ft.)	2910'	0	1515'
24. Type of structure:	15.8' x 4.85' RCBC	Twin 9' x 5.75' RCBC	Single Span Bridge
25. Low beam elevation:	656.52, 656.2	656.13, 655.91	655.9
26. Flow line elevation:	660.72, 660.4	650.38, 650.16	648.13
27. Maximum known high water elevation:	±664.0	±658.8	656.6
28. Date of maximum high water:	July 1957	July 1957	July 1957
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?	Unknown	No	Yes
33. Classify type of scour and/or aggradation / degradation:	N/A	N/A	Streambank Scour

Required Additional Data

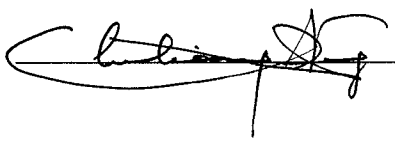
34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:

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: Ilene Dailey, PE Date: 11/17/10

Remarks:

37. Prepared by: Ilene Dailey, PE Date 01/05/12

Signed (QA/QC):  Date 5/17/2012

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. N/A 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)

Illinois Department of Transportation

Hydraulic Report Data Sheets

Route	Elmhurst Road	P or D #	P-91-443-06
Section		PTB #	
County	Cook		
Exist SN	016-0677		
Prop SN			

General Information

1. Name of the Stream: Higgins Creek

2. Location of the Structure: NW ¼ of the NW ¼ of Section 25 , Township 41 , Range 11 E 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.): 5.4

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:
   Design WIT based on current survey data of all existing structures and field-verified lower n-values, to best match observed conditions. .

Hydrologic & Hydraulic Analysis

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

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: FIS Flood Profiles
    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: Wille Road, Kirie entrance
    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 (X:1)
Contraction 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.
Buildings upstream of Elmhurst Road. Lowest surveyed F/F elevation is 656.96 at a loading dock on the building upstream of the low-head dam. Next lowest elevation is 659.68 at the door sill of the building immediately NW of the bridge.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources of Observed Highwater:
Hydrologic Atlas HA-67

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 (Alternate)
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):	648.21 U/S	Abutment type:	closed vertical abutments
Preliminary low beam elevation (ft):	656.46	Skew (degrees):	0°
Width of deck (ft):	114'	Number of spans:	1
Total length from face to face of abutment (ft)	34'		

18. If a culvert is proposed, supply: ***Alternate design*** *– four reinforced concrete box culverts*

Type and size:	2-12'Wx9'H, 2-12'Wx6'H	Length (ft):	114'
Upstream invert elevation (ft):	648.2 (channel)	Entrance type:	concrete headwall
Downstream invert elevation (ft):	647.9 (channel)	Skew (degrees):	0

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): -0.25'
b. Is the IDOT Freeboard Policy Met? ☐ Yes ☒ No ☐ NA Value (ft): 1.52'

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

22. Scour/ Migration Problems: ☐ None/Minimal ☐ Significant ☒ Severe
Comments: Existing structure identified by IDOT as "scour critical". Rip rap added 2011.

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

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

Countermeasures Proposed:

Existing Structure Data

	I-90 Tributary A Structure U/S	Elmhurst Rd. Subject Structure	MWRD Kirie Entrance Structure
23. Distance from proposed structure: (ft.)	1515'	0	356'
24. Type of structure:	Twin 9' x 5.75' RCBC	Single Span Bridge	17' x 9' RCBC
25. Low beam elevation:	656.13, 655.91	655.9	656.3
26. Flow line elevation:	650.38, 650.16	648.13	647.3
27. Maximum known high water elevation:	± 658.8	656.6	±656.0
28. Date of maximum high water:	July 1957	July 1957	July 1957
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?	No	Yes	No
33. Classify type of scour and/or aggradation / degradation:	N/A	Streambank Scour	N/A

Required Additional Data

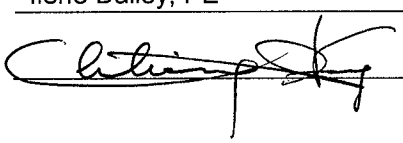
34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:

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: Ilene Dailey, PE Date: 11/17/10

Remarks:

37. Prepared by: Ilene Dailey, PE Date 05/15/12

Signed (QA/QC):  Date 5/17/2012

Hydraulic Report Checklist

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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. N/A 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)

Illinois Department of Transportation

Hydraulic Report Data Sheets

Route I-90 (Jane Addams Tollway) P or D # P-91-443-06
Section PTB #
County Cook
Exist SN 016-9975/ISTHA 535(EB), 016-9869/ISTHA 536(WB)
Prop SN

General Information

1. Name of the Stream: Higgins Creek

2. Location of the Structure: SE ¼ of the NW ¼ of Section 25 , Township 41 N, Range 11 E 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.): 6.8

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:
Design WIT based on current survey data of all existing structures and field-verified lower n-values, to best match observed conditions.

Hydrologic & Hydraulic Analysis

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

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: FIS Flood Profiles
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: Touhy Avenue/RR, Mount Prospect Road
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 (X:1)
Contraction 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 73' D/S 78'
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): 645.3
Preliminary low beam elevation (ft): 655.5
Width of deck (ft): Ex. 125', widened to 276'
Total length from face to face of abutment (ft) 83.6'
Abutment type: Open spill through
Skew (degrees): 10.1
Number of spans: 2

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): 3.80'
b. Is the IDOT Freeboard Policy Met? ☒ Yes ☐ No ☐ NA Value (ft): 8.25'

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

		Wille Rd. Structure U/S	I-90 Subject Structure	TAR Cell 1 Structure D/S
23.	Distance from proposed structure: (ft.)	1642.3'	0	1766.8'
24.	Type of structure:	17' x 9' RCBC	Two Span Bridge	Triple 7' x 5' RCBC
25.	Low beam elevation:	655.5	656.9	648.77, 648.84
26.	Flow line elevation:	646.5, 646.5	645.03	643.77, 643.84
27.	Maximum known high water elevation:	±655.2	±651.7	±651.1
28.	Date of maximum high water:	July 1957	July 1957	July 1957
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)			
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: Ilene Dailey, PE Date: 11/17/10

Remarks:

37. Prepared by: Ilene Dailey, PE Date 01/05/12

Signed (QA/QC): Date 5/14/2012

Hydraulic Report Checklist

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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. N/A 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

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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)

Illinois Department of Transportation

Hydraulic Report Data Sheets

Route IL 72 (Touhy Avenue) P or D # P-91-443-06
Section PTB #
County Cook
Exist SN 016-0974
Prop SN

General Information

1. Name of the Stream: Higgins Creek

2. Location of the Structure: NE ¼ of the NE ¼ of Section 36 , Township 41N, 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.): 7.0

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:
Design WIT based on current survey data of all existing structures and field-verified lower n-values, to best match observed conditions. .

Hydrologic & Hydraulic Analysis

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

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: FIS Flood Profiles
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: Mount Prospect Road

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 (X:1)
Contraction 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:
Hydrologic Atlas HA-67

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 Touhy Ave. will be on an overpass over existing RR culvert. No hydraulic impact.

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): 11.16'

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

		TAR Cell 2 Structure U/S	Il. 72 (Touhy Ave.) Subject Structure	Mt. Prospect Rd. Structure D/S
23.	Distance from proposed structure: (ft.)	160'	0	404'
24.	Type of structure:	Twin 9' x 4' RCBC	Twin 13.5' x 8' RCBC	12' x 8' RCBC
25.	Low beam elevation:	646.71, 646.72	650.28, 650.52	646.92, 645.41
26.	Flow line elevation:	642.71, 642.72	642.28, 642.52	638.92, 637.41
27.	Maximum known high water elevation:	±649.5	649.1	±648.4
28.	Date of maximum high water:	July 1957	July 1957	July 1957
29.	Cause (backwater, headwater, etc.):	Unknown	Unknown	Unknown
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:	No	No	No
32.	Has adverse scour occurred under or adjacent to the structure?	No	No	No
33.	Classify type of scour and/or aggradation / degradation:	No	No	No

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: Ilene A. Dailey, PE Date: 11/17/10

Remarks:

37. Prepared by: Ilene A. Dailey, PE Date 01/05/12

Signed (QA/QC): Date 5/17/2012

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8. ☒ Photographs - (Minimum: U/S & D/S Structure Faces, Up & Down Channel, Up & Down Roadway Across Structure)
9. N/A 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)

Illinois Department of Transportation

Hydraulic Report Data Sheets

Route Mount Prospect Road
Section
County Cook
Exist SN
Prop SN

P or D # P-91-443-06
PTB #

General Information

1. Name of the Stream: Higgins Creek

2. Location of the Structure: NE ¼ of the NE ¼ of Section 36 , Township 41N, 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.): 7.0

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:
Design WIT based on current survey data of all existing structures and field-verified lower n-values, to best match observed conditions.

Hydrologic & Hydraulic Analysis

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

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: FIS Flood Profiles
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: Willow-Higgins Creek

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 (X:1)
Contraction 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:
Hydrologic Atlas HA-67

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: Twin 10' W x 3.5' H RCBC relief culverts
Upstream invert elevation (ft): 648.1
Downstream invert elevation (ft): 648.0
Length (ft): 154'
Entrance type: Wingwall flared
Skew (degrees): 0°
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): 7.24'

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

		Il. 72 (Touhy Ave.) U/S Structure	Mt. Prospect Rd. Subject Structure	D/S Structure
23.	Distance from proposed structure: (ft.)	404'	0	
24.	Type of structure:	Twin 13.5' x 8' RCBC	12' x 8' RCBC	
25.	Low beam elevation:	650.28, 650.52	646.92, 645.41	
26.	Flow line elevation:	642.28, 642.52	638.92, 637.41	
27.	Maximum known high water elevation:	649.1	±648.4	
28.	Date of maximum high water:	July 1957	July 1957	
29.	Cause (backwater, headwater, etc.):	Unknown	Unknown	
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:	No	No	No
32.	Has adverse scour occurred under or adjacent to the structure?	No	No	No
33.	Classify type of scour and/or aggradation / degradation:	No	No	No

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:

Willow-Higgins Creek approved WSELs used as starting WSELs for Higgins Creek.

36. Site Inspection made by: Ilene A. Dailey, PE Date: 11/17/10

Remarks:

37. Prepared by: Ilene A. Dailey, PE Date 01/05/12

Signed (QA/QC): Date 5/14/2012

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. N/A 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
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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)

Illinois Department of Transportation

Abbreviated Hydraulic Data

SN:		Date:	05/15/12
Route:	Elgin-O'Hare West Bypass (EOWB)	Completed by:	Ilene Dailey, PE
Section:			
County:	Cook		
Stream Name:	Higgins Creek and Touhy Avenue Reservoir (TAR) Cell 2		

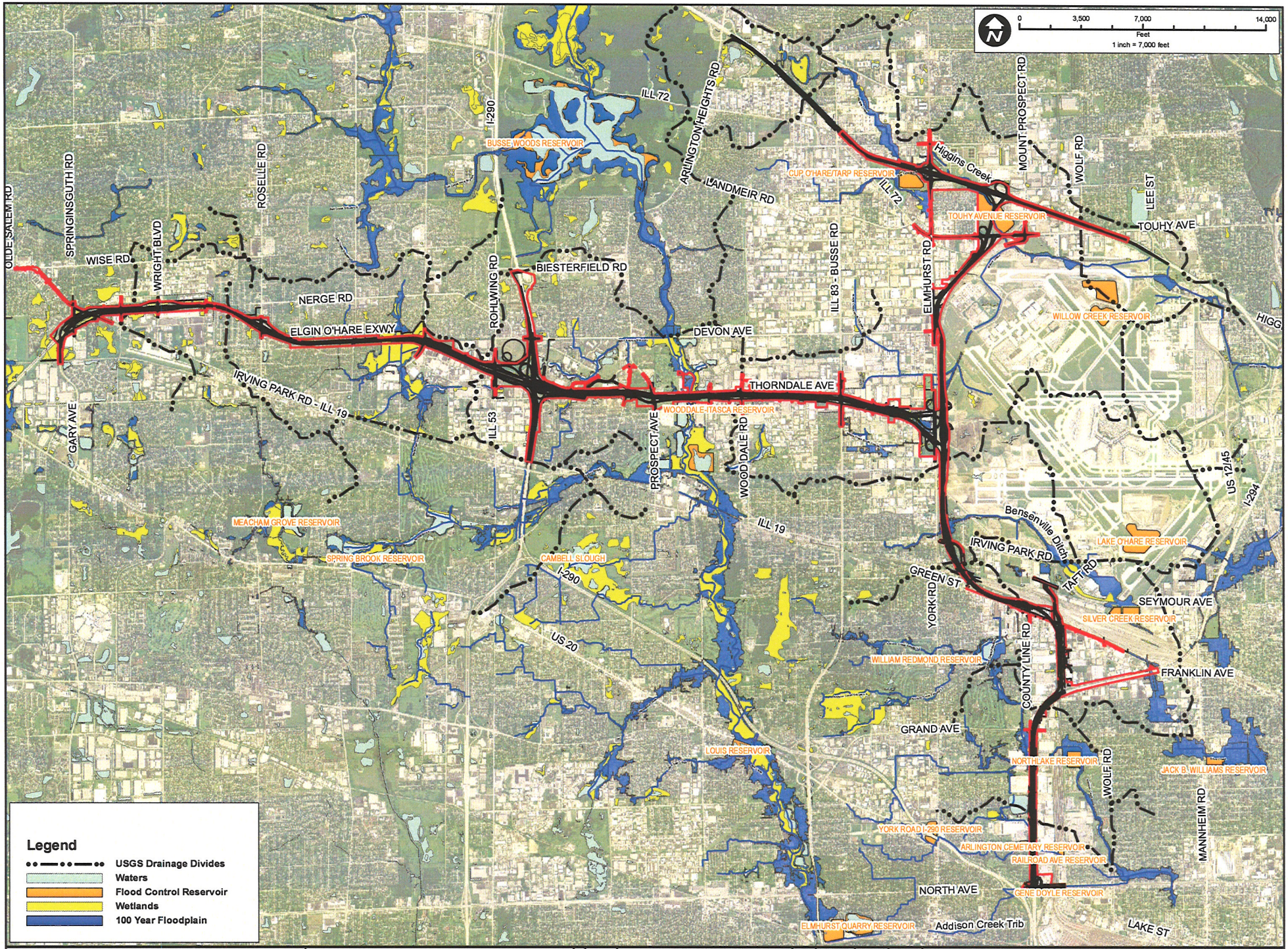
NOTE: To be used only for deck replacements, superstructure widenings, and superstructure replacements on high level crossings. Submit with Bridge Condition Report.

1. Maximum recorded high water elevation 652.0 ft. Date July 1957 Higgins Creek per HA-67
2. Does high water inundate the low beam? ☐ Yes ☒ No How Often?
3. Does high water overtop the approach roadway? ☐ Yes ☒ No How Often?
4. Low beam elevation 667.1 ft. at Sta. 403+50
5. Low point on approach roadway. Elevation 657.9 ft. at Sta. 393+50
6. Has scour occurred under or adjacent to structure? ☐ Yes ☒ No
7. Drainage area 6.9 sq. mi.
8. Is any particularly valuable property located upstream within possible bridge backwater influence? ☐ Yes ☒ No.
9. Describe and list critical upstream flood elevation(s) Low ground at upstream mobile home park = 653.0 per 1' topo. Lowest surveyed F/F is at 653.02.
10. Have there been any hydraulic problems with the existing structure? ☐ Yes ☐ No ☒ N/A
11. Description of proposed improvement. New bridges for proposed West Bypass and ramps connecting proposed West Bypass to I-90.
12. Supplemental hydraulic information (available cross sections, plan and profile, photographs, etc.).
13. Comments: Proposed piers will span entire Higgins Creek floodplain; therefore no floodplain impacts to Higgins Creek. Some proposed piers/fill will be located within live storage volume of the TAR Cell 2 reservoir. The volume occupied by the proposed piers/fill will be properly compensated by additional compensatory excavation, so there will be no loss of reservoir storage and therefore no impact to flood elevations.

Tab 3

SECTION 3

GENERAL PROJECT LOCATION MAP
USGS HYDROLOGIC INVESTIGATIONS ATLAS
USGS PROFILES OF FLOODS ON WILLOW AND HIGGINS CREEKS
FLOOD INSURANCE RATE MAPS
FLOOD INSURANCE STUDY FLOOD PROFILES
CROSS SECTION LOCATION AND REACH LENGTH EXHIBIT



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

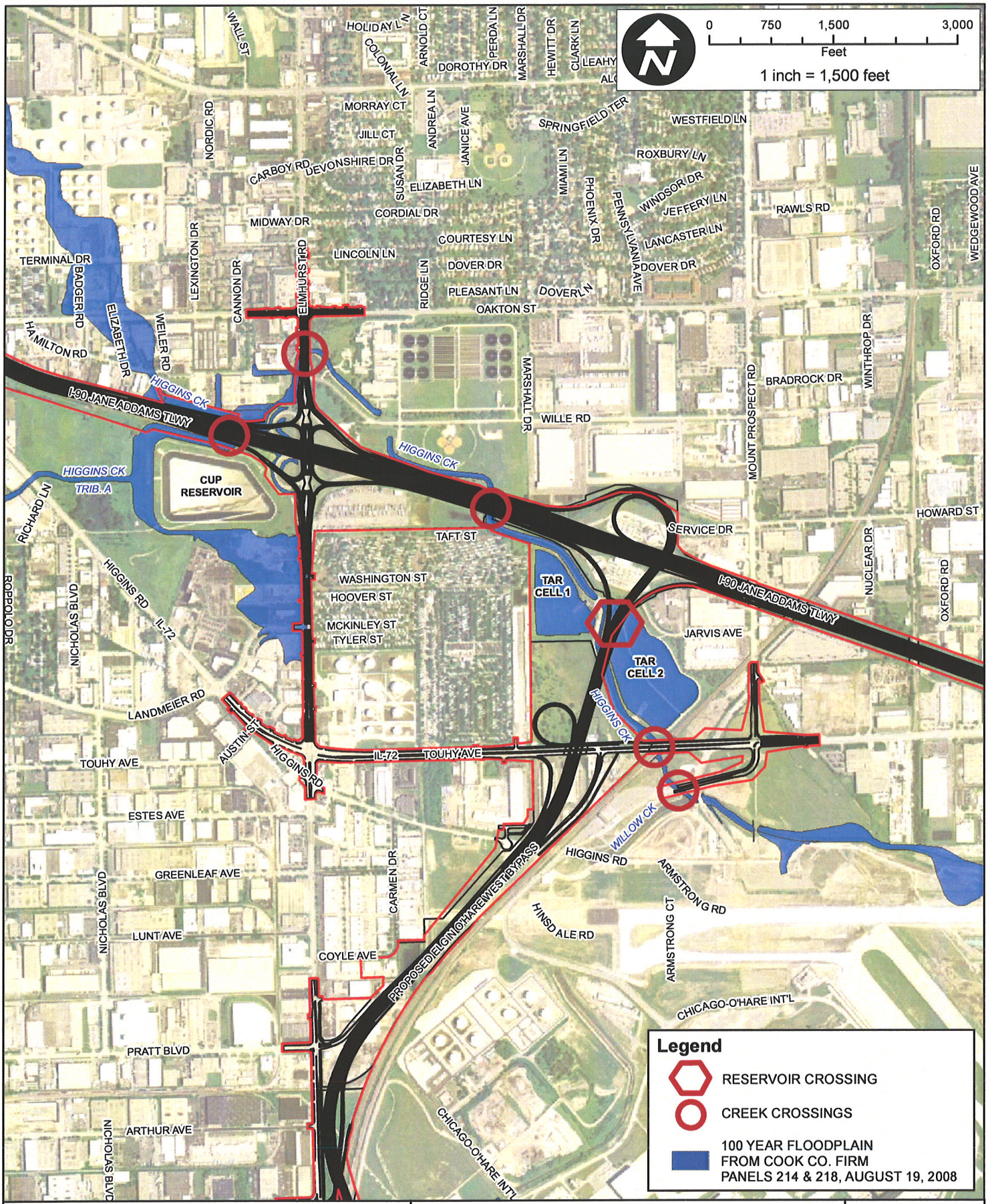
CLIENT:
ILLINOIS DEPARTMENT OF TRANSPORTAION

NO	DATE	NATURE OF REVISION

DSGN.
DWN: DWALTERS
CHKD.
SCALE: 1:7,000'
CHKD. MODEL: ArcGIS 10
PLOT DATE 1/6/2012
FILE NAME Drainage Exhibit Revised 8.5X11
PATH N:\dot\070404\GIS\Exhibits\Drainage Exhibit Revised 8.5X11.mxd

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

PROJ. NO. 070404
DATE:
SHEET 0 OF 0
DRAWING NO.
EXH 1A



CLIENT:

ILLINOIS DEPARTMENT OF TRANSPORTATION

TITLE:

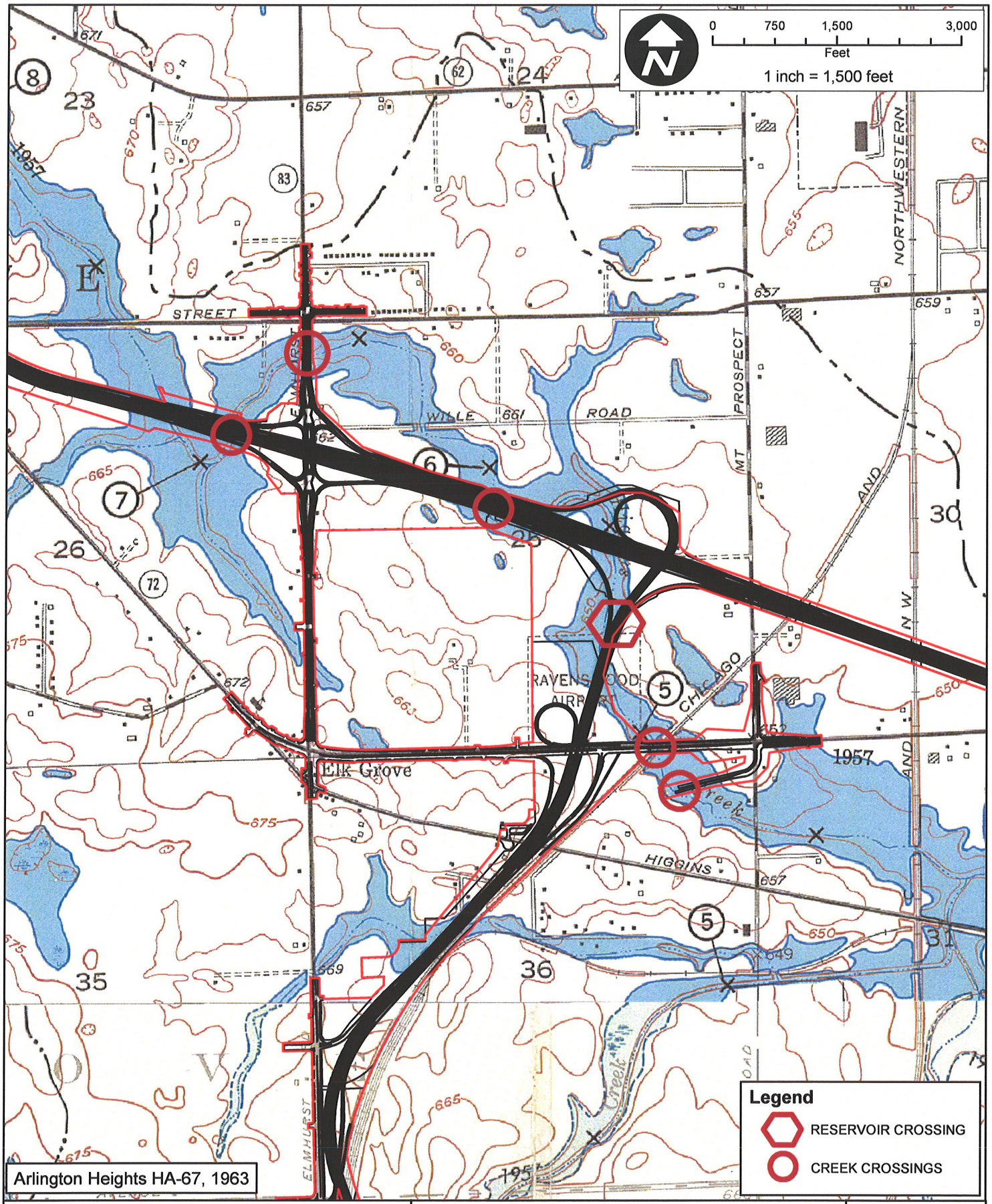
ELGIN O'HARE - WEST BYPASS
HIGGINS CREEK
FLOOD INSURANCE RATE MAP

PROJ. NO.	070404
DATE:	11-01-2010
SHEET	0 OF 0
DRAWING NO.	EXH 1B

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:					

Map Document: (N:\ldot\070404\GIS\ExhibitsHA and FIRM Exhibits\FIRM Exhibits\Higgins Creek.mxd)
11/1/2010 – 13:45:39



CLIENT:
ILLINOIS DEPARTMENT OF TRANSPORTATION

TITLE:
ELGIN O'HARE - WEST BYPASS
HIGGINS CREEK
USGS HYDRUALIC INVESTIGATIONS ATLAS

PROJ. NO.	070404
DATE:	11-01-2010
SHEET	0 OF 0
DRAWING NO.	EXH 2

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

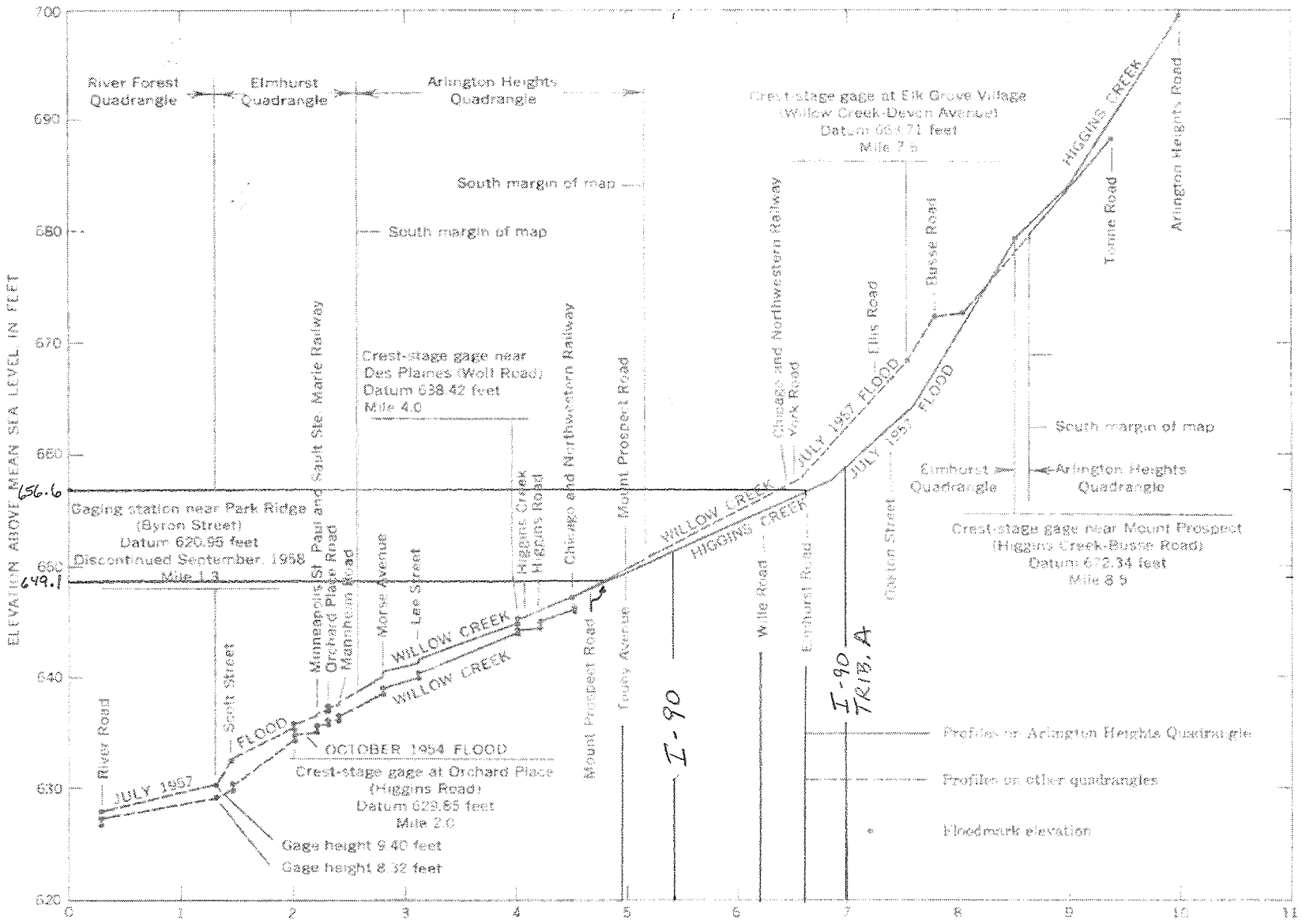
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DWN.			GIS USER	MHAYES
CHKD.			PLOT DATE	
FILE:				

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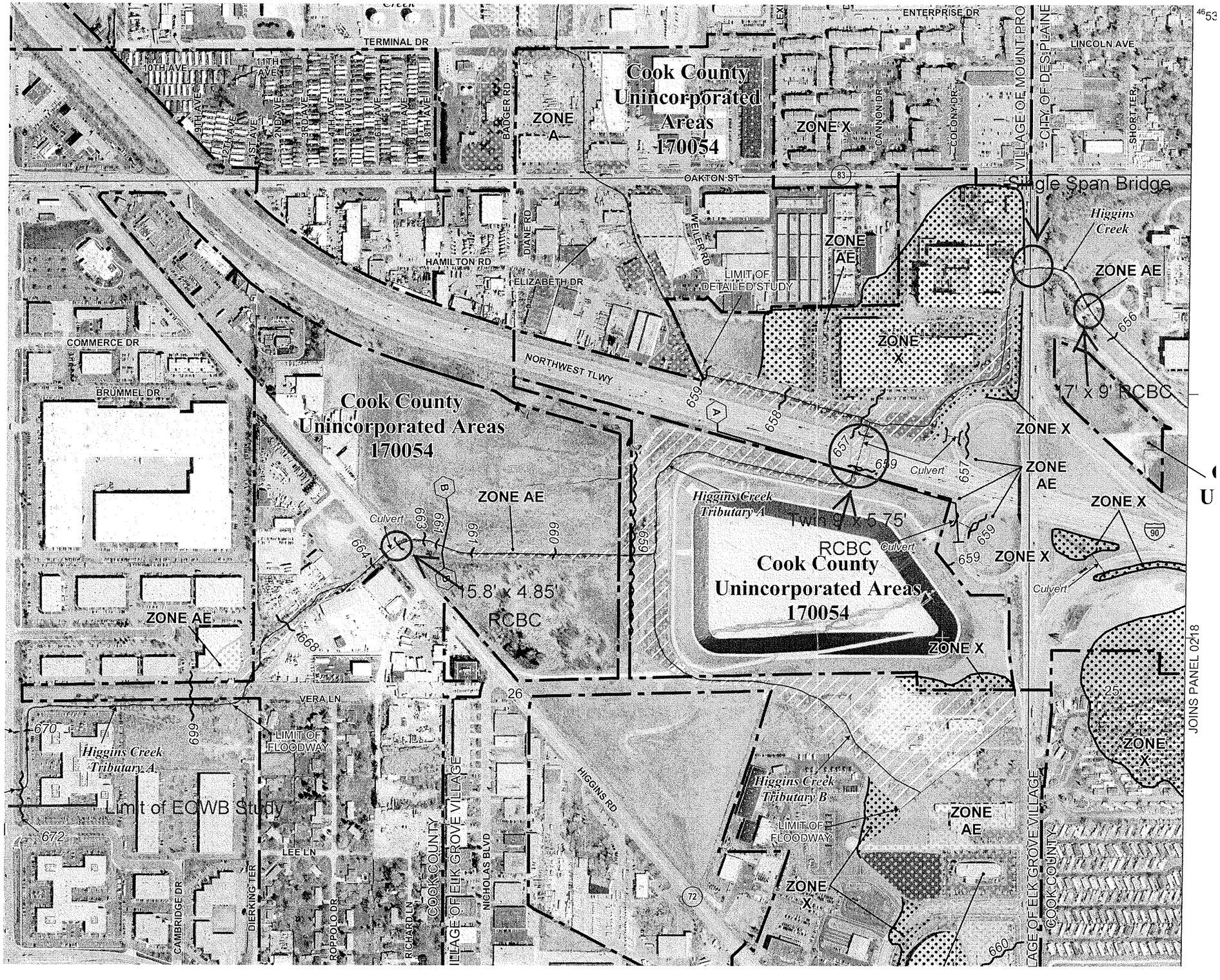
File Selection Navigate View Layout Measure Help

USGS ARLINGTON HEIGHTS HA-67, 1963



USGS FIGURE 9.—*Profiles of floods on Willow and Higgins Creeks.*

EXH 3



MAP SCALE 1" = 500'

250 0 500 1000 FEET

0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0214J

FIRM

FLOOD INSURANCE RATE MAP

COOK COUNTY, ILLINOIS

AND INCORPORATED AREAS

PANEL 214 OF 832

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CHICAGO, CITY OF	170074	0214	J
COOK COUNTY	170054	0214	J
DES PLAINES, CITY OF	170081	0214	J
ELK GROVE VILLAGE, VILLAGE OF	170088	0214	J
MOUNT PROSPECT, VILLAGE OF	170129	0214	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

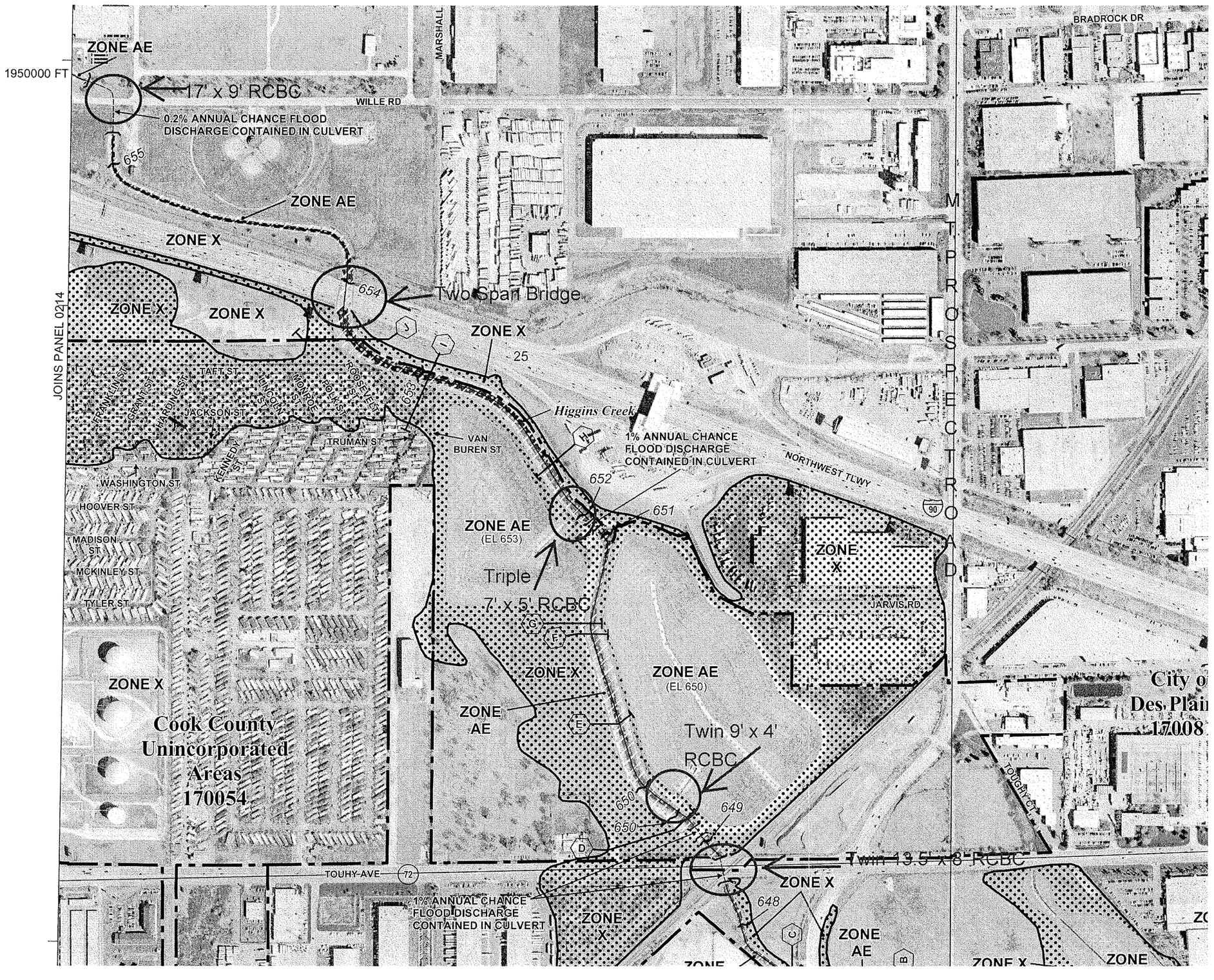
MAP NUMBER
17031C0214J

MAP REVISED
AUGUST 19, 2008

Federal Emergency Management Agency

EXH 4

This is an official copy of a portion of the above referenced flood map. It was extracted using FIRMette - Desktop version 3.0. This map does not reflect changes or amendments which may have been made subsequent to



MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0218J

FIRM

FLOOD INSURANCE RATE MAP

COOK COUNTY, ILLINOIS

AND INCORPORATED AREAS

PANEL 218 OF 832

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CHICAGO, CITY OF	170074	0218	J
COOK COUNTY	170054	0218	J
DES PLAINES, CITY OF	170081	0218	J
ELK GROVE VILLAGE, VILLAGE OF	170088	0218	J

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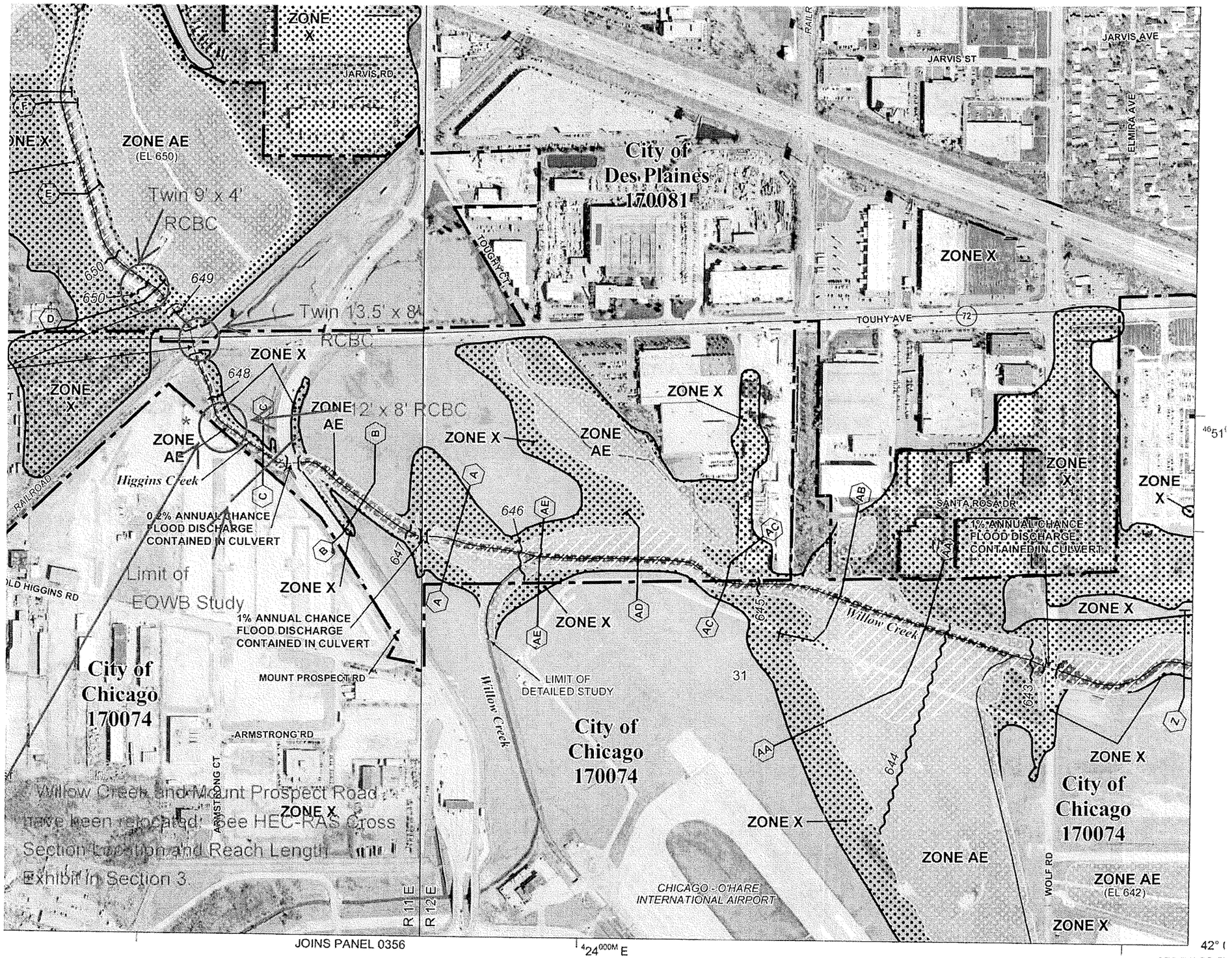
MAP NUMBER
17031C0218J

MAP REVISED
AUGUST 19, 2008

Federal Emergency Management Agency

EXH 5A

This is an official copy of a portion of the above referenced flood map. It was extracted using FIRMette - Desktop version 3.0. This map does not reflect changes or amendments which may have been made subsequent to



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0218J

FIRM

FLOOD INSURANCE RATE MAP

COOK COUNTY, ILLINOIS

AND INCORPORATED AREAS

PANEL 218 OF 832

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CHICAGO, CITY OF	170074	0218	J
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ELK GROVE VILLAGE, VILLAGE OF	170088	0218	J

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17031C0218J

MAP REVISED
AUGUST 19, 2008

Federal Emergency Management Agency

EXH 5B

This is an official copy of a portion of the above referenced flood map. It was extracted using PIRMette - Desktop version 3.0. This map does not reflect changes or amendments which may have been made subsequent to

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4989000M N	1000-meter Universal Transverse Mercator grid values, zone 16
1565000 FT	5000-foot grid tick: Illinois State Plane East Coordinate System, 3776 zone (FIPSZONE 1201) Transverse Mercator
DX5510	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
NOVEMBER 6, 2000

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

December 20, 2002; February 4, 2004; June 2, 2005; December 16, 2005; November 16, 2006; and April 16, 2007

August 19, 2008 - to reflect updated topographic information, to update corporate limits, to add road names, to incorporate previously issued Letters of Map Revision, to change Base Flood Elevations, to add Special Flood Hazard Areas and Base Flood Elevations, and to change zone designations.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

50 0 150 300 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0214J

FIRM

FLOOD INSURANCE RATE MAP

COOK COUNTY, ILLINOIS

AND INCORPORATED AREAS

PANEL 214 OF 832

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
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MOUNT PROSPECT, VILLAGE OF	170129	0214	J

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MAP NUMBER
17031C0214J

MAP REVISED
AUGUST 19, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using FIRMette - Desktop version 3.0. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. Further information about National Flood Insurance Program flood hazard maps is available at http://www.msc.fema.gov/.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0218J

FIRM

FLOOD INSURANCE RATE MAP

COOK COUNTY, ILLINOIS

AND INCORPORATED AREAS

PANEL 218 OF 832

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

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COMMUNITY	NUMBER	PANEL	SUFFIX
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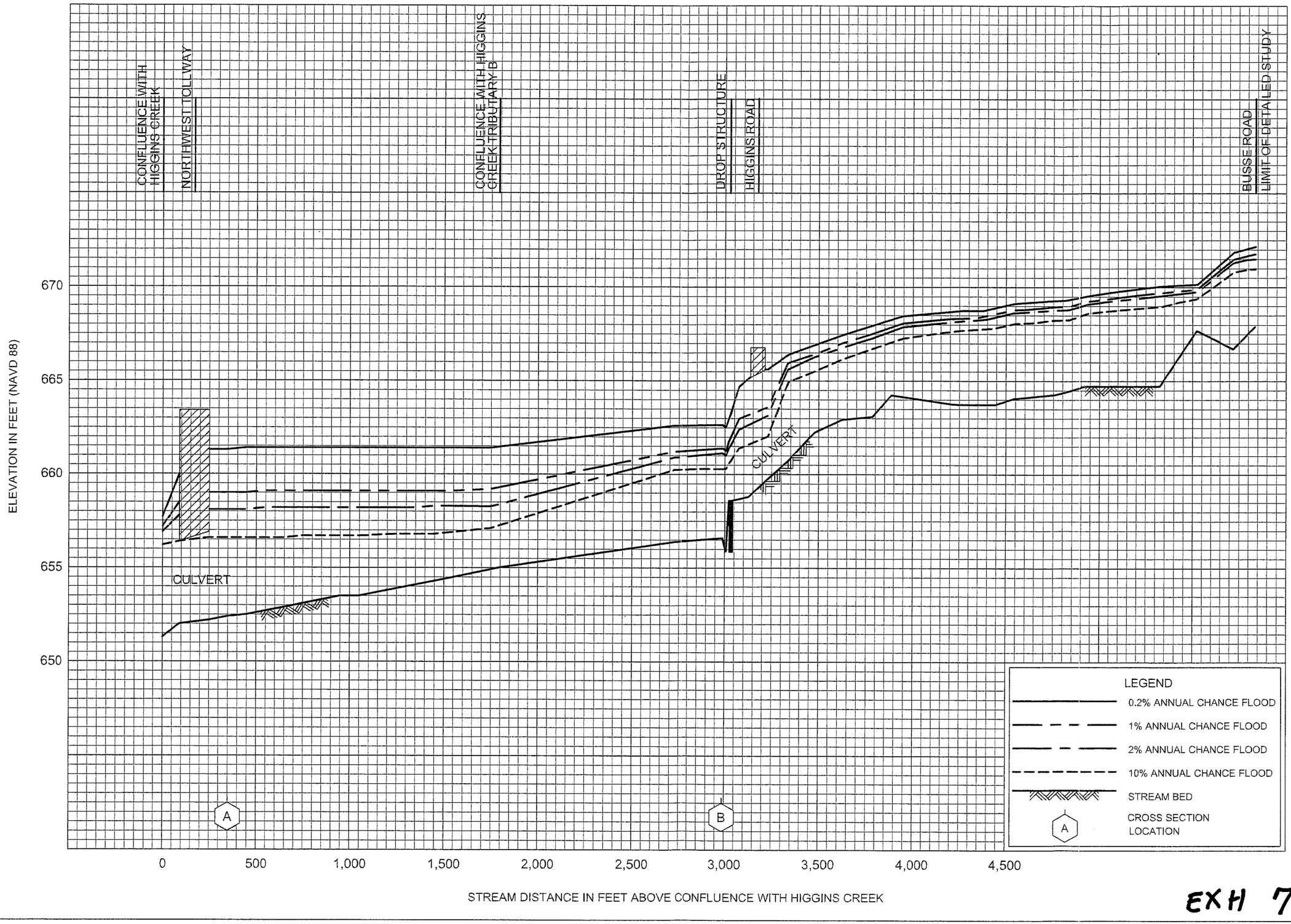
MAP REVISED
AUGUST 19, 2008

Federal Emergency Management Agency

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EXH 6

FIRM LEGEND



FLOOD PROFILES

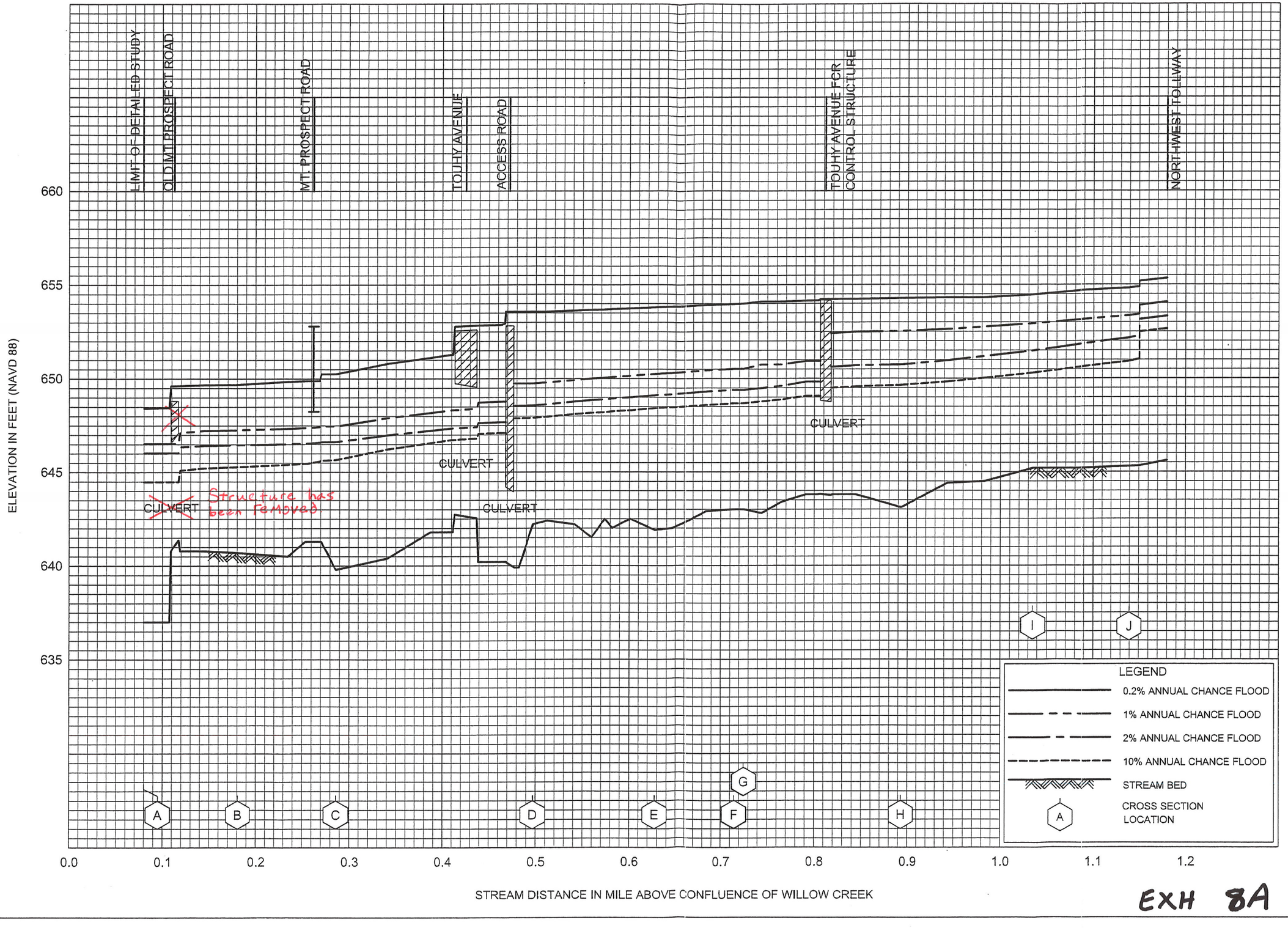
HIGGINS CREEK TRIBUTARY A

FEDERAL EMERGENCY MANAGEMENT AGENCY

COOK COUNTY, IL

AND INCORPORATED AREAS

EXH 7



EXH 8A

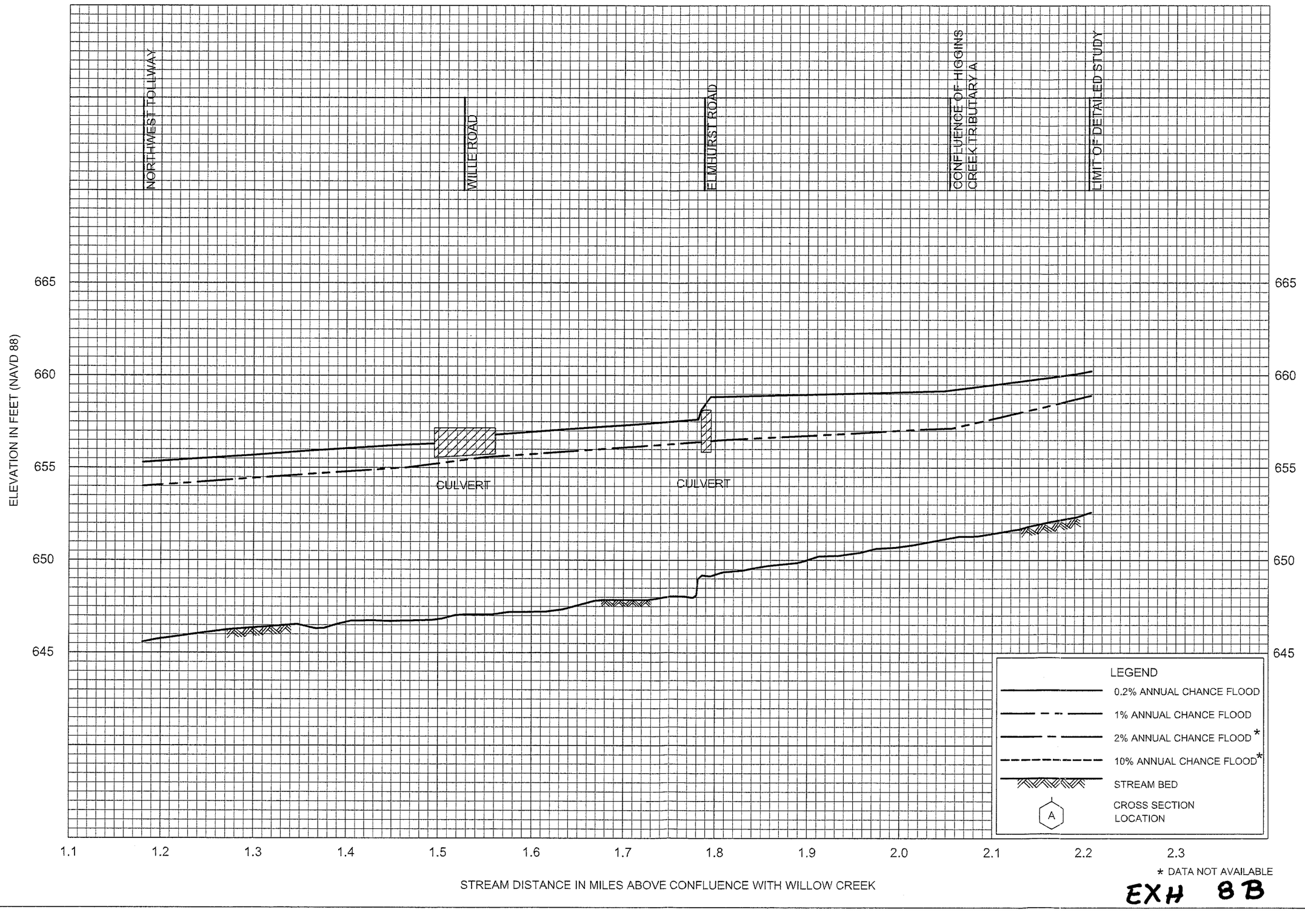
FLOOD PROFILES

HIGGINS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

COOK COUNTY, IL

AND INCORPORATED AREAS



EXH 8B

FLOOD PROFILES

HIGGINS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

COOK COUNTY, IL

AND INCORPORATED AREAS

153P



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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN–O'HARE WEST BYPASS
HIGGINS CREEK AND TRIBUTARY A
HEC–RAS CROSS SECTION LOCATION AND REACH LENGTH EXHIBIT

SHEET NO. 1 OF 1 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	EXHIBIT NO.
				3.1
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

Drawings

Tab 4

SECTION 4

SITE PHOTOGRAPHS



Photo 1: Upstream face of Mt. Prospect Road crossing of Higgins Creek.



Photo 2: Downstream face of IL 72 (Touhy Avenue) crossing of Higgins Creek.



Photo 3: Downstream face of crossing of Higgins Creek near Touhy Avenue Reservoir (TAR) Cell 2.



Photo 4: Upstream face of crossing of Higgins Creek near Touhy Avenue Reservoir (TAR) Cell 1.

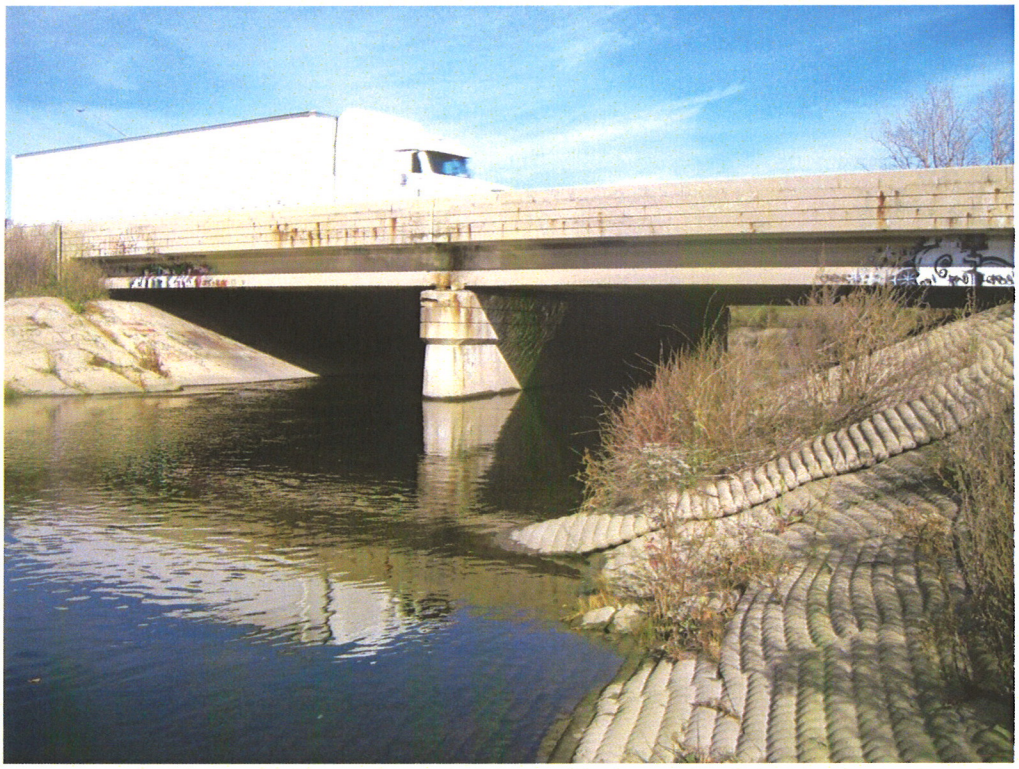


Photo 5: Downstream face of I-90 bridge over Higgins Creek.



Photo 6: Upstream face of I-90 bridge over Higgins Creek.



Photo 7: Higgins Creek downstream of Wille Road.



Photo 8: Downstream face of Wille Road crossing of Higgins Creek.



Photo 9: Upstream face of Wille Road crossing of Higgins Creek.



Photo 10: Downstream face of Kirie WRP entrance road crossing of Higgins Creek.



Photo 11: Upstream face of Kirie WRP entrance road crossing of Higgins Creek.



Photo 12: Higgins Creek downstream of Elmhurst Road.



Photo 13: Downstream face of Elmhurst Road crossing of Higgins Creek.



Photo 14: Upstream face of Elmhurst Road crossing of Higgins Creek.



Photo 15: Higgins Creek downstream of dam, upstream of Elmhurst Road



Photo 16: Small dam upstream of Elmhurst Road on Higgins Creek.



Photo 17: Higgins Creek/pond upstream of small dam, looking south.



Photo 18: Higgins Creek/pond downstream of confluence with Tributary A, looking east.



Photo 19: Downstream face of I-90 crossing of Higgins Creek Tributary A.



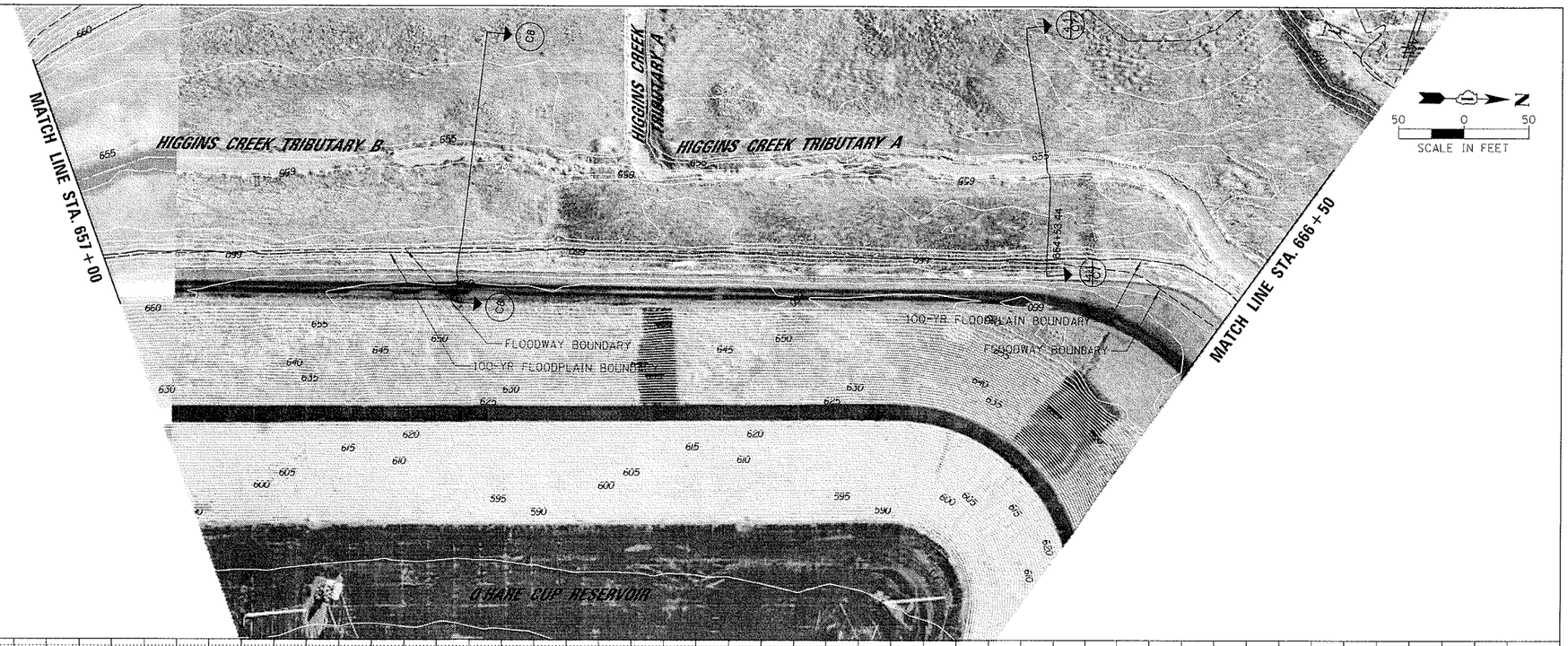
Photo 20: Upstream face of I-90 crossing of Higgins Creek Tributary A.

Tab 5

SECTION 5

STREAMBED PLAN AND PROFILE
ROADWAY PLAN AND PROFILE

STREAMBED PLAN AND PROFILE



PLAN

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PLOTTED	
ALIGNMENT CHECKED	
NOTE BOOK	
NO.	

DATE

PROFILE

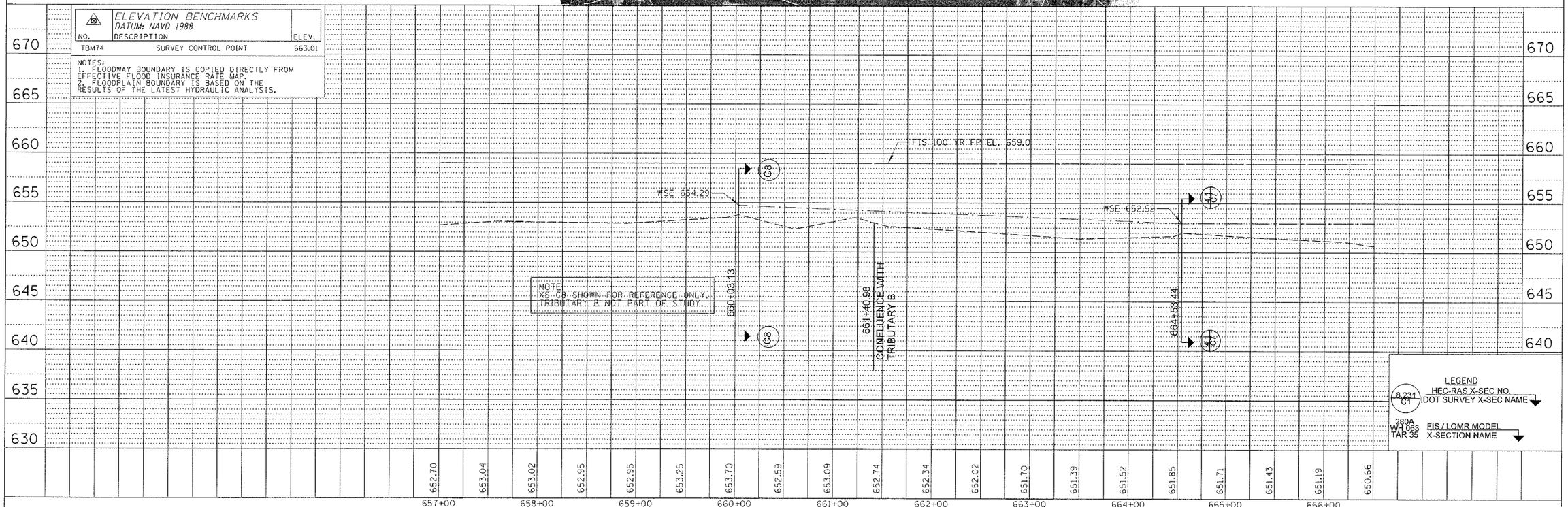
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NO.	

DATE

ELEVATION BENCHMARKS
DATUM: NAVD 1988

NO.	DESCRIPTION	ELEV.
TBM74	SURVEY CONTROL POINT	663.01

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
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280A / WH 063 / TAR 35 — FIS / LOMR MODEL X-SECTION NAME

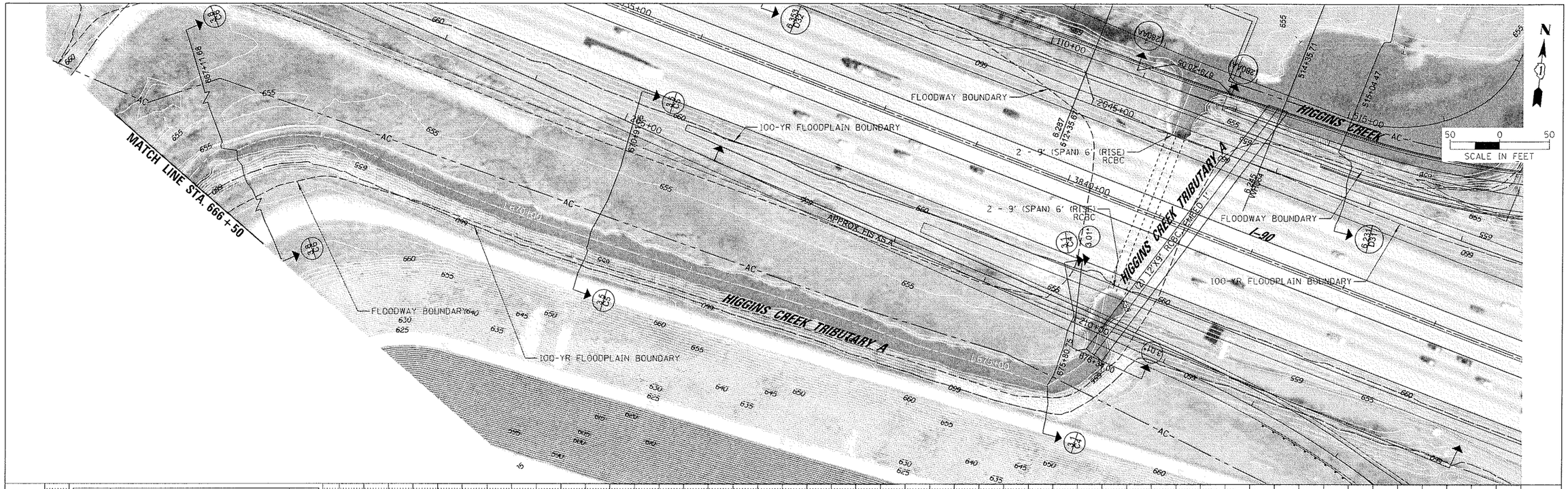
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK TRIBUTARY A
STREAMBED PLAN AND PROFILE

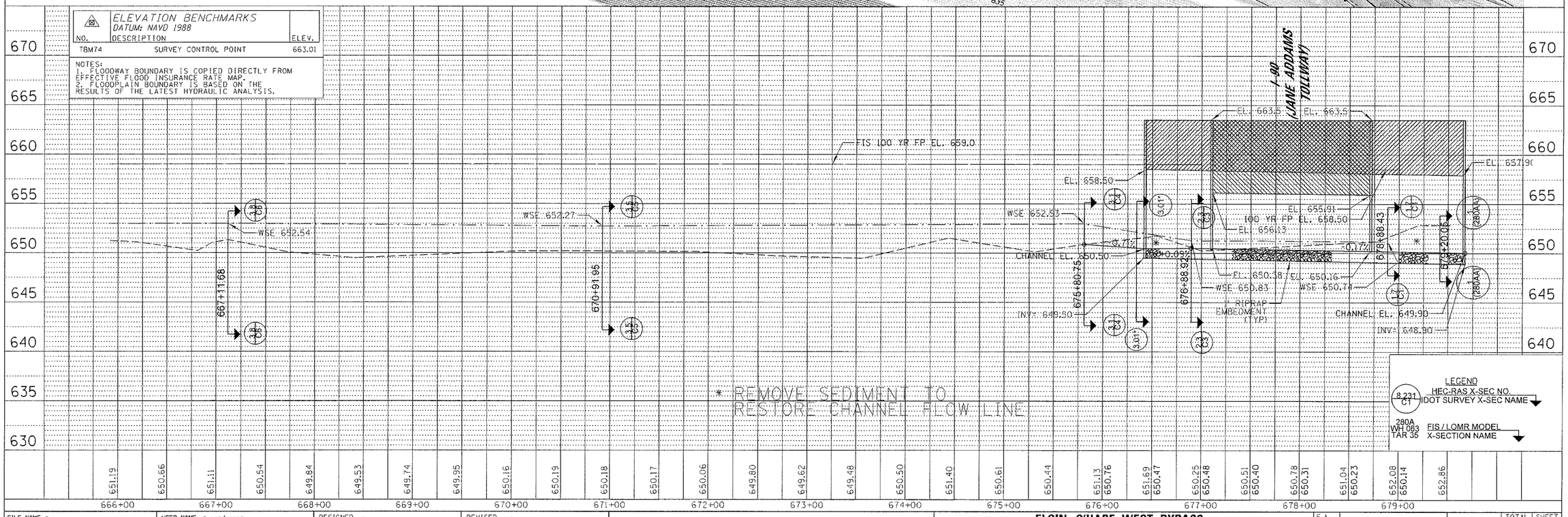
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F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



ELEVATION BENCHMARKS (DATUM: NAVD 1988)		
NO.	DESCRIPTION	ELEV.
TBM74	SURVEY CONTROL POINT	663.01

NOTES:
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK TRIBUTARY A
STREAMBED PLAN AND PROFILE

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

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

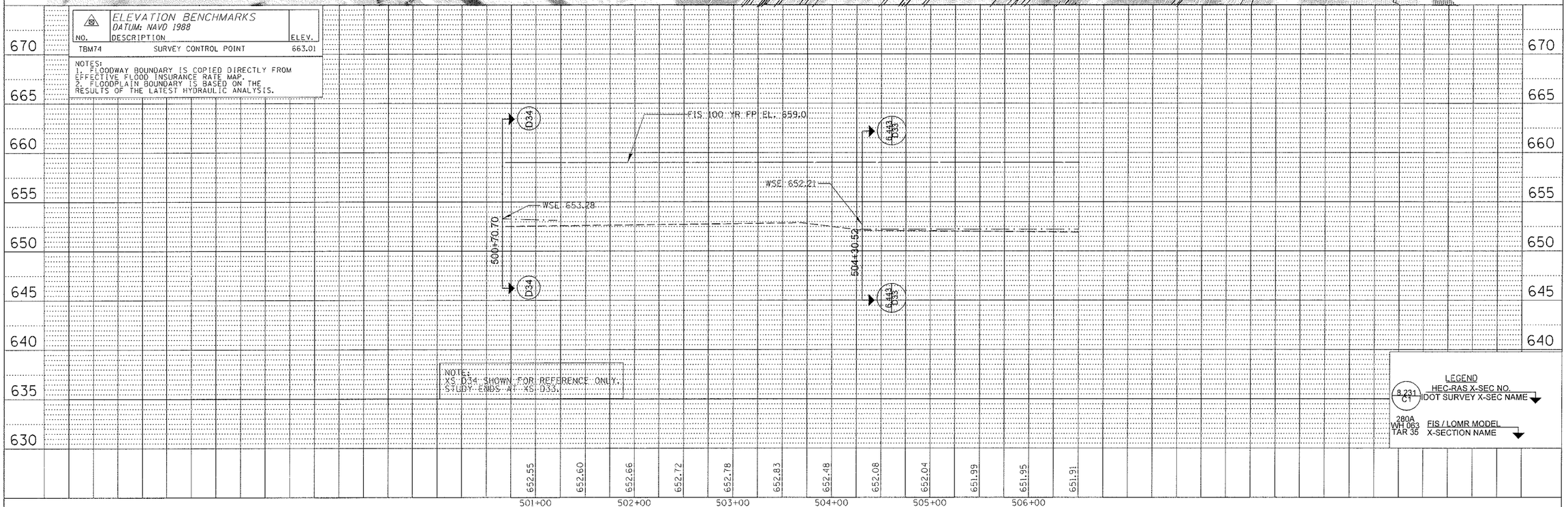


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NOTE BOOK
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NOTE BOOK
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STRUCTURE NO(S)/HS CHKD

ELEVATION BENCHMARKS DATUM: NAVD 1988		
NO.	DESCRIPTION	ELEV.
TBM74	SURVEY CONTROL POINT	663.01

NOTES:
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NOTE:
XS D34 SHOWN FOR REFERENCE ONLY.
STUDY ENDS AT XS D33.

LEGEND
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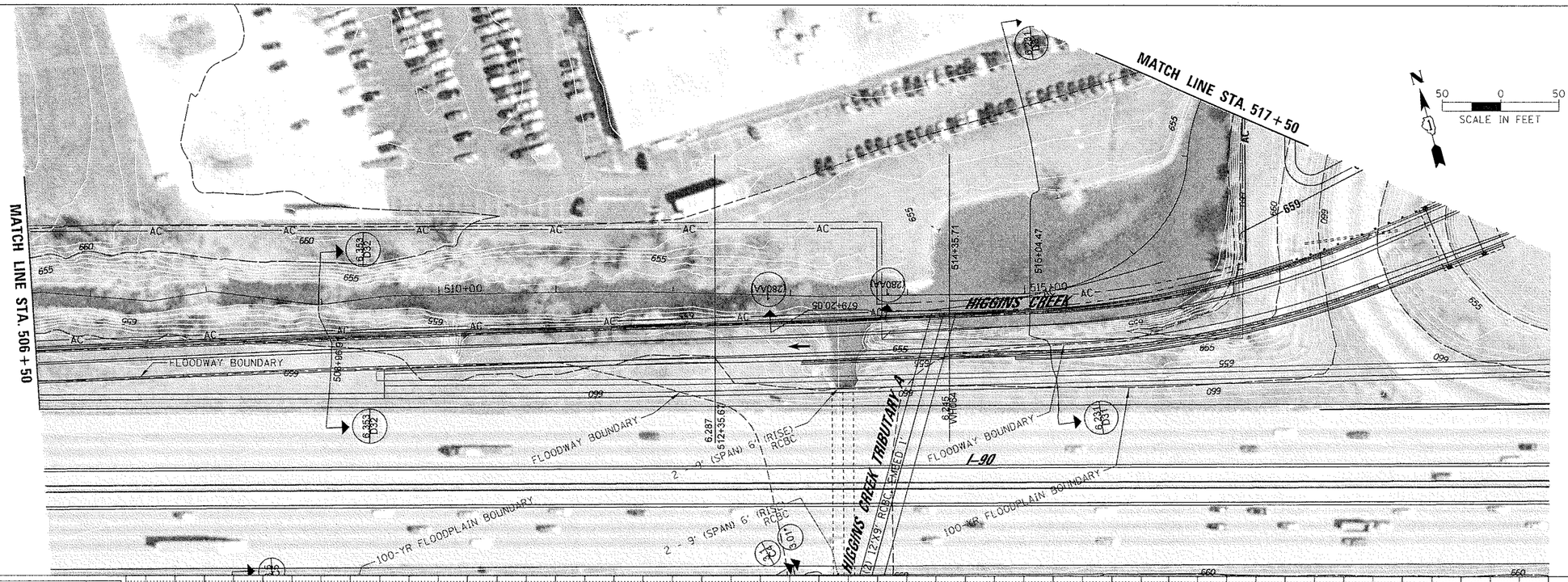
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK
STREAMBED PLAN AND PROFILE

SCALE: | SHEET NO. 1 OF 9 SHEETS | STA. | TO STA.

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



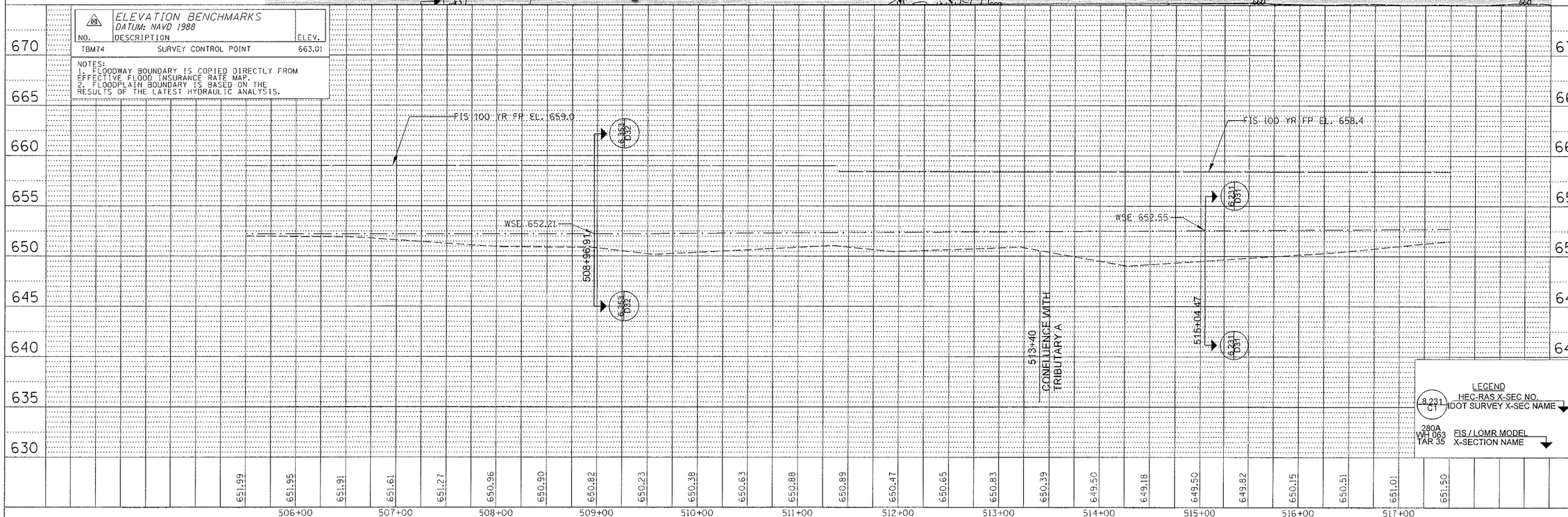
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ELEVATION BENCHMARKS
DATUM: NAVD 1988

NO.	DESCRIPTION	ELEV.
TBM74	SURVEY CONTROL POINT	663.01

NOTES:
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LEGEND
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280A WH 063 TAR 35 — FIS / LOMR MODEL X-SECTION NAME

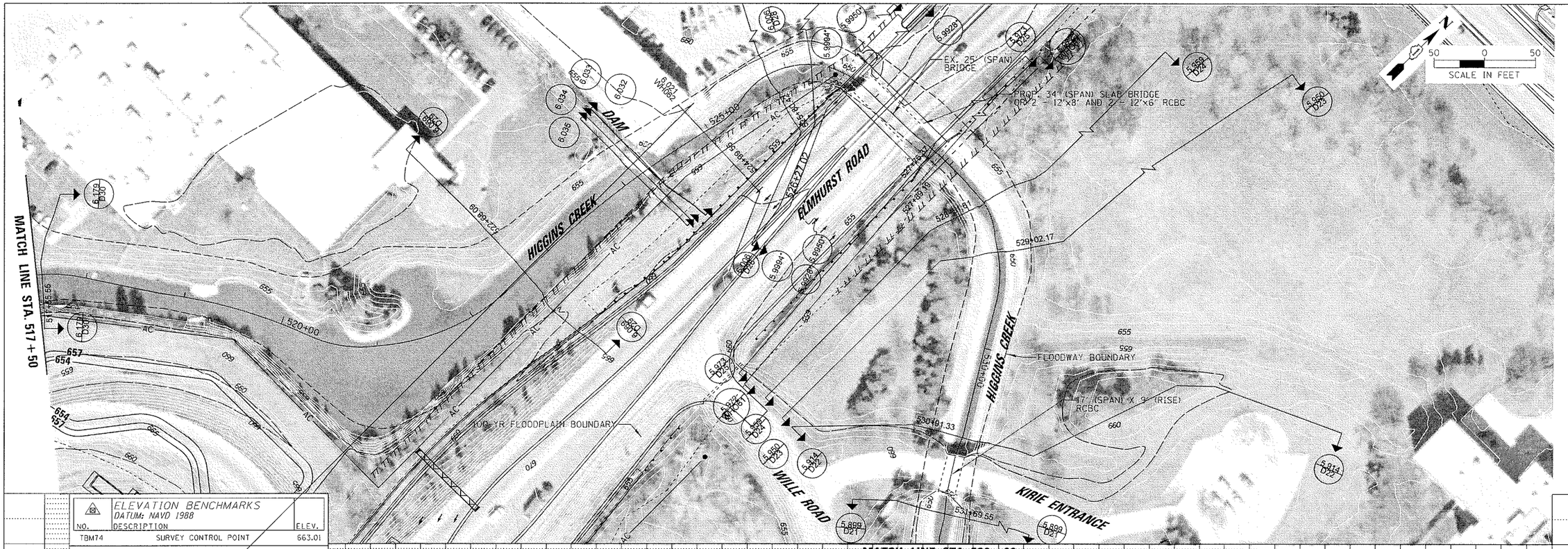
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK
STREAMBED PLAN AND PROFILE

SCALE:
SHEET NO. 2 OF 9 SHEETS
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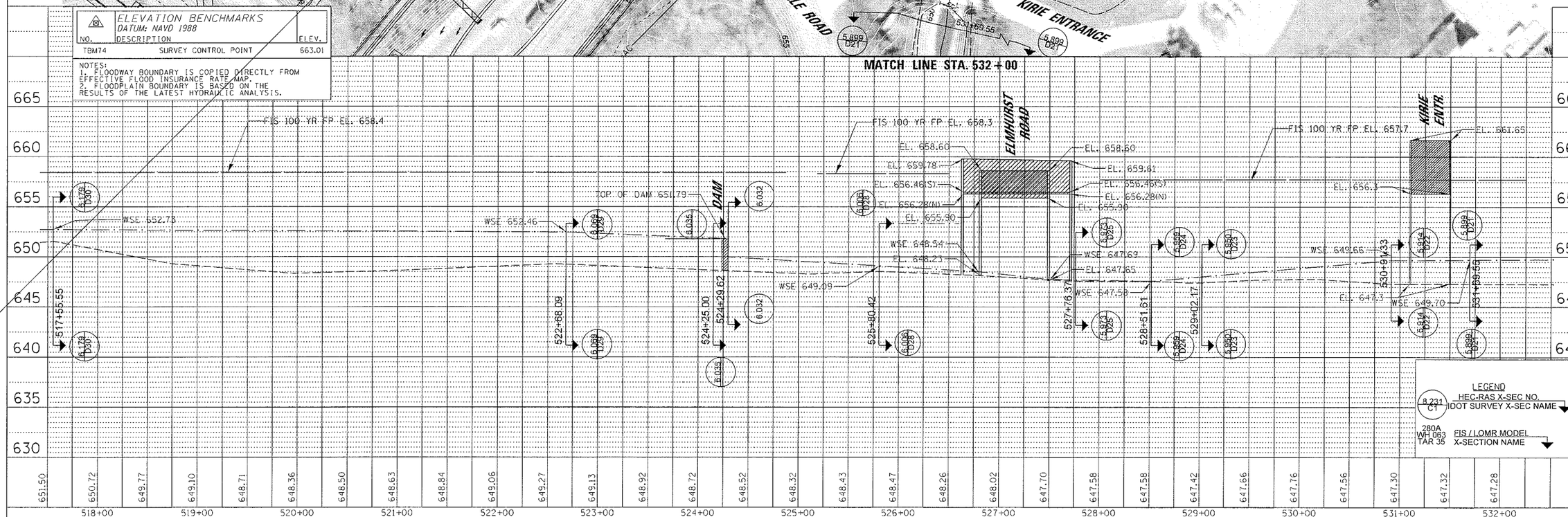
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		



ELEVATION BENCHMARKS DATUM: NAVD 1988		
NO.	DESCRIPTION	ELEV.
TBM74	SURVEY CONTROL POINT	663.01

NOTES:
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2. FLOODPLAIN BOUNDARY IS BASED ON THE RESULTS OF THE LATEST HYDRAULIC ANALYSIS.

MATCH LINE STA. 532+00



LEGEND
8.231 C1 — HEC-RAS X-SEC NO. / IDOT SURVEY X-SEC NAME
290A WH 083 TAR 35 — FIS / LOMR MODEL X-SECTION NAME

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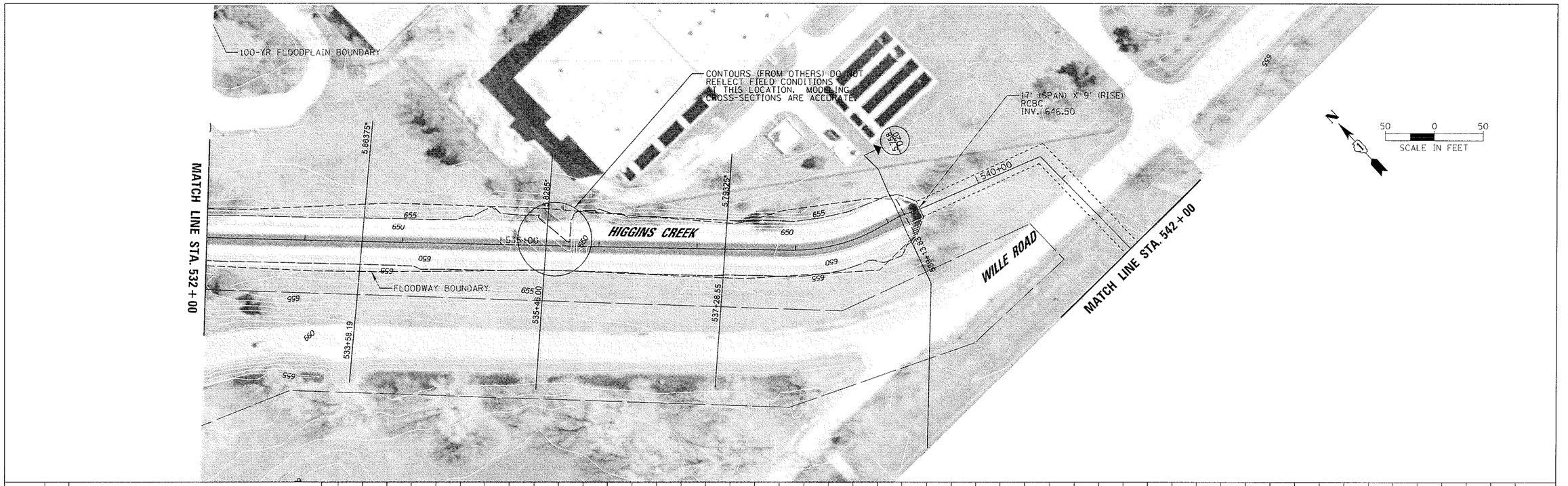
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK
STREAMBED PLAN AND PROFILE

SCALE: | SHEET NO. 3 OF 9 SHEETS | STA. | TO STA.

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



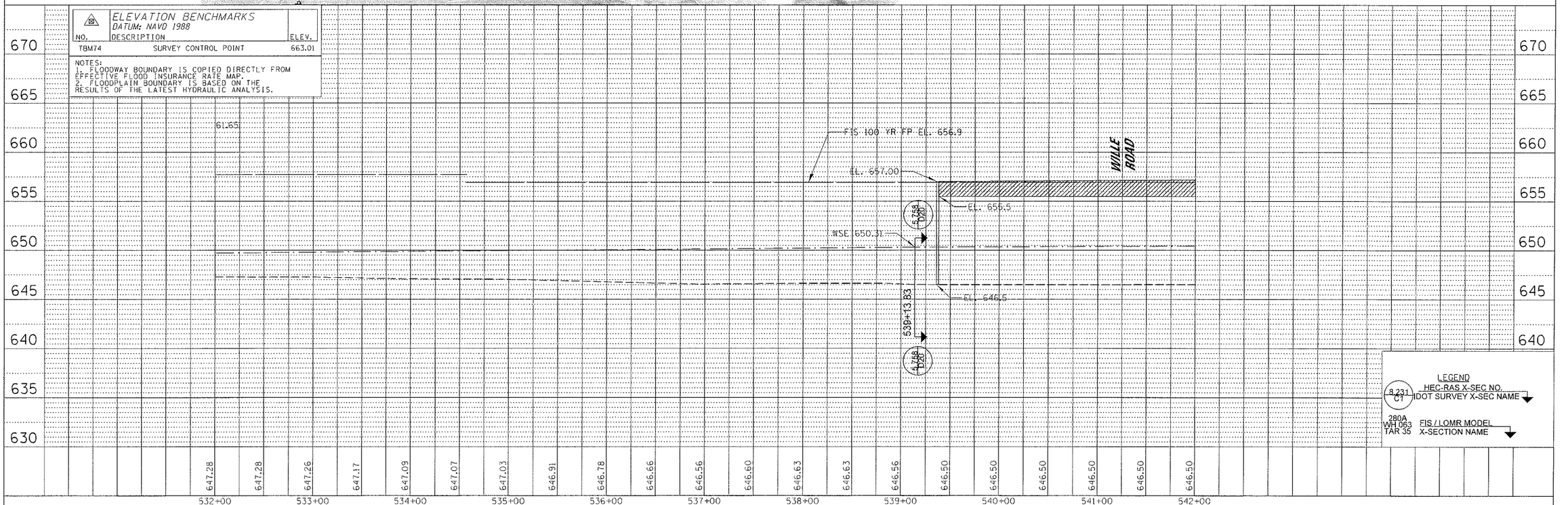
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STRUCTURE NO(S)
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ELEVATION BENCHMARKS
DATUM: NAVD 1988

NO.	DESCRIPTION	ELEV.
TBM74	SURVEY CONTROL POINT	663.01

NOTES:
1. FLOODWAY BOUNDARY IS COPIED DIRECTLY FROM EFFECTIVE FLOOD INSURANCE RATE MAP.
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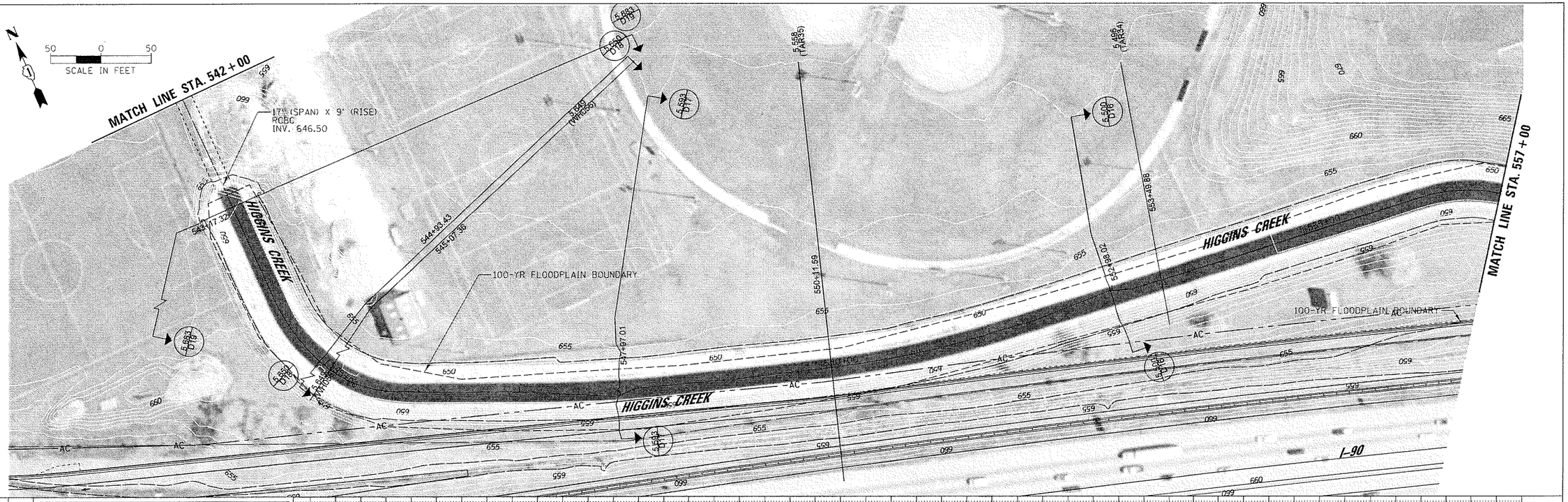
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK
STREAMBED PLAN AND PROFILE

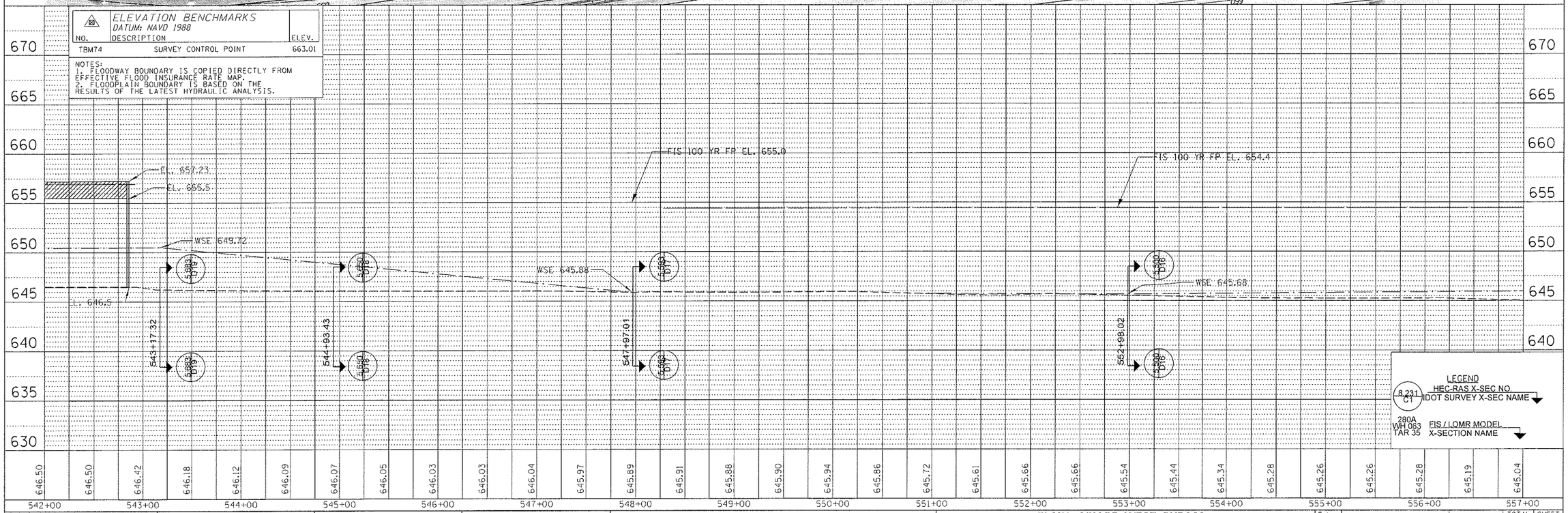
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		CONTRACT NO.		
		ILLINOIS	FED. AID PROJECT	



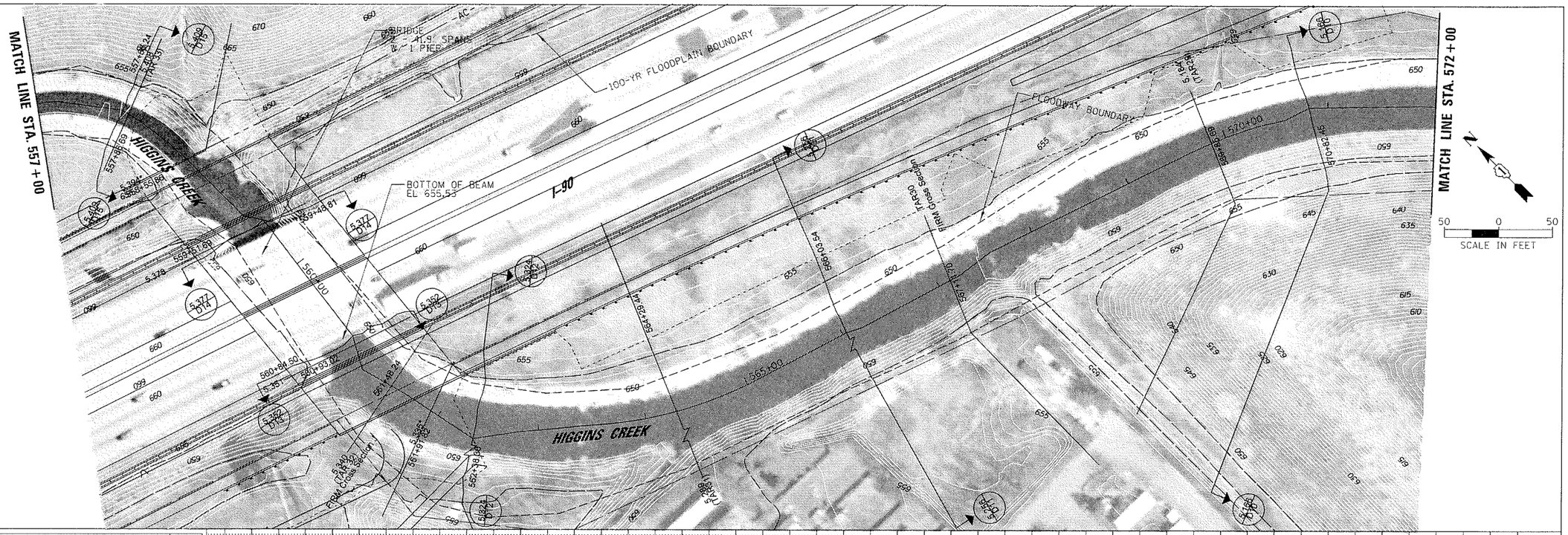
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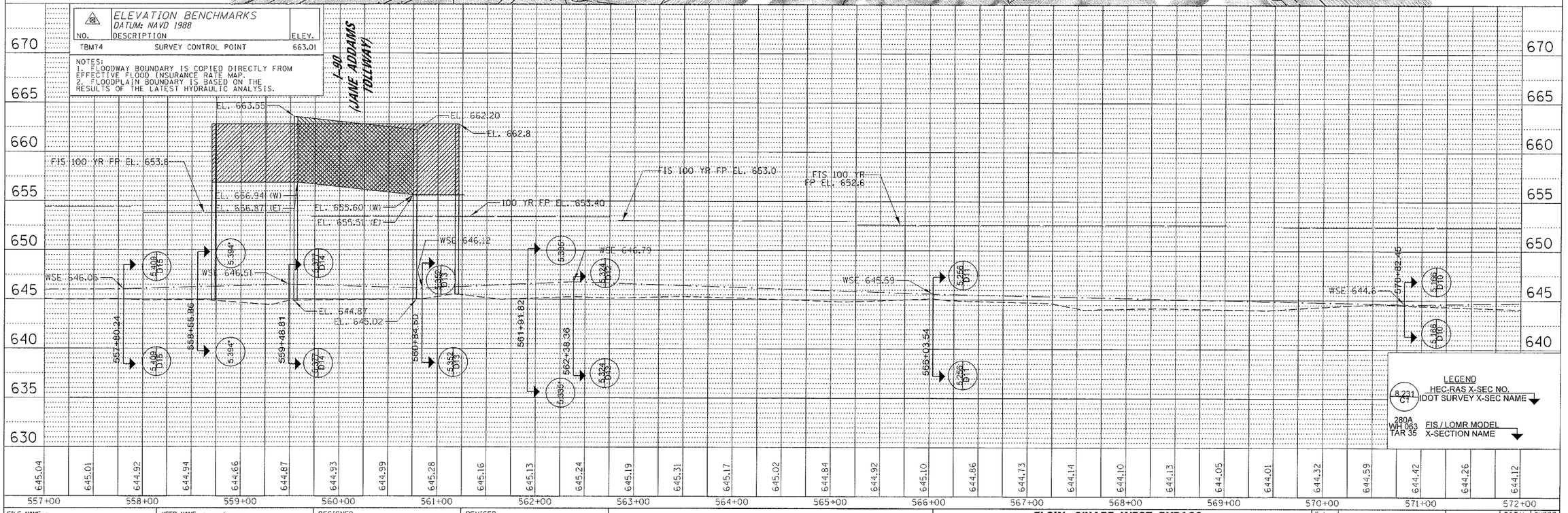
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	PLOT DATE = 10/5/2012	DRAWN -	REVISED -	SCALE: SHEET NO. 5 OF 9 SHEETS STA. TO STA.

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



ELEVATION BENCHMARKS DATUM: NAVD 1988		
NO.	DESCRIPTION	ELEV.
TBM74	SURVEY CONTROL POINT	663.01

NOTES:
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LEGEND
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280A WA1.053 TAR 35 — FIS / LOMR MODEL X-SECTION NAME

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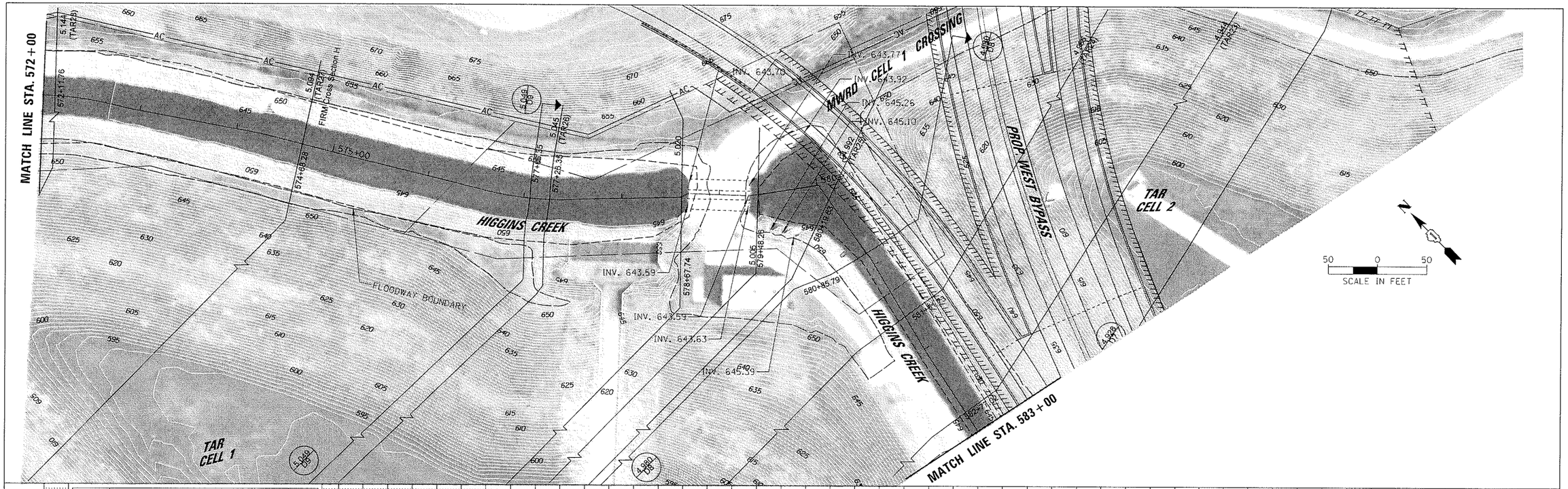
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		DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK
STREAMBED PLAN AND PROFILE

SCALE: | SHEET NO. 6 OF 9 SHEETS | STA. | TO STA.

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



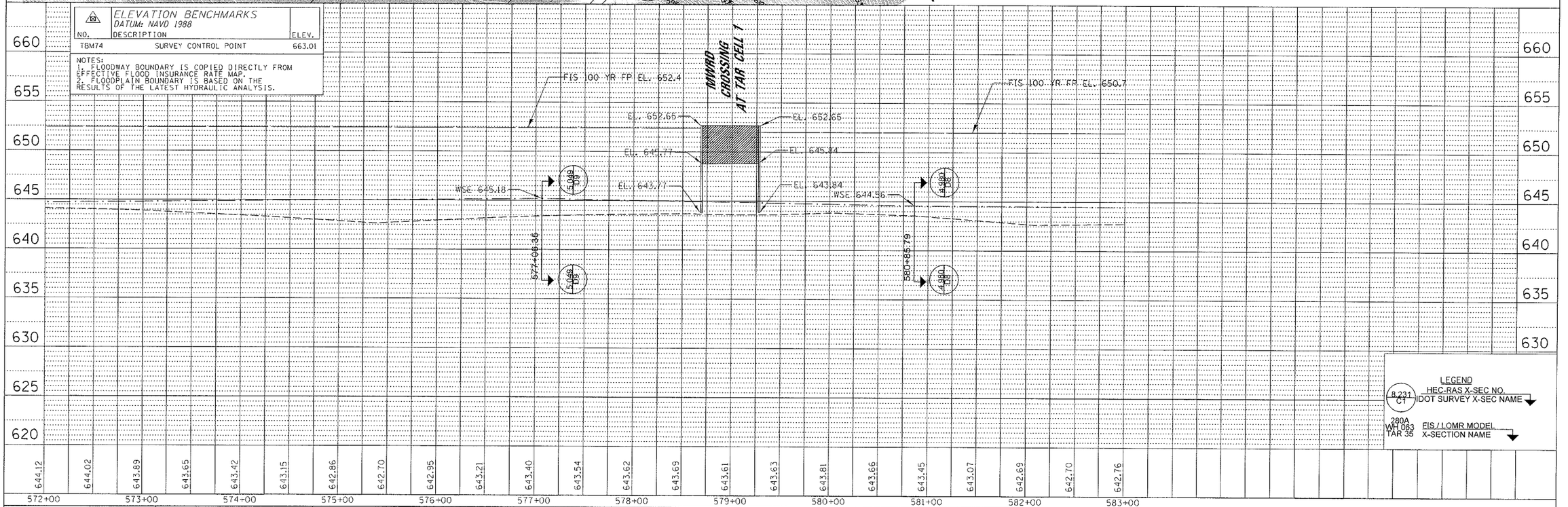
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ELEVATION BENCHMARKS
DATUM: NAVD 1988

NO.	DESCRIPTION	ELEV.
TBM74	SURVEY CONTROL POINT	663.01

NOTES:
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LEGEND
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IDOT SURVEY X-SEC NAME
FIS / LOMR MODEL
X-SECTION NAME

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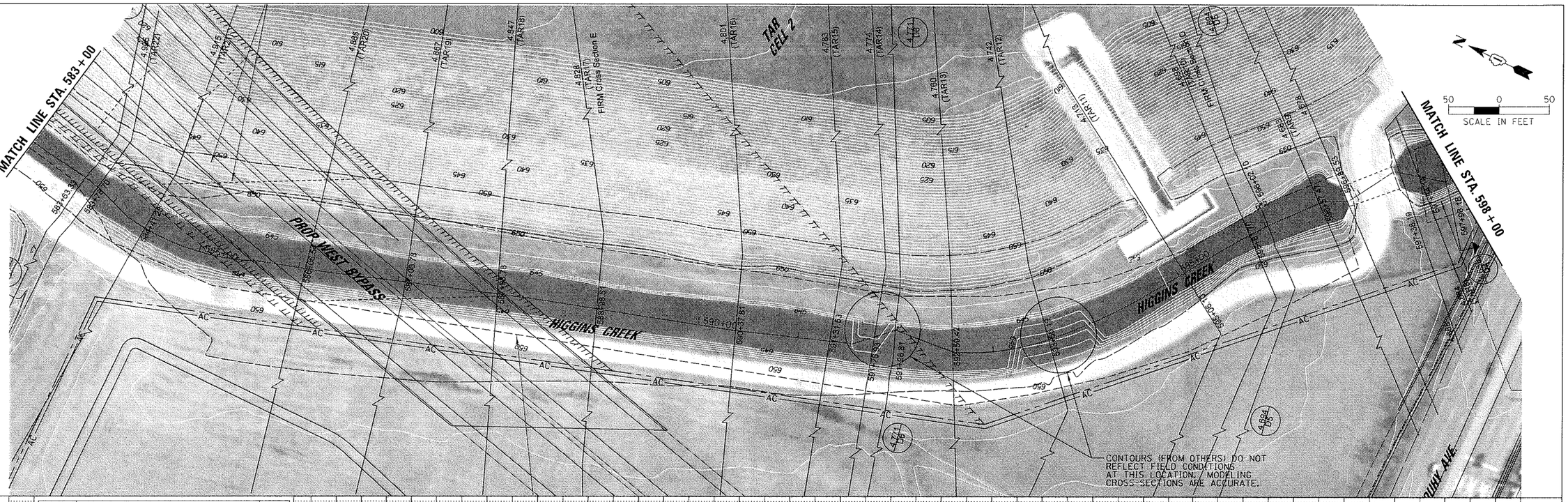
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK
STREAMBED PLAN AND PROFILE

SCALE:

SHEET NO. 7 OF 9 SHEETS	STA.	TO STA.

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



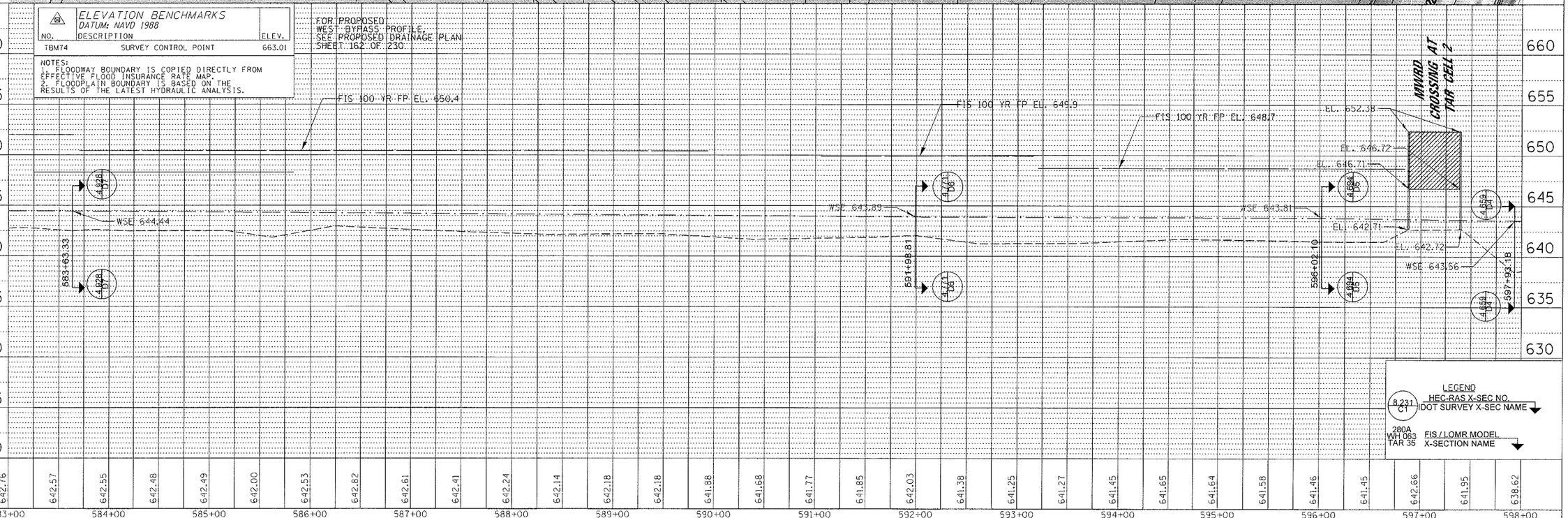
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NO.	DESCRIPTION	ELEV.
TBM74	SURVEY CONTROL POINT	663.01

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.

FOR PROPOSED WEST BYPASS PROFILE, SEE PROPOSED DRAINAGE PLAN SHEET 162 OF 230.



642.76 642.57 642.55 642.48 642.49 642.00 642.53 642.82 642.61 642.41 642.24 642.14 642.18 642.18 641.88 641.68 641.77 641.85 642.03 641.38 641.25 641.27 641.45 641.65 641.64 641.58 641.46 641.45 642.66 641.95 638.62

583+00 584+00 585+00 586+00 587+00 588+00 589+00 590+00 591+00 592+00 593+00 594+00 595+00 596+00 597+00 598+00

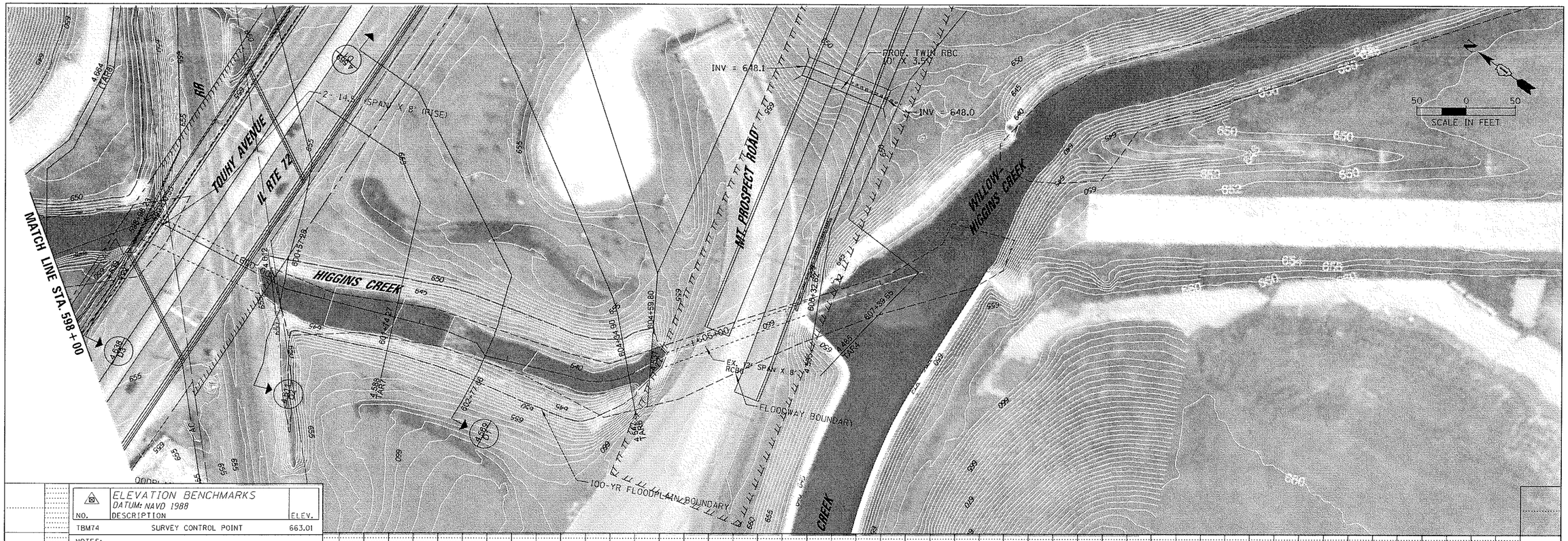
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	PLOT SCALE = 100'	DRAWN -	REVISED -	
	PLOT DATE = 10/5/2012	CHECKED -	REVISED -	
		DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK
STREAMBED PLAN AND PROFILE

SCALE: | SHEET NO. 8 OF 9 SHEETS | STA. | TO STA.

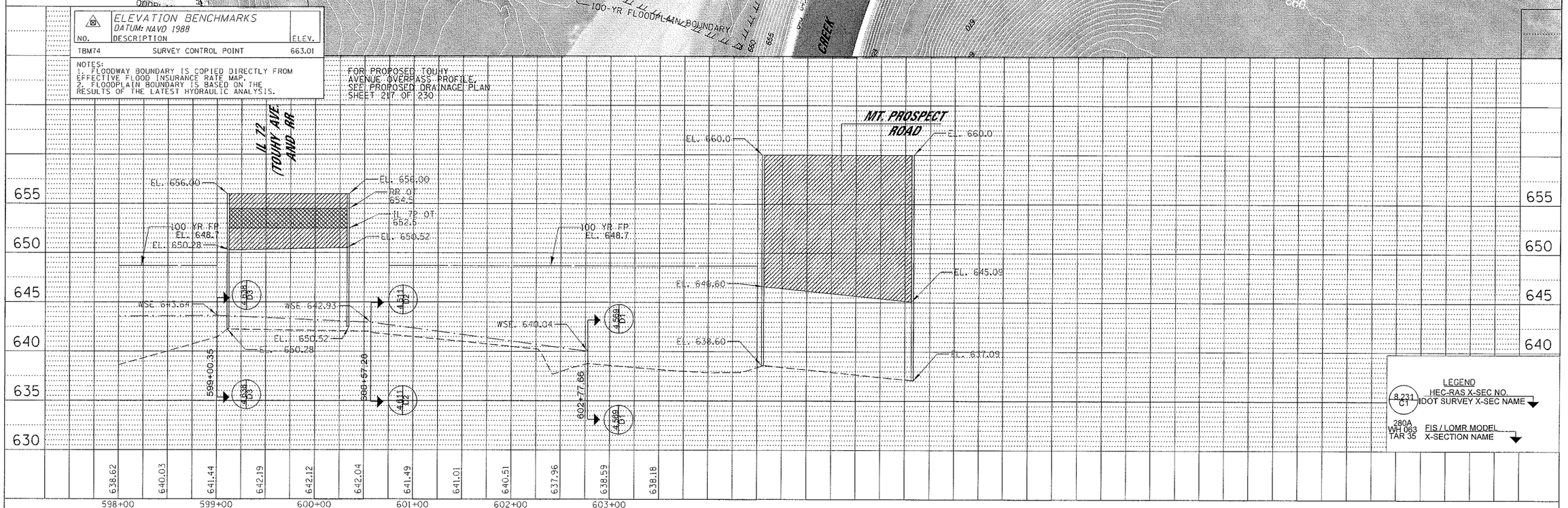
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
		ILLINOIS	FED. AID PROJECT	



ELEVATION BENCHMARKS DATUM: NAVD 1988		
NO.	DESCRIPTION	ELEV.
TBM74	SURVEY CONTROL POINT	663.01

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.

FOR PROPOSED TOUHY AVENUE OVERPASS PROFILE, SEE PROPOSED DRAINAGE PLAN SHEET 217 OF 230



PLAN — SURVEYED, PLOTTED, ALIGNMENT CHECKED, GRADES CHECKED, CADD FILE NAME, NOTE BOOK, NO. — BY, DATE

PROFILE — SURVEYED, PLOTTED, GRADES CHECKED, ALIGNMENT CHKD, STRUCTURE NO(S)/MS CHKD, NOTE BOOK, NO. — BY, DATE

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	PLOT SCALE = 100'	CHECKED -	REVISED -
	PLOT DATE = 10/5/2012	DATE -	REVISED -

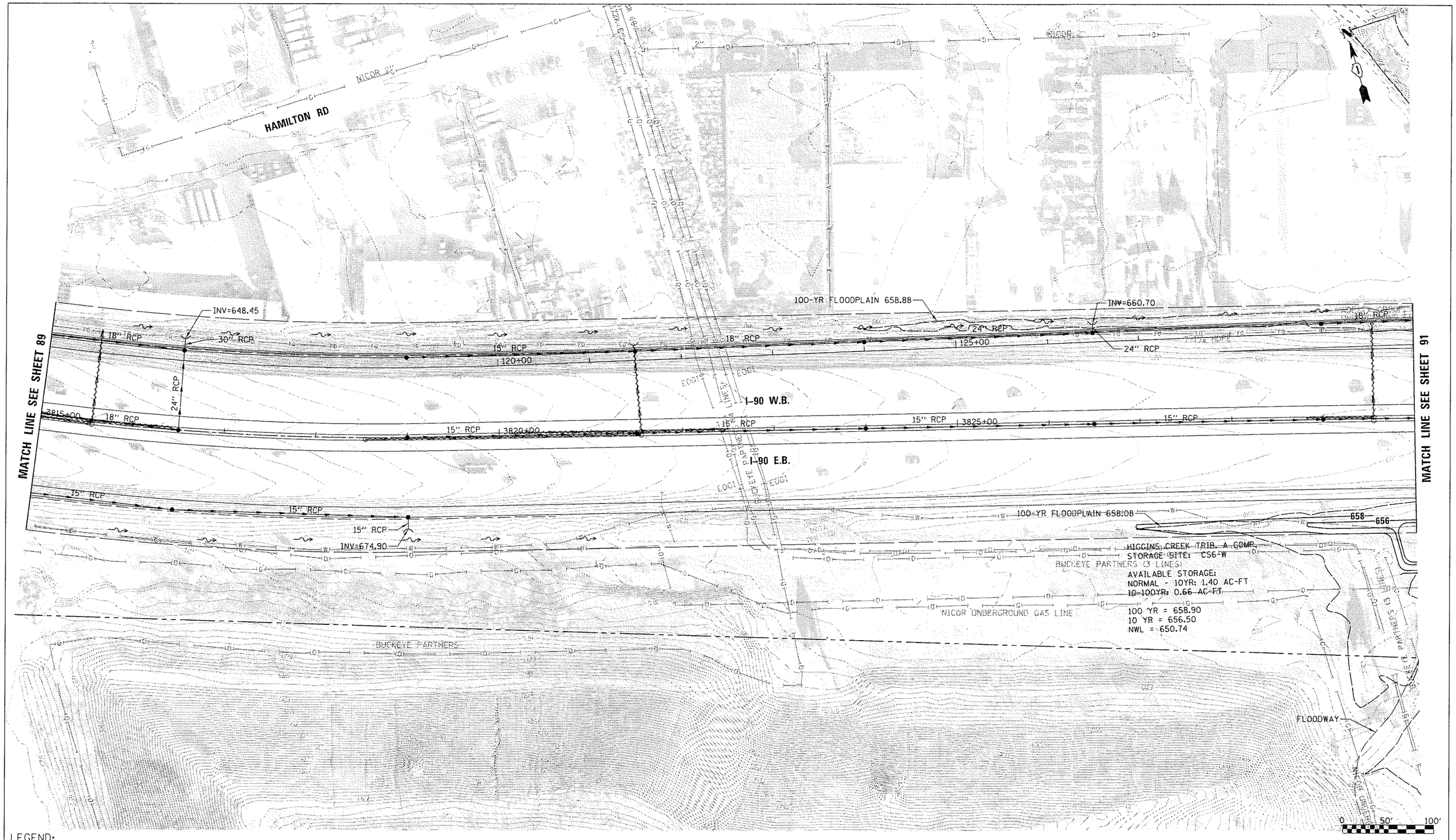
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK
STREAMBED PLAN AND PROFILE

SCALE: | SHEET NO. 9 OF 9 SHEETS | STA. | TO STA.

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

ROADWAY PLAN AND PROFILE



LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1430+00	1715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

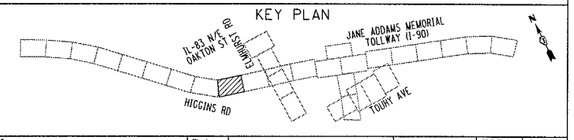
	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		
DRAINAGE BOUNDARY		

DRAINAGE PROPOSAL

- CONSTRUCT COMPENSATORY STORAGE BASIN(S).
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS. INLET LOCATIONS ARE FOR ILLUSTRATION PURPOSE ONLY

KEY PLAN



FILE NAME = DIEOWB-sht-pr-drain-JAE9_FullBuild.dgn	USER NAME = dschroeder	DESIGNED MA	REVISED -
		DRAWN MYG	REVISED -
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ELGIN O'HARE WEST BYPASS
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Illinois Department of Transportation

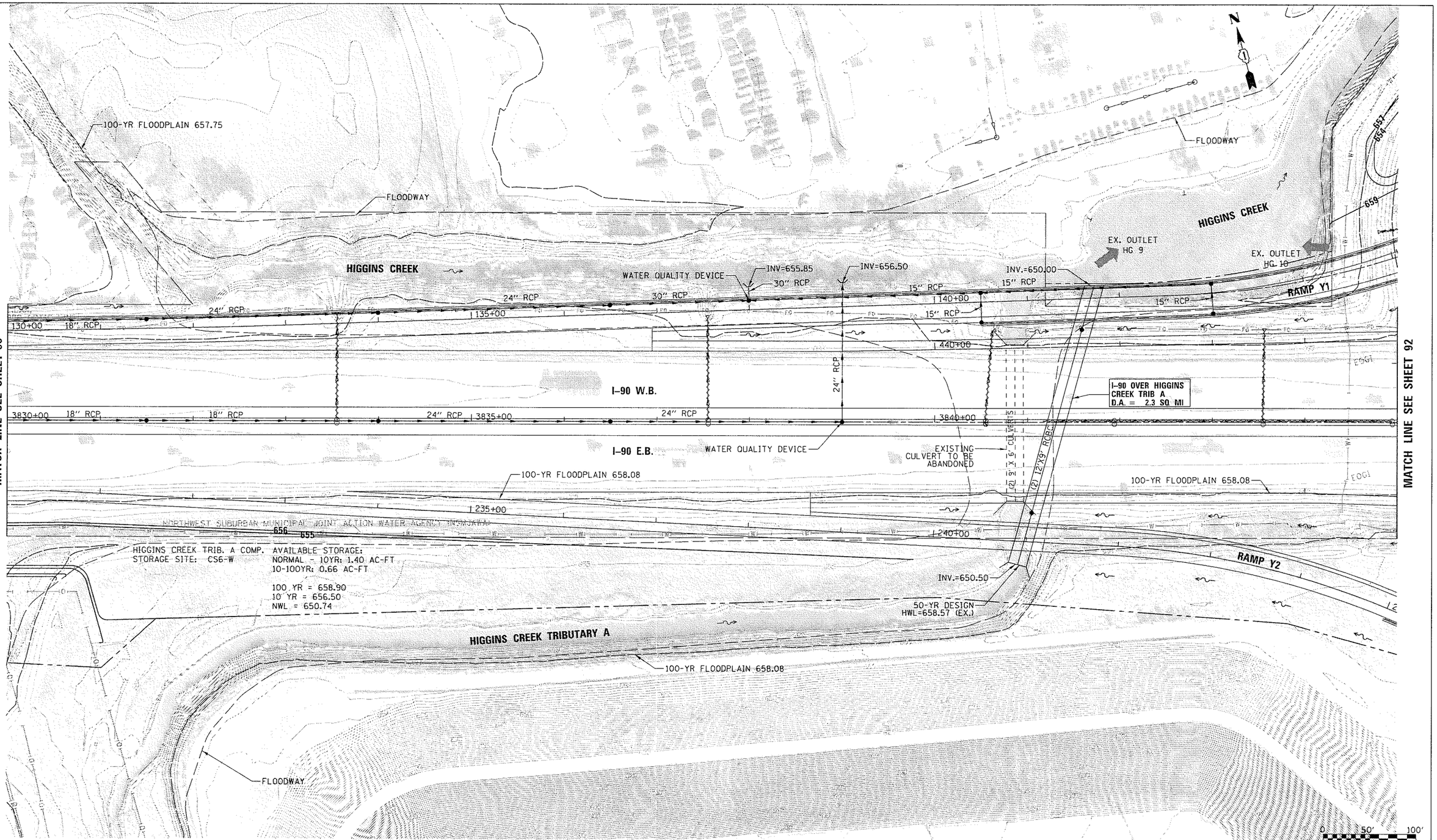
CHRISTOPHER B. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
I-90

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	231	90
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\H\CAD\Models Geometric FullBuild\sheets\DIEOWB-sht-pr-drain-JAE9_FullBuild.dgn
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LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	430+00	715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

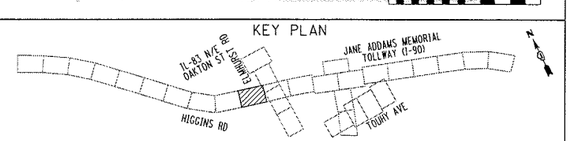
	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		
DRAINAGE BOUNDARY		

DRAINAGE PROPOSAL

- CONSTRUCT COMPENSATORY STORAGE BASIN(S).
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS. INLET LOCATIONS ARE FOR ILLUSTRATION PURPOSE ONLY

KEY PLAN



FILE NAME = DIEOWB-sht-pr-drain-JAEIO_FullBuild.dgn	USER NAME = dschroeder	DESIGNED MA	REVISED -
		DRAWN MYG	REVISED -
	PLOT SCALE = 100'	CHECKED CW	REVISED -
	PLOT DATE = 7/10/2012	DATE -	REVISED -

ELGIN O'HARE WEST BYPASS
communities. opportunities. solutions.

Illinois Department of Transportation

CHRISTOPHER B. BURKE ENGINEERING LTD.

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
I-90

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	231	91
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

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11:39:30 AM

SEE SHEET 77

MATCH LINE SEE SHEET 91

MATCH LINE SEE SHEET 93

HIGGINS CREEK TRIB. A
COMP. STORAGE SITE: CS6-E

AVAILABLE STORAGE:
NORMAL - 10YR: 0.0 AC-FT
10-100YR: 4.65 AC-FT

POND DESIGNED TO BE ACCESSED ABOVE 10-YEAR WSEL

654
659
657

RAMP Y1

445+00

100-YR FLOODPLAIN 657.75

MESTA GROUP, L.L.C.
UNDERGROUND FIBER OPTIC LINE

TRIBUTARY TO OUTLET HG 4

TRIBUTARY TO OUTLET HG 3

18" RCP

RAMP Y4

450+00

TRIBUTARY TO OUTLET HG 11

24" RCP (MIN.)

24" RCP

110+00

455+00

RAMP X4

N

FLOODWAY

HIGGINS CREEK

100-YR FLOODPLAIN 652.79

445+00

450+00

TRIBUTARY TO OUTLET HG 9

I-90 W.B.

3845+00

15" RCP

3850+00

15" RCP

15" RCP

3855+00

I-90 E.B.

18" RCP

100-YR FLOODPLAIN 658.08

145+00

150+00

155+00

CONC. DRAIN

INV=655.05

100-YR FLOODPLAIN 658.64

RAMP Y3

655
649

24" PIPE CULVERT

245+00

RAMP Y2

ELMHURST RD

1250+00

356+00

24" RCP (MIN.)

RAMP Y3

655
649

100-YR FLOODPLAIN 658.08

NORTHLINE ST. CULVERT

BMP DETENTION SITE: D5-W
AVAILABLE DETENTION: 17.23 AC-FT
HWL=655.0 NWL=648.5
INFILTRATION SURFACE=651.5

0 50' 100'

SEE SHEET 76

LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1430+00	1715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

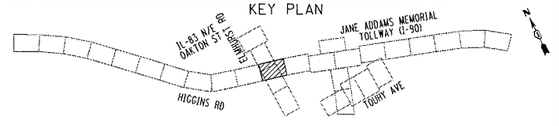
	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		
DRAINAGE BOUNDARY		

DRAINAGE PROPOSAL

- CONSTRUCT NEW DETENTION BASIN(S).
- CONSTRUCT COMPENSATORY STORAGE BASIN(S).
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS. INLET LOCATIONS ARE FOR ILLUSTRATION PURPOSE ONLY

KEY PLAN



FILE NAME = DIEOWB-sht-pr-drain-JAEII_FullBuild.dgn	USER NAME = dschroeder	DESIGNED MA	REVISED -
		DRAWN MYG	REVISED -
	PLOT SCALE = 100'	CHECKED CW	REVISED -
	PLOT DATE = 7/10/2012	DATE -	REVISED -

ELGIN O'HARE WEST BYPASS
communities. opportunities. solutions.

Illinois Department of Transportation

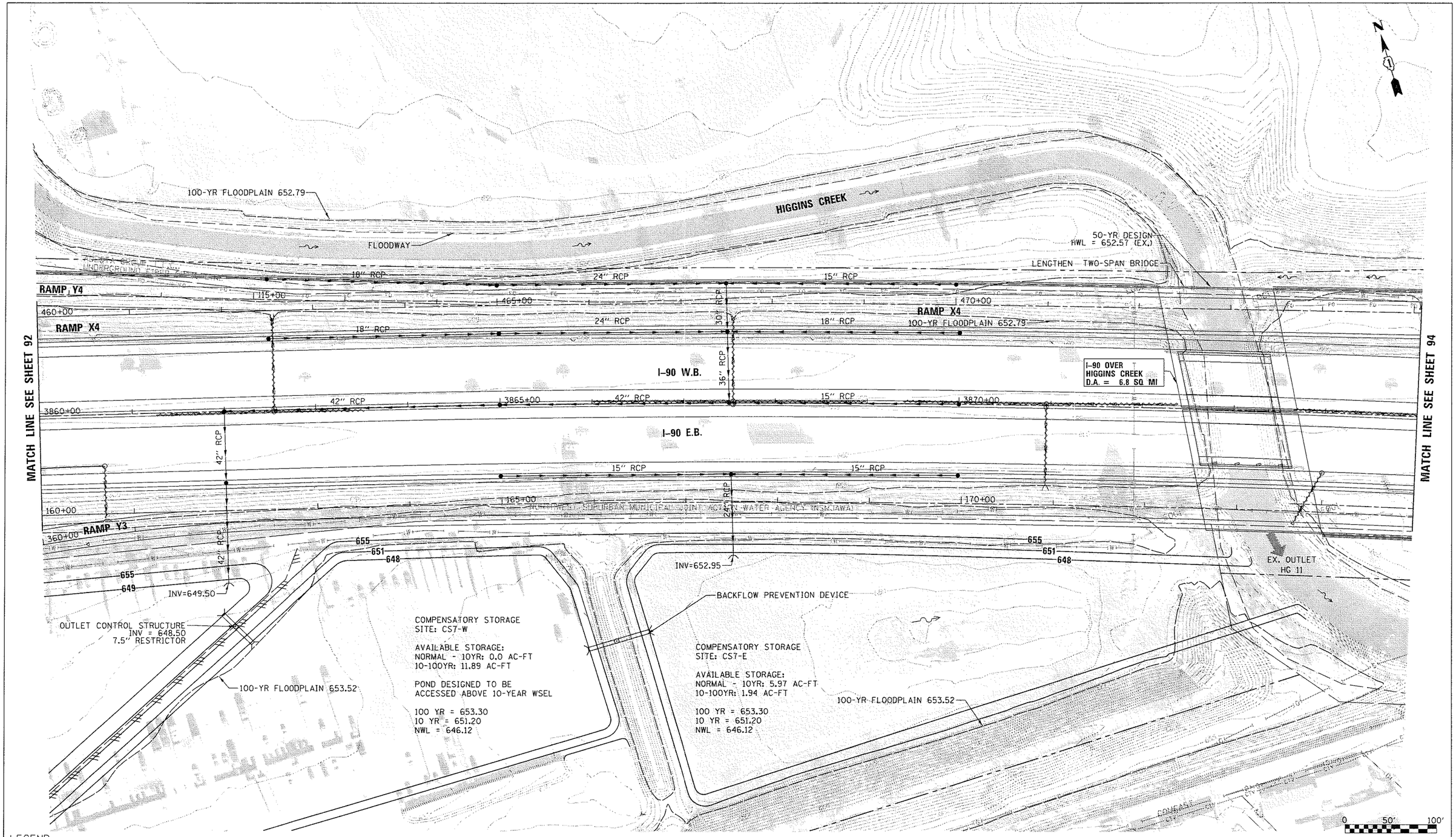
CHRISTOPHER B. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
I-90

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	231	92
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

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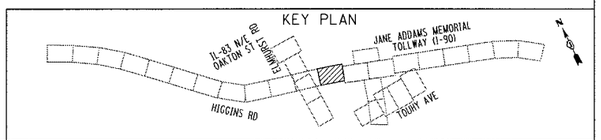
BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1+430+00	1+715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		
DRAINAGE BOUNDARY		

DRAINAGE PROPOSAL
- CONSTRUCT NEW DETENTION BASIN(S).
- CONSTRUCT COMPENSATORY STORAGE BASIN(S).
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS. INLET LOCATIONS ARE FOR ILLUSTRATION PURPOSE ONLY

KEY PLAN



FILE NAME = DIEOWB-sht-pr-drain-JAEI2_FullBuild.dgn	USER NAME = dschroeder	DESIGNED MA	REVISED -
		DRAWN MYG	REVISED -
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	PLOT DATE = 7/10/2012	DATE -	REVISED -

ELGIN O'HARE WEST BYPASS
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Illinois Department of Transportation

CHRISTOPHER B. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
I-90

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	231	93
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

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MATCH LINE SEE SHEET 93

MATCH LINE SEE SHEET 95

SEE SHEET 228

SEE SHEET 147

RAMP X4

RAMP X5

RAMP X8

RAMP X1

I-90 W.B.

I-90 E.B.

HIGGINS CREEK

FLOODWAY

100-YR FLOODPLAIN 652.79

100-YR FLOODPLAIN 653.52

INV=653.80

INV.=651.05

INV=653.74

INV=652.20

INV=649.55

INV=651.07

24" RCP (MIN.)

24" RCP

15" RCP

18" RCP

30" RCP

42" RCP

24" CMP

30" CMP

36" BCCMP

18" RCP

4" HDPE

15" RCP

TRIBUTARY TO OUTLET HG 11

TRIBUTARY TO OUTLET HG 37

TRIBUTARY TO OUTLET HG 36

WATER QUALITY DEVICE

PROP OUTLET HG 36

EX. OUTLET HG 37

OUTLET CONTROL STRUCTURE
INV = 647.00
12" RESTRICTOR

654

648

BMP DETENTION SITE: D5-E
AVAILABLE DETENTION: 12.53 AC-FT
HWL=654.0 NWL=647.0
INFILTRATION SURFACE=648.0

675+00 680+00 685+00 690+00 695+00

575+00 580+00 585+00

1875+00 1880+00 1885+00

1175+00 1180+00 1185+00 1190+00

0 50' 100'

LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	430+00	715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

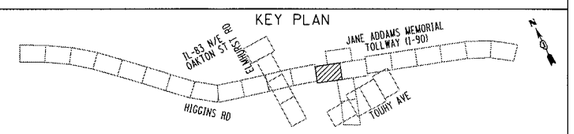
	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		
DRAINAGE BOUNDARY		

DRAINAGE PROPOSAL

- CONSTRUCT NEW DETENTION BASIN(S).
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS. INLET LOCATIONS ARE FOR ILLUSTRATION PURPOSE ONLY

KEY PLAN



FILE NAME = DIEOWB-sht-pr-drain-JAE13_FullBuild.dgn	USER NAME = dschroeder	DESIGNED MA	REVISED -
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	PLOT DATE = 7/12/2012	DATE -	REVISED -

ELGIN O'HARE WEST BYPASS
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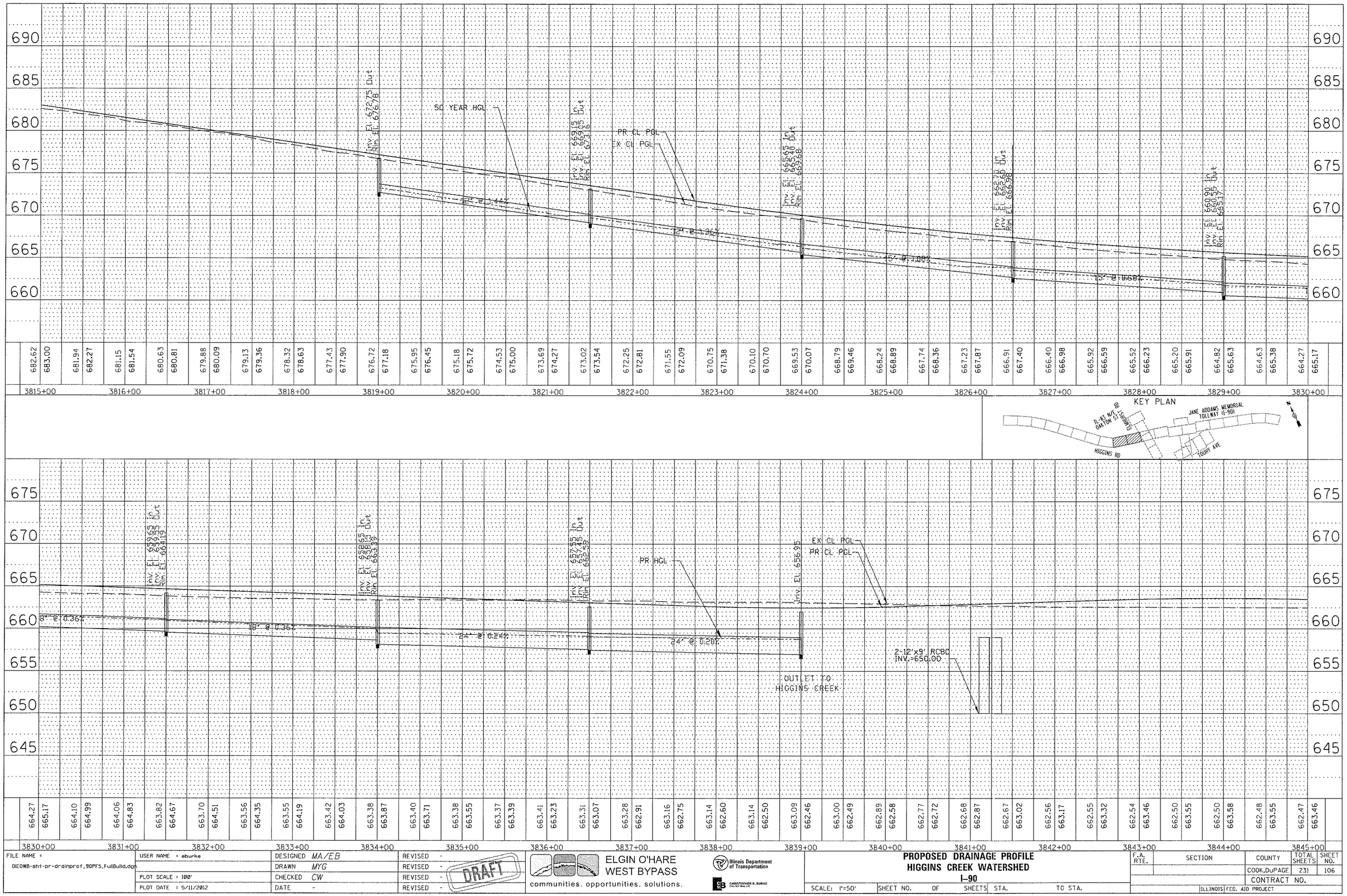
CHRISTOPHER B. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
I-90

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	231	94
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

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PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RE-FILE NAME RECEIVED
NOTE BOOK
NO.
CADD FILE NAME
BY
DATE

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
RE-FILE NAME RECEIVED
NOTE BOOK
NO.
CADD FILE NAME
BY
DATE

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		DRAWN MYG	REVISED -
	PLOT SCALE = 100'	CHECKED CW	REVISED -
	PLOT DATE = 5/11/2012	DATE -	REVISED -

DRAFT

ELGIN O'HARE WEST BYPASS
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CHRISTOPHER B. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PROFILE
HIGGINS CREEK WATERSHED
I–90

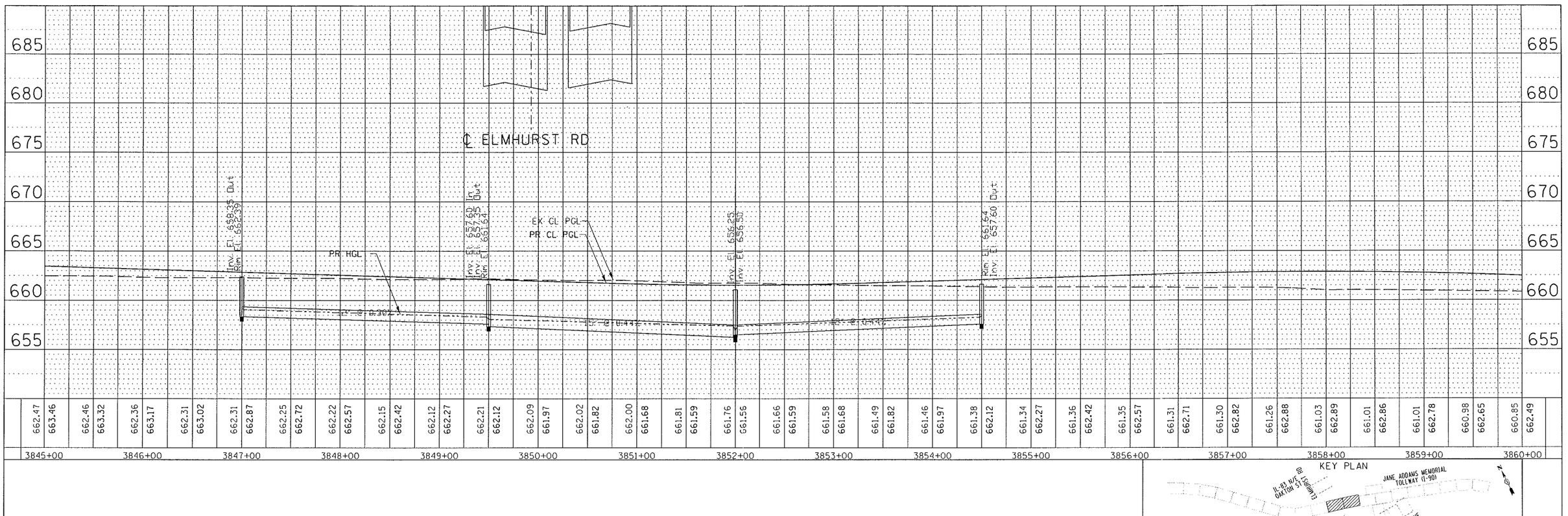
SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	231	106
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

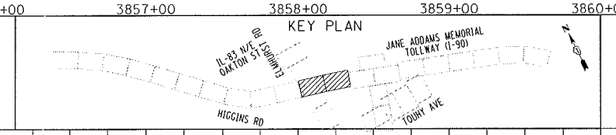
PLAN

BY	DATE
CHECKED	
PLOTTED	
ALIGNMENT CHECKED	
GRADES CHECKED	
CADD FILE NAME	

NOTE BOOK
NO.



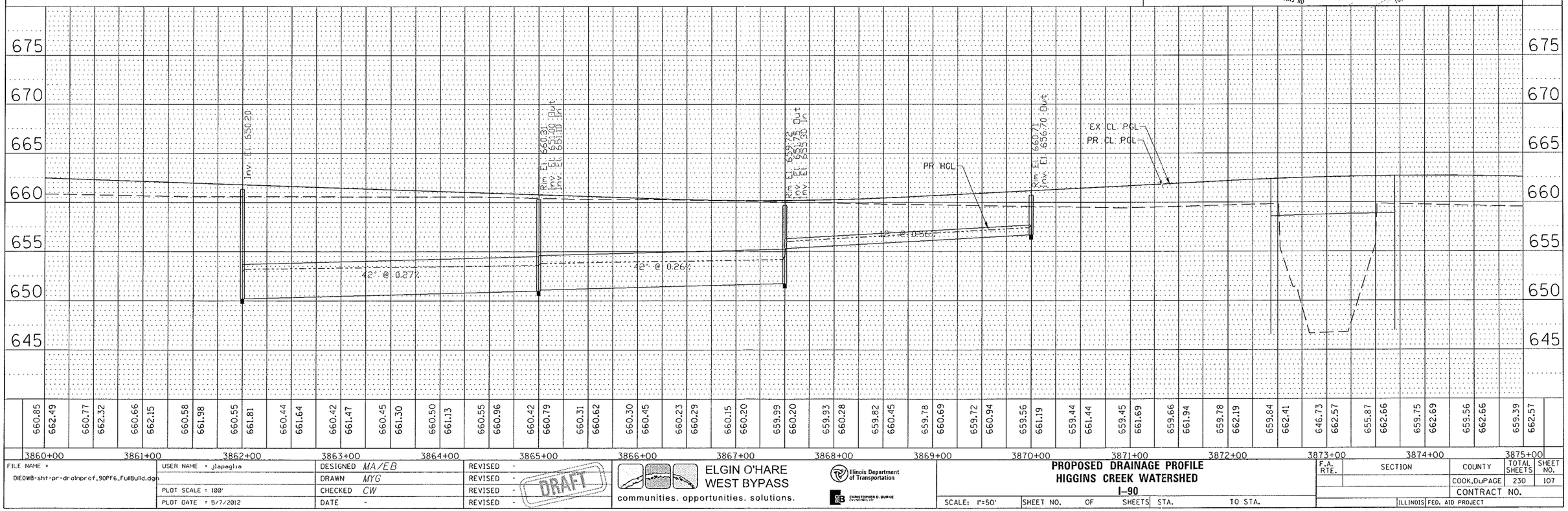
KEY PLAN



PROFILE

BY	DATE
CHECKED	
PLOTTED	
GRADES CHECKED	
ALIGNMENT CHECKED	
CADD FILE NAME	

NOTE BOOK
NO.



FILE NAME = DIE0WB-sht-pr-drainprof_90PF6_FullBuild.dgn	USER NAME = jlapaglia	DESIGNED MA/EB	REVISED -
		DRAWN MYG	REVISED -
	PLOT SCALE = 100'	CHECKED CW	REVISED -
	PLOT DATE = 5/7/2012	DATE -	REVISED -

DRAFT

ELGIN O'HARE WEST BYPASS
communities. opportunities. solutions.

Illinois Department of Transportation

CHRISTOPHER B. BURKE ENGINEERING, LTD.

PROPOSED DRAINAGE PROFILE
HIGGINS CREEK WATERSHED
I-90

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	230	107
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

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PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
GRADES CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

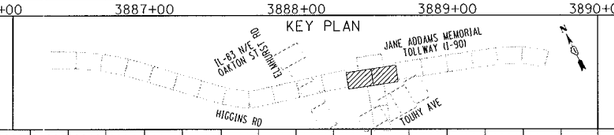
675
670
665
660
655
650
645

50 YEAR HGL
EX CL PGL
PR CL PGL
Inv El 656.70 Out
Rim El 660.71
Inv El 655.45 In
Inv El 655.20 Out
Rim El 659.46
Inv El 653.95 In
Inv El 653.85 Out
Rim El 658.82
Inv El 652.15
Inv El 652.15
Rim El 658.45 Out
Inv El 653.95 In
12" @ 0.30%
15" @ 0.39%
15" @ 0.68%
15" @ 0.64%
15" @ 0.64%

659.39 662.57 659.27 662.41 659.26 662.19 659.09 661.94 659.08 661.69 658.96 661.44 658.84 661.19 658.78 660.94 658.78 660.69 658.81 660.44 658.72 660.19 658.64 659.94 658.58 659.69 658.57 659.44 658.48 659.19 658.48 658.94 658.45 658.69 658.37 658.44 658.29 658.22 658.29 658.06 658.28 657.96 658.28 657.92 658.34 657.94 658.33 658.02 658.52 658.16 658.63 658.36 658.79 658.62 659.01 658.94 659.23 659.32 659.46 659.76 659.70 660.23

3875+00 3876+00 3877+00 3878+00 3879+00 3880+00 3881+00 3882+00 3883+00 3884+00 3885+00 3886+00 3887+00 3888+00 3889+00 3890+00

KEY PLAN



PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
NOTE BOOK
NO.
BY
DATE

685
680
675
670
665
660
655

℄ WEST BYPASS
PR CL PG
EX CL PG
50 YEAR HGL
Rim El 660.22
Inv El 655.95 Out
Inv El 655.20 In
Rim El 662.57
Inv El 658.65 Out
Inv El 659.95
Rim El 668.71
Inv El 661.25 Out
Inv El 662.50 In
Rim El 671.96
Inv El 667.45 Out
Inv El 667.70 In
Rim El 675.21
Inv El 670.95 Out
Inv El 671.20 In
PR 15" @ 0.94%
30" @ 0.52%
15" @ 1.30%
12" @ 1.40%

659.70 660.23 660.18 660.70 660.54 661.17 660.82 661.64 661.36 662.11 661.79 662.58 662.29 663.05 662.85 663.56 663.52 664.10 664.10 664.68 664.69 665.29 665.37 665.94 665.95 666.59 666.57 667.24 667.11 667.89 667.80 668.54 668.43 669.19 669.09 669.84 669.75 670.49 670.41 671.14 670.93 671.79 671.71 672.44 672.31 673.09 672.90 673.74 673.48 674.39 674.16 675.04 674.75 675.69 675.48 676.34 676.09 676.99 676.78 677.64 677.63 678.29

3890+00 3891+00 3892+00 3893+00 3894+00 3895+00 3896+00 3897+00 3898+00 3899+00 3900+00 3901+00 3902+00 3903+00 3904+00 3905+00

FILE NAME = DIEOWB-sht-pr-drainprof_90PF7_FullBuild.dgn	USER NAME = jlopaglia	DESIGNED MA/EB	REVISED -	ELGIN O'HARE WEST BYPASS communities. opportunities. solutions.	Illinois Department of Transportation	PROPOSED DRAINAGE PROFILE HIGGINS CREEK WATERSHED I-90	F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		DRAWN MYG	REVISED -		CHRISTOPHER B. BURKE ENGINEERING				COOK,DuPAGE	230	108
	PLOT SCALE = 100'	CHECKED CW	REVISED -						CONTRACT NO.		
	PLOT DATE = 5/7/2012	DATE -	REVISED -	DRAFT		SCALE: 1"=50' SHEET NO. OF SHEETS STA. TO STA.			ILLINOIS FED. AID PROJECT		

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\MYG\CADD\Models Geometric 4:58:17 PM

SEE SHEET 211

MATCH LINE SEE SHEET 145

MATCH LINE SEE SHEET 147

BMP DETENTION SITE: D7-N2
AVAILABLE DETENTION: 5.73 AC-FT
HWL=653.0 NWL=648.0
INFILTRATION SURFACE=649.0

BMP DETENTION SITE: D7-N1
AVAILABLE DETENTION: 4.38 AC-FT
HWL=652.0 NWL=647.0
INFILTRATION SURFACE=648.0

BMP DETENTION SITE: D5-S
AVAILABLE DETENTION: 12.49 AC-FT
HWL=653.0 NWL=647.0
INFILTRATION SURFACE=648.0

OUTLET CONTROL STRUCTURE
INV. = 648.0

OUTLET CONTROL STRUCTURE
INV = 647.00
INV. = 651.50

INV. = 647.10

OUTLET CONTROL STRUCTURE
INV = 647.00

INV=648.25

INV. = 653.15

RAMP W1

RAMP W2

RAMP W3

WEST BYPASS S.B.

WEST BYPASS N.B.

W TOUHY AVE

649 655 648 652 653

1185+00 1190+00 1300+00 1385+00 1390+00 1395+00 1290+00 1295+00 1150+00 1152+00

30" RCP(L) 24" RCP 18" VCP 15" RCP 12" RCP 42" RCP 36" RCP

SEE SHEET 212

0 50' 100'

LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1430+00	1715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		TT TT TT T
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		

DRAINAGE PROPOSAL
- CONSTRUCT NEW DETENTION BASIN(S).
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS AS SHOWN.

KEY PLAN

TRI-STATE TOLLWAY (I-294) | MT PROSPECT RD. | E GREEN ST | CHICAGO O'HARE INT'L AIRPORT | THORNDALE AVE | E DEVON AVE | N YORK RD | TOUHY AVE | JANE ADDAMS MEMORIAL TOLLWAY (I-90)

FILE NAME = DIEOWB-sht-pr-drain-WBY2I_FullBuild.dgn	USER NAME = jlapaglia	DESIGNED MA	REVISED -	DRAFT
		DRAWN MYG	REVISED -	
	PLOT SCALE = 100'	CHECKED CW	REVISED -	
	PLOT DATE = 5/7/2012	DATE -	REVISED -	

ELGIN O'HARE WEST BYPASS
communities. opportunities. solutions.

Illinois Department of Transportation

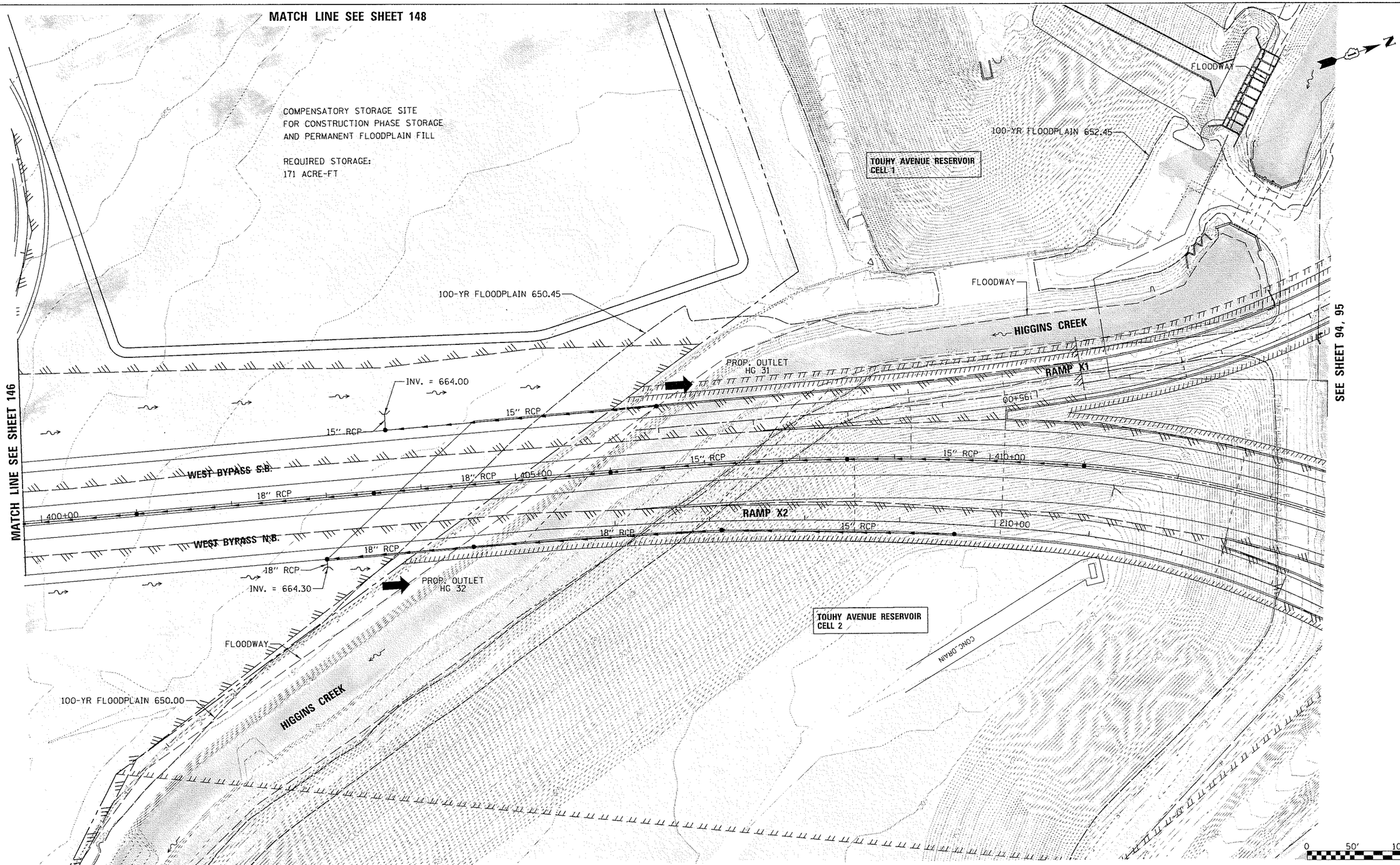
CHRISTOPHER B. BURKE ENGINEERING, LTD.

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
WEST BYPASS

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK, DuPAGE	230	146
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\HYD\CADD\Models Geometric FullBuild\sheets\DIEOWB-sht-pr-drain-WBY2I_FullBuild.dgn 1:954 PM



LEGEND:

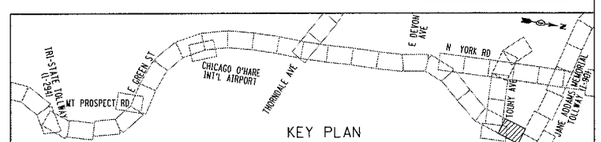
BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1430+00	1715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		77 77 77 7
PERMANENT EASEMENT		7777777777
STORM SEWER REMOVAL		

	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		
DRAINAGE BOUNDARY		

DRAINAGE PROPOSAL

- CONSTRUCT COMPENSATORY STORAGE BASIN(S).
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS. INLET LOCATIONS ARE FOR ILLUSTRATION PURPOSE ONLY



KEY PLAN

FILE NAME = DIEOWB-sht-pr-drain-WBY22_FullBuild.dgn	USER NAME = dschroeder	DESIGNED MA	REVISED -
		DRAWN MYG	REVISED -
	PLOT SCALE = 100'	CHECKED CW	REVISED -
	PLOT DATE = 7/9/2012	DATE -	REVISED -

ELGIN O'HARE WEST BYPASS
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CHRISTOPHER B. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
WEST BYPASS

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	231	147
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

Y:\361160 - Elgin O'Hare - West Bypass\TIER_TWO\H\CAD-Models Geometric Full Build\sheets\DIEOWB-sht-pr-drain-WBY22_FullBuild.dgn
8:2:49 AM

SEE SHEET 94, 211

N

RAMP W3

305+00

COMPENSATORY STORAGE SITE
FOR CONSTRUCTION PHASE STORAGE
AND PERMANENT FLOODPLAIN FILL

REQUIRED STORAGE:
171 ACRE-FT

MATCH LINE SEE SHEET 147

0 50' 100'

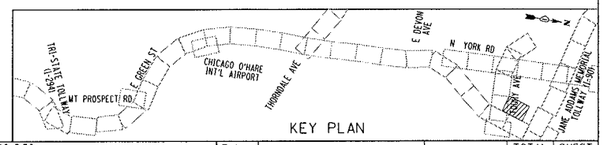
LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1430+00	1715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		TT TT TT T
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		

DRAINAGE PROPOSAL
- CONSTRUCT COMPENSATORY STORAGE BASIN(S).
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS AS SHOWN.



KEY PLAN

FILE NAME = DIEOWB-sht-pr-drain-WBY23_FullBuild.dgn	USER NAME = jlapaglia	DESIGNED MA	REVISED -	DRAFT
		DRAWN MYG	REVISED -	
	PLOT SCALE = 100'	CHECKED CW	REVISED -	
	PLOT DATE = 5/7/2012	DATE -	REVISED -	

ELGIN O'HARE WEST BYPASS
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CHRISTOPHER B. BURKE ENGINEERING, LTD.

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
WEST BYPASS

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	230	148
		CONTRACT NO.		
		ILLINOIS	FED. AID PROJECT	

Y:\36880 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Models Geometric FullBuild\sheets\DEOWB-sht-pr-drain-WBY23_FullBuild.dgn 4/2024 PM

SEE SHEET 92

MATCH LINE SEE SHEET 75

MATCH LINE SEE SHEET 77

FLOODWAY

100-YR FLOODPLAIN 658.08

EX. OUTLET
HG 2

24" RCP

RAMP Y2

24" PIPE CULVERT

CONC. DEAN

100-YR FLOODPLAIN 658.08

12" RCP

1250 SB

90+00

95+00

100+00

30" RCP

30" RCP

42" RCP

ELMHURST RD

42" RCP

15" RCP

18" RCP

INV. =649.00

INV.=655.05

ADAMS CIR

ADAMS ST

BMP DETENTION SITE: D5-W
AVAILABLE DETENTION: 17.23 AC-FT
HWL=655.0 NWL=648.5
INFILTRATION SURFACE=651.5

RAMP Y3

655

649

24" RCP

12" RCP

I-90 E.B.

I-90 W.B.

135'

0 50' 100'

SEE SHEET 92

LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1+430+00	1+715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

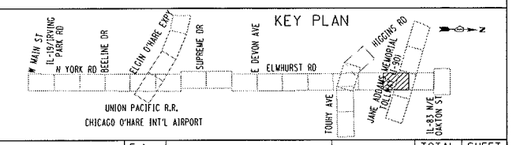
	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		

DRAINAGE PROPOSAL

- MAINTAIN EXISTING STORM SEWERS AND EXISTING DITCHES UNLESS NOTED TO CONTRARY.
- CONSTRUCT NEW DETENTION BASIN(S).
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS AS SHOWN.

KEY PLAN



FILE NAME = DIEOWB-sht-pr-drain-YPRI5_FullBuild.dgn	USER NAME = jtapagia	DESIGNED MA	REVISED -	
		DRAWN MYG	REVISED -	
	PLOT SCALE = 100'	CHECKED CW	REVISED -	
	PLOT DATE = 5/7/2012	DATE -	REVISED -	

DRAFT

ELGIN O'HARE WEST BYPASS
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Illinois Department of Transportation

CHRISTOPHER B. BURKE ENGINEERING, LTD.

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
ELMHURST ROAD

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	230	76
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\PY\CAD\Models Geometric FullBuild\sheets\DIEOWB-sht-pr-drain-YPRI5_FullBuild.dgn 1:45:7 PM

MATCH LINE SEE SHEET 76

MATCH LINE SEE SHEET 78

100-YR FLOODPLAIN 657.75

RAMP Y1

POND ACCESSED DESIGNED TO 10-YEAR WSEL BE ABOVE

AVAILABLE STORAGE: NORMAL - 10YR: 4.20 AC-FT 10-100YR: 0.0 AC-FT

HIGGINS CREEK COMP. STORAGE TRIB. SITE: A CSG-E

100-YR FLOODPLAIN 657.75

PROP. OUTLET HG 41

BACKFLOW PREVENTION DEVICE

FLOODWAY

HIGGINS CREEK

ELMHURST RD

105+00

110+00

18" RCP

24" RCP

24" RCP

30" RCP

48" RCP

48" RCP

48" RCP

INV.=654.45

INV.=650.90

36" RCP

36" RCP

24" RCP

24" RCP

ELMHURST RD OVER HIGGINS CREEK D.A. = 5.4 SQ MI

EX. OUTLET HG 3

100-YR FLOODPLAIN 657.75

RAMP Y4

FLOODWAY

100-YR FLOODPLAIN 658.64

0 50' 100'

LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1+430+00	1+715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		

DRAINAGE PROPOSAL

- MAINTAIN EXISTING STORM SEWERS AND EXISTING DITCHES UNLESS NOTED TO CONTRARY.
- CONSTRUCT COMPENSATORY STORAGE BASIN(S).
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS AS SHOWN.

KEY PLAN

W MAIN ST
IL-19/IRVING PARK RD
N YORK RD
BEELINE DR
ELGIN O'HARE EXPY
SUPREME DR
E DEVON AVE
ELMHURST RD
HIGGINS RD
JANE ADDAMS MEMORIAL TOLLWAY (I-90)
TOUHY AVE
IL-83/N.E. OAKTON ST
UNION PACIFIC R.R.
CHICAGO O'HARE INT'L AIRPORT

FILE NAME = DIEOWB-sht-pr-drain-YPR16_FullBuild.dgn	USER NAME = jlapoglio	DESIGNED MA	REVISED -	
		DRAWN MYG	REVISED -	
	PLOT SCALE = 100'	CHECKED CW	REVISED -	
	PLOT DATE = 5/7/2012	DATE -	REVISED -	

DRAFT

ELGIN O'HARE WEST BYPASS
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Illinois Department of Transportation

CHRISTOPHER B. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
ELMHURST ROAD

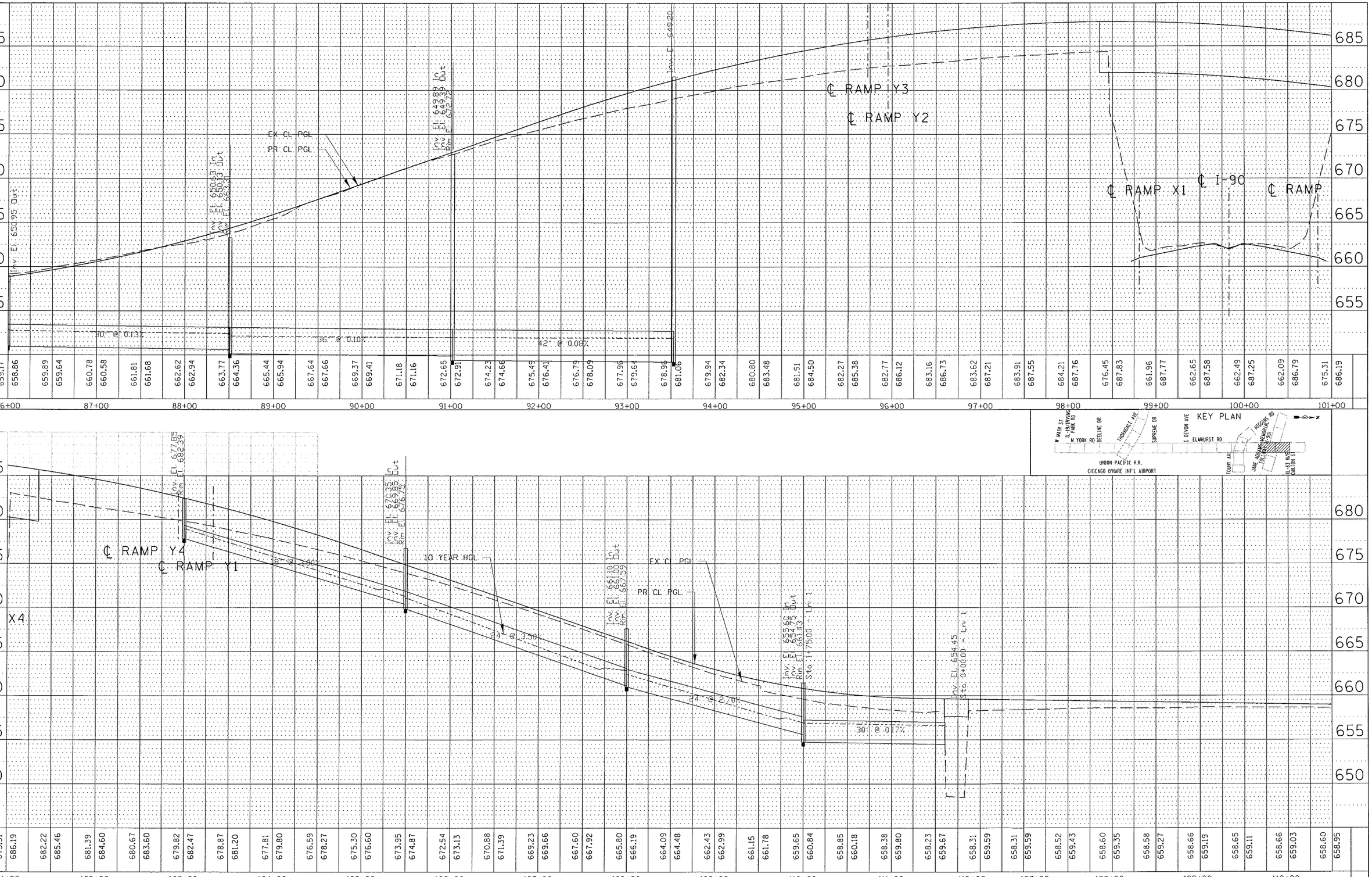
SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	230	77
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Models Geometric FullBuild\sheets\DIEOWB-sht-pr-drain-YPR16_FullBuild.dgn 4:54 PM

PLAN
COMPLETED
PLOTTED
ALIGNMENT CHECKED
GRADES CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
NOTE BOOK
NO.
BY
DATE



KEY PLAN

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
NOTE BOOK
NO.
BY
DATE

FILE NAME = DIEOWB-sht-pr-drainprof_ELM2_FullBuild.dgn	USER NAME = jlapaglia	DESIGNED MA/EB	REVISED -	DRAFT
		DRAWN MYG	REVISED -	
	PLOT SCALE = 100'	CHECKED CW	REVISED -	
	PLOT DATE = 5/7/2012	DATE -	REVISED -	

ELGIN O'HARE WEST BYPASS
communities. opportunities. solutions.

Illinois Department of Transportation

CHRISTOPHER B. BURKE ENGINEERING, LTD.

PROPOSED DRAINAGE PROFILE
ADDISON RIVER WATERSHED
ELMHURST ROAD

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	230	80
		CONTRACT NO.		
		ILLINOIS	FED. AID PROJECT	

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CADD\Models Geometric
5/5/17 PM

LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1430+00	1715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

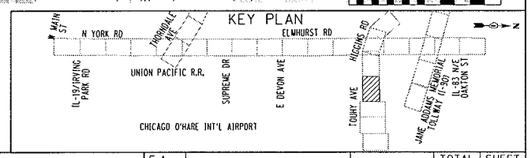
	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		

DRAINAGE PROPOSAL

- MAINTAIN EXISTING STORM SEWERS AND EXISTING DITCHES UNLESS NOTED TO CONTRARY.
- CONSTRUCT NEW DETENTION BASIN(S).
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS AS SHOWN.

KEY PLAN



FILE NAME = DIEOWB-sht-pr-drain-HIG4_FullBuild.dgn	USER NAME = jlapaglia	DESIGNED MA	REVISED -	ELGIN O'HARE WEST BYPASS communities. opportunities. solutions.	Illinois Department of Transportation
		DRAWN MYG	REVISED -		
	PLOT SCALE = 100'	CHECKED CW	REVISED -	DRAFT	CHRISTOPHER B. BURKE ENGINEERING, LTD.
	PLOT DATE = 5/7/2012	DATE -	REVISED -		

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
TOUHY AVENUE

SCALE: 1"=50' | SHEET NO. OF SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	230	211
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\H\CAD\Models Geometric FullBuild\sheets\DIEOWB-sht-pr-drain-HIG4_FullBuild.dgn 12:59 PM

MATCH LINE SEE SHEET 211

RAMP W2

295+00

155+00

400+00

WEST BYPASS S.B.

WEST BYPASS N.B.

PROP OUTLET HG 32

24" RCP

15" RCP

48" RCP

12" RCP

TOUHY AVE

160+00

30"

W12

109.05

HIGGINS CREEK

FLOODWAY

100-YR FLOODPLAIN 647.51

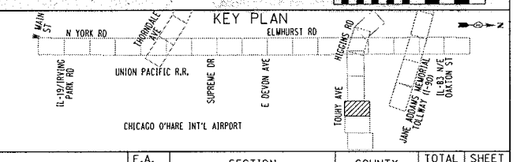
TOUHY AVE OVER
HIGGINS CREEK
D.A. = 7.0 SQ MI

EX. OUTLET
HG 24

INV.=653.70

0 50' 100'

KEY PLAN



MATCH LINE SEE SHEET 213

LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1+430+00	1+715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		

DRAINAGE PROPOSAL

•MAINTAIN EXISTING STORM SEWERS AND EXISTING DITCHES UNLESS NOTED TO CONTRARY.

FILE NAME = DIEOWB-sht-pr-drain-HIG5_FullBuild.dgn	USER NAME = jlapagila	DESIGNED MA	REVISED -
		DRAWN MYG	REVISED -
	PLOT SCALE = 100'	CHECKED CW	REVISED -
	PLOT DATE = 5/7/2012	DATE -	REVISED -

DRAFT

ELGIN O'HARE WEST BYPASS
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Illinois Department of Transportation

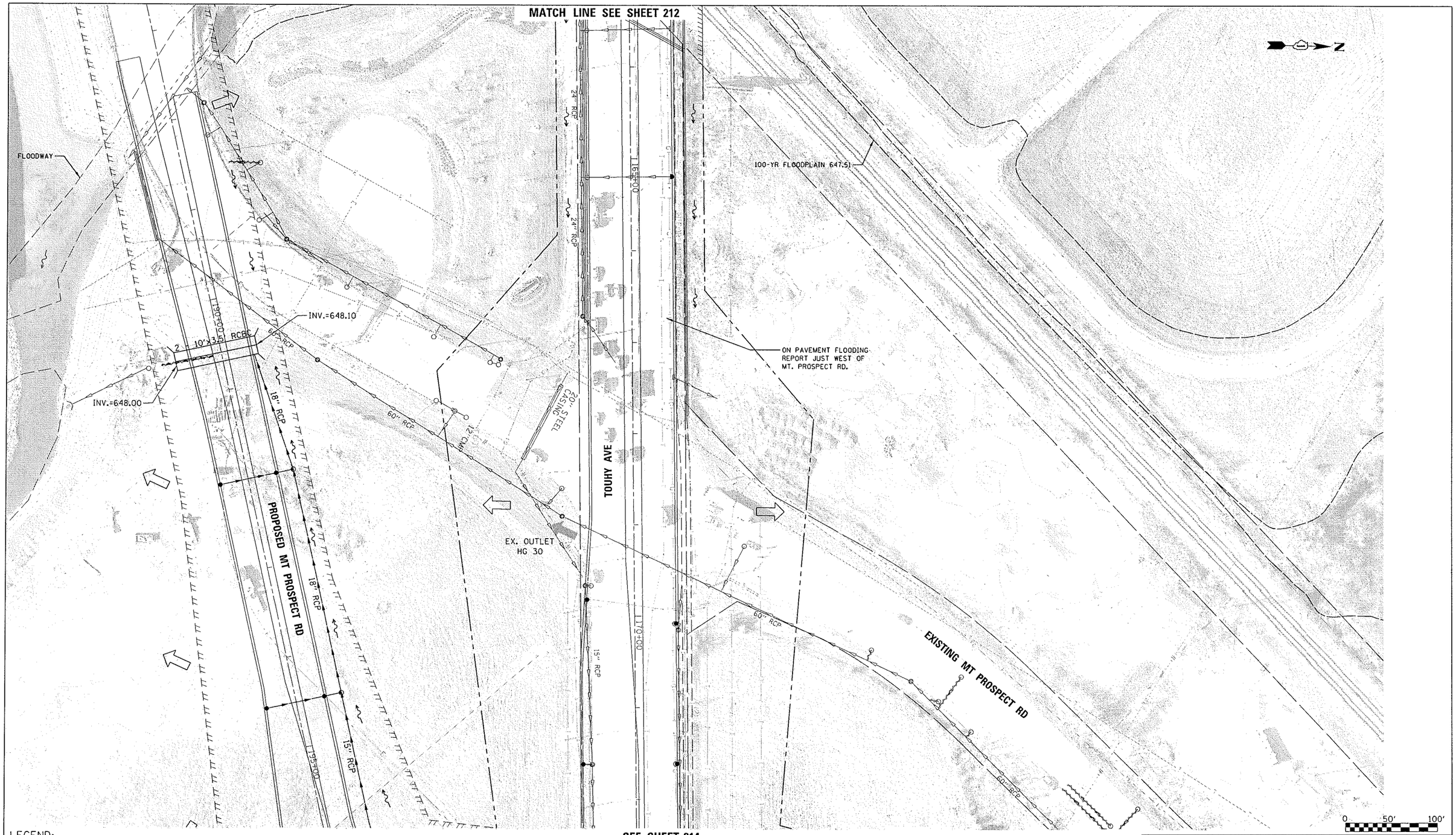
CHRISTOPHER R. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
TOUHY AVE

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	230	212
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\HYCAD\Models Geometric FullBuild\sheets\DIEOWB-sht-pr-drain-HIG5_FullBuild.dgn 12:22:5 PM



SEE SHEET 214

LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1430+00	1715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

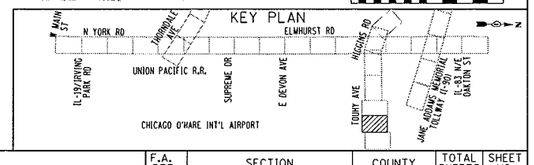
	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		

DRAINAGE PROPOSAL

- MAINTAIN EXISTING STORM SEWERS AND EXISTING DITCHES UNLESS NOTED TO CONTRARY.
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS AS SHOWN.

KEY PLAN



FILE NAME = DIEOWB-sht-pr-drain-HIG6_FullBuild.dgn	USER NAME = dkleinwachter	DESIGNED MA	REVISED -	ELGIN O'HARE WEST BYPASS communities. opportunities. solutions.	Illinois Department of Transportation	PROPOSED DRAINAGE PLAN HIGGINS CREEK WATERSHED TOUHY AVENUE /MT. PROSPECT ROAD	F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		DRAWN MYG	REVISED -		CHRISTOPHER B. BURKE ENGINEERING, LTD.				COOK,DuPAGE	230	213
	PLOT SCALE = 100'	CHECKED CW	REVISED -	DRAFT		SCALE: 1"=50' SHEET NO. OF SHEETS STA. TO STA.			CONTRACT NO.		
	PLOT DATE = 5/10/2012	DATE -	REVISED -						ILLINOIS FED. AID PROJECT		

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\HYD\CAD\Models Geometric FullBuild\sheets\DIEOWB-sht-pr-drain-HIG6_FullBuild.dgn 11:07 AM

MATCH LINE SEE SHEET 213

15" RCP
12" RCP
15" RCP
200+00
175+00
15" RCP
TOUHY AVE
EX. OUTLET
HG 17
15" RCP
18" RCP
18" RCP
PROPOSED MT PROSPECT RD
205+00
EXISTING MT PROSPECT RD
30'
N

0 50' 100'

LEGEND:

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
REFERENCE LINE/CENTERLINE AND STATIONING	1430+00	1715+00
RIGHT OF WAY LINE		
COUNTY LINE		
DRAINAGE DIVIDE (HYDROLOGIC ATLAS)		
TEMPORARY EASEMENT		TT TT TT T
PERMANENT EASEMENT		
STORM SEWER REMOVAL		

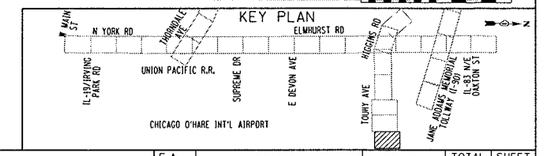
	EXISTING	PROPOSED
SWALE		
DITCH		
DITCH SUMMIT		
CULVERT SIZE/TYPE	2 X 2 BOX	2 X 2 BOX
HEADWALL		
CATCH BASIN		
INLET/SCUPPER		
MANHOLE		
INVERT	(XXX.XX)	XXX.XX
STORM SEWER		

	EXISTING	PROPOSED
OVERFLOW		
OUTLET		
SHEET FLOW		
DITCH CHECK		

DRAINAGE PROPOSAL

- MAINTAIN EXISTING STORM SEWERS AND EXISTING DITCHES UNLESS NOTED TO CONTRARY.
- CONSTRUCT PROPOSED DRAINAGE SYSTEM INCLUDING STORM SEWERS, DITCHES AND PIPE CULVERTS AS SHOWN.

KEY PLAN



FILE NAME = DIEOWB-sht-pr-drain-HG7_FullBuild.dgn	USER NAME = dkleinwachter	DESIGNED MA	REVISED -	
		DRAWN MYG	REVISED -	
	PLOT SCALE = 100'	CHECKED CW	REVISED -	
	PLOT DATE = 5/10/2012	DATE -	REVISED -	

DRAFT

ELGIN O'HARE WEST BYPASS
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Illinois Department of Transportation

CHRISTOPHER B. BURKE ENGINEERING, LTD.

PROPOSED DRAINAGE PLAN
HIGGINS CREEK WATERSHED
TOUHY AVENUE /MT. PROSPECT ROAD

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	230	214
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\HYD\CAD\Models Geometric FullBuild\sheets\DIEOWB-sht-pr-drain-HG7_FullBuild.dgn 11:0:24 AM

PLAN
SURVEYED
PLOTTED
CHECKED
NOTE BOOK
NO.
BY
DATE
ADDED TO R/W
R/L OF WAY CHECKED
CADD FILE NAME

PROFILE
SURVEYED
PLOTTED
CHECKED
NOTE BOOK
NO.
BY
DATE
ADDED TO R/W
R/L OF WAY CHECKED
CADD FILE NAME

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\PY\CAD\Models Geometric Full\Signed\PROFILE\DIEOWB-snt-pr-drainprof_HIG2_FullBuild.dgn 4:22:34 PM

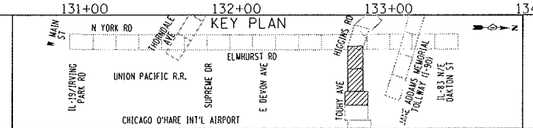
EX CL PGL
PR CL PGL

680 675 670 665 660 655 650

660.70 660.75 660.31 660.34 659.95 660.13 660.04 660.10 660.19 660.27 660.56 660.53 660.86 660.79 661.05 661.05 661.17 661.31 661.07 661.53 660.92 661.66 660.64 661.68 660.63 661.59 660.65 661.43 660.47 661.27 660.38 661.11 660.24 660.95 660.15 660.79 660.04 660.63 659.98 660.47 659.81 660.31 659.73 660.15 659.68 659.99 659.60 659.83 659.46 659.67 659.37 659.51 659.30 659.35 659.19 659.19 659.21 659.03 659.12 658.87 659.14 658.71

126+00 127+00 128+00 129+00 130+00 131+00 132+00 133+00 134+00 135+00 136+00 137+00 138+00 139+00 140+00 141+00

KEY PLAN



685 680 675 670 665 660 655 650

EX CL PGL
PR CL PGL
℄ RAMP W2
℄ RAMP W3
℄ WEST BYPASS

659.14 658.71 659.18 658.55 659.09 658.52 658.74 658.75 658.69 659.24 658.67 659.99 658.53 661.00 658.56 662.27 658.49 663.67 658.40 665.07 658.25 666.47 657.90 667.87 657.58 669.27 657.34 670.67 656.91 672.07 656.42 673.47 656.11 674.87 655.85 676.27 655.42 677.67 655.23 679.07 654.85 680.47 654.54 681.87 654.13 683.27 653.70 684.59 653.32 685.72 653.05 686.66 652.73 687.42 652.46 687.99 652.30 688.37 652.18 688.67 652.19 688.97

141+00 142+00 143+00 144+00 145+00 146+00 147+00 148+00 149+00 150+00 151+00 152+00 153+00 154+00 155+00 156+00

FILE NAME = DIEOWB-snt-pr-drainprof_HIG2_FullBuild.dgn	USER NAME = jlapaglia	DESIGNED MA/EB	REVISED -	DRAFT
		DRAWN MYG	REVISED -	
	PLOT SCALE = 100'	CHECKED CW	REVISED -	
	PLOT DATE = 5/7/2012	DATE -	REVISED -	

ELGIN O'HARE WEST BYPASS
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Illinois Department of Transportation

CHRISTOPHER B. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PROFILE
ADDISON RIVER WATERSHED
TOUHY AVENUE

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	230	216
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

PLAN
SURVEYED
PLOTTED
DRAWN
CHECKED
R.O.W. NOTED
RT. OF WAY CHECKED
NOTE BOOK
NO.
PAID FILE NAME
BY
DATE

PROFILE
SURVEYED
PLOTTED
DRAWN
CHECKED
R.O.W. NOTED
RT. OF WAY CHECKED
NOTE BOOK
NO.
PAID FILE NAME
BY
DATE

Y:\36180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Models Geometric full build\Sheet Files\DEOWB-smt-pr-drainprof_HIG3_FullBuild.dgn 4:02:58 PM

710
705
700
690
685
680
675
670
665
660
655
650
645
640
635

EX CL PGL
RR CL PGL
℄ UP RR
HIGGINS CREEK
Inv. El 674.00 Out
Rim El 676.32
Sta 10+00.00 - Lm 5
15" @ 1.00%
Inv. El 662.00 In
Inv. El 661.75 Out
Rim El 666.32
Sta 7+50.00 - Lm 5
11

652.19	652.25	652.24	652.24	652.36	652.55	652.93	653.65	654.58	655.52	656.10	656.57	656.86	656.55	656.58	656.12	655.65	654.90	654.17	653.32	652.27	652.09	652.03	652.03	652.04	652.05	652.06	652.22	652.17	652.06	652.00
688.97	689.27	689.57	689.87	690.17	690.47	690.77	691.07	691.37	691.67	691.97	692.24	692.25	691.97	691.41	690.56	689.42	688.00	686.29	684.32	682.32	680.32	678.32	676.32	674.32	672.32	670.32	668.32	666.32	664.45	662.82

156+00 157+00 158+00 159+00 160+00 161+00 162+00 163+00 164+00 165+00 166+00 167+00 168+00 169+00 170+00 171+00

KEY PLAN
N YORK RD
W MAIN ST
THORNDALE AVE
ELMHURST RD
HIGGINS RD
IL-19/IRVING PARK RD
UNION PACIFIC R.R.
SUPREME DR
E DEVON AVE
TOUHY AVE
JANE ADDAMS MEMORIAL TOLLWAY (I-90)
IL-83 MPE
DARLTON ST
CHICAGO O'HARE INT'L AIRPORT

FILE NAME = DEOWB-smt-pr-drainprof_HIG3_FullBuild.dgn	USER NAME = dschroeder	DESIGNED MA/EB	REVISED -
		DRAWN MYG	REVISED -
	PLOT SCALE = 100'	CHECKED CW	REVISED -
	PLOT DATE = 7/6/2012	DATE -	REVISED -

ELGIN O'HARE WEST BYPASS
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CHRISTOPHER B. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PROFILE
ADDISON RIVER WATERSHED
TOUHY AVENUE

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	231	217
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

PLAN

SURVEYED	
PLOTTED	
X-SECTIONS CHECKED	
ALIGNMENT CHECKED	
BM. NOTED	
NOTE BOOK	
NO.	
CADD FILE NAME	

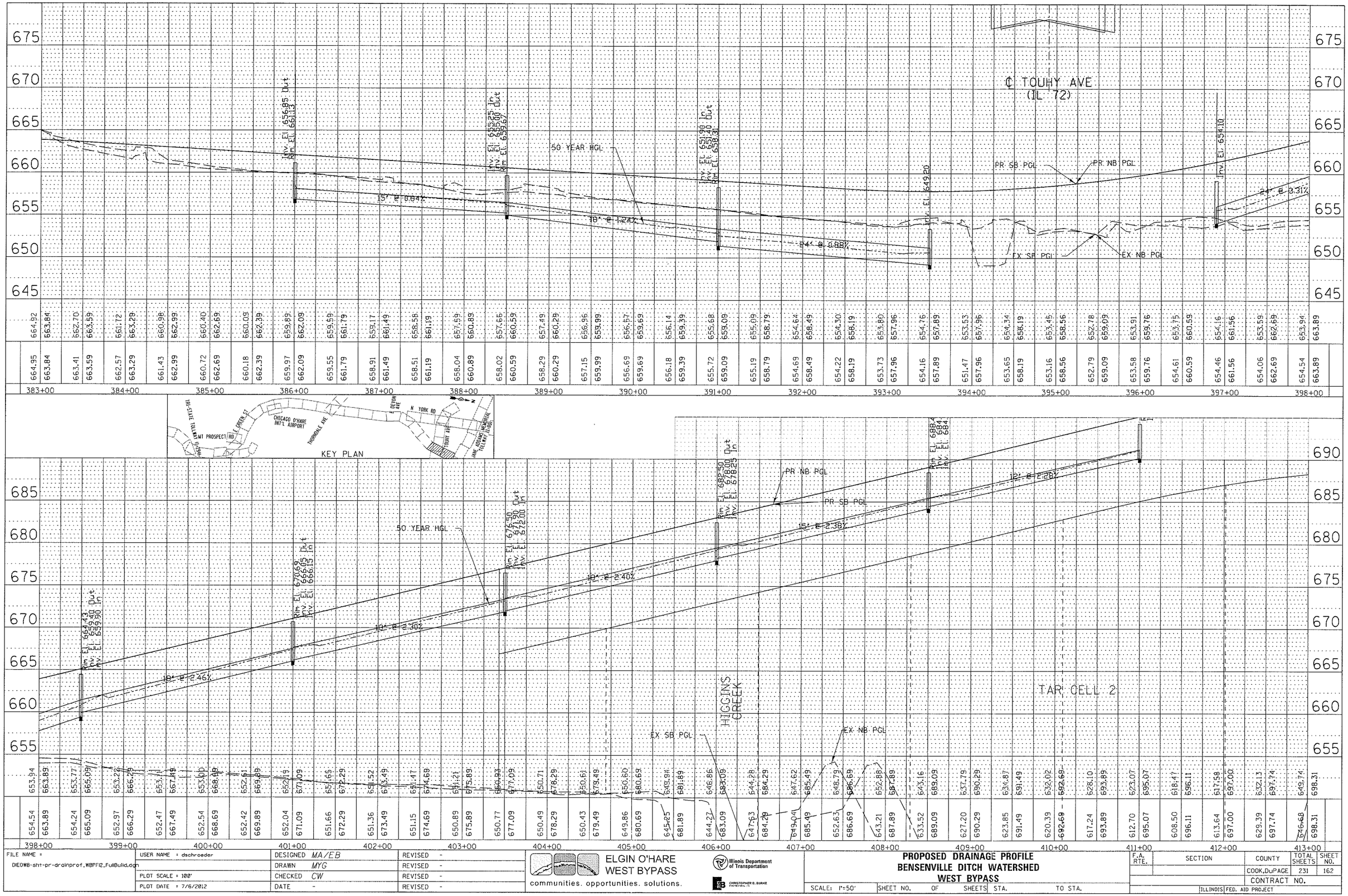
BY	DATE

PROFILE

SURVEYED	
PLOTTED	
X-SECTIONS CHECKED	
BM. NOTED	
NOTE BOOK	
NO.	
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BY	DATE

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		DRAWN MYG	REVISED -
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	PLOT DATE = 7/6/2012	DATE -	REVISED -

ELGIN O'HARE WEST BYPASS

communities. opportunities. solutions.

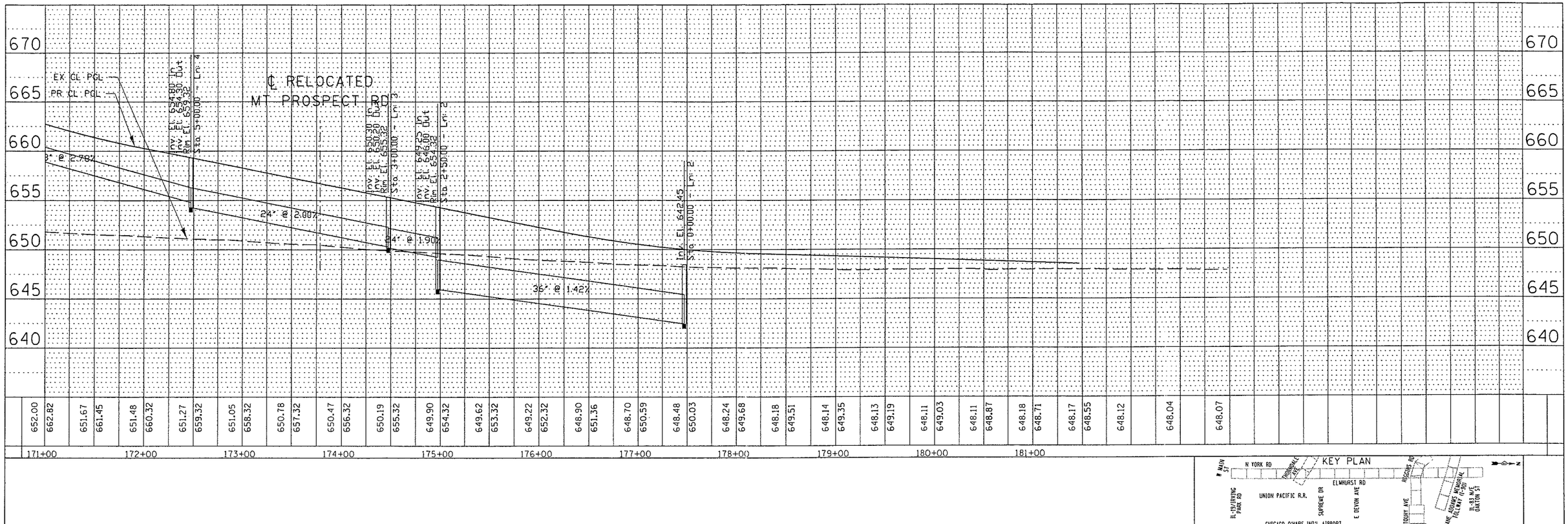
Illinois Department of Transportation

CHRISTOPHER B. BURKE ENGINEERING, LTD.

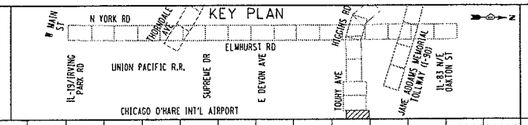
PROPOSED DRAINAGE PROFILE BENSENVILLE DITCH WATERSHED WEST BYPASS

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	231	162
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		



KEY PLAN



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

PROFILE
SURVEYED
PLOTTED
ROADWAY CHECKED
R.M. NOTED
STRUCTURE NOTATIONS SHOWN
ELEVATIONS SHOWN ARE CONSTRUCTION GRADE ELEVATIONS
NOTE BOOK
NO.
BY
DATE

Y:\38180 - Elgin O'Hare - West Bypass\TIER_TWO\H\CAD\Models Geometric\DIEOWB-sht-pr-drainprof_HIG4_FullBuild.dgn 11:03:30 AM

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		DRAWN MYG	REVISED -
	PLOT SCALE = 100'	CHECKED CW	REVISED -
	PLOT DATE = 5/10/2012	DATE -	REVISED -

DRAFT

ELGIN O'HARE WEST BYPASS
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CHRISTOPHER R. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PROFILE
ADDISON RIVER WATERSHED
TOUHY AVENUE

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	230	218
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

PLAN
SURVEYED
PLOTTED
NOTE BOOK
NO.
ALIGNMENT CHECKED
PROFILE CHECKED
CADD FILE NAME
BY
DATE

℄ TOUHY AVE (IL 72)

Inv. El. 648.43 In
Inv. El. 648.45 Out
Rim El. 656.81
Sta. 192+00.00 - Ln 1

Inv. El. 649.36 In
Inv. El. 649.10 Out
Rim El. 654.72
Sta. 194+50.00 - Ln 2

Inv. El. 650.44 In
Inv. El. 650.17 Out
Rim El. 657.43
Sta. 197+00.00 - Ln 3

Inv. El. 652.01 Out
Rim El. 656.03
Sta. 199+00.00 - Ln 4

Inv. El. 651.78 Out
Rim El. 656.03

18" @ 0.26%
18" @ 0.26%
15" @ 0.33%
12" @ 0.80%

660.99 | 660.38 660.57 | 659.43 660.15 | 658.35 659.73 | 657.67 659.31 | 656.89 658.90 | 655.09 658.48 | 649.52 658.06 | 651.59 657.64 | 651.65 657.22 | 655.49 656.81 | 653.21 656.39 | 653.59 655.97 | 653.63 655.55 | 654.36 655.13 | 654.48 654.72 | 654.01 654.31 | 653.28 654.04 | 651.91 653.98 | 651.59 654.10 | 651.93 654.43 | 649.75 654.83 | 650.12 655.23 | 650.14 655.63 | 650.37 656.03 | 650.20 656.42 | 650.62 656.61 | 650.35 656.42 | 650.58 656.03

188+00 189+00 190+00 191+00 192+00 193+00 194+00 195+00 196+00 197+00 198+00 199+00 200+00 201+00

670 665 660 655 650 645 640

KEY PLAN
TRI-STATE TOLLWAY (I-294)
MT PROSPECT RD
E GOLF RD
CHICAGO O'HARE INT'L AIRPORT
THORNDALE AVE
E DEVON AVE
N YORK RD
TOUHY AVE
JANE ADDAMS MEMORIAL TOLLWAY (I-90)

PROFILE
SURVEYED
PLOTTED
NOTE BOOK
NO.
GRADES CHECKED
R.M. NOTED
EXISTING D#90
Full Build\sheets\DIEOWB-sht-pr-drainprof_MTPI_FullBuild.dgn
BY
DATE

Inv. El. 650.39 In
Inv. El. 650.31 Out
Rim El. 654.82
Sta. 202+50.00 - Ln 2

Inv. El. 648.34 In
Inv. El. 648.34 Out
Rim El. 653.19
Sta. 205+00.00 - Ln 1

Sta. 201+00.00 - Ln 3

15" @ 0.80%
18" @ 0.80%
18" @ 0.25%

650.58 656.03 | 650.77 655.62 | 650.90 655.22 | 650.78 654.82 | 650.57 654.42 | 650.39 654.02 | 650.41 653.63 | 650.61 653.33 | 650.54 653.19 | 650.48 653.20 | 652.42 653.36 | 655.40 653.63 | 654.84 653.90 | 654.51 654.17 | 654.82 654.44 | 655.15 654.71 | 655.25 654.98 | 655.25 655.25 | 655.66 | 655.47 | 656.06 | 655.94 | 655.19

201+00 202+00 203+00 204+00 205+00 206+00 207+00 208+00 209+00

670 665 660 655 650 645 640

FILE NAME = DIEOWB-sht-pr-drainprof_MTPI_FullBuild.dgn	USER NAME = eburke	DESIGNED MA/EB	REVISED -
		DRAWN MYG	REVISED -
	PLOT SCALE = 100'	CHECKED CW	REVISED -
	PLOT DATE = 5/11/2012	DATE -	REVISED -

DRAFT

ELGIN O'HARE WEST BYPASS
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CHRISTOPHER B. BURKE ENGINEERING, LTD

PROPOSED DRAINAGE PROFILE
ADDISON RIVER WATERSHED
MT. PROSPECT ROAD

SCALE: 1"=50' | SHEET NO. OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK,DuPAGE	231	219
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

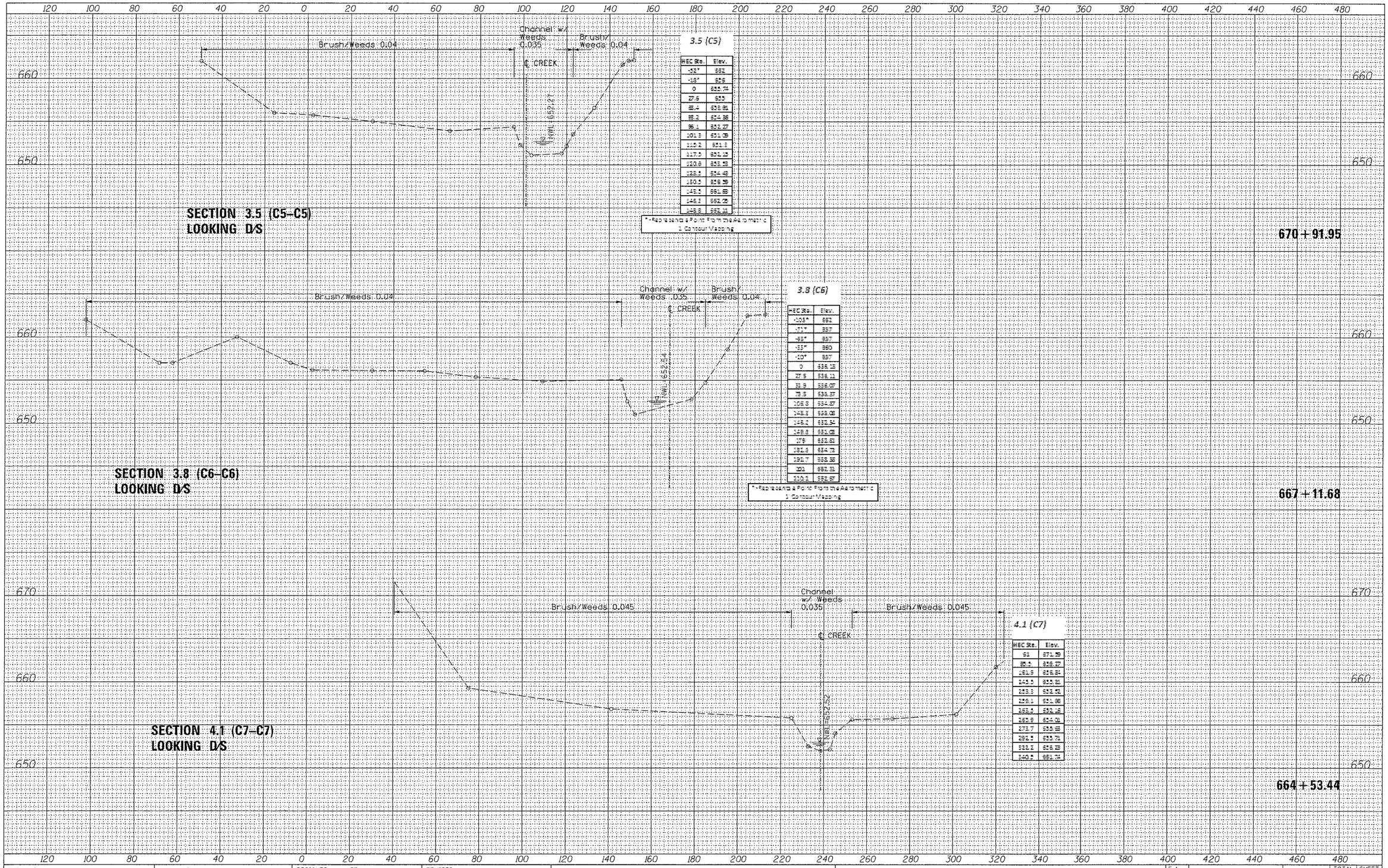
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Tab 6

SECTION 6

STREAM CROSS-SECTION PLOTS
STRUCTURE OPENING PLOTS

STREAM CROSS-SECTION PLOTS



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 =	USER NAME = eanderson	DESIGNED - PP	REVISED -
Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\O1EOWB-05-sht-xssht-01.dgn		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/5/2012	DATE -	REVISED -

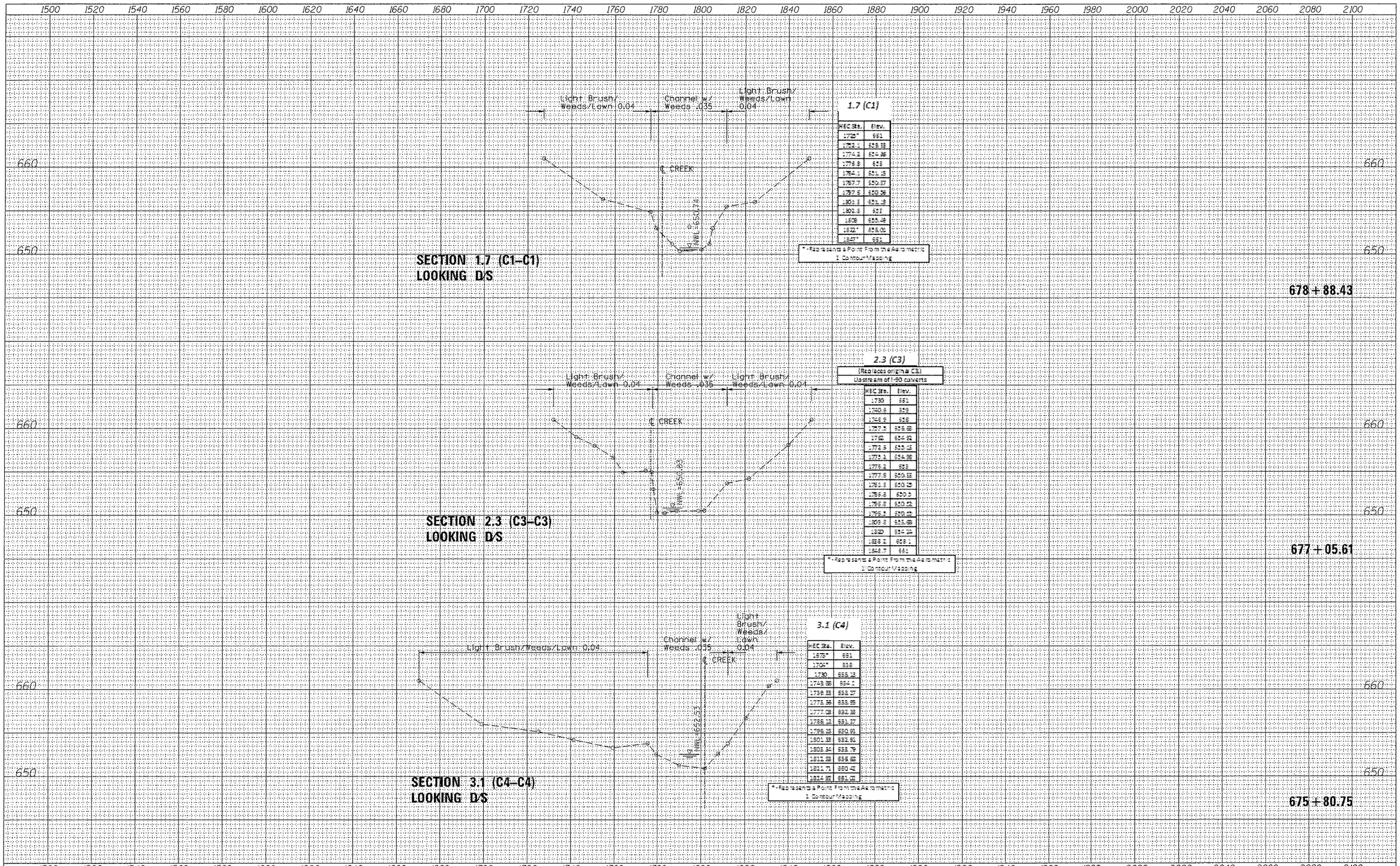
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK TRIBUTARY A

SCALE: 20H 5V | SHEET NO. 1 OF 2 SHEETS | STA. 664+53.44 TO STA. 670+91.95

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

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



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

FILE NAME =	USER NAME = eanderson	DESIGNED - PP	REVISED -
Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\DIEOWB-05-sht-xssht-01.dgn		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/5/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK TRIBUTARY A

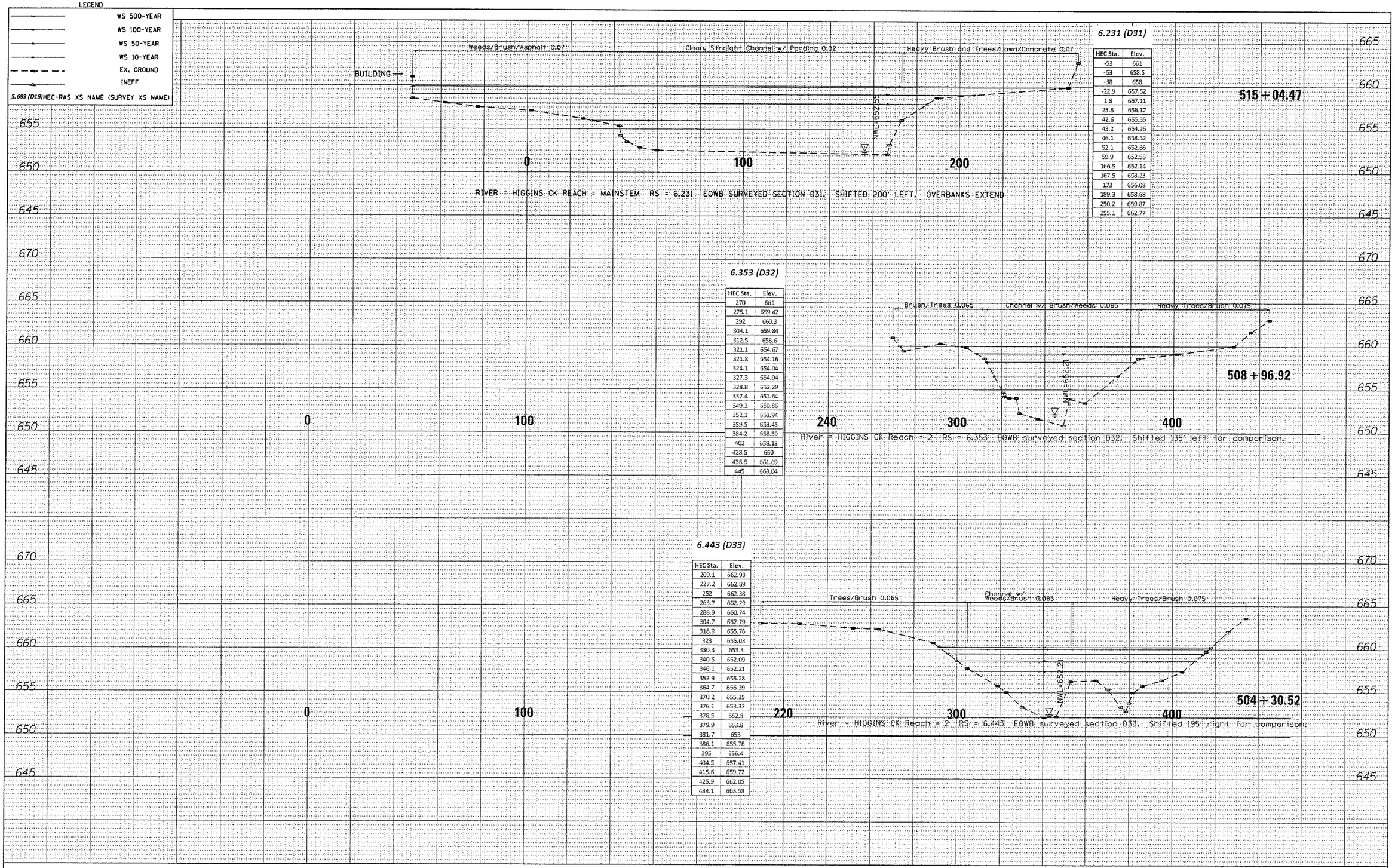
SCALE: 20H 5V | SHEET NO. 2 OF 2 SHEETS | STA. 675+80.75 TO STA. 678+88.43

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

LEGEND

WS 500-YEAR
WS 100-YEAR
WS 50-YEAR
WS 10-YEAR
EX. GROUND
INEFF

5.683 (D19)HEC-RAS XS NAME (SURVEY XS NAME)



6.231 (D31)

HEC Sta.	Elev.
-53	661
-53	658.5
-38	658
-22.9	657.52
1.8	657.11
25.8	656.17
42.6	655.35
43.2	654.26
46.1	653.52
52.1	652.86
59.9	652.55
166.5	652.14
167.5	653.23
173	656.08
189.3	658.68
250.2	659.87
255.1	662.77

515+04.47

6.353 (D32)

HEC Sta.	Elev.
270	661
275.1	659.42
292	660.3
304.1	659.84
312.5	658.6
321.1	654.67
321.8	654.16
324.1	654.04
327.3	654.04
328.8	652.29
337.4	651.64
349.2	650.86
352.1	653.94
359.5	653.45
384.2	658.59
402	659.13
428.5	660
436.5	661.69
445	663.04

508+96.92

6.443 (D33)

HEC Sta.	Elev.
209.1	662.93
227.2	662.89
252	662.38
263.7	662.29
288.9	660.74
304.7	657.79
318.9	655.76
323	655.03
330.3	653.3
340.5	652.09
346.1	652.21
352.9	656.28
364.7	656.39
370.2	655.35
376.1	653.32
378.5	652.8
379.9	653.8
381.7	655
386.1	655.76
395	656.4
404.5	657.41
415.6	659.72
425.9	662.05
434.1	663.58

504+30.52

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:\361100 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\DIEOWB-05-sht-xssht-02_1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 1 OF 15 SHEETS | STA. 504+30.52 TO STA. 515+04.47

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

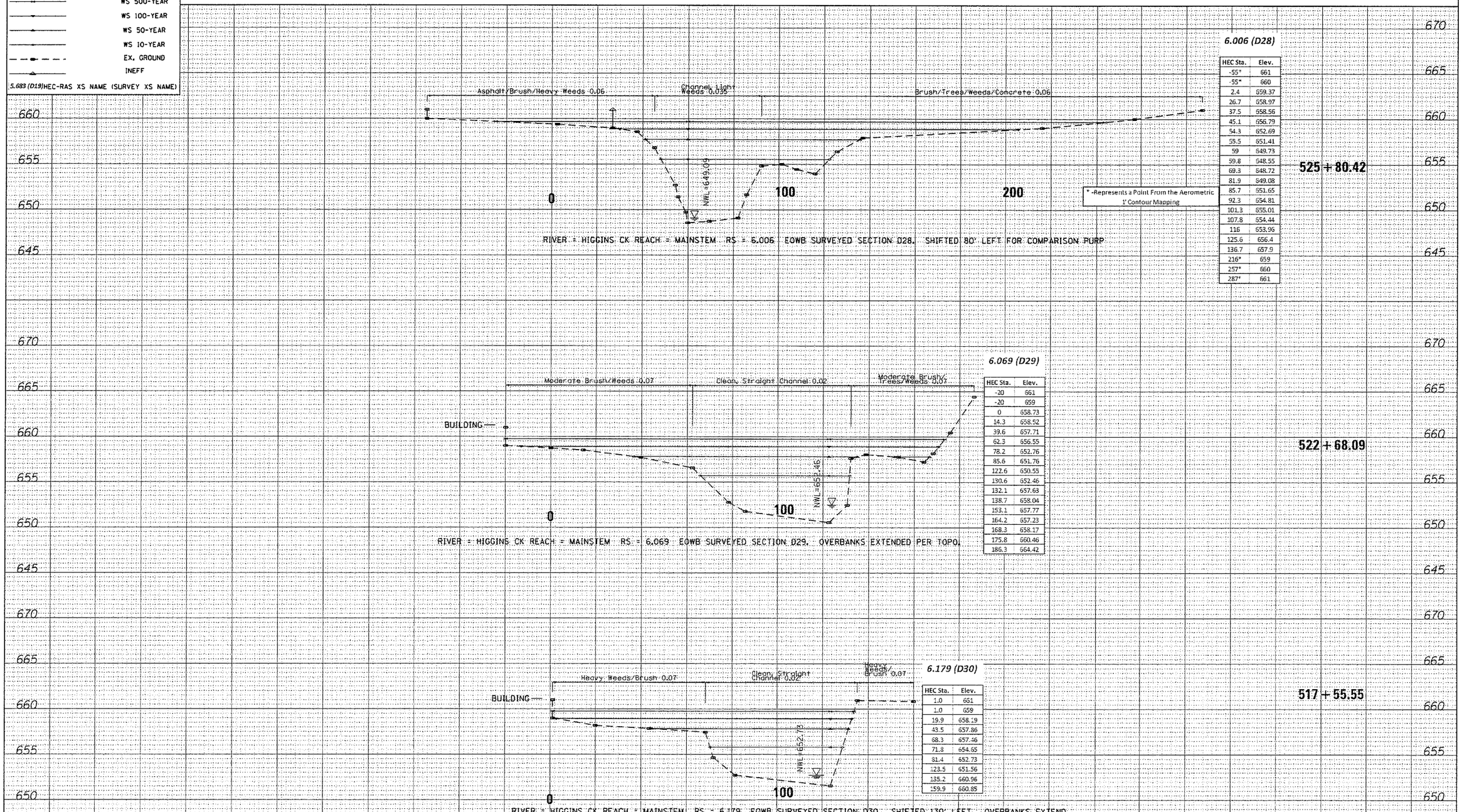
CONTRACT NO.

ILLINOIS | FED. AID PROJECT

LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

5.683 (D19)HEC-RAS XS NAME (SURVEY XS NAME)



6.006 (D28)

HEC Sta.	Elev.
-55*	661
-55*	660
2.4	659.37
26.7	658.97
37.5	658.56
45.1	656.79
54.3	652.69
55.5	651.41
59	649.73
59.8	648.55
69.3	648.72
81.9	649.08
85.7	651.65
92.3	654.81
101.3	655.01
107.8	654.44
116	653.96
125.6	656.4
136.7	657.9
216*	659
257*	660
287*	661

525 + 80.42

* -Represents a Point From the Aerometric 1' Contour Mapping

6.069 (D29)

HEC Sta.	Elev.
-20	661
-20	659
0	658.73
14.3	658.52
39.6	657.71
62.3	656.55
78.2	652.76
85.6	651.76
122.6	650.55
130.6	652.46
132.1	657.63
138.7	658.04
153.1	657.77
164.2	657.23
168.3	658.17
175.8	660.46
186.3	664.42

522 + 68.09

6.179 (D30)

HEC Sta.	Elev.
1.0	661
1.0	659
19.9	658.19
43.5	657.86
68.3	657.46
71.8	654.65
81.4	652.73
123.5	651.56
135.2	660.96
159.9	660.85

517 + 55.55

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:\361100 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\D1EOWB-05-sht-xssht-02_1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 2 OF 15 SHEETS | STA. 517+55.55 TO STA. 525+80.42

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

LEGEND

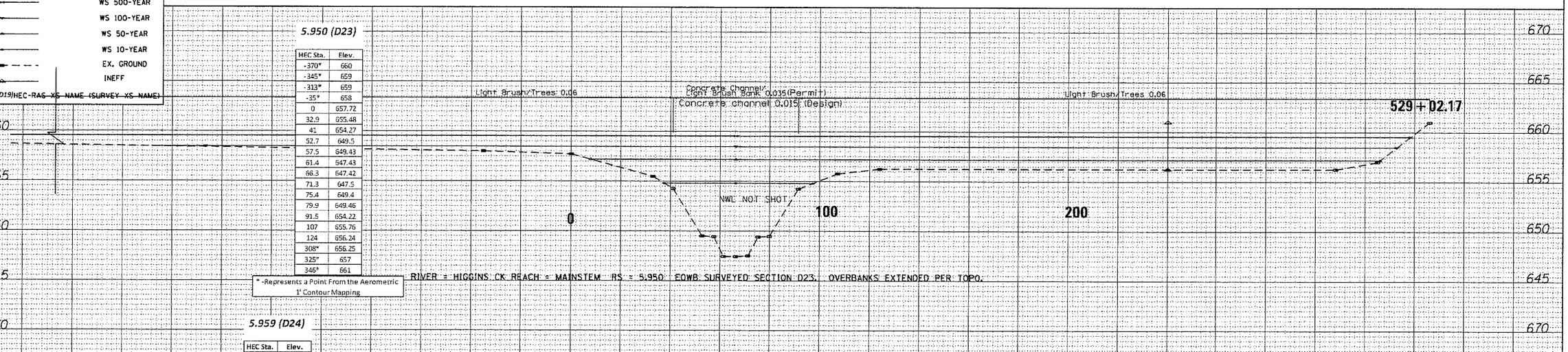
WS 500-YEAR
WS 100-YEAR
WS 50-YEAR
WS 10-YEAR
EX. GROUND
INEFF
5.683 (D19) HEC-RAS XS NAME (SURVEY XS NAME)

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

5.950 (D23)

HEC Sta.	Elev.
-370*	660
-345*	659
-313*	659
-35*	658
0	657.72
32.9	655.48
41	654.27
52.7	649.5
57.5	649.43
61.4	647.43
66.3	647.42
71.3	647.5
75.4	649.4
79.9	649.46
91.5	654.22
107	655.76
124	656.24
308*	656.25
325*	657
346*	661

* -Represents a Point From the Aerometric 1' Contour Mapping

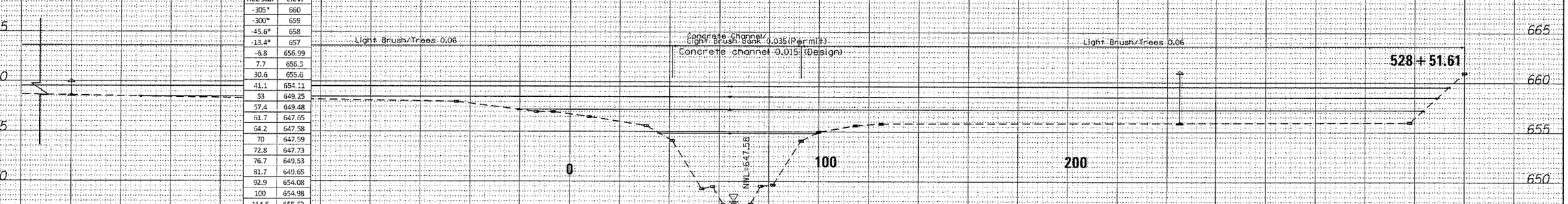


RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.950 EOWB SURVEYED SECTION D23. OVERBANKS EXTENDED PER TOPO.

5.959 (D24)

HEC Sta.	Elev.
-305*	660
-300*	659
-45.6*	658
-13.4*	657
-6.8	656.99
7.7	656.5
30.6	655.6
41.1	654.11
53	649.25
57.4	649.48
61.7	647.65
64.2	647.58
70	647.59
72.8	647.73
76.7	649.53
81.7	649.65
92.9	654.08
100	654.98
114.5	655.62
125	655.8
338*	656
360*	661

* -Represents a Point From the Aerometric 1' Contour Mapping

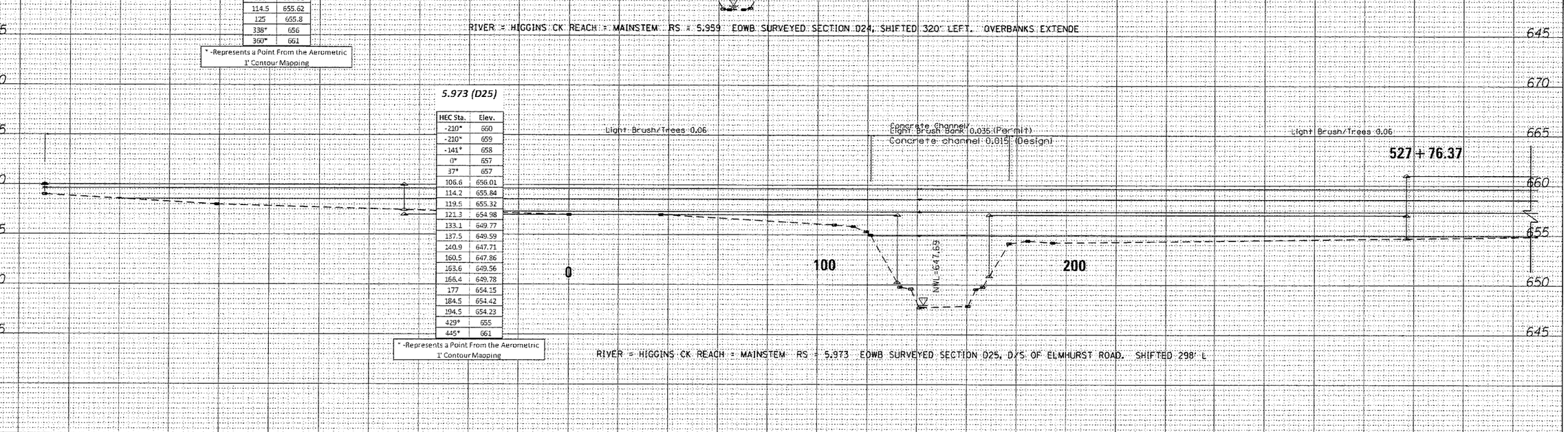


RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.959 EOWB SURVEYED SECTION D24, SHIFTED 320' LEFT. OVERBANKS EXTENDE

5.973 (D25)

HEC Sta.	Elev.
-210*	660
-210*	659
-141*	658
0*	657
37*	657
106.6	656.01
114.2	655.84
119.5	655.32
121.3	654.98
133.1	649.77
137.5	649.59
140.9	647.71
160.5	647.86
163.6	649.56
166.4	649.78
177	654.15
184.5	654.42
194.5	654.23
429*	655
445*	661

* -Represents a Point From the Aerometric 1' Contour Mapping



RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.973 EOWB SURVEYED SECTION D25, D/S OF ELMHURST ROAD. SHIFTED 298' L

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\OIEOWB-05-sht-xssht-02.1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 3 OF 15 SHEETS | STA. 527+76.37 TO STA. 529+02.17

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

LEGEND

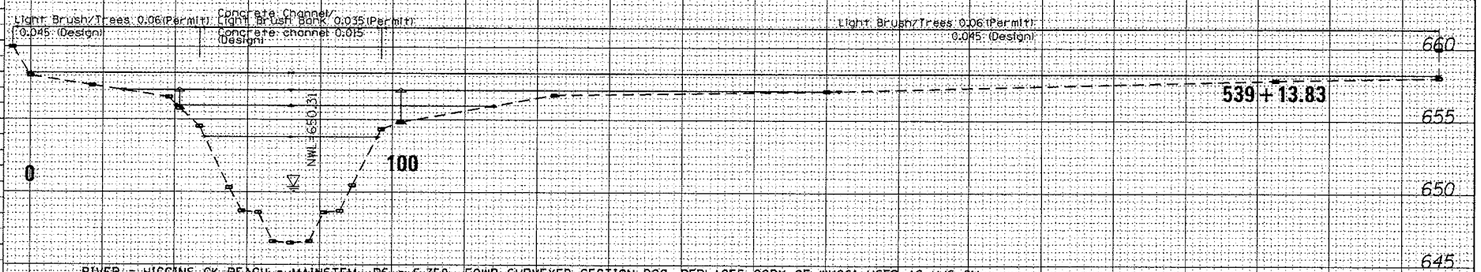
- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

5.683 (D19) HEC-RAS XS NAME (SURVEY XS NAME)

5.758 (D20)

HEC Sta.	Elev.
-5*	660
0	658
17	657.35
38.3	656.54
41.4	655.76
46.7	654.53
55	650.31
58.5	648.7
63	648.6
67	646.6
71.8	646.5
77	646.6
81	648.6
85.5	648.7
88.9	650.47
96.9	654.34
102.1	654.83
144.7	656.7
220	657
345*	657.8
390*	658
390*	660

* -Represents a Point From the Aerometric 1' Contour Mapping

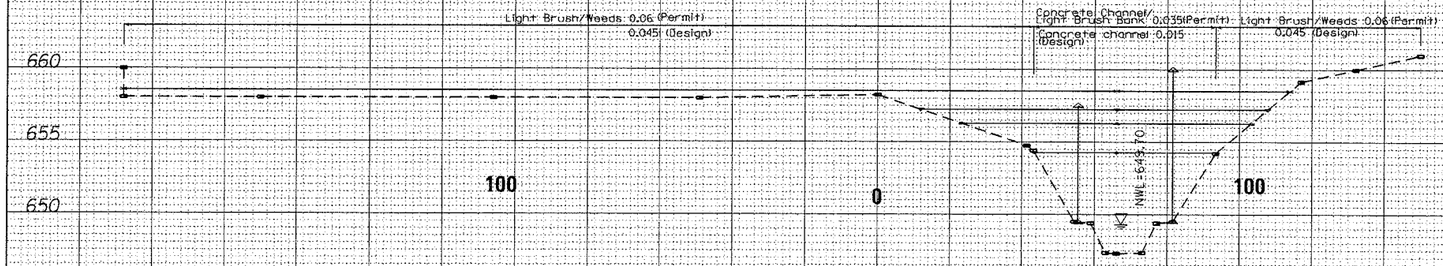


RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.758 EOWB SURVEYED SECTION D20. REPLACES COPY OF WH061 USED AS U/S CU

5.899 (D21)

HEC Sta.	Elev.
-208*	660
-208*	658
-170*	658
-106*	658
-49*	658
0	658.24
41.4	654.75
43.2	654.41
54.5	649.5
59	649.4
63	647.35
66	647.3
73	647.35
77	649.4
81.5	649.5
93.4	654.22
116.9	659.17
132*	660
150*	661

* -Represents a Point From the Aerometric 1' Contour Mapping

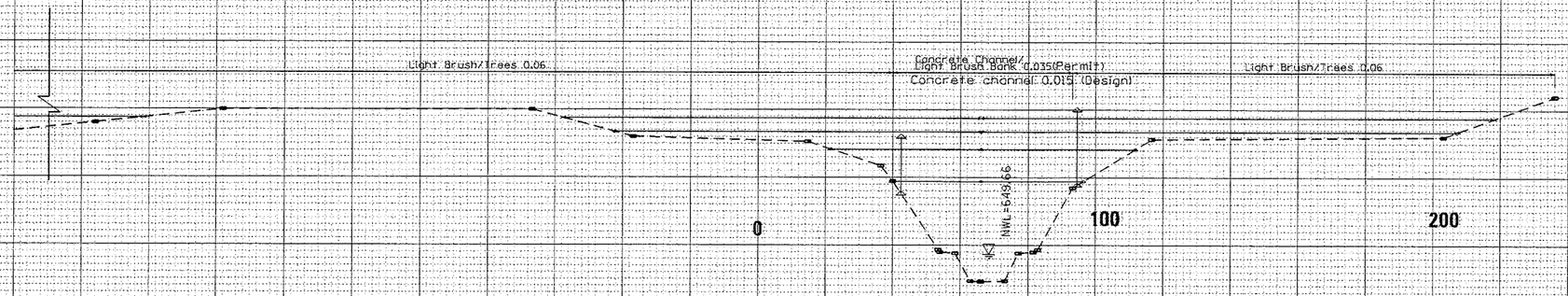


RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.899 EOWB SURVEYED SECTION D21. DOWNSTREAM OF MRWD ENTRANCE. SHAPE R

5.914 (D22)

HEC Sta.	Elev.
-435*	660
-430*	659
-330*	659
-262*	658
-235*	658
-196*	659
-158*	660
-67*	660
-37*	658
14.6	657.65
36.4	655.86
40	654.72
53.5	649.68
54	649.5
58.5	649.4
63	647.35
66	647.31
73	647.35
77	649.4
81.5	649.5
82.8	649.66
93.2	654.22
116.5	657.83
203*	658
236*	661

* -Represents a Point From the Aerometric 1' Contour Mapping



RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.914 EOWB SURVEYED SECTION D22. UPSTREAM OF MRWD ENTRANCE. SHIFTED 6

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\OIEOWB-05-sht-xssht-02_1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

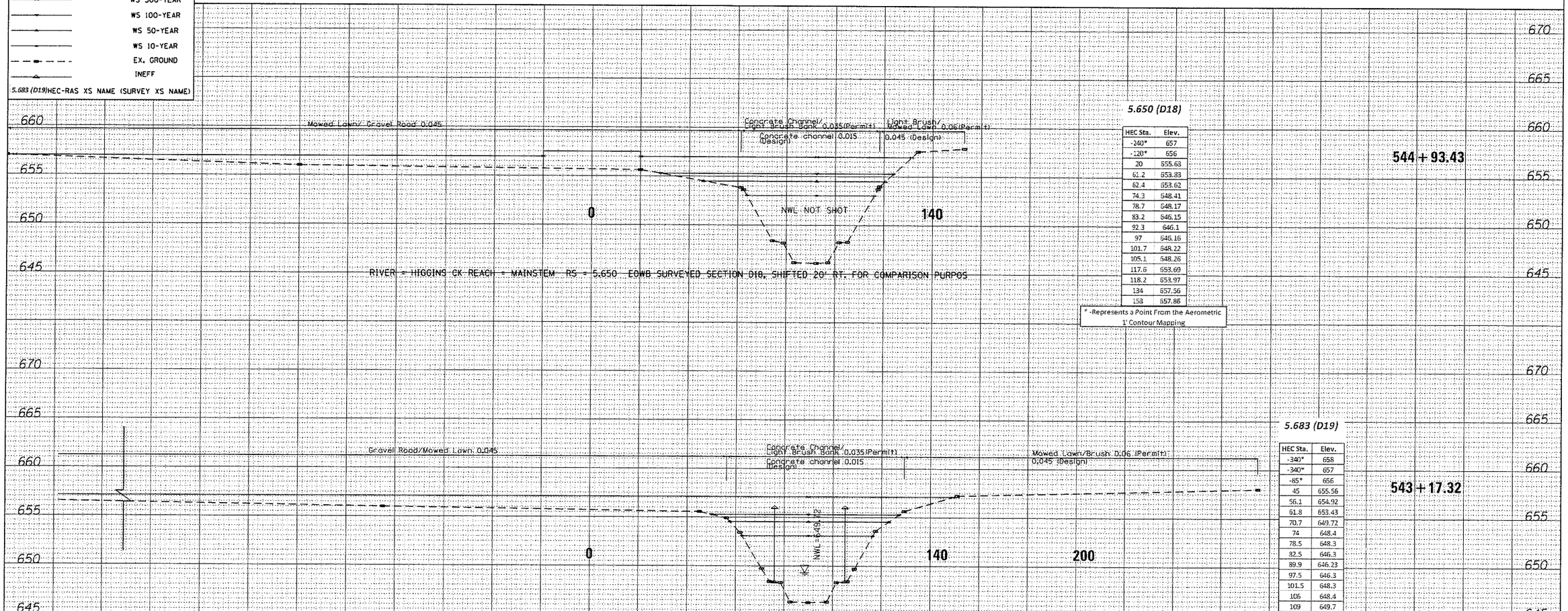
SCALE: | SHEET NO. 4 OF 15 SHEETS | STA. 530+91.33 | TO STA. 539+13.83

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

LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

5.683 (D19)HEC-RAS XS NAME (SURVEY XS NAME)



5.650 (D18)

HEC Sta.	Elev.
-240*	657
-220*	656
20	655.63
61.2	653.83
62.4	653.62
74.3	648.41
78.7	648.17
83.2	646.15
92.3	646.1
97	646.16
101.7	648.22
105.1	648.26
117.6	653.69
118.2	653.97
134	657.56
153	657.86

544+93.43

* -Represents a Point From the Aerometric 1' Contour Mapping

5.683 (D19)

HEC Sta.	Elev.
-340*	658
-340*	657
-85*	656
45	655.56
56.1	654.92
61.8	653.43
70.7	649.72
74	648.4
78.5	648.3
82.5	646.3
89.9	646.23
97.5	646.3
101.5	648.3
106	648.4
109	649.7
117.5	653.6
129.3	655.64
151	657.23
275*	658

543+17.32

* -Represents a Point From the Aerometri 1' Contour Mapping

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\DIEOWB-05-sht-xssht-02.1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 5 OF 15 SHEETS | STA. 539+34.55 TO STA. 544+93.43

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

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

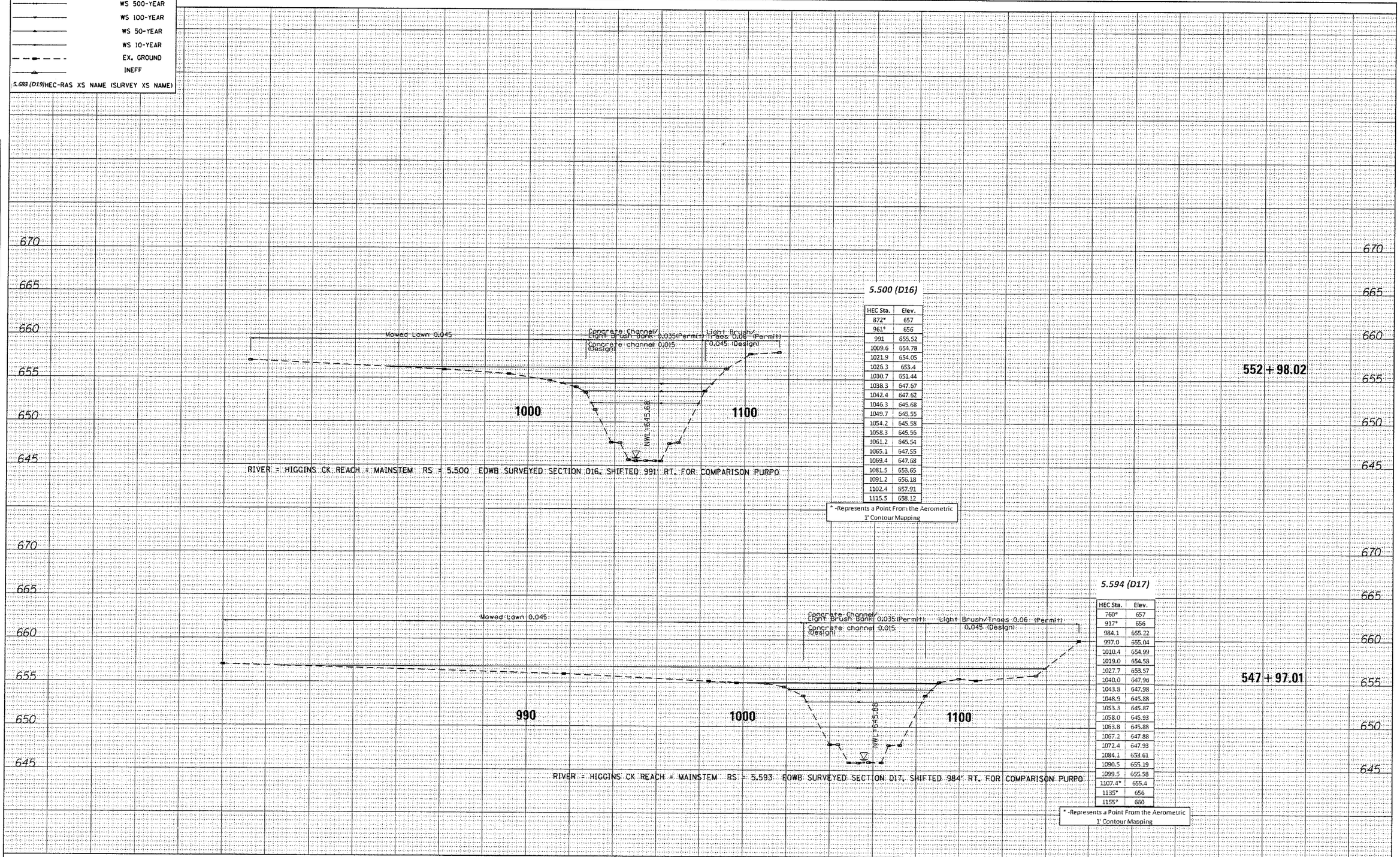
LEGEND

WS 500-YEAR
WS 100-YEAR
WS 50-YEAR
WS 10-YEAR
EX. GROUND
INEFF

5.683 (D19) HEC-RAS XS NAME (SURVEY XS NAME)

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

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



5.500 (D16)

HEC Sta.	Elev.
872*	657
961*	656
991	655.52
1009.6	654.78
1021.9	654.05
1026.3	653.4
1030.7	651.44
1038.3	647.67
1042.4	647.62
1046.3	645.68
1049.7	645.55
1054.2	645.58
1058.3	645.56
1061.2	645.54
1065.1	647.55
1069.4	647.68
1081.5	653.65
1091.2	656.18
1102.4	657.91
1115.5	658.12

* -Represents a Point From the Aerometric 1' Contour Mapping

5.594 (D17)

HEC Sta.	Elev.
760*	657
917*	656
984.1	655.22
997.0	655.04
1010.4	654.99
1019.0	654.58
1027.7	653.57
1040.0	647.96
1043.8	647.98
1048.9	645.88
1053.3	645.87
1058.0	645.93
1063.8	645.88
1067.2	647.88
1072.4	647.93
1084.1	653.61
1090.5	655.19
1099.5	655.58
1107.4*	655.4
1135*	656
1155*	660

* -Represents a Point From the Aerometric 1' Contour Mapping

FILE NAME = Y:\361100 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\OIEOW8-05-sht-xssht-02_1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 6 OF 15 SHEETS | STA. 547+97.01 TO STA. 552+98.02

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

LEGEND

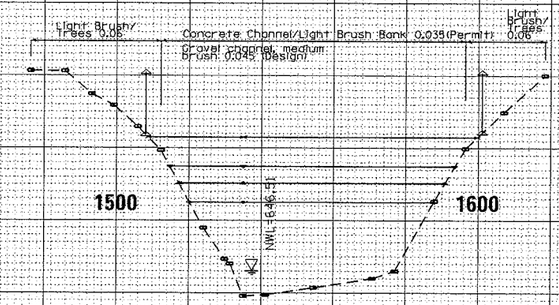
WS 500-YEAR
WS 100-YEAR
WS 50-YEAR
WS 10-YEAR
EX. GROUND
INEFF

5.683 (D19) HEC-RAS XS NAME (SURVEY XS NAME)

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

5.377 (D14)

HEC Sta.	Elev.
1476.1	660.33
1485.6	660.3
1493	658.73
1499.1	657.95
1505.8	656.48
1512.2	654.84
1523.9	649.49
1529.8	647.34
1531.3	647.02
1534.9	644.79
1541.2	644.87
1554.5	645.36
1570.8	646
1577	646.51
1587.8	651.34
1596.3	654.96
1607	657.47
1618.3	660.02

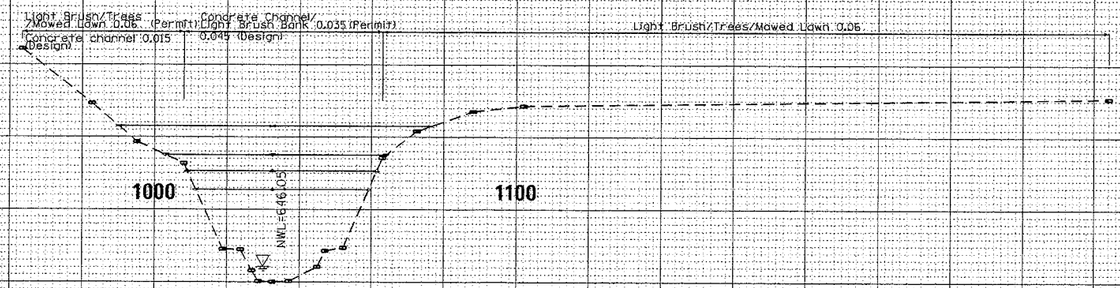


RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.377 EOWB SURVEYED SECTION D14, SHIFTED 1460' RT. FOR COMPARISON PURP

559+48.81

5.409 (D15)

HEC Sta.	Elev.
963.4	661.09
982.6	657.33
995	654.68
1008	653.19
1018.8	647.28
1023.7	647.24
1026.8	645.8
1028.6	645.05
1032.4	645.02
1037	645.06
1044.9	646.05
1047.1	647.15
1052.2	647.37
1063	653.58
1072.5	655.41
1088	656.77
1101.9	657.16
1264	657.7



RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.409 EOWB SURVEYED SECTION D15, SHIFTED 947' RT. FOR COMPARISON PURPO

557+80.24

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

FILE NAME = Y:\361100 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\OIEOWB-05-sht-xssht-02_1.dgn	USER NAME = mhayas	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 7 OF 15 SHEETS | STA. 557+80.24 TO STA. 559+48.81

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

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

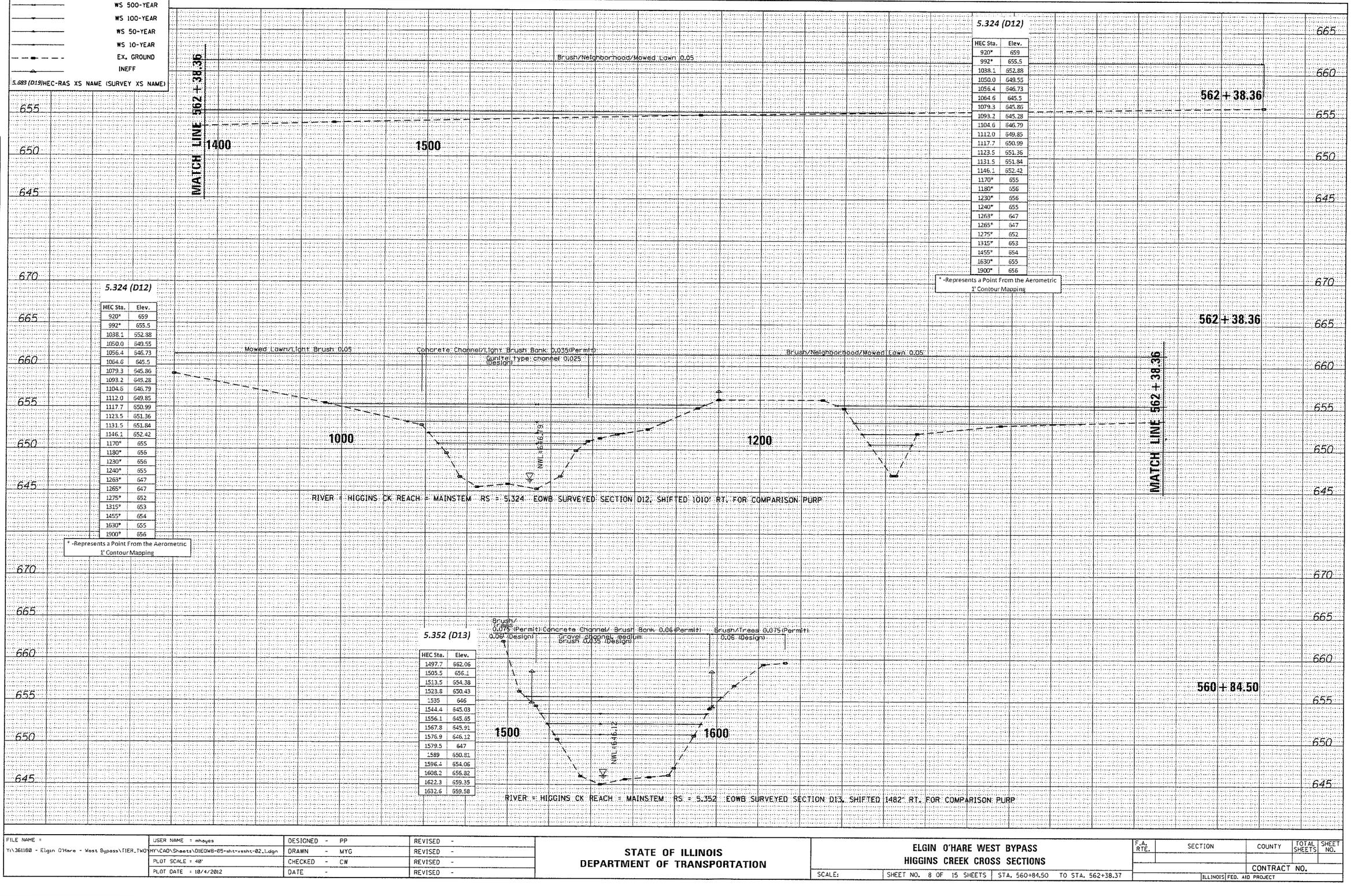
LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- Ex. GROUND
- INEFF

5.683 (D19) HEC-RAS XS NAME (SURVEY XS NAME)

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



5.324 (D12)

HEC Sta.	Elev.
920*	659
992*	655.5
1038.1	652.88
1050.0	649.55
1056.4	646.73
1064.6	645.5
1079.3	645.86
1093.2	645.28
1104.6	646.79
1112.0	649.85
1117.7	650.99
1123.5	651.36
1131.5	651.84
1146.1	652.42
1170*	655
1180*	656
1230*	656
1240*	655
1263*	647
1265*	647
1275*	652
1315*	653
1455*	654
1630*	655
1900*	656

* -Represents a Point From the Aerometric 1' Contour Mapping

RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.324 EOWB SURVEYED SECTION D12, SHIFTED 1010' RT. FOR COMPARISON PURP

5.352 (D13)

HEC Sta.	Elev.
1497.7	662.06
1505.5	656.1
1513.5	654.38
1523.8	650.43
1535	646
1544.4	645.03
1556.1	645.65
1567.8	645.91
1576.9	646.12
1579.5	647
1589	650.81
1596.4	654.06
1608.2	656.82
1622.3	659.35
1632.6	659.58

RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.352 EOWB SURVEYED SECTION D13, SHIFTED 1482' RT. FOR COMPARISON PURP

FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\D1EOWB-05-sht-xssht-02_1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

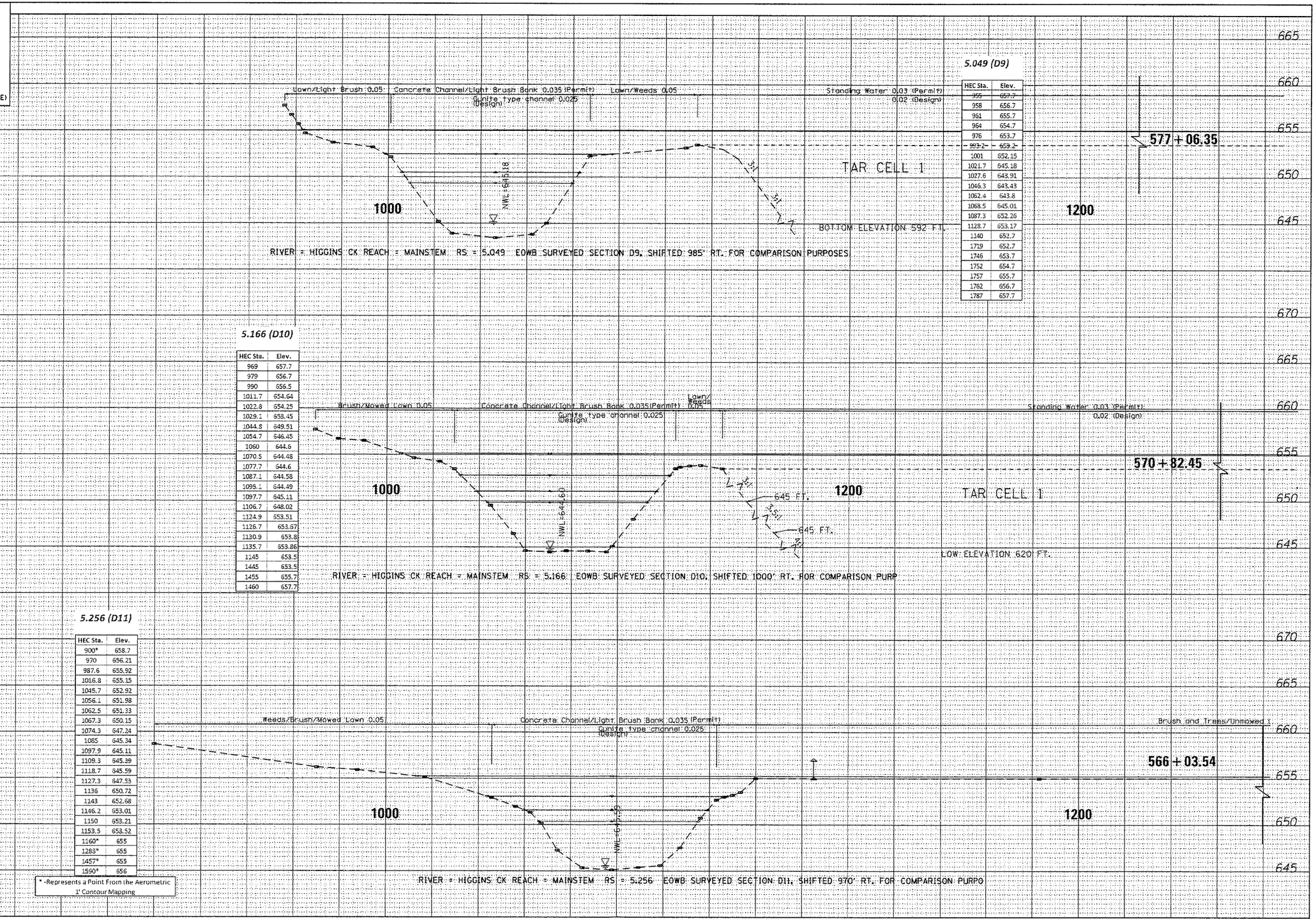
SCALE: | SHEET NO. 8 OF 15 SHEETS | STA. 560+84.50 TO STA. 562+38.37

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

LEGEND

WS 500-YEAR
WS 100-YEAR
WS 50-YEAR
WS 10-YEAR
EX. GROUND
INEFF

5.683 (D19) HEC-RAS XS NAME (SURVEY XS NAME)



5.049 (D9)

HEC Sta.	Elev.
~~955~~	~~657.7~~
958	656.7
961	655.7
964	654.7
976	653.7
~~993.2~~	~~653.2~~
1001	652.15
1021.7	645.18
1027.6	643.91
1046.3	643.43
1062.4	643.8
1068.5	645.01
1087.3	652.26
1128.7	653.17
1140	652.7
1719	652.7
1746	653.7
1752	654.7
1757	655.7
1762	656.7
1787	657.7

5.166 (D10)

HEC Sta.	Elev.
969	657.7
979	656.7
990	656.5
1011.7	654.64
1022.8	654.25
1029.1	653.45
1044.8	649.51
1054.7	646.45
1060	644.6
1070.5	644.48
1077.7	644.6
1087.1	644.58
1095.1	644.49
1097.7	645.11
1106.7	648.02
1124.9	653.51
1126.7	653.67
1130.9	653.8
1135.7	653.86
1145	653.5
1445	653.5
1455	655.7
1460	657.7

5.256 (D11)

HEC Sta.	Elev.
900*	658.7
970	656.21
987.6	655.92
1016.8	655.15
1045.7	652.92
1056.1	651.98
1062.5	651.33
1067.3	650.15
1074.3	647.24
1085	645.34
1097.9	645.11
1109.3	645.39
1118.7	645.59
1127.3	647.53
1136	650.72
1143	652.68
1146.2	653.01
1150	653.21
1153.5	653.52
1160*	655
1283*	655
1457*	655
1590*	656

* -Represents a Point From the Aerometric 1' Contour Mapping

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-05-sht-xssht-02_1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 9 OF 15 SHEETS | STA. 566+03.54 TO STA. 577+06.35

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

CONTRACT NO.

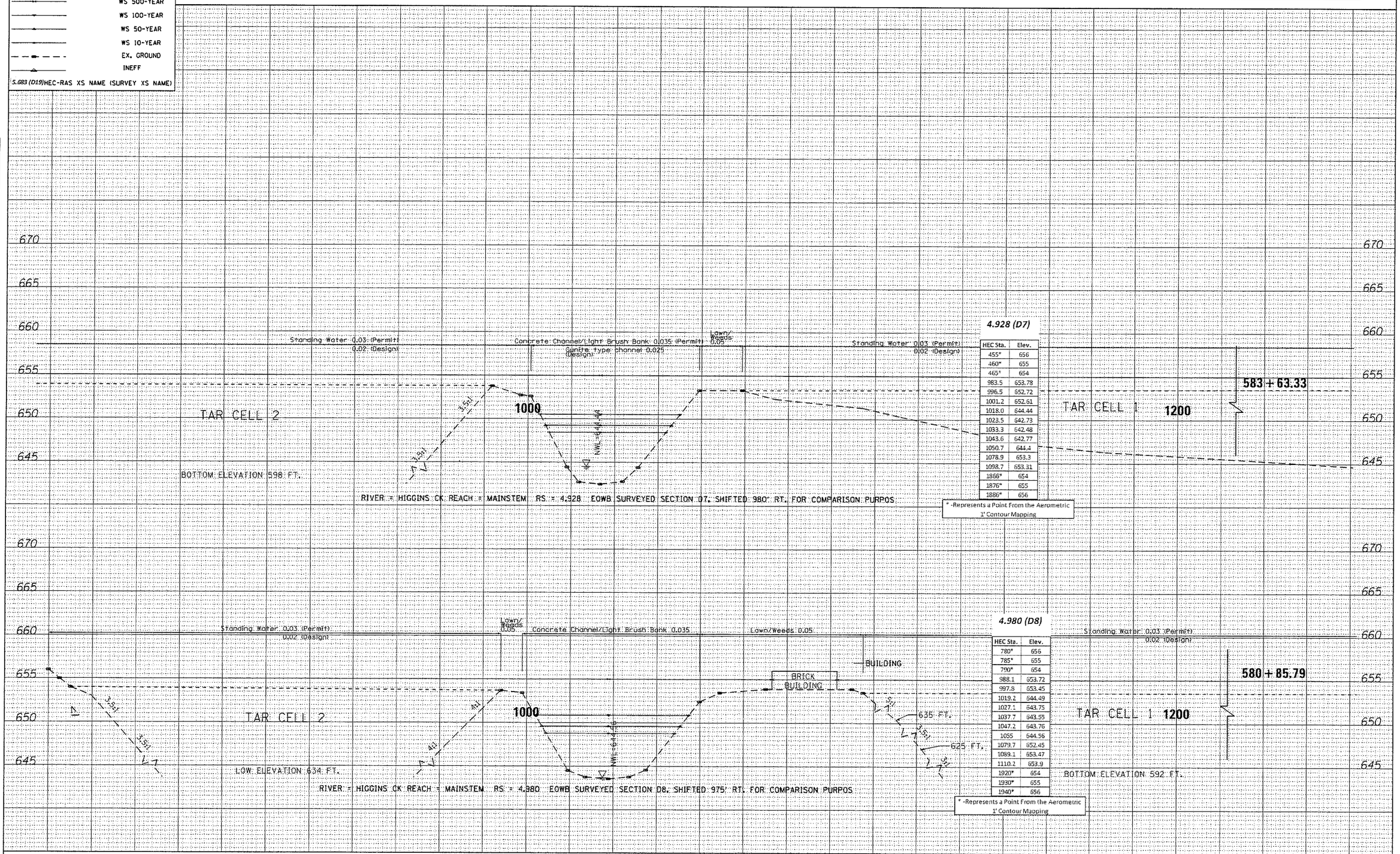
ILLINOIS FED. AID PROJECT

LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

5.683 (D19) HEC-RAS XS NAME (SURVEY XS NAME)

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



ORIGINAL SURVEY / FINAL 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\DIEOWB-05-sht-xssht-02_1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 10 OF 15 SHEETS | STA. 580+85.79 | TO STA. 583+63.33

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

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

LEGEND

WS 500-YEAR
WS 100-YEAR
WS 50-YEAR
WS 10-YEAR
EX. GROUND
INEFF

5.683 (D19) HEC-RAS XS NAME (SURVEY XS NAME)

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

4.694 (D5)

HEC Sta.	Elev.
295*	655
300*	654
1060*	654
1064.2	653.1
1083.3	647.56
1108.1	646.93
1116.8	645.63
1119.3	643.81
1126	641.6
1139.8	641.46
1152.2	641.72
1157.8	645.74
1160.6	643.84
1167.7	648.16
1175.5	650.04
1186.5	650.48
1186.8	650.56
1207.9	651
1390*	652
1625*	654
1630*	655

* -Represents a Point From the Aerometric 1' Contour Mapping

4.771 (D6)

HEC Sta.	Elev.
310*	655
315*	654
1099.1	653.91
1117.7	648.31
1124.3	647.86
1146.1	647.02
1150.1	645.94
1152.4	642.96
1157	642.05
1186.9	642.52
1191.5	642.96
1193.9	643.89
1203.3	648.97
1207.4	649.66
1217.5	649.9
1227.5	650.03
1235	650.14
1270*	651
1510*	653
1620*	655

* -Represents a Point From the Aerometric 1' Contour Mapping

670
665
660
655
650
645

500

TAR CELL 2

BOTTOM ELEVATION 602 FT.

Standing Water 0.065 (Permit)
0.02 (Design)

MATCH LINE 596+02.10

596+02.10

1000

TAR CELL 2

BOTTOM ELEVATION 602 FT.

Standing Water 0.065 (Permit)
0.02 (Design)

Brush/Weeds/Lawn 0.065

Clean Channel W/ Some Weeds 0.04

Mowed Lawn/Weeds/Brush 0.065

591+98.81

NWL 649.88

RIVER = HIGGINS CK REACH = MAINSTEM RS = 4.771 EOWB SURVEYED SECTION D6, SHIFTED 1000' RT. FOR COMPARISON PURPO

FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\DIEOWB-05-sht-xssht-02_1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 11 OF 15 SHEETS | STA. 591+98.81 | TO STA. 596+02.10

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

LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

5.683 (D19) HEC-RAS XS NAME (SURVEY XS NAME)

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

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

MATCH LINE 596+02.10

4.694 (D5)

HEC Sta.	Elev.
295*	655
300*	654
1060*	654
1064.2	653.1
1083.3	647.56
1108.1	646.93
1116.8	645.63
1119.3	643.81
1126	641.6
1139.8	641.46
1152.2	641.72
1157.8	645.74
1160.6	643.84
1167.7	648.16
1175.5	650.04
1186.5	650.48
1186.8	650.56
1207.9	651
1390*	652
1625*	654
1630*	655

* -Represents a Point From the Aerometric 1' Contour Mapping

Pavement/Trees/Brush /Mowed Lawn/Weeds 0.065

1500

596+02.10

MATCH LINE 596+02.10

4.694 (D5)

HEC Sta.	Elev.
295*	655
300*	654
1060*	654
1064.2	653.1
1083.3	647.56
1108.1	646.93
1116.8	645.63
1119.3	643.81
1126	641.6
1139.8	641.46
1152.2	641.72
1157.8	645.74
1160.6	643.84
1167.7	648.16
1175.5	650.04
1186.5	650.48
1186.8	650.56
1207.9	651
1390*	652
1625*	654
1630*	655

* -Represents a Point From the Aerometric 1' Contour Mapping

Standing Water 0.065 (Permit) 0.02 (Design) | Lawn/Brush/Weeds 0.065 | Clean Channel W/ Some Weeds 0.04 | Pavement/Trees/Brush /Mowed Lawn/Weeds 0.065

1000

TAR CELL 2

BOTTOM ELEVATION 602 FT.

596+02.10

MATCH LINE 596+02.10

RIVER = HIGGINS CK REACH = MAINSTEM RS = 4.694 FOWB SURVEYED SECTION D5, SHIFTED 1060' RT. FOR COMPARISON PURPO

670 665 660 655 650 645

FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\OIEOWB-05-sht-xssht-02_1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 12 OF 15 SHEETS | STA. 596+03.10 TO STA. 596+04.10

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

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

LEGEND

WS 500-YEAR
WS 100-YEAR
WS 50-YEAR
WS 10-YEAR
EX. GROUND
INEFF

5.683 (D19)HEC-RAS XS NAME (SURVEY XS NAME)

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

4.638 (D3)

HEC Sta.	Elev.
550*	656
550*	654
1070.9	653.78
1087	651.23
1100.1	648.26
1111.4	645.77
1121.5	644.69
1124.8	643.64
1129.8	642.35
1138.8	641.45
1152.9	640.8
1156.2	641.52
1160.7	641.61
1171.3	643.04
1172.8	647.27
1200.6	653.59
1206.8	654.39
1220*	655

* -Represents a Point From the Aerometric 1' Contour Mapping

Light Brush/Trees/Weeds 0.065

MATCH LINE 599 + 00.35

599 + 00.35

600 700 900

4.659 (D4)

HEC Sta.	Elev.
455*	655
455*	654
855*	654
905*	653
965*	652
1075*	650.9
1090.2	650.55
1106.3	649.74
1113.4	648.29
1119.5	646.26
1120.8	643.56
1124.8	639.8
1168.3	638.42
1173.6	643.5
1176.4	645.87
1181.7	648.12
1190	650.46
1211.9	650.77
1219	650.79
1273.6	654.39
1275*	655

* -Represents a Point From the Aerometric 1' Contour Mapping

Heavy Brush and Weeds/Pavement 0.065 — Clean Channel w/ Some Weeds 0.04 — Heavy Brush/Weeds 0.065

MATCH LINE 597 + 93.18

1000 1200

597 + 93.18

4.659 (D4)

HEC Sta.	Elev.
455*	655
455*	654
855*	654
905*	653
965*	652
1075*	650.9
1090.2	650.55
1106.3	649.74
1113.4	648.29
1119.5	646.26
1120.8	643.56
1124.8	639.8
1168.3	638.42
1173.6	643.5
1176.4	645.87
1181.7	648.12
1190	650.46
1211.9	650.77
1219	650.79
1273.6	654.39
1275*	655

* -Represents a Point From the Aerometric 1' Contour Mapping

RIVER = HIGGINS CK REACH = MAINSTEM RS = 4.659 EOWB SURVEYED SECTION D4, SHIFTED 1075' RT. FOR COMPARISON PURPO

Heavy Brush and Weeds/Pavement 0.065

597 + 93.18

MATCH LINE 597 + 93.18

500 700 900

FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\DIEOWB-05-sht-xssht-02.1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 13 OF 15 SHEETS | STA. 597+93.18 | TO STA. 599+00.35

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

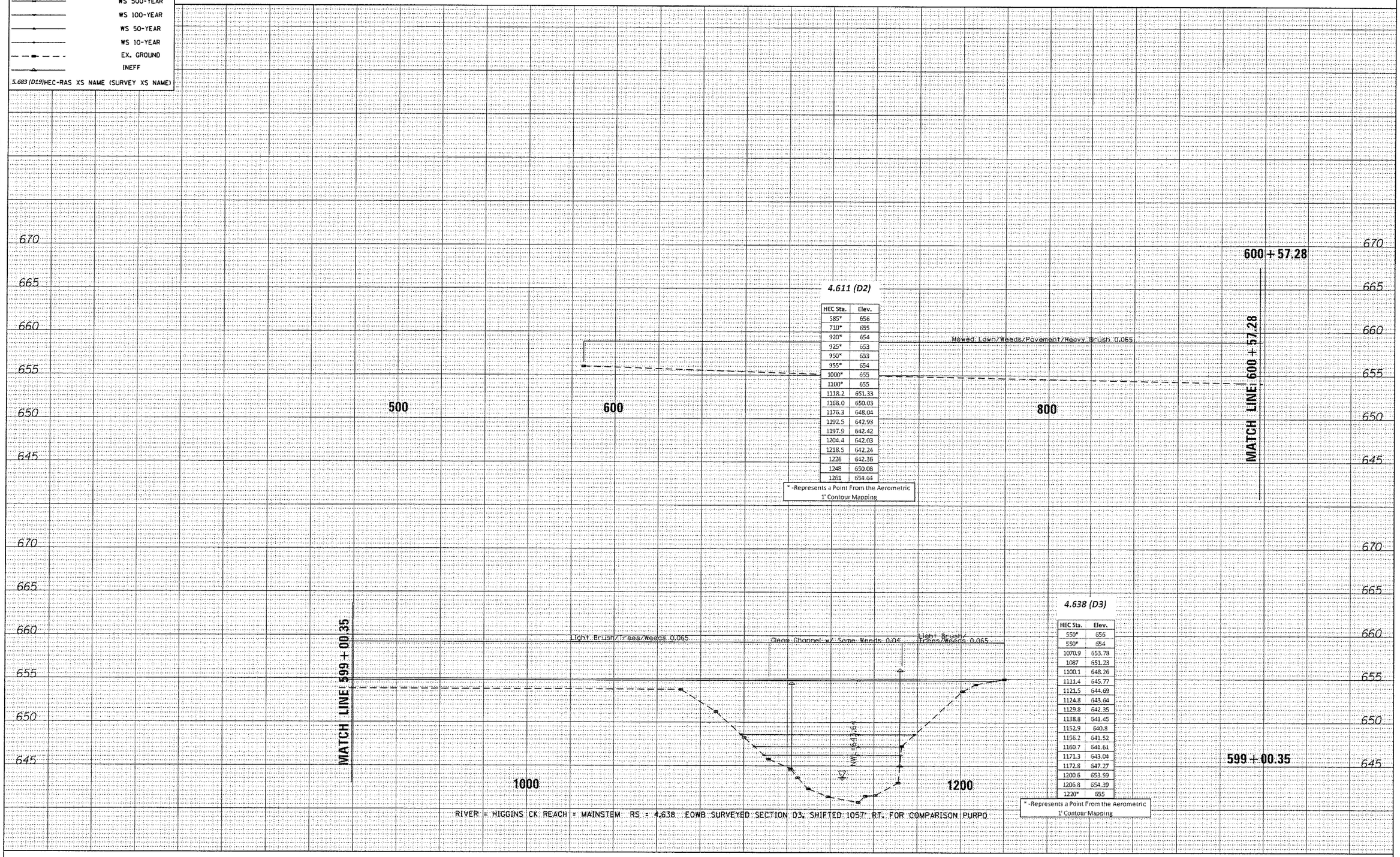
LEGEND

WS 500-YEAR
WS 100-YEAR
WS 50-YEAR
WS 10-YEAR
EX. GROUND
INEFF

5.683 (D19) HEC-RAS XS NAME (SURVEY XS NAME)

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



4.611 (D2)

HEC Sta.	Elev.
585*	656
710*	655
920*	654
925*	653
950*	653
955*	654
1000*	655
1100*	655
1118.2	651.33
1168.0	650.03
1176.3	648.04
1192.5	642.93
1197.9	642.42
1204.4	642.03
1218.5	642.24
1226	642.36
1248	650.08
1261	654.64

*-Represents a Point From the Aerometric 1' Contour Mapping

4.638 (D3)

HEC Sta.	Elev.
550*	656
550*	654
1070.9	653.78
1087	651.23
1100.1	648.26
1111.4	645.77
1121.5	644.69
1124.8	643.64
1129.8	642.35
1138.8	641.45
1152.9	640.8
1156.2	641.52
1160.7	641.61
1171.3	643.04
1172.8	647.27
1200.6	653.59
1206.8	654.39
1220*	655

*-Represents a Point From the Aerometric 1' Contour Mapping

RIVER = HIGGINS CK REACH = MAINSTEM RS = 4.638 EOWB SURVEYED SECTION D3, SHIFTED 1057' RT. FOR COMPARISON PURPO

FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\DIEOWB-05-sht-xssht-02_1.dgn	USER NAME = mhayes	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 10/4/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 14 OF 15 SHEETS | STA. 599+01.35 | TO STA. 600+57.28

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

LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

5.683 (D19) HEC-RAS XS NAME (SURVEY XS NAME)

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

670 665 660 655 650 645

602 + 77.66

Stone/Light Brush/Pavement/Mowed Lawn 0.04

PROPOSED FILL FOR TOUHY AVENUE OVERPASS MODELED AS OBSTRUCTION

Channel w/ Stone Riprap 0.04 0.033 (DESIGN)

Stone/Light Brush 0.04

NWL=640.04

4.569 (D1)

HEC Sta.	Elev.
-275	654.5
-217	653
-214	652
-206	651.8
-198	652
-180	655
31.4	654.86
45.3	653.08
84.5	642.23
93	641.26
95	640
99.8	639.09
106.3	639.34
117.5	638.78
122.8	641.42
135.3	644.26
169.9	655.01

RIVER = HIGGINS CK REACH = MAINSTEM RS = 4.569 EOWB SURVEYED SECTION D1. EXTENDED LEFT TO ALLOW ROADWAY OT FOR COMPARISON PURPOSES

300 200 100 0 100

MATCH LINE 600 + 57.28

Mowed Lawn/Weeds/Pavement/Heavy Brush 0.065

PROPOSED FILL FOR TOUHY AVENUE OVERPASS MODELED AS OBSTRUCTION

Channel w/ Riprap 0.04 (Permit) 0.033 (DESIGN)

Stones/Brush 0.04

NWL=642.93

1000 1200

600 + 57.28

4.611 (D2)

HEC Sta.	Elev.
585*	656
710*	655
920*	654
925*	653
950*	653
955*	654
1000*	655
1100*	655
1118.2	651.33
1168.0	650.03
1176.3	648.04
1192.5	642.93
1197.9	642.42
1204.4	642.03
1218.5	642.24
1226	642.36
1248	650.08
1261	654.64

RIVER = HIGGINS CK REACH = MAINSTEM RS = 4.611 EOWB SURVEYED SECTION D2. SHIFTED 25' LEFT FOR COMPARISON PURPO

* -Represents a Point From the Aerometric 1' Contour Mapping

FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\DIEOWB-05-sht-xssht-02_1.dgn	USER NAME = mgoldenberg	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 11/6/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK CROSS SECTIONS

SCALE: | SHEET NO. 15 OF 15 SHEETS | STA. 600+58.28 | TO STA. 602+77.66

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

STRUCTURE OPENING PLOTS

LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

≤ 683 (0.19) HEC-RAS XS NAME (SURVEY XS NAME)

BY	DATE

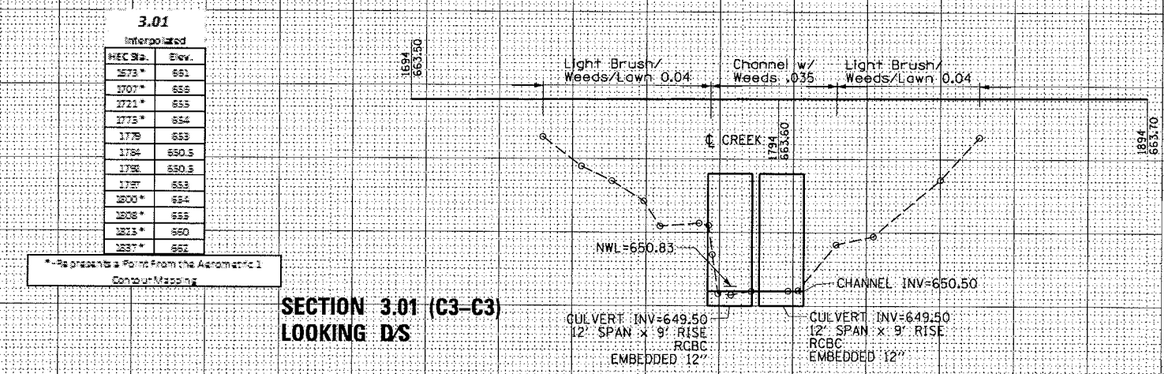
SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED

FINAL SURVEY
NOTE BOOK
NO.

3.01
Interpolated

HEC Sta.	Elev.
1673 *	661
1707 *	659
1721 *	655
1775 *	654
1779	653
1784	650.5
1798	650.5
1797	653
1800 *	654
1808 *	655
1823 *	660
1837 *	662

*-Represents a Point From the Aeromatic 1 Contour Mapping



SECTION 3.01 (C3–C3)
LOOKING D/S

PROPOSED I–90
(TRIBUTARY A)

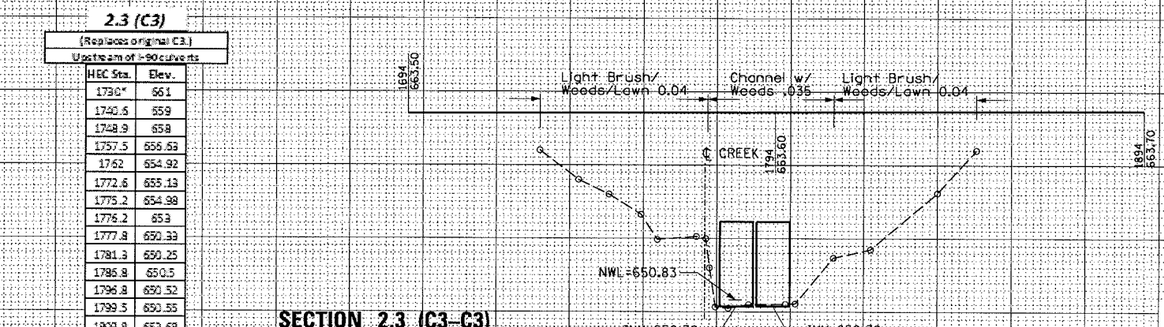
677+05.61

ROUTE I-90
WATERCOURSE HIGGINS CREEK TRIBUTARY A
S.N.
SCALE: HOR: 1" = 40' **VERT:** 10'
PLOTTED BY: pmagnelli **DATE:** 01/25/12
CHECKED BY: IAD **DATE:** 01/26/12
SURVEY DATE: 11/13/09

2.3 (C3)
(Replaces original C3.)
Upstream of I-90 culverts

HEC Sta.	Elev.
1736*	661
1740.6	659
1748.9	658
1757.5	656.63
1762	654.92
1772.6	655.13
1775.2	654.98
1776.2	653
1777.8	650.33
1781.3	650.25
1785.8	650.5
1796.8	650.52
1799.5	650.55
1809.8	653.68
1820	654.24
1838.2	658.1
1848.7*	661

*-Represents a Point From the Aeromatic 1 Contour Mapping



SECTION 2.3 (C3–C3)
LOOKING D/S

EXISTING I–90
(TRIBUTARY A)

677+05.61

ROUTE I-90
WATERCOURSE HIGGINS CREEK TRIBUTARY A
S.N.
SCALE: HOR: 1" = 40' **VERT:** 10'
PLOTTED BY: pmagnelli **DATE:** 01/25/12
CHECKED BY: IAD **DATE:** 01/26/12
SURVEY DATE: 11/13/09

ORIGINAL SURVEY
NOTE BOOK
NO.

SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED

1500 1520 1540 1560 1580 1600 1620 1640 1660 1680 1700 1720 1740 1760 1780 1800 1820 1840 1860 1880 1900 1920 1940 1960 1980 2000 2020 2040 2060 2080 2100

FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\OIEOWB-05-sht-xssht-02.1-A.dgn	USER NAME = pmagnelli	DESIGNED - PP	REVISED -
	PLOT SCALE = 40'	DRAWN - MYG	REVISED -
	PLOT DATE = 11/7/2012	CHECKED - CW	REVISED -
		DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK TRIBUTARY A STRUCTURE OPENING PLOT

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

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

LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

≤ 999 (D13)HEC-RAS XS NAME (SURVEY XS NAME)

5.995

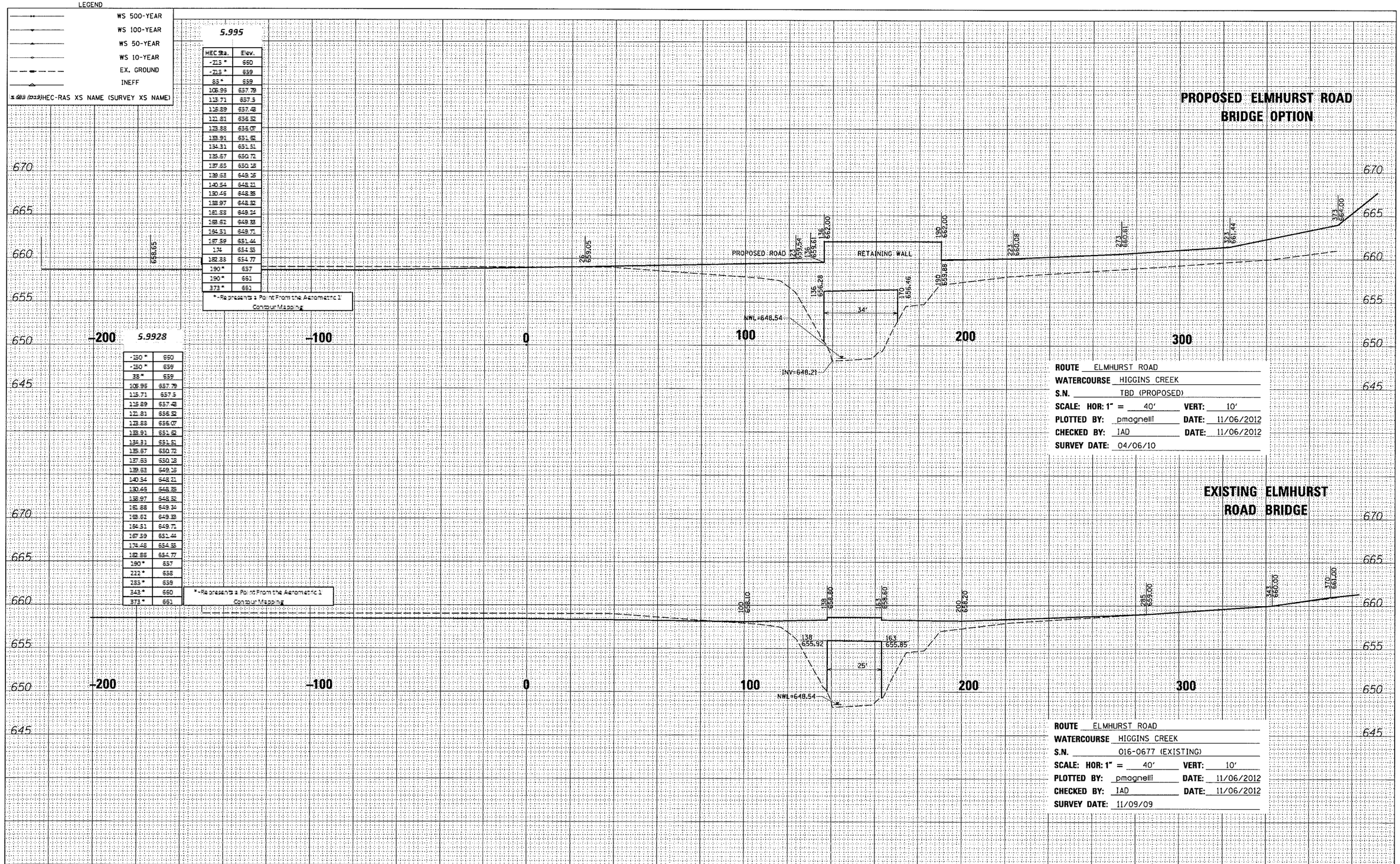
HEC Sta.	Elev.
-21.3 *	660
-21.3 *	659
88 *	659
105.95	657.79
115.71	657.5
115.89	657.48
121.81	656.52
123.88	656.07
133.91	651.82
134.31	651.51
135.67	650.72
137.65	650.18
139.63	649.35
140.54	648.71
140.46	648.35
138.97	648.32
161.88	649.34
169.61	649.33
184.31	649.71
187.59	651.44
174	654.55
182.88	654.77
190 *	657
190 *	661
373 *	661

*-Represents a Point From the Aerometric 1' Contour Mapping

5.9928

-150 *	660
-150 *	659
38 *	659
105.95	657.79
115.71	657.5
115.89	657.48
121.81	656.52
123.88	656.07
133.91	651.82
134.31	651.51
135.67	650.72
137.65	650.18
139.63	649.35
140.54	648.71
140.46	648.35
138.97	648.32
161.88	649.34
169.61	649.33
184.31	649.71
187.59	651.44
174.46	654.55
182.86	654.77
190 *	657
222 *	658
285 *	659
343 *	660
373 *	661

*-Represents a Point From the Aerometric 1' Contour Mapping



ROUTE	ELMHURST ROAD
WATERCOURSE	HIGGINS CREEK
S.N.	TBD (PROPOSED)
SCALE: HOR: 1" =	40' VERT: 10'
PLOTTED BY:	pmagnelli DATE: 11/06/2012
CHECKED BY:	IAD DATE: 11/06/2012
SURVEY DATE:	04/06/10

ROUTE	ELMHURST ROAD
WATERCOURSE	HIGGINS CREEK
S.N.	016-0677 (EXISTING)
SCALE: HOR: 1" =	40' VERT: 10'
PLOTTED BY:	pmagnelli DATE: 11/06/2012
CHECKED BY:	IAD DATE: 11/06/2012
SURVEY DATE:	11/09/09

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

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

-220 -200 -180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380

FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\DIE0W8-05-sht-xssht-02.1-A.dgn	USER NAME = pmagnelli	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 11/7/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK STRUCTURE OPENING PLOT

SCALE: | SHEET NO. 1 OF 6 SHEETS | STA. | TO STA.

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

LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

s.883 (0129)HEC-RAS XS NAME (SURVEY XS NAME)

5.995

HEC Sta.	Elev.
-215 *	660
-215 *	659
88 *	659
106.98	657.79
115.71	657.5
116.89	657.48
121.81	656.52
123.68	656.07
133.91	651.61
134.31	651.51
135.67	650.72
137.55	650.18
139.62	649.35
140.54	648.71
140.46	648.26
138.97	648.12
161.88	648.34
168.67	648.93
184.31	649.71
187.39	651.44
174	654.56
182.88	654.77
190 *	657
190 *	661
373 *	661

*-Represents a Point From the Aerometric & Contour Mapping

PROPOSED ELMHURST ROAD CULVERT OPTION

PROPOSED ROAD

RETAINING WALL

12' (W) X6' (H) RCBC

12' (W) X6' (H) RCBC

NWL=648.54

CHANNEL INV=648.21

12' SPAN X 9' RISE RCBC EMBEDDED 12"

ROUTE	ELMHURST ROAD
WATERCOURSE	HIGGINS CREEK
S.N.	TBD (PROPOSED)
SCALE: HOR: 1" =	40' VERT: 10'
PLOTTED BY:	pmagnelli DATE: 11/06/2012
CHECKED BY:	IAD DATE: 11/06/2012
SURVEY DATE:	04/06/10

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\DIEOWB-05-sht-xssht-02_1-A.dgn	USER NAME = pmagnelli	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 11/7/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK STRUCTURE OPENING PLOT

SCALE: | SHEET NO. 1A OF 6 SHEETS | STA. | TO STA.

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

LEGEND

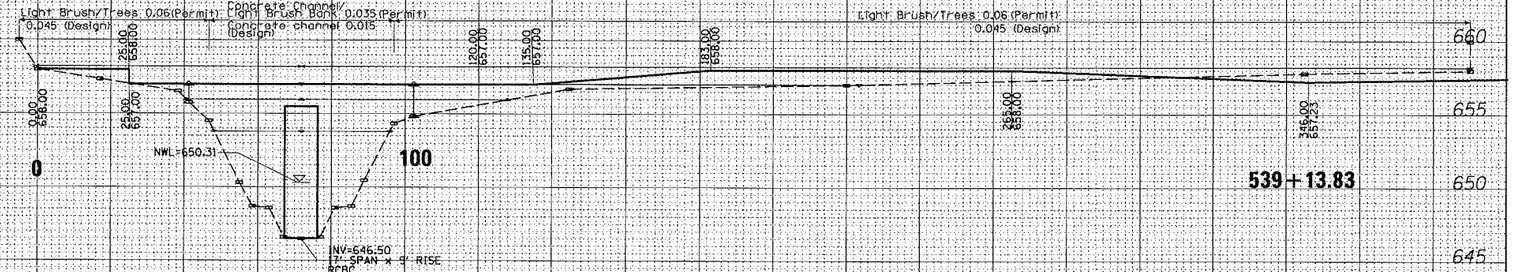
- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF
- s 583 (D219) HEC-RAS XS NAME (SURVEY XS NAME)

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

5.758 (D20)

HEC Sta.	Elev.
-5*	660
0	655
17	657.33
38.3	656.54
41.4	655.76
45.7	654.53
55	650.31
58.3	648.7
63	648.6
67	648.6
71.8	648.3
77	648.6
81	648.6
85.5	648.7
88.9	650.47
95.8	654.34
102.1	654.63
144.7	656.7
220	657
345*	657.8
380*	658
390*	660

*-Represents a Point From the Aerometric 1' Contour Mapping



RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.758 EOWB SURVEYED SECTION D20. REPLACES COPY OF WH061 USED AS U/S CU

EXISTING & PROPOSED WILLE RD.

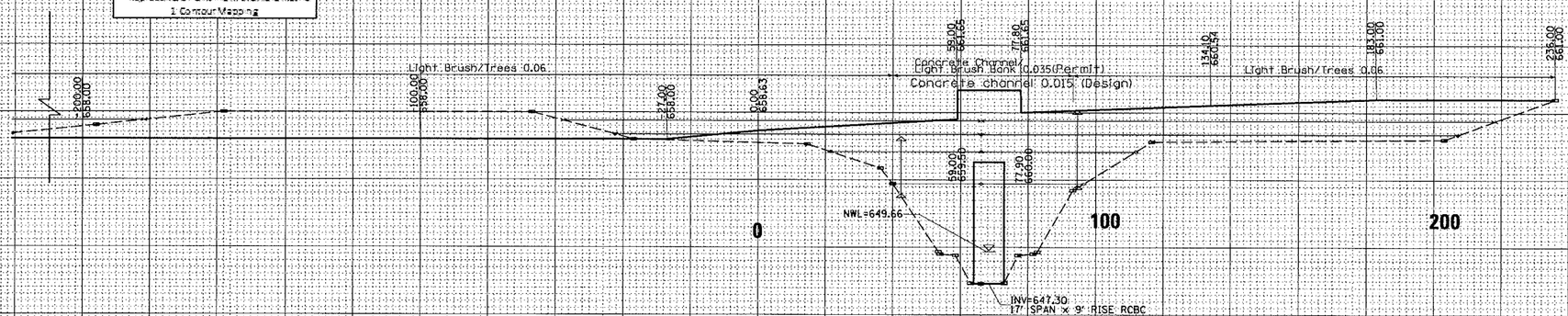
539+13.83

ROUTE WILLE ROAD
WATERCOURSE HIGGINS CREEK
S.N. N/A
SCALE: HOR: 1" = 40' **VERT:** 10'
PLOTTED BY: pmagnelli **DATE:** 01/25/12
CHECKED BY: IAD **DATE:** 01/26/12
SURVEY DATE: 04/06/10

5.914 (D22)

HEC Sta.	Elev.
-435*	660
-430*	659
-330*	659
-261*	658
-235*	658
-196*	659
-158*	660
-87*	660
-37*	658
14.6	657.65
39.4	653.86
40	654.73
53.3	649.88
54	649.5
58.5	648.4
63	647.33
65	647.31
73	647.33
77	648.4
81.5	648.5
82.8	648.66
88.2	654.22
116.5	657.83
208*	658
258*	661

*-Represents a Point From the Aerometric 1' Contour Mapping



RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.914 EOWB SURVEYED SECTION D22. UPSTREAM OF MRWD ENTRANCE. SHIFTED 6

EXISTING & PROPOSED KIRIE WRP ENTRANCE

530+91.33

ROUTE KIRIE WRP ENTRANCE
WATERCOURSE HIGGINS CREEK
S.N. N/A
SCALE: HOR: 1" = 40' **VERT:** 10'
PLOTTED BY: pmagnelli **DATE:** 01/25/12
CHECKED BY: IAD **DATE:** 01/26/12
SURVEY DATE: 04/06/10

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

FILE NAME = Y:\361100 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\D1EOWB-05-sht-xssht-02.1-A.dgn	USER NAME = pmagnelli	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 11/7/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK STRUCTURE OPENING PLOT

SCALE: 20H 5V | SHEET NO. 2 OF 6 SHEETS | STA. 530+91.33 | TO STA. 539+13.83

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

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

LEGEND

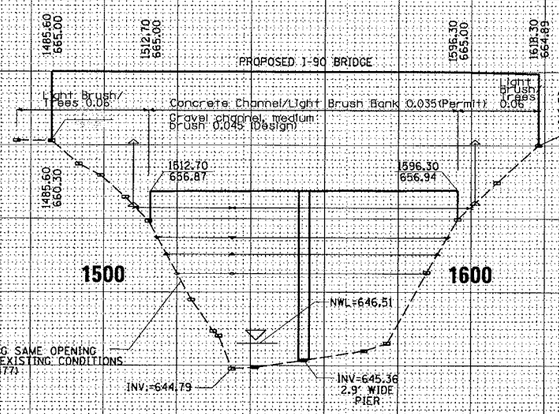
- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

S.893 (D13) HEC-RAS XS NAME (SURVEY XS NAME)

S.394 (copy of TAR 33)

HEC Sta.	Elev.
1478*	651
1498*	657
1505	654.3
1512	652.5
1520.2	647.3
1524.4	645.3
1542.5	643.3
1553	643.5
1573.8	645.8
1596	652.5
1609	656.8
1781	657.7

*-Represents a Point From the Aerometric 1 Contour Mapping

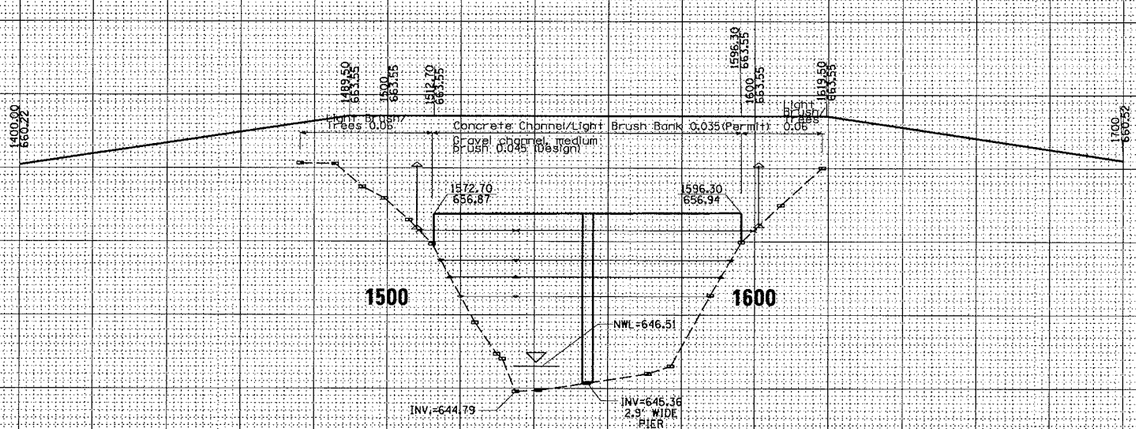


559+48.81
PROPOSED I-90

ROUTE I-90
WATERCOURSE HIGGINS CREEK
S.N. 016-9975 EB, 019-9869 WB
SCALE: HOR: 1" = 40' **VERT:** 10'
PLOTTED BY: pmagnelli **DATE:** 01/25/12
CHECKED BY: IAD **DATE:** 01/26/12
SURVEY DATE: 11/11/09

5.377 (D14)

HEC Sta.	Elev.
1478.1	660.33
1488.6	660.3
1493	658.73
1498.1	657.95
1505.8	656.48
1512.2	654.84
1523.9	648.49
1528.8	647.34
1531.3	647.02
1534.9	644.79
1541.2	644.87
1554.5	643.35
1570.8	648
1577	648.51
1587.8	651.34
1595.3	654.96
1607	657.47
1618.3	660.02



559+48.81
EXISTING I-90

ROUTE I-90
WATERCOURSE HIGGINS CREEK
S.N. 016-9975 EB, 019-9869 WB
SCALE: HOR: 1" = 40' **VERT:** 10'
PLOTTED BY: pmagnelli **DATE:** 01/25/12
CHECKED BY: IAD **DATE:** 01/26/12
SURVEY DATE: 11/11/09

RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.377 EOWB SURVEYED SECTION D14, SHIFTED 1460' RT. FOR COMPARISON PURP

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

FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\DIEOWB-05-sht-xssht-02_1-A.dgn	USER NAME = pmagnelli	DESIGNED - PP	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION
		DRAWN - MYG	REVISED -	ELGIN O'HARE WEST BYPASS HIGGINS CREEK STRUCTURE OPENING PLOT
	PLOT SCALE = 40'	CHECKED - CW	REVISED -	
	PLOT DATE = 11/7/2012	DATE -	REVISED -	SCALE: 20H 5V | SHEET NO. 3 OF 6 SHEETS | STA. 557+80.24 TO STA. 559+48.81

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

LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

~~1.683 (2012)~~ HEC-RAS XS NAME (SURVEY XS NAME)

DATE	BY	NOTE BOOK	NO.

FINAL SURVEY: SURVEYED, PLOTTED, TEMPLATE, AREAS, AREAS CHECKED

4.68

255	655
255	654
1045	653.5
1064	647.6
1095	646.8
1115	639.9
1129	639.9
1171	653.9
1192	653.9
1382	655

Cross Section from FIS/LOMR model.

1000

1070 651.72 | 1096 652.18 | 1127 652.38 | 1142 652.26 | 1160 651.31 | 1176 651.87

NWL NOT SHOT

INV. 642.71 9' SPAN BY 4' RISE RCBC

INV. 642.71 9' SPAN BY 4' RISE RCBC

RIVER = HIGGINS CK REACH = MAINSTEM RS = 4.678 MWRD TARCONT CELL 2 CROSSING PER SURVEY

EXISTING & PROPOSED MWRD TAR CELL 2 CROSSING

596 + 78.61

ROUTE EX AND PR MWRD TAR CELL 1 CROSSING
WATERCOURSE HIGGINS CREEK
S.N. N/A
SCALE: HOR: 1" = 40' **VERT:** 10'
PLOTTED BY: pmagnelli **DATE:** 01/25/12
CHECKED BY: IAD **DATE:** 01/26/12
SURVEY DATE: 04/06/10

5.020

950	638.7
951	638.7
955	657.7
958	638.7
991	638.7
984	634.7
978	638.7
1000	638.4
1004	650.9
1021	645.3
1038	644.3
1044	643.8
1066	644.3
1073	645.3
1088	652.3
1102	652.7
1110	638.3
1746	638.5
1752	634.7
1757	638.7
1762	636.7
1787	657.7

Cross Section from FIS/LOMR model.

956.46 654.58 | 1000 653.82 | 1018 653.46 | 1046 652.64 | 1082 652.61 | 1096.5 653.15 | 1132 654.42 | 1235.53 653.75

NWL NOT SHOT

INV. 643.77 7' SPAN BY 5' RISE RCBC

INV. 643.77 9' SPAN BY 5' RISE RCBC

INV. 643.77 9' SPAN BY 5' RISE RCBC

RIVER = HIGGINS CK REACH = MAINSTEM RS = 5.020 MWRD1 CELL 1 CROSSING

EXISTING & PROPOSED MWRD TAR CELL 1 CROSSING

578 + 67.74

ROUTE EX AND PR MWRD TAR CELL 2 CROSSING
WATERCOURSE HIGGINS CREEK
S.N. N/A
SCALE: HOR: 1" = 40' **VERT:** 10'
PLOTTED BY: pmagnelli **DATE:** 01/25/12
CHECKED BY: IAD **DATE:** 01/26/12
SURVEY DATE: 04/06/10

ORIGINAL SURVEY: SURVEYED, PLOTTED, TEMPLATE, AREAS, AREAS CHECKED

780 800 820 840 860 880 900 920 940 960 980 1000 1020 1040 1060 1080 1100 11200 1140 1160 1180 1200 1220 1240 1260 1280 1300 1320 1340 1360 1380

FILE NAME = Y:\361180 - Elgin O'Hare - West Bypass\TIER_TWO\HY\CAD\Sheets\DIEOWB-05-sht-xssht-02_1-AA.dgn	USER NAME = pmagnelli	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 11/7/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK STRUCTURE OPENING PLOT

SCALE: 20H 5V | SHEET NO. 4 OF 6 SHEETS | STA. 530+91.33 TO STA. 539+13.83

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

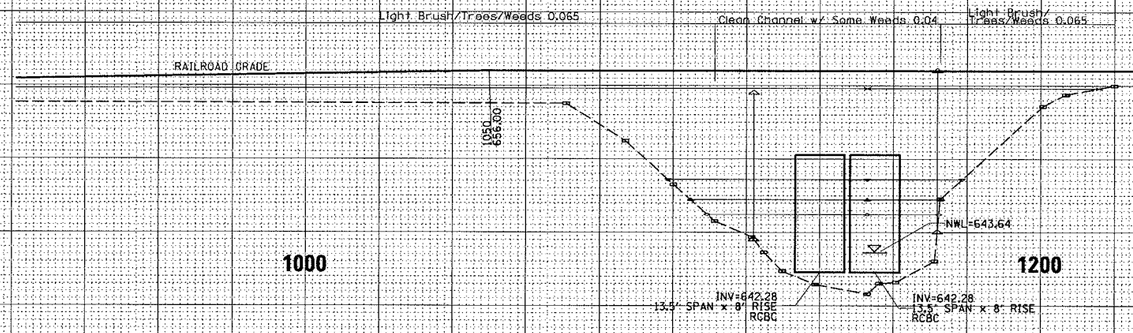
LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF
- 5.683 (D29) HEC-RAS XS NAME (SURVEY XS NAME)

4.638 (D3)

HEC Sta.	Elev.
330*	656
330*	654
1070.9	653.78
1087	651.23
1100.1	648.26
1111.4	643.77
1121.5	644.59
1124.8	643.64
1129.8	642.33
1138.8	641.43
1151.9	640.8
1156.2	641.32
1160.7	641.61
1171.3	643.04
1173.8	647.27
1200.6	653.59
1206.8	654.39
1220*	655

*-Represents a Point From the Aerometric 1'Contour Mapping



RIVER = HIGGINS CK REACH = MAINSTEM RS = 4.638 FOWA SURVEYED SECTION D3, SHIFTED 105.7' RT. FOR COMPARISON PURPO

EXISTING AND PROPOSED IL 72 (TOUHY AVE.)

599+01.35

ROUTE IL ROUTE 72 (TOUHY AVENUE)
WATERCOURSE HIGGINS CREEK
S.N. 016-0974
SCALE: HOR: 1" = 40' **VERT:** 10'
PLOTTED BY: pmagnelli **DATE:** 01/25/12
CHECKED BY: IAD **DATE:** 01/26/12
SURVEY DATE: 04/06/10

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\DIEOWB-05-sht-xssht-02_1-A.dgn	USER NAME = pmagnelli	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 11/7/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
EXISTING AND PROPOSED IL 72 (TOUHY AVE.)

SCALE: 20H 5V | SHEET NO. 5 OF 6 SHEETS | STA. 599+01.35 | TO STA. 599+01.35

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

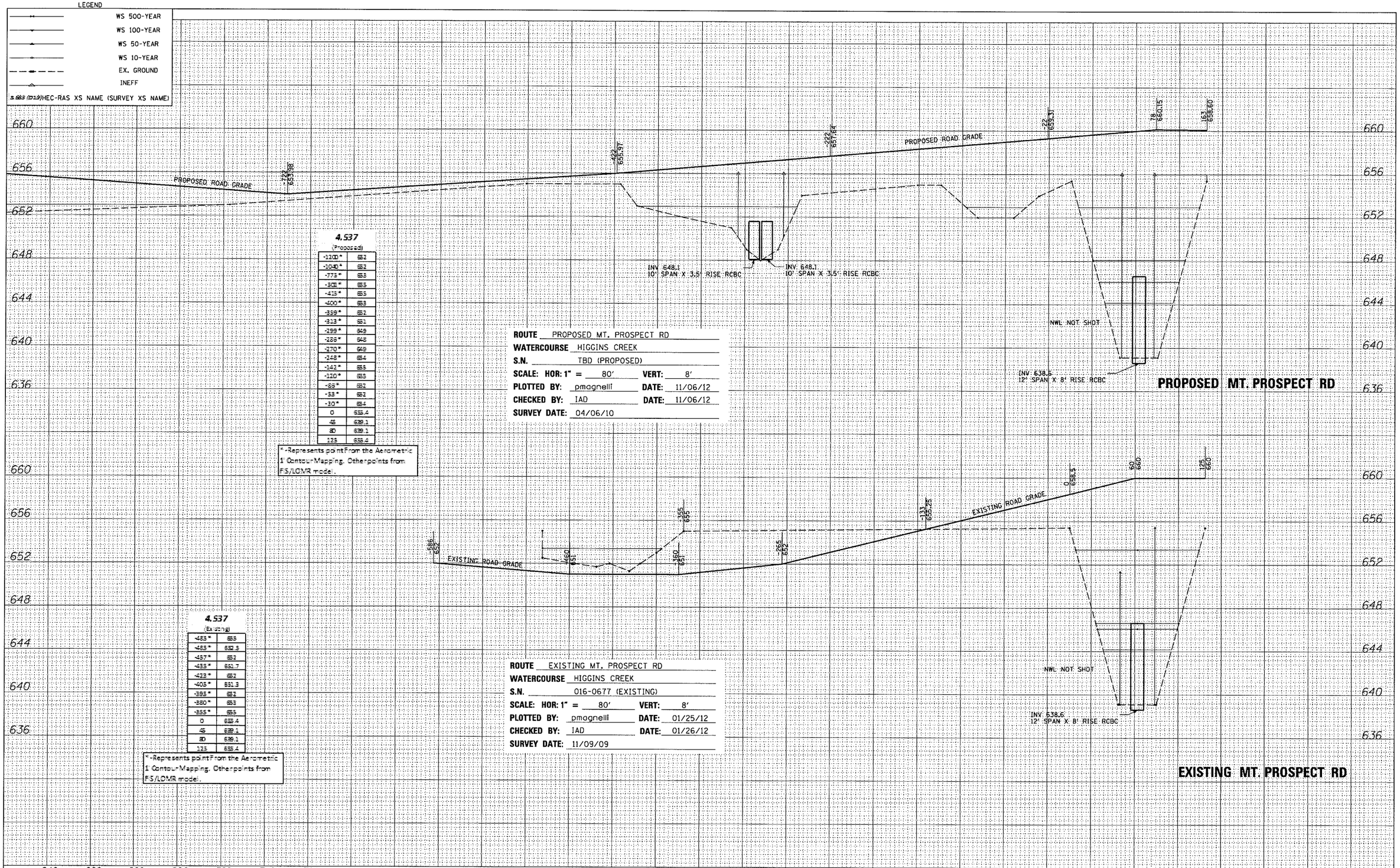
CONTRACT NO.

ILLINOIS | FED. AID PROJECT

LEGEND

- WS 500-YEAR
- WS 100-YEAR
- WS 50-YEAR
- WS 10-YEAR
- EX. GROUND
- INEFF

≤ 883 (2019) HEC-RAS XS NAME (SURVEY XS NAME)



4.537
(Proposed)

-1200*	662
-1040*	662
-775*	663
-501*	663
-415*	663
-400*	663
-359*	662
-313*	661
-298*	659
-286*	658
-270*	659
-248*	664
-142*	665
-120*	665
-88*	662
-53*	662
-30*	664
0	656.4
45	639.1
80	639.1
123	656.4

*-Represents point From the Aerometric 1' Contour-Mapping. Other points from FS/LOMR model.

ROUTE PROPOSED MT. PROSPECT RD
WATERCOURSE HIGGINS CREEK
S.N. TBD (PROPOSED)
SCALE: HOR: 1" = 80' **VERT:** 8'
PLOTTED BY: pmagnelli **DATE:** 11/06/12
CHECKED BY: IAD **DATE:** 11/06/12
SURVEY DATE: 04/06/10

PROPOSED MT. PROSPECT RD

4.537
(Existing)

-485*	653
-485*	652.5
-457*	653
-435*	653.7
-423*	652
-405*	651.3
-395*	652
-380*	653
-355*	653
0	656.4
45	639.1
80	639.1
123	656.4

*-Represents point From the Aerometric 1' Contour-Mapping. Other points from FS/LOMR model.

ROUTE EXISTING MT. PROSPECT RD
WATERCOURSE HIGGINS CREEK
S.N. 016-0677 (EXISTING)
SCALE: HOR: 1" = 80' **VERT:** 8'
PLOTTED BY: pmagnelli **DATE:** 01/25/12
CHECKED BY: IAD **DATE:** 01/26/12
SURVEY DATE: 11/09/09

EXISTING MT. PROSPECT RD

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\DIEOWB-05-sht-xssht-02_1-AA.dgn	USER NAME = pmagnelli	DESIGNED - PP	REVISED -
		DRAWN - MYG	REVISED -
	PLOT SCALE = 40'	CHECKED - CW	REVISED -
	PLOT DATE = 11/7/2012	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ELGIN O'HARE WEST BYPASS
HIGGINS CREEK STRUCTURE OPENING PLOT
SCALE: | SHEET NO. 6 OF 6 SHEETS | STA. | TO STA.

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

Tab 7

SECTION 7

FLOOD INSURANCE STUDY MODELING INFORMATION
REGULATORY HYDROLOGIC AND HYDRAULIC MODELING
INDIVIDUAL OMP/FIS/LOMR MODELS

FLOOD INSURANCE STUDY



COOK COUNTY, ILLINOIS
AND INCORPORATED AREAS

Volume 1 of 5

COMMUNITY NAME	COMMUNITY NUMBER
ALSIP, VILLAGE OF	170055
ARLINGTON HEIGHTS, VILLAGE OF	170056
BARRINGTON, VILLAGE OF	170057
BARRINGTON HILLS, VILLAGE OF	170058
BARTLETT, VILLAGE OF	170059
BEDFORD PARK, VILLAGE OF	171007
BELLWOOD, VILLAGE OF	170061
BENSENVILLE, VILLAGE OF	170200
* BERKELEY, VILLAGE OF	171039
* BERWYN, CITY OF	171036
BLUE ISLAND, CITY OF	170064
BRIDGEVIEW, VILLAGE OF	170065
BROADVIEW, VILLAGE OF	170067
BROOKFIELD, VILLAGE OF	170066
BUFFALO GROVE, VILLAGE OF	170068
* BURBANK, CITY OF	170069
BURNHAM, VILLAGE OF	170070
BURR RIDGE, VILLAGE OF	170071
CALUMET CITY, CITY OF	170072
CALUMET PARK, VILLAGE OF	170073
CHICAGO CITY OF	170074
CHICAGO HEIGHTS, VILLAGE OF	170075
CHICAGO RIDGE, VILLAGE OF	170076
* CICERO, TOWN OF	170077
COOK COUNTY (UNINCORPORATED AREAS)	170054
COUNTRY CLUB HILLS, CITY OF	170078
COUNTRYSIDE, CITY OF	170079
CRESTWOOD, VILLAGE OF	170080
* DEER PARK, VILLAGE OF	171028
DEERFIELD, VILLAGE OF	170361
DES PLAINES, CITY OF	170081
DIXMOOR, VILLAGE OF	170082
DOLTON, VILLAGE OF	170083
* EAST DUNDEE, VILLAGE OF	170323
EAST HAZEL CREST, VILLAGE OF	170085
ELGIN, CITY OF	170087
ELK GROVE VILLAGE, VILLAGE OF	170088
* ELMHURST, CITY OF	170205
ELMWOOD PARK, VILLAGE OF	170089
EVANSTON, CITY OF	170090
* EVERGREEN PARK, VILLAGE OF	170733
FLOSSMOOR, VILLAGE OF	170091
FORD HEIGHTS, VILLAGE OF	170084
FOREST PARK, VILLAGE OF	170092
FOREST VIEW, VILLAGE OF	170093
* FRANKFORT, VILLAGE OF	170701
FRANKLIN PARK, VILLAGE OF	170094
GLENCOE, VILLAGE OF	170095
GLENVIEW, VILLAGE OF	170096
GLENWOOD, VILLAGE OF	170097
GOLF, VILLAGE OF	170098
HANOVER PARK, VILLAGE OF	170099
HARVEY, CITY OF	170100
* HARWOOD HEIGHTS, VILLAGE OF	170101
HAZEL CREST, VILLAGE OF	170102
HICKORY HILLS, CITY OF	170103
HILLSIDE, VILLAGE OF	170104
HINSDALE, VILLAGE OF	170105
HODGKINS, VILLAGE OF	170106
HOFFMAN ESTATES, VILLAGE OF	170107
* HOMETOWN, CITY OF	171040
HOMEWOOD, VILLAGE OF	170109
INDIAN HEAD PARK, VILLAGE OF	170110
INVERNESS, VILLAGE OF	170111
JUSTICE, VILLAGE OF	170112
KENILWORTH, VILLAGE OF	170113
LA GRANGE, VILLAGE OF	170114
LA GRANGE PARK, VILLAGE OF	170115
LANSING, VILLAGE OF	170116
LEMONT, VILLAGE OF	170117
LINCOLNWOOD, VILLAGE OF	171001
LYNWOOD, VILLAGE OF	170119
LYONS, VILLAGE OF	170120
MARKHAM, CITY OF	175169
MATTESON, VILLAGE OF	170123
MAYWOOD, VILLAGE OF	170124
MCCOOK, VILLAGE OF	170121
MELROSE PARK, VILLAGE OF	170125
MERRIONETTE PARK, VILLAGE OF	170126
MIDLOTHIAN, VILLAGE OF	170127
MORTON GROVE, VILLAGE OF	170128
MOUNT PROSPECT, VILLAGE OF	170129
NILES, VILLAGE OF	170130
* NORRIDGE, VILLAGE OF	170131
NORTH RIVERSIDE, VILLAGE OF	170135
NORTHBROOK, VILLAG EOF	170132
NORTHFIELD, VILLAGE OF	170133
NORTHLAKE, CITY OF	170134
* OAKBROOK, VILLAGE OF	170214
OAK FOREST, CITY OF	170136
OAK LAWN, VILLAGE OF	170137
* OAK PARK, VILLAGE OF	171037
OLYMPIA FIELDS, VILLAGE OF	170139
ORLAND HILLS, VILLAGE OF	170172
ORLAND PARK, VILLAGE OF	170140
PALATINE, VILLAGE OF	175170
PALOS HEIGHTS, CITY OF	170142
PALOS HILLS, CITY OF	170143
PALOS PARK, VILLAGE OF	170144
PARK FOREST, VILLAGE OF	170145
PARK RIDGE, CITY OF	170146
* PHOENIX, CITY OF	170147
POSEN, VILLAGE OF	170148
PROSPECT HEIGHTS, CITY OF	170919
RICHTON PARK, VILLAGE OF	170149
RIVER FOREST, VILLAGE OF	170151
RIVER GROVE, VILLAGE OF	170152
RIVERDALE, VILLAGE OF	170150
RIVERSIDE VILLAGE OF	170153
ROBBINS, VILLAGE OF	170154
ROLLING MEADOWS, CITY OF	170155
* ROSELLE, VILLAGE OF	170216
ROSEMONT, VILLAGE OF	170156
SAUK VILLAGE, VILLAGE OF	170157
SCHAUMBURG, VILLAGE OF	170158
SCHILLER PARK, VILLAGE OF	170159
SKOKIE, VILLAGE OF	171000
SOUTH BARRINGTON, VILLAGE OF	170161
SOUTH CHICAGO HEIGHTS, VILLAGE OF	170162
SOUTH HOLLAND, VILLAGE OF	170163
STEGER, VILLAGE OF	170713
STICKNEY, VILLAGE OF	170164
STONE PARK, VILLAGE OF	170165
STREAMWOOD, VILLAGE OF	170166
SUMMIT, VILLAGE OF	170167
THORNTON, VILLAGE OF	170168
TINLEY PARK, VILLAGE OF	170169
UNIVERSITY PARK, VILLAGE OF	170708
WESTCHESTER, VILLAGE OF	170170
WESTERN SPRINGS, VILLAGE OF	170171
WHEELING, VILLAGE OF	170173
WILLOW SPRINGS, VILLAGE OF	170174
WILMETTE, VILLAGE OF	170175
WINNETKA, VILLAGE OF	170176
WORTH, VILLAGE OF	170177

* NO SPECIAL FLOOD HAZARD AREAS IDENTIFIED WITHIN COOK COUNTY

REVISED: AUGUST 19, 2008

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
17031CV001G

Table 3 - Stream Name Changes (Continued)

Community	Old Name	New Name
Country Club Hills (Cont'd)	Tributary S	Calumet Union Drainage Ditch Southwest Branch Tributary S
Countryside, City of	Peck Avenue Ditch	Des Plaines River Tributary A
	East Avenue Ditch Tributary	57th Street Ditch
Deerfield, Village of	West Fork North Branch Chicago River	Chicago River, North Branch, West Fork
Elgin, City of	Randall Road Tributary	Sandy Creek
Elk Grove Village, Village of	Tributary A To Higgins-Willow Creek	Higgins Creek Tributary A
	Tributary D to West Branch of Salt Creek	Salt Creek West Branch Tributary 7
Village of Flossmoor	East Branch Cherry Creek	Cherry Creek East Branch
	East Branch Cherry Creek Tributary	Cherry Creek East Branch Tributary
	South Leg West Branch Cherry Creek	Cherry Creek West Branch East Fork
Glenview, Village of	Navy Ditch	South Navy Ditch
	West Fork North Branch Chicago River	Chicago River, North Branch, West Fork

Table 5 – Limits of Detailed Study for Cook County (Continued)

Flooding Source	Limits of Detailed Study
Flint Creek Tributary	From 16,000 feet above confluence with Flint Creek (approximately 10 feet below Lake-Cook Road, Lake-Cook County Boundary) to 17,900 feet above confluence with Flint Creek (approximately 1,890 feet above Lake-Cook Road)
Flossmoor Ditch	From 5,310 feet above mouth at Union Drainage Ditch (Harlem Avenue, Will-Cook County Boundary) to 10,460 feet above mouth at Union Drainage Ditch (approximately 3,010 feet above confluence of Flossmoor Ditch Tributary A)
Flossmoor Ditch Tributary A	From mouth at Flossmoor Ditch to 8,600 feet above mouth at Flossmoor Ditch (approximately 4,770 feet above Volmer Road)
Golf Course Tributary	From 1,890 feet above confluence with Des Plaines River to 6,040 feet above confluence with Des Plaines River (Fullerton Avenue)
Grand Calumet River	From 8,700 feet above mouth at Little Calumet River (approximately 1,300 feet below Burnham Avenue) to 14,625 feet above mouth at Little Calumet River (Illinois-Indiana State Boundary)
Hickory Creek	From 110,000 feet above mouth at Des Plaines River (approximately 75 feet below Harlem Avenue, Will-Cook County Boundary) to 124,350 above mouth at Des Plaines River (approximately 2,075 feet above Sauk Road)
Hickory Creek Tributary A	From 119,400 feet above confluence of Hickory Creek and Des Plaines River (Harlem Avenue/ Will-Cook County Boundary) to 125,000 feet above confluence of Hickory Creek and Des Plaines River (Steger Road/Cook-Will County Boundary)
Higgins Creek	From the confluence with Willow Creek tojust downstream of Interstate 90 (Northwest Tollway)

Table 5 – Limits of Detailed Study for Cook County (Continued)

Flooding Source	Limits of Detailed Study
Higgins Creek Tributary A	From the confluence with Higgins Creek to 4,760 feet above the confluence with Higgins Creek (approximately 1,610 feet above Higgins Road)
I-57 Drainage Ditch	From Corporate Limits to 5,500 feet above corporate limits (approximately 3,350 feet above Kedzie Avenue)
Illinois and Michigan Canal Tributary A	From 150 feet above mouth at Illinois and Michigan Canal to 6,700 feet above mouth at Illinois and Michigan Canal (approximately 6,450 feet above New Avenue)
Illinois and Michigan Canal Tributary B	From mouth at Illinois and Michigan Canal to 5,919 feet above mouth at Illinois and Michigan Canal (approximately 40 feet above Walker Road Culvert)
Illinois and Michigan Canal Tributary C	From mouth at Illinois and Michigan Canal Tributary B to 3,710 feet above mouth at Illinois and Michigan Canal Tributary B (approximately 210 feet above Cog Hill Country Club Road)
Illinois and Michigan Canal Tributary D	From mouth at Illinois and Michigan Canal to 2,560 feet above mouth at Illinois and Michigan Canal (approximately 1,060 feet above Archer Avenue Culvert)
Industrial Tributary	From the confluence with Crystal Creek Tributary to 3,040 feet above confluence with Crystal Creek Tributary (approximately 620 feet above Trans World Road)
Justice Ditch	From 1,980 feet above mouth at Illinois and Michigan Canal to 4,610 feet above mouth at Illinois and Michigan Canal (approximately 1,020 feet above Blazer Avenue)
Lansing Ditch	From the confluence with North Creek to 40,625 feet above the Confluence with North Creek (approximately 4,070 feet above Gravel Road)

Table 6 - Letters of Map Change (Continued)

LOMC Type	Case Number	Date Effective	Community	Flooding Source	Project Identifier
LOMR	05-05-0378P	1/12/2006	Cook County Inverness SouthBarrington	Poplar Creek	Glen of Inverness - Jung Property
LOMR	05-05-1493P	2/9/2006	Countryside McCook	57th Street Ditch, East Avenue Ditch	City of Countryside Flood Control Improvements
LOMR	05-05-1222P	5/25/2006	Cook County	Illinois & Michigan Canal Tributary B	West Side Machine Company
LOMR	06-05-BG46X	5/26/2006	Cook County	Illinois & Michigan Canal Trib B	West Side Machine Company (II)
LOMR	06-05-B017P	9/28/2006	Cook County Melrose Park Stone Park	Addison Creek	Addison Creek Conveyance Floodway
LOMR	07-05-0329X	10/31/2006	Cook County South Barrington	Spring Creek Tributary	Woods of South Barrington Subdivions (II) - Pre-project condition
LOMR	06-05-BY82P	12/20/2006	Steger	Thorn Creek Tributary A	Steger Project 02-32 (IL)
LOMR	06-05-C262P	4/25/2007	Cook County	East Pond	Barrets Subdivision
LOMR	06-05-BT49	6/7/2007	South Barrington	Poplar Creek	The Glen of South Barrington
LOMR	07-05-1665P	7/2/2007	Cook County	Willow/Higgins creek	Willow-Higgins Flood Control Project *
LOMR	06-05-B267P	7/19/2007	Matteson	Flossmoor Ditch Tributary A	Greater Chicago Auto Auction
LOMR	07-05-2483P	8/30/2007	Oak Grove Cook County	Higgins Creek Tributary A	Dierking Terrace Property *
LOMR	06-05-BR51P	9/24/2007	Cook County	Butterfield Creek	The Point by Montalbano Homes
LOMR	07-05-4501P	10/19/2007	Tinley Park	Union Drainage Ditch	Reissue LOMR 99-05-303P
LOMR	07-05-3481P	10/24/2007	City of Chicago	Wolf Lake	133 & 134 Street Property
LOMR	07-05-6033P	11/30/2007	Hickory Hills	Belly Deep Slough	90th Avenue Floodplain Remapping

trail features in the city of Des Plaines. This project is an element of the USACE Des Plaines River Flood Control Project that was authorized by Congress in the Water Resources Development Act of 1999. The project is ongoing, however the Rand Park Floodwall and Trail Project have been considered in the FIS. The feasibility project benefits the cities of Des Plaines and Park Ridge, the village of Niles, and Maine Township in Cook County. The feasibility study has been completed, but suggested work has not begun.

A diversion conduit between Salt Creek and the Des Plaines River has been constructed by the State of Illinois. This conduit significantly reduces the peak Salt Creek discharges flowing through the village of Brookfield. Flow reductions range from 45 to 25 percent for the 10- to 0.2-percent-annual-chance floods, respectively, and are considered in this FIS.

The State of Illinois is constructing a channel improvement on Salt Creek and modifying the existing Busse Woods Dam. The plan also includes various channel improvements by NRCS or local communities. Six of the seven reservoir projects of the MWRD have been completed. The plan has been reformulated to eliminate the Elmhurst Quarry as a multipurpose reservoir. The design minimizes the inundation periods in Ned Brown Nature Preserve to prevent environmental damage. The Addison Creek Plan, DuPage County Floodway acquisitions, Salt Creek Greenway and Upper Salt Creek projects are compatible with this plan.

The Touhy Reservoir is the expansion of the second cell of the original two cell design O'Hare Treatment Plant Retention Reservoir placed in service in 1984. The O'Hare Reservoir, cell 1, is a 450 acre-foot excavated pump out design reservoir. The city of Chicago designed and constructed the Touhy Reservoir. Touhy Reservoir, cell 2, is a 720 acre-foot excavated pump-out design reservoir and was placed into service in 2005. The Touhy Avenue Reservoir project included some channel modifications to the Willow-Higgins Creek.

The O'Hare Chicago Underflow Plan (CUP) Reservoir is located in Elk Grove Township and was placed in service in 1999. The site area spans approximately 94 acres. The reservoir was originally constructed by the USACE but is currently operated and maintained by the MWRD. This reservoir was designed to hold up to 345 million gallons of combined sewer overflow from the Upper Des Plaines/O'Hare Tunnel System until the flow can be treated at the Kirie Water Reclamation Plant.

on O'Hare Airport

The Willow-Higgins Reservoir is a 1,300 acre-foot excavated pump-out reservoir. This reservoir was designed and constructed by the city of Chicago, and was placed in service in 2005. This reservoir assists with the drainage of O'Hare International Airport. The receiving system of the reservoir discharge varies by season. In warmer months, the reservoir discharges to Willow-Higgins Creek, and in winter months, the reservoir discharges to a sanitary sewer. In addition to the reservoir, portions of Willow-Higgins Creek on O'Hare property have been relocated.

sewer. The final volume of overland flow which required storage was determined from the hydrograph.

In the city of Markham, when the water rises above 6 feet in the channel of the I-57 Drainage Ditch at the entrance to the 10-foot culvert, some excess water begins to flow along the Dixie Creek and stands in the ditches along I-57. The discharges on Dixie Creek were increased for the 100- and 500-year storms to reflect this overflow from the I-57 Drainage Ditch. However, this excess water will have a later peak on Dixie Creek than that which travels in Belaire Creek. The I-57 Drainage Ditch enters a 10-foot diameter reinforced concrete pipe culvert at the corporate limits of the city of Markham with Cook County Unincorporated Areas; the conduit remains underground all the way to the Little Calumet River. Tailwater of the Little Calumet is estimated to be 13,000 feet.

For Navajo Creek in Palos Heights, shallow flooding areas, drainage area, runoff, and topography were determined from historical data, maps, and field reconnaissance.

For Stony Creek (East) in Blue Island and Alsip, Merrionette Park Ditch in Alsip, and Oak Lawn Ditch in Oak Lawn, adjustments in drainage area were made to incorporate the present effect of the Crawford Avenue segment of the Metropolitan Sanitary District of Greater Chicago's Tunnel and Reservoir Project.

For Thorn Creek Tributary B in Chicago Heights, discharges were computed after accounting for the diversion channel linking Thorn Creek Tributary B.

For Tinley Creek in Orland Hills, discharges from the detention pond were computed using TR-55 (Reference 143). Discharges downstream from the detention basin were computed from regional equations, adjusted for the effects of the detention basin (Reference 136). The presence of the detention basin results in lower flows at 88th Avenue than upstream of the detention basin at 167th Street.

Storage capabilities of Orland Lake were modeled using the SCS TR-20 hydrology computer program to determine its effects on the upstream drainage area of Mill Creek in the village of Palos Park (Reference 144). It was found that Orland Lake, because of its storage capacity, would decrease the discharge for the 100-year storm.

For the portion of Higgins Creek not revised as part of LOMR 07-05-1665P, discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods were developed using the SCS watershed model TR-20.

November 6, 2000
Countywide FIS

To calibrate models for Crystal Creek, Crystal Creek Tributary, Industrial Tributary, Motel Ditch, and Sexton Ditch, the precipitation amounts from actual storm events were input into the HEC-1 model. The point rainfall for each storm was obtained from O'Hare precipitation gage data which records daily and hourly rainfall

A revised hydrologic analysis for Weller Creek was performed by CTE for the US Army Corps of Engineers. A HEC-1 model was prepared using Bulletin 70 rainfall along with information from the Weller Creek at Des Plaines streamgage.

A revised hydrologic analysis for Farmer's and Prairie Creeks was performed by the IDNR-OWR. A HEC-1 model was prepared using Bulletin 70 rainfall along with information from eight staff gages installed by OWR.

LOMR 07-05-1665P revised the previous analysis on Willow Creek and the downstream portion of Higgins Creek. The TR-20 hydrologic model resulting from the 1976 Des Plaines River Floodwater Management Plan was revised to include the watershed boundary revisions that were caused by the construction of the Kirie Wastewater Treatment Plant. Additionally, new runoff curve number and times of concentration were developed, and the ISWS Bulletin 70 rainfall was adopted. The model was also revised to include O'Hare improvements, the Touhy Avenue and Willow Creek Flood Control Reservoirs, and the Willow Creek Flood Control Project.

Hydrologic methodology and available gage data for all streams studied by detailed methods are presented in Table 13, "Hydrologic Methodologies". Methodologies and terminology used include: Regional Equations dating from 1958-1979 (e.g., RE73), the Water Resources Council log-Pearson Type III method (l-PTIII), the USACE HEC-1 computer program, the SCS TR-20 and TR-55 models, the ILLUDAS hydrologic model, and the advanced interconnected Channel and Pond Routing hydrologic model (adICPR) (Reference 136, 143, 144, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157). The "Community" column entries shown as Cook County refer to the unincorporated areas of the county.

Table 13 - Hydrologic Methodologies

Stream	Community	Method(s)	Gage No(s).
57th Street Ditch	Countryside	TR-20	
59th Street Ditch	Hinsdale	RE74	
63rd Street Ditch	Burr Ridge	HEC-1	
67th Street Ditch	Countryside	RE74	
71st Street Ditch	Justice	TR-20	
76th Street Ditch	Tinley Park	HEC-1	Midlothian (05536340)
79th Street Ditch	Burr Ridge	RE73 (l-PTIII)	Willow Springs (05533000)

Table 14 - Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Higgins Creek					
At Old Mt. Prospect Road	7.3	454	503	730	1,666
At Mt. Prospect Road	7.0	444	485	700	1,600
At Touhy Avenue Flood Control Reservoir Upstream Cell	6.8	700	920	1,260	2,140
At Northwest Tollway	6.8	907	1,394	1,623	2,270
At Elmhurst Road	5.4	511	626	852	1,145
At upstream side of Wille Road	3.0	450	755	975	1,365
Higgins Creek Tributary A					
At confluence with Higgins Creek	2.3	228	407	451	548
Above confluence of Higgins Creek Tributary B	1.5	206	310	410	418
I-57 Drainage Ditch					
At Kedzie Avenue	1.2	202	315	368	457
Illinois and Michigan Canal Tributary A					
At confluence with Illinois and Michigan Canal	0.9	300	530	700	1,000
Approximately 150 feet upstream of Roberta Street	0.1	100	190	260	380
Illinois and Michigan Canal Tributary B					
At confluence with Illinois and Michigan Canal	2.5	530	920	1,170	1,700
At Walker Road	0.6	110	210	270	420
Illinois and Michigan Canal Tributary C					
At a point approximately 1,600 feet upstream of confluence with Illinois and Michigan Canal Tributary B	1.6	350	600	770	1,150
Illinois and Michigan Canal Tributary D					
At the mouth	0.8	198	320	381	550
At Prospect Avenue	0.6	139	226	269	385

* Data not available

The stillwater elevations have been determined for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods for the flooding sources studied by detailed methods and are summarized in Table 15, "Summary of Stillwater Elevations."

Table 15 – Summary of Stillwater Elevations

Flooding Source and Location	*Elevation (feet NAVD 88)*			
	10-Percent-Annual-Chance	*2-Percent-Annual-Chance*	*1-Percent-Annual-Chance*	*0.2-Percent-Annual-Chance*
Lake Michigan[1]	**	**	584.7	**
City of Chicago				
Willow Higgins Flood Control Reservoir	**	**	641.9	**
City of Des Plaines				
Lake Mary Ann	**	**	634.4	**
Dude Ranch Pond	**	**	631.6	**
Bay Colony Pond	**	**	632.7	**
City of Hickory Hills				
Hickory Hills Reservoir	**	**	623.4	**
Area bounded by 95th Street to the South, 93rd Street to the North, and Kean Avenue to the west, along Belly Deep Slough	**	**	697.8	**
Cook County				
Unincorporated Areas				
Detention Basin, located along an Unnamed tributary to Long Run, just Upstream of Will-Cook Road	**	**	686.0	**
Touhy Avenue Reservoir (East Reservoir) TAR Cell 2	**	**	649.8	**
MWRD Reservoir (West Touhy Avenue FCR) TAR Cell 1	**	**	653.0	**
Village of Bensenville				
Ponding Area No. 1	653.2	654.4	655.0	**
Village of Burr Ridge				
Pond 1	705.2	705.4	705.5	705.7

** Data not available

[1] Stillwater elevation does not include tide or wave runnup.

April 16, 2007 Countywide FIS
Revised Analyses

Cross sections for Buffalo Creek and Wheeling Drainage Ditch were generated by the IDNR-OWR Springfield office using the IDNR-OWR ground survey data (Reference 166) and LiDAR aerial photography (Reference 167). Cross sections were based on as-built plans by CBBEL (Reference 168).

The hydraulic analysis was prepared using HEC-RAS (Version 3.1.1) (Reference 169) to compute the water-surface elevations (WSELs). The starting WSELs are based on the 20-percent-annual-chance (5-year) recurrence intervals elevations at the Des Plaines River.

The Floodway Data Tables and Flood Profiles for Buffalo Creek, Wheeling Drainage Ditch, and the William Rogers Memorial Diversion Channel have been updated.

August 19, 2008 Countywide FIS
Revised Analyses

For this revision, a revised hydraulic analysis was performed by the USACE and the ISWS for the Little Calumet River and Thorn Creek up to the gage at Thornton using unsteady HEC-RAS. This analysis incorporates the 960 acre-foot Thornton Transitional Reservoir operated by MWRD. As built drawings of the intake structure and operating rules for the gate were provided by MWRD. To include the effects of lower backwater along the Little Calumet River, a hydraulic analysis was performed on the following streams: Midlothian Creek, Calumet Union Drainage Ditch, Thorn Creek above the gage at Thornton, Butterfield Creek, Deer Creek, and North Creek. For all of these tributary streams, the only modification was to the downstream boundary condition in the effective hydraulic model.

A revised hydraulic analysis was performed by CTE and the ISWS for Weller Creek. HEC-RAS was used and the study incorporates several flood control projects completed by IDNR, the USACE, and MWRD.

A revised hydraulic analysis was performed by the IDNR – OWR and the ISWS for Farmer's and Prairie Creek. The HEC-RAS computer program was used for the hydraulic analysis. The study also incorporates levee 50 in Des Plaines.

LOMR 07-05-1665P revised the previous analysis on Willow Creek and the downstream portion of Higgins Creek. The WSP-2 hydraulic model was converted into HEC-RAS version 3.1.3

Water surface elevations of floods of the selected recurrence intervals and starting water-surface elevations for all streams studied by detailed methods were computed using methodologies presented in Table 16, "Hydraulic Methodologies." Methodologies and terminology used include: the FEQ model,

Table 16 - Hydraulic Methodologies (Continued)

Stream	Community	Method	Starting Water-Surface Elevation
Flossmoor Ditch Tributary A	Cook County	WSP-2	confluence with Flossmoor Ditch
Golf Course Tributary	River Grove,	WSP-2	normal depth, starting slope=.0005 ft
	Elmwood Park	WSP-2	normal depth, confluence with Des Plaines River
Grand Calumet River	Burnham		
	Calumet City	WSP-2	average WSEL at O'Brian Lock and Dam
Hickory Creek	Cook County	WSP-2	normal depth, at a point approximately 3,350 feet downstream of Will-Cook County Boundary
Hickory Creek Tributary A	Cook County	WSP-2	confluence with Hickory Creek
Higgins Creek	Cook County,	HEC-RAS	
	Des Plaines,	WSP-2	rating curve based on SCS profiles
	Arlington Heights	WSP-2	coincident peaks at confluence
Higgins Creek Tributary A	Cook County	WSP-2	confluence with Higgins Creek
I-57 Drainage Ditch	Markham	WSP-2	confluence with Little Calumet River
Illinois and Michigan Canal Tributary A	Cook County	WSP-2	discharge rating curve at outlet culvert
Illinois and Michigan Canal Tributary B	Cook County	WSP-2	discharge rating curve at outlet culvert
Illinois and Michigan Canal Tributary C	Cook County	WSP-2	confluence with Illinois and Michigan Ship Canal Tributary B
Illinois and Michigan Canal Tributary D	Willow Springs	WSP-2	slope/area method

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Higgins Creek								
A	0.08[48]	87	540	1.6	646.5	646.5	646.5	0.0
B	0.18[48]	59	332	2.2	647.3	647.3	647.2	0.0
C	0.29[48]	42	187	4.1	647.4	647.4	647.4	0.0
D	0.50[48]	101	453	3.2	649.7	649.7	649.7	0.0
E	0.63[48]	102	492	2.9	650.2	650.2	650.2	0.0
F	0.72[48]	104	492	2.9	650.5	650.5	650.5	0.0
G	0.73[48]	62	316	4.0	650.5	650.5	650.5	0.0
H	0.89[48]	94	559	2.9	652.5	652.5	652.5	0.0
I	1.04[48]	91	464	3.5	652.9	652.9	652.9	0.0
J	1.14[48]	151	568	3.1	653.3	653.3	653.3	0.0
Higgins Creek Tributary A								
A	350[49]	67	334	1.2	659.0	659.0	659.0	0.0
B	2,881[49]	24	104	3.8	661.3	661.3	661.3	0.0
I-57 Drainage Ditch								
A	1,100[50]	57	228	2.2	607.0	607.0	607.1	0.1
B	2,535[50]	82	226	1.6	608.9	608.9	609.0	0.1
C	4,845[50]	55	217	1.5	611.3	611.3	611.4	0.1

[48] Miles above confluence with Willow Creek
[49] Feet above confluence with Higgins Creek
[50] Feet above corporate limits

TABLE 19

FEDERAL EMERGENCY MANAGEMENT AGENCY

COOK COUNTY, IL AND INCORPORATED AREAS

FLOODWAY DATA

HIGGINS CREEK – HIGGINS CREEK TRIBUTARY A – I-57 DRAINAGE DITCH

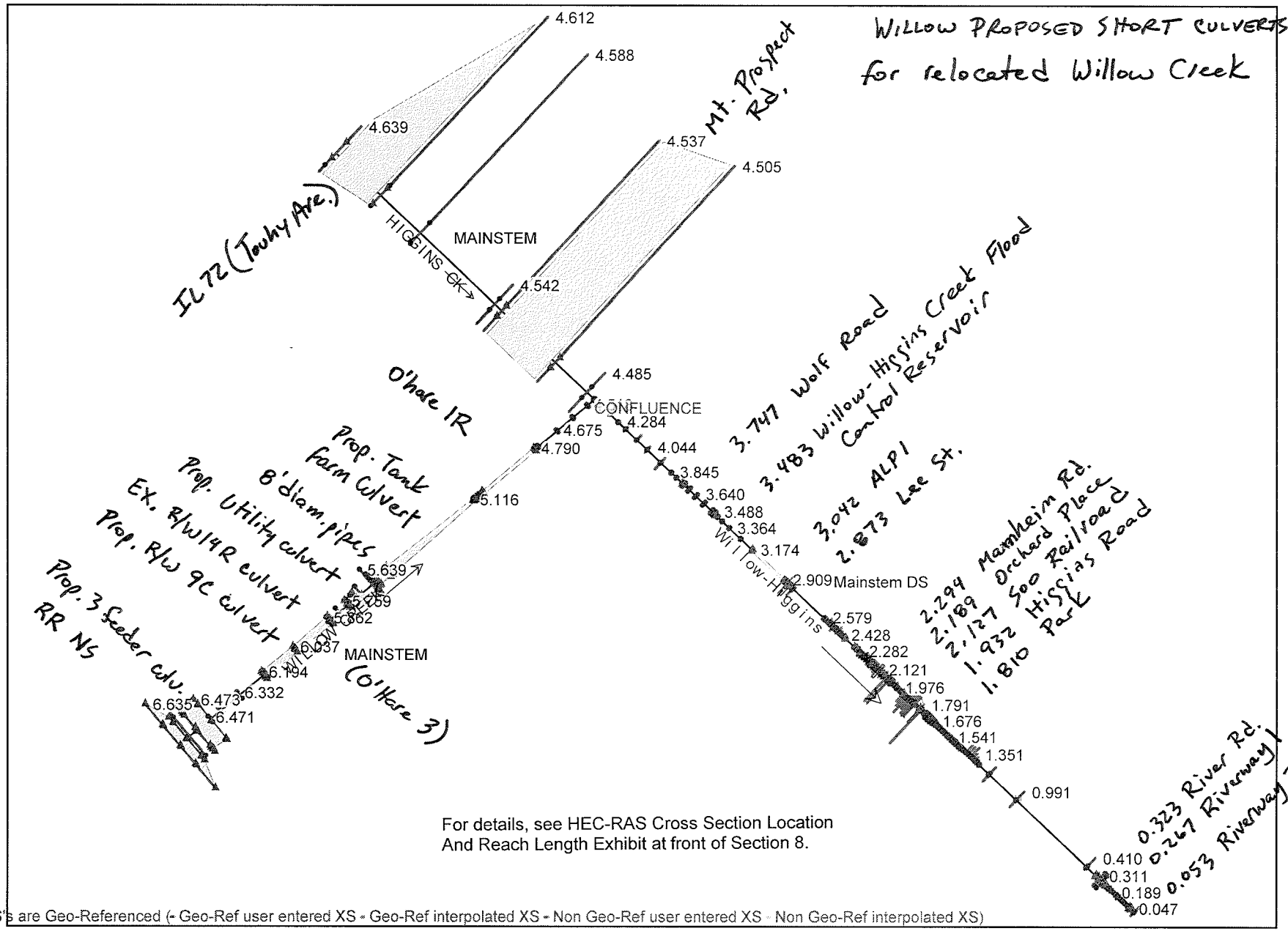
OMP MODEL
WILLOW CREEK SHORT CULVERTS – OT

Includes:
Higgins Creek from IL72 (Touhy Ave.) to confluence with Willow Creek
Relocated Willow Creek from RRNS to confluence with Higgins Creek
Willow-Higgins Creek from confluence to Riverway 2

WILLOW CREEK - OMP Completion Phase

WILLOW PROPOSED SHORT CULVERTS - DT

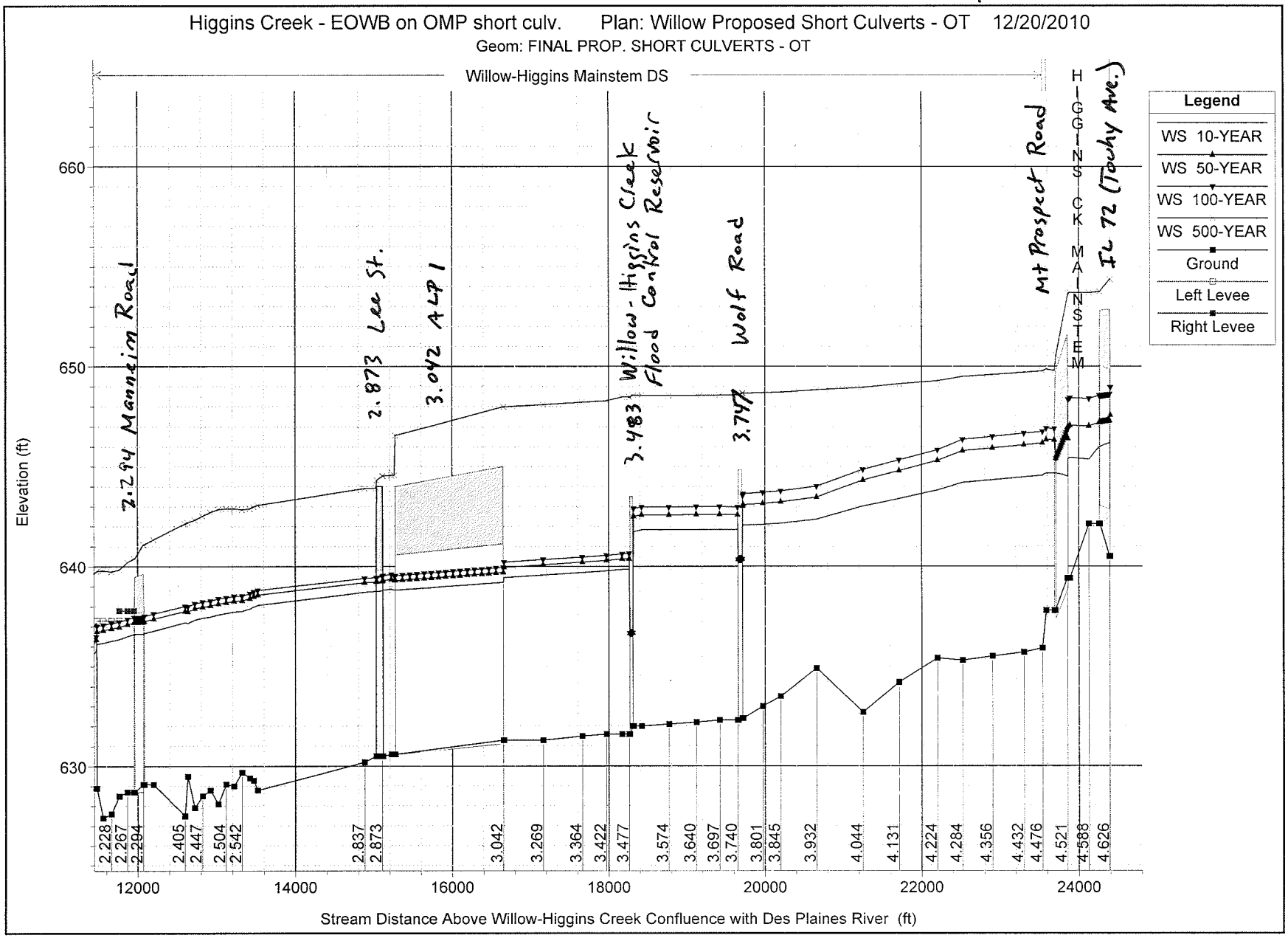
for relocated Willow Creek



For details, see HEC-RAS Cross Section Location
And Reach Length Exhibit at front of Section 8.

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)

Willow Creek-OMP Completion Phase



HEC-RAS Plan: ShortCulv-OT River: HIGGINS CK Reach: MAINSTEM

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	4.639	10-YEAR	444.00	640.50	646.61	642.96	646.68	0.000514	2.13	208.49	52.42	0.18
MAINSTEM	4.639	50-YEAR	485.00	640.50	647.56	643.09	647.62	0.000309	1.89	256.22	76.71	0.15
MAINSTEM	4.639	100-YEAR	700.00	640.50	648.95	643.67	649.02	0.000289	2.15	325.59	94.44	0.15
MAINSTEM	4.639	500-YEAR	1600.00	640.50	654.37	645.49	654.42	0.000142	1.91	994.20	146.00	0.11
MAINSTEM	4.626		Culvert									
MAINSTEM	4.612	10-YEAR	444.00	642.10	646.00	644.38	646.21	0.002492	3.70	119.84	40.74	0.38
MAINSTEM	4.612	50-YEAR	485.00	642.10	647.21	644.50	647.33	0.001047	2.82	172.23	45.75	0.26
MAINSTEM	4.612	100-YEAR	700.00	642.10	648.54	645.04	648.68	0.000845	2.97	235.64	51.25	0.24
MAINSTEM	4.612	500-YEAR	1600.00	642.10	653.75	646.74	653.84	0.000306	2.55	1120.70	547.42	0.16
MAINSTEM	4.588	10-YEAR	454.00	642.10	645.36		645.72	0.005182	4.79	94.74	38.11	0.54
MAINSTEM	4.588	50-YEAR	503.00	642.10	647.03		647.18	0.001293	3.07	164.08	45.01	0.28
MAINSTEM	4.588	100-YEAR	730.00	642.10	648.39		648.55	0.001057	3.19	229.12	50.64	0.26
MAINSTEM	4.588	500-YEAR	1666.00	642.10	653.69		653.79	0.000343	2.69	1090.75	533.28	0.16
MAINSTEM	4.542	10-YEAR	454.00	639.40	645.46		645.50	0.000181	1.66	313.54	68.46	0.12
MAINSTEM	4.542	50-YEAR	503.00	639.40	647.06		647.08	0.000091	1.37	430.07	77.29	0.09
MAINSTEM	4.542	100-YEAR	730.00	639.40	648.42		648.45	0.000101	1.62	540.31	84.80	0.09
MAINSTEM	4.542	500-YEAR	1666.00	639.40	653.70		653.74	0.000082	1.98	1064.63	113.94	0.09
MAINSTEM	4.537	10-YEAR	454.00	639.40	645.40	641.24	645.49	0.000372	2.36	192.00	68.13	0.17
MAINSTEM	4.537	50-YEAR	503.00	639.40	647.01	641.36	647.08	0.000206	2.07	243.54	77.02	0.13
MAINSTEM	4.537	100-YEAR	730.00	639.40	648.34	641.93	648.44	0.000254	2.55	286.13	84.37	0.15
MAINSTEM	4.537	500-YEAR	1666.00	639.40	653.66	643.79	653.74	0.000127	2.46	903.16	223.31	0.11
MAINSTEM	4.521		Culvert									
MAINSTEM	4.505	10-YEAR	454.00	637.80	644.66	639.65	644.73	0.000238	2.07	219.51	75.35	0.14
MAINSTEM	4.505	50-YEAR	503.00	637.80	646.34	639.75	646.39	0.000141	1.84	273.15	85.21	0.11
MAINSTEM	4.505	100-YEAR	730.00	637.80	646.90	640.33	647.00	0.000239	2.51	291.31	88.55	0.15
MAINSTEM	4.505	500-YEAR	1666.00	637.80	649.79	642.19	650.08	0.000499	4.34	383.52	412.02	0.22
MAINSTEM	4.485	10-YEAR	454.00	637.80	644.66		644.69	0.000109	1.40	378.83	75.38	0.09
MAINSTEM	4.485	50-YEAR	503.00	637.80	646.34		646.36	0.000057	1.17	513.81	85.26	0.07
MAINSTEM	4.485	100-YEAR	730.00	637.80	646.92		646.95	0.000093	1.56	564.07	88.66	0.09
MAINSTEM	4.485	500-YEAR	1666.00	637.80	649.87		649.94	0.000156	2.44	850.94	106.00	0.12

Subtract 0.3' to convert starting WSELs from NGVD29 to NAVD88. See VERTCON in Section 15 of this Report.

WILLOW CREEK - OMP Completion Phase NGVD 29

Summary Table - Higgins Ck.

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS

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 DS	4.476	10-YEAR	1348.00	635.90	644.55		644.67	0.000388	3.08	524.12	86.21	0.18
Mainstem DS	4.476	50-YEAR	1960.00	635.90	646.18		646.34	0.000411	3.56	672.93	95.88	0.20
Mainstem DS	4.476	100-YEAR	2206.00	635.90	646.76		646.93	0.000418	3.72	729.23	99.30	0.20
Mainstem DS	4.476	500-YEAR	3044.00	635.90	649.77		649.92	0.000292	3.66	1054.62	117.11	0.17
Mainstem DS	4.432	10-YEAR	1348.00	635.70	644.46		644.58	0.000368	3.03	534.00	86.88	0.18
Mainstem DS	4.432	50-YEAR	1960.00	635.70	646.09		646.24	0.000394	3.51	683.37	96.53	0.19
Mainstem DS	4.432	100-YEAR	2206.00	635.70	646.67		646.83	0.000402	3.68	739.89	99.93	0.20
Mainstem DS	4.432	500-YEAR	3044.00	635.70	649.70		649.85	0.000280	3.61	1070.60	117.91	0.17
Mainstem DS	4.356	10-YEAR	1348.00	635.50	644.32		644.43	0.000358	3.00	540.47	87.57	0.18
Mainstem DS	4.356	50-YEAR	1960.00	635.50	645.94		646.08	0.000385	3.48	689.96	97.21	0.19
Mainstem DS	4.356	100-YEAR	2206.00	635.50	646.51		646.67	0.000393	3.65	746.57	100.62	0.19
Mainstem DS	4.356	500-YEAR	3044.00	635.50	649.60		649.74	0.000271	3.57	1085.45	119.01	0.17
Mainstem DS	4.284	10-YEAR	1348.00	635.30	644.19		644.30	0.000347	2.97	546.42	87.97	0.18
Mainstem DS	4.284	50-YEAR	1960.00	635.30	645.79		645.94	0.000377	3.46	695.48	97.55	0.19
Mainstem DS	4.284	100-YEAR	2206.00	635.30	646.36		646.52	0.000386	3.62	751.96	100.94	0.19
Mainstem DS	4.284	500-YEAR	3044.00	635.30	649.50		649.64	0.000263	3.53	1097.48	119.61	0.17
Mainstem DS	4.224	10-YEAR	1348.00	635.40	643.80		644.10	0.001002	4.63	384.33	76.33	0.29
Mainstem DS	4.224	50-YEAR	1960.00	635.40	645.29		645.72	0.001144	5.55	518.81	115.78	0.32
Mainstem DS	4.224	100-YEAR	2206.00	635.40	645.83		646.29	0.001167	5.82	588.98	143.58	0.33
Mainstem DS	4.224	500-YEAR	3044.00	635.40	649.29		649.52	0.000498	4.63	1417.10	282.00	0.22
Mainstem DS	4.131	10-YEAR	1348.00	634.20	643.38		643.61	0.000935	4.12	442.77	83.15	0.25
Mainstem DS	4.131	50-YEAR	1960.00	634.20	644.79		645.13	0.001155	5.08	586.83	153.11	0.29
Mainstem DS	4.131	100-YEAR	2206.00	634.20	645.33		645.69	0.001169	5.29	683.68	205.55	0.29
Mainstem DS	4.131	500-YEAR	3044.00	634.20	649.13		649.27	0.000398	3.80	1662.46	269.00	0.18
Mainstem DS	4.044	10-YEAR	1348.00	632.70	643.00		643.19	0.000841	3.69	453.85	84.18	0.22
Mainstem DS	4.044	50-YEAR	1960.00	632.70	644.32		644.60	0.001071	4.56	595.77	132.61	0.25
Mainstem DS	4.044	100-YEAR	2206.00	632.70	644.85		645.15	0.001098	4.77	671.63	152.94	0.25
Mainstem DS	4.044	500-YEAR	3044.00	632.70	648.96		649.09	0.000398	3.55	1558.91	254.00	0.16
Mainstem DS	3.932	10-YEAR	1348.00	634.90	642.34		642.53	0.001545	3.65	442.43	91.98	0.24
Mainstem DS	3.932	50-YEAR	1960.00	634.90	643.45		643.75	0.002028	4.60	564.97	166.26	0.28
Mainstem DS	3.932	100-YEAR	2206.00	634.90	644.00		644.30	0.001962	4.72	666.75	206.31	0.28
Mainstem DS	3.932	500-YEAR	3044.00	634.90	648.83		648.88	0.000249	2.24	2728.45	484.00	0.11

Willow Creek - Comp Completion Phase NGVD 29

Summary Table - Willow-Higgins Creek

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	3.845	10-YEAR	1348.00	633.50	642.14		642.23	0.000303	2.72	614.29	107.13	0.16
Mainstem DS	3.845	50-YEAR	1960.00	633.50	643.22		643.35	0.000394	3.36	734.54	116.12	0.19
Mainstem DS	3.845	100-YEAR	2206.00	633.50	643.77		643.91	0.000397	3.50	799.19	120.68	0.19
Mainstem DS	3.845	500-YEAR	3044.00	633.50	648.71		648.79	0.000134	2.64	1452.65	135.00	0.12
Mainstem DS	3.801	10-YEAR	1348.00	633.00	642.09		642.17	0.000255	2.58	648.67	107.78	0.15
Mainstem DS	3.801	50-YEAR	1960.00	633.00	643.14		643.26	0.000342	3.22	767.18	116.25	0.18
Mainstem DS	3.801	100-YEAR	2206.00	633.00	643.69		643.82	0.000348	3.36	831.71	120.61	0.18
Mainstem DS	3.801	500-YEAR	3044.00	633.00	648.69		648.76	0.000122	2.57	1491.53	135.00	0.11
Mainstem DS	3.754	10-YEAR	1348.00	632.40	642.04		642.11	0.000199	2.37	711.45	112.61	0.13
Mainstem DS	3.754	50-YEAR	1960.00	632.40	643.08		643.18	0.000274	2.98	833.07	120.99	0.16
Mainstem DS	3.754	100-YEAR	2206.00	632.40	643.62		643.73	0.000282	3.13	900.03	125.37	0.16
Mainstem DS	3.754	500-YEAR	3044.00	632.40	648.66		648.73	0.000104	2.44	1574.45	135.00	0.11
Mainstem DS	3.753	10-YEAR	1348.00	632.40	642.00	635.60	642.10	0.000247	2.64	540.13	112.31	0.15
Mainstem DS	3.753	50-YEAR	1960.00	632.40	643.01	636.37	643.17	0.000367	3.43	601.39	120.39	0.19
Mainstem DS	3.753	100-YEAR	2206.00	632.40	643.53	636.64	643.72	0.000391	3.66	633.56	124.64	0.19
Mainstem DS	3.753	500-YEAR	3044.00	632.40	648.66	637.53	648.73	0.000104	2.44	1574.38	135.00	0.11
Mainstem DS	3.747		Culvert									
Mainstem DS	3.740	10-YEAR	1348.00	632.30	641.81	634.54	641.87	0.000143	2.00	675.41	197.24	0.11
Mainstem DS	3.740	50-YEAR	1960.00	632.30	642.57	635.17	642.68	0.000235	2.69	728.88	201.78	0.15
Mainstem DS	3.740	100-YEAR	2206.00	632.30	642.95	635.41	643.09	0.000263	2.92	756.46	204.11	0.16
Mainstem DS	3.740	500-YEAR	3044.00	632.30	648.57	636.15	648.58	0.000021	1.10	3002.21	208.60	0.05
Mainstem DS	3.697	10-YEAR	1348.00	632.30	641.83		641.84	0.000029	0.90	1606.54	197.32	0.05
Mainstem DS	3.697	50-YEAR	1960.00	632.30	642.59		642.61	0.000047	1.20	1759.46	201.93	0.07
Mainstem DS	3.697	100-YEAR	2206.00	632.30	642.99		643.01	0.000052	1.29	1839.60	204.30	0.07
Mainstem DS	3.697	500-YEAR	3044.00	632.30	648.56		648.58	0.000021	1.10	3001.17	208.60	0.05
Mainstem DS	3.640	10-YEAR	1348.00	632.20	641.82		641.83	0.000028	0.89	1623.83	197.70	0.05
Mainstem DS	3.640	50-YEAR	1960.00	632.20	642.58		642.60	0.000045	1.19	1776.00	202.27	0.07
Mainstem DS	3.640	100-YEAR	2206.00	632.20	642.97		642.99	0.000050	1.28	1855.97	204.63	0.07
Mainstem DS	3.640	500-YEAR	3044.00	632.20	648.56		648.57	0.000021	1.10	3021.56	209.00	0.05
Mainstem DS	3.574	10-YEAR	1348.00	632.10	641.81		641.82	0.000027	0.88	1641.20	198.23	0.05

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	3.574	50-YEAR	1960.00	632.10	642.56		642.58	0.000044	1.18	1792.58	202.77	0.06
Mainstem DS	3.574	100-YEAR	2206.00	632.10	642.95		642.98	0.000049	1.27	1872.39	205.12	0.07
Mainstem DS	3.574	500-YEAR	3044.00	632.10	648.55		648.57	0.000021	1.09	3043.34	209.60	0.05
Mainstem DS	3.508	10-YEAR	910.00	632.00	641.81		641.81	0.000012	0.59	1661.16	198.83	0.03
Mainstem DS	3.508	50-YEAR	960.00	632.00	642.56		642.57	0.000010	0.57	1813.93	203.39	0.03
Mainstem DS	3.508	100-YEAR	990.00	632.00	642.96		642.96	0.000009	0.56	1894.37	205.75	0.03
Mainstem DS	3.508	500-YEAR	1666.00	632.00	648.55		648.56	0.000006	0.59	3068.65	210.20	0.03
Mainstem DS	3.488	10-YEAR	910.00	632.00	641.72	634.51	641.80	0.000186	2.31	394.50	198.30	0.13
Mainstem DS	3.488	50-YEAR	960.00	632.00	642.48	634.59	642.56	0.000161	2.26	425.50	202.88	0.12
Mainstem DS	3.488	100-YEAR	990.00	632.00	642.87	634.64	642.95	0.000151	2.24	441.52	205.25	0.12
Mainstem DS	3.488	500-YEAR	1666.00	632.00	648.55	635.74	648.56	0.000006	0.59	3068.52	210.20	0.03
Mainstem DS	3.483		Culvert									
Mainstem DS	3.477	10-YEAR	910.00	631.60	639.84	634.09	639.95	0.000322	2.72	334.51	49.99	0.17
Mainstem DS	3.477	50-YEAR	960.00	631.60	640.38	634.18	640.45	0.000192	2.19	438.44	50.00	0.13
Mainstem DS	3.477	100-YEAR	990.00	631.60	640.63	634.25	640.71	0.000186	2.20	451.19	50.00	0.13
Mainstem DS	3.477	500-YEAR	1666.00	631.60	648.47	635.34	648.53	0.000066	1.98	843.50	50.06	0.08
Mainstem DS	3.460	10-YEAR	910.00	631.60	639.84		639.91	0.000214	2.21	411.30	49.99	0.14
Mainstem DS	3.460	50-YEAR	960.00	631.60	640.36		640.44	0.000194	2.20	437.55	50.00	0.13
Mainstem DS	3.460	100-YEAR	990.00	631.60	640.62		640.69	0.000187	2.20	450.33	50.00	0.13
Mainstem DS	3.460	500-YEAR	1666.00	631.60	648.47		648.53	0.000066	1.98	843.20	50.06	0.08
Mainstem DS	3.422	10-YEAR	996.00	631.60	639.77		639.86	0.000263	2.44	408.02	49.99	0.15
Mainstem DS	3.422	50-YEAR	1100.00	631.60	640.29		640.39	0.000261	2.54	433.92	50.00	0.15
Mainstem DS	3.422	100-YEAR	1148.00	631.60	640.54		640.64	0.000259	2.57	446.61	50.00	0.15
Mainstem DS	3.422	500-YEAR	3064.00	631.60	648.28		648.49	0.000231	3.68	833.61	50.06	0.16
Mainstem DS	3.364	10-YEAR	996.00	631.50	639.69		639.78	0.000261	2.44	408.97	49.99	0.15
Mainstem DS	3.364	50-YEAR	1100.00	631.50	640.21		640.31	0.000259	2.53	434.89	50.00	0.15
Mainstem DS	3.364	100-YEAR	1148.00	631.50	640.46		640.56	0.000257	2.57	447.63	50.00	0.15
Mainstem DS	3.364	500-YEAR	3064.00	631.50	648.20		648.41	0.000229	3.68	835.06	50.06	0.16
Mainstem DS	3.269	10-YEAR	996.00	631.30	639.56		639.65	0.000253	2.42	412.60	49.99	0.15
Mainstem DS	3.269	50-YEAR	1100.00	631.30	640.08		640.18	0.000252	2.51	438.56	49.99	0.15
Mainstem DS	3.269	100-YEAR	1148.00	631.30	640.34		640.44	0.000250	2.55	451.36	50.00	0.15

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	3.269	500-YEAR	3064.00	631.30	648.09		648.30	0.000225	3.66	839.44	50.06	0.16
Mainstem DS	3.174	10-YEAR	996.00	631.30	639.43	633.62	639.52	0.000267	2.46	406.05	50.02	0.15
Mainstem DS	3.174	50-YEAR	1100.00	631.30	639.95	633.77	640.05	0.000265	2.55	432.07	50.03	0.15
Mainstem DS	3.174	100-YEAR	1148.00	631.30	640.21	633.83	640.31	0.000262	2.58	444.95	50.03	0.15
Mainstem DS	3.174	500-YEAR	3064.00	631.30	647.98	636.19	648.19	0.000229	3.67	856.56	71.74	0.16
Mainstem DS	3.042		Culvert									
Mainstem DS	2.909	10-YEAR	996.00	630.60	638.81	633.23	638.95	0.000383	2.96	336.65	99.98	0.18
Mainstem DS	2.909	50-YEAR	1100.00	630.60	639.29	633.41	639.44	0.000387	3.09	356.30	99.98	0.18
Mainstem DS	2.909	100-YEAR	1148.00	630.60	639.53	633.50	639.69	0.000384	3.13	366.30	99.98	0.18
Mainstem DS	2.909	500-YEAR	3064.00	630.60	644.56	636.17	644.64	0.000104	2.20	1395.98	100.03	0.10
Mainstem DS	2.902	10-YEAR	996.00	630.60	638.86		638.89	0.000063	1.21	825.78	99.99	0.07
Mainstem DS	2.902	50-YEAR	1100.00	630.60	639.35		639.37	0.000064	1.26	874.20	99.99	0.08
Mainstem DS	2.902	100-YEAR	1148.00	630.60	639.59		639.62	0.000063	1.28	898.79	99.99	0.08
Mainstem DS	2.902	500-YEAR	3064.00	630.60	644.56		644.64	0.000104	2.20	1395.65	100.04	0.10
Mainstem DS	2.882	10-YEAR	996.00	630.50	638.81	633.06	638.87	0.000320	1.90	524.32	97.14	0.13
Mainstem DS	2.882	50-YEAR	1100.00	630.50	639.30	633.22	639.36	0.000311	1.96	560.98	100.74	0.13
Mainstem DS	2.882	100-YEAR	1148.00	630.50	639.54	633.29	639.60	0.000304	1.98	579.64	102.57	0.13
Mainstem DS	2.882	500-YEAR	3064.00	630.50	644.52	635.55	644.62	0.000350	2.51	1416.58	573.75	0.14
Mainstem DS	2.873		Bridge									
Mainstem DS	2.865	10-YEAR	996.00	630.50	638.75	633.05	638.81	0.000330	1.92	519.40	96.66	0.13
Mainstem DS	2.865	50-YEAR	1100.00	630.50	639.22	633.22	639.28	0.000322	1.98	555.51	100.20	0.13
Mainstem DS	2.865	100-YEAR	1148.00	630.50	639.44	633.29	639.50	0.000318	2.01	571.89	101.81	0.13
Mainstem DS	2.865	500-YEAR	3064.00	630.50	643.92	635.55	644.03	0.000450	2.74	1117.69	115.00	0.15
Mainstem DS	2.837	10-YEAR	996.00	630.20	638.71		638.75	0.000343	1.71	582.80	104.16	0.13
Mainstem DS	2.837	50-YEAR	1100.00	630.20	639.18		639.23	0.000326	1.74	633.43	109.53	0.13
Mainstem DS	2.837	100-YEAR	1148.00	630.20	639.40		639.45	0.000317	1.75	657.71	114.17	0.12
Mainstem DS	2.837	500-YEAR	3064.00	630.20	643.89		643.96	0.000265	2.29	2090.96	591.20	0.12
Mainstem DS	2.579	10-YEAR	996.00	628.80	638.07		638.22	0.000430	3.07	325.65	57.50	0.22
Mainstem DS	2.579	50-YEAR	1100.00	628.80	638.58		638.73	0.000402	3.12	354.66	57.50	0.22
Mainstem DS	2.579	100-YEAR	1148.00	628.80	638.81		638.96	0.000391	3.14	367.82	57.50	0.22

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	2.579	500-YEAR	3064.00	628.80	643.06		643.44	0.000522	5.00	668.41	76.83	0.27
Mainstem DS	2.570	10-YEAR	996.00	629.30	637.99		638.19	0.000719	3.55	280.21	56.50	0.28
Mainstem DS	2.570	50-YEAR	1100.00	629.30	638.50		638.70	0.000642	3.56	309.12	56.54	0.27
Mainstem DS	2.570	100-YEAR	1148.00	629.30	638.73		638.93	0.000612	3.56	322.21	56.58	0.26
Mainstem DS	2.570	500-YEAR	3064.00	629.30	642.98		643.40	0.000664	5.31	639.38	82.70	0.30
Mainstem DS	2.560	10-YEAR	996.00	629.40	637.90		638.13	0.001549	3.90	255.09	51.00	0.31
Mainstem DS	2.560	50-YEAR	1100.00	629.40	638.41		638.65	0.001394	3.91	281.45	51.00	0.29
Mainstem DS	2.560	100-YEAR	1148.00	629.40	638.65		638.88	0.001336	3.91	293.35	51.00	0.29
Mainstem DS	2.560	500-YEAR	3064.00	629.40	642.88		643.35	0.001390	5.67	627.02	91.50	0.32
Mainstem DS	2.542	10-YEAR	996.00	629.70	637.78		638.02	0.000805	3.99	249.59	44.75	0.30
Mainstem DS	2.542	50-YEAR	1100.00	629.70	638.30		638.55	0.000756	4.03	273.21	45.50	0.29
Mainstem DS	2.542	100-YEAR	1148.00	629.70	638.53		638.79	0.000732	4.04	284.05	49.50	0.29
Mainstem DS	2.542	500-YEAR	3064.00	629.70	642.83		643.23	0.000690	5.47	888.05	191.00	0.30
Mainstem DS	2.523	10-YEAR	996.00	629.00	637.74		637.89	0.001426	3.11	321.29	64.50	0.24
Mainstem DS	2.523	50-YEAR	1100.00	629.00	638.27		638.42	0.001265	3.11	355.65	64.50	0.23
Mainstem DS	2.523	100-YEAR	1148.00	629.00	638.51		638.66	0.001205	3.11	371.16	64.50	0.23
Mainstem DS	2.523	500-YEAR	3064.00	629.00	642.89		643.09	0.000946	3.93	1091.22	233.00	0.22
Mainstem DS	2.504	10-YEAR	996.00	629.10	637.66		637.81	0.000464	3.09	324.45	65.05	0.23
Mainstem DS	2.504	50-YEAR	1100.00	629.10	638.20		638.35	0.000418	3.10	360.82	69.68	0.22
Mainstem DS	2.504	100-YEAR	1148.00	629.10	638.45		638.60	0.000401	3.12	379.79	96.24	0.22
Mainstem DS	2.504	500-YEAR	3064.00	629.10	642.88		643.03	0.000279	3.65	1606.76	365.00	0.20
Mainstem DS	2.485	10-YEAR	996.00	628.10	637.60		637.73	0.001449	2.89	349.86	68.07	0.21
Mainstem DS	2.485	50-YEAR	1100.00	628.10	638.15		638.28	0.001331	2.91	392.28	97.50	0.20
Mainstem DS	2.485	100-YEAR	1148.00	628.10	638.40		638.53	0.001273	2.91	416.36	97.50	0.20
Mainstem DS	2.485	500-YEAR	3064.00	628.10	642.84		642.98	0.000932	3.42	1240.67	235.00	0.18
Mainstem DS	2.466	10-YEAR	996.00	628.80	637.49		637.65	0.000522	3.19	312.04	59.26	0.25
Mainstem DS	2.466	50-YEAR	1100.00	628.80	638.04		638.20	0.000480	3.18	345.56	61.52	0.24
Mainstem DS	2.466	100-YEAR	1148.00	628.80	638.29		638.45	0.000464	3.18	361.02	62.65	0.23
Mainstem DS	2.466	500-YEAR	3064.00	628.80	642.71		642.92	0.000365	4.02	1214.55	255.00	0.22
Mainstem DS	2.447	10-YEAR	996.00	628.50	637.43		637.59	0.000538	3.27	304.14	56.35	0.25
Mainstem DS	2.447	50-YEAR	1100.00	628.50	637.99		638.15	0.000479	3.28	336.96	61.37	0.24

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	2.447	100-YEAR	1148.00	628.50	638.24		638.40	0.000456	3.28	352.62	63.87	0.23
Mainstem DS	2.447	500-YEAR	3064.00	628.50	642.51		642.86	0.000521	4.88	787.20	127.00	0.27
Mainstem DS	2.428	10-YEAR	996.00	627.90	637.34		637.52	0.000951	3.42	291.19	48.00	0.24
Mainstem DS	2.428	50-YEAR	1100.00	627.90	637.90		638.09	0.000886	3.46	318.18	48.00	0.24
Mainstem DS	2.428	100-YEAR	1148.00	627.90	638.15		638.34	0.000862	3.48	330.21	48.00	0.23
Mainstem DS	2.428	500-YEAR	3064.00	627.90	642.30		642.77	0.001351	5.58	612.37	84.00	0.30
Mainstem DS	2.411	10-YEAR	996.00	629.50	637.17		637.40	0.002151	3.84	259.04	48.00	0.29
Mainstem DS	2.411	50-YEAR	1100.00	629.50	637.74		637.97	0.001921	3.84	286.78	48.00	0.28
Mainstem DS	2.411	100-YEAR	1148.00	629.50	638.00		638.23	0.001841	3.84	299.08	48.00	0.27
Mainstem DS	2.411	500-YEAR	3064.00	629.50	642.18		642.61	0.002118	5.55	706.52	141.00	0.30
Mainstem DS	2.405	10-YEAR	996.00	627.50	637.20	631.55	637.32	0.000773	2.81	354.00	46.00	0.18
Mainstem DS	2.405	50-YEAR	1100.00	627.50	637.77	631.77	637.90	0.000762	2.89	380.41	46.00	0.18
Mainstem DS	2.405	100-YEAR	1148.00	627.50	638.03	631.86	638.16	0.000759	2.93	392.13	46.00	0.18
Mainstem DS	2.405	500-YEAR	3064.00	627.50	642.12	634.58	642.55	0.001668	5.28	580.18	84.00	0.26
Mainstem DS	2.329	10-YEAR	996.00	629.10	636.79	632.64	636.98	0.000950	3.46	288.23	46.36	0.24
Mainstem DS	2.329	50-YEAR	1100.00	629.10	637.38	632.82	637.57	0.000887	3.48	315.91	47.18	0.24
Mainstem DS	2.329	100-YEAR	1148.00	629.10	637.64	632.90	637.83	0.000864	3.50	328.29	47.54	0.23
Mainstem DS	2.329	500-YEAR	3064.00	629.10	641.33	635.64	641.88	0.001649	5.96	545.82	175.60	0.33
Mainstem DS	2.307	10-YEAR	996.00	629.10	636.66	632.64	636.86	0.001010	3.53	282.30	46.18	0.25
Mainstem DS	2.307	50-YEAR	1100.00	629.10	637.26	632.82	637.46	0.000934	3.54	310.34	47.01	0.24
Mainstem DS	2.307	100-YEAR	1148.00	629.10	637.53	632.90	637.73	0.000907	3.56	322.84	47.38	0.24
Mainstem DS	2.307	500-YEAR	3064.00	629.10	641.08	635.64	641.66	0.001793	6.13	519.94	170.62	0.34
Mainstem DS	2.294		Culvert									
Mainstem DS	2.282	10-YEAR	996.00	628.70	636.61	632.73	636.75	0.001110	2.95	337.24	56.00	0.21
Mainstem DS	2.282	50-YEAR	1100.00	628.70	637.20	632.88	637.34	0.001016	2.97	370.28	56.00	0.20
Mainstem DS	2.282	100-YEAR	1148.00	628.70	637.46	632.95	637.60	0.000983	2.98	384.82	56.00	0.20
Mainstem DS	2.282	500-YEAR	3064.00	628.70	640.38	635.13	640.69	0.001782	4.78	886.62	208.00	0.27
Mainstem DS	2.267	10-YEAR	996.00	628.70	636.51	632.73	636.65	0.001169	3.00	331.66	56.00	0.22
Mainstem DS	2.267	50-YEAR	1100.00	628.70	637.11	632.88	637.25	0.001059	3.01	365.23	56.00	0.21
Mainstem DS	2.267	100-YEAR	1148.00	628.70	637.38	632.95	637.52	0.001022	3.02	379.95	56.00	0.20
Mainstem DS	2.267	500-YEAR	3064.00	628.70	640.20	635.13	640.53	0.001958	4.94	847.78	208.00	0.28

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	2.247	10-YEAR	996.00	628.50	636.36	632.94	636.52	0.001438	3.20	311.47	56.00	0.24
Mainstem DS	2.247	50-YEAR	1100.00	628.50	636.98	633.08	637.13	0.001267	3.18	346.01	56.00	0.23
Mainstem DS	2.247	100-YEAR	1148.00	628.50	637.24	633.14	637.40	0.001210	3.18	361.05	56.00	0.22
Mainstem DS	2.247	500-YEAR	3064.00	628.50	639.84	635.33	640.28	0.002696	5.57	745.65	270.00	0.33
Mainstem DS	2.228	10-YEAR	996.00	627.60	636.27	632.41	636.39	0.000956	2.73	364.28	62.00	0.20
Mainstem DS	2.228	50-YEAR	1100.00	627.60	636.90	632.55	637.02	0.000851	2.73	403.26	62.00	0.19
Mainstem DS	2.228	100-YEAR	1148.00	627.60	637.18	632.60	637.29	0.000816	2.73	420.16	62.00	0.18
Mainstem DS	2.228	500-YEAR	3064.00	627.60	639.73	634.64	640.04	0.001592	4.69	969.01	355.00	0.27
Mainstem DS	2.208	10-YEAR	1004.00	627.40	636.18	632.33	636.29	0.000900	2.62	382.96	67.00	0.19
Mainstem DS	2.208	50-YEAR	1150.00	627.40	636.82	632.57	636.93	0.000851	2.70	425.28	67.00	0.19
Mainstem DS	2.208	100-YEAR	1208.00	627.40	637.09	632.64	637.21	0.000823	2.72	443.71	67.00	0.19
Mainstem DS	2.208	500-YEAR	2000.00	627.40	639.79	633.50	639.88	0.000479	2.59	1189.37	325.00	0.15
Mainstem DS	2.193	10-YEAR	1004.00	628.90	636.12	631.58	636.23	0.000693	2.62	383.70	67.00	0.18
Mainstem DS	2.193	50-YEAR	1150.00	628.90	636.75	631.89	636.87	0.000665	2.73	421.61	67.00	0.18
Mainstem DS	2.193	100-YEAR	1208.00	628.90	637.03	631.99	637.15	0.000645	2.76	438.16	67.00	0.18
Mainstem DS	2.193	500-YEAR	2000.00	628.90	639.76	632.99	639.84	0.000435	2.51	1211.29	325.00	0.14
Mainstem DS	2.189		Bridge									
Mainstem DS	2.184	10-YEAR	1004.00	628.90	635.72	631.77	635.85	0.001056	2.92	343.50	115.05	0.22
Mainstem DS	2.184	50-YEAR	1150.00	628.90	636.23	632.18	636.37	0.001043	3.07	374.04	278.11	0.22
Mainstem DS	2.184	100-YEAR	1208.00	628.90	636.39	632.28	636.54	0.001056	3.15	383.82	284.00	0.22
Mainstem DS	2.184	500-YEAR	2000.00	628.90	639.69	633.23	639.72	0.000203	1.67	1507.72	285.00	0.10
Mainstem DS	2.167	10-YEAR	1004.00	628.40	635.62		635.74	0.001388	2.81	357.23	86.51	0.24
Mainstem DS	2.167	50-YEAR	1150.00	628.40	636.14		636.26	0.001240	2.84	449.29	272.21	0.23
Mainstem DS	2.167	100-YEAR	1208.00	628.40	636.31		636.43	0.001197	2.85	496.00	284.00	0.22
Mainstem DS	2.167	500-YEAR	2000.00	628.40	639.64		639.69	0.000318	2.05	1446.37	285.00	0.12
Mainstem DS	2.151	10-YEAR	1004.00	626.90	635.52		635.63	0.001098	2.63	398.52	118.47	0.21
Mainstem DS	2.151	50-YEAR	1150.00	626.90	636.06		636.16	0.000991	2.68	472.96	187.89	0.21
Mainstem DS	2.151	100-YEAR	1208.00	626.90	636.22		636.33	0.000974	2.71	507.10	217.11	0.20
Mainstem DS	2.151	500-YEAR	2000.00	626.90	639.62		639.67	0.000274	1.98	1557.34	320.00	0.12
Mainstem DS	2.133	10-YEAR	1004.00	630.50	635.44		635.52	0.001081	2.40	607.84	321.07	0.21

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	2.133	50-YEAR	1150.00	630.50	636.01		636.07	0.000769	2.20	795.46	339.49	0.18
Mainstem DS	2.133	100-YEAR	1208.00	630.50	636.18		636.24	0.000711	2.16	855.48	342.71	0.17
Mainstem DS	2.133	500-YEAR	2000.00	630.50	639.62		639.64	0.000158	1.45	2224.02	435.00	0.09
Mainstem DS	2.132	10-YEAR	1004.00	629.40	635.31	632.55	635.48	0.002059	3.34	300.66	74.19	0.29
Mainstem DS	2.132	50-YEAR	1150.00	629.40	635.85	632.77	636.03	0.001812	3.37	340.85	74.34	0.28
Mainstem DS	2.132	100-YEAR	1208.00	629.40	636.01	632.85	636.20	0.001786	3.42	353.20	74.38	0.28
Mainstem DS	2.132	500-YEAR	2000.00	629.40	639.43	633.88	639.60	0.000894	3.29	608.38	75.00	0.20
Mainstem DS	2.127		Bridge									
Mainstem DS	2.123	10-YEAR	1004.00	629.40	635.08		635.28	0.002473	3.54	283.92	74.13	0.32
Mainstem DS	2.123	50-YEAR	1150.00	629.40	635.65		635.84	0.002084	3.53	326.17	74.28	0.30
Mainstem DS	2.123	100-YEAR	1208.00	629.40	635.82		636.02	0.002041	3.57	338.65	74.33	0.29
Mainstem DS	2.123	500-YEAR	2000.00	629.40	639.20		639.37	0.000977	3.38	591.11	75.00	0.21
Mainstem DS	2.121	10-YEAR	1004.00	628.60	635.09		635.23	0.001708	2.97	337.62	84.42	0.26
Mainstem DS	2.121	50-YEAR	1150.00	628.60	635.66		635.80	0.001460	2.98	385.87	84.43	0.25
Mainstem DS	2.121	100-YEAR	1208.00	628.60	635.83		635.97	0.001435	3.02	400.11	84.44	0.24
Mainstem DS	2.121	500-YEAR	2000.00	628.60	639.21		639.34	0.000677	2.88	738.49	138.05	0.18
Mainstem DS	2.102	10-YEAR	1004.00	626.40	634.97	631.15	635.08	0.001177	2.70	372.29	80.00	0.22
Mainstem DS	2.102	50-YEAR	1150.00	626.40	635.55	631.45	635.67	0.001094	2.73	420.71	83.00	0.21
Mainstem DS	2.102	100-YEAR	1208.00	626.40	635.72	631.85	635.84	0.001087	2.78	434.82	83.00	0.21
Mainstem DS	2.102	500-YEAR	2000.00	626.40	639.17	632.99	639.27	0.000545	2.58	924.91	218.26	0.16
Mainstem DS	2.083	10-YEAR	1004.00	628.20	634.57	632.72	634.86	0.003895	4.37	230.00	147.20	0.39
Mainstem DS	2.083	50-YEAR	1150.00	628.20	635.19	632.92	635.47	0.003304	4.31	267.00	153.58	0.36
Mainstem DS	2.083	100-YEAR	1208.00	628.20	635.35	633.00	635.65	0.003236	4.35	277.41	154.92	0.36
Mainstem DS	2.083	500-YEAR	2000.00	628.20	639.02	633.96	639.19	0.001091	3.42	712.13	282.29	0.23
Mainstem DS	2.064	10-YEAR	1004.00	626.70	634.40		634.58	0.001724	3.40	294.95	57.20	0.26
Mainstem DS	2.064	50-YEAR	1150.00	626.70	635.03		635.22	0.001629	3.47	331.13	59.02	0.26
Mainstem DS	2.064	100-YEAR	1208.00	626.70	635.20		635.40	0.001639	3.54	341.16	60.11	0.26
Mainstem DS	2.064	500-YEAR	2000.00	626.70	639.04		639.10	0.000351	2.27	2087.55	1042.88	0.13
Mainstem DS	2.045	10-YEAR	1004.00	624.80	634.05		634.36	0.002535	4.46	224.95	31.63	0.29
Mainstem DS	2.045	50-YEAR	1150.00	624.80	634.65		635.00	0.002631	4.71	244.07	31.88	0.30
Mainstem DS	2.045	100-YEAR	1208.00	624.80	634.80		635.17	0.002746	4.85	248.85	31.94	0.31

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	2.045	500-YEAR	2000.00	624.80	638.87		639.03	0.000983	3.81	1211.94	712.97	0.20
Mainstem DS	2.042	10-YEAR	1004.00	627.10	633.98		634.31	0.004416	4.62	217.13	37.03	0.34
Mainstem DS	2.042	50-YEAR	1150.00	627.10	634.60		634.95	0.004667	4.78	240.70	40.92	0.35
Mainstem DS	2.042	100-YEAR	1208.00	627.10	634.75		635.12	0.004785	4.89	246.98	41.28	0.35
Mainstem DS	2.042	500-YEAR	2000.00	627.10	638.72		639.00	0.002494	4.20	477.18	149.00	0.41
Mainstem DS	2.023	10-YEAR	1004.00	627.00	633.73		634.02	0.001899	4.33	231.81	45.39	0.34
Mainstem DS	2.023	50-YEAR	1150.00	627.00	634.36		634.66	0.001780	4.41	260.97	47.42	0.33
Mainstem DS	2.023	100-YEAR	1208.00	627.00	634.51		634.82	0.001821	4.51	268.05	47.90	0.34
Mainstem DS	2.023	500-YEAR	2000.00	627.00	638.59		638.85	0.000919	4.08	491.05	61.94	0.25
Mainstem DS	1.995	10-YEAR	1004.00	626.90	633.18		633.64	0.003277	5.44	184.63	33.65	0.41
Mainstem DS	1.995	50-YEAR	1150.00	626.90	633.81		634.30	0.003138	5.57	206.30	34.77	0.40
Mainstem DS	1.995	100-YEAR	1208.00	626.90	633.94		634.45	0.003269	5.74	210.54	34.98	0.41
Mainstem DS	1.995	500-YEAR	2000.00	626.90	638.21		638.65	0.001674	5.31	380.82	65.02	0.31
Mainstem DS	1.976	10-YEAR	1004.00	626.80	633.10		633.35	0.001667	4.06	247.38	44.91	0.30
Mainstem DS	1.976	50-YEAR	1150.00	626.80	633.75		634.02	0.001564	4.15	276.96	45.71	0.30
Mainstem DS	1.976	100-YEAR	1208.00	626.80	633.87		634.15	0.001628	4.28	282.52	45.90	0.30
Mainstem DS	1.976	500-YEAR	2000.00	626.80	638.26		638.48	0.000751	3.83	629.04	111.52	0.22
Mainstem DS	1.950	10-YEAR	1004.00	626.60	632.76		633.09	0.002143	4.60	218.34	38.58	0.34
Mainstem DS	1.950	50-YEAR	1150.00	626.60	633.42		633.76	0.002127	4.69	245.07	41.43	0.34
Mainstem DS	1.950	100-YEAR	1208.00	626.60	633.53		633.89	0.002226	4.84	249.37	41.44	0.35
Mainstem DS	1.950	500-YEAR	2000.00	626.60	638.02		638.35	0.001113	4.56	442.85	48.72	0.25
Mainstem DS	1.940	10-YEAR	1004.00	626.60	632.62	629.72	632.97	0.002311	4.71	212.97	38.57	0.35
Mainstem DS	1.940	50-YEAR	1150.00	626.60	633.28	630.10	633.64	0.002285	4.80	239.35	41.42	0.35
Mainstem DS	1.940	100-YEAR	1208.00	626.60	633.38	630.20	633.76	0.002398	4.96	243.31	41.43	0.36
Mainstem DS	1.940	500-YEAR	2000.00	626.60	637.96	631.45	638.29	0.001135	4.59	439.72	48.39	0.25
Mainstem DS	1.932		Bridge									
Mainstem DS	1.924	10-YEAR	1004.00	627.60	631.00	630.42	631.85	0.046922	7.42	135.27	43.00	0.74
Mainstem DS	1.924	50-YEAR	1150.00	627.60	631.88	630.66	632.57	0.028184	6.63	173.44	43.00	0.58
Mainstem DS	1.924	100-YEAR	1208.00	627.60	631.86	630.76	632.62	0.031790	7.01	172.22	43.00	0.62
Mainstem DS	1.924	500-YEAR	2000.00	627.60	637.15	631.92	637.28	0.002996	3.45	993.57	567.91	0.20

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	1.923	10-YEAR	1023.00	627.60	630.87		631.43	0.028472	6.01	170.24	52.00	0.59
Mainstem DS	1.923	50-YEAR	1152.00	627.60	631.86		632.28	0.015670	5.20	221.60	52.00	0.44
Mainstem DS	1.923	100-YEAR	1208.00	627.60	631.83		632.30	0.017635	5.49	219.97	52.00	0.47
Mainstem DS	1.923	500-YEAR	3030.00	627.60	636.86		637.19	0.006161	5.07	921.82	490.25	0.29
Mainstem DS	1.906	10-YEAR	1023.00	623.50	631.02		631.07	0.000843	1.73	590.29	78.50	0.11
Mainstem DS	1.906	50-YEAR	1152.00	623.50	631.95		631.99	0.000744	1.74	663.10	78.50	0.11
Mainstem DS	1.906	100-YEAR	1208.00	623.50	631.93		631.98	0.000825	1.83	661.50	78.50	0.11
Mainstem DS	1.906	500-YEAR	3030.00	623.50	636.82		636.93	0.001142	2.78	1448.87	623.54	0.13
Mainstem DS	1.891	10-YEAR	1023.00	623.50	630.99		631.04	0.000125	1.87	546.80	73.00	0.12
Mainstem DS	1.891	50-YEAR	1152.00	623.50	631.92		631.97	0.000110	1.87	614.69	73.00	0.11
Mainstem DS	1.891	100-YEAR	1208.00	623.50	631.90		631.96	0.000122	1.97	612.98	73.00	0.12
Mainstem DS	1.891	500-YEAR	3030.00	623.50	636.75		636.90	0.000182	3.10	1314.17	749.02	0.15
Mainstem DS	1.873	10-YEAR	1023.00	623.40	630.95		631.03	0.000197	2.30	445.16	59.00	0.15
Mainstem DS	1.873	50-YEAR	1152.00	623.40	631.88		631.96	0.000175	2.30	500.12	59.00	0.14
Mainstem DS	1.873	100-YEAR	1208.00	623.40	631.85		631.94	0.000195	2.42	498.47	59.00	0.15
Mainstem DS	1.873	500-YEAR	3030.00	623.40	636.65		636.87	0.000298	3.81	952.33	477.50	0.18
Mainstem DS	1.856	10-YEAR	1023.00	623.40	630.84		631.00	0.000403	3.12	327.56	44.00	0.20
Mainstem DS	1.856	50-YEAR	1152.00	623.40	631.78		631.93	0.000360	3.12	368.67	44.00	0.19
Mainstem DS	1.856	100-YEAR	1208.00	623.40	631.74		631.91	0.000401	3.29	366.95	44.00	0.20
Mainstem DS	1.856	500-YEAR	3030.00	623.40	636.39		636.81	0.000658	5.24	653.43	246.64	0.26
Mainstem DS	1.842	10-YEAR	1023.00	623.30	630.85		630.96	0.000262	2.60	392.74	52.00	0.17
Mainstem DS	1.842	50-YEAR	1152.00	623.30	631.79		631.90	0.000234	2.61	441.46	52.00	0.16
Mainstem DS	1.842	100-YEAR	1208.00	623.30	631.75		631.87	0.000260	2.75	439.48	52.00	0.17
Mainstem DS	1.842	500-YEAR	3030.00	623.30	636.44		636.74	0.000420	4.37	801.74	335.11	0.21
Mainstem DS	1.827	10-YEAR	1023.00	623.30	630.80	625.76	630.93	0.000339	2.90	352.33	47.00	0.19
Mainstem DS	1.827	50-YEAR	1152.00	623.30	631.74	625.95	631.87	0.000302	2.91	396.50	47.00	0.18
Mainstem DS	1.827	100-YEAR	1208.00	623.30	631.69	626.04	631.84	0.000337	3.06	394.42	47.00	0.19
Mainstem DS	1.827	500-YEAR	3030.00	623.30	636.30	628.34	636.67	0.000567	4.93	760.72	389.75	0.24
Mainstem DS	1.810		Culvert									
Mainstem DS	1.791	10-YEAR	1023.00	622.90	630.59	626.34	630.73	0.000369	3.06	354.94	67.55	0.22
Mainstem DS	1.791	50-YEAR	1152.00	622.90	631.53	626.55	631.66	0.000296	2.94	420.79	72.45	0.20

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	1.791	100-YEAR	1208.00	622.90	631.46	626.66	631.60	0.000336	3.12	415.74	72.09	0.21
Mainstem DS	1.791	500-YEAR	3030.00	622.90	635.47	629.08	635.79	0.000421	4.65	908.32	355.26	0.26
Mainstem DS	1.779	10-YEAR	1023.00	622.80	630.58		630.67	0.000554	2.46	441.25	64.89	0.16
Mainstem DS	1.779	50-YEAR	1152.00	622.80	631.52		631.61	0.000479	2.45	503.03	66.52	0.15
Mainstem DS	1.779	100-YEAR	1208.00	622.80	631.45		631.55	0.000541	2.59	498.36	66.40	0.16
Mainstem DS	1.779	500-YEAR	3030.00	622.80	635.46		635.72	0.000866	4.22	966.69	763.06	0.21
Mainstem DS	1.770	10-YEAR	1209.00	620.00	630.52		630.64	0.000568	3.01	441.36	56.82	0.17
Mainstem DS	1.770	50-YEAR	1414.00	620.00	631.44		631.58	0.000547	3.15	495.51	61.11	0.17
Mainstem DS	1.770	100-YEAR	1495.00	620.00	631.36		631.52	0.000630	3.37	490.44	60.59	0.19
Mainstem DS	1.770	500-YEAR	3050.00	620.00	635.41		635.68	0.000746	4.58	823.21	132.77	0.21
Mainstem DS	1.751	10-YEAR	1209.00	622.30	630.46		630.59	0.000593	2.86	444.27	59.68	0.18
Mainstem DS	1.751	50-YEAR	1414.00	622.30	631.39		631.53	0.000559	2.99	500.75	64.69	0.18
Mainstem DS	1.751	100-YEAR	1495.00	622.30	631.30		631.46	0.000647	3.19	494.89	63.07	0.19
Mainstem DS	1.751	500-YEAR	3050.00	622.30	635.34		635.61	0.000699	4.28	920.90	185.98	0.21
Mainstem DS	1.732	10-YEAR	1209.00	622.00	630.53		630.54	0.000040	0.78	1571.18	187.87	0.05
Mainstem DS	1.732	50-YEAR	1414.00	622.00	631.47		631.48	0.000038	0.82	1750.83	197.74	0.05
Mainstem DS	1.732	100-YEAR	1495.00	622.00	631.39		631.40	0.000044	0.88	1734.94	196.58	0.05
Mainstem DS	1.732	500-YEAR	3050.00	622.00	635.50		635.52	0.000054	1.23	2585.23	214.09	0.06
Mainstem DS	1.714	10-YEAR	1209.00	620.80	630.53		630.54	0.000031	0.74	1657.88	179.96	0.04
Mainstem DS	1.714	50-YEAR	1414.00	620.80	631.47		631.48	0.000031	0.79	1830.35	187.72	0.04
Mainstem DS	1.714	100-YEAR	1495.00	620.80	631.39		631.40	0.000035	0.84	1815.16	187.05	0.05
Mainstem DS	1.714	500-YEAR	3050.00	620.80	635.49		635.52	0.000048	1.22	2645.12	216.93	0.06
Mainstem DS	1.695	10-YEAR	1209.00	621.60	630.52		630.53	0.000043	0.84	1482.24	177.07	0.05
Mainstem DS	1.695	50-YEAR	1414.00	621.60	631.46		631.47	0.000042	0.89	1652.83	183.93	0.05
Mainstem DS	1.695	100-YEAR	1495.00	621.60	631.38		631.39	0.000049	0.95	1637.76	183.62	0.05
Mainstem DS	1.695	500-YEAR	3050.00	621.60	635.48		635.51	0.000062	1.35	2426.10	206.86	0.06
Mainstem DS	1.676	10-YEAR	1209.00	620.60	630.52		630.53	0.000068	0.86	1423.05	151.00	0.05
Mainstem DS	1.676	50-YEAR	1414.00	620.60	631.45		631.47	0.000068	0.92	1565.15	152.03	0.05
Mainstem DS	1.676	100-YEAR	1495.00	620.60	631.37		631.39	0.000078	0.98	1552.55	151.94	0.05
Mainstem DS	1.676	500-YEAR	3050.00	620.60	635.47		635.50	0.000108	1.43	2237.90	178.85	0.07
Mainstem DS	1.657	10-YEAR	1209.00	620.80	630.48		630.51	0.000220	1.52	814.72	92.55	0.09

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	1.657	50-YEAR	1414.00	620.80	631.41		631.45	0.000218	1.62	902.41	95.09	0.09
Mainstem DS	1.657	100-YEAR	1495.00	620.80	631.32		631.37	0.000251	1.72	893.99	94.85	0.09
Mainstem DS	1.657	500-YEAR	3050.00	620.80	635.38		635.48	0.000338	2.49	1311.25	121.07	0.12
Mainstem DS	1.637	10-YEAR	1209.00	620.10	630.42		630.48	0.000361	2.03	627.37	70.27	0.11
Mainstem DS	1.637	50-YEAR	1414.00	620.10	631.35		631.42	0.000363	2.16	693.42	71.63	0.11
Mainstem DS	1.637	100-YEAR	1495.00	620.10	631.25		631.33	0.000419	2.31	686.43	71.49	0.12
Mainstem DS	1.637	500-YEAR	3050.00	620.10	635.25		635.42	0.000610	3.43	991.85	98.01	0.16
Mainstem DS	1.620	10-YEAR	1209.00	620.00	630.39		630.45	0.000351	2.02	635.99	70.54	0.11
Mainstem DS	1.620	50-YEAR	1414.00	620.00	631.32		631.39	0.000355	2.15	702.17	71.68	0.11
Mainstem DS	1.620	100-YEAR	1495.00	620.00	631.22		631.30	0.000409	2.30	694.82	71.55	0.12
Mainstem DS	1.620	500-YEAR	3050.00	620.00	635.20		635.37	0.000594	3.39	994.90	86.49	0.15
Mainstem DS	1.600	10-YEAR	1209.00	619.80	630.35		630.41	0.000345	2.02	646.65	74.00	0.11
Mainstem DS	1.600	50-YEAR	1414.00	619.80	631.28		631.35	0.000347	2.14	716.21	75.44	0.11
Mainstem DS	1.600	100-YEAR	1495.00	619.80	631.18		631.25	0.000401	2.29	708.04	75.27	0.12
Mainstem DS	1.600	500-YEAR	3050.00	619.80	635.14		635.30	0.000594	3.40	1026.11	99.42	0.15
Mainstem DS	1.580	10-YEAR	1209.00	620.00	630.30		630.37	0.000440	2.22	570.01	64.93	0.12
Mainstem DS	1.580	50-YEAR	1414.00	620.00	631.22		631.31	0.000442	2.36	631.30	67.11	0.13
Mainstem DS	1.580	100-YEAR	1495.00	620.00	631.11		631.20	0.000513	2.52	623.41	66.84	0.14
Mainstem DS	1.580	500-YEAR	3050.00	620.00	635.03		635.23	0.000731	3.70	908.94	88.84	0.17
Mainstem DS	1.561	10-YEAR	1209.00	620.50	630.24		630.32	0.000552	2.35	531.23	64.00	0.14
Mainstem DS	1.561	50-YEAR	1414.00	620.50	631.16		631.26	0.000544	2.48	591.59	66.05	0.14
Mainstem DS	1.561	100-YEAR	1495.00	620.50	631.04		631.14	0.000635	2.66	583.17	65.77	0.15
Mainstem DS	1.561	500-YEAR	3050.00	620.50	634.94		635.15	0.000847	3.81	893.14	104.90	0.18
Mainstem DS	1.541	10-YEAR	1209.00	620.90	630.19		630.26	0.000510	2.22	564.84	70.38	0.13
Mainstem DS	1.541	50-YEAR	1414.00	620.90	631.12		631.20	0.000497	2.33	631.23	72.28	0.13
Mainstem DS	1.541	100-YEAR	1495.00	620.90	630.98		631.08	0.000582	2.51	621.40	72.00	0.14
Mainstem DS	1.541	500-YEAR	3050.00	620.90	634.87		635.06	0.000748	3.55	957.23	105.76	0.17
Mainstem DS	1.522	10-YEAR	1209.00	620.90	630.13		630.21	0.000540	2.34	540.97	63.48	0.14
Mainstem DS	1.522	50-YEAR	1414.00	620.90	631.06		631.15	0.000537	2.48	600.93	67.63	0.14
Mainstem DS	1.522	100-YEAR	1495.00	620.90	630.91		631.02	0.000629	2.66	591.13	66.17	0.15
Mainstem DS	1.522	500-YEAR	3050.00	620.90	634.77		634.98	0.000818	3.77	929.69	111.17	0.18

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	1.502	10-YEAR	1209.00	620.40	630.11		630.16	0.000292	1.67	727.30	83.65	0.10
Mainstem DS	1.502	50-YEAR	1414.00	620.40	631.05		631.09	0.000287	1.77	806.07	85.24	0.10
Mainstem DS	1.502	100-YEAR	1495.00	620.40	630.90		630.95	0.000338	1.90	793.39	84.99	0.11
Mainstem DS	1.502	500-YEAR	3050.00	620.40	634.77		634.89	0.000457	2.76	1145.38	110.88	0.13
Mainstem DS	1.485	10-YEAR	1209.00	619.50	630.10		630.13	0.000198	1.52	818.47	86.16	0.08
Mainstem DS	1.485	50-YEAR	1414.00	619.50	631.03		631.07	0.000202	1.63	899.50	87.55	0.09
Mainstem DS	1.485	100-YEAR	1495.00	619.50	630.88		630.93	0.000236	1.75	886.23	87.32	0.09
Mainstem DS	1.485	500-YEAR	3050.00	619.50	634.75		634.85	0.000351	2.60	1235.19	93.06	0.12
Mainstem DS	1.464	10-YEAR	1209.00	619.50	630.07		630.11	0.000241	1.67	750.50	81.24	0.09
Mainstem DS	1.464	50-YEAR	1414.00	619.50	631.00		631.05	0.000244	1.78	826.99	82.95	0.09
Mainstem DS	1.464	100-YEAR	1495.00	619.50	630.84		630.90	0.000286	1.91	813.96	82.66	0.10
Mainstem DS	1.464	500-YEAR	3050.00	619.50	634.69		634.80	0.000422	2.82	1145.38	89.70	0.13
Mainstem DS	1.446	10-YEAR	1209.00	619.30	630.04		630.08	0.000228	1.65	766.80	82.98	0.09
Mainstem DS	1.446	50-YEAR	1414.00	619.30	630.97		631.02	0.000232	1.76	844.71	84.32	0.09
Mainstem DS	1.446	100-YEAR	1495.00	619.30	630.81		630.87	0.000272	1.89	831.12	84.09	0.10
Mainstem DS	1.446	500-YEAR	3050.00	619.30	634.65		634.76	0.000406	2.81	1163.98	89.59	0.13
Mainstem DS	1.427	10-YEAR	1209.00	619.40	629.97		630.05	0.000448	2.29	557.38	61.24	0.13
Mainstem DS	1.427	50-YEAR	1414.00	619.40	630.90		630.99	0.000455	2.44	614.67	62.56	0.13
Mainstem DS	1.427	100-YEAR	1495.00	619.40	630.72		630.83	0.000537	2.62	603.78	62.31	0.14
Mainstem DS	1.427	500-YEAR	3050.00	619.40	634.47		634.70	0.000802	3.89	847.59	67.65	0.18
Mainstem DS	1.407	10-YEAR	1209.00	619.90	629.77		629.96	0.001329	3.66	377.07	53.30	0.21
Mainstem DS	1.407	50-YEAR	1414.00	619.90	630.69		630.90	0.001287	3.84	427.35	56.10	0.21
Mainstem DS	1.407	100-YEAR	1495.00	619.90	630.48		630.72	0.001555	4.16	415.41	55.45	0.23
Mainstem DS	1.407	500-YEAR	3050.00	619.90	634.08		634.54	0.002053	5.87	635.02	66.42	0.28
Mainstem DS	1.388	10-YEAR	1209.00	619.30	629.54		629.80	0.002008	4.39	337.43	54.78	0.26
Mainstem DS	1.388	50-YEAR	1414.00	619.30	630.47		630.74	0.001869	4.52	389.92	58.07	0.25
Mainstem DS	1.388	100-YEAR	1495.00	619.30	630.20		630.53	0.002320	4.94	374.60	56.79	0.28
Mainstem DS	1.388	500-YEAR	3050.00	619.30	633.87		634.32	0.002456	6.28	1305.78	361.71	0.30
Mainstem DS	1.369	10-YEAR	1209.00	619.50	629.25		629.56	0.002726	4.58	290.42	48.25	0.29
Mainstem DS	1.369	50-YEAR	1414.00	619.50	630.20		630.52	0.002460	4.70	337.89	51.53	0.28
Mainstem DS	1.369	100-YEAR	1495.00	619.50	629.85		630.25	0.003185	5.21	320.19	50.33	0.32
Mainstem DS	1.369	500-YEAR	3050.00	619.50	633.30		633.99	0.003707	7.06	514.33	62.23	0.36

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	1.351	10-YEAR	1209.00	618.60	629.17		629.35	0.001241	3.60	387.19	54.74	0.20
Mainstem DS	1.351	50-YEAR	1414.00	618.60	630.13		630.32	0.001197	3.76	441.33	58.06	0.20
Mainstem DS	1.351	100-YEAR	1495.00	618.60	629.75		630.00	0.001527	4.15	420.05	56.78	0.23
Mainstem DS	1.351	500-YEAR	3050.00	618.60	633.20		633.66	0.002108	5.90	641.55	78.53	0.28
Mainstem DS	1.332	10-YEAR	1209.00	619.20	628.98		629.21	0.001611	3.97	345.10	52.54	0.23
Mainstem DS	1.332	50-YEAR	1414.00	619.20	629.94		630.19	0.001516	4.12	397.82	56.48	0.23
Mainstem DS	1.332	100-YEAR	1495.00	619.20	629.52		629.82	0.001992	4.59	374.05	54.74	0.26
Mainstem DS	1.332	500-YEAR	3050.00	619.20	632.81		633.41	0.002789	6.60	586.09	92.58	0.32
Mainstem DS	1.317	10-YEAR	1209.00	618.60	628.94		629.08	0.001055	3.29	487.59	89.86	0.19
Mainstem DS	1.317	50-YEAR	1414.00	618.60	629.92		630.06	0.000936	3.31	579.31	95.80	0.18
Mainstem DS	1.317	100-YEAR	1495.00	618.60	629.48		629.66	0.001265	3.74	537.31	93.12	0.21
Mainstem DS	1.317	500-YEAR	3050.00	618.60	632.88		633.15	0.001456	4.87	889.15	113.59	0.23
Mainstem DS	1.298	10-YEAR	1337.00	619.40	628.83		628.96	0.001246	3.36	529.48	92.48	0.20
Mainstem DS	1.298	50-YEAR	1670.00	619.40	629.80		629.95	0.001256	3.62	623.92	98.74	0.21
Mainstem DS	1.298	100-YEAR	1495.00	619.40	629.38		629.52	0.001220	3.46	582.88	97.79	0.20
Mainstem DS	1.298	500-YEAR	3055.00	619.40	632.78		633.00	0.001341	4.48	927.06	103.62	0.22
Mainstem DS	1.214	10-YEAR	1337.00	620.10	628.35		628.45	0.001038	2.46	543.88	85.79	0.17
Mainstem DS	1.214	50-YEAR	1670.00	620.10	629.32		629.43	0.001048	2.66	629.49	90.73	0.18
Mainstem DS	1.214	100-YEAR	1495.00	620.10	628.92		629.02	0.001000	2.52	593.71	88.68	0.17
Mainstem DS	1.214	500-YEAR	3055.00	620.10	632.32		632.48	0.000985	3.24	1058.28	165.90	0.18
Mainstem DS	0.991	10-YEAR	1337.00	618.40	626.65	622.68	626.91	0.001638	4.14	323.25	55.58	0.30
Mainstem DS	0.991	50-YEAR	1670.00	618.40	627.56	623.24	627.87	0.001686	4.45	375.49	58.93	0.31
Mainstem DS	0.991	100-YEAR	1495.00	618.40	627.31	622.95	627.58	0.001507	4.14	360.93	58.01	0.29
Mainstem DS	0.991	500-YEAR	3055.00	618.40	631.25	625.14	631.45	0.000781	4.00	1314.26	444.81	0.23
Mainstem DS	0.410	10-YEAR	1337.00	616.90	625.49		625.53	0.000193	1.73	773.33	90.13	0.10
Mainstem DS	0.410	50-YEAR	1670.00	616.90	626.24		626.30	0.000228	1.99	840.85	90.14	0.11
Mainstem DS	0.410	100-YEAR	1495.00	616.90	626.22		626.27	0.000183	1.78	839.85	90.14	0.10
Mainstem DS	0.410	500-YEAR	3055.00	616.90	630.10		630.20	0.000240	2.57	1189.52	98.37	0.12
Mainstem DS	0.336	10-YEAR	1337.00	615.00	625.41	617.48	625.48	0.000066	2.14	624.79	108.33	0.12
Mainstem DS	0.336	50-YEAR	1670.00	615.00	626.14	617.88	626.24	0.000083	2.50	668.33	115.29	0.13
Mainstem DS	0.336	100-YEAR	1495.00	615.00	626.15	617.67	626.22	0.000066	2.24	668.84	115.37	0.12

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	0.336	500-YEAR	3055.00	615.00	630.04	619.33	630.15	0.000074	2.89	1314.37	161.87	0.13
Mainstem DS	0.323		Culvert									
Mainstem DS	0.311	10-YEAR	1337.00	614.90	624.98	617.98	625.07	0.000094	2.36	566.55	104.21	0.14
Mainstem DS	0.311	50-YEAR	1670.00	614.90	625.46	618.44	625.58	0.000125	2.81	594.83	108.73	0.16
Mainstem DS	0.311	100-YEAR	1495.00	614.90	625.60	618.21	625.69	0.000096	2.48	603.47	110.11	0.14
Mainstem DS	0.311	500-YEAR	3055.00	614.90	628.16	619.87	628.29	0.000145	2.98	1075.91	134.66	0.17
Mainstem DS	0.303	10-YEAR	1337.00	614.50	625.03		625.03	0.000004	0.46	2922.98	365.42	0.03
Mainstem DS	0.303	50-YEAR	1670.00	614.50	625.51		625.52	0.000006	0.54	3103.46	373.56	0.03
Mainstem DS	0.303	100-YEAR	1495.00	614.50	625.64		625.65	0.000004	0.47	3152.60	375.75	0.03
Mainstem DS	0.303	500-YEAR	3055.00	614.50	628.22		628.23	0.000009	0.71	4366.11	555.69	0.04
Mainstem DS	0.284	10-YEAR	1337.00	614.50	625.03		625.03	0.000004	0.41	3260.95	424.64	0.03
Mainstem DS	0.284	50-YEAR	1670.00	614.50	625.51		625.52	0.000005	0.48	3471.04	437.22	0.03
Mainstem DS	0.284	100-YEAR	1495.00	614.50	625.65		625.65	0.000004	0.42	3529.74	458.19	0.03
Mainstem DS	0.284	500-YEAR	3055.00	614.50	628.22		628.22	0.000006	0.62	5010.61	599.00	0.04
Mainstem DS	0.273	10-YEAR	1337.00	614.30	624.96	616.72	625.01	0.000049	1.82	733.78	151.61	0.10
Mainstem DS	0.273	50-YEAR	1670.00	614.30	625.42	617.07	625.50	0.000066	2.18	766.03	156.22	0.12
Mainstem DS	0.273	100-YEAR	1495.00	614.30	625.57	616.89	625.63	0.000051	1.93	776.62	157.73	0.10
Mainstem DS	0.273	500-YEAR	3055.00	614.30	628.02	618.38	628.18	0.000109	3.22	947.61	171.00	0.15
Mainstem DS	0.267		Culvert									
Mainstem DS	0.261	10-YEAR	1337.00	614.20	624.87	616.62	624.93	0.000048	1.82	735.22	152.75	0.10
Mainstem DS	0.261	50-YEAR	1670.00	614.20	625.30	616.96	625.37	0.000066	2.18	764.85	156.98	0.12
Mainstem DS	0.261	100-YEAR	1800.00	614.20	625.48	617.12	625.56	0.000073	2.32	777.44	158.78	0.12
Mainstem DS	0.261	500-YEAR	3055.00	614.20	627.66	618.27	627.83	0.000116	3.28	930.14	173.30	0.16
Mainstem DS	0.246	10-YEAR	1337.00	614.10	624.77		624.90	0.000194	3.44	535.13	101.75	0.19
Mainstem DS	0.246	50-YEAR	1670.00	614.10	625.17		625.34	0.000250	4.01	576.22	105.71	0.22
Mainstem DS	0.246	100-YEAR	1800.00	614.10	625.34		625.52	0.000269	4.19	594.50	107.42	0.23
Mainstem DS	0.246	500-YEAR	3055.00	614.10	627.55		627.79	0.000295	4.99	851.21	122.74	0.25
Mainstem DS	0.227	10-YEAR	1337.00	614.00	624.76		624.88	0.000186	3.39	543.68	102.58	0.19
Mainstem DS	0.227	50-YEAR	1670.00	614.00	625.15		625.31	0.000241	3.95	584.58	106.50	0.21
Mainstem DS	0.227	100-YEAR	1800.00	614.00	625.32		625.49	0.000259	4.14	602.82	108.20	0.22

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (Continued)

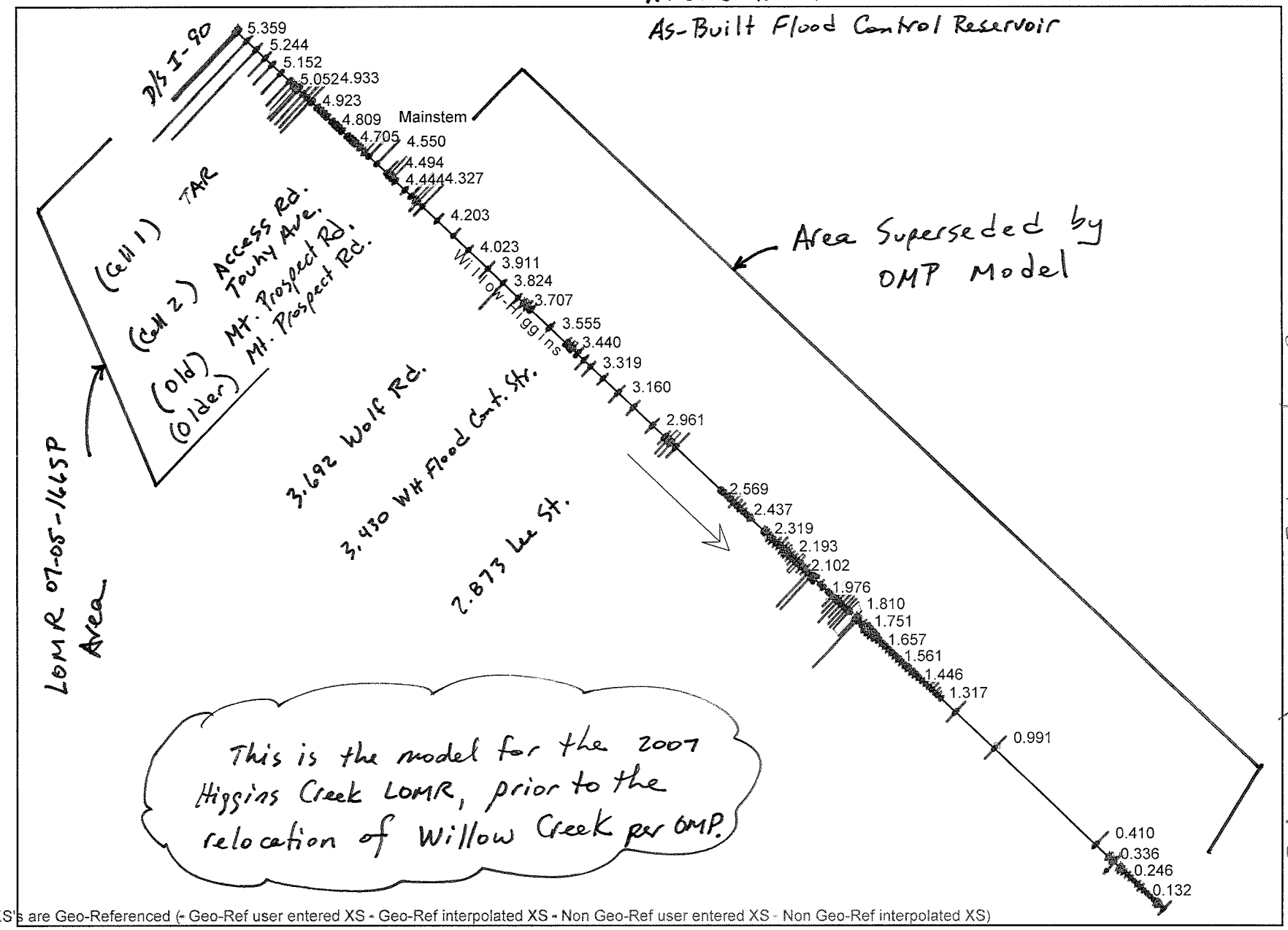
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mainstem DS	0.227	500-YEAR	3055.00	614.00	627.52		627.76	0.000294	5.00	865.15	130.20	0.25
Mainstem DS	0.208	10-YEAR	1337.00	613.90	624.74		624.86	0.000179	3.34	552.37	103.43	0.18
Mainstem DS	0.208	50-YEAR	1670.00	613.90	625.13		625.28	0.000233	3.90	593.09	107.29	0.21
Mainstem DS	0.208	100-YEAR	1800.00	613.90	625.30		625.47	0.000250	4.09	611.29	108.98	0.22
Mainstem DS	0.208	500-YEAR	3055.00	613.90	627.50		627.73	0.000286	4.95	874.93	130.95	0.24
Mainstem DS	0.189	10-YEAR	1337.00	613.80	624.69		624.84	0.000203	3.57	462.46	60.75	0.20
Mainstem DS	0.189	50-YEAR	1670.00	613.80	625.04		625.25	0.000277	4.26	484.10	60.81	0.23
Mainstem DS	0.189	100-YEAR	1800.00	613.80	625.20		625.43	0.000304	4.50	493.54	60.84	0.24
Mainstem DS	0.189	500-YEAR	3055.00	613.80	627.25		627.67	0.000446	6.13	618.51	61.19	0.30
Mainstem DS	0.170	10-YEAR	1337.00	613.70	624.70		624.81	0.000166	3.25	568.45	104.97	0.18
Mainstem DS	0.170	50-YEAR	1670.00	613.70	625.06		625.21	0.000219	3.81	607.51	108.63	0.21
Mainstem DS	0.170	100-YEAR	1800.00	613.70	625.22		625.39	0.000236	4.00	625.03	110.23	0.21
Mainstem DS	0.170	500-YEAR	3055.00	613.70	627.35		627.58	0.000280	4.91	882.22	131.51	0.24
Mainstem DS	0.151	10-YEAR	1337.00	613.60	624.68		624.79	0.000160	3.20	577.53	105.83	0.17
Mainstem DS	0.151	50-YEAR	1670.00	613.60	625.04		625.19	0.000211	3.76	616.41	109.45	0.20
Mainstem DS	0.151	100-YEAR	1800.00	613.60	625.20		625.36	0.000228	3.95	633.89	111.03	0.21
Mainstem DS	0.151	500-YEAR	3055.00	613.60	627.33		627.55	0.000272	4.85	892.26	132.27	0.24
Mainstem DS	0.132	10-YEAR	1337.00	613.50	624.65		624.77	0.000168	3.30	531.66	83.65	0.18
Mainstem DS	0.132	50-YEAR	1670.00	613.50	625.00		625.16	0.000227	3.92	560.91	85.41	0.21
Mainstem DS	0.132	100-YEAR	1800.00	613.50	625.15		625.33	0.000248	4.13	573.97	86.18	0.22
Mainstem DS	0.132	500-YEAR	3055.00	613.50	627.22		627.52	0.000332	5.36	762.97	96.69	0.26
Mainstem DS	0.114	10-YEAR	1337.00	615.30	624.51		624.74	0.000334	4.22	381.37	61.11	0.25
Mainstem DS	0.114	50-YEAR	1670.00	615.30	624.80		625.12	0.000457	5.04	398.83	61.20	0.29
Mainstem DS	0.114	100-YEAR	1800.00	615.30	624.93		625.28	0.000502	5.33	406.69	61.24	0.31
Mainstem DS	0.114	500-YEAR	3055.00	615.30	626.83		627.44	0.000690	7.07	523.52	61.83	0.37
Mainstem DS	0.095	10-YEAR	1337.00	613.30	624.55		624.69	0.000177	3.41	484.48	60.78	0.18
Mainstem DS	0.095	50-YEAR	1670.00	613.30	624.85		625.05	0.000247	4.10	502.79	60.83	0.22
Mainstem DS	0.095	100-YEAR	1800.00	613.30	624.99		625.20	0.000274	4.35	510.95	60.85	0.23
Mainstem DS	0.095	500-YEAR	3055.00	613.30	626.91		627.32	0.000426	6.04	628.29	61.17	0.30
Mainstem DS	0.076	10-YEAR	1337.00	613.20	624.54		624.67	0.000172	3.37	489.60	60.79	0.18
Mainstem DS	0.076	50-YEAR	1670.00	613.20	624.83		625.02	0.000240	4.06	507.53	60.83	0.22

HEC-RAS Plan: ShortCulv-OT River: Willow-Higgins Reach: Mainstem DS (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 DS	0.076	100-YEAR	1800.00	613.20	624.96		625.18	0.000266	4.31	515.54	60.86	0.23
Mainstem DS	0.076	500-YEAR	3055.00	613.20	626.87		627.28	0.000418	6.00	632.00	61.17	0.29
Mainstem DS	0.059	10-YEAR	1337.00	613.20	624.57	615.62	624.62	0.000039	1.71	783.63	100.79	0.09
Mainstem DS	0.059	50-YEAR	1670.00	613.20	624.88	615.97	624.95	0.000056	2.07	805.39	100.84	0.11
Mainstem DS	0.059	100-YEAR	1800.00	613.20	625.02	616.12	625.10	0.000062	2.21	815.05	100.87	0.11
Mainstem DS	0.059	500-YEAR	3055.00	613.20	627.01	617.27	627.12	0.000076	2.72	1238.00	101.19	0.13
Mainstem DS	0.053		Culvert									
Mainstem DS	0.048	10-YEAR	1337.00	613.10	624.50	615.52	624.54	0.000039	1.70	785.43	100.79	0.09
Mainstem DS	0.048	50-YEAR	1670.00	613.10	624.77	615.87	624.84	0.000056	2.08	804.68	100.83	0.11
Mainstem DS	0.048	100-YEAR	1800.00	613.10	624.90	616.02	624.97	0.000063	2.21	813.29	100.85	0.11
Mainstem DS	0.048	500-YEAR	3055.00	613.10	626.59	617.17	626.70	0.000083	2.79	1205.48	101.13	0.13
Mainstem DS	0.047	10-YEAR	1337.00	613.00	624.39		624.52	0.000168	3.35	492.77	60.78	0.18
Mainstem DS	0.047	50-YEAR	1670.00	613.00	624.61		624.80	0.000242	4.07	506.35	60.82	0.22
Mainstem DS	0.047	100-YEAR	1800.00	613.00	624.71		624.93	0.000271	4.34	512.54	60.83	0.23
Mainstem DS	0.047	500-YEAR	3055.00	613.00	626.14		626.60	0.000490	6.32	599.50	61.06	0.31
Mainstem DS	0.019	10-YEAR	1337.00	614.00	624.00	620.00	624.42	0.003236	5.22	256.25	41.25	0.37
Mainstem DS	0.019	50-YEAR	1670.00	614.00	624.00	620.75	624.66	0.005048	6.52	256.25	41.25	0.46
Mainstem DS	0.019	100-YEAR	1800.00	614.00	624.00	621.02	624.77	0.005865	7.02	256.25	41.25	0.50
Mainstem DS	0.019	500-YEAR	3055.00	614.00	624.00	623.19	626.21	0.016894	11.92	256.25	41.25	0.84

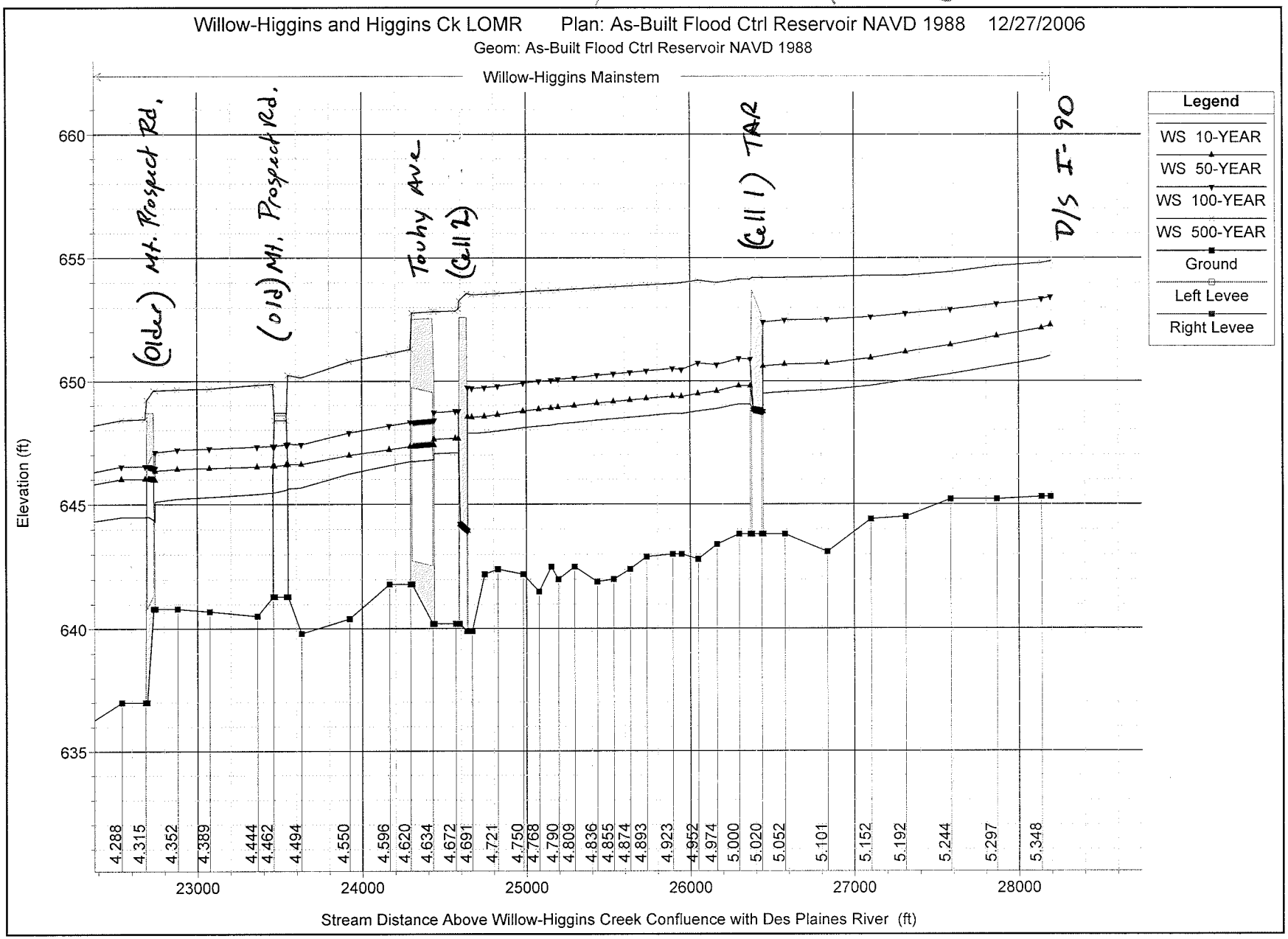
FIS/LOMR 07-05-1665P MODEL

Includes:
Higgins Creek from downstream of Hamilton Road
to IL72 (Touhy Ave.)



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)

Chicago 05-702 LOMR '07\LOMR.prj



LOMR Area

HEC-RAS Plan: As-Built FCR Locations: User Defined

River	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)	
Willow-Higgins	Mainstem	5.359	10-YEAR	907.00	645.30	651.03	648.12	651.17	0.002374	2.94	308.19	79.27	0.26
Willow-Higgins	Mainstem	5.359	50-YEAR	1394.00	645.30	652.28	648.86	652.46	0.002411	3.37	413.18	89.38	0.27
Willow-Higgins	Mainstem	5.359	100-YEAR	1623.00	645.30	653.42	649.16	653.57	0.001643	3.16	514.23	103.76	0.23
Willow-Higgins	Mainstem	5.359	500-YEAR	2270.00	645.30	654.87	649.92	655.06	0.001573	3.51	646.95	515.60	0.23
Willow-Higgins	Mainstem	5.348 J	10-YEAR	907.00	645.30	650.91		651.04	0.001988	2.85	318.49	75.29	0.24
Willow-Higgins	Mainstem	5.348 J	50-YEAR	1394.00	645.30	652.15		652.33	0.002165	3.35	418.82	101.23	0.26
Willow-Higgins	Mainstem	5.348 J	100-YEAR	1623.00	645.30	653.34		653.48	0.001451	3.08	568.34	151.30	0.22
Willow-Higgins	Mainstem	5.348 J	500-YEAR	2270.00	645.30	654.80		654.96	0.001299	3.32	848.89	400.44	0.22
Willow-Higgins	Mainstem	5.297	10-YEAR	907.00	645.20	650.62		650.74	0.000704	2.80	323.36	81.00	0.25
Willow-Higgins	Mainstem	5.297	50-YEAR	1394.00	645.20	651.84		652.00	0.000751	3.26	427.37	89.41	0.26
Willow-Higgins	Mainstem	5.297	100-YEAR	1623.00	645.20	653.14		653.28	0.000458	2.93	605.12	230.00	0.21
Willow-Higgins	Mainstem	5.297	500-YEAR	2270.00	645.20	654.68		654.79	0.000327	2.89	1151.43	481.98	0.19
Willow-Higgins	Mainstem	5.244 I	10-YEAR	907.00	645.20	650.29		650.48	0.001199	3.50	259.15	69.15	0.32
Willow-Higgins	Mainstem	5.244 I	50-YEAR	1394.00	645.20	651.47		651.73	0.001254	4.03	345.66	76.89	0.34
Willow-Higgins	Mainstem	5.244 I	100-YEAR	1623.00	645.20	652.92		653.11	0.000730	3.50	464.65	91.34	0.26
Willow-Higgins	Mainstem	5.244 I	500-YEAR	2270.00	645.20	654.44		654.66	0.000635	3.78	625.55	122.52	0.26
Willow-Higgins	Mainstem	5.192	10-YEAR	907.00	644.50	650.02		650.18	0.000927	3.23	280.59	69.35	0.28
Willow-Higgins	Mainstem	5.192	50-YEAR	1394.00	644.50	651.18		651.41	0.001047	3.82	365.32	76.93	0.31
Willow-Higgins	Mainstem	5.192	100-YEAR	1623.00	644.50	652.75		652.92	0.000614	3.28	494.34	87.21	0.24
Willow-Higgins	Mainstem	5.192	500-YEAR	2270.00	644.50	654.29		654.49	0.000569	3.57	650.02	120.63	0.24
Willow-Higgins	Mainstem	5.152	10-YEAR	907.00	644.40	649.82		649.98	0.000965	3.27	276.99	69.13	0.29
Willow-Higgins	Mainstem	5.152	50-YEAR	1394.00	644.40	650.94		651.18	0.001101	3.88	359.10	76.55	0.32
Willow-Higgins	Mainstem	5.152	100-YEAR	1623.00	644.40	652.62		652.79	0.000607	3.27	497.00	87.60	0.24
Willow-Higgins	Mainstem	5.152	500-YEAR	2270.00	644.40	654.29		654.37	0.000283	2.51	1303.38	615.01	0.17
Willow-Higgins	Mainstem	5.101 H	10-YEAR	907.00	643.10	649.64		649.76	0.000646	2.83	320.22	73.65	0.24
Willow-Higgins	Mainstem	5.101 H	50-YEAR	1394.00	643.10	650.73		650.92	0.000793	3.44	404.65	80.74	0.27
Willow-Higgins	Mainstem	5.101 H	100-YEAR	1623.00	643.10	652.51		652.64	0.000446	2.90	559.10	93.70	0.21
Willow-Higgins	Mainstem	5.101 H	500-YEAR	2270.00	643.10	654.25		654.30	0.000190	2.20	1518.80	659.63	0.14
Willow-Higgins	Mainstem	5.052	10-YEAR	571.00	643.80	649.56		649.62	0.000311	1.94	294.37	68.84	0.17
Willow-Higgins	Mainstem	5.052	50-YEAR	750.00	643.80	650.69		650.75	0.000268	2.00	375.01	74.64	0.16
Willow-Higgins	Mainstem	5.052	100-YEAR	1000.00	643.80	652.48		652.54	0.000192	1.93	517.33	83.91	0.14
Willow-Higgins	Mainstem	5.052	500-YEAR	2000.00	643.80	654.22		654.25	0.000134	1.91	1671.81	779.29	0.12
Willow-Higgins	Mainstem	5.028	10-YEAR	571.00	643.80	649.50	645.95	649.57	0.000320	2.26	253.07	68.49	0.17
Willow-Higgins	Mainstem	5.028	50-YEAR	750.00	643.80	650.61	646.27	650.70	0.000287	2.44	307.79	74.26	0.17
Willow-Higgins	Mainstem	5.028	100-YEAR	1000.00	643.80	652.40	646.69	652.50	0.000222	2.53	395.50	83.49	0.16
Willow-Higgins	Mainstem	5.028	500-YEAR	2000.00	643.80	654.20	648.07	654.24	0.000137	1.92	1657.31	778.95	0.12
Willow-Higgins	Mainstem	5.020 Touhy Fcr		Culvert									

LOMR Area Summary Table

HEC-RAS Plan: As-Built FCR Locations: User Defined (Continued)

River	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)	
Willow-Higgins	Mainstem	5.013	10-YEAR	571.00	643.80	649.05	645.55	649.13	0.000335	2.31	246.76	92.16	0.18
Willow-Higgins	Mainstem	5.013	50-YEAR	750.00	643.80	649.80	645.87	649.91	0.000367	2.65	282.74	96.41	0.19
Willow-Higgins	Mainstem	5.013	100-YEAR	1000.00	643.80	650.89	646.28	651.03	0.000370	2.98	335.25	102.62	0.20
Willow-Higgins	Mainstem	5.013	500-YEAR	2000.00	643.80	654.15	647.69	654.20	0.000134	1.96	1461.41	1276.84	0.12
Willow-Higgins	Mainstem	5.000	10-YEAR	571.00	643.80	649.06		649.09	0.000178	1.46	390.10	92.21	0.13
Willow-Higgins	Mainstem	5.000	50-YEAR	750.00	643.80	649.82		649.86	0.000186	1.62	461.60	96.51	0.13
Willow-Higgins	Mainstem	5.000	100-YEAR	1000.00	643.80	650.92		650.97	0.000177	1.75	571.76	102.78	0.13
Willow-Higgins	Mainstem	5.000	500-YEAR	2000.00	643.80	654.14		654.19	0.000135	1.96	1448.32	1276.71	0.12
Willow-Higgins	Mainstem	4.974	10-YEAR	700.00	643.40	648.87		649.03	0.000960	3.20	218.48	55.67	0.29
Willow-Higgins	Mainstem	4.974	50-YEAR	920.00	643.40	649.60		649.79	0.001012	3.54	260.22	59.37	0.30
Willow-Higgins	Mainstem	4.974	100-YEAR	1260.00	643.40	650.67		650.90	0.001003	3.85	326.90	64.85	0.30
Willow-Higgins	Mainstem	4.974	500-YEAR	2140.00	643.40	654.00		654.15	0.000459	3.35	952.09	929.07	0.22
Willow-Higgins	Mainstem	4.952	10-YEAR	700.00	642.80	648.77		648.92	0.000856	3.15	222.00	52.71	0.27
Willow-Higgins	Mainstem	4.952	50-YEAR	920.00	642.80	649.48		649.68	0.000943	3.53	260.89	56.15	0.29
Willow-Higgins	Mainstem	4.952	100-YEAR	1260.00	642.80	650.74		650.79	0.000286	2.19	1022.59	836.22	0.16
Willow-Higgins	Mainstem	4.952	500-YEAR	2140.00	642.80	654.10		654.10	0.000015	0.67	4510.47	1456.16	0.04
Willow-Higgins	Mainstem	4.933 G	10-YEAR	700.00	643.00	648.66		648.83	0.000994	3.30	212.11	52.86	0.29
Willow-Higgins	Mainstem	4.933 G	50-YEAR	920.00	643.00	649.37		649.57	0.001078	3.67	250.59	56.39	0.31
Willow-Higgins	Mainstem	4.933 G	100-YEAR	1260.00	643.00	650.47		650.72	0.001061	3.99	316.09	61.94	0.31
Willow-Higgins	Mainstem	4.933 G	500-YEAR	2140.00	643.00	653.99		654.09	0.000327	2.87	1256.20	964.79	0.18
Willow-Higgins	Mainstem	4.923 F	10-YEAR	700.00	643.00	648.67		648.76	0.000619	2.47	310.40	93.28	0.21
Willow-Higgins	Mainstem	4.923 F	50-YEAR	920.00	643.00	649.39		649.50	0.000646	2.73	378.88	97.62	0.21
Willow-Higgins	Mainstem	4.923 F	100-YEAR	1260.00	643.00	650.51		650.64	0.000611	2.94	492.53	104.42	0.21
Willow-Higgins	Mainstem	4.923 F	500-YEAR	2140.00	643.00	653.96		654.07	0.000364	2.84	887.84	125.22	0.17
Willow-Higgins	Mainstem	4.893	10-YEAR	700.00	642.90	648.58		648.67	0.000566	2.38	320.14	93.85	0.20
Willow-Higgins	Mainstem	4.893	50-YEAR	920.00	642.90	649.30		649.40	0.000597	2.64	388.56	98.10	0.21
Willow-Higgins	Mainstem	4.893	100-YEAR	1260.00	642.90	650.43		650.54	0.000569	2.86	503.19	104.83	0.21
Willow-Higgins	Mainstem	4.893	500-YEAR	2140.00	642.90	653.90		654.01	0.000341	2.78	903.97	125.54	0.17
Willow-Higgins	Mainstem	4.874	10-YEAR	700.00	642.40	648.52		648.61	0.000579	2.46	311.95	91.85	0.20
Willow-Higgins	Mainstem	4.874	50-YEAR	920.00	642.40	649.23		649.34	0.000622	2.73	378.40	96.06	0.21
Willow-Higgins	Mainstem	4.874	100-YEAR	1260.00	642.40	650.36		650.48	0.000598	2.96	490.89	102.78	0.21
Willow-Higgins	Mainstem	4.874	500-YEAR	2140.00	642.40	653.86		653.98	0.000359	2.86	887.74	123.61	0.17
Willow-Higgins	Mainstem	4.855	10-YEAR	700.00	642.00	648.46		648.55	0.000567	2.45	311.44	91.12	0.20
Willow-Higgins	Mainstem	4.855	50-YEAR	920.00	642.00	649.16		649.27	0.000615	2.74	376.89	95.34	0.21
Willow-Higgins	Mainstem	4.855	100-YEAR	1260.00	642.00	650.30		650.42	0.000597	2.97	488.78	102.15	0.21
Willow-Higgins	Mainstem	4.855	500-YEAR	2140.00	642.00	653.83		653.94	0.000358	2.86	886.88	123.36	0.17

HEC-RAS Plan: As-Built FCR Locations: User Defined (Continued)

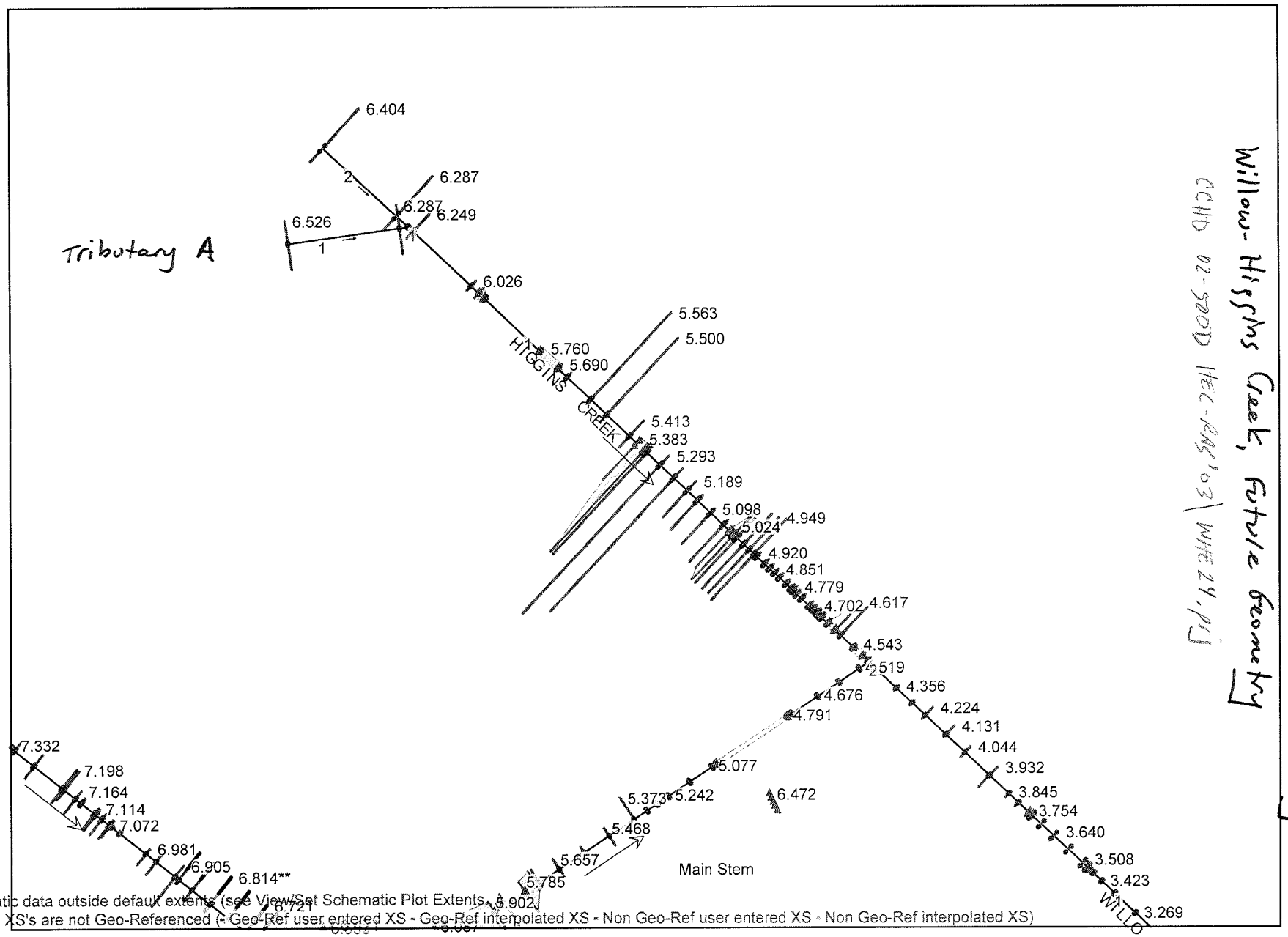
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Willow-Higgins	Mainstem	4.836 E	10-YEAR	700.00	641.90	648.41		648.50	0.000549	2.42	315.56	91.39	0.20
Willow-Higgins	Mainstem	4.836 E	50-YEAR	920.00	641.90	649.10		649.21	0.000600	2.71	380.72	95.58	0.21
Willow-Higgins	Mainstem	4.836 E	100-YEAR	1260.00	641.90	650.24		650.36	0.000583	2.94	493.06	102.40	0.21
Willow-Higgins	Mainstem	4.836 E	500-YEAR	2140.00	641.90	653.79		653.90	0.000350	2.84	894.99	123.76	0.17
Willow-Higgins	Mainstem	4.809	10-YEAR	700.00	642.50	648.30		648.41	0.000700	2.62	291.97	90.88	0.22
Willow-Higgins	Mainstem	4.809	50-YEAR	920.00	642.50	648.99		649.12	0.000743	2.90	356.05	95.01	0.23
Willow-Higgins	Mainstem	4.809	100-YEAR	1260.00	642.50	650.14		650.27	0.000690	3.10	468.43	101.85	0.23
Willow-Higgins	Mainstem	4.809	500-YEAR	2140.00	642.50	653.74		653.85	0.000380	2.91	874.04	123.43	0.18
Willow-Higgins	Mainstem	4.790	10-YEAR	700.00	642.00	648.25		648.34	0.000601	2.50	303.49	90.77	0.20
Willow-Higgins	Mainstem	4.790	50-YEAR	920.00	642.00	648.93		649.05	0.000656	2.80	366.99	94.84	0.22
Willow-Higgins	Mainstem	4.790	100-YEAR	1260.00	642.00	650.08		650.21	0.000625	3.01	479.46	101.66	0.22
Willow-Higgins	Mainstem	4.790	500-YEAR	2140.00	642.00	653.70		653.81	0.000357	2.86	887.32	123.24	0.17
Willow-Higgins	Mainstem	4.782	10-YEAR	700.00	642.50	648.20		648.31	0.000740	2.66	287.21	90.73	0.22
Willow-Higgins	Mainstem	4.782	50-YEAR	920.00	642.50	648.89		649.02	0.000783	2.95	350.50	94.83	0.23
Willow-Higgins	Mainstem	4.782	100-YEAR	1260.00	642.50	650.04		650.18	0.000716	3.13	463.49	101.75	0.23
Willow-Higgins	Mainstem	4.782	500-YEAR	2140.00	642.50	653.68		653.80	0.000381	2.91	874.62	123.69	0.18
Willow-Higgins	Mainstem	4.768	10-YEAR	700.00	641.50	648.17		648.26	0.000563	2.45	309.11	90.51	0.20
Willow-Higgins	Mainstem	4.768	50-YEAR	920.00	641.50	648.85		648.96	0.000624	2.76	371.85	94.59	0.21
Willow-Higgins	Mainstem	4.768	100-YEAR	1260.00	641.50	650.00		650.12	0.000601	2.98	484.67	101.51	0.21
Willow-Higgins	Mainstem	4.768	500-YEAR	2140.00	641.50	653.66		653.77	0.000345	2.83	897.02	123.55	0.17
Willow-Higgins	Mainstem	4.750	10-YEAR	700.00	642.20	648.10		648.20	0.000680	2.60	291.67	90.53	0.22
Willow-Higgins	Mainstem	4.750	50-YEAR	920.00	642.20	648.77		648.89	0.000735	2.90	353.81	94.52	0.23
Willow-Higgins	Mainstem	4.750	100-YEAR	1260.00	642.20	649.92		650.06	0.000681	3.10	467.09	101.39	0.22
Willow-Higgins	Mainstem	4.750	500-YEAR	2140.00	642.20	653.62		653.74	0.000365	2.88	882.69	123.36	0.17
Willow-Higgins	Mainstem	4.721	10-YEAR	700.00	642.40	647.96		648.08	0.000841	2.78	270.46	89.57	0.24
Willow-Higgins	Mainstem	4.721	50-YEAR	920.00	642.40	648.62		648.77	0.000892	3.09	331.00	93.55	0.25
Willow-Higgins	Mainstem	4.721	100-YEAR	1260.00	642.40	649.79		649.95	0.000790	3.25	444.74	100.60	0.24
Willow-Higgins	Mainstem	4.721	500-YEAR	2140.00	642.40	653.56		653.68	0.000390	2.93	866.09	123.25	0.18
Willow-Higgins	Mainstem	4.705 D	10-YEAR	700.00	642.20	647.90		648.01	0.000772	2.71	278.38	89.82	0.23
Willow-Higgins	Mainstem	4.705 D	50-YEAR	920.00	642.20	648.56		648.69	0.000830	3.02	338.66	93.74	0.24
Willow-Higgins	Mainstem	4.705 D	100-YEAR	1260.00	642.20	649.74		649.88	0.000743	3.19	453.30	100.77	0.23
Willow-Higgins	Mainstem	4.705 D	500-YEAR	2140.00	642.20	653.53		653.65	0.000372	2.89	878.52	123.40	0.18
Willow-Higgins	Mainstem	4.691	10-YEAR	700.00	639.90	647.88		647.96	0.000453	2.30	324.00	89.77	0.18
Willow-Higgins	Mainstem	4.691	50-YEAR	920.00	639.90	648.53		648.64	0.000528	2.63	383.81	93.68	0.20
Willow-Higgins	Mainstem	4.691	100-YEAR	1260.00	639.90	649.71		649.83	0.000523	2.87	498.29	100.75	0.20
Willow-Higgins	Mainstem	4.691	500-YEAR	2140.00	639.90	653.51		653.62	0.000307	2.74	925.03	123.58	0.16
Willow-Higgins	Mainstem	4.686	10-YEAR	700.00	639.90	647.88	642.43	647.94	0.000572	1.99	212.61	89.78	0.13

HEC-RAS Plan: As-Built FCR Locations: User Defined (Continued)

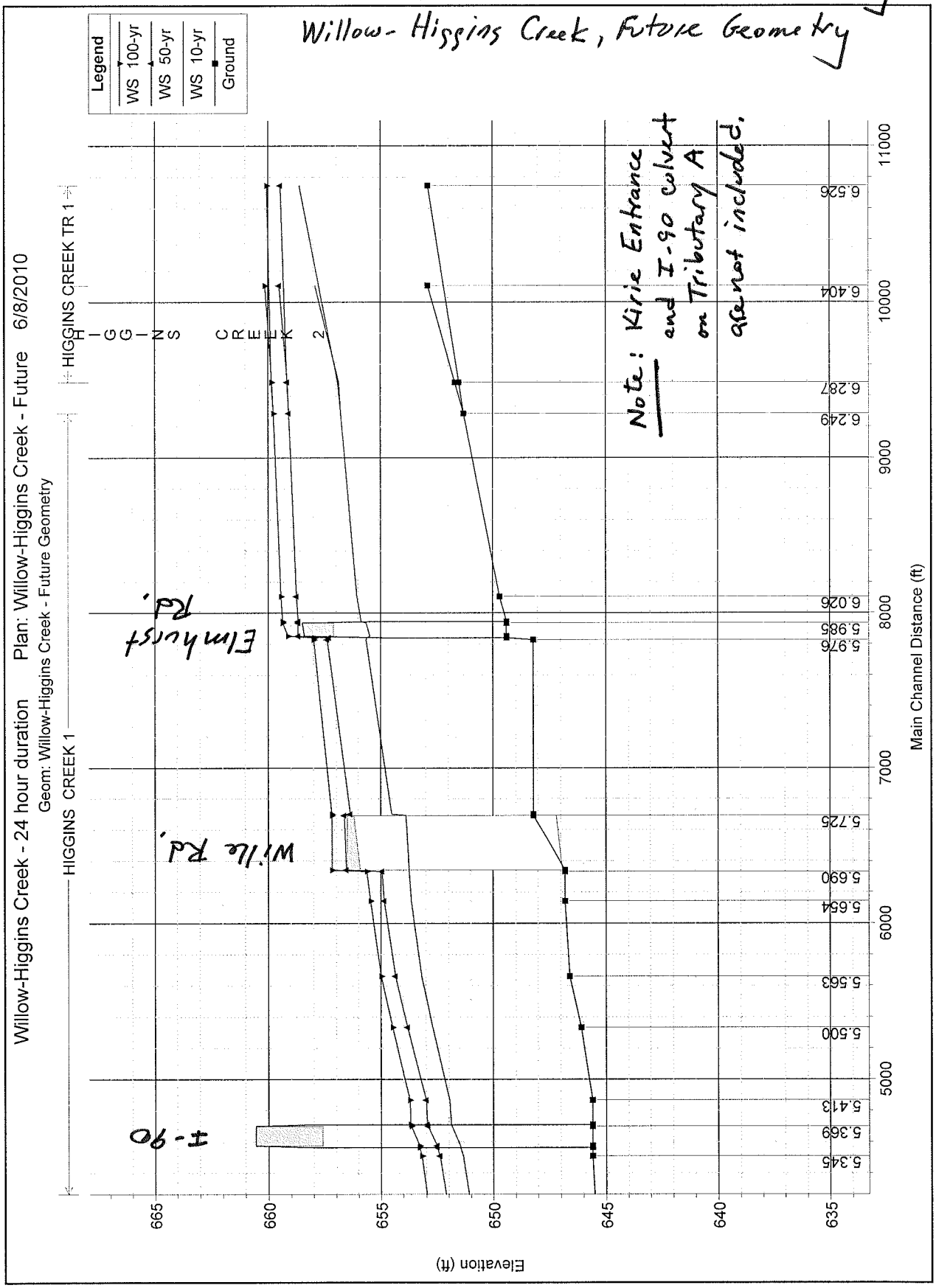
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Willow-Higgins	Mainstem	4.686	50-YEAR	920.00	639.90	648.55	642.49	648.60	0.000740	1.92	231.91	93.77	0.12
Willow-Higgins	Mainstem	4.686	100-YEAR	1260.00	639.90	649.74	642.53	649.78	0.000873	1.73	266.48	100.92	0.10
Willow-Higgins	Mainstem	4.686	500-YEAR	2140.00	639.90	653.56	642.92	653.57	0.000302	0.76	930.51	123.84	0.04
Willow-Higgins	Mainstem	4.681 Access Road		Culvert									
Willow-Higgins	Mainstem	4.676	10-YEAR	424.00	640.20	647.08	642.57	647.17	0.000329	2.29	185.48	70.63	0.16
Willow-Higgins	Mainstem	4.676	50-YEAR	445.00	640.20	647.66	642.63	647.73	0.000273	2.20	202.12	88.50	0.15
Willow-Higgins	Mainstem	4.676	100-YEAR	460.00	640.20	648.78	642.68	648.83	0.000177	1.96	234.50	95.19	0.12
Willow-Higgins	Mainstem	4.676	500-YEAR	600.00	640.20	652.94	643.07	652.95	0.000030	0.83	851.65	120.14	0.05
Willow-Higgins	Mainstem	4.672	10-YEAR	444.00	640.20	647.10		647.14	0.000316	1.76	255.46	70.98	0.15
Willow-Higgins	Mainstem	4.672	50-YEAR	485.00	640.20	647.67		647.71	0.000259	1.69	301.75	88.56	0.13
Willow-Higgins	Mainstem	4.672	100-YEAR	700.00	640.20	648.77		648.83	0.000275	1.93	403.14	95.17	0.14
Willow-Higgins	Mainstem	4.672	500-YEAR	1600.00	640.20	652.86		652.93	0.000220	2.24	842.06	119.66	0.14
Willow-Higgins	Mainstem	4.647	10-YEAR	444.00	640.20	647.05	642.66	647.10	0.000298	1.81	245.63	69.51	0.14
Willow-Higgins	Mainstem	4.647	50-YEAR	485.00	640.20	647.63	642.79	647.68	0.000245	1.77	274.58	88.33	0.13
Willow-Higgins	Mainstem	4.647	100-YEAR	700.00	640.20	648.72	643.37	648.79	0.000280	2.13	328.92	94.84	0.15
Willow-Higgins	Mainstem	4.647	500-YEAR	1600.00	640.20	652.83	645.18	652.90	0.000223	2.25	838.53	119.48	0.14
Willow-Higgins	Mainstem	4.634 Touhy Avenue		Culvert									
Willow-Higgins	Mainstem	4.620	10-YEAR	444.00	641.80	646.73	644.08	646.84	0.001011	2.71	163.88	44.99	0.25
Willow-Higgins	Mainstem	4.620	50-YEAR	485.00	641.80	647.34	644.19	647.44	0.000763	2.52	192.50	47.55	0.22
Willow-Higgins	Mainstem	4.620	100-YEAR	700.00	641.80	648.32	644.74	648.45	0.000846	2.91	240.75	51.58	0.24
Willow-Higgins	Mainstem	4.620	500-YEAR	1600.00	641.80	651.29	646.44	651.53	0.000963	3.87	427.01	122.70	0.27
Willow-Higgins	Mainstem	4.596	10-YEAR	454.00	641.80	646.56		646.69	0.001205	2.90	156.56	44.31	0.27
Willow-Higgins	Mainstem	4.596	50-YEAR	503.00	641.80	647.22		647.33	0.000897	2.70	186.58	47.03	0.24
Willow-Higgins	Mainstem	4.596	100-YEAR	730.00	641.80	648.17		648.32	0.001005	3.13	233.27	50.97	0.26
Willow-Higgins	Mainstem	4.596	500-YEAR	1666.00	641.80	651.11		651.38	0.001141	4.15	406.85	100.37	0.29
Willow-Higgins	Mainstem	4.550	10-YEAR	454.00	640.40	646.23		646.38	0.001386	3.10	146.48	41.68	0.29
Willow-Higgins	Mainstem	4.550	50-YEAR	503.00	640.40	646.98		647.10	0.000970	2.81	179.20	45.13	0.25
Willow-Higgins	Mainstem	4.550	100-YEAR	730.00	640.40	647.90		648.06	0.001125	3.28	222.41	49.31	0.27
Willow-Higgins	Mainstem	4.550	500-YEAR	1666.00	640.40	650.80		651.10	0.001180	4.39	399.79	74.59	0.30
Willow-Higgins	Mainstem	4.494 C	10-YEAR	454.00	639.80	645.66		645.89	0.001991	3.81	120.19	34.23	0.35
Willow-Higgins	Mainstem	4.494 C	50-YEAR	503.00	639.80	646.61		646.78	0.001215	3.33	154.63	38.37	0.28
Willow-Higgins	Mainstem	4.494 C	100-YEAR	730.00	639.80	647.42		647.68	0.001530	4.05	187.16	41.91	0.32
Willow-Higgins	Mainstem	4.494 C	500-YEAR	1666.00	639.80	650.14		650.63	0.002016	5.70	317.28	54.29	0.39
Willow-Higgins	Mainstem	4.479	10-YEAR	454.00	641.30	645.62	643.47	645.71	0.000995	2.30	197.46	71.12	0.24
Willow-Higgins	Mainstem	4.479	50-YEAR	503.00	641.30	646.61	643.57	646.66	0.000494	1.84	272.65	80.55	0.18
Willow-Higgins	Mainstem	4.479	100-YEAR	730.00	641.30	647.45	644.03	647.52	0.000519	2.14	341.00	82.50	0.19

HEC-RAS Plan: As-Built FCR Locations: User Defined (Continued)

River	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)	
Willow-Higgins	Mainstem	4.479	500-YEAR	1666.00	641.30	650.25	645.40	650.38	0.000525	2.91	572.13	170.56	0.19
Willow-Higgins	Mainstem	4.471 Mt. Prospect Rd		Bridge									
Willow-Higgins	Mainstem	4.462	10-YEAR	454.00	641.30	645.46	643.47	645.56	0.000799	2.44	186.18	69.47	0.26
Willow-Higgins	Mainstem	4.462	50-YEAR	503.00	641.30	646.54	643.57	646.59	0.000359	1.89	266.75	80.25	0.18
Willow-Higgins	Mainstem	4.462	100-YEAR	730.00	641.30	647.37	644.03	647.44	0.000376	2.18	334.36	82.50	0.19
Willow-Higgins	Mainstem	4.462	500-YEAR	1666.00	641.30	649.88	645.40	650.03	0.000424	3.08	541.67	149.55	0.21
Willow-Higgins	Mainstem	4.444	10-YEAR	454.00	640.50	645.41		645.49	0.000495	2.36	226.41	95.55	0.21
Willow-Higgins	Mainstem	4.444	50-YEAR	503.00	640.50	646.51		646.56	0.000242	1.92	341.24	107.61	0.16
Willow-Higgins	Mainstem	4.444	100-YEAR	730.00	640.50	647.33		647.41	0.000287	2.30	431.40	111.52	0.17
Willow-Higgins	Mainstem	4.444	500-YEAR	1666.00	640.50	649.84		649.98	0.000391	3.32	725.86	123.44	0.21
Willow-Higgins	Mainstem	4.389 B	10-YEAR	454.00	640.70	645.29		645.36	0.000396	2.09	217.89	59.61	0.19
Willow-Higgins	Mainstem	4.389 B	50-YEAR	503.00	640.70	646.45		646.50	0.000197	1.76	290.13	65.37	0.14
Willow-Higgins	Mainstem	4.389 B	100-YEAR	730.00	640.70	647.26		647.33	0.000248	2.18	344.54	69.76	0.16
Willow-Higgins	Mainstem	4.389 B	500-YEAR	1666.00	640.70	649.69		649.87	0.000382	3.43	530.45	86.46	0.21
Willow-Higgins	Mainstem	4.352	10-YEAR	454.00	640.80	645.22		645.28	0.000368	1.98	228.91	62.05	0.18
Willow-Higgins	Mainstem	4.352	50-YEAR	503.00	640.80	646.42		646.46	0.000182	1.65	304.84	65.27	0.13
Willow-Higgins	Mainstem	4.352	100-YEAR	730.00	640.80	647.22		647.28	0.000234	2.06	357.87	67.78	0.15
Willow-Higgins	Mainstem	4.352	500-YEAR	1666.00	640.80	649.66		649.79	0.000300	2.97	987.60	525.12	0.19
Willow-Higgins	Mainstem	4.327	10-YEAR	454.00	640.80	645.10	642.73	645.21	0.000563	2.62	173.14	61.90	0.24
Willow-Higgins	Mainstem	4.327	50-YEAR	503.00	640.80	646.35	642.83	646.42	0.000272	2.20	229.14	65.05	0.17
Willow-Higgins	Mainstem	4.327	100-YEAR	730.00	640.80	647.11	643.27	647.23	0.000360	2.77	263.36	67.43	0.20
Willow-Higgins	Mainstem	4.327	500-YEAR	1666.00	640.80	649.62	644.76	649.75	0.000309	3.00	964.24	519.02	0.19
Willow-Higgins	Mainstem	4.321 Old Mt Prospect		Culvert									


Willow-Higgins Creek, Future Geometry
CCHD 02-2000 HEC-RAS '03 \ WHF24.prj
Extended Geometry
Tributary A
6.404
2
6.287
6.287
6.249
6.526
1
6.026
5.563
5.500
HIGGINS
5.760
5.690
CREEK
5.413
5.383
5.293
5.189
5.098
5.024
4.949
4.920
4.851
4.779
4.702
4.617
4.543
2.519
4.356
4.676
4.224
4.791
4.131
4.044
5.077
3.932
3.845
5.373
5.242
6.472
3.754
5.468
3.640
5.657
3.508
Main Stem
3.423
5.785
WILLO
3.269
5.902
7.332
7.198
7.164
7.114
7.072
6.981
6.905
6.814**
Some schematic data outside default extents (see View/Set Schematic Plot Extents...)
369 of the 370 XS's are not Geo-Referenced (= Geo-Ref user entered XS - Geo-Ref interpolated XS - Non Geo-Ref user entered XS - Non Geo-Ref interpolated XS)

CCHD 02-500D HEC-RAS '03 \ WHE24.prj Extended Geometry



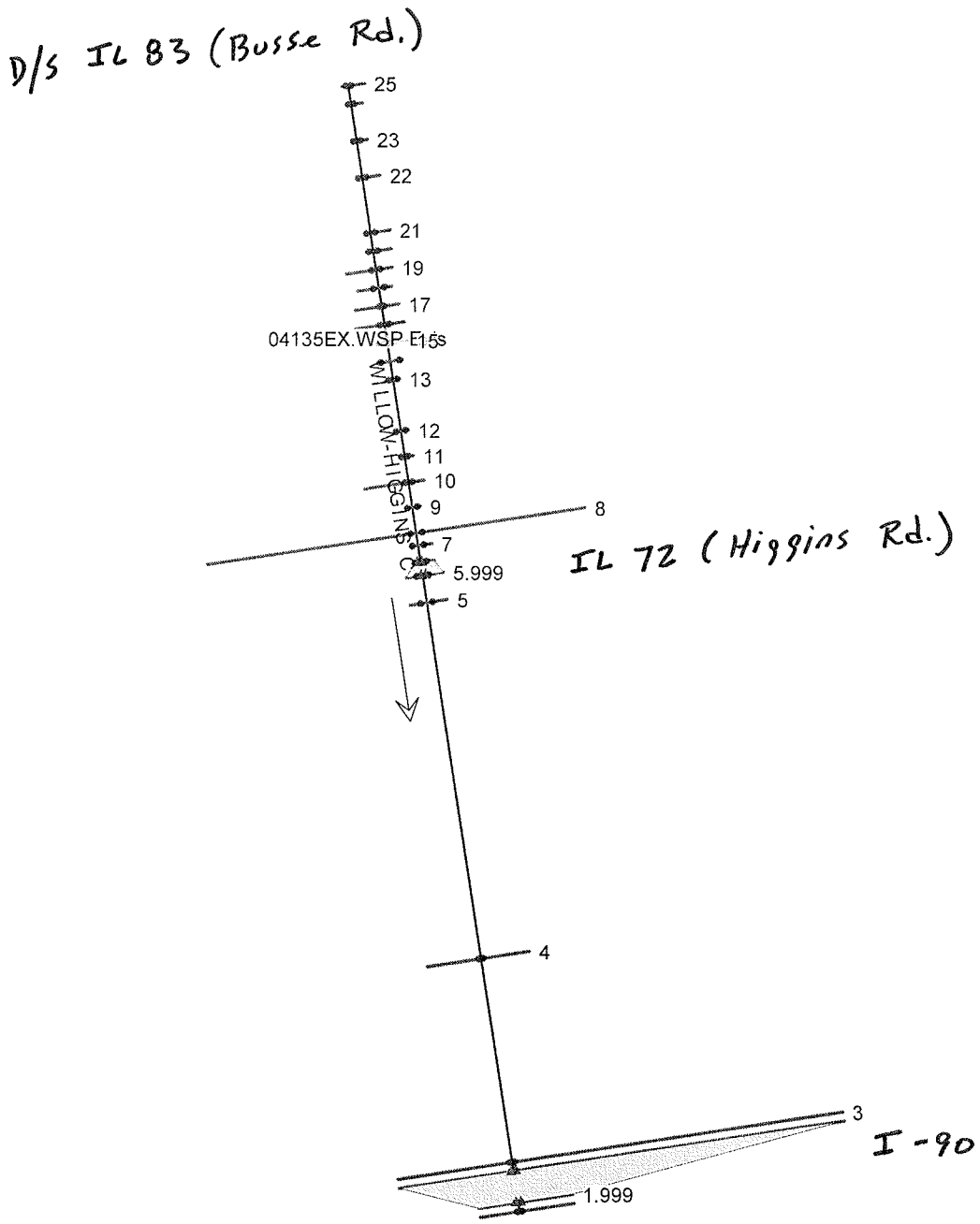
FIS/LOMR 07-05-2483P MODEL

Includes:
Higgins Creek Tributary A from IL 83 (Busse Road)
Confluence with Higgins Creek

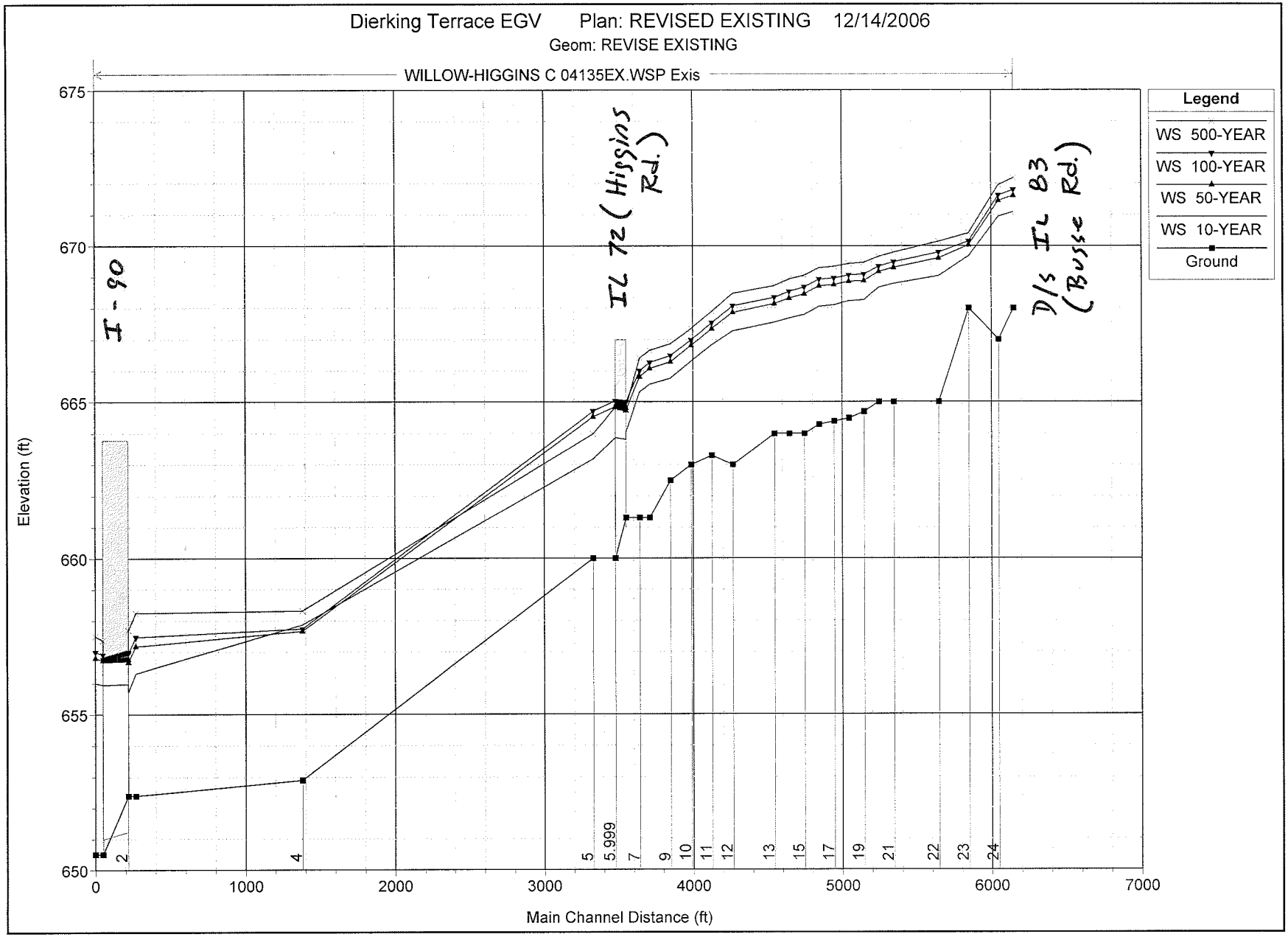
HIGGINS CREEK TRIBUTARY A

MODEL FOR LOMR 07-05-2483P

Dierking Terrace EGV



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)


Dierking Terrace EGV Plan: REVISED EXISTING 12/14/2006
Geom: REVISE EXISTING
WILLOW-HIGGINS C 04135EX.WSP Exis
Legend
WS 500-YEAR
WS 100-YEAR
WS 50-YEAR
WS 10-YEAR
Ground
I-90
IL 72 (Higgins Rd.)
D/S IL 83 (Busse Rd.)
Elevation (ft)
Main Channel Distance (ft)
675
670
665
660
655
650
0
1000
2000
3000
4000
5000
6000
7000
2
4
5
5.999
7
9
10
11
12
13
15
17
19
21
22
23
24

HEC-RAS Plan: REV. EXIST River: WILLOW-HIGGINS C Reach: 04135EX.WSP Exis

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)	
04135EX.WSP Exis	25	10-YEAR	222.00	668.00	671.09		671.27	0.002002	3.44	68.42	41.28	0.38
04135EX.WSP Exis	25	50-YEAR	308.00	668.00	671.61		671.81	0.001811	3.72	99.55	77.86	0.38
04135EX.WSP Exis	25	100-YEAR	342.00	668.00	671.80		672.00	0.001715	3.77	115.56	91.12	0.37
04135EX.WSP Exis	25	500-YEAR	414.00	668.00	672.19		672.37	0.001475	3.77	155.19	110.62	0.35
04135EX.WSP Exis	24	10-YEAR	222.00	667.00	670.95		671.09	0.001422	2.97	74.63	27.78	0.32
04135EX.WSP Exis	24	50-YEAR	308.00	667.00	671.45		671.64	0.001622	3.47	89.06	30.24	0.35
04135EX.WSP Exis	24	100-YEAR	342.00	667.00	671.62		671.83	0.001689	3.64	94.39	31.11	0.36
04135EX.WSP Exis	24	500-YEAR	414.00	667.00	671.96		672.20	0.001824	3.98	105.08	32.78	0.38
04135EX.WSP Exis	23	10-YEAR	222.00	668.00	669.67	669.67	670.35	0.016922	6.60	33.62	25.18	1.01
04135EX.WSP Exis	23	50-YEAR	308.00	668.00	670.03	670.03	670.83	0.016042	7.16	43.03	27.36	1.01
04135EX.WSP Exis	23	100-YEAR	342.00	668.00	670.16	670.16	671.00	0.015836	7.35	46.52	28.12	1.01
04135EX.WSP Exis	23	500-YEAR	414.00	668.00	670.41	670.41	671.33	0.015323	7.69	53.86	29.67	1.01
04135EX.WSP Exis	22	10-YEAR	222.00	665.00	669.04		669.09	0.000381	1.79	124.08	36.44	0.17
04135EX.WSP Exis	22	50-YEAR	308.00	665.00	669.60		669.67	0.000465	2.12	145.16	38.05	0.19
04135EX.WSP Exis	22	100-YEAR	342.00	665.00	669.79		669.87	0.000498	2.24	152.40	38.58	0.20
04135EX.WSP Exis	22	500-YEAR	414.00	665.00	670.15		670.24	0.000565	2.49	166.21	39.98	0.21
04135EX.WSP Exis	21	10-YEAR	222.00	665.00	668.79		668.89	0.001217	2.63	84.50	34.62	0.30
04135EX.WSP Exis	21	50-YEAR	308.00	665.00	669.31		669.45	0.001355	2.98	103.41	38.00	0.32
04135EX.WSP Exis	21	100-YEAR	342.00	665.00	669.48		669.63	0.001413	3.11	110.01	39.12	0.33
04135EX.WSP Exis	21	500-YEAR	414.00	665.00	669.79		669.97	0.001543	3.38	122.67	41.17	0.34
04135EX.WSP Exis	20	10-YEAR	222.00	665.00	668.66		668.77	0.001316	2.57	86.38	39.15	0.30
04135EX.WSP Exis	20	50-YEAR	308.00	665.00	669.18		669.31	0.001362	2.86	107.65	43.08	0.32
04135EX.WSP Exis	20	100-YEAR	342.00	665.00	669.35		669.49	0.001374	2.98	115.02	44.09	0.32
04135EX.WSP Exis	20	500-YEAR	414.00	665.00	669.66		669.82	0.001433	3.23	128.89	45.94	0.33
04135EX.WSP Exis	19	10-YEAR	222.00	664.70	668.26		668.52	0.004821	4.10	55.82	46.13	0.56
04135EX.WSP Exis	19	50-YEAR	308.00	664.70	668.88		669.10	0.003300	3.85	95.65	83.59	0.48
04135EX.WSP Exis	19	100-YEAR	342.00	664.70	669.09		669.29	0.002871	3.73	114.61	93.54	0.45
04135EX.WSP Exis	19	500-YEAR	414.00	664.70	669.47		669.64	0.002323	3.57	151.72	104.05	0.41
04135EX.WSP Exis	18	10-YEAR	222.00	664.50	668.23		668.29	0.000884	1.96	114.17	64.99	0.24
04135EX.WSP Exis	18	50-YEAR	308.00	664.50	668.86		668.92	0.000693	2.04	163.08	91.49	0.22
04135EX.WSP Exis	18	100-YEAR	342.00	664.50	669.06		669.13	0.000654	2.07	182.99	98.84	0.22
04135EX.WSP Exis	18	500-YEAR	414.00	664.50	669.43		669.50	0.000616	2.15	220.56	105.96	0.22

HEC-RAS Plan: REV. EXIST River: WILLOW-HIGGINS C Reach: 04135EX.WSP Exis (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)	
04135EX.WSP Exis	17	10-YEAR	222.00	664.40	668.10		668.19	0.001044	2.73	97.76	52.62	0.28
04135EX.WSP Exis	17	50-YEAR	308.00	664.40	668.75		668.84	0.000839	2.68	137.84	69.64	0.26
04135EX.WSP Exis	17	100-YEAR	342.00	664.40	668.97		669.05	0.000801	2.69	153.32	75.19	0.25
04135EX.WSP Exis	17	500-YEAR	414.00	664.40	669.34		669.43	0.000775	2.76	184.99	95.75	0.25
04135EX.WSP Exis	16	10-YEAR	222.00	664.30	668.05		668.11	0.000536	1.84	123.13	54.33	0.20
04135EX.WSP Exis	16	50-YEAR	308.00	664.30	668.71		668.77	0.000463	1.98	168.19	82.62	0.19
04135EX.WSP Exis	16	100-YEAR	342.00	664.30	668.93		668.99	0.000451	2.04	186.82	91.81	0.19
04135EX.WSP Exis	16	500-YEAR	414.00	664.30	669.30		669.36	0.000448	2.18	225.35	118.66	0.20
04135EX.WSP Exis	15	10-YEAR	222.00	664.00	667.80		667.99	0.002439	3.56	62.39	26.87	0.41
04135EX.WSP Exis	15	50-YEAR	308.00	664.00	668.45		668.67	0.002056	3.77	88.93	64.61	0.39
04135EX.WSP Exis	15	100-YEAR	342.00	664.00	668.67		668.89	0.001916	3.82	104.95	82.28	0.38
04135EX.WSP Exis	15	500-YEAR	414.00	664.00	669.05		669.27	0.001710	3.90	142.33	109.96	0.37
04135EX.WSP Exis	14	10-YEAR	222.00	664.00	667.68		667.80	0.001264	2.73	81.44	32.25	0.30
04135EX.WSP Exis	14	50-YEAR	308.00	664.00	668.31		668.44	0.001940	2.92	105.72	53.81	0.36
04135EX.WSP Exis	14	100-YEAR	342.00	664.00	668.53		668.66	0.002171	2.89	118.92	67.60	0.38
04135EX.WSP Exis	14	500-YEAR	414.00	664.00	668.93		669.05	0.002186	2.76	151.10	93.01	0.38
04135EX.WSP Exis	13	10-YEAR	222.00	664.00	667.55		667.66	0.001391	2.75	80.86	34.06	0.31
04135EX.WSP Exis	13	50-YEAR	308.00	664.00	668.14		668.28	0.001442	3.00	103.07	44.49	0.33
04135EX.WSP Exis	13	100-YEAR	342.00	664.00	668.34		668.48	0.001406	3.09	112.77	52.89	0.32
04135EX.WSP Exis	13	500-YEAR	414.00	664.00	668.72		668.88	0.001333	3.23	135.02	60.22	0.32
04135EX.WSP Exis	12	10-YEAR	224.00	663.00	667.28		667.35	0.000868	2.16	103.62	43.48	0.25
04135EX.WSP Exis	12	50-YEAR	310.00	663.00	667.86		667.95	0.000892	2.37	130.67	48.75	0.26
04135EX.WSP Exis	12	100-YEAR	344.00	663.00	668.07		668.16	0.000884	2.44	140.91	50.68	0.26
04135EX.WSP Exis	12	500-YEAR	416.00	663.00	668.47		668.57	0.000830	2.58	161.89	54.66	0.25
04135EX.WSP Exis	11	10-YEAR	224.00	663.30	666.83		667.11	0.003496	4.22	53.09	22.97	0.49
04135EX.WSP Exis	11	50-YEAR	310.00	663.30	667.35		667.70	0.003748	4.74	65.42	24.93	0.52
04135EX.WSP Exis	11	100-YEAR	344.00	663.30	667.53		667.91	0.003820	4.91	70.06	25.62	0.52
04135EX.WSP Exis	11	500-YEAR	416.00	663.30	667.90		668.32	0.003930	5.23	79.59	27.00	0.54
04135EX.WSP Exis	10	10-YEAR	224.00	663.00	666.31		666.59	0.003964	4.25	52.75	25.19	0.52
04135EX.WSP Exis	10	50-YEAR	310.00	663.00	666.81		667.16	0.003990	4.71	65.78	26.80	0.53
04135EX.WSP Exis	10	100-YEAR	344.00	663.00	666.99		667.36	0.003998	4.87	70.64	27.37	0.53
04135EX.WSP Exis	10	500-YEAR	416.00	663.00	667.35		667.76	0.004004	5.16	80.59	28.51	0.54

HEC-RAS Plan: REV. EXIST River: WILLOW-HIGGINS C Reach: 04135EX.WSP Exis (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)	
04135EX.WSP Exis	9	10-YEAR	224.00	662.50	665.76		666.03	0.004114	4.15	54.01	27.71	0.52
04135EX.WSP Exis	9	50-YEAR	310.00	662.50	666.29		666.60	0.003955	4.46	69.49	30.98	0.52
04135EX.WSP Exis	9	100-YEAR	344.00	662.50	666.48		666.80	0.003875	4.55	75.57	32.17	0.52
04135EX.WSP Exis	9	500-YEAR	416.00	662.50	666.87		667.21	0.003694	4.70	88.45	34.57	0.52
04135EX.WSP Exis	8	10-YEAR	224.00	661.30	665.56		665.65	0.001465	2.48	90.45	35.11	0.27
04135EX.WSP Exis	8	50-YEAR	310.00	661.30	666.07		666.20	0.001662	2.84	109.26	37.93	0.29
04135EX.WSP Exis	8	100-YEAR	344.00	661.30	666.26		666.40	0.001709	2.95	116.62	38.97	0.30
04135EX.WSP Exis	8	500-YEAR	416.00	661.30	666.65		666.81	0.001773	3.15	132.11	41.08	0.31
04135EX.WSP Exis	7	10-YEAR	224.00	661.30	665.31		665.50	0.003523	3.45	64.96	32.00	0.43
04135EX.WSP Exis	7	50-YEAR	310.00	661.30	665.80		666.02	0.004040	3.76	82.55	39.83	0.46
04135EX.WSP Exis	7	100-YEAR	344.00	661.30	666.00		666.22	0.004025	3.80	90.60	42.94	0.46
04135EX.WSP Exis	7	500-YEAR	416.00	661.30	666.41		666.63	0.003708	3.81	109.31	48.67	0.45
04135EX.WSP Exis	6.001	10-YEAR	224.00	661.30	664.06	664.06	664.79	0.021411	6.88	32.57	22.30	1.00
04135EX.WSP Exis	6.001	50-YEAR	310.00	661.30	664.73	664.43	665.38	0.012311	6.47	47.94	25.67	0.80
04135EX.WSP Exis	6.001	100-YEAR	344.00	661.30	665.00	664.56	665.62	0.010396	6.35	54.20	26.99	0.74
04135EX.WSP Exis	6.001	500-YEAR	416.00	661.30	664.83	664.83	665.90	0.019241	8.29	50.20	26.15	1.00
04135EX.WSP Exis	6		Culvert									
04135EX.WSP Exis	5.999	10-YEAR	224.00	660.00	663.87	662.38	664.04	0.002570	3.36	66.63	31.90	0.35
04135EX.WSP Exis	5.999	50-YEAR	310.00	660.00	664.85	662.75	665.03	0.001866	3.48	89.14	36.81	0.31
04135EX.WSP Exis	5.999	100-YEAR	344.00	660.00	665.02	662.88	665.23	0.001981	3.69	93.20	37.70	0.32
04135EX.WSP Exis	5.999	500-YEAR	416.00	660.00	664.84	663.14	665.18	0.003383	4.68	88.97	36.77	0.42
04135EX.WSP Exis	5	10-YEAR	224.00	660.00	663.18	662.35	663.44	0.006575	4.06	55.15	28.46	0.51
04135EX.WSP Exis	5	50-YEAR	310.00	660.00	664.55		664.70	0.002445	3.14	98.65	35.31	0.33
04135EX.WSP Exis	5	100-YEAR	344.00	660.00	664.71		664.88	0.002566	3.29	104.47	36.13	0.34
04135EX.WSP Exis	5	500-YEAR	416.00	660.00	664.00	663.10	664.42	0.007912	5.20	79.99	32.55	0.58
04135EX.WSP Exis	4	10-YEAR	224.00	652.90	657.87		657.88	0.001550	1.38	289.11	334.57	0.15
04135EX.WSP Exis	4	50-YEAR	310.00	652.90	657.66		657.71	0.005689	2.49	226.29	284.42	0.28
04135EX.WSP Exis	4	100-YEAR	344.00	652.90	657.74		657.78	0.005500	2.50	247.64	292.19	0.28
04135EX.WSP Exis	4	500-YEAR	416.00	652.90	658.32		658.33	0.001607	1.56	475.78	479.12	0.16
04135EX.WSP Exis	3	10-YEAR	294.00	652.40	656.31	655.16	656.38	0.001216	2.76	206.13	397.23	0.30
04135EX.WSP Exis	3	50-YEAR	407.00	652.40	657.18		657.19	0.000194	1.33	760.13	1002.95	0.12
04135EX.WSP Exis	3	100-YEAR	452.00	652.40	657.47		657.48	0.000104	1.03	1088.62	1173.03	0.09

HEC-RAS Plan: REV. EXIST River: WILLOW-HIGGINS C Reach: 04135EX.WSP Exis (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)	
04135EX.WSP Exis	3	500-YEAR	574.00	652.40	658.25		658.25	0.000029	0.61	2114.44	1435.37	0.05
04135EX.WSP Exis	2.001	10-YEAR	294.00	652.40	655.73	655.16	656.22	0.006926	5.66	51.94	143.04	0.69
04135EX.WSP Exis	2.001	50-YEAR	407.00	652.40	656.66	655.65	657.12	0.003950	5.40	75.31	574.07	0.55
04135EX.WSP Exis	2.001	100-YEAR	452.00	652.40	656.95	655.81	657.42	0.003591	5.48	82.53	747.11	0.53
04135EX.WSP Exis	2.001	500-YEAR	574.00	652.40	657.70	656.20	658.20	0.002939	5.67	101.15	1263.01	0.50
04135EX.WSP Exis	2		Culvert									
04135EX.WSP Exis	1.999	10-YEAR	294.00	650.50	655.94	653.30	656.08	0.001663	2.93	100.30	500.17	0.26
04135EX.WSP Exis	1.999	50-YEAR	407.00	650.50	656.72	653.77	656.90	0.001771	3.40	119.62	500.31	0.27
04135EX.WSP Exis	1.999	100-YEAR	452.00	650.50	656.90	653.95	657.11	0.001922	3.64	124.30	500.35	0.29
04135EX.WSP Exis	1.999	500-YEAR	574.00	650.50	657.37	654.38	657.64	0.002303	4.22	135.90	500.43	0.32
04135EX.WSP Exis	1	10-YEAR	294.00	650.50	656.00	653.90	656.00	0.000068	0.60	792.95	500.18	0.05
04135EX.WSP Exis	1	50-YEAR	407.00	650.50	656.80	654.13	656.80	0.000038	0.50	1193.15	500.33	0.04
04135EX.WSP Exis	1	100-YEAR	452.00	650.50	657.00	654.19	657.00	0.000036	0.51	1293.23	500.36	0.04
04135EX.WSP Exis	1	500-YEAR	574.00	650.50	657.50	654.34	657.50	0.000033	0.52	1543.43	500.45	0.04

TAB 8

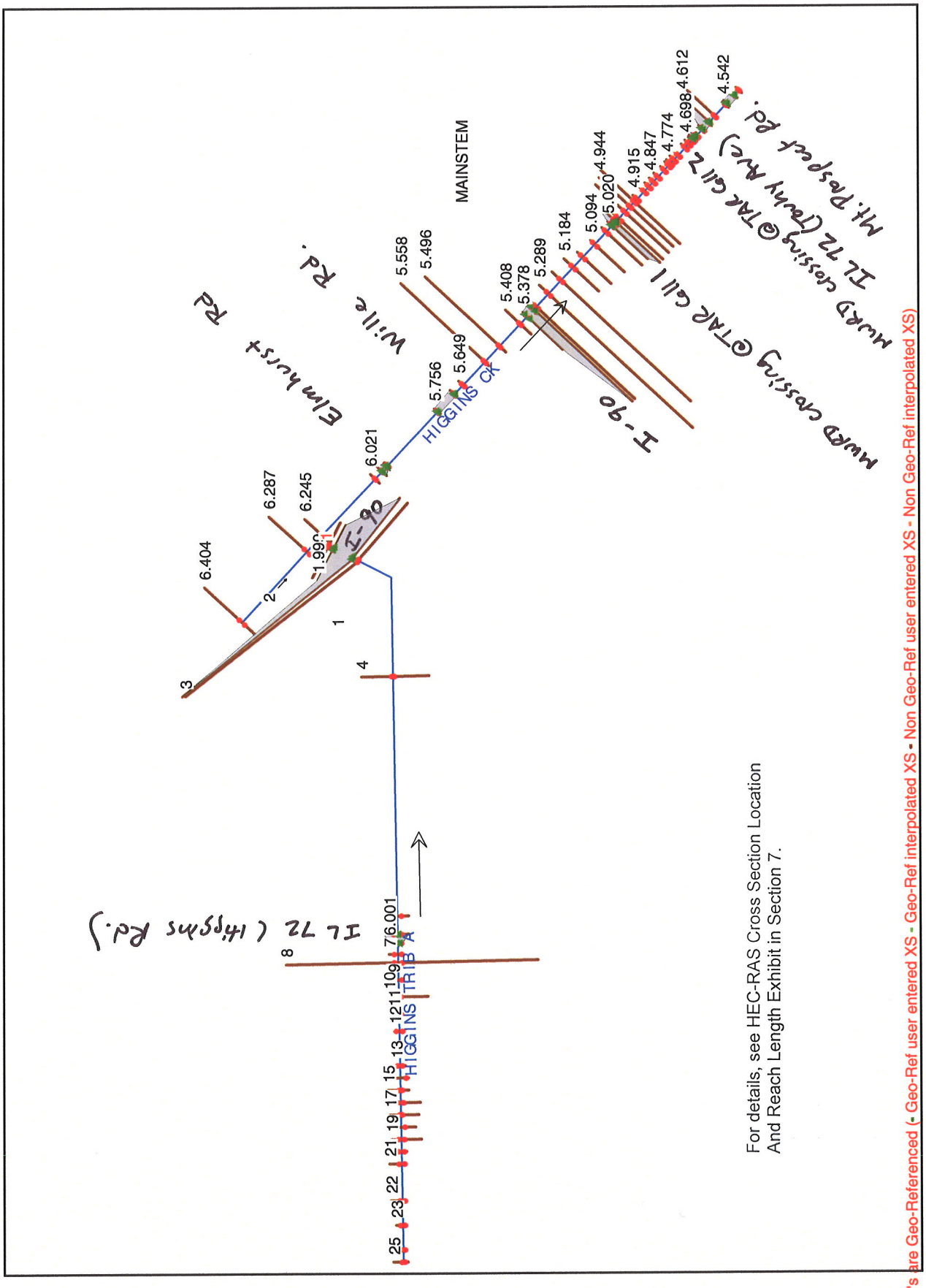
SECTION 8

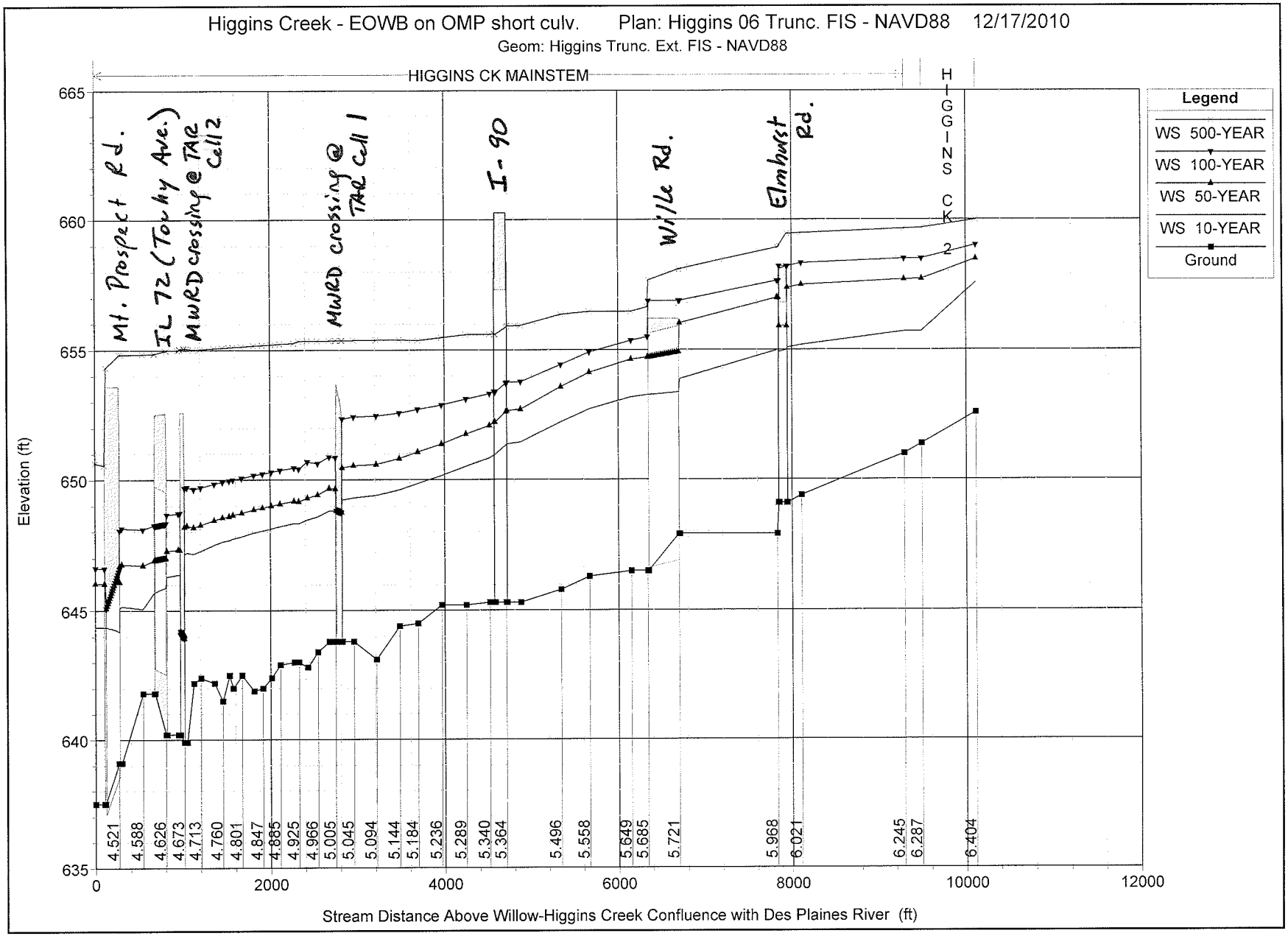
BASELINE CONDITIONS ANALYSIS

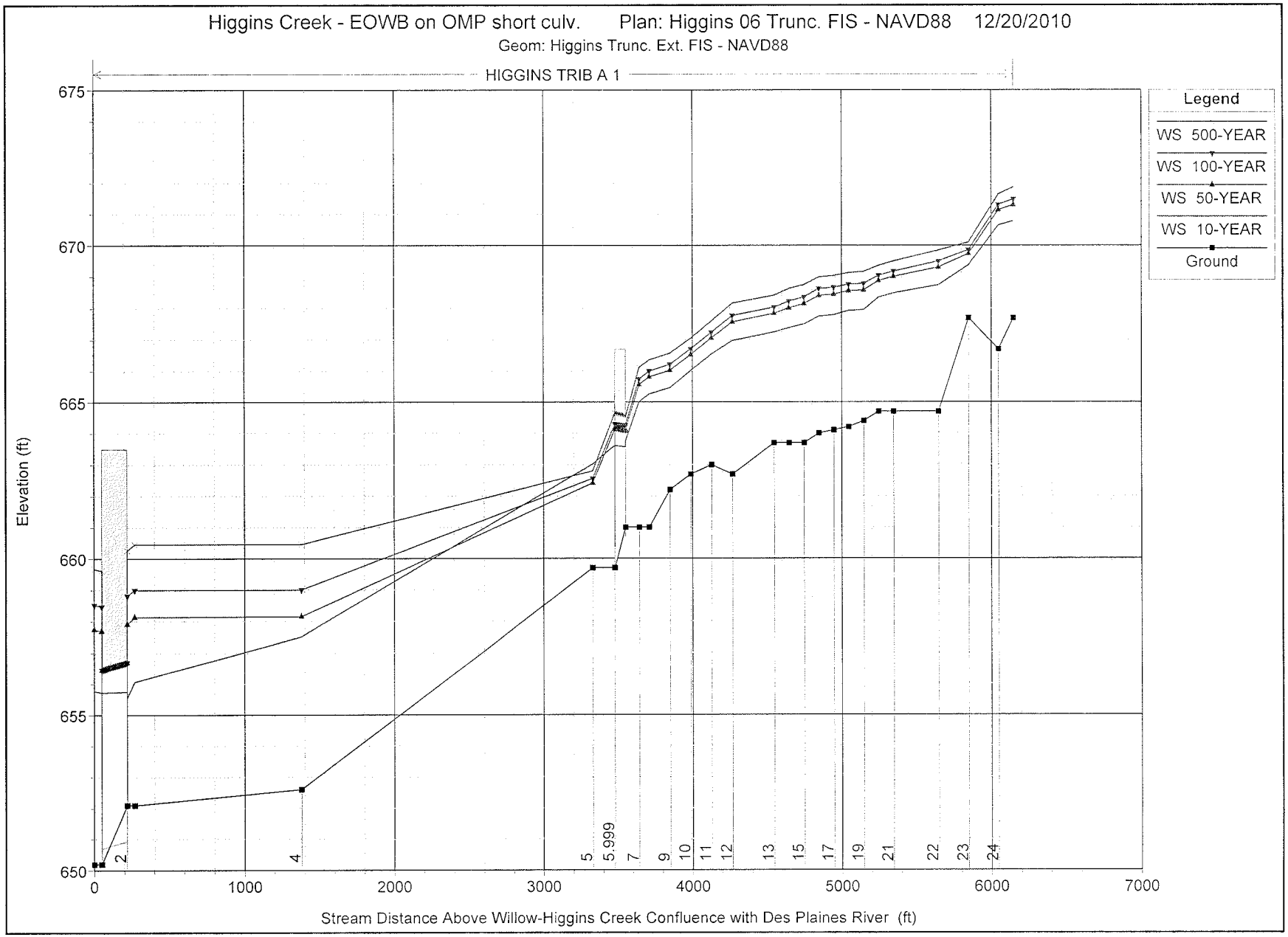
SECTION 9

BASELINE CONDITIONS ANALYSIS

COMBINED FIS/LOMR MODELS
SCHEMATIC




Higgins Creek - EOWB on OMP short culv. Plan: Higgins 06 Trunc. FIS - NAVD88 12/17/2010
Geom: Higgins Trunc. Ext. FIS - NAVD88
HIGGINS CK MAINSTEM
HIGGINS CK 2
Mt. Prospect Rd.
IL 72 (Touhy Ave.)
MWRD crossing @ TAR Cell 2
MWRD crossing @ TAR Cell 1
I-90
Wille Rd.
Elmhurst Rd.
Legend
WS 500-YEAR
WS 100-YEAR
WS 50-YEAR
WS 10-YEAR
Ground
Elevation (ft)
665
660
655
650
645
640
635
0
2000
4000
6000
8000
10000
12000
4.521
4.588
4.626
4.673
4.713
4.760
4.801
4.847
4.885
4.925
4.966
5.005
5.045
5.094
5.144
5.184
5.236
5.289
5.340
5.364
5.496
5.558
5.649
5.685
5.721
5.968
6.021
6.245
6.287
6.404
Stream Distance Above Willow-Higgins Creek Confluence with Des Plaines River (ft)


Higgins Creek - EOWB on OMP short culv. Plan: Higgins 06 Trunc. FIS - NAVD88 12/20/2010
Geom: Higgins Trunc. Ext. FIS - NAVD88
HIGGINS TRIB A 1
Legend
WS 500-YEAR
WS 100-YEAR
WS 50-YEAR
WS 10-YEAR
Ground
Elevation (ft)
675
670
665
660
655
650
0
1000
2000
3000
4000
5000
6000
7000
Stream Distance Above Willow-Higgins Creek Confluence with Des Plaines River (ft)
2
4
5
5.999
7
9
10
11
12
13
15
17
19
21
22
23
24

COMBINED FIS/LOMR MODELS NAVD 88

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Higgins Creek - EOWB on OMP short culv.
Project File : WillowCreek-OMP.prj
Run Date and Time: 12/17/2010 5:13:16 PM

Project in English units

Project Description:
EOWB Higgins Creek and Higgins Creek Trib. A CBBEL 10/2010

Willow-Higgins
Creek, Willow Creek, Higgins Creek, Cook County, Illinois
Existing and Proposed Conditions OMP with As-Built Flood Control Reservoir Conditions

10-, 50-, 100-, 500-, and 100-Year Floodway Storm Event Flood Profiles
Christopher B. Burke Engineering, Ltd. 01/06

Updated for Final Willow Creek Relocation Alignment - OMP Project Competion
Phase for proposed conditions (short feeder culverts with open channels through
future western bypass area) - by HNTB/APS Consulting, Inc. 03/2010.

PLAN DATA

Plan Title: Higgins 06 Trunc. FIS - NAVD88
Plan File : n:\Idot\070404\Drain\Hydraulic Models & Reports\Higgins Creek\Working Models\Higgins extended (Willow appr by IDOT)\WillowCreek-OMP.p07

Geometry Title: Higgins Trunc. Ext. FIS - NAVD88
Geometry File : n:\Idot\070404\Drain\Hydraulic Models & Reports\Higgins Creek\Working Models\Higgins extended (Willow appr by IDOT)\WillowCreek-OMP.g07

Flow Title : Higgins 06 Trunc. - FINAL WILLOW NAVD88
Flow File : n:\Idot\070404\Drain\Hydraulic Models & Reports\Higgins Creek\Working Models\Higgins extended (Willow appr by IDOT)\WillowCreek-OMP.f05

Plan Description:
Higgins Creek & Tributary A FIS/LOMR combined model without EOWB surveyed sections. Downstream Willow Creek and Willow-Higgins Creek removed. NAVD88

Plan Summary Information:

Number of:	Cross Sections	= 78	Multiple Openings	=	0
	Culverts	= 7	Inline Structures	=	0
	Bridges	= 2	Lateral Structures	=	0

Computational Information
    Water surface calculation tolerance = 0.01
    Critical depth calculation tolerance = 0.01
    Maximum number of iterations = 20
    Maximum difference tolerance = 0.3
    Flow tolerance factor = 0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method: Average Conveyance
    Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Higgins 06 Trunc. - FINAL WILLOW NAVD88
Flow File : n:\Idot\070404\Drain\Hydraulic Models & Reports\Higgins Creek\Working Models\Higgins extended (Willow appr by IDOT)\WillowCreek-OMP.f05

Flow Data (cfs)

River	Reach	RS	10-YEAR	50-YEAR	100-YEAR	500-YEAR
HIGGINS CK	2	6.404	275	400	461	548
HIGGINS CK	MAINSTEM	6.245	562	810	911	1253
HIGGINS CK	MAINSTEM	6.021	564	810	915	1258
HIGGINS CK	MAINSTEM	5.971	645	1100	1320	1930
HIGGINS CK	MAINSTEM	5.558	907	1394	1623	2270
HIGGINS CK	MAINSTEM	5.045	571	750	1000	2000
HIGGINS CK	MAINSTEM	4.966	700	920	1260	2140
HIGGINS CK	MAINSTEM	4.683	424	445	460	600
HIGGINS CK	MAINSTEM	4.664	444	485	700	1600
HIGGINS CK	MAINSTEM	4.588	454	503	730	1666
HIGGINS TRIB A	1	25	222	308	342	414
HIGGINS TRIB A	1	12	224	310	344	416
HIGGINS TRIB A	1	3	294	407	452	574

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
HIGGINS CK	MAINSTEM	10-YEAR		Known WS = 644.37
HIGGINS CK	MAINSTEM	50-YEAR		Known WS = 646.05
HIGGINS CK	MAINSTEM	100-YEAR		Known WS = 646.63
HIGGINS CK	MAINSTEM	500-YEAR		Known WS = 650.63

GEOMETRY DATA

Geometry Title: Higgins Trunc. Ext. FIS - NAVD88
Geometry File : n:\Idot\070404\Drain\Hydraulic Models & Reports\Higgins Creek\Working Models\Higgins extended (Willow appr by IDOT)\WillowCreek-OMP.g07

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
HIGGINS CK	2		1
HIGGINS CK	MAINSTEM	1	
HIGGINS TRIB A	1		1

JUNCTION INFORMATION

Name: 1
Description:
Energy computation Method

Length across Junction River	Reach		Tributary River	Reach	Length	Angle
HIGGINS CK	2	to	HIGGINS CK	MAINSTEM	200	0
HIGGINS TRIB A	1	to	HIGGINS CK	MAINSTEM	200	0

CROSS SECTION

RIVER: HIGGINS CK
REACH: 2 RS: 6.404

INPUT
Description: WH065
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	660.8	100	662.7	200	663.1	300	663.1	310	663.5
323	655.1	325	654.6	333	652.8	336	652.6	347	654.5
350	655.1	358	656.6	400	657.8	415	658.4	450	662.7

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.065	310	.065	358	.075

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
310	358	540	620	540	.1 .3

CROSS SECTION

RIVER: HIGGINS CK
REACH: 2 RS: 6.287

INPUT
Description: copied from 6.404 and adjusted for slope
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	659.59	100	661.49	200	661.89	300	661.89	310	662.29
323	653.89	325	653.39	333	651.59	336	651.39	347	653.29
350	653.89	358	655.39	400	656.59	415	657.19	450	661.49

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.065	310	.065	358	.075

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
310	358	0	0	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 6.245

INPUT
Description: 6.246 6.249 WH064 ** HIGGINS CREEK**
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	670.8	82	670.7	82	658.6	180	655.7	210	653.7
330	653.7	340	651	370	651	390	657.7	450	659.7
500	663.7								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.07	330	.02	390	.07

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           330     390             1100    1180    1100             .1       .3

CROSS SECTION


RIVER: HIGGINS CK
REACH: MAINSTEM           RS: 6.021

INPUT
Description: 6.022  6.026  Approach - Elmhurst Rd ** HIGGINS CREEK** WH062
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   670.7      82   670.7      82   658.6      84   658.4      96   652.1
      99   650.1     108   649.4     120   650.1     124   652.1     124   654.1
     128   655.2     157     655     164   654.1     166   654.1     191   659.5
     200   659.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04      84    .029     128     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           84     128             160     160     160              .3       .5

CROSS SECTION


RIVER: HIGGINS CK
REACH: MAINSTEM           RS: 5.991

INPUT
Description: 5.992  5.992  Immediately Upstream - Elmhurst Rd ** HIGGINS
             CREEK**
Cross Section based on Approach section and WSP-2 bridge
             opening & girder data.
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      42   670.7     124   670.7     124   658.6     126   658.4     138   652.1
     138   649.1     150   649.1     163   649.1     166   652.1     166   654.1
     170   655.2     199     655     206   654.1     208   654.1     233   659.5
     242   659.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      42     .04     126    .029     170     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          126     170             105     105     105              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
      42     128   658.3          F
     173     242   658.3          F

BRIDGE


RIVER: HIGGINS CK
REACH: MAINSTEM           RS: 5.981

INPUT
Description: 5.982  5.985  Elmhurst Road (Note: deck widened to 85'; matches
             existing conditions)
Distance from Upstream XS =      10
Deck/Roadway Width        =      85
Weir Coefficient          =     2.7
Upstream  Deck/Roadway Coordinates
    num=       8
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   658.4     -.3     100   658.1     -.3     138   658.3     -.3
     138   658.3   655.9     163   658.3   655.9     163   658.3     -.3
```

```
     200   658.2     -.3     242   658.6     -.3

Upstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      42   670.7     124   670.7     124   658.6     126   658.4     138   652.1
     138   649.1     150   649.1     163   649.1     166   652.1     166   654.1
     170   655.2     199     655     206   654.1     208   654.1     233   659.5
     242   659.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      42     .04     126    .029     170     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          126     170             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
      42     128   658.3       F
     173     242   658.3       F

Downstream  Deck/Roadway Coordinates
    num=       7
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    80.5   658.2     -.3     100   658.1     -.3     138   658.3     -.3
     138   658.3   655.9     163   658.3   655.9     163   658.3     -.3
   188.5   658.2     -.3

Downstream Bridge Cross Section Data
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    80.5   655.7   120.5   655.2   123.5   654.7   133.5     650     138   649.1
     150   649.1     163   649.1   164.5     650   173.5   654.7   177.5   656.2
   188.5   656.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    80.5     .06   120.5    .035   177.5     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
         120.5   177.5             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    80.5     128   657.3       F
     173   188.5   657.3       F

Upstream Embankment side slope             =     2.9 horiz. to 1.0 vertical
Downstream Embankment side slope           =     2.9 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins        =     -.3
Energy head used in spillway design        =     -.3
Spillway height used in design             =       0
Weir crest shape                           = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =   656.8

Additional Bridge Parameters
       Add Friction component to Momentum
       Add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
```

Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.971

INPUT
Description: 5.972 5.979 Immediately Downstream - Elmhurst Rd ** HIGGINS CREEK**
Cross Section based on Exit section and WSP-2 bridge opening & girder data.
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
80.5	655.7	120.5	655.2	123.5	654.7	133.5	650	138	649.1
150	649.1	163	649.1	164.5	650	173.5	654.7	177.5	656.2
188.5	656.2								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
80.5	.06	120.5	.035	177.5	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
120.5	177.5	14	14	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
80.5	128	657.3	F
173	188.5	657.3	F

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.968

INPUT
Description: 5.969 5.976 Approach - Wille Rd / Exit - Elmhurst Rd ** HIGGINS CREEK** WH061
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	655.7	40	655.2	43	654.7	53	650	61	650
65	648	70	647.9	75	648	79	650	84	650
93	654.7	97	656.2	108	656.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	40	.035	97	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
40	97	1123	1123	.3	.5

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.756

INPUT
Description: 5.757 5.760 Immediately Upstream - Wille Rd ** HIGGINS CREEK**
Cross Section copied from Approach section.
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	655.7	40	655.2	43	654.7	53	650	61	650
65	648	70	647.9	75	648	79	650	84	650
93	654.7	97	656.2	108	656.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	40	.035	97	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
40 97 370 370 370 .3 .5
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 51.5 656.7 F
88.5 108 656.7 F

CULVERT

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.721

INPUT
Description: 5.722 5.725 Wille Road
Deck data is suspect in WSP-2 model;
suspect points deleted.
Distance from Upstream XS = 10
Deck/Roadway Width = 350
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 3

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	656.7	-.3	42	656.2	-.3	108	657.1	-.3

Upstream Bridge Cross Section Data
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	655.7	40	655.2	43	654.7	53	650	61	650
65	648	70	647.9	75	648	79	650	84	650
93	654.7	97	656.2	108	656.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	40	.035	97	.06

Bank Sta: Left Right Coeff Contr. Expan.
40 97 .3 .5
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 51.5 656.7 F
88.5 108 656.7 F

Downstream Deck/Roadway Coordinates
num= 5

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	656.7	-.3	42	656.2	-.3	112	657.2	-.3
227	657.3	-.3	247	657.2	-.3			

Downstream Bridge Cross Section Data
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	656.2	55	656.2	60	654.7	72	648.6	79	648.6
83	646.6	90	646.5	98	646.6	102	648.6	109	648.6
120	654.7	127	656.2	130	657.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	55	.035	120	.06

Bank Sta: Left Right Coeff Contr. Expan.
55 120 .3 .5
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 72 655.1 F
109 130 655.1 F

Upstream Embankment side slope = .1 horiz. to 1.0 vertical
Downstream Embankment side slope = .1 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95

```
Elevation at which weir flow begins          =   646.6
Energy head used in spillway design          =
Spillway height used in design               =
Weir crest shape                             = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise    Span
Culv # 1             Box       9      17
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss
Coef
                10     350     .012     .012        0                  .4               1
Upstream   Elevation =  646.9
           Centerline Station =  70
Downstream Elevation =  646.62
           Centerline Station =  90.5

CROSS SECTION


RIVER: HIGGINS CK
REACH: MAINSTEM           RS: 5.685

INPUT
Description: 5.686  5.690  Immediately Downstream - Wille Rd ** HIGGINS
             CREEK**
Cross Section copied from Exit section.
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   656.2      55   656.2      60   654.7      72   648.6      79   648.6
      83   646.6      90   646.5      98   646.6     102   648.6     109   648.6
     120   654.7     127   656.2     130   657.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06      55    .035     120     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            55     120              190     190     190             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      72   655.1       F
     109     130   655.1       F

CROSS SECTION


RIVER: HIGGINS CK
REACH: MAINSTEM           RS: 5.649

INPUT
Description: 5.650  5.654  Exit - Wille Rd ** HIGGINS CREEK** WH056
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   656.2      55   656.2      60   654.7      72   648.6      79   648.6
      83   646.6      90   646.5      98   646.6     102   648.6     109   648.6
     120   654.7     127   656.2     130   657.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06      55    .035     120     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            55     120              482     482     482             .1       .3
```

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.558

INPUT
Description: 5.559 5.563 TAR35 ** HIGGINS CREEK**
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-700	659.7	-600	654.7	1000	655.2	1025	653.9	1037	648.3
1041	648.2	1045	646.3	1048	647.7	1052	646.3	1060	646.3
1066	646.3	1070	647.7	1071	648.2	1075	648.3	1087	653.8
1091	655.7	1102	656.4	1142	660.7				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-700	.06	1025	.035	1087	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1025	1087	329	329	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.496

INPUT
Description: 5.497 5.500 TAR34 ** HIGGINS CREEK**
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-500	659.7	-400	654.7	1000	655.3	1026	653.8	1038	647.9
1042	647.9	1043	647.6	1046	645.9	1053	645.9	1061	645.8
1064	647.5	1065	647.8	1070	647.9	1081	653.8	1099	657.9
1106	658.3	1186	660.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-500	.06	1026	.035	1081	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1026	1081	464	464	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.408

INPUT
Description: 5.409 5.413 Approach- NW Tollway ** HIGGINS CREEK** TAR33
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
724	655.7	824	654.7	1000	654.3	1007	653.6	1019	647.5
1024	647.3	1028	645.3	1036	645.3	1043	645.3	1047	647.3
1052	647.5	1064	653.8	1091	656.8	1264	657.7		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
724	.06	1007	.035	1064	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1007	1064	157.3	157.3	.3	.5

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.378

INPUT
Description: 5.379 5.383 Immediately Upstream - NW Tollway ** HIGGINS CREEK**
Cross Section based on Approach section and WSP-2 bridge opening & girder data.
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1458	659.7	1460	658.7	1463	657.7	1466	656.7	1469	655.7
1472	654.7	1484	653.7	1508	653.4	1512	652.5	1530.2	647.3
1534.4	645.3	1542.6	645.3	1553	645.5	1573.8	646.6	1596	652.5
1610	652.7	2227	652.7	2254	653.7	2260	654.7	2265	655.7
2270	656.7	2295	657.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1458	.06	1508	.035	1596	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1508	1596	145	145	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1458	1502.7	660.2	F
1609.3	2295	660.2	F

BRIDGE

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.364

INPUT
Description: 5.365 5.369 Northwest Tollway
Skew effects ignored due to low skew angle (<20 degrees)
Distance from Upstream XS = 10
Deck/Roadway Width = 125
Weir Coefficient = 2.7
Bridge Deck/Roadway Skew = 10.1
Upstream Deck/Roadway Coordinates
num= 17

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
1000	659.8	-.3	1100	659.9	-.3	1200	660	-.3
1300	660.1	-.3	1400	660.2	-.3	1500	660.3	-.3
1512.7	660.3	-.3	1512.7	660.3	657.1	1596.3	660.4	657.2
1596.3	660.4	-.3	1600	660.4	-.3	1700	660.5	-.3
1800	660.6	-.3	1900	660.7	-.3	2000	660.8	-.3
2100	660.9	-.3	2295	660.9	-.3			

Upstream Bridge Cross Section Data
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1458	659.7	1460	658.7	1463	657.7	1466	656.7	1469	655.7
1472	654.7	1484	653.7	1508	653.4	1512	652.5	1530.2	647.3
1534.4	645.3	1542.6	645.3	1553	645.5	1573.8	646.6	1596	652.5
1610	652.7	2227	652.7	2254	653.7	2260	654.7	2265	655.7
2270	656.7	2295	657.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1458	.06	1508	.035	1596	.06

Bank Sta: Left	Right	Coeff Contr.	Expan.
1508	1596	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent

```
    1458  1502.7   660.2       F
  1609.3    2295   660.2       F

Downstream  Deck/Roadway Coordinates
    num=      17
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    1000   659.8     -.3    1100   659.9     -.3    1200     660     -.3
    1300   660.1     -.3    1400   660.2     -.3    1500   660.3     -.3
  1512.7   660.3     -.3  1512.7   660.3   657.1  1596.3   660.4   657.2
  1596.3   660.4     -.3    1600   660.4     -.3    1700   660.5     -.3
    1800   660.6     -.3    1900   660.7     -.3    2000   660.8     -.3
    2100   660.9     -.3  3623.7   660.9     -.3

Downstream Bridge Cross Section Data
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  1452.7   659.7  1512.7     655  1530.2   647.3  1534.4   645.3  1542.6   645.3
    1553   645.5  1573.8   646.6  1575.8   646.7  1610.7   652.7  1623.7   653.7
  1730.7   654.7  3510.7   655.7  3543.7   656.7  3623.7   657.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  1452.7    .075  1512.7     .06  1623.7    .075

Bank Sta: Left   Right    Coeff Contr.   Expan.
        1512.7  1623.7            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  1452.7  1502.7   658.5       F
  1606.3  3623.7   658.5       F

Upstream Embankment side slope              =       4 horiz. to 1.0 vertical
Downstream Embankment side slope            =       4 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =     -.3
Energy head used in spillway design         =     -.3
Spillway height used in design              =       0
Weir crest shape                            = Broad Crested

Number of Piers =  1

Pier Data
Pier Station     Upstream=  1554.5    Downstream=  1554.5
Upstream     num=       2
    Width   Elev    Width   Elev
      2.9   645.3     2.9   660.4
Downstream     num=       2
    Width   Elev    Width   Elev
      2.9   645.3     2.9   660.4

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =     1.2
       Yarnell                KVal =      .9
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =   657.3

Additional Bridge Parameters
       Add Friction component to Momentum
       Add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line
```

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.351

INPUT
Description: 5.352 5.355 Immediately Downstream - NW Tollway ** HIGGINS CREEK**
Cross Section based on Exit section and WSP-2 bridge opening & girder data.
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1452.7	659.7	1512.7	655	1530.2	647.3	1534.4	645.3	1542.6	645.3
1553	645.5	1573.8	646.6	1575.8	646.7	1610.7	652.7	1623.7	653.7
1730.7	654.7	3510.7	655.7	3543.7	656.7	3623.7	657.7		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1452.7	.075	1512.7	.06	1623.7	.075

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1512.7	1623.7	55.8	55.8	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1452.7	1502.7	658.5	F
1606.3	3623.7	658.5	F

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.340

INPUT
Description: 5.341 5.345 Exit - NW Tollway ** HIGGINS CREEK** TAR32
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
940	659.7	1000	654.8	1007	654.1	1011	654	1029	647.2
1038	645.4	1055	645.3	1077	645.8	1082	647.1	1098	652
1111	652	1218	654.7	2998	655.7	3031	656.7	3111	657.7

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
940	.075	1011	.06	1098	.075	1111	.075

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1011	1098	271	271	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.289

INPUT
Description: 5.290 5.293 TAR31 ** HIGGINS CREEK**
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
900	658.7	1000	655.3	1046	652.4	1069	646.7	1076	645.6
1095	645.2	1115	645.6	1123	646.7	1139	652.3	1495	654.7
3895	654.7	4095	659.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
900	.05	1046	.035	1139	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1046	1139	281	281	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.236

INPUT
Description: 5.237 5.240 TAR30 ** HIGGINS CREEK**
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
904	658.7	1000	655.8	1053	652.5	1078	646.4	1083	645.6
1098	645.2	1118	645.5	1122	646.5	1140	653.9	1149	655
3098	654.7	3798	659.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
904	.05	1053	.035	1140	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1053	1140	272	272	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.184

INPUT
Description: 5.185 5.189 TAR29 ** HIGGINS CREEK**
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
900	658.7	1000	655	1044	653.1	1068	646.3	1073	644.7
1090	644.5	1107	644.6	1113	646.3	1138	654.6	1153	654.9
1583	654.7	1590	655.7	1609	656.7	1623	657.7		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
900	.05	1044	.035	1138	.05	1153	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1044	1138	212	212	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.144

INPUT
Description: 5.145 5.149 TAR28 ** HIGGINS CREEK**
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
969	657.7	979	656.7	1000	656.5	1031	654	1057	646.3
1062	644.6	1079	644.4	1098	644.5	1103	646.3	1127	653.8
1137	653.3	1602	652.7	1640	653.7	1644	654.7	1648	655.7
1659	656.7	1672	657.7						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
969	.05	1031	.035	1127	.05	1137	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1031	1127	266	266	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.094

INPUT
Description: 5.095 5.098 TAR27 ** HIGGINS CREEK**
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
974	657.7	976	656.7	979	655.7	986	654.7	998	653.7
1000	653.6	1012	652.5	1016	651.7	1034	646.3	1040	644.5
1061	643.1	1079	644.4	1086	646.3	1109	653.6	1120	652.9
1647	652.7	1650	653.7	1652	654.7	1655	655.7	1658	656.7
1680	657.7								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
974	.05	1012	.035	1109	.05	1120	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1012	1109	259	259	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.045

INPUT
Description: 5.046 5.049 Approach - MWRD ** HIGGINS CREEK** TAR26
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
950	659.7	952	658.7	955	657.7	958	656.7	961	655.7
964	654.7	976	653.7	1000	653.4	1004	652.5	1021	646.3
1028	644.5	1044	643.8	1066	644.3	1073	646.3	1088	652.5
1102	652.7	1719	652.7	1746	653.7	1752	654.7	1757	655.7
1762	656.7	1787	657.7						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
950	.05	1004	.035	1088	.05	1102	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1004	1088	130	130	.3	.5

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.020

INPUT
Description: 5.021 5.024 Immediately Upstream - MWRD ** HIGGINS CREEK**
Cross Section copied from Approach section.
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
950	659.7	952	658.7	955	657.7	958	656.7	961	655.7
964	654.7	976	653.7	1000	653.4	1004	652.5	1021	646.3
1028	644.5	1044	643.8	1066	644.3	1073	646.3	1088	652.5
1102	652.7	1719	652.7	1746	653.7	1752	654.7	1757	655.7
1762	656.7	1787	657.7						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
950	.05	1004	.035	1088	.05	1102	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1004	1088	80	80	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
950	1022	653.7	F
1071	1787	653.2	F

CULVERT

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 5.012

INPUT
Description: 5.013 5.017 MWRD1
Deck realigned to match section stationing.
Distance from Upstream XS = 10
Deck/Roadway Width = 60
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 23

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
944	660.7	-.3	947	659.7	-.3	950	658.7	-.3
953	657.7	-.3	956	656.7	-.3	959	654.7	-.3
1000	653.8	-.3	1024	654.1	-.3	1070	654.2	-.3
1130	654.4	-.3	1325	652.7	-.3	1336	651.7	-.3
1348	650.7	-.3	1355	650.2	-.3	1444	649.9	-.3
1454	650.7	-.3	1465	651.7	-.3	1477	652.7	-.3
2120	653.7	-.3	2140	654.7	-.3	2145	655.7	-.3
2220	656.7	-.3	2370	657.7	-.3			

Upstream Bridge Cross Section Data
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
950	659.7	952	658.7	955	657.7	958	656.7	961	655.7
964	654.7	976	653.7	1000	653.4	1004	652.5	1021	646.3
1028	644.5	1044	643.8	1066	644.3	1073	646.3	1088	652.5
1102	652.7	1719	652.7	1746	653.7	1752	654.7	1757	655.7
1762	656.7	1787	657.7						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
950	.05	1004	.035	1088	.05	1102	.03

Bank Sta: Left Right Coeff Contr. Expan.
1004 1088 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
950	1022	653.7	F
1071	1787	653.2	F

Downstream Deck/Roadway Coordinates
num= 24

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
663	660.7	-.3	944	660.7	-.3	947	659.7	-.3
950	658.7	-.3	953	657.7	-.3	956	656.7	-.3
959	654.7	-.3	1000	653.8	-.3	1024	654.1	-.3
1070	654.2	-.3	1130	654.4	-.3	1325	652.7	-.3
1336	651.7	-.3	1348	650.7	-.3	1355	650.2	-.3
1444	649.9	-.3	1454	650.7	-.3	1465	651.7	-.3
1477	652.7	-.3	2120	653.7	-.3	2140	654.7	-.3
2145	655.7	-.3	2220	656.7	-.3	2370	657.7	-.3

Downstream Bridge Cross Section Data
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
663	657.7	666	656.7	669	655.7	672	654.7	678	653.7
1000	653.4	1003	652.8	1024	645.5	1030	644.5	1065	643.8
1090	643.8	1096	645.5	1117	653	1126	653.8	1949	653.7
1956	654.7	1963	655.7	1970	656.7				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
663	.03	1000	.05	1003	.035	1117	.05	1126	.03

```
Bank Sta: Left   Right    Coeff Contr.   Expan.
          1003    1117          .3         .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     663    1042   652.7       F
    1090    1970   652.7       F

Upstream Embankment side slope              =   2.602 horiz. to 1.0 vertical
Downstream Embankment side slope            =   2.602 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =   649.9
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  2

Culvert Name      Shape      Rise    Span
Culv # 1             Box       5       7
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss
Coef
                10      60     .015     .015        0                  .4                1
Upstream   Elevation =  643.75
           Centerline Station =  1036
Downstream Elevation =  643.82
           Centerline Station =  1056

Culvert Name      Shape      Rise    Span
Culv # 2             Box       5       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss
Coef
                10      60     .015     .015        0                  .4                1
Number of Barrels =  2
Upstream   Elevation =  643.75
Centerline Stations
    Sta.    Sta.
    1045    1055
Downstream Elevation =  643.82
Centerline Stations
    Sta.    Sta.
    1065    1075

CROSS SECTION


RIVER: HIGGINS CK
REACH: MAINSTEM          RS: 5.005

INPUT
Description: 5.006  5.009  Immediately Downstream - MWRD ** HIGGINS
             CREEK**
Cross Section copied from Exit section.
Station Elevation Data    num=      18
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
     663   657.7      666   656.7      669   655.7      672   654.7      678   653.7
    1000   653.4     1003   652.8     1024   645.5     1030   644.5     1065   643.8
    1090   643.8     1096   645.5     1117     653     1126   653.8     1949   653.7
    1956   654.7     1963   655.7     1970   656.7

Manning's n Values        num=       5
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
     663     .03     1000     .05     1003    .035     1117     .05     1126     .03
```

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1003 1117 69 69 69 .3 .5
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
663 1042 652.7 F
1090 1970 652.7 F

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.992

INPUT
Description: 4.993 4.996 Exit - MWRD ** HIGGINS CREEK** TAR25
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
663	657.7	666	656.7	669	655.7	672	654.7	678	653.7
1000	653.4	1003	652.8	1024	645.5	1030	644.5	1065	643.8
1090	643.8	1096	645.5	1117	653	1126	653.8	1949	653.7
1956	654.7	1963	655.7	1970	656.7				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
663	.03	1000	.05	1003	.035	1117	.05	1126	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1003 1117 135 135 135 .1 .3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.966

INPUT
Description: 4.967 4.971 TAR24 ** HIGGINS CREEK**
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
427	656.7	431	655.7	447	654.7	460	654	1000	654
1002	653.6	1018	645.6	1024	643.8	1038	643.4	1050	643.8
1057	645.6	1079	652.7	1087	653.4	1927	653.7	1934	654.7
1940	655.7	1945	656.7						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
427	.03	1000	.05	1002	.035	1079	.05	1087	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1002 1079 115 115 115 .1 .3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.944

INPUT
Description: 4.945 4.949 TAR23 ** HIGGINS CREEK**
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
385	656.7	400	655.7	423	654.7	433	653.7	440	652.7
1000	653.3	1003	652.8	1017	645.5	1023	643.2	1035	642.8
1048	643.3	1054	645.5	1067	650	1084	650	1839	649.7
1843	650.7	1847	651.7	1851	652.7	1882	653.7	1890	654.7
1898	655.7	1925	656.7						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
385	.03	1000	.05	1003	.035	1067	.05	1084	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1003	1067	100	100	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.925

INPUT
Description: 4.926 4.930 TAR22 ** HIGGINS CREEK**
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
320	656.7	330	655.7	350	654.7	827	654.3	960	653.7
1000	652.7	1002	652.7	1017	645.5	1024	643.1	1036	643
1046	643.3	1054	645.5	1076	653	1082	653.1	1839	653.2
1856	653.7	1872	654.7	1886	655.7	1916	656.7	1978	657.7

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
320	.05	1002	.035	1076	.05	1082	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1002	1076	55	55	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.915

INPUT
Description: 4.916 4.920 TAR21 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
954	654	972	648	1002	647	1014	643	1046	643
1081	654.5	1102	654.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
954	.065	1002	.04	1081	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1002	1081	159	159	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.885

INPUT
Description: 4.886 4.889 TAR20 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
987	653.9	1005	647.9	1034	646.9	1046	642.9	1080	642.9
1114	654.4	1135	654.4						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
987	.065	1034	.04	1114	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1034	1114	101	101	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.866

INPUT
Description: 4.867 4.870 TAR19 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1009	653.9	1027	647.9	1058	646.9	1071	642.4	1099	642.4
1134	654.3	1155	654.3						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1009	.065	1058	.04	1134	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1058	1134	100	100	100	.1 .3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.847

INPUT
Description: 4.848 4.851 TAR18 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
985	653.9	1003	647.9	1034	646.9	1049	642	1073	642
1110	654.3	1131	654.3						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
985	.065	1034	.04	1110	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1034	1110	101	101	101	.1 .3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.828

INPUT
Description: 4.829 4.832 TAR17 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
980	653.8	998	647.8	1029	646.8	1044	641.9	1068	641.9
1105	654.2	1126	654.2						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
980	.065	1029	.04	1105	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1029	1105	139	139	139	.1 .3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.801

INPUT
Description: 4.802 4.806 TAR16 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
998	653.8	1016	647.8	1047	646.8	1060	642.5	1088	642.5

1123	654.2	1144	654.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
998	.065	1047	.04	1123	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1047	1123	99	99	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.783

INPUT
Description: 4.784 4.787 TAR15 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1038	653.8	1056	647.8	1087	646.8	1101	642	1127	642
1163	654.2	1184	654.2						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1038	.065	1087	.04	1163	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1087	1163	43	43	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.774

INPUT
Description: 4.775 4.779 TAR14 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1058	653.7	1076	647.7	1107	646.7	1120	642.5	1148	642.5
1183	654.1	1204	654.1						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1058	.065	1107	.04	1183	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1107	1183	75	75	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.760

INPUT
Description: 4.761 4.765 TAR13 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1117	653.7	1135	647.7	1166	646.7	1182	641.5	1204	641.5
1242	654.1	1263	654.1						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1117	.065	1166	.04	1242	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1166	1242	95	95	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.742

INPUT
Description: 4.743 4.747 TAR12 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1124	653.7	1142	647.7	1173	646.7	1186	642.2	1214	642.2
1249	654.1	1270	654.1						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1124	.065	1173	.04	1249	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1173	1249	156	156	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.713

INPUT
Description: 4.714 4.717 TAR11 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1087	653.7	1105	647.7	1136	646.7	1149	642.4	1177	642.4
1212	654	1233	654						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1087	.065	1136	.04	1212	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1136	1212	80	80	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.698

INPUT
Description: 4.699 4.702 TAR10 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1063	653.6	1081	647.6	1112	646.6	1125	642.2	1153	642.2
1188	654	1209	654						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1063	.065	1112	.04	1188	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1112	1188	77	77	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.683

INPUT
Description: 4.684 4.688 TAR9 ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1046	653.6	1064	647.6	1095	646.6	1115	639.9	1129	639.9

```
    1171   653.9    1192   653.9

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val     Sta   n Val
    1046    .065    1095     .04    1171    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1095    1171               26      26      26             .3       .5

CROSS SECTION


RIVER: HIGGINS CK
REACH: MAINSTEM           RS: 4.678

INPUT
Description: 4.679  4.683  Immediately Upstream - Touhy Ave Reservoir
             Control
Cross Section copied from Approach section. ** HIGGINS
             CREEK**
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    1046   653.6    1064   647.6    1095   646.6    1115   639.9    1129   639.9
    1171   653.9    1192   653.9

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val     Sta   n Val
    1046    .065    1095     .04    1171    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1095    1171               55      55      55             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    1046  1107.5   652.6        F
  1136.5    1192   652.6        F

CULVERT


RIVER: HIGGINS CK
REACH: MAINSTEM           RS: 4.673

INPUT
Description: 4.674  4.677  TOUHY AVE RESERVOIR CONTROL
Deck realigned to match
             section stationing.
Distance from Upstream XS =       5
Deck/Roadway Width        =      45
Weir Coefficient          =     2.7
Upstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    1046   653.6     -.3    1051   652.6     -.3    1167   652.9     -.3
    1172   653.9     -.3

Upstream Bridge Cross Section Data
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    1046   653.6    1064   647.6    1095   646.6    1115   639.9    1129   639.9
    1171   653.9    1192   653.9

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val     Sta   n Val
    1046    .065    1095     .04    1171    .065

Bank Sta: Left   Right    Coeff Contr.   Expan.
          1095    1171             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    1046  1107.5   652.6        F
  1136.5    1192   652.6        F
```

Downstream Deck/Roadway Coordinates
num= 4

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1071 653.6	-.3	1076 652.6	-.3	1192 652.9	-.3
1197 653.9	-.3				

Downstream Bridge Cross Section Data
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1071	653.6	1089	647.6	1120	646.6	1139	640.2	1155	640.2
1196	653.9	1217	653.9						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1071	.065	1120	.04	1196	.065

Bank Sta: Left Right Coeff Contr. Expan.
1120 1196 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1071	1132.5	651.2	F
1161.5	1217	651.2	F

Upstream Embankment side slope = .671 horiz. to 1.0 vertical
Downstream Embankment side slope = .671 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 652.6
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culv # 1	Box	4	9

FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	5	45	.015	.015	0	.4	1

Number of Barrels = 2
Upstream Elevation = 639.94
Centerline Stations

Sta.	Sta.
1117	1127

Downstream Elevation = 640.21
Centerline Stations

Sta.	Sta.
1142	1152

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.668

INPUT
Description: 4.669 4.672 Immediately Downstream - Touhy Ave Reservoir
Control
Cross Section copied from Exit section. ** HIGGINS CREEK**
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1071	653.6	1089	647.6	1120	646.6	1139	640.2	1155	640.2
1196	653.9	1217	653.9						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1071	.065	1120	.04	1196	.065

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1120    1196              19      19      19             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    1071  1132.5   651.2       F
  1161.5    1217   651.2       F

CROSS SECTION


RIVER: HIGGINS CK
REACH: MAINSTEM           RS: 4.664

INPUT
Description: 4.665  4.669  Approach - Touhy Ave / Exit - Touhy Ave Reservoir
             Control  TAR8 ** HIGGINS CREEK**
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    1071   653.6    1089   647.6    1120   646.6    1139   640.2    1155   640.2
    1196   653.9    1217   653.9

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    1071    .065    1120     .04    1196    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1120    1196             130     130     130             .3       .5

CROSS SECTION


RIVER: HIGGINS CK
REACH: MAINSTEM           RS: 4.639

INPUT
Description: 4.640  4.644  Immediately Upstream - Touhy Ave ** HIGGINS CREEK**
             Cross Section copied from Approach section.
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    1071   653.6    1089   647.6    1120   646.6    1139   640.2    1155   640.2
    1196   653.9    1217   653.9

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    1071    .065    1120     .04    1196    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1120    1196           144.4   144.4   144.4             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    1071    1122   652.5       F
    1172    1217   652.5       F

CULVERT


RIVER: HIGGINS CK
REACH: MAINSTEM           RS: 4.626

INPUT
Description: 4.627  4.630  TOUHY AVE
Deck realigned to match section
             stationing.
Distance from Upstream XS =      10
Deck/Roadway Width        =   124.4
Weir Coefficient          =     2.7
Upstream  Deck/Roadway Coordinates
    num=      19
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     500   656.1     -.3     533   656.6     -.3     550   656.2     -.3
     608   656.6     -.3     628   656.6     -.3     661   656.5     -.3
```

703	659.3	-.3	714	656.3	-.3	766	656.1	-.3
818	655.5	-.3	863	654.7	-.3	948	652.7	-.3
1083	652.7	-.3	1243	652.5	-.3	1378	652.7	-.3
1568	653.7	-.3	1748	654.7	-.3	1933	655.7	-.3
2058	656.7	-.3						

Upstream Bridge Cross Section Data
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1071	653.6	1089	647.6	1120	646.6	1139	640.2	1155	640.2
1196	653.9	1217	653.9						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1071	.065	1120	.04	1196	.065

Bank Sta: Left Right Coeff Contr. Expan.
1120 1196 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1071	1122	652.5	F
1172	1217	652.5	F

Downstream Deck/Roadway Coordinates
num= 19

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
500	656.1	-.3	533	656.6	-.3	550	656.2	-.3
608	656.6	-.3	628	656.6	-.3	661	656.5	-.3
703	659.3	-.3	714	656.3	-.3	766	656.1	-.3
818	655.5	-.3	863	654.7	-.3	948	652.7	-.3
1083	652.7	-.3	1243	652.5	-.3	1378	652.7	-.3
1568	653.7	-.3	1748	654.7	-.3	1933	655.7	-.3
2058	656.7	-.3						

Downstream Bridge Cross Section Data
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
620	653.7	975	652.3	1000	651.4	1048	651.4	1104	651.3
1165	650.8	1185	643.1	1200	641.8	1213	641.8	1231	653.5

Manning's n Values num= 2

Sta	n Val	Sta	n Val
620	.085	1165	.04

Bank Sta: Left Right Coeff Contr. Expan.
1165 1231 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
620	1174	651.1	F
1224	1231	651.1	F

Upstream Embankment side slope = 4 horiz. to 1.0 vertical
Downstream Embankment side slope = 4 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 652.5
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name Shape Rise Span
Culv # 1 Box 7 14.5
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 2 - Wingwall flared 90 or 15 deg.
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	10	124.4	.015	.015	0	.5	1

Number of Barrels = 2
Upstream Elevation = 642.54

Centerline Stations
Sta. Sta.
1139 1155
Downstream Elevation = 642.74
Centerline Stations
Sta. Sta.
1190.8 1206.8

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.612

INPUT
Description: 4.613 4.617 Immediately Downstream - Touhy Ave ** HIGGINS CREEK** Cross Section copied from Exit section.
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
620	653.7	975	652.3	1000	651.4	1048	651.4	1104	651.3
1165	650.8	1185	643.1	1200	641.8	1213	641.8	1231	653.5

Manning's n Values num= 2

Sta	n Val	Sta	n Val
620	.085	1165	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1165	1231	129	129	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
620	1174	651.1	F
1224	1231	651.1	F

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.588

INPUT
Description: 4.589 4.592 Exit - Touhy Ave ** HIGGINS CREEK** TAR7
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
620	653.7	975	652.3	1000	651.4	1048	651.4	1104	651.3
1165	650.8	1185	643.1	1200	641.8	1213	641.8	1231	653.5

Manning's n Values num= 2

Sta	n Val	Sta	n Val
620	.085	1165	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1165	1231	242	242	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.542

INPUT
Description: 4.543 4.543 Approach - Mt Prospect Rd TAR6
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	655.4	45	639.1	80	639.1	125	655.4

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	45	.04	80	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
45	80	23	23	.1	.3

CROSS SECTION

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.537

INPUT
Description: 4.538 4.539 Immediately Upstream - Mt Prospect Rd
Cross Section
copied from Approach section.
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	655.4	45	639.1	80	639.1	125	655.4

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	45	.04	80	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
45	80	174	174	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	46.5	653.6	F
78.5	125	653.6	F

CULVERT

RIVER: HIGGINS CK
REACH: MAINSTEM RS: 4.521

INPUT
Description: 4.522 4.522 Mt. Prospect Road
Distance from Upstream XS = 10
Deck/Roadway Width = 154
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
0	653.6	-.3	125	653.6	-.3

Upstream Bridge Cross Section Data
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	655.4	45	639.1	80	639.1	125	655.4

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	45	.04	80	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
45	80	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	46.5	653.6	F
78.5	125	653.6	F

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
0	653.6	-.3	125	653.6	-.3

Downstream Bridge Cross Section Data
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	652.8	45	637.5	80	637.5	125	652.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	45	.04	80	.04

```
Bank Sta: Left   Right    Coeff Contr.   Expan.
           45     80            .3        .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    46.5   653.6       F
    78.5     125   653.6       F

Upstream Embankment side slope              =       4 horiz. to 1.0 vertical
Downstream Embankment side slope            =       4 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =   653.6
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culv # 1             Box       8      12
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss
Coef
                 1     154     .015     .015        0                  .4               1
Upstream   Elevation =  638.6
           Centerline Station =  62.5
Downstream Elevation =  637.09
           Centerline Station =  62.5

CROSS SECTION


RIVER: HIGGINS CK
REACH: MAINSTEM          RS: 4.505

INPUT
Description: 4.506  4.506  Immediately Downstream - Mt Prospect Rd
Cross
            Section copied from Exit section.
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   652.8      45   637.5      80   637.5     125   652.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04      45     .04      80     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           45     80                 103     103     103            .3        .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    46.5   653.6       F
    78.5     125   653.6       F

CROSS SECTION


RIVER: HIGGINS CK
REACH: MAINSTEM          RS: 4.485

INPUT
Description: 4.486  4.486  Exit - Mt Prospect Rd  TAR4
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   652.8      45   637.5      80   637.5     125   652.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04      45     .04      80     .04
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            45      80                0       0       0             .1      .3

CROSS SECTION


RIVER: HIGGINS TRIB A
REACH: 1                  RS: 25

INPUT
Description: River Mile or Station US5
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   672.2      10   671.7      70   670.7      73   669.7      80   667.7
      90   667.7      98   669.7     105   670.7     115   671.7     120   672.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .055      70    .035     105    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            73      98                100     100     100             .1      .3

CROSS SECTION


RIVER: HIGGINS TRIB A
REACH: 1                  RS: 24

INPUT
Description: River Mile or Station US4
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   674.7      12   671.7      45   671.7      55   666.7      65   666.7
      75   670.7      78   671.7      83   672.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .055      45    .035      75    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            45      75                200     200     200             .1      .3

CROSS SECTION


RIVER: HIGGINS TRIB A
REACH: 1                  RS: 23

INPUT
Description: River Mile or Station US3
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   674.7       9   671.7      19   671.7      30   672.7      39   671.7
      50   667.7      65   667.7      75   670.7      78   671.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .055      39    .035      75    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            39      75                200     200     200             .1      .3
```

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 22

INPUT
Description: River Mile or Station US2
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	674.7	60	673.7	75	669.7	80	664.7	105	664.7
116	670.7	120	671.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.055	75	.035	116	.055

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
75	116	300	300	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 21

INPUT
Description: River Mile or Station US1
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	673.7	10	671.7	70	670.7	80	669.7	95	664.7
105	664.7	126	670.7	130	671.7				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.055	80	.035	126	.055

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
80	126	100	100	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 20

INPUT
Description: River Mile or Station EGV8
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	672.7	8	671.7	40	670.7	72	669.7	87	664.7
95	664.7	117	668.7	120	669.7	134	670.7		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.055	72	.035	117	.055

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
72	117	100	100	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 19

INPUT
Description: River Mile or Station EGV7
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	672.7	8	671.7	38	670.7	61	669.7	77	667.7

```
      89   665.7      92   664.4      94   664.7     107   667.7     160   668.7
     180   669.7     245   670.7

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
       0    .055       61    .035      107    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            61     107             100     100     100             .1       .3

CROSS SECTION


RIVER: HIGGINS TRIB A
REACH: 1                  RS: 18

INPUT
Description: River Mile or Station EGV6
Station Elevation Data    num=        9
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
      40   670.7       75   669.7       87   664.7       92   664.2       97   664.7
     135   667.7      175   668.7      192   669.7      219   670.7

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
      40     .04       87    .035      135    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            75     135             100     100     100             .1       .3

CROSS SECTION


RIVER: HIGGINS TRIB A
REACH: 1                  RS: 17

INPUT
Description: River Mile or Station EGV5
Station Elevation Data    num=       11
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0   673.7       12   670.7       81   669.7       92   664.1      100   664.1
     104   664.7      119   666.7      135   667.7      159   668.7      215   669.7
     235   670.7

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
       0    .055       81    .035      135    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            81     104             100     100     100             .1       .3

CROSS SECTION


RIVER: HIGGINS TRIB A
REACH: 1                  RS: 16

INPUT
Description: River Mile or Station EGV4
Station Elevation Data    num=       12
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0   672.7       15   669.7       50   668.7       84   667.7       92    664
     101    664       120   665.7      130   666.7      136   667.7      145   668.7
     190   669.7      265   670.7

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
       0    .055       84    .035      136    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            84     130             100     100     100             .1       .3
```

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 15

INPUT
Description: River Mile or Station EGV3
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	672.2	12	669.7	15	668.7	90	667.7	101	663.7
107	663.7	118	667.7	124	668.7	139	669.7	169	670.7

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.055	90	.035	118	.055

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
90	118	100	100	100	.1 .3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 14

INPUT
Description: River Mile or Station EGV2
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	672.2	15	669.7	18	668.7	78	667.7	90	663.7
102	663.7	112	667.7	129	672.7				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.055	15	.035	112	.055

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
15	112	100	100	100	.1 .3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 13

INPUT
Description: River Mile or Station EGV1
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	671.7	12	669.7	25	663.7	39	663.7	47	666.7
55	667.7	75	668.2						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	12	.035	75	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
12	55	280	280	280	.1 .3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 12

INPUT
Description: River Mile or Station 281C
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	669.7	8	668.7	16	667.7	23	666.7	37	665.7
39	664.7	40	663.7	41	662.7	56	662.7	58	663.7
60	664.7	62	665.7	64	666.7	66	667.7	68	668.7

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	16	.035	66	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
16	66	140	140	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 11

INPUT
Description: River Mile or Station 281CC
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
955	672.7	975	671.7	980	670.7	983	669.7	992	664.7
994	663.7	1000	663	1005	663.7	1008	664.7	1018	669.7
1022	670.7	1028	671.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
955	.04	983	.035	1018	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
983	1018	140	140	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 10

INPUT
Description: River Mile or Station 281B
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
779	671.7	840	670.7	845	669.7	852	664.7	857	663.7
862	662.7	869	663.7	873	664.7	882	669.7	890	670.7
1015	670.7	1100	670.9						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
779	.04	845	.035	882	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
845	882	138	138	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 9

INPUT
Description: River Mile or Station 281BB
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
960	670.7	976	669.7	992	664.7	995	663.7	997	662.7
1000	662.2	1008	662.7	1010	663.7	1015	664.7	1030	669.7
1040	670.7								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
960	.04	976	.035	1030	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
976	1030	140	140	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 8

INPUT
Description: River Mile or Station 281
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	673.7	100	672	122	672.3	132	675.4	139	672.6
160	672.2	200	671.8	300	673.6	400	674	500	674.1
600	673.8	700	672.4	800	671.7	878	670.4	886	667.9
896	662.1	899	661.3	900	661	901	661.3	915	662.4
943	669.9	1000	669.5	1100	669.2	1200	669.2	1300	669.1
1400	667.1	1500	669.4	1555	667.5	1600	669.6	1700	667.9
1800	668	1900	667	1969	667.5	2000	667.6	2043	667.8

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	160	.035	200	.035	878	.042	943	.04
1555	.04								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
878	943	68	68	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 7

INPUT
Description: River Mile or Station 281X
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
990	668.7	1026	667.7	1033	666.7	1042	665.7	1055	664.7
1058	663.7	1060	662.7	1070	661	1075	662.7	1080	663.7
1082	664.7	1085	665.7	1095	667.7	1102	668.7		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
990	.04	1033	.04	1095	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1033	1095	91	91	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 6.001

INPUT
Description: River Mile or Station 281X used just upstream of crossing.
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
990	668.7	1026	667.7	1033	666.7	1042	665.7	1055	664.7
1058	663.7	1060	662.7	1070	661	1075	662.7	1080	663.7
1082	664.7	1085	665.7	1095	667.7	1102	668.7		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
990	.04	1033	.04	1095	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1033	1095	72.5	72.5	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
990	1058	666.7	F
1082	1102	666.7	F

CULVERT

RIVER: HIGGINS TRIB A
REACH: 1 RS: 6

INPUT
Description: Culvert(s) @ 281A
Distance from Upstream XS = 1
Deck/Roadway Width = 70.5
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 4

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
990	667	-.3	1090 666.7	-.3	1190 666.7	-.3
1290	666.9	-.3			

Upstream Bridge Cross Section Data
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
990	668.7	1026	667.7	1033	666.7	1042	665.7	1055	664.7
1058	663.7	1060	662.7	1070	661	1075	662.7	1080	663.7
1082	664.7	1085	665.7	1095	667.7	1102	668.7		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
990	.04	1033	.04	1095	.04

Bank Sta: Left Right Coeff Contr. Expan.
1033 1095 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
990	1058	666.7	F
1082	1102	666.7	F

Downstream Deck/Roadway Coordinates
num= 4

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
799	667	-.3	900 666.7	-.3	1000 666.7	-.3
1100	666.9	-.3			

Downstream Bridge Cross Section Data
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
799	675.7	800	670.4	878	669.1	886	666.6	896	660.8
899	660	900	659.7	901	660	915	661.1	943	669.6
1000	668.2	1001	675.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
799	.04	878	.045	943	.04

Bank Sta: Left Right Coeff Contr. Expan.
878 943 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
799	896	666.7	F
919	1001	666.7	F

Upstream Embankment side slope = 3.362 horiz. to 1.0 vertical
Downstream Embankment side slope = 3.362 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 666.7
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culv # 1	Box	4.85	15.8

FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	1	70.5	.012	.012	0	.4	1

Upstream Elevation = 660.7
Centerline Station = 1070
Downstream Elevation = 660.38
Centerline Station = 907.9

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 5.999

INPUT
Description: River Mile or Station 281AA used just downstream of crossing.
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
799	675.7	800	670.4	878	669.1	886	666.6	896	660.8
899	660	900	659.7	901	660	915	661.1	943	669.6
1000	668.2	1001	675.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
799	.04	878	.045	943	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
878	943	149	149	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
799	896	666.7	F
919	1001	666.7	F

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 5

INPUT
Description: River Mile or Station 281AA
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
799	675.7	800	670.4	878	669.1	886	666.6	896	660.8
899	660	900	659.7	901	660	915	661.1	943	669.6
1000	668.2	1001	675.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
799	.04	878	.045	943	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
878	943	1950	1950	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 4

INPUT
Description: River Mile or Station WHE03
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

-1	669.7	0	657.7	4	656.9	14	654.7	20	656.6
30	656.8	100	656.8	200	656.5	225	656.4	235	657.3
248	657.2	255	655.7	257	653.9	259	652.9	260	652.6
262	652.8	264	653.9	270	657.2	300	657.5	400	657.7
500	658.1	550	658.7	551	669.7				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-1	.085	248	.075	270	.085

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
248	270	1110	1110	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 3

INPUT
Description: River Mile or Station 280
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	664.7	7	662.1	100	661.1	200	660.9	400	661.3
600	660.1	800	657.7	1000	657	1100	656.8	1200	655.8
1300	655.8	1400	656.6	1500	656.9	1600	656.7	1700	656.2
1777	655.6	1784	653.1	1787	652.5	1794	652.1	1797	653.1
1802	655.3	1900	655.2	2000	656.3	2100	657.1	2200	658
2300	658.4	2344	659.7	2361	659.8	2372	655.8	2373	655.9
2383	656.9	2393	660	2400	662.2	2410	665.2		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	1777	.035	1802	.04	2300	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1777	1802	49	49	.1	.3

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 2.001

INPUT
Description: River Mile or Station 280 used just upstream of crossing.
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	664.7	7	662.1	100	661.1	200	660.9	400	661.3
600	660.1	800	657.7	1000	657	1100	656.8	1200	655.8
1300	655.8	1400	656.6	1500	656.9	1600	656.7	1700	656.2
1777	655.6	1784	653.1	1787	652.5	1794	652.1	1797	653.1
1802	655.3	1900	655.2	2000	656.3	2100	657.1	2200	658
2300	658.4	2344	659.7	2361	659.8	2372	655.8	2373	655.9
2383	656.9	2393	660	2400	662.2	2410	665.2		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	1777	.035	1802	.04	2300	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1777	1802	170.75 170.75	170.75	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1777	663.5	F
1802	2410	663.5	F

CULVERT

RIVER: HIGGINS TRIB A
REACH: 1 RS: 2

INPUT
Description: Culvert(s) @ 280A
Distance from Upstream XS = 1
Deck/Roadway Width = 168.75
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 5

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	664.7		1694	663.5	-.3	1794	663.6	-.3
1894	663.7	-.3	2410	665.2				

Upstream Bridge Cross Section Data
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	664.7	7	662.1	100	661.1	200	660.9	400	661.3
600	660.1	800	657.7	1000	657	1100	656.8	1200	655.8
1300	655.8	1400	656.6	1500	656.9	1600	656.7	1700	656.2
1777	655.6	1784	653.1	1787	652.5	1794	652.1	1797	653.1
1802	655.3	1900	655.2	2000	656.3	2100	657.1	2200	658
2300	658.4	2344	659.7	2361	659.8	2372	655.8	2373	655.9
2383	656.9	2393	660	2400	662.2	2410	665.2		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	1777	.035	1802	.04	2300	.04

Bank Sta: Left Right Coeff Contr. Expan.
1777 1802 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1777	663.5	F
1802	2410	663.5	F

Downstream Deck/Roadway Coordinates
num= 5

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	664.7		1694	663.5	-.3	1794	663.6	-.3
1894	663.7	-.3	2410	665.2				

Downstream Bridge Cross Section Data
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1499	665.7	1500	655	1600	654.8	1700	654.3	1777	655
1784	651.2	1787	650.6	1794	650.2	1797	651.2	1802	653.4
1900	653.3	2000	654.4	2001	665.7				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1499	.05	1777	.05	1802	.05

Bank Sta: Left Right Coeff Contr. Expan.
1777 1802 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1499	1777	663.5	F
1802	2001	663.5	F

Upstream Embankment side slope = 4 horiz. to 1.0 vertical
Downstream Embankment side slope = 4 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 663.45
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culv # 1	Box	5.75	9

FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	1	168.75	.012	.012	0	.4	1

Number of Barrels = 2
Upstream Elevation = 650.94
Centerline Stations

Sta.	Sta.
1793.5	1783.5

Downstream Elevation = 650.7
Centerline Stations

Sta.	Sta.
1793.5	1783.5

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 1.999

INPUT
Description: River Mile or Station 280AA used just downstream of crossing.
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1499	665.7	1500	655	1600	654.8	1700	654.3	1777	655
1784	651.2	1787	650.6	1794	650.2	1797	651.2	1802	653.4
1900	653.3	2000	654.4	2001	665.7				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1499	.05	1777	.05	1802	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1777	1802	49	49	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1499	1777	663.5	F
1802	2001	663.5	F

CROSS SECTION

RIVER: HIGGINS TRIB A
REACH: 1 RS: 1

INPUT
Description: Cross Section 1 from Tributary A LOMR '07 = WSP2 XS 280AA
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1499	665.7	1500	655	1600	654.8	1700	654.3	1777	655
1784	651.2	1787	650.6	1794	650.2	1797	651.2	1802	653.4
1900	653.3	2000	654.4	2001	665.7				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1499	.05	1777	.05	1802	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1777	1802	0	0	.1	.3

SUMMARY OF MANNING'S N VALUES

River:HIGGINS CK

Reach	River Sta.	n1	n2	n3	n4	n5
2	6.404	.065	.065	.075		
2	6.287	.065	.065	.075		
MAINSTEM	6.245	.07	.02	.07		
MAINSTEM	6.021	.04	.029	.04		
MAINSTEM	5.991	.04	.029	.04		
MAINSTEM	5.981	Bridge				
MAINSTEM	5.971	.06	.035	.06		
MAINSTEM	5.968	.06	.035	.06		
MAINSTEM	5.756	.06	.035	.06		
MAINSTEM	5.721	Culvert				
MAINSTEM	5.685	.06	.035	.06		
MAINSTEM	5.649	.06	.035	.06		
MAINSTEM	5.558	.06	.035	.06		
MAINSTEM	5.496	.06	.035	.06		
MAINSTEM	5.408	.06	.035	.06		
MAINSTEM	5.378	.06	.035	.06		
MAINSTEM	5.364	Bridge				
MAINSTEM	5.351	.075	.06	.075		
MAINSTEM	5.340	.075	.06	.075	.075	
MAINSTEM	5.289	.05	.035	.05		
MAINSTEM	5.236	.05	.035	.05		
MAINSTEM	5.184	.05	.035	.05	.03	
MAINSTEM	5.144	.05	.035	.05	.03	
MAINSTEM	5.094	.05	.035	.05	.03	
MAINSTEM	5.045	.05	.035	.05	.03	
MAINSTEM	5.020	.05	.035	.05	.03	
MAINSTEM	5.012	Culvert				
MAINSTEM	5.005	.03	.05	.035	.05	.03
MAINSTEM	4.992	.03	.05	.035	.05	.03
MAINSTEM	4.966	.03	.05	.035	.05	.03
MAINSTEM	4.944	.03	.05	.035	.05	.03
MAINSTEM	4.925	.05	.035	.05	.03	
MAINSTEM	4.915	.065	.04	.065		
MAINSTEM	4.885	.065	.04	.065		
MAINSTEM	4.866	.065	.04	.065		
MAINSTEM	4.847	.065	.04	.065		
MAINSTEM	4.828	.065	.04	.065		
MAINSTEM	4.801	.065	.04	.065		
MAINSTEM	4.783	.065	.04	.065		
MAINSTEM	4.774	.065	.04	.065		
MAINSTEM	4.760	.065	.04	.065		
MAINSTEM	4.742	.065	.04	.065		
MAINSTEM	4.713	.065	.04	.065		
MAINSTEM	4.698	.065	.04	.065		
MAINSTEM	4.683	.065	.04	.065		
MAINSTEM	4.678	.065	.04	.065		
MAINSTEM	4.673	Culvert				
MAINSTEM	4.668	.065	.04	.065		
MAINSTEM	4.664	.065	.04	.065		
MAINSTEM	4.639	.065	.04	.065		
MAINSTEM	4.626	Culvert				
MAINSTEM	4.612	.085	.04			
MAINSTEM	4.588	.085	.04			
MAINSTEM	4.542	.04	.04	.04		
MAINSTEM	4.537	.04	.04	.04		
MAINSTEM	4.521	Culvert				
MAINSTEM	4.505	.04	.04	.04		
MAINSTEM	4.485	.04	.04	.04		

River:HIGGINS TRIB A

Reach	River Sta.	n1	n2	n3	n4	n5	n6
1	25	.055	.035	.055			
1	24	.055	.035	.055			
1	23	.055	.035	.055			
1	22	.055	.035	.055			
1	21	.055	.035	.055			
1	20	.055	.035	.055			
1	19	.055	.035	.055			
1	18	.04	.035	.055			
1	17	.055	.035	.055			
1	16	.055	.035	.055			
1	15	.055	.035	.055			
1	14	.055	.035	.055			
1	13	.04	.035	.04			
1	12	.04	.035	.04			
1	11	.04	.035	.04			
1	10	.04	.035	.04			
1	9	.04	.035	.04			
1	8	.04	.035	.035	.042	.04	.04
1	7	.04	.04	.04			
1	6.001	.04	.04	.04			
1	6	Culvert					
1	5.999	.04	.045	.04			
1	5	.04	.045	.04			
1	4	.085	.075	.085			
1	3	.04	.035	.04	.04		
1	2.001	.04	.035	.04	.04		
1	2	Culvert					
1	1.999	.05	.05	.05			
1	1	.05	.05	.05			

SUMMARY OF REACH LENGTHS

River: HIGGINS CK

Reach	River Sta.	Left	Channel	Right
2	6.404	540	620	540
2	6.287	0	0	0
MAINSTEM	6.245	1100	1180	1100
MAINSTEM	6.021	160	160	160
MAINSTEM	5.991	105	105	105
MAINSTEM	5.981	Bridge		
MAINSTEM	5.971	14	14	14
MAINSTEM	5.968	1123	1123	1123
MAINSTEM	5.756	370	370	370
MAINSTEM	5.721	Culvert		
MAINSTEM	5.685	190	190	190
MAINSTEM	5.649	482	482	482
MAINSTEM	5.558	329	329	329
MAINSTEM	5.496	464	464	464
MAINSTEM	5.408	157.3	157.3	157.3
MAINSTEM	5.378	145	145	145
MAINSTEM	5.364	Bridge		
MAINSTEM	5.351	55.8	55.8	55.8
MAINSTEM	5.340	271	271	271
MAINSTEM	5.289	281	281	281
MAINSTEM	5.236	272	272	272
MAINSTEM	5.184	212	212	212
MAINSTEM	5.144	266	266	266
MAINSTEM	5.094	259	259	259
MAINSTEM	5.045	130	130	130
MAINSTEM	5.020	80	80	80
MAINSTEM	5.012	Culvert		
MAINSTEM	5.005	69	69	69

MAINSTEM	4.992	135	135	135
MAINSTEM	4.966	115	115	115
MAINSTEM	4.944	100	100	100
MAINSTEM	4.925	55	55	55
MAINSTEM	4.915	159	159	159
MAINSTEM	4.885	101	101	101
MAINSTEM	4.866	100	100	100
MAINSTEM	4.847	101	101	101
MAINSTEM	4.828	139	139	139
MAINSTEM	4.801	99	99	99
MAINSTEM	4.783	43	43	43
MAINSTEM	4.774	75	75	75
MAINSTEM	4.760	95	95	95
MAINSTEM	4.742	156	156	156
MAINSTEM	4.713	80	80	80
MAINSTEM	4.698	77	77	77
MAINSTEM	4.683	26	26	26
MAINSTEM	4.678	55	55	55
MAINSTEM	4.673	Culvert		
MAINSTEM	4.668	19	19	19
MAINSTEM	4.664	130	130	130
MAINSTEM	4.639	144.4	144.4	144.4
MAINSTEM	4.626	Culvert		
MAINSTEM	4.612	129	129	129
MAINSTEM	4.588	242	242	242
MAINSTEM	4.542	23	23	23
MAINSTEM	4.537	174	174	174
MAINSTEM	4.521	Culvert		
MAINSTEM	4.505	103	103	103
MAINSTEM	4.485	0	0	0

River: HIGGINS TRIB A

Reach	River Sta.	Left	Channel	Right
1	25	100	100	100
1	24	200	200	200
1	23	200	200	200
1	22	300	300	300
1	21	100	100	100
1	20	100	100	100
1	19	100	100	100
1	18	100	100	100
1	17	100	100	100
1	16	100	100	100
1	15	100	100	100
1	14	100	100	100
1	13	280	280	280
1	12	140	140	140
1	11	140	140	140
1	10	138	138	138
1	9	140	140	140
1	8	68	68	68
1	7	91	91	91
1	6.001	72.5	72.5	72.5
1	6	Culvert		
1	5.999	149	149	149
1	5	1950	1950	1950
1	4	1110	1110	1110
1	3	49	49	49
1	2.001	170.75	170.75	170.75
1	2	Culvert		
1	1.999	49	49	49
1	1	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: HIGGINS CK

Reach	River Sta.	Contr.	Expan.
2	6.404	.1	.3
2	6.287	.1	.3
MAINSTEM	6.245	.1	.3
MAINSTEM	6.021	.3	.5
MAINSTEM	5.991	.3	.5
MAINSTEM	5.981	Bridge	
MAINSTEM	5.971	.3	.5
MAINSTEM	5.968	.3	.5
MAINSTEM	5.756	.3	.5
MAINSTEM	5.721	Culvert	
MAINSTEM	5.685	.3	.5
MAINSTEM	5.649	.1	.3
MAINSTEM	5.558	.1	.3
MAINSTEM	5.496	.1	.3
MAINSTEM	5.408	.3	.5
MAINSTEM	5.378	.3	.5
MAINSTEM	5.364	Bridge	
MAINSTEM	5.351	.3	.5
MAINSTEM	5.340	.1	.3
MAINSTEM	5.289	.1	.3
MAINSTEM	5.236	.1	.3
MAINSTEM	5.184	.1	.3
MAINSTEM	5.144	.1	.3
MAINSTEM	5.094	.1	.3
MAINSTEM	5.045	.3	.5
MAINSTEM	5.020	.3	.5
MAINSTEM	5.012	Culvert	
MAINSTEM	5.005	.3	.5
MAINSTEM	4.992	.1	.3
MAINSTEM	4.966	.1	.3
MAINSTEM	4.944	.1	.3
MAINSTEM	4.925	.1	.3
MAINSTEM	4.915	.1	.3
MAINSTEM	4.885	.1	.3
MAINSTEM	4.866	.1	.3
MAINSTEM	4.847	.1	.3
MAINSTEM	4.828	.1	.3
MAINSTEM	4.801	.1	.3
MAINSTEM	4.783	.1	.3
MAINSTEM	4.774	.1	.3
MAINSTEM	4.760	.1	.3
MAINSTEM	4.742	.1	.3
MAINSTEM	4.713	.1	.3
MAINSTEM	4.698	.1	.3
MAINSTEM	4.683	.3	.5
MAINSTEM	4.678	.3	.5
MAINSTEM	4.673	Culvert	
MAINSTEM	4.668	.3	.5
MAINSTEM	4.664	.3	.5
MAINSTEM	4.639	.3	.5
MAINSTEM	4.626	Culvert	
MAINSTEM	4.612	.3	.5
MAINSTEM	4.588	.1	.3
MAINSTEM	4.542	.1	.3
MAINSTEM	4.537	.3	.5
MAINSTEM	4.521	Culvert	
MAINSTEM	4.505	.3	.5
MAINSTEM	4.485	.1	.3

River: HIGGINS TRIB A

Reach	River Sta.	Contr.	Expan.
1	25	.1	.3
1	24	.1	.3
1	23	.1	.3
1	22	.1	.3
1	21	.1	.3
1	20	.1	.3
1	19	.1	.3
1	18	.1	.3
1	17	.1	.3
1	16	.1	.3
1	15	.1	.3
1	14	.1	.3
1	13	.1	.3
1	12	.1	.3
1	11	.1	.3
1	10	.1	.3
1	9	.1	.3
1	8	.1	.3
1	7	.1	.3
1	6.001	.3	.5
1	6	Culvert	
1	5.999	.3	.5
1	5	.1	.3
1	4	.1	.3
1	3	.1	.3
1	2.001	.3	.5
1	2	Culvert	
1	1.999	.3	.5
1	1	.1	.3

COMBINED OMP/FIS/LOMR BASELINE MODEL

HIGGINS CREEK SUMMARY TABLE

HEC-RAS Plan: HiggnsExtTrunc88

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)	
2	6.404	10-YEAR	275.00	652.60	657.58		657.65	0.002047	2.17	139.06	73.06	0.22
2	6.404	50-YEAR	400.00	652.60	658.48		658.55	0.001618	2.23	217.19	97.85	0.20
2	6.404	100-YEAR	461.00	652.60	659.02		659.08	0.001240	2.10	272.20	103.16	0.18
2	6.404	500-YEAR	548.00	652.60	659.99		660.03	0.000761	1.83	376.10	112.49	0.14
2	6.287	10-YEAR	275.00	651.39	655.71		655.83	0.004546	2.83	98.69	48.86	0.31
2	6.287	50-YEAR	400.00	651.39	657.72		657.77	0.001022	1.88	262.51	102.24	0.16
2	6.287	100-YEAR	461.00	651.39	658.50		658.54	0.000673	1.67	345.37	109.81	0.13
2	6.287	500-YEAR	548.00	651.39	659.68		659.71	0.000394	1.43	481.94	126.07	0.10
MAINSTEM	6.245	10-YEAR	562.00	651.00	655.69		655.75	0.000152	2.21	475.82	203.88	0.20
MAINSTEM	6.245	50-YEAR	810.00	651.00	657.70		657.74	0.000066	1.82	960.07	277.81	0.14
MAINSTEM	6.245	100-YEAR	911.00	651.00	658.49		658.52	0.000049	1.73	1196.98	327.73	0.12
MAINSTEM	6.245	500-YEAR	1253.00	651.00	659.66		659.69	0.000045	1.86	1605.04	366.66	0.12
MAINSTEM	6.021	10-YEAR	564.00	649.40	655.18		655.38	0.000885	3.63	165.44	78.03	0.32
MAINSTEM	6.021	50-YEAR	810.00	649.40	657.49		657.59	0.000308	2.72	369.86	95.98	0.20
MAINSTEM	6.021	100-YEAR	915.00	649.40	658.32		658.41	0.000236	2.54	451.71	101.40	0.18
MAINSTEM	6.021	500-YEAR	1258.00	649.40	659.49		659.58	0.000229	2.79	576.82	117.66	0.18
MAINSTEM	5.991	10-YEAR	564.00	649.10	655.08	651.57	655.24	0.000658	3.26	173.09	62.13	0.27
MAINSTEM	5.991	50-YEAR	810.00	649.10	657.38	652.22	657.53	0.000375	3.03	271.54	95.27	0.21
MAINSTEM	5.991	100-YEAR	915.00	649.10	658.21	652.48	658.35	0.000315	3.01	308.53	100.64	0.20
MAINSTEM	5.991	500-YEAR	1258.00	649.10	659.46	653.29	659.55	0.000209	2.67	596.28	116.80	0.17
MAINSTEM	5.981		Bridge									
MAINSTEM	5.971	10-YEAR	645.00	649.10	654.98	651.56	655.11	0.000579	2.89	223.39	52.44	0.23
MAINSTEM	5.971	50-YEAR	1100.00	649.10	656.98	652.51	657.17	0.000546	3.51	313.17	108.00	0.23
MAINSTEM	5.971	100-YEAR	1320.00	649.10	657.65	652.89	657.80	0.000495	3.24	483.88	108.00	0.22
MAINSTEM	5.971	500-YEAR	1930.00	649.10	658.93	653.83	659.14	0.000541	3.81	622.60	108.00	0.24
MAINSTEM	5.968	10-YEAR	645.00	647.90	654.98		655.10	0.000629	2.77	233.10	52.41	0.23
MAINSTEM	5.968	50-YEAR	1100.00	647.90	657.00		657.13	0.000500	3.04	416.59	108.00	0.22
MAINSTEM	5.968	100-YEAR	1320.00	647.90	657.64		657.79	0.000490	3.22	486.52	108.00	0.22
MAINSTEM	5.968	500-YEAR	1930.00	647.90	658.93		659.13	0.000538	3.79	625.18	108.00	0.24
MAINSTEM	5.756	10-YEAR	645.00	647.90	653.88	651.45	654.11	0.001196	3.88	166.20	46.68	0.32
MAINSTEM	5.756	50-YEAR	1100.00	647.90	656.01	652.41	656.33	0.000952	4.49	245.16	96.50	0.31
MAINSTEM	5.756	100-YEAR	1320.00	647.90	656.89	652.79	657.10	0.000772	3.73	404.88	108.00	0.27

HEC-RAS Plan: HiggnsExtTrunc88 (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	5.756	500-YEAR	1930.00	647.90	658.11	653.79	658.37	0.000812	4.33	536.42	108.00	0.28
MAINSTEM	5.721		Culvert									
MAINSTEM	5.685	10-YEAR	645.00	646.50	653.27	649.67	653.41	0.000522	3.05	211.46	54.60	0.22
MAINSTEM	5.685	50-YEAR	1100.00	646.50	654.72	650.57	654.98	0.000716	4.15	265.04	60.13	0.27
MAINSTEM	5.685	100-YEAR	1320.00	646.50	655.50	650.97	655.68	0.000639	3.44	384.94	66.37	0.25
MAINSTEM	5.685	500-YEAR	1930.00	646.50	656.64	651.95	656.91	0.000786	4.19	489.89	128.32	0.28
MAINSTEM	5.649	10-YEAR	645.00	646.50	653.19		653.29	0.000534	2.60	248.15	54.30	0.21
MAINSTEM	5.649	50-YEAR	1100.00	646.50	654.63		654.80	0.000684	3.33	330.44	59.74	0.25
MAINSTEM	5.649	100-YEAR	1320.00	646.50	655.36		655.55	0.000682	3.52	375.95	65.28	0.25
MAINSTEM	5.649	500-YEAR	1930.00	646.50	656.46		656.75	0.000862	4.31	467.01	127.79	0.29
MAINSTEM	5.558	10-YEAR	907.00	646.30	652.73		652.92	0.000989	3.51	258.09	57.16	0.29
MAINSTEM	5.558	50-YEAR	1394.00	646.30	654.13		654.38	0.001024	4.08	342.52	67.05	0.31
MAINSTEM	5.558	100-YEAR	1623.00	646.30	654.91	650.85	655.17	0.000873	4.11	472.83	761.02	0.29
MAINSTEM	5.558	500-YEAR	2270.00	646.30	656.47		656.51	0.000200	2.28	3007.85	1738.01	0.14
MAINSTEM	5.496	10-YEAR	907.00	645.80	652.24		652.52	0.001520	4.25	213.62	48.90	0.36
MAINSTEM	5.496	50-YEAR	1394.00	645.80	653.58		653.95	0.001627	4.93	282.72	54.13	0.38
MAINSTEM	5.496	100-YEAR	1623.00	645.80	654.43		654.81	0.001350	4.92	333.89	68.69	0.35
MAINSTEM	5.496	500-YEAR	2270.00	645.80	656.36		656.43	0.000302	2.80	2428.49	1525.44	0.18
MAINSTEM	5.408	10-YEAR	907.00	645.30	651.46		651.76	0.001721	4.43	204.53	48.32	0.38
MAINSTEM	5.408	50-YEAR	1394.00	645.30	652.72		653.14	0.001875	5.19	268.78	53.22	0.41
MAINSTEM	5.408	100-YEAR	1623.00	645.30	653.77		654.15	0.001459	4.97	326.77	58.65	0.37
MAINSTEM	5.408	500-YEAR	2270.00	645.30	655.93		656.20	0.000763	4.44	807.06	359.13	0.28
MAINSTEM	5.378	10-YEAR	907.00	645.30	651.38	648.17	651.51	0.000698	2.87	316.57	75.88	0.25
MAINSTEM	5.378	50-YEAR	1394.00	645.30	652.67	648.91	652.84	0.000745	3.32	421.27	96.67	0.26
MAINSTEM	5.378	100-YEAR	1623.00	645.30	653.76	649.24	653.91	0.000534	3.13	531.77	771.01	0.23
MAINSTEM	5.378	500-YEAR	2270.00	645.30	655.91	650.01	656.06	0.000354	3.14	761.07	797.66	0.20
MAINSTEM	5.364		Bridge									
MAINSTEM	5.351	10-YEAR	907.00	645.30	650.96	648.12	651.10	0.002507	3.00	302.24	78.66	0.27
MAINSTEM	5.351	50-YEAR	1394.00	645.30	652.23	648.86	652.41	0.002494	3.41	408.75	88.97	0.28
MAINSTEM	5.351	100-YEAR	1623.00	645.30	653.39	649.16	653.55	0.001666	3.17	511.96	103.37	0.23
MAINSTEM	5.351	500-YEAR	2270.00	645.30	655.61	649.92	655.77	0.001122	3.17	719.24	1853.20	0.20

HEC-RAS Plan: HiggnsExtTrunc88 (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	5.340	10-YEAR	907.00	645.30	650.83		650.96	0.002103	2.90	312.33	74.80	0.25
MAINSTEM	5.340	50-YEAR	1394.00	645.30	652.10		652.28	0.002240	3.38	413.30	98.90	0.27
MAINSTEM	5.340	100-YEAR	1623.00	645.30	653.31		653.46	0.001473	3.09	564.34	150.17	0.22
MAINSTEM	5.340	500-YEAR	2270.00	645.30	655.60		655.69	0.000701	2.61	1737.37	1828.97	0.16
MAINSTEM	5.289	10-YEAR	907.00	645.20	650.51		650.64	0.000760	2.88	314.94	80.28	0.26
MAINSTEM	5.289	50-YEAR	1394.00	645.20	651.77		651.94	0.000783	3.31	421.27	88.94	0.27
MAINSTEM	5.289	100-YEAR	1623.00	645.20	653.11		653.25	0.000467	2.94	598.22	225.02	0.21
MAINSTEM	5.289	500-YEAR	2270.00	645.20	655.58		655.61	0.000103	1.75	3729.44	2938.58	0.11
MAINSTEM	5.236	10-YEAR	907.00	645.20	650.15		650.36	0.001333	3.63	249.72	68.26	0.33
MAINSTEM	5.236	50-YEAR	1394.00	645.20	651.39		651.65	0.001325	4.11	339.00	76.32	0.34
MAINSTEM	5.236	100-YEAR	1623.00	645.20	652.88		653.08	0.000744	3.52	461.54	90.70	0.27
MAINSTEM	5.236	500-YEAR	2270.00	645.20	655.48		655.56	0.000251	2.61	2032.67	2201.83	0.16
MAINSTEM	5.184	10-YEAR	907.00	644.50	649.85		650.03	0.001046	3.37	268.79	68.23	0.30
MAINSTEM	5.184	50-YEAR	1394.00	644.50	651.07		651.31	0.001114	3.90	357.19	76.23	0.32
MAINSTEM	5.184	100-YEAR	1623.00	644.50	652.72		652.89	0.000625	3.31	491.07	86.97	0.25
MAINSTEM	5.184	500-YEAR	2270.00	644.50	655.37		655.48	0.000300	2.84	1049.81	597.63	0.18
MAINSTEM	5.144	10-YEAR	907.00	644.40	649.61		649.80	0.001116	3.45	263.02	67.79	0.31
MAINSTEM	5.144	50-YEAR	1394.00	644.40	650.82		651.07	0.001187	3.99	349.57	75.72	0.33
MAINSTEM	5.144	100-YEAR	1623.00	644.40	652.59		652.75	0.000619	3.29	493.50	87.33	0.24
MAINSTEM	5.144	500-YEAR	2270.00	644.40	655.40		655.42	0.000096	1.62	1992.27	633.11	0.10
MAINSTEM	5.094	10-YEAR	907.00	643.10	649.40		649.54	0.000754	2.99	303.06	72.12	0.26
MAINSTEM	5.094	50-YEAR	1394.00	643.10	650.59		650.78	0.000859	3.55	393.11	79.81	0.28
MAINSTEM	5.094	100-YEAR	1623.00	643.10	652.47		652.60	0.000455	2.92	555.14	93.28	0.21
MAINSTEM	5.094	500-YEAR	2270.00	643.10	655.38		655.40	0.000067	1.44	2275.38	672.80	0.09
MAINSTEM	5.045	10-YEAR	571.00	643.80	649.31		649.38	0.000370	2.06	277.17	67.54	0.18
MAINSTEM	5.045	50-YEAR	750.00	643.80	650.54		650.60	0.000292	2.06	363.85	73.87	0.16
MAINSTEM	5.045	100-YEAR	1000.00	643.80	652.44		652.50	0.000196	1.95	513.70	83.69	0.14
MAINSTEM	5.045	500-YEAR	2000.00	643.80	655.37		655.38	0.000043	1.19	2582.20	793.37	0.07
MAINSTEM	5.020	10-YEAR	571.00	643.80	649.23	645.94	649.32	0.000380	2.38	240.26	67.14	0.19
MAINSTEM	5.020	50-YEAR	750.00	643.80	650.46	646.26	650.55	0.000312	2.50	300.22	73.46	0.18
MAINSTEM	5.020	100-YEAR	1000.00	643.80	652.36	646.68	652.46	0.000226	2.54	393.34	83.27	0.16
MAINSTEM	5.020	500-YEAR	2000.00	643.80	655.37	648.06	655.38	0.000044	1.19	2577.65	793.33	0.07

HEC-RAS Plan: HiggnsExtTrunc88 (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	5.012		Culvert									
MAINSTEM	5.005	10-YEAR	571.00	643.80	648.80	645.55	648.89	0.000396	2.43	234.71	90.73	0.19
MAINSTEM	5.005	50-YEAR	750.00	643.80	649.65	645.87	649.77	0.000400	2.72	275.56	95.56	0.20
MAINSTEM	5.005	100-YEAR	1000.00	643.80	650.85	646.28	650.99	0.000377	3.00	333.19	102.38	0.20
MAINSTEM	5.005	500-YEAR	2000.00	643.80	655.36	647.69	655.37	0.000036	1.11	3018.99	1290.62	0.06
MAINSTEM	4.992	10-YEAR	571.00	643.80	648.81		648.85	0.000213	1.56	367.05	90.78	0.14
MAINSTEM	4.992	50-YEAR	750.00	643.80	649.67		649.71	0.000205	1.68	447.21	95.66	0.14
MAINSTEM	4.992	100-YEAR	1000.00	643.80	650.88		650.93	0.000181	1.76	567.37	102.54	0.13
MAINSTEM	4.992	500-YEAR	2000.00	643.80	655.36		655.37	0.000036	1.12	3015.76	1290.60	0.06
MAINSTEM	4.966	10-YEAR	700.00	643.40	648.58		648.77	0.001186	3.45	202.76	54.21	0.31
MAINSTEM	4.966	50-YEAR	920.00	643.40	649.43		649.64	0.001130	3.68	250.20	58.50	0.31
MAINSTEM	4.966	100-YEAR	1260.00	643.40	650.62		650.86	0.001030	3.89	323.78	64.60	0.31
MAINSTEM	4.966	500-YEAR	2140.00	643.40	655.35		655.37	0.000061	1.36	2961.87	1501.32	0.08
MAINSTEM	4.944	10-YEAR	700.00	642.80	648.46		648.64	0.001058	3.40	205.87	51.22	0.30
MAINSTEM	4.944	50-YEAR	920.00	642.80	649.30		649.51	0.001053	3.67	250.68	55.27	0.30
MAINSTEM	4.944	100-YEAR	1260.00	642.80	650.69		650.74	0.000317	2.29	977.84	835.90	0.17
MAINSTEM	4.944	500-YEAR	2140.00	642.80	655.36		655.36	0.000006	0.45	6362.99	1487.41	0.03
MAINSTEM	4.925	10-YEAR	700.00	643.00	648.32		648.52	0.001272	3.60	194.33	51.14	0.33
MAINSTEM	4.925	50-YEAR	920.00	643.00	649.17		649.39	0.001224	3.84	239.40	55.39	0.33
MAINSTEM	4.925	100-YEAR	1260.00	643.00	650.41		650.67	0.001095	4.03	312.54	61.66	0.32
MAINSTEM	4.925	500-YEAR	2140.00	643.00	655.34		655.36	0.000059	1.36	3064.35	1543.85	0.08
MAINSTEM	4.915	10-YEAR	700.00	643.00	648.33		648.44	0.000806	2.71	278.54	91.19	0.23
MAINSTEM	4.915	50-YEAR	920.00	643.00	649.19		649.31	0.000739	2.86	359.41	96.40	0.23
MAINSTEM	4.915	100-YEAR	1260.00	643.00	650.46		650.58	0.000631	2.97	486.58	104.07	0.22
MAINSTEM	4.915	500-YEAR	2140.00	643.00	655.27		655.35	0.000218	2.40	1069.94	148.00	0.14
MAINSTEM	4.885	10-YEAR	700.00	642.90	648.21		648.31	0.000751	2.63	285.36	91.62	0.22
MAINSTEM	4.885	50-YEAR	920.00	642.90	649.08		649.19	0.000689	2.78	367.56	96.81	0.22
MAINSTEM	4.885	100-YEAR	1260.00	642.90	650.37		650.49	0.000588	2.89	496.88	104.47	0.21
MAINSTEM	4.885	500-YEAR	2140.00	642.90	655.24		655.31	0.000204	2.34	1090.34	148.00	0.13
MAINSTEM	4.866	10-YEAR	700.00	642.40	648.12		648.24	0.000775	2.72	275.98	89.50	0.23
MAINSTEM	4.866	50-YEAR	920.00	642.40	649.00		649.12	0.000720	2.88	356.79	94.71	0.23

HEC-RAS Plan: HiggnsExtTrunc88 (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	4.866	100-YEAR	1260.00	642.40	650.30		650.42	0.000619	2.99	484.47	102.41	0.22
MAINSTEM	4.866	500-YEAR	2140.00	642.40	655.21		655.29	0.000213	2.41	1075.17	146.00	0.14
MAINSTEM	4.847	10-YEAR	700.00	642.00	648.04		648.16	0.000765	2.72	273.96	88.62	0.23
MAINSTEM	4.847	50-YEAR	920.00	642.00	648.93		649.05	0.000716	2.89	354.45	93.92	0.23
MAINSTEM	4.847	100-YEAR	1260.00	642.00	650.23		650.36	0.000618	3.00	482.16	101.76	0.21
MAINSTEM	4.847	500-YEAR	2140.00	642.00	655.19		655.27	0.000212	2.41	1075.68	146.00	0.14
MAINSTEM	4.828	10-YEAR	700.00	641.90	647.97		648.08	0.000751	2.70	276.13	88.76	0.23
MAINSTEM	4.828	50-YEAR	920.00	641.90	648.86		648.98	0.000702	2.87	357.22	94.09	0.22
MAINSTEM	4.828	100-YEAR	1260.00	641.90	650.17		650.30	0.000605	2.98	486.21	102.00	0.21
MAINSTEM	4.828	500-YEAR	2140.00	641.90	655.17		655.25	0.000206	2.38	1087.36	146.00	0.13
MAINSTEM	4.801	10-YEAR	700.00	642.50	647.82		647.96	0.001019	2.98	248.77	87.98	0.26
MAINSTEM	4.801	50-YEAR	920.00	642.50	648.72		648.87	0.000894	3.09	330.62	93.39	0.25
MAINSTEM	4.801	100-YEAR	1260.00	642.50	650.06		650.21	0.000718	3.14	461.19	101.42	0.23
MAINSTEM	4.801	500-YEAR	2140.00	642.50	655.14		655.22	0.000219	2.42	1068.65	146.00	0.14
MAINSTEM	4.783	10-YEAR	700.00	642.00	647.74		647.86	0.000873	2.84	258.02	85.97	0.24
MAINSTEM	4.783	50-YEAR	920.00	642.00	648.65		648.78	0.000789	2.98	340.37	93.16	0.24
MAINSTEM	4.783	100-YEAR	1260.00	642.00	650.00		650.14	0.000651	3.06	471.97	101.22	0.22
MAINSTEM	4.783	500-YEAR	2140.00	642.00	655.12		655.20	0.000207	2.39	1083.27	146.00	0.13
MAINSTEM	4.774	10-YEAR	700.00	642.50	647.67		647.82	0.001130	3.08	239.66	86.70	0.27
MAINSTEM	4.774	50-YEAR	920.00	642.50	648.59		648.74	0.000961	3.17	322.89	93.06	0.26
MAINSTEM	4.774	100-YEAR	1260.00	642.50	649.96		650.11	0.000748	3.18	455.81	101.29	0.23
MAINSTEM	4.774	500-YEAR	2140.00	642.50	655.11		655.19	0.000217	2.42	1073.62	146.00	0.14
MAINSTEM	4.760	10-YEAR	700.00	641.50	647.62		647.74	0.000834	2.81	260.18	84.83	0.24
MAINSTEM	4.760	50-YEAR	920.00	641.50	648.54		648.67	0.000757	2.95	343.48	92.77	0.23
MAINSTEM	4.760	100-YEAR	1260.00	641.50	649.92		650.05	0.000626	3.03	476.85	101.05	0.22
MAINSTEM	4.760	500-YEAR	2140.00	641.50	655.09		655.17	0.000200	2.36	1096.96	146.00	0.13
MAINSTEM	4.742	10-YEAR	700.00	642.20	647.50		647.65	0.001069	3.03	239.60	81.52	0.27
MAINSTEM	4.742	50-YEAR	920.00	642.20	648.45		648.59	0.000916	3.13	323.63	92.61	0.25
MAINSTEM	4.742	100-YEAR	1260.00	642.20	649.84		649.99	0.000713	3.15	458.92	100.91	0.23
MAINSTEM	4.742	500-YEAR	2140.00	642.20	655.07		655.15	0.000208	2.39	1084.16	146.00	0.13
MAINSTEM	4.713	10-YEAR	700.00	642.40	647.27		647.45	0.001466	3.36	212.80	73.48	0.31
MAINSTEM	4.713	50-YEAR	920.00	642.40	648.26		648.43	0.001161	3.39	297.16	91.34	0.28

HEC-RAS Plan: HiggnsExtTrunc88 (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	4.713	100-YEAR	1260.00	642.40	649.71		649.87	0.000832	3.31	435.95	100.07	0.25
MAINSTEM	4.713	500-YEAR	2140.00	642.40	655.04		655.12	0.000217	2.42	1072.49	146.00	0.14
MAINSTEM	4.698	10-YEAR	700.00	642.20	647.16		647.33	0.001384	3.30	216.39	73.21	0.30
MAINSTEM	4.698	50-YEAR	920.00	642.20	648.17		648.34	0.001091	3.32	302.82	91.43	0.27
MAINSTEM	4.698	100-YEAR	1260.00	642.20	649.65		649.80	0.000784	3.25	444.17	100.23	0.24
MAINSTEM	4.698	500-YEAR	2140.00	642.20	655.02		655.10	0.000208	2.39	1086.16	146.00	0.13
MAINSTEM	4.683	10-YEAR	424.00	639.90	647.21		647.25	0.000256	1.62	267.19	74.72	0.13
MAINSTEM	4.683	50-YEAR	445.00	639.90	648.23		648.26	0.000147	1.36	356.32	91.91	0.10
MAINSTEM	4.683	100-YEAR	460.00	639.90	649.72		649.74	0.000069	1.05	499.46	100.82	0.07
MAINSTEM	4.683	500-YEAR	600.00	639.90	655.07		655.07	0.000014	0.64	1143.54	146.00	0.03
MAINSTEM	4.678	10-YEAR	424.00	639.90	647.15	642.43	647.23	0.000297	2.21	191.54	72.90	0.15
MAINSTEM	4.678	50-YEAR	445.00	639.90	648.18	642.49	648.25	0.000202	2.01	221.46	91.61	0.13
MAINSTEM	4.678	100-YEAR	460.00	639.90	649.68	642.54	649.72	0.000119	1.74	264.74	100.56	0.10
MAINSTEM	4.678	500-YEAR	600.00	639.90	655.07	642.92	655.07	0.000014	0.64	1143.49	146.00	0.03
MAINSTEM	4.673		Culvert									
MAINSTEM	4.668	10-YEAR	424.00	640.20	646.37	642.57	646.48	0.000488	2.57	164.83	52.80	0.19
MAINSTEM	4.668	50-YEAR	445.00	640.20	647.30	642.62	647.39	0.000324	2.32	191.83	78.07	0.16
MAINSTEM	4.668	100-YEAR	460.00	640.20	648.72	642.68	648.78	0.000182	1.98	232.78	94.83	0.12
MAINSTEM	4.668	500-YEAR	600.00	640.20	655.04	643.06	655.05	0.000014	0.64	1136.20	146.00	0.04
MAINSTEM	4.664	10-YEAR	444.00	640.20	646.38		646.45	0.000518	2.09	212.75	52.84	0.18
MAINSTEM	4.664	50-YEAR	485.00	640.20	647.31		647.37	0.000326	1.83	271.75	78.39	0.15
MAINSTEM	4.664	100-YEAR	700.00	640.20	648.71		648.77	0.000284	1.95	397.45	94.82	0.14
MAINSTEM	4.664	500-YEAR	1600.00	640.20	654.99		655.03	0.000100	1.71	1129.58	146.00	0.09
MAINSTEM	4.639	10-YEAR	444.00	640.20	646.31	642.65	646.38	0.000514	2.13	208.54	52.42	0.18
MAINSTEM	4.639	50-YEAR	485.00	640.20	647.27	642.79	647.32	0.000308	1.89	256.40	76.83	0.15
MAINSTEM	4.639	100-YEAR	700.00	640.20	648.66	643.37	648.73	0.000288	2.15	325.87	94.48	0.15
MAINSTEM	4.639	500-YEAR	1600.00	640.20	654.98	645.18	655.02	0.000101	1.72	1127.64	146.00	0.09
MAINSTEM	4.626		Culvert									
MAINSTEM	4.612	10-YEAR	444.00	641.80	645.70	644.08	645.91	0.002488	3.70	119.91	40.75	0.38
MAINSTEM	4.612	50-YEAR	485.00	641.80	646.91	644.19	647.04	0.001043	2.81	172.44	45.77	0.26
MAINSTEM	4.612	100-YEAR	700.00	641.80	648.25	644.74	648.38	0.000842	2.97	235.97	51.28	0.24

HEC-RAS Plan: HiggnsExtTrunc88 (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	4.612	500-YEAR	1600.00	641.80	654.86	646.44	654.90	0.000122	1.76	1975.66	611.00	0.10
MAINSTEM	4.588	10-YEAR	454.00	641.80	645.07		645.42	0.005155	4.78	94.91	38.13	0.53
MAINSTEM	4.588	50-YEAR	503.00	641.80	646.73		646.88	0.001288	3.06	164.32	45.03	0.28
MAINSTEM	4.588	100-YEAR	730.00	641.80	648.10		648.25	0.001052	3.18	229.51	50.67	0.26
MAINSTEM	4.588	500-YEAR	1666.00	641.80	654.84		654.88	0.000134	1.84	1962.90	611.00	0.10
MAINSTEM	4.542	10-YEAR	454.00	639.10	645.16		645.20	0.000180	1.66	313.82	68.49	0.12
MAINSTEM	4.542	50-YEAR	503.00	639.10	646.77		646.79	0.000090	1.37	430.47	77.32	0.09
MAINSTEM	4.542	100-YEAR	730.00	639.10	648.13		648.16	0.000101	1.62	540.94	84.84	0.09
MAINSTEM	4.542	500-YEAR	1666.00	639.10	654.82		654.86	0.000055	1.73	1232.94	121.82	0.08
MAINSTEM	4.537	10-YEAR	454.00	639.10	645.10	640.95	645.19	0.000371	2.36	192.13	68.15	0.17
MAINSTEM	4.537	50-YEAR	503.00	639.10	646.72	641.08	646.78	0.000206	2.06	243.71	77.05	0.13
MAINSTEM	4.537	100-YEAR	730.00	639.10	648.05	641.63	648.15	0.000253	2.55	286.37	84.41	0.15
MAINSTEM	4.537	500-YEAR	1666.00	639.10	654.82	643.49	654.86	0.000055	1.73	1232.77	121.81	0.08
MAINSTEM	4.521		Culvert									
MAINSTEM	4.505	10-YEAR	454.00	637.50	644.37	639.34	644.43	0.000237	2.07	219.70	75.39	0.14
MAINSTEM	4.505	50-YEAR	503.00	637.50	646.04	639.48	646.09	0.000141	1.84	273.31	85.24	0.11
MAINSTEM	4.505	100-YEAR	730.00	637.50	646.61	640.03	646.71	0.000239	2.50	291.55	88.59	0.15
MAINSTEM	4.505	500-YEAR	1666.00	637.50	650.55	641.89	650.80	0.000375	3.99	417.69	111.78	0.19
MAINSTEM	4.485	10-YEAR	454.00	637.50	644.37	639.16	644.40	0.000108	1.40	379.26	75.41	0.09
MAINSTEM	4.485	50-YEAR	503.00	637.50	646.05	639.28	646.07	0.000057	1.17	514.26	85.29	0.07
MAINSTEM	4.485	100-YEAR	730.00	637.50	646.63	639.75	646.66	0.000092	1.56	564.72	88.71	0.09
MAINSTEM	4.485	500-YEAR	1666.00	637.50	650.63	641.26	650.68	0.000110	2.17	966.60	112.24	0.11

COMBINED OMP/FIS/LOMR BASELINE MODEL

TRIBUTARY A SUMMARY TABLE

HEC-RAS Plan: HiggnsExtTrunc88 River: HIGGINS TRIB A Reach: 1

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)	
1	25	10-YEAR	222.00	667.70	670.79		670.97	0.002002	3.44	68.42	41.28	0.38
1	25	50-YEAR	308.00	667.70	671.31		671.51	0.001812	3.72	99.54	77.85	0.38
1	25	100-YEAR	342.00	667.70	671.50		671.70	0.001717	3.77	115.48	91.06	0.37
1	25	500-YEAR	414.00	667.70	671.89		672.07	0.001474	3.77	155.26	110.64	0.35
1	24	10-YEAR	222.00	666.70	670.65		670.79	0.001422	2.97	74.63	27.78	0.32
1	24	50-YEAR	308.00	666.70	671.15		671.34	0.001622	3.47	89.06	30.24	0.35
1	24	100-YEAR	342.00	666.70	671.32		671.53	0.001691	3.64	94.36	31.11	0.36
1	24	500-YEAR	414.00	666.70	671.66		671.90	0.001823	3.98	105.10	32.79	0.38
1	23	10-YEAR	222.00	667.70	669.37	669.37	670.05	0.016897	6.60	33.64	25.19	1.01
1	23	50-YEAR	308.00	667.70	669.73	669.73	670.53	0.016038	7.16	43.03	27.36	1.01
1	23	100-YEAR	342.00	667.70	669.86	669.86	670.70	0.015756	7.34	46.60	28.14	1.00
1	23	500-YEAR	414.00	667.70	670.11	670.11	671.03	0.015363	7.69	53.81	29.66	1.01
1	22	10-YEAR	222.00	664.70	668.74		668.79	0.000381	1.79	124.08	36.44	0.17
1	22	50-YEAR	308.00	664.70	669.31		669.38	0.000465	2.12	145.18	38.05	0.19
1	22	100-YEAR	342.00	664.70	669.49		669.57	0.000498	2.24	152.42	38.58	0.20
1	22	500-YEAR	414.00	664.70	669.85		669.94	0.000565	2.49	166.22	39.98	0.21
1	21	10-YEAR	222.00	664.70	668.49		668.59	0.001217	2.63	84.50	34.62	0.30
1	21	50-YEAR	308.00	664.70	669.01		669.15	0.001355	2.98	103.43	38.01	0.32
1	21	100-YEAR	342.00	664.70	669.18		669.33	0.001413	3.11	110.03	39.12	0.33
1	21	500-YEAR	414.00	664.70	669.49		669.67	0.001543	3.37	122.67	41.17	0.34
1	20	10-YEAR	222.00	664.70	668.36		668.47	0.001316	2.57	86.38	39.15	0.30
1	20	50-YEAR	308.00	664.70	668.88		669.01	0.001361	2.86	107.68	43.08	0.32
1	20	100-YEAR	342.00	664.70	669.05		669.19	0.001373	2.98	115.05	44.10	0.32
1	20	500-YEAR	414.00	664.70	669.36		669.52	0.001433	3.23	128.89	45.94	0.33
1	19	10-YEAR	222.00	664.40	667.96		668.22	0.004821	4.10	55.82	46.13	0.56
1	19	50-YEAR	308.00	664.40	668.58		668.80	0.003293	3.85	95.75	83.67	0.48
1	19	100-YEAR	342.00	664.40	668.79		668.99	0.002866	3.73	114.71	93.57	0.45
1	19	500-YEAR	414.00	664.40	669.17		669.34	0.002323	3.57	151.72	104.05	0.41
1	18	10-YEAR	222.00	664.20	667.93		667.99	0.000884	1.96	114.17	64.99	0.24
1	18	50-YEAR	308.00	664.20	668.56		668.62	0.000692	2.03	163.20	91.55	0.22
1	18	100-YEAR	342.00	664.20	668.77		668.83	0.000653	2.07	183.09	98.86	0.22
1	18	500-YEAR	414.00	664.20	669.13		669.20	0.000616	2.15	220.56	105.96	0.22

HEC-RAS Plan: HiggnsExtTrunc88 River: HIGGINS TRIB A Reach: 1 (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)	
1	17	10-YEAR	222.00	664.10	667.80		667.89	0.001044	2.73	97.76	52.62	0.28
1	17	50-YEAR	308.00	664.10	668.46		668.54	0.000837	2.68	137.95	69.68	0.26
1	17	100-YEAR	342.00	664.10	668.67		668.76	0.000799	2.69	153.41	75.22	0.25
1	17	500-YEAR	414.00	664.10	669.04		669.13	0.000775	2.76	184.99	95.75	0.25
1	16	10-YEAR	222.00	664.00	667.75		667.81	0.000536	1.84	123.13	54.33	0.20
1	16	50-YEAR	308.00	664.00	668.41		668.47	0.000462	1.98	168.32	82.69	0.19
1	16	100-YEAR	342.00	664.00	668.63		668.69	0.000450	2.04	186.93	91.86	0.19
1	16	500-YEAR	414.00	664.00	669.00		669.06	0.000448	2.18	225.35	118.66	0.20
1	15	10-YEAR	222.00	663.70	667.50		667.69	0.002438	3.56	62.39	26.88	0.41
1	15	50-YEAR	308.00	663.70	668.15		668.37	0.002051	3.77	89.07	64.78	0.39
1	15	100-YEAR	342.00	663.70	668.37		668.59	0.001912	3.82	105.08	82.41	0.38
1	15	500-YEAR	414.00	663.70	668.75		668.97	0.001710	3.90	142.33	109.96	0.37
1	14	10-YEAR	222.00	663.70	667.38		667.50	0.001264	2.73	81.44	32.25	0.30
1	14	50-YEAR	308.00	663.70	668.01		668.15	0.001939	2.91	105.85	53.96	0.36
1	14	100-YEAR	342.00	663.70	668.23		668.36	0.002168	2.88	119.05	67.72	0.38
1	14	500-YEAR	414.00	663.70	668.63		668.75	0.002185	2.76	151.11	93.01	0.38
1	13	10-YEAR	222.00	663.70	667.25		667.36	0.001391	2.75	80.86	34.06	0.31
1	13	50-YEAR	308.00	663.70	667.84		667.98	0.001437	3.00	103.19	44.60	0.33
1	13	100-YEAR	342.00	663.70	668.04		668.19	0.001402	3.08	112.90	52.99	0.32
1	13	500-YEAR	414.00	663.70	668.42		668.58	0.001333	3.23	135.02	60.22	0.32
1	12	10-YEAR	224.00	662.70	666.98		667.05	0.000868	2.16	103.62	43.48	0.25
1	12	50-YEAR	310.00	662.70	667.57		667.65	0.000889	2.37	130.84	48.79	0.25
1	12	100-YEAR	344.00	662.70	667.77		667.86	0.000880	2.44	141.08	50.71	0.26
1	12	500-YEAR	416.00	662.70	668.17		668.27	0.000830	2.58	161.90	54.66	0.25
1	11	10-YEAR	224.00	663.00	666.53		666.81	0.003496	4.22	53.10	22.97	0.49
1	11	50-YEAR	310.00	663.00	667.06		667.40	0.003725	4.73	65.57	24.95	0.51
1	11	100-YEAR	344.00	663.00	667.24		667.61	0.003798	4.90	70.20	25.65	0.52
1	11	500-YEAR	416.00	663.00	667.60		668.02	0.003929	5.23	79.60	27.00	0.54
1	10	10-YEAR	224.00	662.70	666.01		666.29	0.003963	4.25	52.75	25.19	0.52
1	10	50-YEAR	310.00	662.70	666.52		666.87	0.003930	4.69	66.12	26.84	0.53
1	10	100-YEAR	344.00	662.70	666.70		667.07	0.003949	4.85	70.95	27.41	0.53

HEC-RAS Plan: HiggnsExtTrunc88 River: HIGGINS TRIB A Reach: 1 (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)	
1	10	500-YEAR	416.00	662.70	667.05		667.46	0.004002	5.16	80.61	28.51	0.54
1	9	10-YEAR	224.00	662.20	665.46		665.73	0.004112	4.15	54.02	27.71	0.52
1	9	50-YEAR	310.00	662.20	666.02		666.32	0.003815	4.40	70.41	31.16	0.52
1	9	100-YEAR	344.00	662.20	666.21		666.52	0.003760	4.50	76.41	32.34	0.52
1	9	500-YEAR	416.00	662.20	666.57		666.91	0.003690	4.70	88.49	34.57	0.52
1	8	10-YEAR	224.00	661.00	665.26		665.35	0.001464	2.48	90.47	35.12	0.27
1	8	50-YEAR	310.00	661.00	665.81		665.93	0.001601	2.80	110.75	38.14	0.29
1	8	100-YEAR	344.00	661.00	666.00		666.13	0.001657	2.92	117.93	39.15	0.30
1	8	500-YEAR	416.00	661.00	666.35		666.51	0.001771	3.15	132.16	41.09	0.31
1	7	10-YEAR	224.00	661.00	665.01		665.20	0.003519	3.45	65.00	32.01	0.43
1	7	50-YEAR	310.00	661.00	665.56		665.77	0.003803	3.66	84.79	40.72	0.45
1	7	100-YEAR	344.00	661.00	665.74		665.96	0.003809	3.71	92.68	43.62	0.45
1	7	500-YEAR	416.00	661.00	666.11		666.33	0.003700	3.80	109.40	48.70	0.45
1	6.001	10-YEAR	224.00	661.00	663.76	663.76	664.49	0.021411	6.88	32.57	22.30	1.00
1	6.001	50-YEAR	310.00	661.00	664.13	664.13	665.02	0.020275	7.60	40.81	24.13	1.00
1	6.001	100-YEAR	344.00	661.00	664.26	664.26	665.21	0.019843	7.83	43.94	24.81	1.00
1	6.001	500-YEAR	416.00	661.00	664.53	664.53	665.60	0.019241	8.29	50.20	26.15	1.00
1	6		Culvert									
1	5.999	10-YEAR	224.00	659.70	663.61	662.09	663.78	0.002445	3.31	67.64	32.12	0.34
1	5.999	50-YEAR	310.00	659.70	664.13	662.46	664.36	0.002733	3.90	79.50	34.71	0.37
1	5.999	100-YEAR	344.00	659.70	664.30	662.58	664.56	0.002862	4.12	83.46	35.57	0.38
1	5.999	500-YEAR	416.00	659.70	664.65	662.84	664.97	0.003086	4.55	91.45	37.32	0.40
1	5	10-YEAR	224.00	659.70	663.03		663.25	0.005358	3.78	59.26	29.18	0.47
1	5	50-YEAR	310.00	659.70	662.41	662.41	663.25	0.026904	7.32	42.37	26.11	1.01
1	5	100-YEAR	344.00	659.70	662.56	662.56	663.42	0.025815	7.45	46.18	26.84	1.00
1	5	500-YEAR	416.00	659.70	662.81	662.81	663.76	0.025396	7.85	53.02	28.09	1.01
1	4	10-YEAR	224.00	652.60	657.52		657.53	0.001814	1.47	271.85	307.41	0.16
1	4	50-YEAR	310.00	652.60	658.15		658.16	0.000641	1.01	543.49	504.48	0.10
1	4	100-YEAR	344.00	652.60	659.01		659.01	0.000146	0.57	1001.44	550.14	0.05
1	4	500-YEAR	416.00	652.60	660.48		660.48	0.000034	0.33	1811.46	550.39	0.03

HEC-RAS Plan: HiggnsExtTrunc88 River: HIGGINS TRIB A Reach: 1 (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)	
1	3	10-YEAR	294.00	652.10	656.07	655.45	656.13	0.000995	2.53	232.14	426.10	0.27
1	3	50-YEAR	407.00	652.10	658.13		658.13	0.000010	0.38	2375.95	1489.07	0.03
1	3	100-YEAR	452.00	652.10	659.00		659.00	0.000003	0.24	3765.62	1655.31	0.02
1	3	500-YEAR	574.00	652.10	660.48		660.48	0.000001	0.16	6353.18	1857.57	0.01
1	2.001	10-YEAR	294.00	652.10	655.55	654.87	656.00	0.005797	5.33	55.11	155.08	0.63
1	2.001	50-YEAR	407.00	652.10	657.91	655.35	658.11	0.000992	3.57	113.98	1427.42	0.29
1	2.001	100-YEAR	452.00	652.10	658.81	655.51	658.98	0.000670	3.31	136.59	1632.24	0.25
1	2.001	500-YEAR	574.00	652.10	660.29	655.89	660.46	0.000486	3.31	173.53	1825.82	0.22
1	2		Culvert									
1	1.999	10-YEAR	294.00	650.20	655.72	653.00	655.85	0.001557	2.87	102.30	500.18	0.25
1	1.999	50-YEAR	407.00	650.20	657.70	653.49	657.81	0.000804	2.68	151.59	500.54	0.19
1	1.999	100-YEAR	452.00	650.20	658.47	653.66	658.58	0.000664	2.64	171.01	500.68	0.18
1	1.999	500-YEAR	574.00	650.20	659.63	654.08	659.76	0.000634	2.87	200.06	500.90	0.18
1	1	10-YEAR	294.00	650.20	655.78		655.78	0.000059	0.56	832.37	500.19	0.05
1	1	50-YEAR	407.00	650.20	657.75		657.75	0.000010	0.30	1818.52	500.55	0.02
1	1	100-YEAR	452.00	650.20	658.53		658.53	0.000007	0.26	2206.88	500.69	0.02
1	1	500-YEAR	574.00	650.20	659.70		659.70	0.000005	0.25	2793.79	500.91	0.02