

DRAINAGE INVESTIGATION

**ELGIN O'HARE – WEST BYPASS
IL ROUTE 19 (IRVING PARK ROAD) AT BENSENVILLE DITCH/SILVER CREEK
P-91-443-06**

COOK COUNTY, ILLINOIS

Prepared for

Illinois Department of Transportation
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CBBEL Project No. 07-0404

June 2012



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EXECUTIVE SUMMARY

The Illinois Department of Transportation (IDOT), as part of the Elgin-O'Hare West Bypass (EOWB) project, is desirous of completing a Drainage Investigation (DI) of Irving Park Road (IL Route 19) near the O'Hare International Airport Post Office facility within the City of Chicago. IL Route 19 is a four-lane arterial connecting Mannheim Road and York Road. IL Route 19 at the Bensenville Ditch west of Seymour Avenue has been prone to overtopping. The location of this crossing is shown on Exhibit 1 and Exhibit 2.

The purpose of this study is to evaluate alternatives to prevent IL Route 19 from frequent overtopping and extended road closures. Improvements will include the raising of the IL Route 19 embankment and increasing the size of the existing culvert crossing. This report summarizes alternatives and their impacts on upstream water surface elevations and adjacent property owners.

CHAPTER 1

PROJECT OVERVIEW

1.1 INTRODUCTION

IL Route 19 is persistently overtopped by the Bensenville Ditch during storm events slightly greater than a 5-year recurrence interval. The Bensenville Ditch is mapped as Zone A and Zone AE floodplain in this area according to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Cook County, Illinois and Incorporated Areas, Panel 358 of 832, dated August 19, 2008 as shown on Exhibit 3.

The Bensenville Ditch is conveyed through the IL Route 19 roadway embankment via a two – 13.5'(W) by 3.5'(H) reinforced concrete box culverts (RCBC) approximately 177 feet long. Overtopping of IL Route 19 is generally caused by limited conveyance due to head restrictions on the existing RCBC and a tailwater condition attributed to the Metropolitan Water Reclamation District of Greater Chicago (MWRD) Flood Control Structure 102 (Structure 102). The approximate low road elevation is 648.8 feet (approximately 400 feet east of crossing) and the depth to overtopping of IL Route 19 is approximately 5.8 feet from the invert elevation of the twin RCBC. The tailwater effects caused by Structure 102, located immediately downstream of IL Route 19, reduce conveyance of the twin RCBC and increase upstream headwaters.

Floodwaters enter Structure 102 after an existing online 60" diameter reinforced concrete pipe culvert (RCP) surcharges and overtop an existing concrete weir. Cook County 1-foot topography appears to show a grassed area in front of the overtopping weir at an elevation of 647.0 ft. This is approximately 0.2 feet above the approximate overtopping elevation of 646.80 feet associated with the concrete weir of Structure 102. The overtopping elevation into Structure 102 is only 1.8 feet below the low road elevation of IL Route 19. A 15 feet wide chute spillway is the primary low flow conveyance into Structure 102. When the capacity of this spillway is exceeded, floodwaters begin to enter Structure 102 by spilling over the primary berm line along IL Route 19 at elevation 650.0 according to 1-foot Cook County topography. A cross-section location exhibit has been provided in Appendix 3 to illustrate features of Structure 102. Notated plans for Structure 102 are also included in Appendix 3. Table 1-1 summarizes relevant data for the IL Route 19 crossing, the downstream 60" RCP bypass pipe, and depth of overtopping over IL Route 19.

IL Route 19		60" Bypass RCP	
U/S Invert: 643.0 feet		U/S Invert: 642.2 feet	
D/S Invert: 642.6 feet			
Depth of Overtopping (ft)			
10-Year (ft)	50-Year (ft)	100-Year (ft)	
1.5	2.3	2.6	

Table 1-1 Roadway Overtopping Depth Summary at IL 19

CHAPTER 2**EXISTING CONDITIONS ANALYSIS**

The baseline modeling was developed as part of the Metropolitan Water Reclamation District of Greater Chicago (MWRD) Detailed Watershed Plan for the Lower Des Plaines River Watershed (DWP) study. While this modeling was developed to determine future flooding related to capital improvement projects, it is considered best available information for the watershed. Effective modeling within the watershed is broken up into several different hydraulic models. Due to floodplain mapping breaks and the watershed being in multiple counties, there is no continuous effective model of Bensenville Ditch. Zone AE floodplain exists from the Village of Bensenville/DuPage County areas to the old O'Hare International Airport boundary. From here, the Bensenville Ditch is then mapped as Zone A floodplain to the IL Route 19 crossing. It then returns to Zone AE floodplain for the rest of the watershed. The unsteady hydraulic modeling completed as part of the MWRD study provides the only continuous hydraulic model through the project limits and provides the most accurate water surface elevations for this drainage investigation.

2.1 HEC-HMS MODELING

Hydrologic modeling was completed for MWRD using HEC-HMS 3.3. The HEC-HMS model was developed by Christopher B. Burke Engineering, Ltd. (CBBEL) as part of the DWP study for use as the primary hydrologic model for the Bensenville Ditch/Silver Creek watershed. This model was not revised as part of this drainage investigation. A critical duration analysis was completed for the watershed and the 48-hour was determined to be critical. The land use data used to develop runoff curve numbers was taken from Natural Resources Conservation Service (NRCS) soil data for Cook County and the 2001 Northern Illinois Planning Commission (NIPC) land-use mapping for Cook County. NRCS soil data representative of 2005 conditions was obtained for DuPage County portions of the watershed. The O'Hare Modernization Program (OMP) Phase 1 watershed boundaries were used throughout the airport to represent existing conditions. While the Bensenville Ditch watershed boundary through the O'Hare International Airport is consistently changing, the Phase 1 boundary is a conservative estimate for the hydrologic modeling. An exhibit comparing Pre-OMP, Phase 1, and Ultimate Alignment watershed boundaries is included in Appendix 1. Phase 1 tributary area was reduced by 0.71 square miles from Pre-OMP conditions. Approximately 0.44 square miles will be further removed from the watershed once all OMP improvements are completed in the South Airfield. A total of 1.15 square miles will be removed as a result of the OMP. The 10-year, 50-year, and 100-year, 48-hour storm events were modeled as part of this drainage investigation.

2.2 UNSTEADY HEC-RAS MODELING

Flows from the hydrologic modeling were input into a HEC-RAS 4.0 unsteady model. HEC-GeoRAS cross-sections were extracted from a TIN created in GIS from the 2003 Cook County LiDAR topographic data were imported into HEC-RAS. The channel geometry information from a United States Army Corps of Engineers (USACOE) 2007 study and the channel field survey were

incorporated into these GIS cross-sections. Field survey was performed by DB Sterlin Consultants, Inc. in early 2009 under the protocol of FEMA's "Guideline and Specifications for Flood Hazard Mapping partners, Appendix A: Guidance for Aerial Mapping and Surveying". DB Sterlin Consultants, Inc. verified invert elevations of the intake weir for Structure 102, verified culvert geometry, and invert elevations of structures located upstream of North Avenue.

This baseline HEC-RAS modeling through IL Route 19 was supplemented with site-specific overtopping cross-sections and structure data completed by CBBEL in July 2011. The hydraulic model and all site-specific survey are provided on the North American Vertical Datum of 1988 (NAVD '88). No stream cross-sections were added or removed from the baseline modeling. The overtopping weir cross-section into Structure 102 was updated based on original plans and 1-foot Cook County topography. Existing conditions and supplemental survey are shown on Exhibit 4. Existing right-of-way boundaries for IL Route 19 were extended from the Seymour Avenue intersection study located approximately 1,300 feet east of this crossing. Additional survey information and notes are provided in Appendix 1.

Tables 2-1 and 2-2 provide comparisons between FEMA Flood Insurance Study (FIS) data and modeling completed as part of this drainage investigation. Table 2-1 shows water surface elevations correlate well to FIS profiles at the downstream face of IL 19. IDOT provided information regarding an overtopping event on July 24, 2010. This storm event was estimated to be a 50-year recurrence interval and overtopping depths appeared to be 2.5 feet based on provided photography. IDOT – Bureau of Maintenance did not have a report corresponding to this storm event. With a minimum roadway elevation of 648.8 feet, the overtopping elevation of 651.3 feet was within 0.2 feet of the modeled 50-year storm event. Table 2-2 compares the FIS flowrate and MWRD flowrate at the closest comparable location; the upstream face of Godfrey Railroad yard. Flowrates between the two models are difficult to compare due to the difference in modeling methodologies, reduction in upstream watershed area due to the OMP, and phasing of Structure 102 operation/available volume.

At D/S Face of IL 19			
Recurrence Interval (Yr)	FIS WSEL (ft)	MWRD WSEL (ft)	Difference (ft)
10	650.2	650.3	+0.1
50	651.1	651.1	0.0
100	651.6	651.4	-0.2

Table 2-1 WSEL Comparison

At U/S Face of Godfrey RR Culvert			
Recurrence Interval (Yr)	FIS Q (cfs)	MWRD Q (cfs)	Difference (cfs)
10	350	95	-255
50	535	261	-274
100	640	535	-105

Table 2-2 Flowrate Comparison

Area surrounding the IL Route 19 crossing is encompassed primarily of commercial warehouses, manufacturing complexes, a United States Post Office Facility, and O'Hare International Airport. No sensitive flood receptors have been reported in the vicinity of this crossing. The approximate lowest adjacent grade at the Post Office facility based on the 1-foot topography is 655 feet. An airport perimeter road located north of IL Route 19 and south of Runway 4R/22L has a low road elevation of approximately 652 feet based on the 1-foot topography. Both elevations are above the 100-year floodplain elevation.

CHAPTER 3**PROPOSED CONDITIONS ANALYSIS**

Existing conditions hydraulic modeling was revised to eliminate roadway overtopping by raising the roadway and provide a larger culvert opening to safely convey the 100-year design storm event. A Waterway Information Table (WIT) has been included with this memorandum in Appendix 2. A quadruple-celled 11'(W) by 6.5'(H) RCBC should be constructed to convey the 100-year design storm event. The proposed culvert was modeled using the existing length of 177 feet assuming wing/head walls will be constructed to retain adjacent soils. The top slab of the box culvert is assumed to be approximately 9-inch thick for use in estimating cover depths. The minimum cover provided at the upstream face along the edge of shoulder would be 1.44 ft. ($643.05' + 6.5' + 9'' = 650.3'$ top of pipe, $651.74'(\text{EOS}) - 650.3' = 1.44'$). The WIT shows that the proposed structure will create approximately 0.19 feet of head. This represents a 0.14 feet increase when compared to the existing conditions 100-year design storm event. This can be attributed to WSE fluctuations associated with Structure 102 located downstream, unsteady hydraulic modeling, and small head increases due to the large overtopping of the existing IL Route 19. Larger structures were modeled with little reduction in created head; therefore, the aforementioned structure was determined to be a suitable size for this crossing. Reductions in created head less than or equal to 0.1 foot would likely require a revision to the intake operation of Structure 102.

The IDOT Drainage Manual states that a minimum of 3 feet of freeboard should be provided from the edge of pavement to the design (50-year) headwater elevation. To meet this criteria, portions of the roadway would need to be raised by 5 feet. Improvements to the IL Route 19 corridor are restricted due to adjacent floodplain, O'Hare International Airport, and Structure 102. Due to the proximity to existing Runway 4R/22L, the following Federal Aviation Authority (FAA) surfaces prohibit significant roadway improvements to IL Route 19:

- Runway Safety Area (RSA) – The RSA is a restricted trapezoidal area off the end of runways that provides adequate maneuvering capabilities to emergency responders in case an aircraft overruns the runway.
- Glide Slope Area (GSA) - The GSA aids in navigating incoming aircraft using an instrument landing system (ILS). Terrain changes within the GSA are usually problematic and require significant study by airport authorities to determine if proposed grading will impact existing navigation systems.
- Terminal Instrument Procedures (TERPS) – TERPS surfaces are constructed from the electronic signals transmitted by ground and space based air navigation electronic equipment.
- Part 77 Surfaces – Part 77 surfaces extend off the edges of runways at a pre-determined slope. Objects within these vertical surfaces are limited due to their impacts on navigable airspace.

Information provided by the OMP determined that the most restrictive surface to the raising of IL Route 19 would be the Part 77 surfaces. The provided surface limitations are included in Appendix 4. The roadway at the existing lowest point can only be raised 3.18 ft. to elevation 651.98 feet. This would provide minimal freeboard; however, the pavement would be dry during a 100-year design storm event. The HEC-RAS modeling was revised to include a constant roadway elevation of 651.98 feet. It is recommended that the FAA be contacted prior to the design phase begins for this roadway. Transitional grading required to raise the roadway should not require additional right-of-way as shown on Exhibit 5. Hydrologic and hydraulic modeling has been provided on a DVD in Appendix 5.

3.1 FLOODWAY FILL/COMPENSATORY STORAGE

Bensenville Ditch through the subject crossing is mapped as Zone A floodplain according to the FEMA FIRM for Cook County, Illinois and Incorporated Areas, Panel 358 of 832, dated August 19, 2008 as shown on Exhibit 3. There is no designated floodway through the site. Since the tributary area is greater than one square mile, an Individual Permit under Part 3700 Rules from the Illinois Department of Natural Resources – Office of Water Resources will be required. These improvements comply with Section 3700.70(a) – Special Provisions for Bridges and Culverts. Since this crossing has experienced documented and demonstrable flood damage, this project will be considered a new crossing versus a reconstruction. The following requirements will be met by this project.

Permits will be granted for new bridges and culverts which would not result in flood damages or potential flood damages outside of the project right-of-way due to increases in flood heights or velocities. Absent contrary evidence, this standard will be considered met if, for the worst-case analysis, the application shows that:

1. Any water surface profile increase would be contained within the channel banks (or within existing vertical extensions of the channel banks such as within the design protection grade of existing levees or floodwalls) or flood easements; or
2. In urban areas, the water surface profile increase would not exceed 0.5 feet at the structure, nor 0.1 foot at a point 1,000 feet upstream of the structure as determined by the horizontal projection of the increase and the slope of the hydraulic grade line; or
3. In rural areas, the water surface profile increase would not exceed 1.0 foot at the structure, nor 0.5 feet at a point 1,000 feet upstream of the structure as determined by the horizontal projection of the increase and the slope of the hydraulic grade line; or
4. Any increase in average channel velocity would not be beyond the scour velocity of the predominant soil type of the channel; or
5. Increased scour, erosion and sedimentation would be prevented by the use of riprap or other design measures.

CHAPTER 4**CONCLUSIONS AND RECOMMENDATIONS**

Based on the detailed evaluation of improvements presented in the previous chapters, conclusions to address existing flood conditions are provided below.

4.1 CONCLUSIONS

A quadruple-celled 11'(W) by 6.5'(H) RCBC should be constructed at the existing length and similar invert elevations. This culvert size would allow for a pre-cast option, if desired. This proposed structure will convey the 100-year design storm event without the overtopping of IL Route 19. Due to the noted FAA restrictions and impacts to the floodplain of the Bensenville Ditch, only one alternative has been provided. The maximum roadway elevation at centerline would be 651.98 feet to meet FAA restrictions. Assuming a 2% cross slope and a one-lane width of 12 feet, the approximate lowest edge of pavement grade would be 651.74 feet. Assuming a 10 feet wide shoulder and a cross-slope of 4%, the lowest edge of shoulder would be 651.34 feet. This conceptual grading is shown on Exhibit 5. Based on the proposed 100-year floodplain elevation of 651.5 feet portions of the shoulder would be wet, but the roadway would remain dry. Based on the restrictive surface analysis provided by the OMP, portions of the roadway outside of the low area may be able to be raised higher. This should be considered when the road geometry is determined.

4.2 RECOMMENDATIONS

Due to the adjacent restrictions associated with O'Hare International Airport, the roadway raising scenarios are limited. It is recommended that the culvert be replaced and the roadway be raised to the maximum elevation based on restricted surface information provided by the OMP. Other sections of the roadway outside of the low point can be raised higher than 651.98 feet based on data provided by OMP. However, as part of this drainage investigation, a detailed geometric profile was not determined. Once the design phase for this project commences, it is recommended that further discussions with the FAA take place to determine exact limitations east and west of the critical low point.

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CHAPTER 5**DATA COLLECTION**

Data that was used in this study was collected from a variety of sources. Each data source is listed in Table 5-1 below, along with the data provided by each source:

Source	Data Provided
Cook County	1' contour aerial topographic mapping
United States Geological Survey (USGS)	Floods in Elmhurst Quadrangle, Illinois Hydrologic Investigations Atlas HA-68
CBBEL	- Supplemental topographic survey - Site visits - Previous studies

Table 5-1 Data Sources

5.1 ITEMS REVIEWED**5.1.1 REPORTS**

- 'Detailed Watershed Plan for the Lower Des Plaines River Watershed Volume 1' prepared by CBBEL, dated February 28, 2011;
- 'Silver Creek Hydrologic & Hydraulic Analyses – Final Report' prepared by U.S. Army Corps of Engineers, Chicago District Environmental & Hydraulic Engineering Section, dated February 2007.

5.1.2 PLAN SETS

- 'Lower Des Plaines Tributaries Watershed Protection and Flood Prevention Project – Silver Creek Reservoir' prepared by Metropolitan Sanitary District of Greater Chicago, dated July 1988;

5.1.3 FAA CIRCULARS/CFR DOCUMENTS

- AC 150/5190-4A – 'A Zoning Ordinance to Limit Height of Objects Around Airports', dated December 14, 1987.
- AC 150/5300-13 – 'Airport Design', dated September 29, 1989.
- AC150/5300-1B – 'Runway Protection Zone and Airport Object Clearing Policy', dated February 5, 1999.
- Code of Federal Regulations, Title 14 – Aeronautics and Space, Part 77 – 'Objects Affecting Navigable Airspace', dated N/A

5.1.4 MISCELLANEOUS

- Field investigation;
- Photos

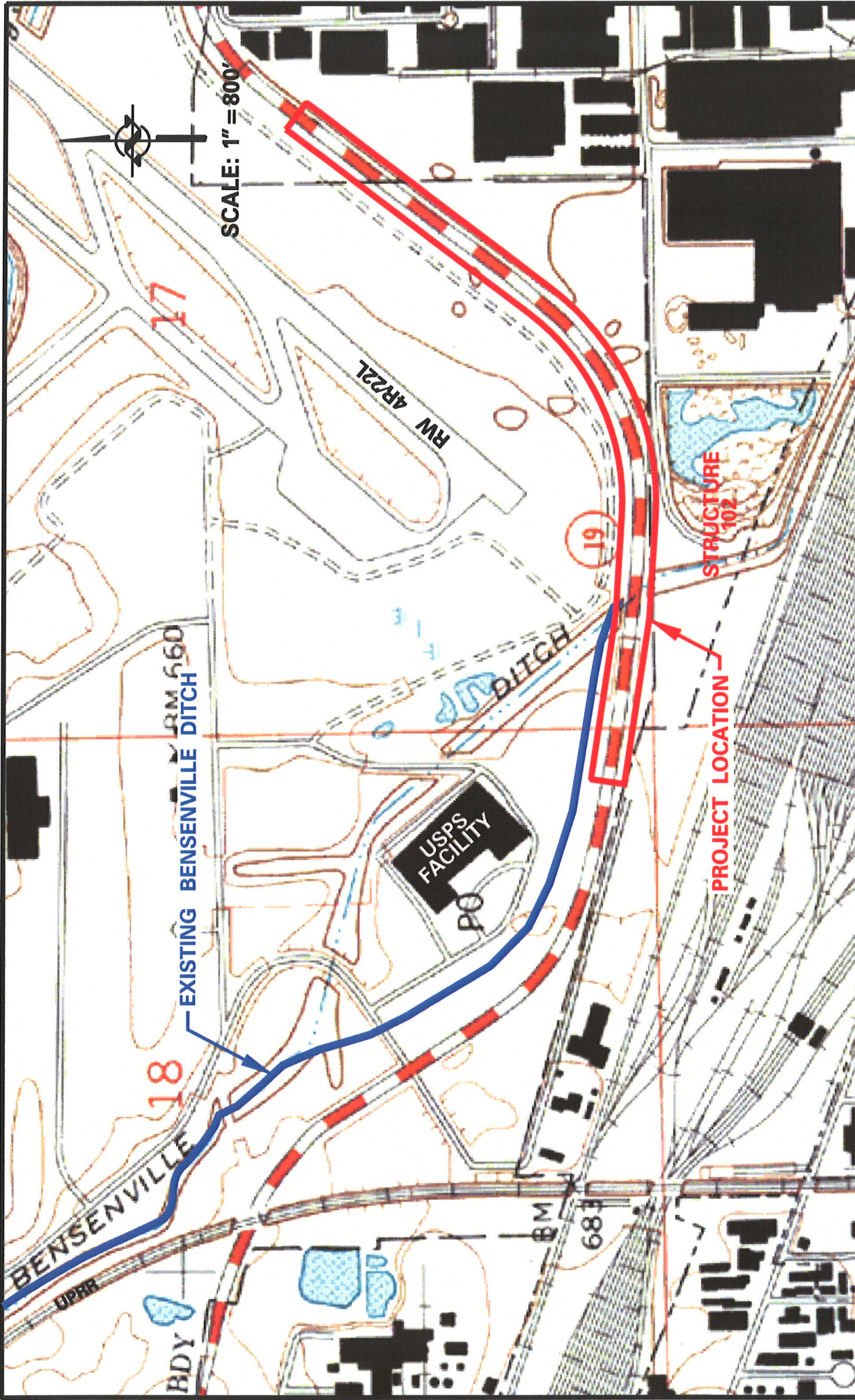
LIST OF EXHIBITS

- 1) Location Map
- 2) Aerial Photography
- 3) Flood Insurance Rate Map
- 4) Existing Conditions Supplemental Survey
- 5) Conceptual Grading Plan

LIST OF APPENDICES

- 1) Survey Data & Photographs
 - IL 19 Structure Details
 - Notated Photographs of Structure 102 and IL 19
- 2) Waterway Information Table
- 3) HEC-RAS Output, Cross-Section Location Map, FEMA Documentation
 - HEC-RAS Output (Existing, Natural, Proposed)
 - Notated Structure 102 Plans
 - Cross-Section Location Exhibit
 - Perpendicular Cross-Sections at Culvert and Low Spot
 - OMP Watershed Phasing Exhibit
 - FEMA FIS Documentation
- 4) FAA Documentation
- 5) DVD Containing Supporting Documentation & HEC-HMS/HEC-RAS Files
- 6) Correspondence

N:\dot\070404\Water\19_19 DI\Exhibit\070404exh1 USGS Location Map.dgn



CLIENT:

ILLINOIS DEPARTMENT OF TRANSPORTATION

PROJECT NO.

07-0404

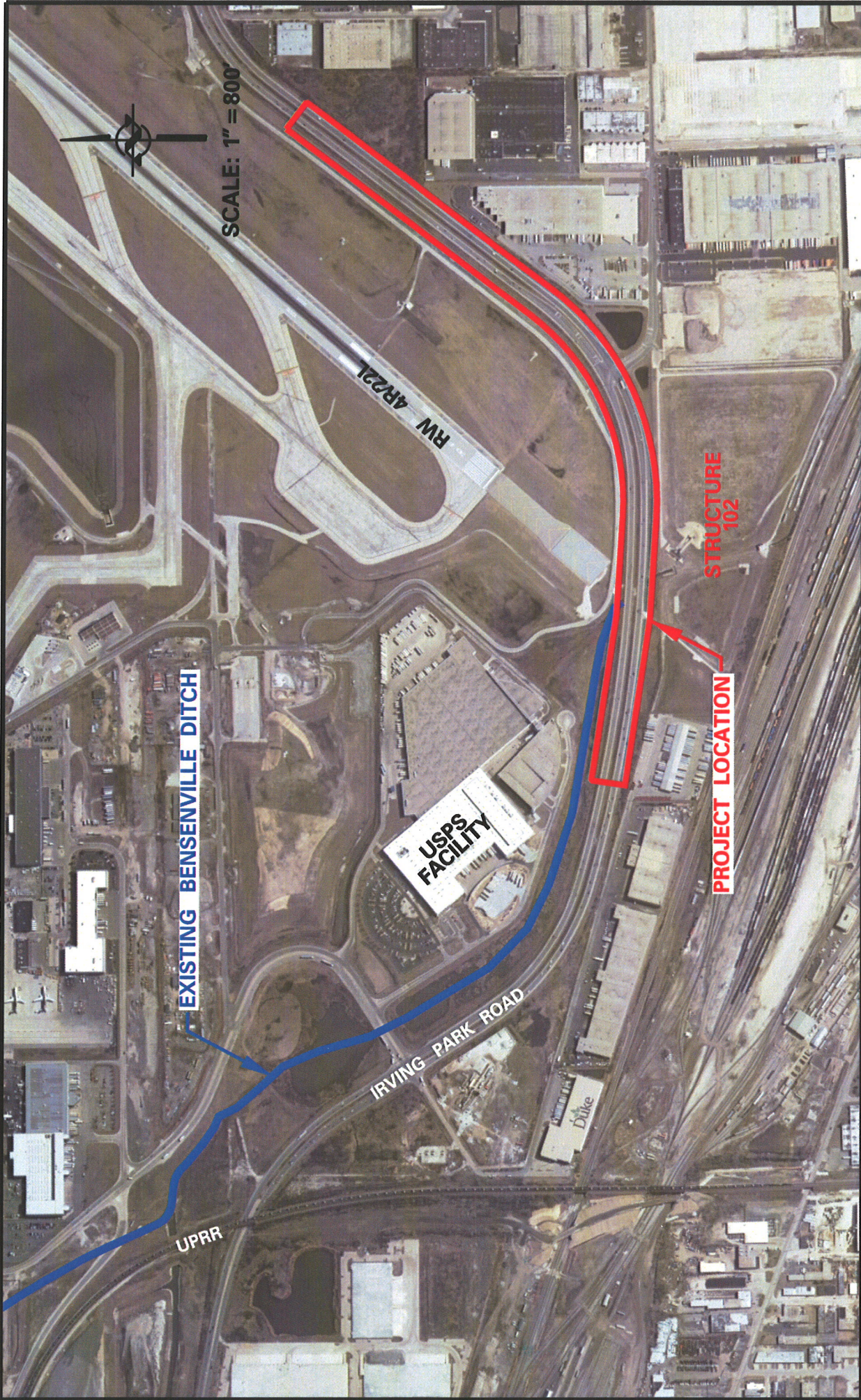
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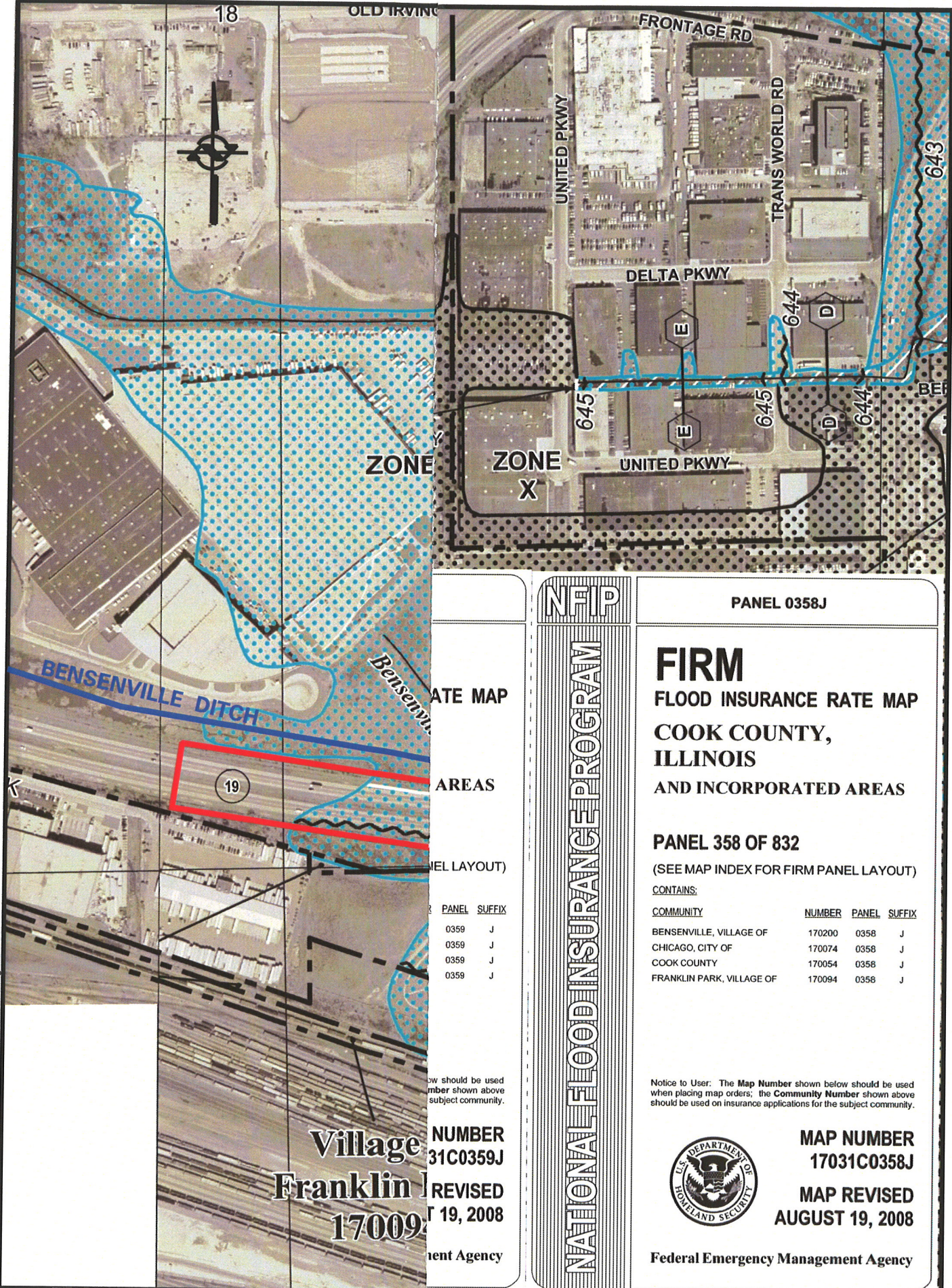
EXHIBIT 1

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

ELGIN O'HARE - WEST BYPASS
ILLINOIS ROUTE 19 AT BENSENVILLE DITCH
LOCATION MAP



CLIENT: ILLINOIS DEPARTMENT OF TRANSPORTATION ELGIN O'HARE - WEST BYPASS ILLINOIS ROUTE 19 AT BENSENVILLE DITCH AERIAL PHOTOGRAPHY	PROJECT NO. 07-0404
	DATE 10/20/2011
	EXHIBIT 2
CB CHRISTOPHER B. BURKE ENGINEERING LTD. 9575 West Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	



ATE MAP

AREAS

EL LAYOUT)

PANEL	SUFFIX
0359	J
0359	J
0359	J
0359	J

ow should be used
number shown above
subject community.

Village of Franklin Park
170092
ment Agency

NUMBER
31C0359J
REVISED
AUG 19, 2008

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0358J

FIRM
FLOOD INSURANCE RATE MAP
COOK COUNTY,
ILLINOIS
AND INCORPORATED AREAS

PANEL 358 OF 832
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BENSENVILLE, VILLAGE OF	170200	0358	J
CHICAGO, CITY OF	170074	0358	J
COOK COUNTY	170054	0358	J
FRANKLIN PARK, VILLAGE OF	170094	0358	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
17031C0358J
MAP REVISED
AUGUST 19, 2008

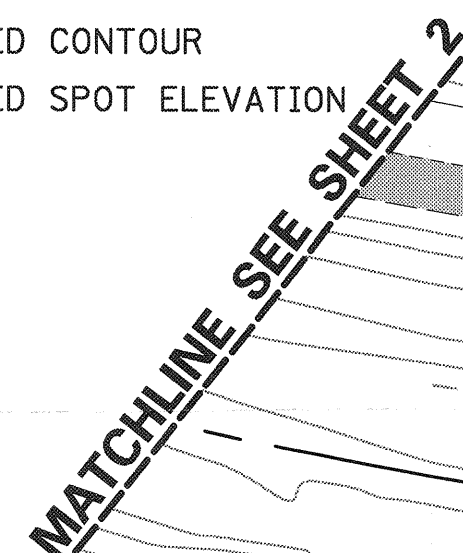
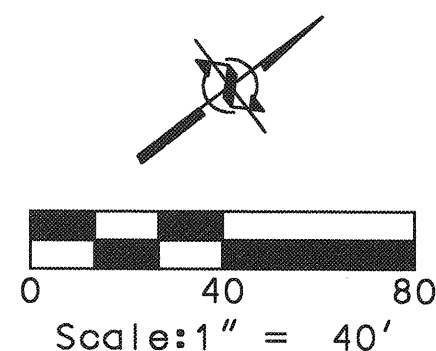
Federal Emergency Management Agency

NOTE:
1) 1-FOOT TOPOGRAPHY FROM COOK COUNTY LIDAR DATA
2) EXISTING R.O.W. ESTIMATED FROM SEYMOUR AVENUE PLANS.
3) FLOODPLAIN INFORMATION TAKEN FROM FEMA PANELS 358
AND 359 FOR COOK COUNTY, ILLINOIS AND INCORPORATED
AREAS, DATED 8/19/2008.

LEGEND

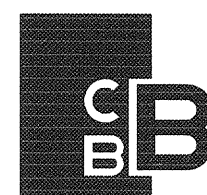
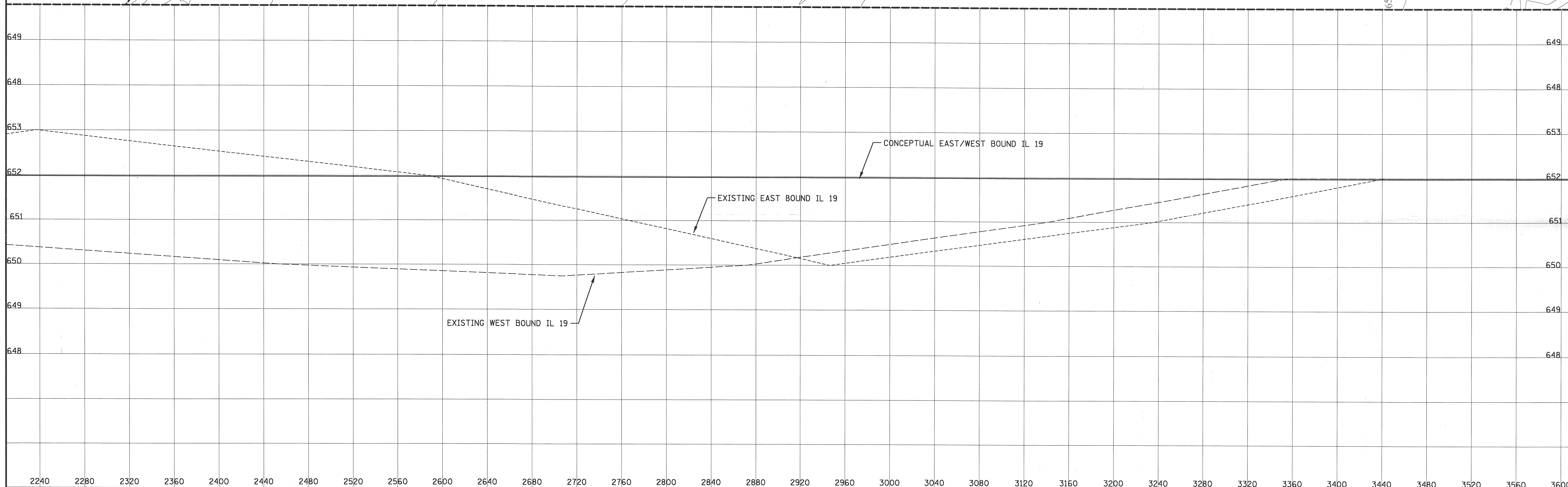
Diagram illustrating the cross-section of a road and its associated features, with elevations in feet:

- 645 ——— EXISTING CONTOUR
- EXISTING CENTER LINE
- EXISTING EDGE OF PAVEMENT
- EXISTING EDGE OF SHOULDER
- [———] EXISTING BOX CULVERT
- x 652.74 ——— EXISTING SPOT ELEVATION
- ██████████ SHOULDER
- - - - - R.O.W.
- LIMIT OF DETAILED STUDY
- - - - - FLOODPLAIN BOUNDARY
- 652 ——— PROPOSED CONTOUR
- x651.74 ——— PROPOSED SPOT ELEVATION



ILLINOIS ROUTE 19

37+00 MATCHLINE SEE SHEET A



CHRISTOPHER B. BURKE ENGINEERING LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
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CLIENT:

ILLINOIS DEPARTMENT OF TRANSPORTATION

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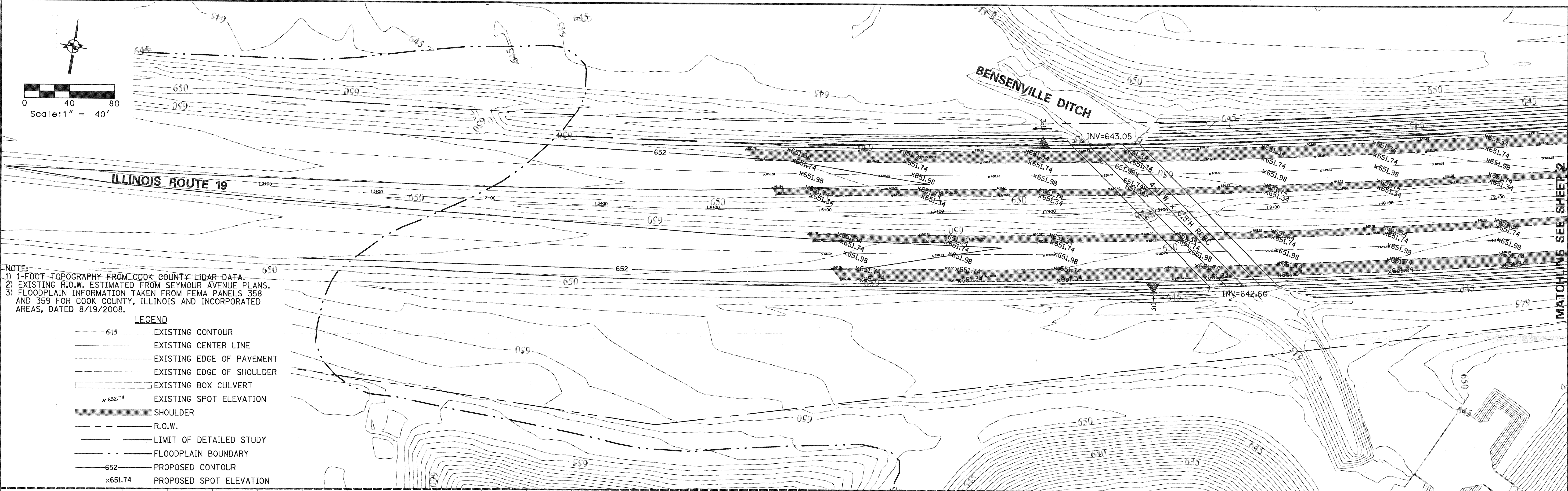
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**ELGIN O'HARE - WEST BYPASS
ILLINOIS ROUTE 19 AT BENSENVILLE DITCH
CONCEPTUAL GRADING**

PROJECT NO. 07-0404

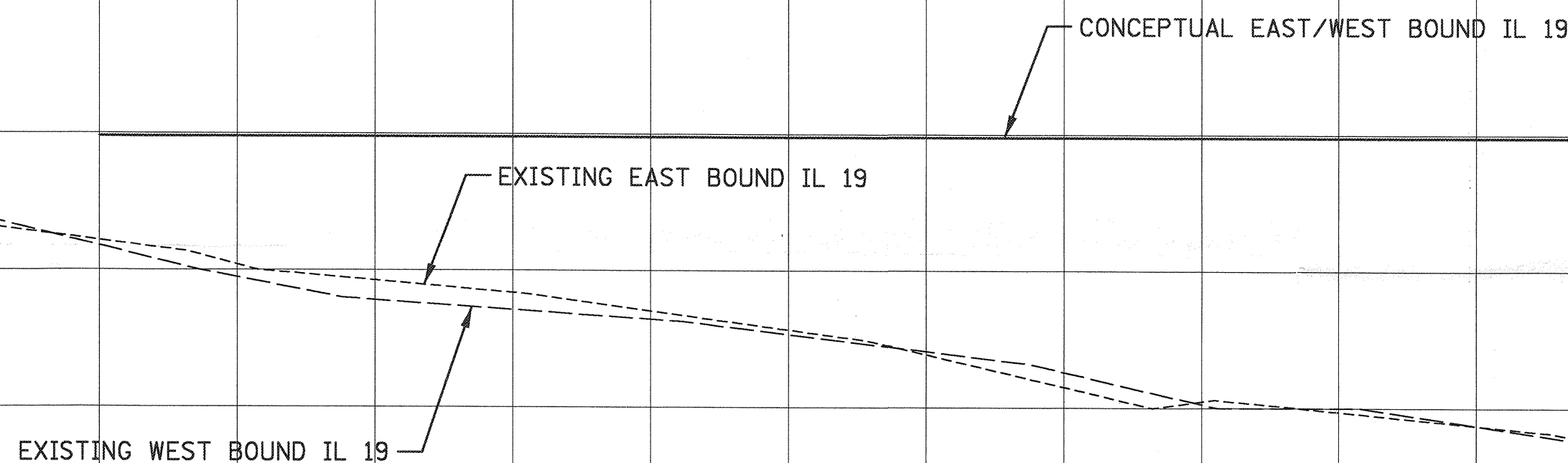
SHEET	3	OF	4
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EXHIBIT 5



LEGEND

-
- Diagram illustrating the cross-section of a road and its features, with labels and elevations:
- 645 EXISTING CONTOUR
 - EXISTING CENTER LINE
 - EXISTING EDGE OF PAVEMENT
 - EXISTING EDGE OF SHOULDER
 - EXISTING BOX CULVERT
 - EXISTING SPOT ELEVATION
 - SHOULDER
 - R.O.W.
 - LIMIT OF DETAILED STUDY
 - FLOODPLAIN BOUNDARY
 - PROPOSED CONTOUR
 - PROPOSED SPOT ELEVATION



LEGEND

-
- 0 40 80
Scale: 1" = 40'

The profile view shows the elevation of the proposed road section. The vertical axis represents elevation in feet, ranging from 648 to 649. The horizontal axis represents stationing, ranging from 3640 to 5000. The profile includes a dashed line for the existing ground and a solid line for the proposed road grade. Key features include 'EXISTING WEST BOUND IL 19' and 'EXISTING EAST BOUND IL 19'.

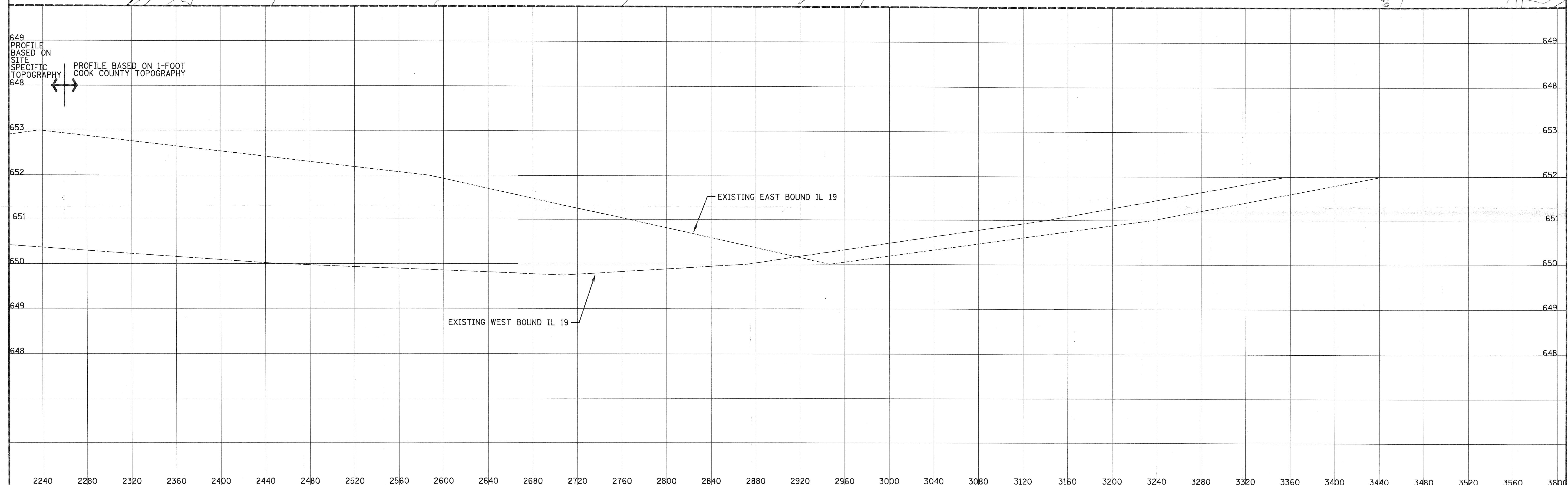
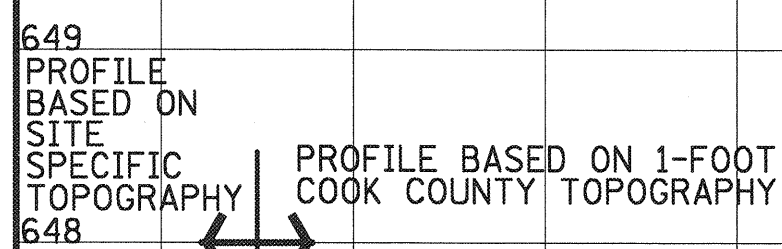
Stationing	Existing Ground Elevation (ft)	Proposed Road Grade Elevation (ft)
3640	651.8	651.8
3720	651.8	651.8
3800	651.8	651.8
3880	651.8	651.8
3920	651.5	651.5
3960	651.2	651.2
4000	651.5	651.5
4040	651.8	651.8
4080	652.0	652.0
4120	652.0	652.0
4160	652.0	652.0
4200	652.0	652.0
4240	652.0	652.0
4280	652.0	652.0
4320	652.0	652.0
4360	652.0	652.0
4400	652.0	652.0
4440	652.0	652.0
4480	652.0	652.0
4520	652.0	652.0
4560	652.0	652.0
4600	651.8	651.8
4640	651.5	651.5
4680	651.2	651.2
4720	651.0	651.0
4760	650.8	650.8
4800	650.8	650.8
4840	650.5	650.5
4880	650.2	650.2
4920	650.0	650.0
4960	650.0	650.0
5000	650.0	650.0

EXISTING WEST BOUND IL 19—

PROJECT NO. 07-0404
DATE: 2/3/2012
SHEET 4 OF 4
EXHIBIT 4

LEGEND

- OF DETAILED STUDY
PLAIN BOUNDARY
- MATCHLINE SEE SHEET 2**



ILLINOIS DEPARTMENT OF TRANSPORTATION

[illegible]

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

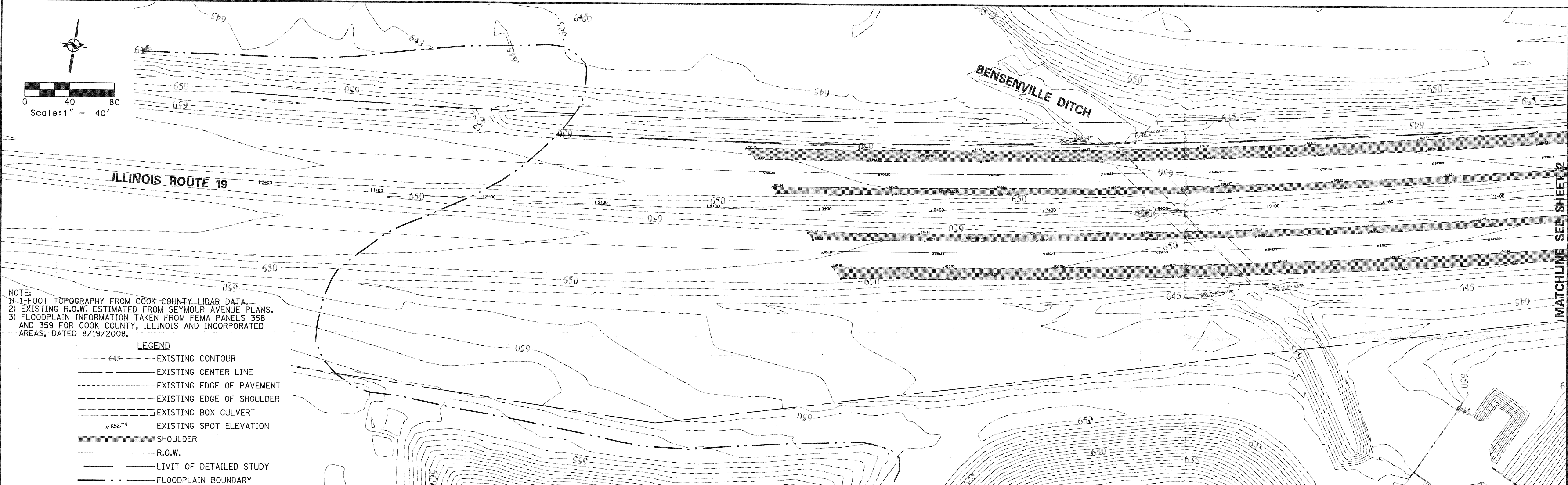
TITLE: **ELGIN O'HARE - WEST BYPASS
ILLINOIS ROUTE 19 AT BENSENVILLE DITCH
EXISTING CONDITIONS
SUPPLEMENTAL SURVEY**

PROJECT NO. 07-0404

DATE: 2/3/2012

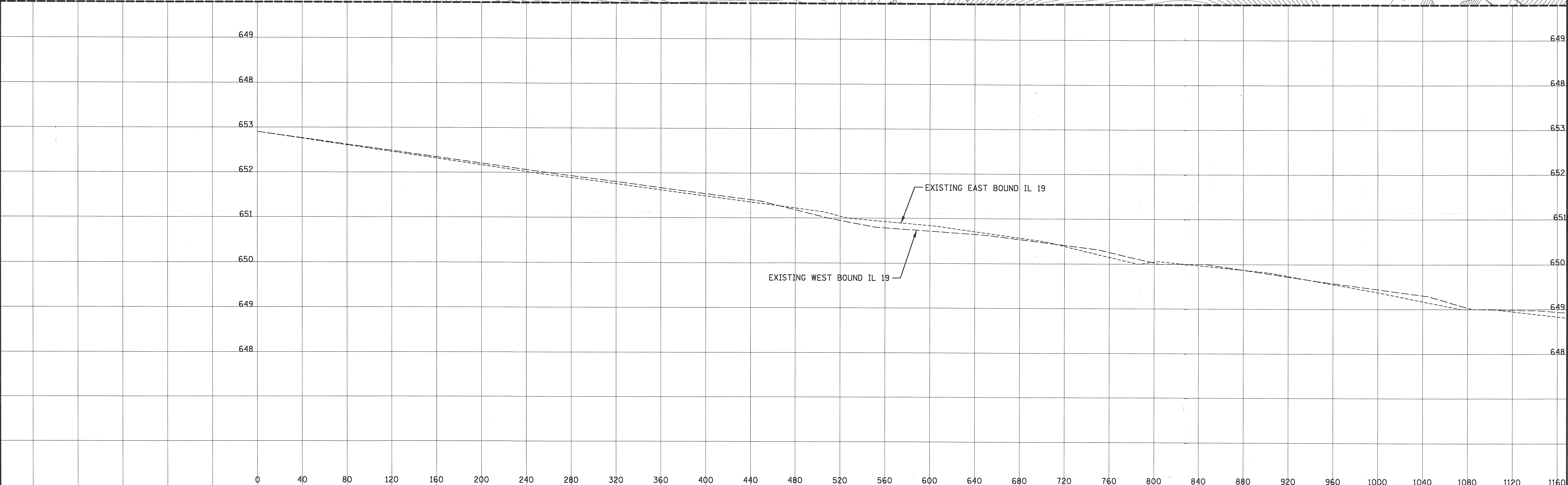
SHEET 3 OF 4

EXHIBIT 4



LEGEND

- 645 ————— EXISTING CONTOUR
 ————— EXISTING CENTER LINE
 - - - - - EXISTING EDGE OF PAVEMENT
 - - - - - EXISTING EDGE OF SHOULDER
 [- - - - -] EXISTING BOX CULVERT
 x 652.74 EXISTING SPOT ELEVATION
 ■■■■■■■■ SHOULDER
 - - - - - R.O.W.
 ————— LIMIT OF DETAILED STUDY
 - - - - - FLOODPLAIN BOUNDARY



CLIENT:

[illegible]

DSGN.	DCO	
DWN.	EAT	
CHKD.		
SCALE:	1"=40'	

TITLE: **ELGIN O'HARE - WEST BYPASS
ILLINOIS ROUTE 19 AT BENSENVILLE DITCH
EXISTING CONDITIONS
SUPPLEMENTAL SURVEY**

EXHIBIT 4

Tab 1

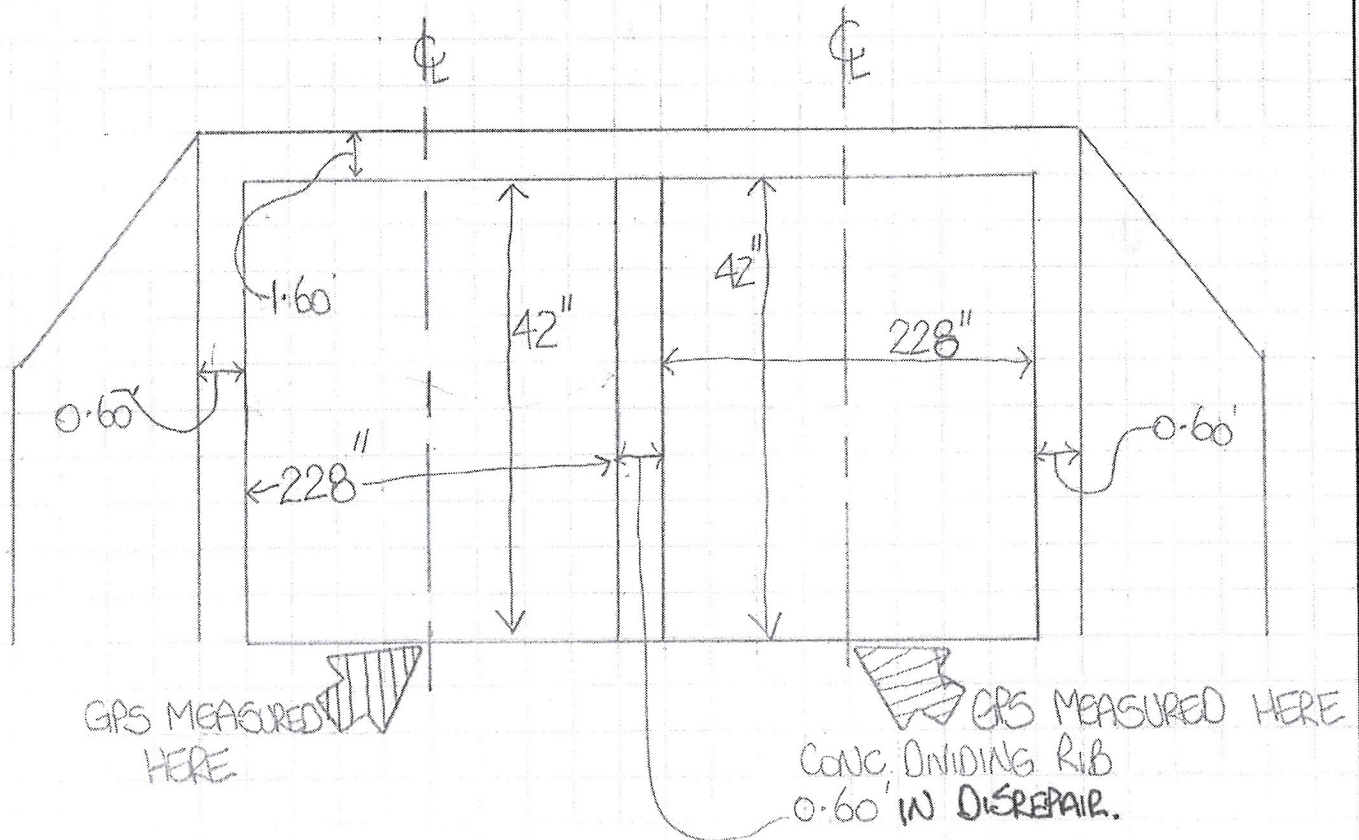
Appendix 1
Survey Data & Photographs

CB

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

JOB 070404 - IRVING PARK ROAD
SHEET NO. 1 OF 1
CALCULATED BY MDW DATE 8/9/11
CHECKED BY _____ DATE _____
SCALE NRS

BOX CULVERTS @ IRVING PARK ROAD.



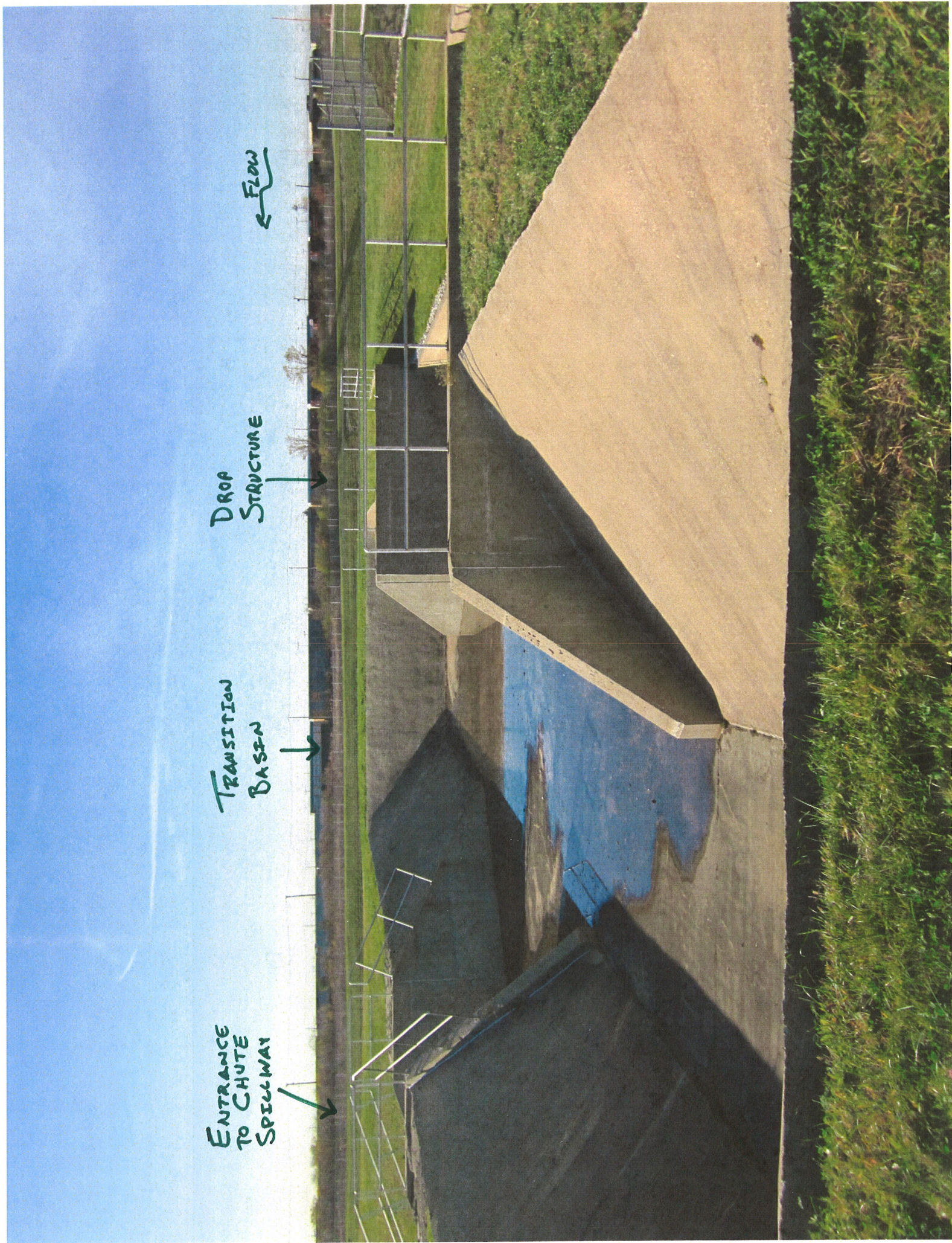
(*) DIMENSION MEASURED ON SKEIN (+/- 42°). PERPENDICULAR
OPENING IS 42" H X 162" W RCBC

ENTRANCE
TO CHUTE
SPILLWAY

TRANSITION
BASIN

DROP
STRUCTURE

← FLOW



TRANSITION
BASIN

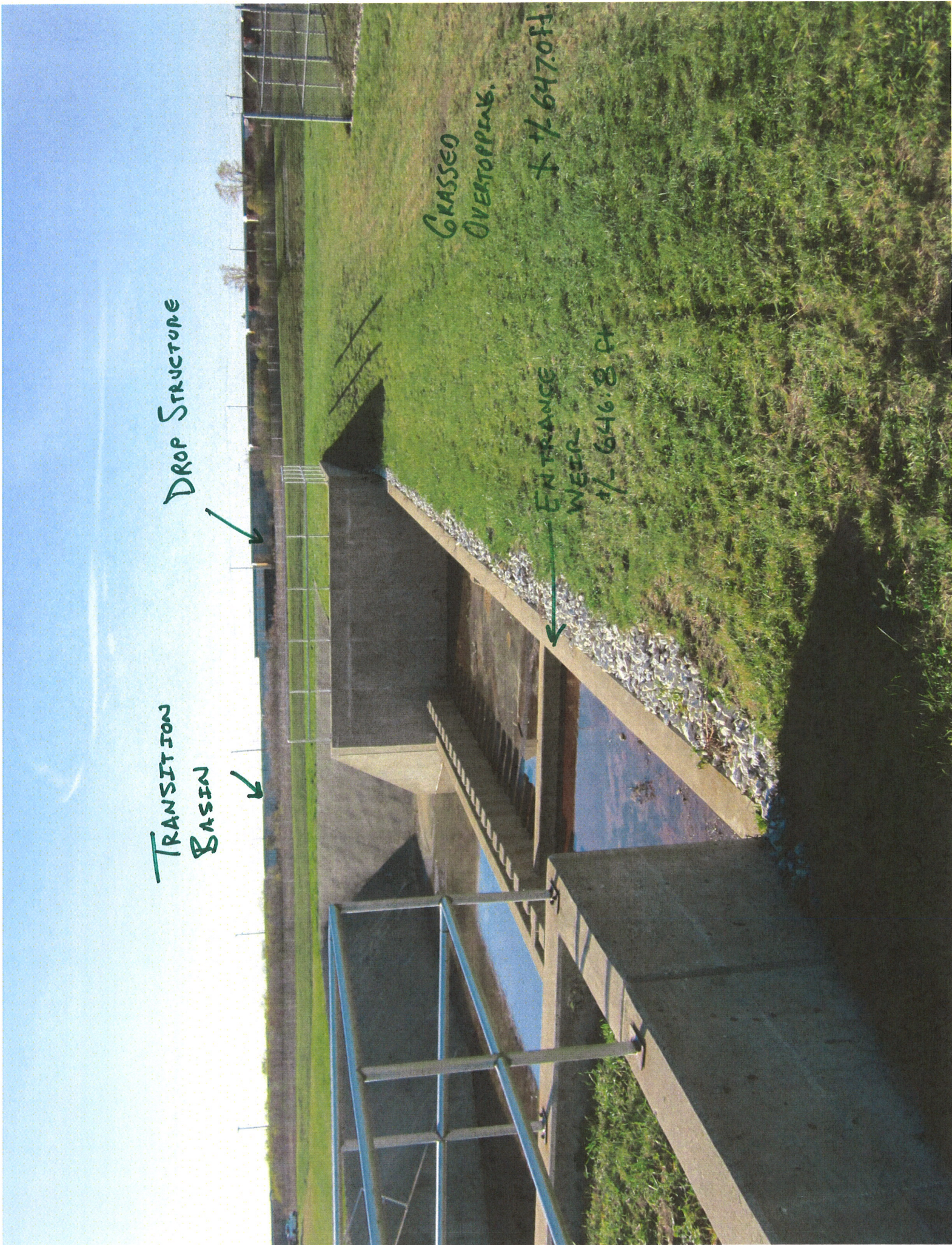
DROP STRUCTURE

GRASSED
OVERTOPPING

ENTRANCE
WEIR

+/- 646.8 ft

+/- 647.0 ft



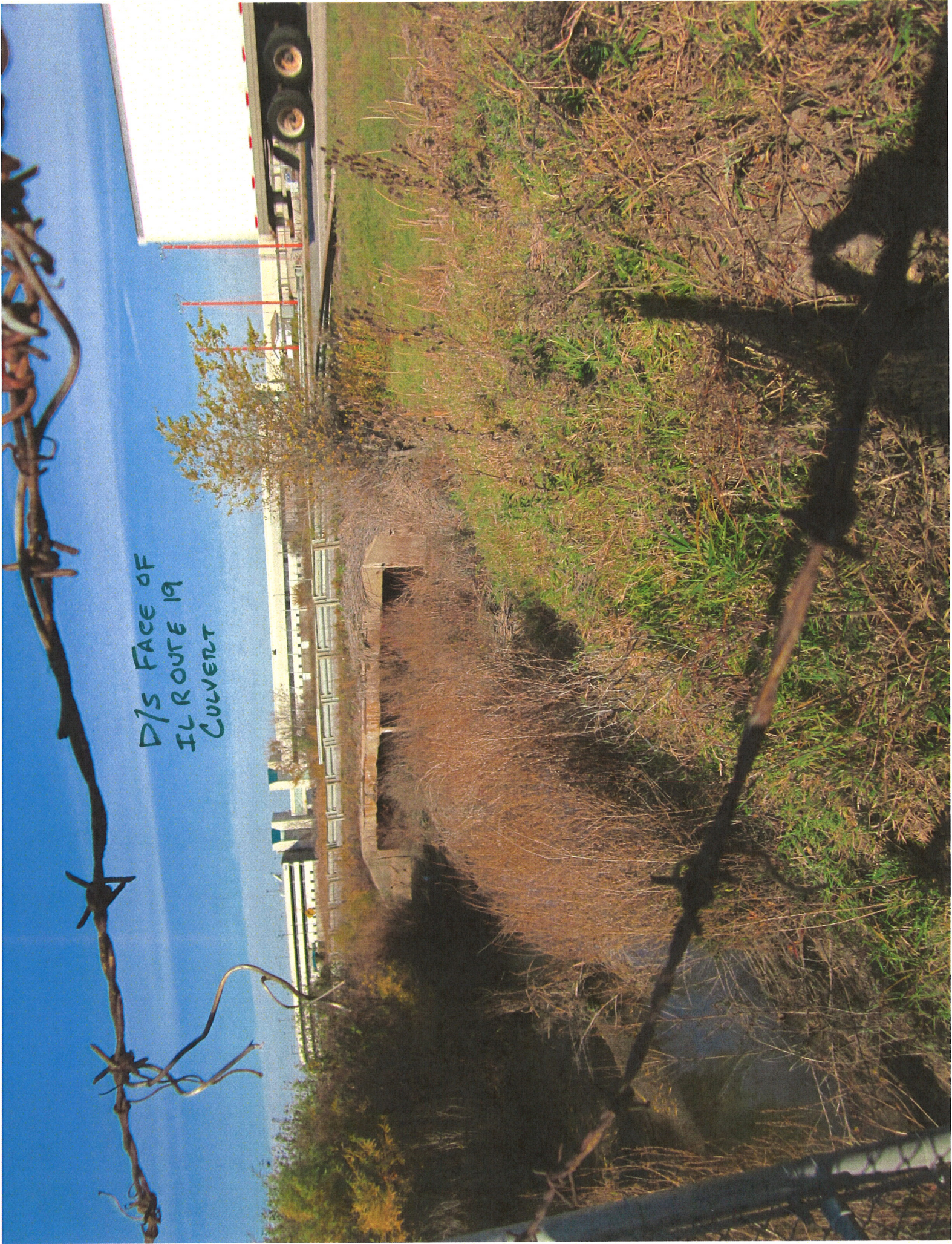
CHUTE SPILLWAY
TO EAST CELL





60" RCP
BYPASS PIPE

D/S FACE OF
IL ROUTE 19
CULVERT



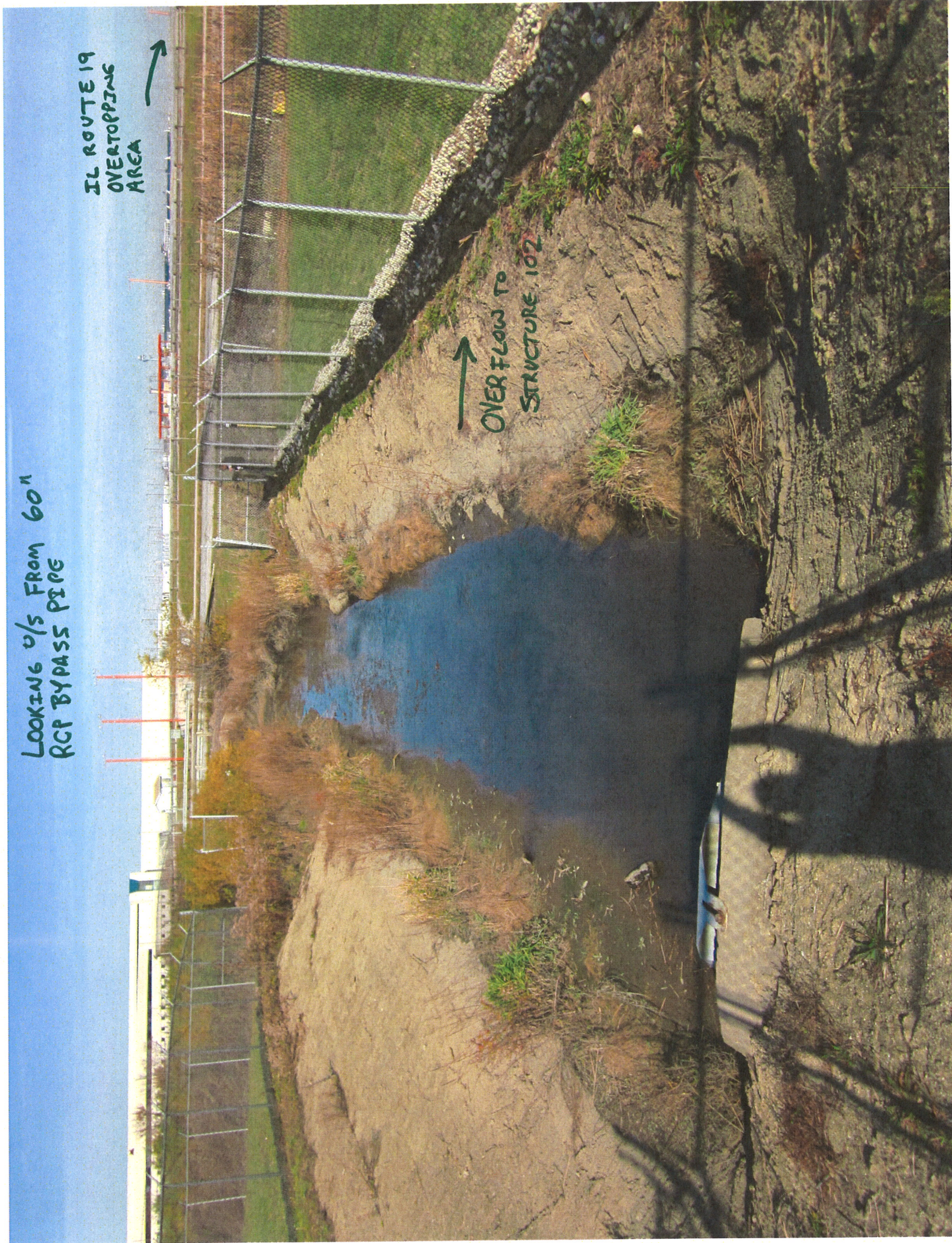
GRASSED OVERTOPPING AREA
TO PRIMARY SPEEDWAY (+/- 647.0')



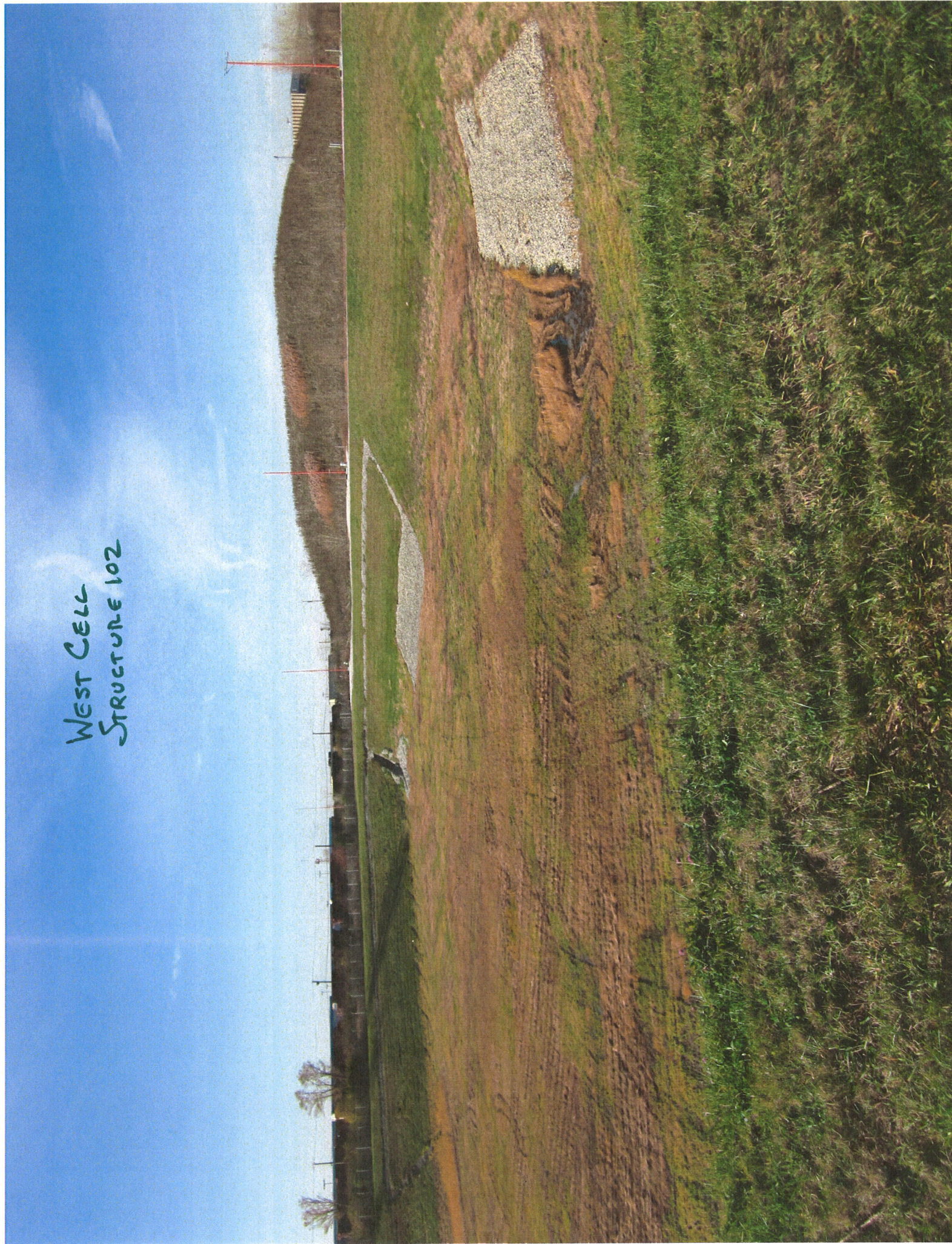
LOOKING U/S FROM 60"
RCP BYPASS PIPE

IL ROUTE 19
OVERTOPPING
AREA

OVERFLOW TO
STRUCTURE 102



WEST CELL
STRUCTURE 102



EAST CELL
STRUCTURE 102
(VIEW OF CHUTE SPILLWAY)

EQUALIZER PIPE
BETWEEN CELLS



EAST CELL
STRUCTURE 102
(EMERGENCY ACCESS)





D/S FACE 60' BYPASS
PIRE

LOOKING D/S OF 60" BYPASS PIPE @ GODFREY RR YARD.



SOUTHERN BERMING OF WEST CELL
(EMERGENCY OVERFLOW SECTION)



Tab 2

Appendix 2
Waterway Information Table



Illinois Department of Transportation

Culvert Waterway Information Table

Route: Illinois 19
Section: S.N. Exist: N/A
County: Cook S.N. Prop: TBD
Station: Waterway: Silver Creek

Computed by: DCO
Checked by: JSG
Date: 01/30/12
Date: 6/26/12

Drainage Area = +/- 3.31		Square Miles		Existing Overtopping Elevation: 648.8		ft. @ Sta		12+80	
Flood	Frequency Year	Discharge cfs	Waterway Opening	Proposed Overtopping Evaluation: 651.98		ft. @ Sta		THROUGHT	
				Existing	Natural H.W.E.	Existing	Proposed	Existing	Proposed
	10	352	94.5	286.0	650.15	0.14	0.15	650.29	650.30
Design	50	642	94.5	286.0	651.00	0.07	0.08	651.07	651.08
Base	100	790	94.5	286.0	651.34	0.05	0.19	651.39	651.53
OVT(E)	<10								
OVT(P)	>100								
Max Calc	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

10-Year Outlet Velocity from Existing Structure = 3.7 fps
10-Year Outlet Velocity from Proposed Structure = 1.2 fps

OVT = Overtopping Event
(E) Existing (P) Proposed
DATUM: NAVD '88
ALL-TIME H.W.E. & DATE:

SCOPE OF WORK:

EXISTING STRUCTURE
Bridge or Culvert Type: RCBC
Cell Dimensions (W x H): 13.5' x 3.5'
of spans \ cells: 2
Length: 177
U/S Flowline: 643.0
D/S Flowline: 642.6
Skew: 42
Low EOP: 647.76

EXISTING DROPBOX
Dimensions:
Drop:
Weir Elevation:

PROPOSED STRUCTURE
Culvert Type: RCBC
Cell Dimensions (W x H): 11' x 6.5'
of cells: 4
Length: 177
U/S Flowline: 643.05
D/S Flowline: 642.6
Skew: 42
Low EOP: 651.74

PROPOSED DROPBOX
Dimensions:
Drop:
Weir Elevation:

NOTE(S): All alternatives have the same hydraulic data (i.e. - only one Waterway Information Table has been provided).

Tab 3

Appendix 3

HEC-RAS Output, Cross-Section Location Map, FEMA Documentation

16-YR EXISTING HEC-RAS

HEC-RAS Plan: BL, 10-Yr CE River: Bens Reach: Main Profile: Max WS

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	30000 GODFREY RAILYARD		Culvert									
Main	30990.95	Max WS	94.71	641.50	644.11		644.14	0.000194	1.24	76.54	30.00	0.13
Main	31038.6*	Max WS	93.70	641.51	644.09		644.18	0.001285	2.32	40.46	16.89	0.26
Main	31086.39	Max WS	92.70	641.52	644.17		644.60	0.013947	5.27	17.58	12.12	0.77
Main	31131.5*	Max WS	91.76	641.53	644.82		645.04	0.005632	3.77	24.32	13.82	0.50
Main	31176.6*	Max WS	90.80	641.53	645.09		645.27	0.004349	3.45	26.35	13.87	0.44
Main	31221.8*	Max WS	89.82	641.54	645.29		645.45	0.003651	3.25	27.60	13.57	0.40
Main	31266.9*	Max WS	88.85	641.54	645.46		645.61	0.003082	3.09	28.76	13.10	0.37
Main	31312.1*	Max WS	87.88	641.55	645.61		645.74	0.002727	2.95	29.77	13.00	0.34
Main	31357.2*	Max WS	86.91	641.55	645.74		645.86	0.002437	2.83	30.73	12.91	0.32
Main	31402.4*	Max WS	85.93	641.56	645.85		645.97	0.002215	2.72	31.56	12.83	0.31
Main	31447.5*	Max WS	84.96	641.56	645.96		646.07	0.002008	2.62	32.44	12.76	0.29
Main	31492.71	Max WS	83.99	641.57	646.06		646.16	0.001850	2.53	33.17	12.71	0.28
Main	31564.4*	Max WS	82.45	641.58	646.20		646.26	0.000964	1.98	41.61	14.60	0.21
Main	31636.2*	Max WS	80.90	641.59	646.28		646.32	0.000598	1.62	49.90	17.34	0.17
Main	31708.0*	Max WS	79.35	641.60	646.33		646.35	0.000377	1.33	59.58	20.64	0.14
Main	31779.7*	Max WS	77.81	641.61	646.36		646.38	0.000239	1.11	69.80	23.02	0.11
Main	31851.56	Max WS	76.28	641.62	646.38		646.39	0.000158	0.95	80.13	24.93	0.09
Main	31917.4*	Max WS	74.85	641.63	646.39		646.40	0.000153	0.94	79.69	24.67	0.09
Main	31983.3*	Max WS	73.43	641.64	646.40		646.41	0.000149	0.93	79.25	24.43	0.09
Main	32049.2*	Max WS	72.01	641.65	646.41		646.42	0.000144	0.91	78.99	24.25	0.09
Main	32115.1*	Max WS	70.60	641.66	646.42		646.43	0.000139	0.90	78.64	24.05	0.09
Main	32181.08	Max WS	69.18	641.67	646.43		646.44	0.000134	0.88	78.40	23.89	0.09
Main	32239.9*	Max WS	67.87	641.68	646.44		646.45	0.000155	0.91	74.70	24.57	0.09
Main	32298.7*	Max WS	66.57	641.69	646.45		646.46	0.000184	0.94	70.97	25.30	0.10
Main	32357.5*	Max WS	65.27	641.69	646.46		646.47	0.000221	0.97	67.27	26.08	0.11
Main	32357.52		Lat Struct									
Main	32416.3*	Max WS	63.96	641.70	646.47		646.49	0.000271	1.01	63.60	26.92	0.12
Main	32475.18	Max WS	62.67	641.71	646.54	643.96	646.71	0.005024	3.27	19.16	1.77	0.26
Main	33106.07	Max WS	62.80	642.19	650.18	644.44	650.35	0.005763	3.25	19.34		0.20
Main	33135.4*	Max WS	62.45	642.34	650.28		650.28	0.000000	0.08	1747.84	980.79	0.01
Main	33164.7*	Max WS	71.90	642.49	650.28		650.28	0.000000	0.08	2849.88	1506.60	0.01
Main	33194.0*	Max WS	350.34	642.65	650.28		650.28	0.000002	0.36	4015.67	2060.72	0.02
Main	33200 STRUCTURE 102		Lat Struct									
Main	33223.43	Max WS	354.77	642.80	650.28		650.28	0.000001	0.41	4652.83	1687.28	0.03
Main	33300 IRVING PARK ROAD		Culvert									
Main	33468.31	Max WS	354.67	644.00	650.29		650.29	0.000000	0.14	8195.01	1691.95	0.01
Main	33487.60	Max WS	354.39	642.29	650.29		650.29	0.000058	0.62	616.60	120.96	0.04
Main	33503.8*	Max WS	354.19	642.47	650.29		650.30	0.000058	0.61	618.44	124.64	0.04
Main	33520.0*	Max WS	354.07	642.64	650.29		650.30	0.000057	0.60	619.64	127.34	0.04
Main	33536.3*	Max WS	353.86	642.82	650.29		650.30	0.000056	0.59	620.87	128.81	0.04
Main	33552.5*	Max WS	353.69	642.99	650.29		650.30	0.000055	0.58	623.06	129.09	0.04
Main	33568.79	Max WS	353.52	643.17	650.29		650.30	0.000053	0.56	629.23	120.44	0.04
Main	33595.9*	Max WS	353.12	642.94	650.30		650.30	0.000044	0.52	683.77	128.19	0.04
Main	33623.0*	Max WS	352.72	642.71	650.30		650.30	0.000036	0.48	741.51	133.48	0.03
Main	33650.12	Max WS	352.34	642.48	650.30		650.30	0.000030	0.44	802.30	138.99	0.03
Main	33680.14	Max WS	351.89	643.20	650.30		650.30	0.000018	0.36	986.87	162.95	0.03
Main	33685.0*	Max WS	351.80	643.18	650.30		650.30	0.000015	0.33	1131.56	399.23	0.02
Main	33689.9*	Max WS	351.74	643.16	650.30		650.30	0.000007	0.22	2172.67	732.48	0.02
Main	33694.78	Max WS	351.61	643.14	650.30		650.30	0.000013	0.29	1194.04	832.06	0.02
Main	33711.4*	Max WS	351.37	643.35	650.30		650.30	0.000002	0.10	3994.06	863.75	0.01
Main	33728.1*	Max WS	351.12	643.57	650.30		650.30	0.000001	0.10	4163.95	891.85	0.01
Main	33744.8*	Max WS	350.82	643.79	650.30		650.30	0.000001	0.09	4335.56	916.22	0.01
Main	33761.48	Max WS	350.59	644.00	650.30		650.30	0.000008	0.21	1634.87	938.97	0.02
Main	33770.7*	Max WS	350.48	643.60	650.30		650.30	0.000001	0.08	4716.56	1001.85	0.01
Main	33780.10	Max WS	350.20	643.20	650.30		650.30	0.000003	0.14	2523.72	1033.21	0.01
Main	33824.0*	Max WS	349.66	643.42	650.30		650.30	0.000001	0.07	5380.75	1071.33	0.01
Main	33868.0*	Max WS	348.97	643.63	650.30		650.30	0.000001	0.07	5635.42	1122.28	0.00
Main	33911.98	Max WS	348.33	643.85	650.30		650.30	0.000002	0.11	3272.75	1178.75	0.01
Main	33952.1*	Max WS	347.75	643.57	650.30		650.30	0.000001	0.06	6098.37	1200.67	0.00
Main	33992.23	Max WS	347.09	643.29	650.30		650.30	0.000001	0.10	3585.56	1256.24	0.01
Main	34036.1*	Max WS	346.41	643.40	650.30		650.30	0.000002	0.11	3534.80	931.50	0.01
Main	34080.1*	Max WS	345.79	643.51	650.30		650.30	0.000005	0.17	2068.17	427.99	0.01
Main	34124.11	Max WS	345.06	643.62	650.30		650.30	0.000011	0.24	1438.09	305.78	0.02
Main	34165.1*	Max WS	344.51	643.55	650.30		650.30	0.000011	0.24	1411.01	277.99	0.02
Main	34206.2*	Max WS	343.96	643.48	650.30		650.30	0.000010	0.25	1380.39	241.89	0.02
Main	34247.3*	Max WS	343.09	643.42	650.30		650.30	0.000010	0.25	1368.30	244.89	0.02
Main	34288.38	Max WS	342.72	643.35	650.30		650.31	0.000010	0.27	1282.83	244.91	0.02
Main	34323.2*	Max WS	341.98	643.15	650.30		650.31	0.000014	0.30	1164.73	242.73	0.02
Main	34358.2*	Max WS	341.85	642.94	650.30		650.31	0.000020	0.35	1018.09	214.76	0.03
Main	34393.10	Max WS	341.26	642.74	650.30		650.31	0.000030	0.42	821.69	202.24	0.03
Main	34492.09	Max WS	339.67	644.45	650.31		650.31	0.000048	0.51	668.69	179.75	0.04
Main	34642.28	Max WS	337.61	644.50	650.31		650.32	0.000053	0.51	660.70	183.33	0.04
Main	34844.43	Max WS	334.53	645.21	650.33		650.33	0.000054	0.49	683.85	197.69	0.04
Main	34990.5	Max WS	332.23	643.89	650.33		650.34	0.000021	0.36	920.60	210.07	0.03
Main	35157.52	Max WS	329.81	645.42	650.34		650.34	0.000059	0.48	682.19	217.06	0.04
Main	35397.52	Max WS	326.55	644.70	650.35		650.35	0.000029	0.40	820.97	267.95	0.03
Main	35498.37	Max WS	325.09	644.73	650.35		650.36	0.000027	0.38	864.15	285.46	0.03
Main	35640.53	Max WS	322.83	644.62	650.36		650.36	0.000037	0.39	830.69	263.11	0.03
Main	35728.81	Max WS	321.13	644.78	650.36		650.36	0.000016	0.29	1103.02	293.63	0.02
Main	35941.41	Max WS	318.48	644.83	650.36		650.37	0.000012	0.26	1246.90	341.03	0.02
Main	36092.81	Max WS	316.17	644.33	650.37		650.37	0.000018	0.29	1088.62	323.70	0.02
Main	36259.72	Max WS	313.02	644.90	650.37		650.37	0.000012	0.26	1217.51	236.31	0.02
Main	36370.35	Max WS	311.59	644.95	650.37		650.37	0.000012	0.25	1248.53	615.42	0.02

HEC-RAS Plan: BL, 10-Yr CE River: Bens Reach: Main Profile: Max WS (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	36404.39	Max WS	311.35	642.72	650.37		650.37	0.000009	0.23	1374.94	479.92	0.02
Main	36432.47	Max WS	310.77	643.95	650.37		650.37	0.000009	0.23	1348.18	313.50	0.02
Main	36457.53	Max WS	310.03	643.75	650.36		650.42	0.000535	2.01	154.35	243.37	0.14
Main	36500 TAFT ROAD	Culvert										
Main	36660.35	Max WS	311.48	643.94	650.41		650.48	0.000572	2.05	151.67	540.92	0.14
Main	36693.56	Max WS	311.90	643.98	650.43		650.43	0.000003	0.11	2781.15	619.17	0.01
Main	36790.51	Max WS	279.43	643.76	650.43		650.43	0.000001	0.08	3370.64	728.53	0.01
Main	36862.61	Max WS	279.39	644.44	650.43		650.43	0.000001	0.07	3774.46	832.40	0.01
Main	36990.25	Max WS	279.13	642.70	650.43		650.43	0.000001	0.06	4328.56	843.25	0.01
Main	37113.29	Max WS	278.22	644.36	650.43		650.43	0.000001	0.08	3548.71	751.02	0.01
Main	37178.67	Max WS	278.16	642.92	650.43		650.43	0.000001	0.08	3468.32	710.42	0.01
Main	37334.5	Max WS	277.08	642.70	650.43		650.43	0.000004	0.14	2023.29	446.68	0.01
Main	37347.7*	Max WS	277.50	642.78	650.43		650.43	0.000005	0.18	1546.69	355.25	0.02
Main	37360.9*	Max WS	277.45	642.85	650.43		650.44	0.000011	0.25	1091.19	263.52	0.02
Main	37374.1*	Max WS	277.40	642.93	650.43		650.44	0.000021	0.42	690.28	248.36	0.04
Main	37387.33	Max WS	276.58	643.01	650.43		650.44	0.000116	0.86	429.64	281.58	0.08
Main	37606.41	Max WS	277.74	643.66	650.45		650.47	0.000125	1.11	273.41	83.27	0.09
Main	37689.1*	Max WS	277.66	643.56	650.46		650.48	0.000148	1.17	257.90	83.98	0.10
Main	37771.8*	Max WS	278.07	643.46	650.47		650.49	0.000170	1.22	246.26	81.97	0.11
Main	37854.5*	Max WS	279.52	643.35	650.48		650.50	0.000190	1.26	240.55	76.30	0.11
Main	37937.2*	Max WS	280.17	643.25	650.50		650.52	0.000200	1.28	245.04	81.95	0.11
Main	38020.00	Max WS	271.63	643.15	650.52		650.54	0.000175	1.22	257.31	96.28	0.10
Main	38361.14	Max WS	274.34	644.16	650.57		650.58	0.000059	0.80	341.41	107.57	0.08
Main	38408.3*	Max WS	275.32	644.15	650.57		650.58	0.000047	0.79	350.38	95.36	0.07
Main	38455.5*	Max WS	274.34	644.15	650.57		650.58	0.000040	0.81	337.32	79.59	0.07
Main	38502.69	Max WS	272.85	644.14	650.55		650.59	0.000085	1.58	173.03	61.56	0.11
Main	38600 UNION PACIFIC RR	Culvert										
Main	38717.64	Max WS	291.15	644.30	650.70		650.74	0.000109	1.69	171.88	45.18	0.12
Main	39039.40	Max WS	296.02	644.35	650.74		650.77	0.000059	1.27	254.99	51.27	0.09
Main	39339.37	Max WS	297.26	644.63	650.76		650.79	0.000073	1.25	242.35	51.35	0.10
Main	39639.57 COOK-DUPAGE CNTY	Max WS	307.23	644.90	650.79		650.81	0.000101	1.32	232.66	50.10	0.11

50-YR EXISTING HEC-RAS

HEC-RAS Plan: BL, 50-Yr CE River: Bens Reach: Main Profile: Max WS

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	30000 GODFREY RAILYARD		Culvert									
Main	30990.95	Max WS	259.28	641.50	645.07		645.16	0.000537	2.48	104.51	30.00	0.23
Main	31038.6*	Max WS	258.42	641.51	644.97		645.29	0.003949	4.56	56.73	20.35	0.48
Main	31086.39	Max WS	257.60	641.52	644.93	645.21	646.24	0.030990	9.18	28.05	15.29	1.20
Main	31131.5*	Max WS	256.74	641.53	646.62		646.95	0.004874	4.58	56.06	21.46	0.50
Main	31176.6*	Max WS	255.96	641.53	646.85		647.16	0.004500	4.43	57.72	21.61	0.48
Main	31221.8*	Max WS	255.15	641.54	647.07		647.36	0.004405	4.32	59.11	22.55	0.47
Main	31266.9*	Max WS	254.35	641.54	647.29		647.56	0.004225	4.18	60.84	23.42	0.46
Main	31312.1*	Max WS	253.57	641.55	647.49		647.74	0.003920	4.06	62.42	23.41	0.44
Main	31357.2*	Max WS	252.74	641.55	647.67		647.92	0.003680	3.97	63.68	23.21	0.42
Main	31402.4*	Max WS	251.93	641.56	647.84		648.08	0.003448	3.90	64.67	22.92	0.41
Main	31447.5*	Max WS	251.09	641.56	648.00		648.23	0.003237	3.83	65.59	22.52	0.39
Main	31492.71	Max WS	250.28	641.57	648.15		648.37	0.003040	3.78	66.29	21.83	0.38
Main	31564.4*	Max WS	239.02	641.58	648.43		648.55	0.001474	2.78	86.16	27.98	0.27
Main	31636.2*	Max WS	203.21	641.59	648.59		648.65	0.000617	1.95	104.58	30.95	0.18
Main	31708.0*	Max WS	136.16	641.60	648.69		648.71	0.000181	1.13	121.08	32.64	0.10
Main	31779.7*	Max WS	62.69	641.61	648.72		648.73	0.000028	0.46	135.53	33.31	0.04
Main	31851.56	Max WS	42.48	641.62	648.73		648.73	0.000010	0.29	148.66	34.21	0.02
Main	31917.4*	Max WS	41.29	641.63	648.73		648.73	0.000009	0.28	146.88	33.60	0.02
Main	31983.3*	Max WS	40.09	641.64	648.73		648.73	0.000009	0.28	145.22	32.78	0.02
Main	32049.2*	Max WS	38.86	641.65	648.73		648.73	0.000008	0.27	143.96	32.01	0.02
Main	32115.1*	Max WS	37.75	641.66	648.73		648.73	0.000008	0.26	142.68	31.36	0.02
Main	32181.08	Max WS	36.55	641.67	648.73		648.73	0.000008	0.26	141.67	31.07	0.02
Main	32239.9*	Max WS	35.44	641.68	648.73		648.73	0.000008	0.25	140.44	32.88	0.02
Main	32298.7*	Max WS	34.31	641.69	648.73		648.73	0.000008	0.25	139.10	34.92	0.02
Main	32357.5*	Max WS	33.23	641.69	648.73		648.73	0.000008	0.24	137.68	36.53	0.02
Main	32357.52		Lat Struct									
Main	32416.3*	Max WS	32.09	641.70	648.73		648.74	0.000008	0.24	136.17	37.83	0.02
Main	32475.18	Max WS	31.21	641.71	648.76	643.28	648.77	0.000382	0.66	47.49	39.25	0.04
Main	33106.07	Max WS	66.60	642.19	650.96	644.52	650.96	0.001314	0.85	123.53	40.724	0.03
Main	33135.4*	Max WS	85.83	642.34	651.06		651.06	0.000000	0.08	2519.57	984.54	0.01
Main	33164.7*	Max WS	176.77	642.49	651.06		651.06	0.000000	0.13	4066.23	1561.83	0.01
Main	33194.0*	Max WS	597.38	642.65	651.06		651.06	0.000002	0.42	5654.91	2128.47	0.03
Main	33200 STRUCTURE 102		Lat Struct									
Main	33223.43	Max WS	651.73	642.80	651.06		651.06	0.000002	0.56	5977.07	1690.66	0.03
Main	33300 IRVING PARK ROAD		Culvert									
Main	33468.31	Max WS	651.67	644.00	651.07		651.07	0.000000	0.23	9523.47	1691.97	0.02
Main	33487.60	Max WS	651.17	642.29	651.07		651.09	0.000127	0.98	712.79	124.47	0.07
Main	33503.8*	Max WS	650.90	642.47	651.08		651.09	0.000124	0.97	717.92	128.66	0.07
Main	33520.0*	Max WS	650.63	642.64	651.08		651.09	0.000122	0.96	721.77	132.31	0.07
Main	33536.3*	Max WS	650.27	642.82	651.08		651.09	0.000120	0.94	724.61	134.73	0.06
Main	33552.5*	Max WS	649.99	642.99	651.08		651.09	0.000118	0.92	727.56	135.84	0.06
Main	33568.79	Max WS	649.72	643.17	651.08		651.10	0.000115	0.90	731.94	145.31	0.06
Main	33595.9*	Max WS	649.07	642.94	651.09		651.10	0.000096	0.83	789.55	139.27	0.06
Main	33623.0*	Max WS	648.42	642.71	651.09		651.10	0.000080	0.77	851.17	142.68	0.05
Main	33650.12	Max WS	647.75	642.48	651.10		651.10	0.000067	0.71	916.36	151.90	0.05
Main	33680.14	Max WS	647.14	643.20	651.10		651.10	0.000041	0.58	1122.13	175.57	0.04
Main	33685.0*	Max WS	646.90	643.18	651.10		651.11	0.000031	0.51	1498.15	493.83	0.03
Main	33689.9*	Max WS	646.74	643.16	651.10		651.10	0.000012	0.31	2767.76	753.78	0.02
Main	33694.78	Max WS	646.59	643.14	651.10		651.11	0.000029	0.48	1356.09	845.05	0.03
Main	33711.4*	Max WS	646.16	643.35	651.10		651.10	0.000003	0.16	4692.06	878.21	0.01
Main	33728.1*	Max WS	645.77	643.57	651.10		651.10	0.000003	0.15	4883.67	904.15	0.01
Main	33744.8*	Max WS	645.37	643.79	651.10		651.10	0.000003	0.14	5074.17	927.06	0.01
Main	33761.48	Max WS	644.98	644.00	651.10		651.10	0.000016	0.35	1869.37	948.56	0.02
Main	33770.7*	Max WS	644.75	643.60	651.10		651.10	0.000002	0.13	5529.65	1022.92	0.01
Main	33780.10	Max WS	644.52	643.20	651.10		651.10	0.000006	0.22	2910.84	1094.61	0.02
Main	33824.0*	Max WS	643.31	643.42	651.10		651.10	0.000002	0.11	6250.65	1099.55	0.01
Main	33868.0*	Max WS	642.37	643.63	651.10		651.10	0.000002	0.10	6540.01	1135.83	0.01
Main	33911.98	Max WS	641.13	643.85	651.10		651.11	0.000004	0.17	3747.38	1190.31	0.01
Main	33952.1*	Max WS	640.39	643.57	651.11		651.11	0.000001	0.10	7070.55	1245.19	0.01
Main	33992.23	Max WS	638.96	643.29	651.10		651.11	0.000003	0.16	4066.78	1309.38	0.01
Main	34036.1*	Max WS	638.40	643.40	651.11		651.11	0.000004	0.17	4299.95	975.73	0.01
Main	34080.1*	Max WS	637.13	643.51	651.10		651.11	0.000011	0.27	2435.09	492.85	0.02
Main	34124.11	Max WS	636.04	643.62	651.10		651.11	0.000023	0.38	1686.06	317.04	0.03
Main	34165.1*	Max WS	635.03	643.55	651.11		651.11	0.000023	0.39	1638.47	287.67	0.03
Main	34206.2*	Max WS	633.50	643.48	651.11		651.11	0.000022	0.40	1584.65	269.90	0.03
Main	34247.3*	Max WS	633.18	643.42	651.11		651.11	0.000022	0.41	1568.97	258.27	0.03
Main	34288.38	Max WS	632.28	643.35	651.11		651.11	0.000024	0.44	1445.64	295.35	0.03
Main	34323.2*	Max WS	630.81	643.15	651.11		651.11	0.000031	0.49	1371.01	273.75	0.03
Main	34358.2*	Max WS	630.58	642.94	651.11		651.11	0.000042	0.56	1209.30	273.00	0.04
Main	34393.10	Max WS	629.08	642.74	651.11		651.11	0.000065	0.67	957.24	279.73	0.05
Main	34492.09	Max WS	627.15	644.45	651.11		651.12	0.000101	0.81	788.65	248.73	0.06
Main	34642.28	Max WS	623.78	644.50	651.13		651.14	0.000110	0.81	784.55	252.22	0.06
Main	34844.43	Max WS	619.19	645.21	651.15		651.16	0.000108	0.76	812.76	253.04	0.06
Main	34990.5	Max WS	615.78	643.89	651.17		651.17	0.000048	0.58	1058.17	247.33	0.04
Main	35157.52	Max WS	611.69	645.42	651.18		651.19	0.000113	0.74	825.13	267.08	0.06
Main	35397.52	Max WS	605.99	644.70	651.20		651.21	0.000061	0.63	964.33	364.53	0.05
Main	35498.37	Max WS	603.91	644.73	651.21		651.21	0.000057	0.60	1011.31	403.69	0.04
Main	35640.53	Max WS	600.16	644.62	651.22		651.22	0.000070	0.60	1003.34	323.54	0.05
Main	35728.81	Max WS	598.47	644.78	651.22		651.23	0.000034	0.46	1291.96	303.36	0.03
Main	35941.41	Max WS	593.19	644.83	651.23		651.23	0.000025	0.41	1458.06	365.58	0.03
Main	36092.81	Max WS	589.72	644.33	651.23		651.24	0.000037	0.45	1297.91	344.13	0.03
Main	36259.72	Max WS	585.82	644.90	651.24		651.24	0.000026	0.41	1425.49	257.14	0.03
Main	36370.35	Max WS	583.09	644.95	651.24		651.25	0.000025	0.40	1465.51	626.74	0.03

HEC-RAS Plan: BL, 50-Yr CE River: Bens Reach: Main Profile: Max WS (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	36404.39	Max WS	582.57	642.72	651.24		651.25	0.000020	0.36	1613.35	561.13	0.03
Main	36432.47	Max WS	581.13	643.95	651.24		651.25	0.000020	0.37	1571.64	517.43	0.03
Main	36457.53	Max WS	579.17	643.75	651.20		651.37	0.001248	3.32	174.20	420.49	0.22
Main	36500 TAFT ROAD	Culvert										
Main	36660.35	Max WS	589.81	643.94	651.48		651.65	0.001230	3.34	176.84	560.31	0.21
Main	36693.56	Max WS	589.87	643.98	651.53		651.53	0.000005	0.17	3471.15	636.78	0.01
Main	36790.51	Max WS	530.82	643.76	651.54		651.54	0.000003	0.13	4207.50	815.88	0.01
Main	36862.61	Max WS	530.95	644.44	651.54		651.54	0.000002	0.11	4700.06	846.87	0.01
Main	36990.25	Max WS	530.08	642.70	651.54		651.54	0.000001	0.10	5259.94	848.34	0.01
Main	37113.29	Max WS	529.28	644.36	651.54		651.54	0.000002	0.12	4384.60	764.90	0.01
Main	37178.87	Max WS	528.84	642.92	651.54		651.54	0.000002	0.12	4255.81	719.58	0.01
Main	37334.5	Max WS	528.17	642.70	651.54		651.54	0.000008	0.21	2526.58	467.07	0.02
Main	37347.7*	Max WS	526.92	642.78	651.54		651.54	0.000009	0.27	1949.30	381.16	0.02
Main	37360.9*	Max WS	527.42	642.85	651.54		651.54	0.000019	0.38	1421.62	335.43	0.03
Main	37374.1*	Max WS	526.72	642.93	651.53		651.54	0.000030	0.59	1019.29	362.48	0.05
Main	37387.33	Max WS	526.07	643.01	651.53		651.54	0.000101	0.97	814.19	377.07	0.08
Main	37606.41	Max WS	524.38	643.66	651.54		651.58	0.000202	1.63	382.33	135.88	0.12
Main	37689.1*	Max WS	526.12	643.56	651.56		651.60	0.000229	1.70	360.86	116.66	0.13
Main	37771.8*	Max WS	527.33	643.46	651.57		651.62	0.000257	1.76	347.38	107.34	0.14
Main	37854.5*	Max WS	529.16	643.35	651.60		651.64	0.000281	1.80	346.48	114.72	0.14
Main	37937.2*	Max WS	531.63	643.25	651.62		651.67	0.000286	1.79	360.31	132.31	0.14
Main	38020.00	Max WS	516.99	643.15	651.65		651.69	0.000264	1.69	363.24	132.58	0.13
Main	38361.14	Max WS	521.31	644.16	651.73		651.75	0.000077	1.09	499.13	251.12	0.09
Main	38408.3*	Max WS	521.32	644.15	651.73		651.75	0.000067	1.12	470.75	112.35	0.09
Main	38455.5*	Max WS	521.99	644.15	651.73		651.75	0.000066	1.22	435.09	88.20	0.09
Main	38502.69	Max WS	515.98	644.14	651.67		651.77	0.000178	2.54	203.23	65.45	0.16
Main	38600 UNION PACIFIC RR	Culvert										
Main	38717.64	Max WS	544.98	644.30	652.25		652.35	0.000184	2.55	213.94	51.79	0.16
Main	39039.40	Max WS	549.35	644.35	652.35		652.40	0.000087	1.80	341.94	56.97	0.11
Main	39339.37	Max WS	550.58	644.63	652.38		652.42	0.000100	1.74	330.15	57.39	0.12
Main	39639.57 COOK-DUPAGE CNTY	Max WS	551.42	644.90	652.41		652.46	0.000120	1.75	318.76	56.07	0.12

HEC-RAS Plan: BL, 100-Yr CE River: Bens Reach: Main Profile: Max WS

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	30000 GODFREY RAILYARD		Culvert									
Main	30990.95	Max WS	535.28	641.50	647.25		647.40	0.000509	3.15	169.71	34.28	0.24
Main	31038.6*	Max WS	533.79	641.51	647.13		647.50	0.002870	4.85	110.02	29.22	0.44
Main	31086.39	Max WS	532.30	641.52	647.08		647.93	0.014873	7.43	71.60	31.60	0.87
Main	31131.5*	Max WS	530.94	641.53	647.92		648.41	0.006755	5.61	95.08	36.99	0.60
Main	31176.6*	Max WS	529.52	641.53	648.25		648.68	0.005512	5.28	101.26	38.56	0.55
Main	31221.8*	Max WS	528.10	641.54	648.52		648.92	0.004866	5.11	105.04	41.17	0.52
Main	31266.9*	Max WS	526.68	641.54	648.75		649.13	0.004456	5.00	108.14	43.87	0.50
Main	31312.1*	Max WS	525.25	641.55	648.96		649.33	0.004172	4.93	110.90	46.78	0.48
Main	31357.2*	Max WS	523.83	641.55	649.15		649.52	0.003963	4.87	113.85	52.74	0.47
Main	31402.4*	Max WS	522.41	641.56	649.34		649.69	0.003774	4.81	117.74	59.16	0.45
Main	31447.5*	Max WS	520.98	641.56	649.52		649.86	0.003586	4.73	122.52	65.41	0.44
Main	31492.71	Max WS	474.51	641.57	649.79		650.04	0.002579	4.11	134.80	76.62	0.37
Main	31564.4*	Max WS	142.35	641.58	650.23		650.24	0.000104	0.95	180.88	90.83	0.08
Main	31636.2*	Max WS	94.31	641.59	650.25		650.25	0.000034	0.58	190.28	93.42	0.05
Main	31708.0*	Max WS	67.82	641.60	650.25		650.25	0.000013	0.38	200.74	73.52	0.03
Main	31779.7*	Max WS	58.56	641.61	650.25		650.26	0.000008	0.30	212.10	74.31	0.02
Main	31851.56	Max WS	50.34	641.62	650.26		650.26	0.000005	0.24	222.85	86.65	0.02
Main	31917.4*	Max WS	44.00	641.63	650.26		650.26	0.000004	0.22	215.06	63.97	0.02
Main	31983.3*	Max WS	39.25	641.64	650.26		650.26	0.000003	0.20	208.30	59.38	0.01
Main	32049.2*	Max WS	37.18	641.65	650.26		650.26	0.000003	0.19	203.00	53.44	0.01
Main	32115.1*	Max WS	35.10	641.66	650.26		650.26	0.000003	0.18	198.65	48.26	0.01
Main	32181.08	Max WS	32.99	641.67	650.26		650.26	0.000003	0.17	195.34	44.12	0.01
Main	32239.9*	Max WS	31.11	641.68	650.26		650.26	0.000003	0.16	198.76	49.54	0.01
Main	32298.7*	Max WS	29.28	641.69	650.26		650.26	0.000002	0.15	202.33	54.98	0.01
Main	32357.5*	Max WS	27.34	641.69	650.26		650.26	0.000002	0.13	206.14	60.74	0.01
Main	32357.52		Lat Struct									
Main	32416.3*	Max WS	25.39	641.70	650.26		650.26	0.000002	0.12	210.42	69.53	0.01
Main	32475.18	Max WS	23.57	641.71	650.28	643.07	650.28	0.000013	0.19	129.52	81.49	0.01
Main	33106.07	Max WS	67.84	642.19	651.27	644.53	651.27	0.000146	0.37	252.39	407.24	0.02
Main	33135.4*	Max WS	98.55	642.34	651.38		651.38	0.000000	0.08	2834.33	984.54	0.01
Main	33164.7*	Max WS	235.35	642.49	651.38		651.38	0.000001	0.15	4565.55	1561.83	0.01
Main	33194.0*	Max WS	722.78	642.65	651.38		651.38	0.000002	0.45	6337.20	2137.96	0.03
Main	33200 STRUCTURE 102		Lat Struct									
Main	33223.43	Max WS	805.60	642.80	651.38		651.38	0.000002	0.63	6517.28	1690.78	0.04
Main	33300 IRVING PARK ROAD		Culvert									
Main	33468.31	Max WS	805.60	644.00	651.40		651.40	0.000000	0.27	10068.11	1691.98	0.02
Main	33487.60	Max WS	804.78	642.29	651.39		651.41	0.000164	1.16	753.05	126.29	0.08
Main	33503.8*	Max WS	804.55	642.47	651.40		651.42	0.000160	1.14	759.58	130.39	0.08
Main	33520.0*	Max WS	804.21	642.64	651.40		651.42	0.000157	1.12	764.75	134.27	0.07
Main	33536.3*	Max WS	803.79	642.82	651.40		651.42	0.000155	1.10	768.55	137.28	0.07
Main	33552.5*	Max WS	803.46	642.99	651.41		651.42	0.000152	1.08	772.09	153.36	0.07
Main	33568.79	Max WS	803.22	643.17	651.41		651.43	0.000148	1.06	776.39	202.95	0.07
Main	33595.9*	Max WS	802.34	642.94	651.41		651.43	0.000124	0.98	839.90	185.79	0.07
Main	33623.0*	Max WS	801.64	642.71	651.42		651.43	0.000103	0.91	899.18	161.17	0.06
Main	33650.12	Max WS	800.85	642.48	651.42		651.43	0.000087	0.84	965.62	180.20	0.06
Main	33680.14	Max WS	799.88	643.20	651.43		651.44	0.000054	0.69	1180.80	180.64	0.04
Main	33685.0*	Max WS	799.69	643.18	651.43		651.44	0.000039	0.59	1672.19	569.19	0.04
Main	33689.9*	Max WS	799.62	643.16	651.43		651.44	0.000015	0.35	3018.86	764.08	0.02
Main	33694.78	Max WS	799.43	643.14	651.43		651.44	0.000038	0.56	1424.72	854.85	0.04
Main	33711.4*	Max WS	798.81	643.35	651.44		651.44	0.000004	0.18	4984.19	886.60	0.01
Main	33728.1*	Max WS	798.44	643.57	651.44		651.44	0.000004	0.17	5184.15	911.41	0.01
Main	33744.8*	Max WS	797.79	643.79	651.44		651.44	0.000003	0.16	5382.31	933.60	0.01
Main	33761.48	Max WS	797.29	644.00	651.43		651.44	0.000021	0.41	1967.52	954.72	0.03
Main	33770.7*	Max WS	796.91	643.60	651.44		651.44	0.000003	0.15	5869.91	1031.57	0.01
Main	33780.10	Max WS	796.87	643.20	651.44		651.44	0.000008	0.26	3077.13	1100.76	0.02
Main	33824.0*	Max WS	795.61	643.42	651.44		651.44	0.000002	0.13	6620.93	1136.09	0.01
Main	33868.0*	Max WS	794.32	643.63	651.44		651.44	0.000002	0.12	6918.32	1149.30	0.01
Main	33911.98	Max WS	792.64	643.85	651.44		651.44	0.000005	0.20	3944.85	1194.83	0.01
Main	33952.1*	Max WS	791.77	643.57	651.44		651.44	0.000002	0.11	7489.05	1283.04	0.01
Main	33992.23	Max WS	790.45	643.29	651.44		651.44	0.000004	0.19	4267.81	1341.98	0.01
Main	34036.1*	Max WS	788.95	643.40	651.44		651.44	0.000005	0.20	4625.92	991.14	0.01
Main	34080.1*	Max WS	787.63	643.51	651.44		651.44	0.000013	0.31	2602.76	520.00	0.02
Main	34124.11	Max WS	786.30	643.62	651.44		651.44	0.000029	0.45	1790.58	333.52	0.03
Main	34165.1*	Max WS	784.87	643.55	651.44		651.44	0.000029	0.46	1737.02	305.21	0.03
Main	34206.2*	Max WS	784.00	643.48	651.44		651.44	0.000029	0.47	1677.88	290.65	0.03
Main	34247.3*	Max WS	782.78	643.42	651.44		651.44	0.000029	0.48	1657.44	276.94	0.03
Main	34288.38	Max WS	781.54	643.35	651.44		651.44	0.000031	0.52	1513.86	413.20	0.03
Main	34323.2*	Max WS	780.60	643.15	651.44		651.44	0.000040	0.58	1489.56	426.53	0.04
Main	34358.2*	Max WS	779.65	642.94	651.44		651.45	0.000054	0.65	1325.17	411.50	0.04
Main	34393.10	Max WS	778.28	642.74	651.44		651.45	0.000083	0.79	1016.65	390.56	0.05
Main	34492.09	Max WS	776.07	644.45	651.45		651.46	0.000128	0.94	843.47	351.68	0.07
Main	34642.28	Max WS	771.62	644.50	651.47		651.48	0.000137	0.94	840.63	363.28	0.07
Main	34844.43	Max WS	765.99	645.21	651.49		651.51	0.000134	0.88	869.18	360.06	0.07
Main	34990.5	Max WS	761.37	643.89	651.51		651.52	0.000062	0.68	1116.82	323.84	0.05
Main	35157.52	Max WS	757.36	645.42	651.53		651.54	0.000140	0.85	886.35	304.77	0.07
Main	35397.52	Max WS	750.26	644.70	651.56		651.56	0.000076	0.74	1025.74	415.40	0.05
Main	35498.37	Max WS	747.76	644.73	651.56		651.57	0.000073	0.70	1074.27	449.36	0.05
Main	35640.53	Max WS	743.21	644.62	651.58		651.58	0.000087	0.69	1076.88	394.89	0.05
Main	35728.81	Max WS	740.17	644.78	651.58		651.59	0.000043	0.54	1372.30	307.45	0.04
Main	35941.41	Max WS	734.46	644.83	651.59		651.60	0.000032	0.47	1547.81	370.99	0.03
Main	36092.81	Max WS	730.09	644.33	651.60		651.60	0.000045	0.53	1386.88	363.61	0.04
Main	36259.72	Max WS	725.01	644.90	651.61		651.61	0.000033	0.48	1514.16	265.35	0.03
Main	36370.35	Max WS	722.01	644.95	651.61		651.61	0.000031	0.46	1557.66	631.24	0.03

HEC-RAS Plan: BL, 100-Yr CE River: Bens Reach: Main Profile: Max WS (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	36404.39	Max WS	721.77	642.72	651.61		651.61	0.000025	0.42	1714.93	585.86	0.03
Main	36432.47	Max WS	720.53	643.95	651.61		651.61	0.000025	0.43	1666.14	542.37	0.03
Main	36457.53	Max WS	717.28	643.75	651.55		651.79	0.001642	3.93	182.38	469.77	0.25
Main	36500 TAFT ROAD	Culvert										
Main	36660.35	Max WS	731.22	643.94	652.02		652.26	0.001499	3.86	189.58	570.57	0.24
Main	36693.56	Max WS	732.56	643.98	652.09		652.09	0.000006	0.19	3829.45	652.92	0.01
Main	36790.51	Max WS	660.79	643.76	652.09		652.09	0.000003	0.14	4665.22	828.32	0.01
Main	36862.61	Max WS	659.34	644.44	652.09		652.09	0.000002	0.13	5173.03	852.49	0.01
Main	36990.25	Max WS	658.51	642.70	652.09		652.09	0.000002	0.11	5733.02	851.50	0.01
Main	37113.29	Max WS	658.44	644.36	652.09		652.09	0.000003	0.14	4811.76	770.46	0.01
Main	37178.67	Max WS	657.21	642.92	652.09		652.09	0.000003	0.14	4659.87	732.62	0.01
Main	37334.5	Max WS	655.77	642.70	652.09		652.09	0.000008	0.24	2789.39	477.26	0.02
Main	37347.7*	Max WS	655.65	642.78	652.09		652.09	0.000010	0.30	2168.97	407.02	0.02
Main	37360.9*	Max WS	656.23	642.85	652.09		652.09	0.000020	0.42	1620.05	374.54	0.03
Main	37374.1*	Max WS	655.40	642.93	652.09		652.09	0.000031	0.63	1229.73	391.07	0.05
Main	37387.33	Max WS	654.59	643.01	652.09		652.10	0.000086	0.98	1036.49	417.30	0.08
Main	37606.41	Max WS	653.91	643.66	652.10		652.14	0.000211	1.77	471.41	212.57	0.13
Main	37689.1*	Max WS	654.56	643.56	652.11		652.16	0.000240	1.86	434.90	146.57	0.13
Main	37771.8*	Max WS	653.77	643.46	652.13		652.18	0.000272	1.94	422.33	161.36	0.14
Main	37854.5*	Max WS	656.75	643.35	652.15		652.20	0.000288	1.95	424.37	171.54	0.14
Main	37937.2*	Max WS	658.31	643.25	652.18		652.23	0.000284	1.91	443.07	169.24	0.14
Main	38020.00	Max WS	640.08	643.15	652.21		652.25	0.000272	1.84	424.00	194.24	0.14
Main	38361.14	Max WS	642.84	644.16	652.29		652.31	0.000068	1.12	686.60	370.39	0.09
Main	38408.3*	Max WS	642.03	644.15	652.28		652.31	0.000069	1.23	535.35	120.52	0.09
Main	38455.5*	Max WS	642.04	644.15	652.28		652.31	0.000071	1.35	484.74	90.91	0.10
Main	38502.69	Max WS	633.63	644.14	652.20		652.33	0.000214	2.91	217.61	66.97	0.18
Main	38600 UNION PACIFIC RR	Culvert										
Main	38717.64	Max WS	677.58	644.30	653.13		653.25	0.000200	2.85	237.46	55.88	0.17
Main	39039.40	Max WS	679.97	644.35	653.24		653.29	0.000090	1.96	394.05	60.15	0.12
Main	39339.37	Max WS	680.46	644.63	653.27		653.32	0.000099	1.88	382.75	60.73	0.12
Main	39639.57 COOK-DUPAGE CNTY	Max WS	681.49	644.90	653.30		653.35	0.000116	1.88	370.10	59.34	0.12

10-YR NATURAL HEC-RAS

HEC-RAS Plan: BL, 10-Yr NAT River: Bens Reach: Main Profile: Max WS

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	30000 GODFREY RAILYARD		Culvert									
Main	30990.95	Max WS	93.36	641.50	644.10		644.12	0.000192	1.23	76.20	30.00	0.13
Main	31038.6*	Max WS	92.36	641.51	644.08		644.17	0.001264	2.29	40.28	16.85	0.26
Main	31086.39	Max WS	91.36	641.52	644.16		644.58	0.013806	5.23	17.45	12.08	0.77
Main	31131.5*	Max WS	90.42	641.53	644.80		645.02	0.005624	3.76	24.06	13.74	0.50
Main	31176.6*	Max WS	89.46	641.53	645.07		645.25	0.004335	3.43	26.08	13.78	0.44
Main	31221.8*	Max WS	88.50	641.54	645.27		645.43	0.003633	3.24	27.33	13.48	0.40
Main	31266.9*	Max WS	87.54	641.54	645.44		645.59	0.003069	3.07	28.48	13.04	0.37
Main	31312.1*	Max WS	86.57	641.55	645.59		645.72	0.002715	2.94	29.49	12.94	0.34
Main	31357.2*	Max WS	85.63	641.55	645.72		645.84	0.002426	2.81	30.45	12.85	0.32
Main	31402.4*	Max WS	84.66	641.56	645.83		645.95	0.002204	2.71	31.27	12.77	0.30
Main	31447.5*	Max WS	83.71	641.56	645.94		646.04	0.001998	2.60	32.14	12.71	0.29
Main	31492.71	Max WS	82.75	641.57	646.03		646.13	0.001841	2.52	32.87	12.65	0.28
Main	31564.4*	Max WS	81.23	641.58	646.17		646.23	0.000958	1.97	41.24	14.54	0.21
Main	31636.2*	Max WS	79.72	641.59	646.25		646.29	0.000593	1.61	49.45	17.21	0.17
Main	31708.0*	Max WS	78.19	641.60	646.30		646.33	0.000375	1.32	59.03	20.53	0.14
Main	31779.7*	Max WS	76.68	641.61	646.33		646.35	0.000237	1.11	69.19	22.92	0.11
Main	31851.56	Max WS	75.15	641.62	646.35		646.36	0.000157	0.95	79.47	24.84	0.09
Main	31917.4*	Max WS	73.75	641.63	646.36		646.38	0.000152	0.93	79.03	24.58	0.09
Main	31983.3*	Max WS	72.37	641.64	646.37		646.39	0.000148	0.92	78.60	24.35	0.09
Main	32049.2*	Max WS	70.97	641.65	646.38		646.40	0.000143	0.91	78.34	24.16	0.09
Main	32115.1*	Max WS	69.57	641.66	646.39		646.41	0.000138	0.89	77.99	23.97	0.09
Main	32181.08	Max WS	68.19	641.67	646.40		646.42	0.000133	0.88	77.76	23.81	0.09
Main	32239.9*	Max WS	66.90	641.68	646.41		646.42	0.000155	0.90	74.04	24.48	0.09
Main	32298.7*	Max WS	65.61	641.69	646.42		646.43	0.000184	0.93	70.29	25.20	0.10
Main	32357.5*	Max WS	64.32	641.69	646.43		646.45	0.000221	0.97	66.57	25.96	0.11
Main	32357.52		Lat Struct									
Main	32416.3*	Max WS	63.04	641.70	646.45		646.46	0.000272	1.00	62.87	26.80	0.12
Main	32475.18	Max WS	61.79	641.71	646.51	643.93	646.68	0.004845	3.23	19.11	1.94	0.26
Main	33106.07	Max WS	61.99	642.19	650.06	644.43	650.22	0.005615	3.21	19.34		0.20
Main	33135.4*	Max WS	60.13	642.34	650.15		650.15	0.000000	0.09	1624.59	977.85	0.01
Main	33164.7*	Max WS	62.28	642.49	650.15		650.15	0.000000	0.07	2660.42	1504.19	0.01
Main	33194.0*	Max WS	321.77	642.65	650.15		650.15	0.000002	0.36	3756.83	2058.60	0.02
Main	33200 STRUCTURE 102		Lat Struct									
Main	33223.43	Max WS	321.89	642.80	650.15		650.15	0.000001	0.39	4440.82	1686.70	0.03
Main	33468.31	Max WS	322.06	644.00	650.15		650.15	0.000000	0.13	7959.97	1691.95	0.01
Main	33487.60	Max WS	321.60	642.29	650.15		650.15	0.000052	0.57	599.86	120.36	0.04
Main	33503.8*	Max WS	321.55	642.47	650.15		650.16	0.000052	0.57	601.18	123.91	0.04
Main	33520.0*	Max WS	321.39	642.64	650.15		650.16	0.000051	0.56	602.02	126.37	0.04
Main	33536.3*	Max WS	321.23	642.82	650.15		650.16	0.000050	0.55	603.02	127.76	0.04
Main	33552.5*	Max WS	321.07	642.99	650.15		650.16	0.000049	0.54	605.17	127.89	0.04
Main	33568.79	Max WS	320.79	643.17	650.15		650.16	0.000048	0.52	612.74	116.37	0.04
Main	33595.9*	Max WS	320.41	642.94	650.16		650.16	0.000040	0.48	666.00	126.63	0.04
Main	33623.0*	Max WS	320.15	642.71	650.16		650.16	0.000033	0.44	722.95	132.17	0.03
Main	33650.12	Max WS	319.94	642.48	650.16		650.16	0.000027	0.41	782.96	137.55	0.03
Main	33680.14	Max WS	319.22	643.20	650.16		650.16	0.000016	0.33	964.20	160.82	0.02
Main	33685.0*	Max WS	319.35	643.18	650.16		650.16	0.000014	0.31	1080.10	339.44	0.02
Main	33689.9*	Max WS	319.27	643.16	650.16		650.16	0.000007	0.21	2070.25	726.62	0.01
Main	33694.78	Max WS	319.23	643.14	650.16		650.16	0.000012	0.27	1166.07	829.98	0.02
Main	33711.4*	Max WS	318.99	643.35	650.16		650.16	0.000001	0.10	3873.10	860.29	0.01
Main	33728.1*	Max WS	318.37	643.57	650.16		650.16	0.000001	0.09	4039.00	889.79	0.01
Main	33744.8*	Max WS	318.51	643.79	650.16		650.16	0.000001	0.09	4207.12	914.44	0.01
Main	33761.48	Max WS	318.28	644.00	650.16		650.16	0.000007	0.20	1594.04	937.42	0.02
Main	33770.7*	Max WS	317.95	643.60	650.16		650.16	0.000001	0.08	4576.42	995.50	0.01
Main	33780.10	Max WS	318.02	643.20	650.16		650.16	0.000003	0.13	2464.46	1028.33	0.01
Main	33824.0*	Max WS	317.45	643.42	650.16		650.16	0.000001	0.07	5230.80	1066.85	0.00
Main	33868.0*	Max WS	316.48	643.63	650.16		650.16	0.000001	0.06	5478.14	1120.46	0.00
Main	33911.98	Max WS	316.09	643.85	650.16		650.16	0.000002	0.10	3190.27	1176.67	0.01
Main	33952.1*	Max WS	315.62	643.57	650.16		650.16	0.000001	0.06	5929.87	1198.89	0.00
Main	33992.23	Max WS	314.57	643.29	650.16		650.16	0.000001	0.09	3501.98	1241.95	0.01
Main	34036.1*	Max WS	314.40	643.40	650.16		650.16	0.000002	0.10	3404.15	929.07	0.01
Main	34080.1*	Max WS	313.88	643.51	650.16		650.16	0.000004	0.16	2009.15	411.07	0.01
Main	34124.11	Max WS	312.86	643.62	650.16		650.16	0.000010	0.23	1395.29	304.58	0.02
Main	34165.1*	Max WS	312.51	643.55	650.16		650.16	0.000009	0.23	1372.63	269.00	0.02
Main	34206.2*	Max WS	311.80	643.48	650.16		650.16	0.000009	0.23	1346.46	241.33	0.02
Main	34247.3*	Max WS	311.10	643.42	650.16		650.16	0.000009	0.24	1334.03	243.35	0.02
Main	34288.38	Max WS	310.50	643.35	650.16		650.16	0.000009	0.25	1254.59	242.45	0.02
Main	34323.2*	Max WS	310.16	643.15	650.16		650.17	0.000013	0.28	1130.95	238.11	0.02
Main	34358.2*	Max WS	309.71	642.94	650.16		650.17	0.000018	0.32	988.35	209.24	0.02
Main	34393.10	Max WS	309.34	642.74	650.16		650.17	0.000027	0.39	799.41	197.93	0.03
Main	34492.09	Max WS	307.55	644.45	650.17		650.17	0.000043	0.47	649.76	174.54	0.04
Main	34642.28	Max WS	305.75	644.50	650.17		650.18	0.000047	0.48	640.84	179.97	0.04
Main	34844.43	Max WS	303.46	645.21	650.18		650.19	0.000049	0.46	662.05	195.88	0.04
Main	34990.5	Max WS	300.80	643.89	650.19		650.19	0.000019	0.34	897.41	208.04	0.03
Main	35157.52	Max WS	299.05	645.42	650.19		650.20	0.000054	0.45	658.25	214.70	0.04
Main	35397.52	Max WS	295.97	644.70	650.20		650.21	0.000027	0.37	797.06	253.88	0.03
Main	35498.37	Max WS	294.35	644.73	650.21		650.21	0.000024	0.35	839.61	258.03	0.03
Main	35640.53	Max WS	292.60	644.62	650.21		650.21	0.000034	0.36	801.81	258.77	0.03
Main	35728.81	Max WS	291.18	644.78	650.21		650.22	0.000014	0.27	1071.44	291.97	0.02
Main	35941.41	Max WS	288.19	644.83	650.22		650.22	0.000011	0.24	1211.60	330.99	0.02
Main	36092.81	Max WS	285.28	644.33	650.22		650.22	0.000017	0.27	1053.66	321.73	0.02
Main	36259.72	Max WS	283.62	644.90	650.22		650.22	0.000011	0.24	1182.86	235.51	0.02
Main	36370.35	Max WS	281.86	644.95	650.22		650.22	0.000011	0.23	1212.35	613.47	0.02
Main	36404.39	Max WS	281.84	642.72	650.22		650.22	0.000008	0.21	1335.19	406.09	0.02

HEC-RAS Plan: BL, 10-Yr NAT River: Bens Reach: Main Profile: Max WS (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	36432.47	Max WS	281.11	643.95	650.22		650.22	0.000008	0.21	1310.78	289.62	0.02
Main	36457.53	Max WS	280.01	643.75	650.21		650.26	0.000470	1.86	150.95	231.79	0.13
Main	36500	Taft Road Culvert										
Main	36660.35	Max WS	282.87	643.94	650.26		650.31	0.000512	1.91	148.05	538.20	0.13
Main	36693.56	Max WS	283.80	643.98	650.28		650.28	0.000003	0.11	2694.21	617.23	0.01
Main	36790.51	Max WS	250.53	643.76	650.28		650.28	0.000001	0.08	3256.54	726.83	0.01
Main	36862.61	Max WS	250.10	644.44	650.28		650.28	0.000001	0.07	3644.03	829.87	0.01
Main	36990.25	Max WS	249.76	642.70	650.28		650.28	0.000001	0.06	4196.34	842.66	0.00
Main	37113.29	Max WS	249.52	644.36	650.28		650.28	0.000001	0.07	3431.05	748.59	0.01
Main	37178.67	Max WS	249.33	642.92	650.28		650.28	0.000001	0.07	3356.85	709.17	0.01
Main	37334.5	Max WS	248.03	642.70	650.28		650.28	0.000004	0.13	1953.42	443.79	0.01
Main	37347.7*	Max WS	248.22	642.78	650.28		650.28	0.000005	0.17	1491.20	352.49	0.01
Main	37360.9*	Max WS	248.70	642.85	650.28		650.28	0.000010	0.24	1050.06	260.82	0.02
Main	37374.1*	Max WS	248.38	642.93	650.28		650.28	0.000019	0.39	652.49	233.32	0.04
Main	37387.33	Max WS	246.83	643.01	650.27		650.28	0.000115	0.83	394.03	252.99	0.08
Main	37606.41	Max WS	249.20	643.66	650.29		650.31	0.000115	1.03	260.51	81.55	0.09
Main	37689.1*	Max WS	249.74	643.56	650.30		650.32	0.000137	1.10	244.91	81.38	0.10
Main	37771.8*	Max WS	251.13	643.46	650.31		650.33	0.000160	1.16	233.52	79.29	0.10
Main	37854.5*	Max WS	252.50	643.35	650.32		650.34	0.000179	1.19	228.68	73.47	0.11
Main	37937.2*	Max WS	254.45	643.25	650.34		650.36	0.000188	1.22	232.18	78.73	0.11
Main	38020.00	Max WS	245.43	643.15	650.36		650.38	0.000162	1.15	243.88	90.04	0.10
Main	38361.14	Max WS	251.10	644.16	650.40		650.41	0.000055	0.77	324.08	101.79	0.08
Main	38408.3*	Max WS	251.64	644.15	650.41		650.41	0.000044	0.75	334.86	93.29	0.07
Main	38455.5*	Max WS	251.36	644.15	650.41		650.42	0.000039	0.78	324.32	78.43	0.07
Main	38502.69	Max WS	249.41	644.14	650.39		650.42	0.000077	1.48	168.67	60.88	0.10
Main	38600	UNION PACIFIC RR Culvert										
Main	38717.64	Max WS	261.67	644.30	650.51		650.54	0.000097	1.57	166.75	44.39	0.11
Main	39039.40	Max WS	266.14	644.35	650.55		650.57	0.000053	1.19	245.02	50.57	0.08
Main	39339.37	Max WS	266.95	644.63	650.57		650.59	0.000067	1.17	232.28	50.62	0.09
Main	39639.57	COOK-DUPAGE CNTY	268.81	644.90	650.59		650.61	0.000088	1.21	222.72	49.36	0.10

50-YR NATURAL HEC-RAS

HEC-RAS Plan: BL 50 IL 19 NAT River: Bens Reach: Main Profile: Max WS

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	30000 GODFREY RAILYARD		Culvert									
Main	30990.95	Max WS	240.30	641.50	644.82		644.91	0.000582	2.47	97.14	30.00	0.24
Main	31038.6*	Max WS	238.88	641.51	644.72		645.05	0.004312	4.61	51.78	19.37	0.50
Main	31086.39	Max WS	238.25	641.52	644.73	645.07	646.13	0.035482	9.48	25.14	14.48	1.27
Main	31131.5*	Max WS	238.77	641.53	646.63		646.91	0.004161	4.24	56.35	21.51	0.46
Main	31176.6*	Max WS	238.12	641.53	646.83		647.10	0.003994	4.17	57.17	21.50	0.45
Main	31221.8*	Max WS	237.52	641.54	647.02		647.28	0.003951	4.10	57.88	21.89	0.44
Main	31266.9*	Max WS	236.83	641.54	647.21		647.46	0.003905	4.01	59.01	22.70	0.44
Main	31312.1*	Max WS	236.09	641.55	647.39		647.63	0.003716	3.92	60.20	22.81	0.43
Main	31357.2*	Max WS	235.41	641.55	647.57		647.79	0.003507	3.84	61.23	22.50	0.41
Main	31402.4*	Max WS	234.67	641.56	647.73		647.95	0.003331	3.78	62.09	22.10	0.40
Main	31447.5*	Max WS	233.95	641.56	647.88		648.10	0.003110	3.72	62.93	21.49	0.38
Main	31492.71	Max WS	233.22	641.57	648.02		648.23	0.002874	3.67	63.58	20.48	0.36
Main	31564.4*	Max WS	227.64	641.58	648.28		648.40	0.001522	2.78	82.00	26.75	0.28
Main	31636.2*	Max WS	202.80	641.59	648.43		648.50	0.000702	2.03	99.73	29.70	0.19
Main	31708.0*	Max WS	149.70	641.60	648.53		648.55	0.000247	1.29	116.04	31.31	0.12
Main	31779.7*	Max WS	62.43	641.61	648.58		648.58	0.000030	0.48	130.78	32.61	0.04
Main	31851.56	Max WS	41.27	641.62	648.59		648.59	0.000010	0.29	143.79	33.57	0.02
Main	31917.4*	Max WS	40.19	641.63	648.59		648.59	0.000010	0.28	142.11	32.80	0.02
Main	31983.3*	Max WS	39.11	641.64	648.59		648.59	0.000009	0.28	140.57	31.99	0.02
Main	32049.2*	Max WS	38.03	641.65	648.59		648.59	0.000009	0.27	139.41	31.35	0.02
Main	32115.1*	Max WS	36.94	641.66	648.59		648.59	0.000008	0.27	138.21	30.91	0.02
Main	32181.08	Max WS	35.86	641.67	648.59		648.59	0.000008	0.26	137.24	30.62	0.02
Main	32239.9*	Max WS	34.87	641.68	648.59		648.59	0.000008	0.26	135.76	32.33	0.02
Main	32298.7*	Max WS	33.87	641.69	648.59		648.59	0.000009	0.25	134.14	34.08	0.02
Main	32357.5*	Max WS	32.90	641.69	648.59		648.59	0.000009	0.25	132.50	35.61	0.02
Main	32357.52		Lat Struct									
Main	32416.3*	Max WS	31.88	641.70	648.59		648.59	0.000009	0.24	130.80	37.04	0.02
Main	32475.18	Max WS	30.91	641.71	648.61	643.27	648.62	0.000557	0.74	41.90	38.41	0.05
Main	33106.07	Max WS	66.18	642.19	650.90	644.51	650.91	0.002386	1.07	100.22	407.24	0.04
Main	33135.4*	Max WS	83.59	642.34	651.00		651.00	0.000000	0.08	2461.94	984.54	0.01
Main	33164.7*	Max WS	166.97	642.49	651.00		651.00	0.000000	0.12	3975.00	1561.83	0.01
Main	33194.0*	Max WS	575.97	642.65	651.00		651.00	0.000002	0.42	5530.66	2126.05	0.03
Main	33200 STRUCTURE 102		Lat Struct									
Main	33223.43	Max WS	625.50	642.80	651.00		651.00	0.000001	0.55	5878.42	1690.64	0.03
Main	33468.31	Max WS	625.93	644.00	651.00		651.00	0.000000	0.22	9400.47	1691.97	0.02
Main	33487.60	Max WS	625.04	642.29	651.00		651.01	0.000121	0.96	703.77	124.06	0.07
Main	33503.8*	Max WS	624.78	642.47	651.00		651.02	0.000119	0.94	708.58	128.29	0.06
Main	33520.0*	Max WS	624.67	642.64	651.00		651.02	0.000117	0.93	712.16	131.87	0.06
Main	33536.3*	Max WS	624.40	642.82	651.01		651.02	0.000115	0.91	714.80	134.15	0.06
Main	33552.5*	Max WS	623.97	642.99	651.01		651.02	0.000113	0.90	717.67	135.22	0.06
Main	33568.79	Max WS	623.70	643.17	651.01		651.02	0.000111	0.88	722.07	136.09	0.06
Main	33595.9*	Max WS	622.97	642.94	651.02		651.03	0.000092	0.81	779.38	138.17	0.06
Main	33623.0*	Max WS	622.83	642.71	651.02		651.03	0.000077	0.75	840.71	141.81	0.05
Main	33650.12	Max WS	621.78	642.48	651.02		651.03	0.000064	0.69	905.55	149.93	0.05
Main	33680.14	Max WS	621.21	643.20	651.03		651.03	0.000039	0.57	1109.22	174.44	0.04
Main	33685.0*	Max WS	621.07	643.18	651.03		651.03	0.000030	0.50	1461.96	485.74	0.03
Main	33689.9*	Max WS	621.05	643.16	651.03		651.03	0.000012	0.31	2711.99	751.62	0.02
Main	33694.78	Max WS	620.77	643.14	651.03		651.03	0.000028	0.46	1340.90	843.12	0.03
Main	33711.4*	Max WS	620.36	643.35	651.03		651.03	0.000003	0.15	4627.06	876.43	0.01
Main	33728.1*	Max WS	620.10	643.57	651.03		651.03	0.000003	0.15	4816.73	902.79	0.01
Main	33744.8*	Max WS	619.70	643.79	651.03		651.03	0.000003	0.14	5005.63	925.80	0.01
Main	33761.48	Max WS	619.10	644.00	651.03		651.03	0.000016	0.34	1847.58	947.18	0.02
Main	33770.7*	Max WS	618.71	643.60	651.03		651.03	0.000002	0.12	5453.93	1020.98	0.01
Main	33780.10	Max WS	618.95	643.20	651.03		651.03	0.000006	0.22	2873.78	1093.23	0.01
Main	33824.0*	Max WS	617.91	643.42	651.03		651.03	0.000002	0.11	6169.29	1096.48	0.01
Main	33868.0*	Max WS	616.38	643.63	651.03		651.03	0.000001	0.10	6455.96	1132.95	0.01
Main	33911.98	Max WS	615.79	643.85	651.03		651.03	0.000004	0.17	3703.28	1189.30	0.01
Main	33952.1*	Max WS	614.95	643.57	651.03		651.03	0.000001	0.09	6978.60	1236.65	0.01
Main	33992.23	Max WS	613.83	643.29	651.03		651.03	0.000003	0.15	4022.06	1303.82	0.01
Main	34036.1*	Max WS	612.11	643.40	651.03		651.03	0.000004	0.17	4227.77	972.57	0.01
Main	34080.1*	Max WS	611.28	643.51	651.03		651.03	0.000010	0.26	2398.79	486.72	0.02
Main	34124.11	Max WS	610.81	643.62	651.03		651.03	0.000022	0.37	1662.88	313.35	0.03
Main	34165.1*	Max WS	609.57	643.55	651.03		651.03	0.000022	0.38	1617.18	287.02	0.03
Main	34206.2*	Max WS	608.17	643.48	651.03		651.03	0.000021	0.39	1564.71	268.15	0.03
Main	34247.3*	Max WS	606.90	643.42	651.03		651.04	0.000021	0.40	1549.98	254.99	0.03
Main	34288.38	Max WS	606.33	643.35	651.03		651.04	0.000022	0.42	1430.49	268.92	0.03
Main	34323.2*	Max WS	605.80	643.15	651.03		651.04	0.000030	0.47	1350.87	269.40	0.03
Main	34358.2*	Max WS	604.78	642.94	651.03		651.04	0.000041	0.54	1190.12	251.13	0.04
Main	34393.10	Max WS	604.50	642.74	651.03		651.04	0.000062	0.65	944.02	244.40	0.05
Main	34492.09	Max WS	601.84	644.45	651.04		651.05	0.000097	0.79	776.52	225.80	0.06
Main	34642.28	Max WS	598.40	644.50	651.05		651.06	0.000106	0.78	772.18	227.62	0.06
Main	34844.43	Max WS	594.21	645.21	651.08		651.08	0.000105	0.74	800.63	229.37	0.06
Main	34990.5	Max WS	590.87	643.89	651.09		651.10	0.000046	0.57	1045.36	235.57	0.04
Main	35157.52	Max WS	586.80	645.42	651.10		651.11	0.000110	0.72	811.80	250.29	0.06
Main	35397.52	Max WS	581.99	644.70	651.12		651.13	0.000058	0.62	951.02	353.28	0.04
Main	35498.37	Max WS	579.17	644.73	651.13		651.13	0.000055	0.58	997.72	393.75	0.04
Main	35640.53	Max WS	576.63	644.62	651.14		651.14	0.000068	0.58	987.45	305.01	0.05
Main	35728.81	Max WS	574.68	644.78	651.14		651.15	0.000032	0.45	1274.62	302.47	0.03
Main	35941.41	Max WS	569.45	644.83	651.15		651.15	0.000024	0.40	1438.70	364.41	0.03
Main	36092.81	Max WS	566.01	644.33	651.16		651.16	0.000035	0.44	1278.76	340.07	0.03
Main	36259.72	Max WS	562.55	644.90	651.16		651.16	0.000025	0.40	1406.45	255.36	0.03
Main	36370.35	Max WS	559.41	644.95	651.16		651.17	0.000024	0.39	1445.70	625.78	0.03
Main	36404.39	Max WS	559.33	642.72	651.17		651.17	0.000019	0.35	1591.58	555.06	0.03

HEC-RAS Plan: BL 50 IL 19 NAT River: Bens Reach: Main Profile: Max WS (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	36432.47	Max WS	558.64	643.95	651.17		651.17	0.000019	0.36	1551.28	512.41	0.03
Main	38457.53	Max WS	554.35	643.75	651.12		651.28	0.001183	3.22	172.40	410.33	0.21
Main	36500 TAFT ROAD	Culvert										
Main	36660.35	Max WS	569.34	643.94	651.38		651.55	0.001200	3.26	174.43	558.41	0.21
Main	36693.56	Max WS	571.16	643.98	651.43		651.43	0.000005	0.17	3405.06	634.16	0.01
Main	36790.51	Max WS	511.77	643.76	651.43		651.43	0.000003	0.12	4122.80	812.92	0.01
Main	36862.61	Max WS	512.05	644.44	651.43		651.43	0.000002	0.11	4612.04	845.82	0.01
Main	36990.25	Max WS	511.22	642.70	651.43		651.43	0.000001	0.10	5171.73	847.76	0.01
Main	37113.29	Max WS	510.45	644.36	651.43		651.43	0.000002	0.12	4305.10	763.90	0.01
Main	37176.67	Max WS	509.34	642.92	651.43		651.43	0.000002	0.12	4181.02	718.67	0.01
Main	37334.5	Max WS	508.30	642.70	651.43		651.43	0.000007	0.21	2478.16	465.14	0.02
Main	37347.7*	Max WS	508.21	642.78	651.43		651.43	0.000009	0.27	1909.98	375.22	0.02
Main	37360.9*	Max WS	508.12	642.85	651.43		651.43	0.000018	0.37	1387.07	330.07	0.03
Main	37374.1*	Max WS	508.03	642.93	651.43		651.43	0.000031	0.58	981.90	356.27	0.05
Main	37387.33	Max WS	506.28	643.01	651.43		651.44	0.000105	0.98	775.31	369.43	0.08
Main	37606.41	Max WS	506.27	643.66	651.44		651.48	0.000202	1.61	368.78	127.09	0.12
Main	37689.1*	Max WS	508.46	643.56	651.45		651.49	0.000229	1.68	349.24	108.65	0.13
Main	37771.8*	Max WS	508.38	643.46	651.47		651.52	0.000255	1.73	338.79	100.30	0.13
Main	37854.5*	Max WS	510.55	643.35	651.49		651.54	0.000282	1.78	334.81	111.25	0.14
Main	37937.2*	Max WS	513.30	643.25	651.52		651.56	0.000289	1.77	346.96	126.56	0.14
Main	38020.00	Max WS	499.65	643.15	651.55		651.59	0.000267	1.68	352.88	129.27	0.13
Main	38361.14	Max WS	509.43	644.16	651.63		651.64	0.000081	1.10	475.69	211.40	0.10
Main	38408.3*	Max WS	507.43	644.15	651.63		651.65	0.000068	1.12	459.46	111.34	0.09
Main	38455.5*	Max WS	508.77	644.15	651.63		651.65	0.000066	1.21	426.25	87.60	0.09
Main	38502.69	Max WS	498.56	644.14	651.57		651.66	0.000174	2.49	200.57	65.16	0.16
Main	38600 UNION PACIFIC RR	Culvert										
Main	38717.64	Max WS	542.86	644.30	652.14		652.24	0.000191	2.58	210.75	51.28	0.16
Main	39039.40	Max WS	543.83	644.35	652.23		652.28	0.000091	1.82	335.36	56.56	0.12
Main	39339.37	Max WS	543.90	644.63	652.26		652.31	0.000104	1.75	323.58	56.97	0.12
Main	39639.57 COOK-DUPAGE CNTY	Max WS	544.35	644.90	652.29		652.34	0.000124	1.76	312.40	55.65	0.13

100-YR NATURAL HEC-RAS

HEC-RAS Plan: BL, 100-Yr NAT River: Bens Reach: Main Profile: Max WS

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	30000 GODFREY RAILYARD		Culvert									
Main	30990.95	Max WS	490.54	641.50	646.75		646.91	0.000576	3.18	154.24	32.56	0.25
Main	31038.6*	Max WS	489.22	641.51	646.61		647.02	0.003488	5.12	95.52	26.86	0.48
Main	31086.39	Max WS	487.71	641.52	646.37	646.35	647.62	0.018972	8.96	54.43	21.27	0.99
Main	31131.5*	Max WS	486.02	641.53	647.70		648.18	0.007357	5.59	87.04	35.88	0.62
Main	31176.6*	Max WS	485.23	641.53	648.06		648.48	0.005696	5.18	94.21	36.34	0.55
Main	31221.8*	Max WS	484.01	641.54	648.34		648.72	0.004995	4.98	98.10	37.49	0.52
Main	31266.9*	Max WS	482.67	641.54	648.58		648.94	0.004528	4.86	100.97	39.97	0.50
Main	31312.1*	Max WS	481.38	641.55	648.79		649.14	0.004213	4.78	103.36	42.50	0.48
Main	31357.2*	Max WS	480.05	641.55	648.98		649.33	0.003980	4.72	105.64	45.39	0.46
Main	31402.4*	Max WS	478.71	641.56	649.17		649.51	0.003800	4.67	108.35	51.35	0.45
Main	31447.5*	Max WS	477.38	641.56	649.35		649.67	0.003622	4.61	111.99	57.58	0.44
Main	31492.71	Max WS	446.43	641.57	649.59		649.85	0.002830	4.16	120.58	66.70	0.38
Main	31564.4*	Max WS	147.25	641.58	650.06		650.07	0.000132	1.05	165.51	85.07	0.09
Main	31636.2*	Max WS	91.58	641.59	650.08		650.09	0.000036	0.59	177.23	73.66	0.05
Main	31708.0*	Max WS	66.41	641.60	650.09		650.09	0.000015	0.39	188.99	69.02	0.03
Main	31779.7*	Max WS	56.44	641.61	650.09		650.09	0.000008	0.30	200.63	67.22	0.02
Main	31851.56	Max WS	48.34	641.62	650.09		650.09	0.000005	0.24	211.82	72.41	0.02
Main	31917.4*	Max WS	42.82	641.63	650.09		650.09	0.000004	0.22	204.76	60.27	0.02
Main	31983.3*	Max WS	39.07	641.64	650.09		650.09	0.000004	0.20	198.91	54.10	0.02
Main	32049.2*	Max WS	37.14	641.65	650.09		650.09	0.000004	0.19	194.61	48.23	0.02
Main	32115.1*	Max WS	35.13	641.66	650.09		650.09	0.000003	0.18	191.06	43.90	0.01
Main	32181.08	Max WS	33.24	641.67	650.09		650.09	0.000003	0.18	188.39	40.03	0.01
Main	32239.9*	Max WS	31.47	641.68	650.09		650.09	0.000003	0.17	190.92	45.25	0.01
Main	32298.7*	Max WS	29.67	641.69	650.09		650.09	0.000003	0.15	193.54	50.97	0.01
Main	32357.5*	Max WS	27.88	641.69	650.09		650.09	0.000002	0.14	196.37	57.37	0.01
Main	32357.52		Lat Struct									
Main	32416.3*	Max WS	26.02	641.70	650.09		650.09	0.000002	0.13	199.40	64.44	0.01
Main	32475.18	Max WS	24.32	641.71	650.11	643.09	650.11	0.000018	0.22	116.70	74.91	0.01
Main	33106.07	Max WS	67.56	642.19	651.24	644.54	651.24	0.000176	0.39	237.32	407.24	0.02
Main	33135.4*	Max WS	96.93	642.34	651.34		651.34	0.000000	0.08	2797.13	984.54	0.01
Main	33164.7*	Max WS	228.06	642.49	651.34		651.34	0.000001	0.15	4506.54	1561.83	0.01
Main	33194.0*	Max WS	707.56	642.65	651.34		651.34	0.000002	0.45	6256.70	2137.60	0.03
Main	33200 STRUCTURE 102		Lat Struct									
Main	33223.43	Max WS	786.89	642.80	651.34		651.34	0.000002	0.62	6453.41	1690.76	0.04
Main	33468.31	Max WS	786.93	644.00	651.34		651.34	0.000000	0.26	9976.31	1691.98	0.02
Main	33487.60	Max WS	786.64	642.29	651.34		651.36	0.000161	1.14	746.21	125.99	0.08
Main	33503.8*	Max WS	786.12	642.47	651.34		651.36	0.000157	1.12	752.52	130.04	0.07
Main	33520.0*	Max WS	785.53	642.64	651.35		651.36	0.000154	1.10	757.47	133.94	0.07
Main	33536.3*	Max WS	785.47	642.82	651.35		651.37	0.000152	1.09	761.08	136.85	0.07
Main	33552.5*	Max WS	784.87	642.99	651.35		651.37	0.000149	1.07	764.42	137.91	0.07
Main	33568.79	Max WS	784.81	643.17	651.35		651.37	0.000146	1.04	768.85	192.70	0.07
Main	33595.9*	Max WS	784.21	642.94	651.36		651.37	0.000122	0.97	830.08	172.92	0.07
Main	33623.0*	Max WS	782.97	642.71	651.36		651.38	0.000101	0.89	890.75	150.89	0.06
Main	33650.12	Max WS	782.31	642.48	651.37		651.38	0.000085	0.83	956.91	163.29	0.05
Main	33680.14	Max WS	781.83	643.20	651.37		651.38	0.000052	0.68	1170.89	179.80	0.04
Main	33685.0*	Max WS	781.58	643.18	651.38		651.38	0.000039	0.58	1641.31	553.51	0.04
Main	33689.9*	Max WS	781.40	643.16	651.38		651.38	0.000015	0.35	2976.86	761.93	0.02
Main	33694.78	Max WS	781.30	643.14	651.38		651.38	0.000037	0.55	1413.16	853.21	0.04
Main	33711.4*	Max WS	780.80	643.35	651.38		651.38	0.000004	0.18	4935.31	885.20	0.01
Main	33728.1*	Max WS	780.21	643.57	651.38		651.38	0.000004	0.17	5134.01	910.23	0.01
Main	33744.8*	Max WS	779.84	643.79	651.38		651.38	0.000003	0.16	5330.77	932.49	0.01
Main	33761.48	Max WS	779.35	644.00	651.38		651.38	0.000021	0.40	1951.09	953.69	0.03
Main	33770.7*	Max WS	778.90	643.60	651.38		651.38	0.000003	0.15	5812.97	1030.13	0.01
Main	33780.10	Max WS	778.37	643.20	651.38		651.38	0.000008	0.26	3049.36	1099.72	0.02
Main	33824.0*	Max WS	777.06	643.42	651.38		651.38	0.000002	0.13	6558.35	1135.06	0.01
Main	33868.0*	Max WS	776.35	643.63	651.38		651.38	0.000002	0.12	6855.12	1146.80	0.01
Main	33911.98	Max WS	774.80	643.85	651.38		651.38	0.000005	0.20	3911.86	1194.08	0.01
Main	33952.1*	Max WS	772.93	643.57	651.38		651.38	0.000002	0.11	7418.64	1275.04	0.01
Main	33992.23	Max WS	772.45	643.29	651.38		651.38	0.000004	0.18	4234.18	1336.92	0.01
Main	34036.1*	Max WS	770.89	643.40	651.38		651.38	0.000005	0.19	4571.30	988.64	0.01
Main	34080.1*	Max WS	769.84	643.51	651.38		651.38	0.000013	0.31	2574.17	515.26	0.02
Main	34124.11	Max WS	768.24	643.62	651.38		651.38	0.000029	0.44	1773.03	330.77	0.03
Main	34165.1*	Max WS	767.29	643.55	651.38		651.38	0.000028	0.45	1720.24	302.93	0.03
Main	34206.2*	Max WS	765.78	643.48	651.38		651.39	0.000028	0.47	1661.89	288.67	0.03
Main	34247.3*	Max WS	764.84	643.42	651.38		651.39	0.000028	0.48	1642.31	272.23	0.03
Main	34288.38	Max WS	763.31	643.35	651.38		651.39	0.000030	0.51	1502.45	393.73	0.03
Main	34323.2*	Max WS	762.38	643.15	651.38		651.39	0.000040	0.57	1466.35	414.93	0.04
Main	34358.2*	Max WS	761.44	642.94	651.38		651.39	0.000053	0.64	1302.82	396.65	0.04
Main	34393.10	Max WS	761.09	642.74	651.38		651.39	0.000082	0.78	1006.71	379.89	0.05
Main	34492.09	Max WS	757.23	644.45	651.39		651.40	0.000126	0.93	834.31	334.57	0.07
Main	34642.28	Max WS	753.94	644.50	651.41		651.42	0.000135	0.92	831.32	344.35	0.07
Main	34844.43	Max WS	748.18	645.21	651.44		651.45	0.000132	0.87	859.79	342.59	0.07
Main	34990.5	Max WS	744.09	643.89	651.46		651.46	0.000061	0.67	1107.23	306.71	0.05
Main	35157.52	Max WS	740.40	645.42	651.47		651.48	0.000139	0.84	876.39	299.78	0.07
Main	35397.52	Max WS	734.32	644.70	651.50		651.51	0.000076	0.73	1015.83	407.54	0.05
Main	35498.37	Max WS	731.59	644.73	651.51		651.51	0.000072	0.69	1064.17	442.09	0.05
Main	35640.53	Max WS	727.05	644.62	651.52		651.53	0.000086	0.68	1065.15	383.51	0.05
Main	35728.81	Max WS	725.07	644.78	651.53		651.53	0.000042	0.53	1359.51	306.80	0.04
Main	35941.41	Max WS	718.69	644.83	651.54		651.54	0.000032	0.47	1533.57	370.14	0.03
Main	36092.81	Max WS	714.87	644.33	651.54		651.55	0.000045	0.52	1372.77	360.44	0.04
Main	36259.72	Max WS	710.26	644.90	651.55		651.55	0.000033	0.47	1500.13	284.07	0.03
Main	36370.35	Max WS	706.00	644.95	651.55		651.56	0.000031	0.46	1543.14	630.49	0.03
Main	36404.39	Max WS	705.44	642.72	651.55		651.56	0.000024	0.42	1698.90	582.80	0.03

HEC-RAS Plan: BL, 100-Yr NAT River: Bens Reach: Main Profile: Max WS (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	36432.47	Max WS	705.02	643.95	651.55		651.56	0.000025	0.43	1651.24	538.08	0.03
Main	36457.53	Max WS	699.67	643.75	651.49		651.72	0.001600	3.86	181.07	464.37	0.25
Main	36500 TAFT ROAD	Culvert										
Main	36660.35	Max WS	722.15	643.94	651.95		652.18	0.001510	3.85	187.77	569.04	0.24
Main	36693.56	Max WS	723.38	643.98	652.01		652.01	0.000006	0.19	3779.38	649.23	0.01
Main	36790.51	Max WS	650.97	643.76	652.01		652.02	0.000003	0.14	4601.56	827.31	0.01
Main	36862.61	Max WS	650.71	644.44	652.02		652.02	0.000002	0.13	5107.50	851.70	0.01
Main	36990.25	Max WS	649.66	642.70	652.02		652.02	0.000002	0.11	5667.55	851.03	0.01
Main	37113.29	Max WS	649.11	644.36	652.02		652.02	0.000003	0.14	4752.54	769.66	0.01
Main	37178.67	Max WS	647.90	642.92	652.02		652.02	0.000003	0.14	4603.57	731.74	0.01
Main	37334.5	Max WS	645.70	642.70	652.02		652.02	0.000009	0.23	2752.79	475.86	0.02
Main	37347.7*	Max WS	646.97	642.78	652.02		652.02	0.000010	0.30	2137.78	403.68	0.02
Main	37360.9*	Max WS	646.20	642.85	652.01		652.02	0.000020	0.42	1591.43	370.52	0.03
Main	37374.1*	Max WS	646.07	642.93	652.01		652.02	0.000031	0.64	1199.76	387.79	0.05
Main	37387.33	Max WS	645.20	643.01	652.01		652.02	0.000091	0.99	1004.38	414.31	0.08
Main	37606.41	Max WS	643.15	643.66	652.02		652.06	0.000217	1.78	457.54	186.12	0.13
Main	37689.1*	Max WS	644.53	643.56	652.03		652.08	0.000246	1.86	423.94	143.52	0.14
Main	37771.8*	Max WS	645.20	643.46	652.05		652.11	0.000280	1.95	410.31	156.48	0.14
Main	37854.5*	Max WS	647.36	643.35	652.08		652.13	0.000295	1.96	411.84	163.27	0.15
Main	37937.2*	Max WS	648.80	643.25	652.11		652.15	0.000292	1.92	430.83	161.83	0.14
Main	38020.00	Max WS	631.25	643.15	652.13		652.18	0.000278	1.85	415.11	176.21	0.14
Main	38361.14	Max WS	637.71	644.16	652.22		652.24	0.000072	1.14	660.53	367.28	0.09
Main	38408.3*	Max WS	637.74	644.15	652.21		652.24	0.000072	1.24	526.93	119.74	0.10
Main	38455.5*	Max WS	637.75	644.15	652.21		652.24	0.000073	1.36	478.38	90.58	0.10
Main	38502.69	Max WS	626.62	644.14	652.13		652.26	0.000215	2.90	215.73	66.79	0.18
Main	38600 UNION PACIFIC RR	Culvert										
Main	38717.64	Max WS	674.53	644.30	653.04		653.17	0.000205	2.87	235.24	55.27	0.17
Main	39039.40	Max WS	677.42	644.35	653.16		653.21	0.000092	1.98	389.22	59.86	0.12
Main	39339.37	Max WS	678.90	644.63	653.19		653.24	0.000103	1.90	377.91	60.43	0.12
Main	39639.57 COOK-DUPAGE CNTY	Max WS	678.41	644.90	653.22		653.27	0.000119	1.90	365.44	59.05	0.13

10-YR PROPOSED HEC-RAS

HEC-RAS Plan: PRP 10-YR River: Bens Reach: Main Profile: Max WS

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	30000 GODFREY RAILYARD	Culvert										
Main	30990.95	Max WS	94.61	641.50	644.11		644.14	0.000194	1.24	76.51	30.00	0.13
Main	31038.6*	Max WS	93.60	641.51	644.09		644.18	0.001283	2.31	40.45	16.89	0.26
Main	31086.39	Max WS	92.60	641.52	644.17		644.60	0.013937	5.27	17.57	12.12	0.77
Main	31131.5*	Max WS	91.65	641.53	644.82		645.04	0.005632	3.77	24.30	13.81	0.50
Main	31176.6*	Max WS	90.68	641.53	645.08		645.27	0.004348	3.44	26.33	13.86	0.44
Main	31221.8*	Max WS	89.71	641.54	645.29		645.45	0.003649	3.25	27.58	13.56	0.40
Main	31266.9*	Max WS	88.74	641.54	645.46		645.61	0.003081	3.09	28.73	13.10	0.37
Main	31312.1*	Max WS	87.76	641.55	645.61		645.74	0.002726	2.95	29.75	13.00	0.34
Main	31357.2*	Max WS	86.80	641.55	645.74		645.86	0.002436	2.83	30.71	12.90	0.32
Main	31402.4*	Max WS	85.82	641.56	645.85		645.97	0.002213	2.72	31.54	12.82	0.31
Main	31447.5*	Max WS	84.85	641.56	645.96		646.07	0.002007	2.62	32.42	12.76	0.29
Main	31492.71	Max WS	83.88	641.57	646.05		646.15	0.001849	2.53	33.15	12.70	0.28
Main	31564.4*	Max WS	82.34	641.58	646.20		646.26	0.000964	1.98	41.57	14.59	0.21
Main	31636.2*	Max WS	80.79	641.59	646.27		646.32	0.000598	1.62	49.86	17.33	0.17
Main	31708.0*	Max WS	79.26	641.60	646.32		646.35	0.000377	1.33	59.53	20.63	0.14
Main	31779.7*	Max WS	77.71	641.61	646.35		646.37	0.000239	1.11	69.75	23.01	0.11
Main	31851.56	Max WS	76.17	641.62	646.38		646.39	0.000158	0.95	80.07	24.92	0.09
Main	31917.4*	Max WS	74.74	641.63	646.39		646.40	0.000153	0.94	79.63	24.67	0.09
Main	31983.3*	Max WS	73.34	641.64	646.40		646.41	0.000149	0.93	79.20	24.43	0.09
Main	32049.2*	Max WS	71.92	641.65	646.41		646.42	0.000144	0.91	78.93	24.24	0.09
Main	32115.1*	Max WS	70.50	641.66	646.42		646.43	0.000139	0.90	78.58	24.04	0.09
Main	32181.08	Max WS	69.09	641.67	646.43		646.44	0.000134	0.88	78.35	23.89	0.09
Main	32239.9*	Max WS	67.78	641.68	646.44		646.45	0.000155	0.91	74.64	24.56	0.09
Main	32298.7*	Max WS	66.48	641.69	646.45		646.46	0.000184	0.94	70.92	25.29	0.10
Main	32357.5*	Max WS	65.18	641.69	646.46		646.47	0.000221	0.97	67.21	26.07	0.11
Main	32357.52	Lat Struct										
Main	32416.3*	Max WS	63.88	641.70	646.47		646.49	0.000271	1.01	63.54	26.91	0.12
Main	32475.18	Max WS	62.59	641.71	646.54	643.96	646.71	0.005007	3.27	19.16	1.78	0.26
Main	33106.07	Max WS	62.73	642.19	650.17	644.45	650.33	0.005749	3.24	19.34		0.20
Main	33135.4*	Max WS	62.23	642.34	650.27		650.27	0.000000	0.08	1736.83	980.50	0.01
Main	33164.7*	Max WS	70.92	642.49	650.27		650.27	0.000000	0.08	2832.96	1506.39	0.01
Main	33194.0*	Max WS	347.61	642.65	650.26		650.27	0.000002	0.36	3992.78	2060.53	0.02
Main	33200 STRUCTURE 102	Lat Struct										
Main	33223.43	Max WS	351.64	642.60	650.26		650.27	0.000001	0.38	4673.73	1687.23	0.02
Main	33300 IRVING PARK ROAD	Culvert										
Main	33468.31	Max WS	351.67	644.00	650.29		650.30	0.000007	1.07	327.79	1691.95	0.08
Main	33487.60	Max WS	351.26	642.29	650.30		650.30	0.000057	0.61	617.65	121.00	0.04
Main	33503.8*	Max WS	351.08	642.47	650.30		650.30	0.000056	0.60	619.53	124.68	0.04
Main	33520.0*	Max WS	350.91	642.64	650.30		650.30	0.000056	0.59	620.75	127.41	0.04
Main	33536.3*	Max WS	350.79	642.82	650.30		650.31	0.000055	0.58	621.97	128.87	0.04
Main	33552.5*	Max WS	350.63	642.99	650.30		650.31	0.000054	0.57	624.17	129.17	0.04
Main	33568.79	Max WS	350.46	643.17	650.30		650.31	0.000052	0.56	630.27	120.69	0.04
Main	33595.9*	Max WS	350.05	642.94	650.30		650.31	0.000043	0.51	684.86	128.29	0.04
Main	33623.0*	Max WS	349.66	642.71	650.31		650.31	0.000036	0.47	742.65	133.56	0.03
Main	33650.12	Max WS	349.26	642.48	650.31		650.31	0.000029	0.44	803.47	139.07	0.03
Main	33680.14	Max WS	348.78	643.20	650.31		650.31	0.000018	0.35	988.24	163.09	0.02
Main	33685.0*	Max WS	348.73	643.18	650.31		650.31	0.000015	0.33	1134.93	400.63	0.02
Main	33689.9*	Max WS	348.63	643.16	650.31		650.31	0.000007	0.22	2178.79	732.78	0.02
Main	33694.78	Max WS	348.46	643.14	650.31		650.31	0.000013	0.29	1195.74	832.18	0.02
Main	33711.4*	Max WS	348.30	643.35	650.31		650.31	0.000002	0.10	4001.28	863.96	0.01
Main	33728.1*	Max WS	347.99	643.57	650.31		650.31	0.000001	0.10	4171.51	891.98	0.01
Main	33744.8*	Max WS	347.74	643.79	650.31		650.31	0.000001	0.09	4343.27	916.32	0.01
Main	33761.48	Max WS	347.49	644.00	650.31		650.31	0.000007	0.21	1637.31	939.07	0.02
Main	33770.7*	Max WS	347.41	643.60	650.31		650.31	0.000001	0.08	4724.94	1002.23	0.01
Main	33780.10	Max WS	347.28	643.20	650.31		650.31	0.000003	0.14	2527.26	1033.50	0.01
Main	33824.0*	Max WS	346.54	643.42	650.31		650.31	0.000001	0.07	5389.77	1071.60	0.01
Main	33868.0*	Max WS	345.80	643.63	650.31		650.31	0.000001	0.07	5645.01	1122.39	0.00
Main	33911.98	Max WS	345.25	643.85	650.31		650.31	0.000002	0.11	3277.71	1178.88	0.01
Main	33952.1*	Max WS	344.76	643.57	650.31		650.31	0.000001	0.06	6108.33	1200.77	0.00
Main	33992.23	Max WS	343.91	643.29	650.31		650.31	0.000001	0.10	3590.58	1256.90	0.01
Main	34036.1*	Max WS	343.26	643.40	650.31		650.31	0.000002	0.11	3542.59	931.64	0.01
Main	34080.1*	Max WS	342.77	643.51	650.31		650.31	0.000005	0.17	2071.83	428.67	0.01
Main	34124.11	Max WS	341.78	643.62	650.31		650.31	0.000011	0.24	1440.67	305.86	0.02
Main	34165.1*	Max WS	341.48	643.55	650.31		650.31	0.000010	0.24	1413.35	278.12	0.02
Main	34206.2*	Max WS	340.69	643.48	650.31		650.31	0.000010	0.25	1382.41	241.92	0.02
Main	34247.3*	Max WS	340.15	643.42	650.31		650.31	0.000010	0.25	1370.36	244.98	0.02
Main	34288.38	Max WS	339.34	643.35	650.31		650.31	0.000010	0.26	1284.55	245.06	0.02
Main	34323.2*	Max WS	338.86	643.15	650.31		650.31	0.000014	0.30	1166.76	243.01	0.02
Main	34358.2*	Max WS	338.30	642.94	650.31		650.31	0.000019	0.34	1019.92	215.23	0.03
Main	34393.10	Max WS	337.82	642.74	650.31		650.32	0.000029	0.41	823.05	202.51	0.03
Main	34492.09	Max WS	336.74	644.45	650.32		650.32	0.000047	0.50	669.82	180.06	0.04
Main	34642.28	Max WS	334.52	644.50	650.32		650.33	0.000052	0.51	661.87	183.53	0.04
Main	34844.43	Max WS	331.46	645.21	650.33		650.34	0.000053	0.48	685.06	197.79	0.04
Main	34990.5	Max WS	329.25	643.89	650.34		650.34	0.000021	0.36	921.84	210.18	0.03
Main	35157.52	Max WS	326.93	645.42	650.35		650.35	0.000058	0.48	683.46	217.18	0.04
Main	35397.52	Max WS	323.48	644.70	650.36		650.36	0.000029	0.39	822.17	268.66	0.03
Main	35498.37	Max WS	321.81	644.73	650.36		650.36	0.000026	0.37	865.37	286.82	0.03
Main	35640.53	Max WS	319.70	644.62	650.36		650.37	0.000036	0.38	832.10	263.33	0.03
Main	35728.81	Max WS	318.81	644.78	650.37		650.37	0.000016	0.29	1104.53	293.71	0.02
Main	35941.41	Max WS	315.22	644.83	650.37		650.37	0.000012	0.25	1248.58	341.54	0.02
Main	36092.81	Max WS	313.01	644.33	650.37		650.37	0.000018	0.29	1090.27	323.79	0.02
Main	36259.72	Max WS	310.68	644.90	650.38		650.38	0.000012	0.25	1219.14	236.34	0.02
Main	36370.35	Max WS	308.59	644.95	650.38		650.38	0.000012	0.25	1250.23	615.51	0.02

HEC-RAS Plan: PRP 10-YR River: Bens Reach: Main Profile: Max WS (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	36404.39	Max WS	308.34	642.72	650.38		650.38	0.000009	0.22	1376.80	480.86	0.02
Main	36432.47	Max WS	308.04	643.95	650.38		650.38	0.000009	0.23	1349.92	314.61	0.02
Main	36457.53	Max WS	306.95	643.75	650.36		650.42	0.000523	1.99	154.52	243.95	0.14
Main	36500 TAFT ROAD	Culvert										
Main	36660.35	Max WS	308.27	643.94	650.42		650.48	0.000559	2.03	151.82	541.03	0.14
Main	36693.56	Max WS	308.79	643.98	650.44		650.44	0.000003	0.11	2784.89	619.25	0.01
Main	36790.51	Max WS	275.87	643.76	650.44		650.44	0.000001	0.08	3375.04	728.60	0.01
Main	36862.61	Max WS	275.65	644.44	650.44		650.44	0.000001	0.07	3779.34	832.49	0.01
Main	36990.25	Max WS	275.41	642.70	650.44		650.44	0.000001	0.06	4333.66	843.27	0.00
Main	37113.29	Max WS	275.13	644.36	650.44		650.44	0.000001	0.08	3553.16	751.11	0.01
Main	37178.67	Max WS	274.08	642.92	650.44		650.44	0.000001	0.08	3472.48	710.47	0.01
Main	37334.5	Max WS	274.25	642.70	650.44		650.44	0.000004	0.14	2025.93	446.79	0.01
Main	37347.7*	Max WS	273.67	642.78	650.44		650.44	0.000005	0.18	1548.81	355.35	0.01
Main	37360.9*	Max WS	273.62	642.85	650.44		650.44	0.000011	0.25	1092.74	263.62	0.02
Main	37374.1*	Max WS	273.35	642.93	650.44		650.44	0.000021	0.41	691.80	248.89	0.04
Main	37387.33	Max WS	273.52	643.01	650.43		650.44	0.000113	0.85	431.04	282.61	0.08
Main	37606.41	Max WS	274.17	643.66	650.45		650.47	0.000122	1.09	273.87	83.33	0.09
Main	37689.1*	Max WS	275.12	643.56	650.46		650.48	0.000144	1.16	258.34	84.06	0.10
Main	37771.8*	Max WS	275.53	643.46	650.47		650.49	0.000166	1.21	246.67	82.05	0.10
Main	37854.5*	Max WS	276.48	643.35	650.49		650.51	0.000186	1.25	240.90	76.40	0.11
Main	37937.2*	Max WS	277.15	643.25	650.50		650.52	0.000195	1.26	245.38	82.03	0.11
Main	38020.00	Max WS	268.75	643.15	650.52		650.54	0.000171	1.20	257.63	96.43	0.10
Main	38361.14	Max WS	270.52	644.16	650.57		650.58	0.000057	0.79	341.68	107.61	0.08
Main	38408.3*	Max WS	270.27	644.15	650.57		650.58	0.000045	0.77	350.61	95.39	0.07
Main	38455.5*	Max WS	271.49	644.15	650.57		650.58	0.000039	0.80	337.49	79.60	0.07
Main	38502.69	Max WS	269.04	644.14	650.55		650.59	0.000083	1.55	173.11	61.58	0.11
Main	38600 UNION PACIFIC RR	Culvert										
Main	38717.64	Max WS	287.10	644.30	650.69		650.74	0.000106	1.67	171.82	45.17	0.12
Main	39039.40	Max WS	292.58	644.35	650.74		650.76	0.000058	1.26	254.84	51.26	0.09
Main	39339.37	Max WS	294.13	644.63	650.76		650.78	0.000072	1.24	242.16	51.34	0.09
Main	39639.57 COOK-DUPAGE CNTY	Max WS	296.00	644.90	650.78		650.81	0.000094	1.27	232.43	50.08	0.10

50-YR PROPOSED HEC-RAS

HEC-RAS Plan: PRP 50-YR River: Bens Reach: Main Profile: Max WS

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	30000 GODFREY RAILYARD	Culvert										
Main	30990.95	Max WS	259.53	641.50	645.06		645.16	0.000539	2.48	104.45	30.00	0.23
Main	31038.6*	Max WS	258.68	641.51	644.97		645.29	0.003966	4.56	56.69	20.34	0.48
Main	31086.39	Max WS	257.87	641.52	644.93	645.20	646.24	0.031148	9.20	28.02	15.28	1.20
Main	31131.5*	Max WS	256.98	641.53	646.63		646.95	0.004853	4.57	56.19	21.48	0.50
Main	31176.6*	Max WS	256.21	641.53	646.86		647.16	0.004487	4.43	57.82	21.63	0.48
Main	31221.8*	Max WS	255.44	641.54	647.08		647.37	0.004402	4.31	59.21	22.60	0.47
Main	31266.9*	Max WS	254.62	641.54	647.29		647.56	0.004219	4.18	60.93	23.45	0.46
Main	31312.1*	Max WS	253.82	641.55	647.49		647.75	0.003914	4.06	62.50	23.43	0.44
Main	31357.2*	Max WS	253.03	641.55	647.68		647.92	0.003677	3.97	63.76	23.23	0.42
Main	31402.4*	Max WS	252.21	641.56	647.85		648.08	0.003445	3.90	64.74	22.95	0.41
Main	31447.5*	Max WS	251.41	641.56	648.01		648.23	0.003236	3.83	65.66	22.55	0.39
Main	31492.71	Max WS	250.58	641.57	648.16		648.38	0.003041	3.78	66.36	21.86	0.38
Main	31564.4*	Max WS	239.12	641.58	648.43		648.55	0.001471	2.78	86.26	28.01	0.27
Main	31636.2*	Max WS	202.94	641.59	648.59		648.65	0.000613	1.94	104.69	30.97	0.18
Main	31708.0*	Max WS	135.43	641.60	648.69		648.71	0.000178	1.12	121.19	32.67	0.10
Main	31779.7*	Max WS	62.49	641.61	648.73		648.73	0.000027	0.46	135.63	33.32	0.04
Main	31851.56	Max WS	42.50	641.62	648.73		648.73	0.000010	0.29	148.76	34.22	0.02
Main	31917.4*	Max WS	41.25	641.63	648.73		648.73	0.000009	0.28	146.97	33.61	0.02
Main	31983.3*	Max WS	40.11	641.64	648.73		648.73	0.000009	0.28	145.31	32.79	0.02
Main	32049.2*	Max WS	38.92	641.65	648.73		648.73	0.000008	0.27	144.05	32.03	0.02
Main	32115.1*	Max WS	37.73	641.66	648.73		648.74	0.000008	0.26	142.77	31.37	0.02
Main	32181.08	Max WS	36.45	641.67	648.73		648.74	0.000007	0.26	141.76	31.08	0.02
Main	32239.9*	Max WS	35.44	641.68	648.74		648.74	0.000008	0.25	140.53	32.90	0.02
Main	32298.7*	Max WS	34.34	641.69	648.74		648.74	0.000008	0.25	139.19	34.94	0.02
Main	32357.5*	Max WS	33.19	641.69	648.74		648.74	0.000008	0.24	137.78	36.55	0.02
Main	32357.52	Lat Struct										
Main	32416.3*	Max WS	32.11	641.70	648.74		648.74	0.000008	0.24	136.27	37.85	0.02
Main	32475.18	Max WS	31.16	641.71	648.76	643.29	648.77	0.000378	0.65	47.61	39.26	0.04
Main	33106.07	Max WS	66.43	642.19	650.93	644.50	650.94	0.001637	0.92	114.51	407.24	0.03
Main	33135.4*	Max WS	84.94	642.34	651.04		651.04	0.000000	0.08	2497.34	984.54	0.01
Main	33164.7*	Max WS	172.95	642.49	651.04		651.04	0.000000	0.13	4030.95	1561.83	0.01
Main	33194.0*	Max WS	588.94	642.65	651.04		651.04	0.000002	0.42	5606.86	2127.49	0.03
Main	33200 STRUCTURE 102	Lat Struct										
Main	33223.43	Max WS	641.47	642.60	651.04		651.04	0.000001	0.54	5978.33	1690.65	0.03
Main	33300 IRVING PARK ROAD	Culvert										
Main	33468.31	Max WS	641.54	644.00	651.12		651.17	0.000015	1.72	372.95	1691.97	0.12
Main	33487.60	Max WS	640.93	642.29	651.15		651.17	0.000118	0.96	722.72	124.93	0.06
Main	33503.8*	Max WS	640.61	642.47	651.15		651.17	0.000115	0.94	728.16	129.07	0.06
Main	33520.0*	Max WS	640.39	642.64	651.16		651.17	0.000113	0.93	732.28	132.79	0.06
Main	33536.3*	Max WS	640.12	642.82	651.16		651.17	0.000112	0.91	735.30	135.35	0.06
Main	33552.5*	Max WS	639.80	642.99	651.16		651.17	0.000110	0.90	738.31	136.51	0.06
Main	33568.79	Max WS	639.53	643.17	651.16		651.17	0.000107	0.88	742.66	156.78	0.06
Main	33595.9*	Max WS	638.88	642.94	651.17		651.18	0.000089	0.81	800.52	140.14	0.06
Main	33623.0*	Max WS	638.23	642.71	651.17		651.18	0.000074	0.75	862.37	143.61	0.05
Main	33650.12	Max WS	637.64	642.48	651.17		651.18	0.000062	0.69	927.88	154.06	0.05
Main	33680.14	Max WS	636.92	643.20	651.18		651.18	0.000038	0.57	1135.86	176.77	0.04
Main	33685.0*	Max WS	636.70	643.18	651.18		651.18	0.000029	0.49	1537.00	503.58	0.03
Main	33689.9*	Max WS	636.63	643.16	651.18		651.18	0.000011	0.30	2826.41	756.00	0.02
Main	33694.78	Max WS	636.41	643.14	651.18		651.18	0.000027	0.47	1372.11	847.11	0.03
Main	33711.4*	Max WS	636.07	643.35	651.18		651.18	0.000003	0.15	4760.27	880.25	0.01
Main	33728.1*	Max WS	635.69	643.57	651.18		651.18	0.000003	0.14	4953.93	905.89	0.01
Main	33744.8*	Max WS	635.21	643.79	651.18		651.18	0.000002	0.14	5146.19	928.52	0.01
Main	33761.48	Max WS	634.77	644.00	651.18		651.18	0.000015	0.34	1892.32	950.01	0.02
Main	33770.7*	Max WS	634.64	643.60	651.18		651.18	0.000002	0.12	5609.02	1024.94	0.01
Main	33780.10	Max WS	634.41	643.20	651.18		651.18	0.000006	0.22	2949.70	1096.04	0.01
Main	33824.0*	Max WS	633.22	643.42	651.18		651.18	0.000002	0.11	6336.14	1102.75	0.01
Main	33868.0*	Max WS	632.26	643.63	651.18		651.18	0.000001	0.10	6628.17	1138.82	0.01
Main	33911.98	Max WS	631.04	643.85	651.18		651.18	0.000004	0.17	3793.52	1191.37	0.01
Main	33952.1*	Max WS	630.08	643.57	651.18		651.18	0.000001	0.09	7167.57	1254.12	0.01
Main	33992.23	Max WS	628.90	643.29	651.18		651.18	0.000003	0.15	4113.63	1315.62	0.01
Main	34036.1*	Max WS	628.14	643.40	651.18		651.18	0.000004	0.16	4375.84	979.35	0.01
Main	34080.1*	Max WS	626.93	643.51	651.18		651.18	0.000010	0.26	2473.59	499.04	0.02
Main	34124.11	Max WS	625.52	643.62	651.18		651.18	0.000022	0.37	1710.39	320.90	0.03
Main	34165.1*	Max WS	624.83	643.55	651.18		651.18	0.000021	0.38	1660.92	294.64	0.03
Main	34206.2*	Max WS	623.66	643.48	651.18		651.19	0.000021	0.39	1605.74	275.41	0.03
Main	34247.3*	Max WS	622.94	643.42	651.18		651.19	0.000020	0.40	1589.09	262.30	0.03
Main	34288.38	Max WS	621.79	643.35	651.18		651.19	0.000022	0.43	1461.46	322.87	0.03
Main	34323.2*	Max WS	620.83	643.15	651.19		651.19	0.000029	0.47	1393.40	310.30	0.03
Main	34358.2*	Max WS	620.55	642.94	651.19		651.19	0.000039	0.54	1231.74	307.94	0.04
Main	34393.10	Max WS	619.60	642.74	651.18		651.19	0.000060	0.65	970.99	316.42	0.05
Main	34492.09	Max WS	617.16	644.45	651.19		651.20	0.000094	0.79	801.23	272.42	0.06
Main	34642.28	Max WS	613.28	644.50	651.20		651.21	0.000102	0.78	797.08	276.64	0.06
Main	34844.43	Max WS	608.46	645.21	651.23		651.23	0.000100	0.74	824.71	276.37	0.06
Main	34990.5	Max WS	605.01	643.89	651.24		651.24	0.000045	0.57	1070.41	258.69	0.04
Main	35157.52	Max WS	601.53	645.42	651.25		651.26	0.000105	0.72	837.66	280.26	0.06
Main	35397.52	Max WS	596.34	644.70	651.27		651.28	0.000056	0.62	976.40	374.86	0.04
Main	35498.37	Max WS	593.56	644.73	651.28		651.28	0.000053	0.58	1023.57	412.64	0.04
Main	35640.53	Max WS	590.10	644.62	651.29		651.29	0.000065	0.58	1017.44	337.12	0.05
Main	35728.81	Max WS	588.74	644.78	651.29		651.30	0.000031	0.45	1307.19	304.14	0.03
Main	35941.41	Max WS	583.16	644.83	651.30		651.30	0.000024	0.40	1474.86	368.60	0.03
Main	36092.81	Max WS	580.03	644.33	651.30		651.31	0.000034	0.44	1314.46	347.63	0.03
Main	36259.72	Max WS	575.89	644.90	651.31		651.31	0.000025	0.40	1441.82	258.66	0.03
Main	36370.35	Max WS	572.41	644.95	651.31		651.31	0.000023	0.39	1482.43	627.56	0.03

HEC-RAS Plan: PRP 50-YR River: Bens Reach: Main Profile: Max WS (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	
Main	36404.39	Max WS	571.58	642.72	651.31		651.31	0.000018	0.35	1631.94	566.44	0.03	
Main	36432.47	Max WS	570.54	643.95	651.31		651.31	0.000018	0.36	1588.93	521.66	0.03	
Main	36457.53	Max WS	568.52	643.75	651.27		651.43	0.001165	3.23	175.83	428.13	0.21	
Main	36500	TAFT ROAD	Culvert										
Main	36660.35	Max WS	579.87	643.94	651.54		651.71	0.001156	3.25	178.31	561.49	0.21	
Main	36693.56	Max WS	579.97	643.98	651.59		651.59	0.000005	0.17	3509.36	638.29	0.01	
Main	36790.51	Max WS	521.59	643.76	651.59		651.60	0.000002	0.12	4256.25	817.42	0.01	
Main	36862.61	Max WS	521.44	644.44	651.60		651.60	0.000002	0.11	4750.74	847.47	0.01	
Main	36990.25	Max WS	520.60	642.70	651.60		651.60	0.000001	0.10	5310.58	848.67	0.01	
Main	37113.29	Max WS	519.24	644.36	651.60		651.60	0.000002	0.12	4430.28	765.48	0.01	
Main	37178.67	Max WS	518.22	642.92	651.60		651.60	0.000002	0.12	4298.78	720.10	0.01	
Main	37334.5	Max WS	517.06	642.70	651.60		651.60	0.000007	0.20	2554.50	468.16	0.02	
Main	37347.7*	Max WS	518.02	642.78	651.60		651.60	0.000009	0.26	1972.15	384.73	0.02	
Main	37360.9*	Max WS	517.41	642.85	651.59		651.60	0.000017	0.37	1441.84	340.04	0.03	
Main	37374.1*	Max WS	517.83	642.93	651.59		651.60	0.000028	0.57	1041.14	365.74	0.05	
Main	37387.33	Max WS	516.65	643.01	651.59		651.60	0.000091	0.93	837.05	381.86	0.08	
Main	37606.41	Max WS	516.05	643.66	651.60		651.64	0.000188	1.58	390.47	140.65	0.12	
Main	37689.1*	Max WS	517.06	643.56	651.61		651.65	0.000212	1.64	367.70	121.13	0.12	
Main	37771.8*	Max WS	516.96	643.46	651.63		651.67	0.000238	1.71	353.57	113.05	0.13	
Main	37854.5*	Max WS	518.54	643.35	651.65		651.69	0.000259	1.74	352.84	117.34	0.13	
Main	37937.2*	Max WS	519.59	643.25	651.67		651.72	0.000282	1.72	367.41	135.32	0.13	
Main	38020.00	Max WS	507.90	643.15	651.70		651.74	0.000245	1.64	368.41	134.21	0.13	
Main	38361.14	Max WS	512.95	644.16	651.77		651.79	0.000072	1.06	510.91	268.86	0.09	
Main	38408.3*	Max WS	512.96	644.15	651.77		651.79	0.000063	1.09	475.81	112.81	0.09	
Main	38455.5*	Max WS	513.63	644.15	651.77		651.80	0.000062	1.19	439.07	88.48	0.09	
Main	38502.69	Max WS	506.29	644.14	651.71		651.81	0.000168	2.48	204.52	65.59	0.16	
Main	38600	UNION PACIFIC RR	Culvert										
Main	38717.64	Max WS	543.44	644.30	652.29		652.39	0.000180	2.53	214.95	51.95	0.16	
Main	39039.40	Max WS	543.91	644.35	652.39		652.43	0.000084	1.78	343.93	57.10	0.11	
Main	39339.37	Max WS	544.35	644.63	652.41		652.46	0.000096	1.71	332.11	57.52	0.11	
Main	39639.57	COOK-DUPAGE CNTY	Max WS	545.18	644.90	652.44		652.49	0.000115	1.72	320.60	56.19	0.12

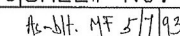
100-YR PROPOSED HEC-RAS

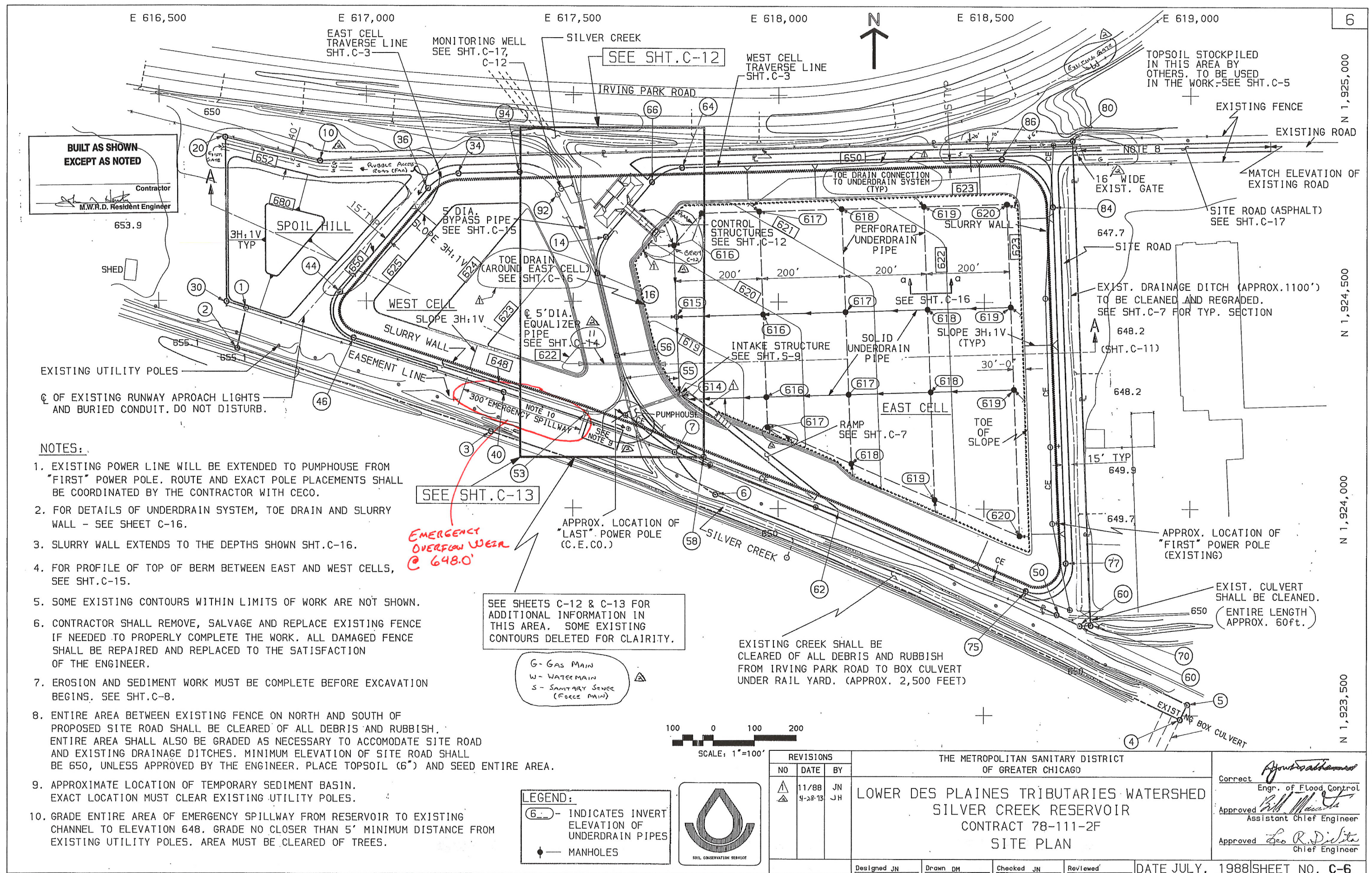
HEC-RAS Plan: PRP 100-YR River: Bens Reach: Main Profile: Max WS

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	30000 GODFREY RAILYARD		Culvert									
Main	30990.95	Max WS	537.32	641.50	647.26		647.41	0.000510	3.16	169.99	34.31	0.24
Main	31038.6*	Max WS	535.85	641.51	647.14		647.51	0.002878	4.86	110.28	29.29	0.44
Main	31086.39	Max WS	534.37	641.52	647.09		647.95	0.014783	7.40	72.17	31.92	0.87
Main	31131.5*	Max WS	532.99	641.53	647.93		648.42	0.006699	5.60	95.61	37.07	0.60
Main	31176.6*	Max WS	531.59	641.53	648.26		648.70	0.005487	5.28	101.67	38.68	0.55
Main	31221.8*	Max WS	530.19	641.54	648.53		648.93	0.004853	5.12	105.43	41.38	0.52
Main	31266.9*	Max WS	528.78	641.54	648.76		649.14	0.004450	5.01	108.52	44.06	0.50
Main	31312.1*	Max WS	527.37	641.55	648.96		649.34	0.004169	4.93	111.29	46.99	0.48
Main	31357.2*	Max WS	525.96	641.55	649.16		649.52	0.003961	4.88	114.29	53.12	0.47
Main	31402.4*	Max WS	524.55	641.56	649.35		649.70	0.003772	4.81	118.23	59.54	0.45
Main	31447.5*	Max WS	523.12	641.56	649.53		649.87	0.003584	4.74	123.06	65.82	0.44
Main	31492.71	Max WS	475.81	641.57	649.80		650.05	0.002586	4.11	135.54	77.10	0.37
Main	31564.4*	Max WS	142.25	641.58	650.24		650.25	0.000103	0.95	181.61	90.87	0.08
Main	31636.2*	Max WS	94.40	641.59	650.25		650.26	0.000034	0.58	191.01	93.45	0.05
Main	31708.0*	Max WS	67.89	641.60	650.26		650.26	0.000013	0.38	201.32	73.93	0.03
Main	31779.7*	Max WS	58.52	641.61	650.26		650.26	0.000008	0.30	212.69	75.51	0.02
Main	31851.56	Max WS	50.34	641.62	650.26		650.26	0.000005	0.24	223.39	87.18	0.02
Main	31917.4*	Max WS	43.91	641.63	650.26		650.26	0.000004	0.22	215.56	64.40	0.02
Main	31983.3*	Max WS	39.12	641.64	650.26		650.26	0.000003	0.19	208.76	59.54	0.01
Main	32049.2*	Max WS	37.06	641.65	650.26		650.27	0.000003	0.19	203.42	53.69	0.01
Main	32115.1*	Max WS	35.02	641.66	650.26		650.27	0.000003	0.18	199.03	48.47	0.01
Main	32181.08	Max WS	32.90	641.67	650.27		650.27	0.000003	0.17	195.69	44.32	0.01
Main	32239.9*	Max WS	31.02	641.68	650.27		650.27	0.000002	0.16	199.14	49.70	0.01
Main	32298.7*	Max WS	29.09	641.69	650.27		650.27	0.000002	0.15	202.76	55.13	0.01
Main	32357.5*	Max WS	27.24	641.69	650.27		650.27	0.000002	0.13	206.62	60.89	0.01
Main	32357.52		Lat Struct									
Main	32416.3*	Max WS	25.36	641.70	650.27		650.27	0.000002	0.12	210.97	69.84	0.01
Main	32475.18	Max WS	23.48	641.71	650.28	643.08	650.28	0.000013	0.19	130.17	81.93	0.01
Main	33106.07	Max WS	67.62	642.19	651.24	644.54	651.24	0.000170	0.39	240.21	407.24	0.02
Main	33135.4*	Max WS	97.19	642.34	651.35		651.35	0.000000	0.08	2804.16	984.54	0.01
Main	33164.7*	Max WS	229.32	642.49	651.35		651.35	0.000001	0.15	4517.88	1561.83	0.01
Main	33194.0*	Max WS	710.41	642.65	651.35		651.35	0.000002	0.45	6272.09	2137.67	0.03
Main	33200 STRUCTURE 102		Lat Struct									
Main	33223.43	Max WS	790.32	642.60	651.35		651.35	0.000002	0.60	6505.23	1690.76	0.04
Main	33300 IRVING PARK ROAD		Culvert									
Main	33468.31	Max WS	790.22	644.00	651.49		651.55	0.000019	2.01	392.58	1691.99	0.13
Main	33487.60	Max WS	789.56	642.29	651.53		651.55	0.000148	1.11	769.95	127.05	0.07
Main	33503.8*	Max WS	789.19	642.47	651.53		651.55	0.000144	1.09	777.01	131.25	0.07
Main	33520.0*	Max WS	788.87	642.64	651.53		651.55	0.000141	1.07	782.65	135.08	0.07
Main	33536.3*	Max WS	788.57	642.82	651.53		651.55	0.000139	1.06	786.82	138.31	0.07
Main	33552.5*	Max WS	788.24	642.99	651.54		651.55	0.000136	1.04	795.44	196.24	0.07
Main	33568.79	Max WS	787.91	643.17	651.54		651.56	0.000133	1.02	794.78	226.66	0.07
Main	33595.9*	Max WS	787.09	642.94	651.55		651.56	0.000111	0.94	866.30	215.00	0.06
Main	33623.0*	Max WS	786.31	642.71	651.55		651.56	0.000093	0.87	923.49	209.08	0.06
Main	33650.12	Max WS	785.55	642.48	651.55		651.56	0.000079	0.81	988.92	226.80	0.05
Main	33680.14	Max WS	784.66	643.20	651.56		651.57	0.000049	0.66	1204.44	182.65	0.04
Main	33685.0*	Max WS	784.47	643.18	651.56		651.57	0.000035	0.56	1746.66	576.22	0.04
Main	33689.9*	Max WS	784.30	643.16	651.56		651.57	0.000013	0.34	3118.30	769.30	0.02
Main	33694.78	Max WS	784.10	643.14	651.56		651.57	0.000034	0.54	1452.14	858.62	0.04
Main	33711.4*	Max WS	783.64	643.35	651.56		651.57	0.000004	0.18	5099.34	889.86	0.01
Main	33728.1*	Max WS	783.07	643.57	651.56		651.57	0.000003	0.17	5302.54	914.23	0.01
Main	33744.8*	Max WS	782.65	643.79	651.56		651.57	0.000003	0.16	5503.34	936.19	0.01
Main	33761.48	Max WS	782.06	644.00	651.56		651.57	0.000019	0.39	2006.35	957.13	0.03
Main	33770.7*	Max WS	781.87	643.60	651.57		651.57	0.000003	0.14	6003.67	1034.74	0.01
Main	33780.10	Max WS	781.65	643.20	651.56		651.57	0.000007	0.25	3142.57	1103.37	0.02
Main	33824.0*	Max WS	780.18	643.42	651.57		651.57	0.000002	0.12	6768.31	1138.56	0.01
Main	33868.0*	Max WS	778.93	643.63	651.57		651.57	0.000002	0.12	7067.70	1155.20	0.01
Main	33911.98	Max WS	777.42	643.85	651.57		651.57	0.000005	0.19	4022.27	1201.38	0.01
Main	33952.1*	Max WS	776.39	643.57	651.57		651.57	0.000002	0.11	7657.05	1304.05	0.01
Main	33992.23	Max WS	775.32	643.29	651.57		651.57	0.000004	0.18	4346.84	1347.11	0.01
Main	34036.1*	Max WS	774.01	643.40	651.57		651.57	0.000004	0.19	4754.67	997.09	0.01
Main	34080.1*	Max WS	772.47	643.51	651.57		651.57	0.000012	0.30	2670.84	531.40	0.02
Main	34124.11	Max WS	771.42	643.62	651.56		651.57	0.000026	0.43	1831.88	338.67	0.03
Main	34165.1*	Max WS	770.19	643.55	651.57		651.57	0.000026	0.44	1776.73	308.74	0.03
Main	34206.2*	Max WS	768.96	643.48	651.57		651.57	0.000026	0.45	1715.76	295.12	0.03
Main	34247.3*	Max WS	767.55	643.42	651.57		651.57	0.000026	0.47	1693.81	285.01	0.03
Main	34288.38	Max WS	766.39	643.35	651.57		651.57	0.000028	0.50	1540.64	442.38	0.03
Main	34323.2*	Max WS	765.46	643.15	651.57		651.57	0.000036	0.55	1546.32	451.22	0.04
Main	34358.2*	Max WS	764.53	642.94	651.57		651.57	0.000048	0.62	1380.54	445.72	0.04
Main	34393.10	Max WS	763.73	642.74	651.57		651.58	0.000075	0.76	1040.01	415.60	0.05
Main	34492.09	Max WS	760.62	644.45	651.57		651.59	0.000114	0.91	864.81	391.39	0.06
Main	34642.28	Max WS	758.43	644.50	651.59		651.60	0.000122	0.90	861.84	401.71	0.06
Main	34844.43	Max WS	750.70	645.21	651.62		651.63	0.000119	0.85	890.08	387.78	0.06
Main	34990.5	Max WS	746.64	643.89	651.64		651.64	0.000056	0.66	1137.51	355.98	0.04
Main	35157.52	Max WS	741.85	645.42	651.65		651.66	0.000125	0.82	907.62	315.40	0.06
Main	35397.52	Max WS	735.07	644.70	651.67		651.68	0.000069	0.71	1046.13	431.51	0.05
Main	35498.37	Max WS	732.41	644.73	651.68		651.69	0.000066	0.67	1094.93	464.68	0.05
Main	35640.53	Max WS	728.60	644.62	651.69		651.70	0.000078	0.66	1100.55	414.79	0.05
Main	35728.81	Max WS	725.73	644.78	651.70		651.70	0.000039	0.52	1397.85	308.74	0.04
Main	35941.41	Max WS	719.97	644.83	651.71		651.71	0.000029	0.46	1575.98	372.67	0.03
Main	36092.81	Max WS	715.16	644.33	651.71		651.72	0.000041	0.51	1414.59	369.81	0.04
Main	36259.72	Max WS	709.61	644.90	651.72		651.72	0.000030	0.46	1541.53	267.83	0.03
Main	36370.35	Max WS	707.03	644.95	651.72		651.72	0.000028	0.45	1585.88	632.72	0.03

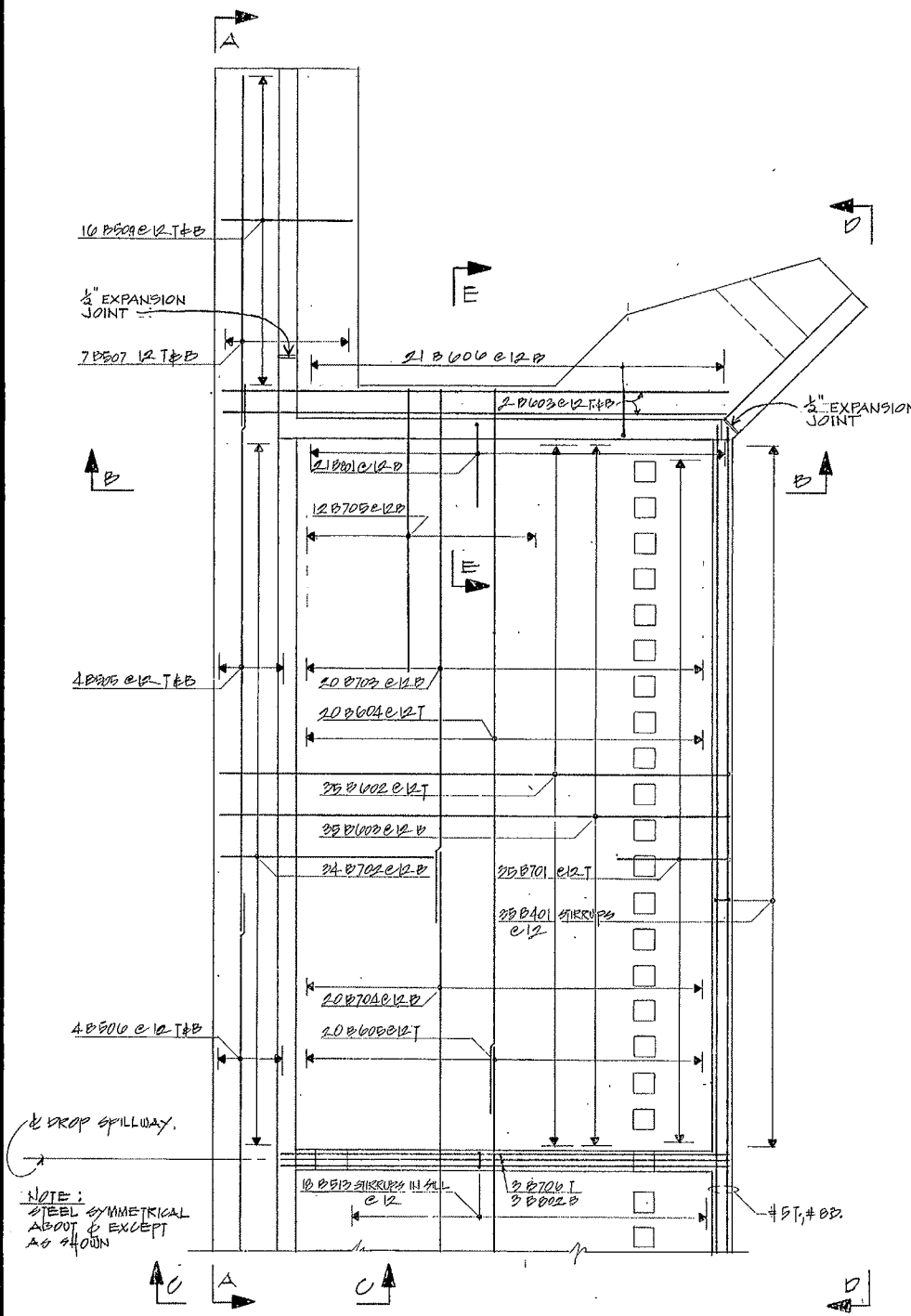
HEC-RAS Plan: PRP 100-YR River: Bens Reach: Main Profile: Max WS (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Cht
Main	36404.39	Max WS	705.71	642.72	651.72		651.73	0.000022	0.41	1746.04	591.77	0.03
Main	36432.47	Max WS	704.61	643.95	651.72		651.73	0.000023	0.42	1694.94	549.59	0.03
Main	36457.53	Max WS	701.34	643.75	651.66		651.89	0.001494	3.79	185.10	480.98	0.24
Main	36500 TAFT ROAD	Culvert										
Main	36660.35	Max WS	718.75	643.94	652.13		652.34	0.001389	3.74	192.00	572.82	0.23
Main	36693.56	Max WS	719.42	643.98	652.19		652.19	0.000005	0.18	3893.92	657.56	0.01
Main	36790.51	Max WS	647.99	643.76	652.19		652.19	0.000003	0.14	4746.63	829.62	0.01
Main	36862.61	Max WS	647.02	644.44	652.19		652.19	0.000002	0.12	5256.85	853.50	0.01
Main	36990.25	Max WS	646.91	642.70	652.19		652.19	0.000002	0.11	5816.67	852.10	0.01
Main	37113.29	Max WS	646.19	644.36	652.19		652.19	0.000002	0.13	4887.57	771.46	0.01
Main	37178.67	Max WS	644.75	642.92	652.19		652.19	0.000003	0.14	4731.83	733.75	0.01
Main	37334.5	Max WS	642.88	642.70	652.19		652.19	0.000008	0.23	2836.34	479.09	0.02
Main	37347.7*	Max WS	642.76	642.78	652.19		652.19	0.000009	0.29	2209.11	410.33	0.02
Main	37360.9*	Max WS	642.64	642.85	652.19		652.19	0.000018	0.40	1657.15	380.60	0.03
Main	37374.1*	Max WS	642.98	642.93	652.19		652.19	0.000027	0.61	1268.48	395.65	0.05
Main	37387.33	Max WS	641.93	643.01	652.19		652.19	0.000075	0.92	1077.88	421.13	0.07
Main	37608.41	Max WS	639.36	643.66	652.19		652.23	0.000188	1.69	489.42	235.50	0.12
Main	37689.1*	Max WS	641.46	643.56	652.21		652.25	0.000218	1.78	449.33	157.84	0.13
Main	37771.8*	Max WS	642.13	643.46	652.22		652.27	0.000245	1.86	437.72	166.07	0.13
Main	37854.5*	Max WS	643.76	643.35	652.24		652.29	0.000258	1.87	440.54	181.52	0.14
Main	37937.2*	Max WS	644.94	643.25	652.27		652.31	0.000256	1.83	458.53	179.31	0.13
Main	38020.00	Max WS	626.59	643.15	652.29		652.33	0.000246	1.77	435.03	217.73	0.13
Main	38361.14	Max WS	632.26	644.16	652.37		652.38	0.000061	1.07	715.88	373.85	0.09
Main	38408.3*	Max WS	631.13	644.15	652.36		652.38	0.000064	1.19	544.83	122.10	0.09
Main	38455.5*	Max WS	631.70	644.15	652.36		652.39	0.000066	1.31	491.85	91.28	0.09
Main	38502.69	Max WS	621.76	644.14	652.28		652.41	0.000199	2.83	219.85	67.18	0.17
Main	38600 UNION PACIFIC RR	Culvert										
Main	38717.64	Max WS	671.36	644.30	653.19		653.31	0.000192	2.81	239.22	56.22	0.17
Main	39039.40	Max WS	675.54	644.35	653.30		653.35	0.000086	1.93	397.75	60.37	0.11
Main	39339.37	Max WS	675.87	644.63	653.33		653.38	0.000095	1.85	366.42	60.96	0.12
Main	39639.57 COOK-DUPAGE CNTY	Max WS	678.24	644.90	653.36		653.41	0.000112	1.86	373.62	59.56	0.12

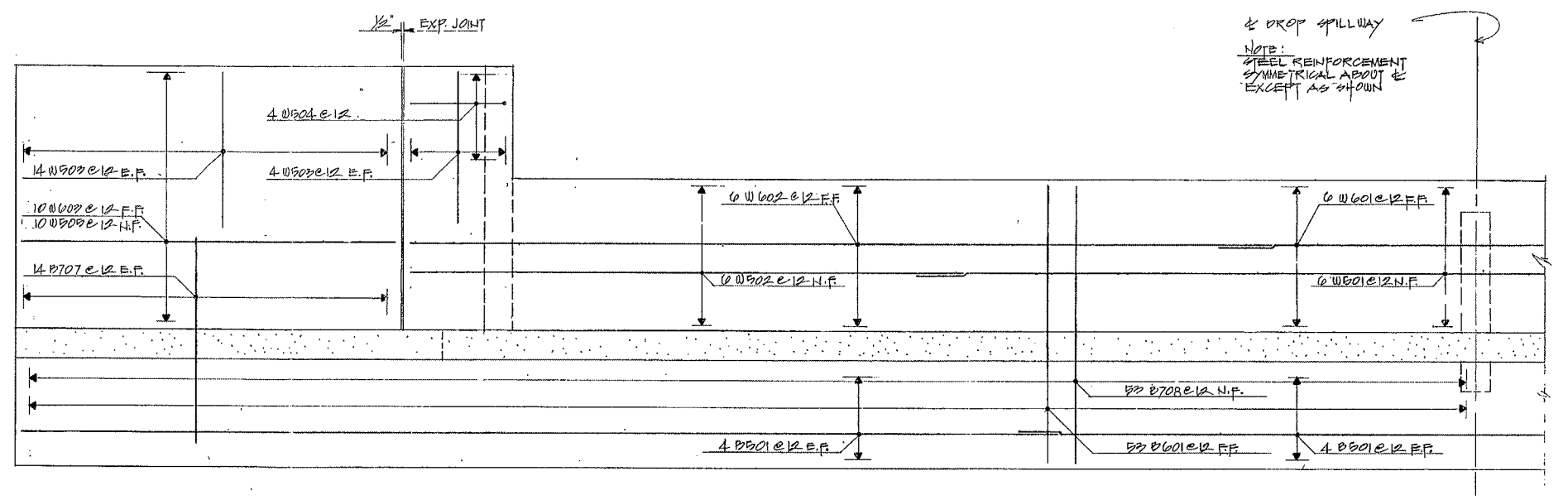




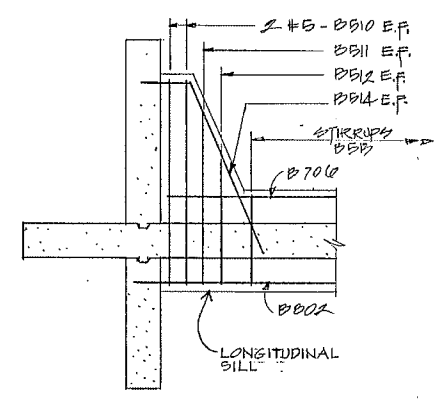
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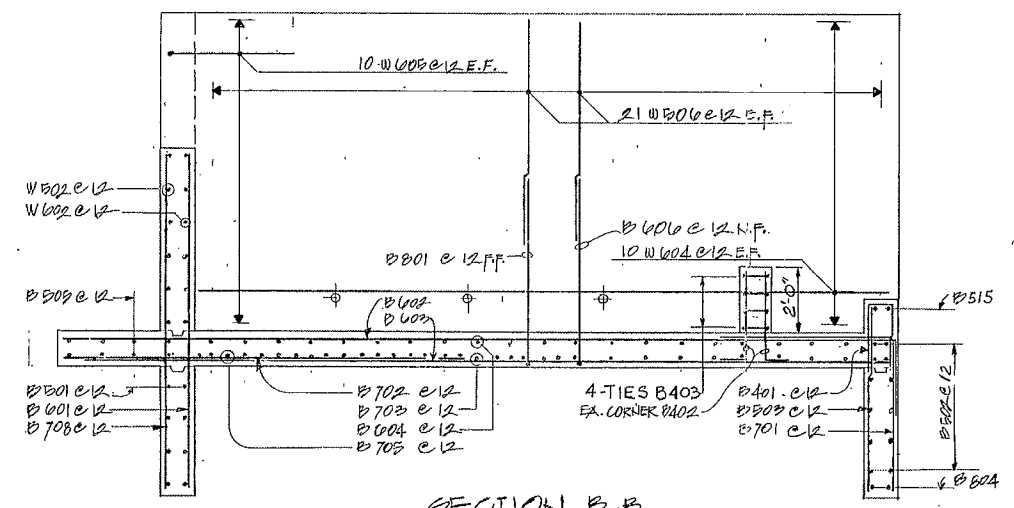
PLAN
SCALE: 1/4" = 1'-0"



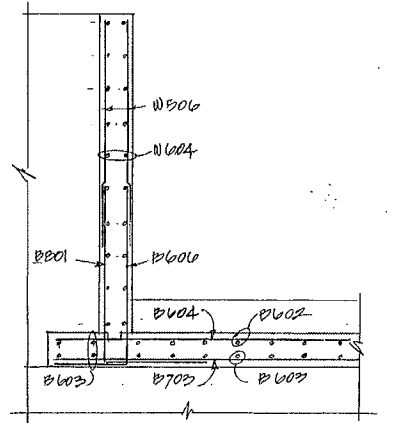
SECTION A-A



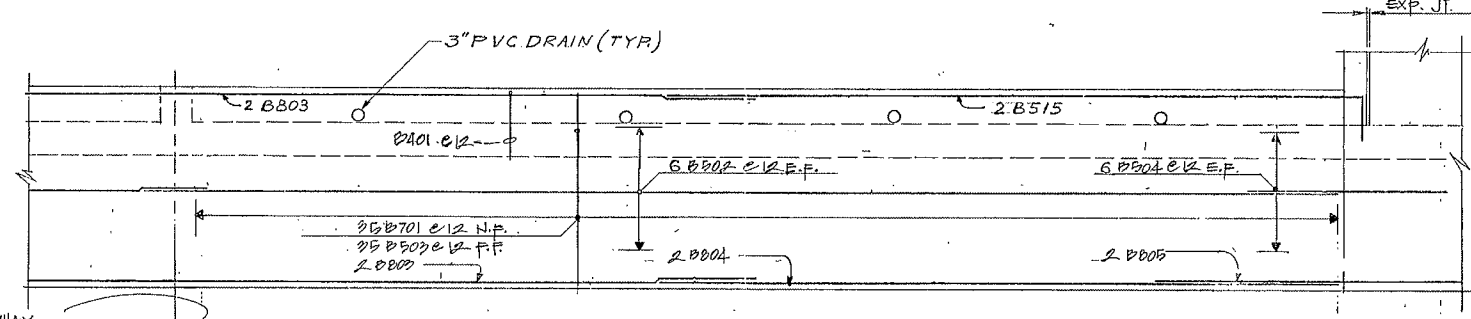
SECTION U-U



SECTION B-B



SECTION E-E



SECTION D-D

NOTE:
STEEL REINFORCEMENT
SYMMETRICAL ABOUT &
EXCEPT AS SHOWN



BUILT AS SHOWN
EXCEPT AS NOTED

Contractor
M.W.R.D. Resident Engineer

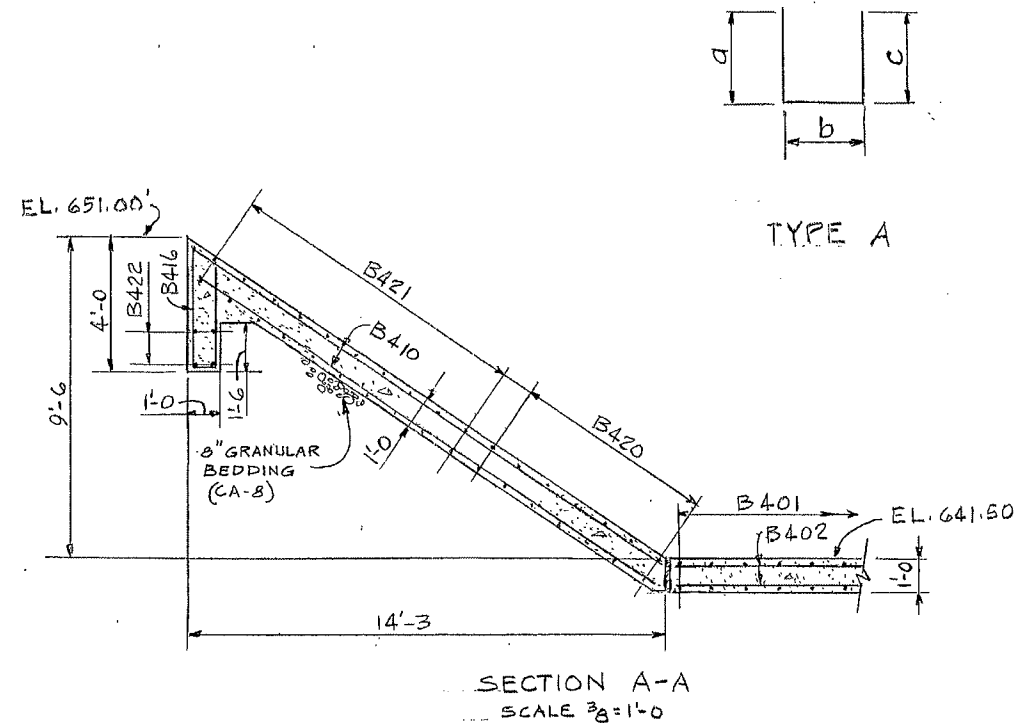
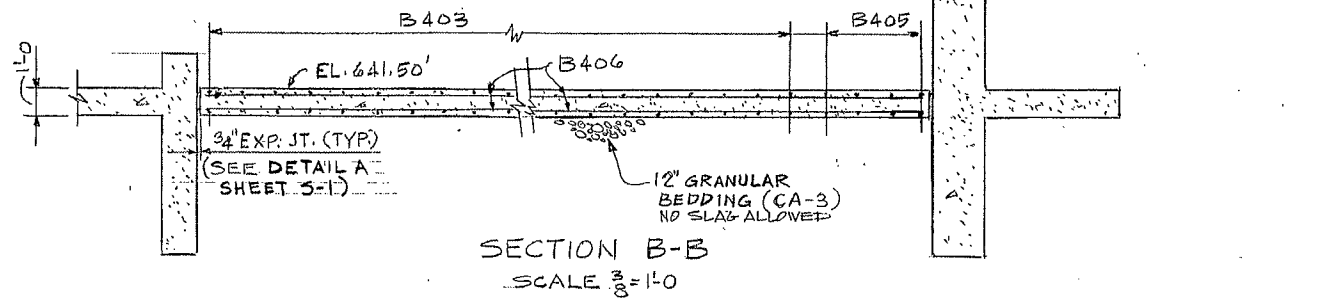
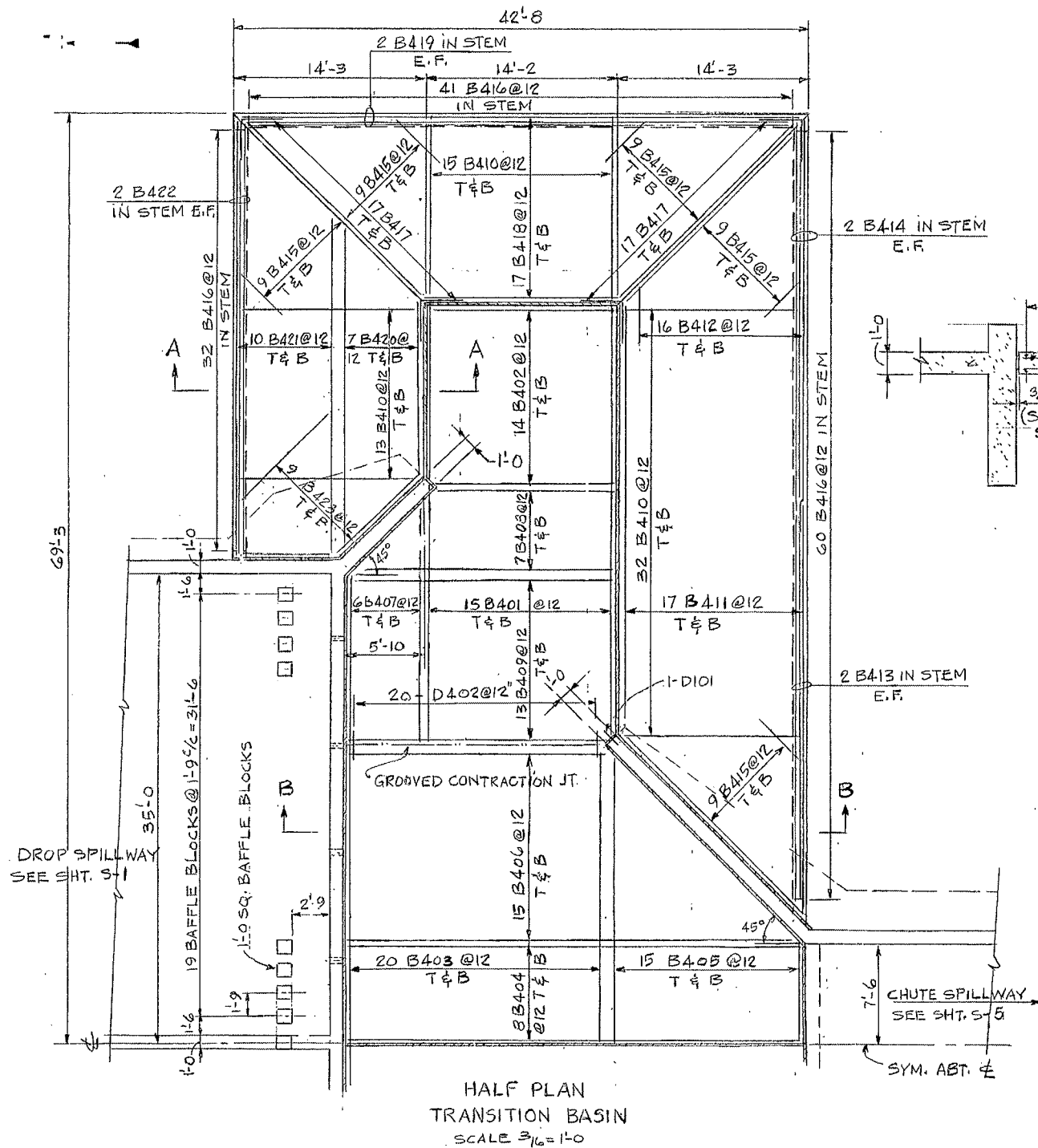
SCALE: 3/8" = 1'-0"

1' 0' 1' 2' 3' 4' 7' 8' 9' 11' 12'

unless noted

REVISIONS			THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO		Correct <i>Leslie Sombai</i> r. of Structural Design
NO.	DATE	BY			
			LOWER DES PLAINES TRIBUTARIES WATERSHED SILVER CREEK RESERVOIR		Approved <i>Robert Baulman</i> Assistant Chief Engineer
			CONTRACT 78-111-2F		Approved <i>[Signature]</i> Chief Engineer
			DROP SPILLWAY REINFORCING		SCALES SHOWN ARE SCALES OF TRACINGS
Designed	H.W.	Drawn	M.E.	Checked	J.L.P.
Reviewed					
DATE JULY, 1988				SHEET NO. S-2	

MARK	TYPE	SIZE	NO	LENGTH	a	b	c
B401	—	4	60	32'-2			
B402	—	4	56	13'-10			
B403	—	4	80	22'-1			
B404	—	4	32	33'-11			
B405	—	4	4x15	7'-5 TO 21'-5 STEP 1'-0			
B406	—	4	4x15	19'-5 TO 33'-5 STEP 1'-0			
B407	—	4	4x7	12'-7 TO 11'-7 STEP 1'-0			
B408	—	4	4x7	13'-10 TO 19'-10 STEP 1'-0			
B409	—	4	52	19'-8			
B410	—	4	240	16'-8			
B411	—	4	68	31'-10			
B412	—	4	4x16	4'-4 TO 29'-4 STEP 1'-8			
B413	—	4	8	31'-10			
B414	—	4	8	30'-4			
B415	—	4	20x9	4'-0 TO 21'-0 STEP 2'-12			
B416	A	4	266	7'-6	3'-9	8	3'-1
B417	A	4	144	6'-0	3'-0	3'-0	
B418	—	4	4x17	14'-0 TO 40'-8 STEP 1'-8			
B419	—	4	8	40'-0			
B420	—	4	4x7	13'-10 TO 23'-10 STEP 1'-8			
B421	—	4	4x10	24'-6 TO 32'-0 STEP 1'-0			
B422	—	4	8	33'-0			
B423	—	4	36	9'-0			



SCALE: $\frac{1}{16} = 1'-0$

5' 0' 5' 10'

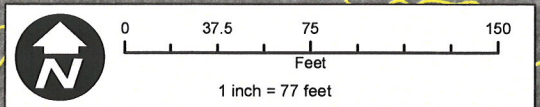
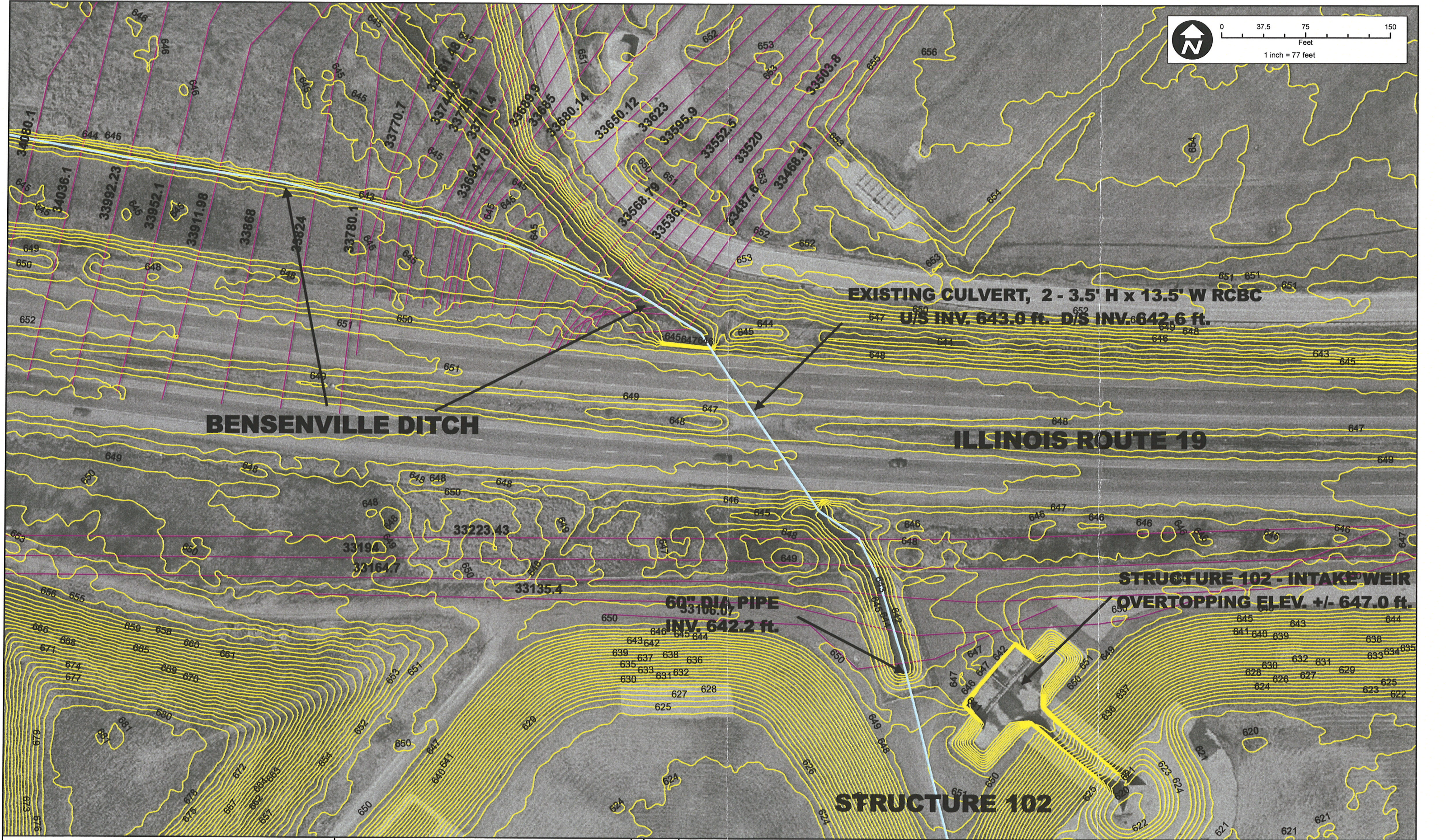
unless noted

BUILT AS SHOWN
EXCEPT AS NOTED

Contractor
M.W.R.D. Resident Engineer

REVISIONS			THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO		Correct <i>Leslie Dombai</i> Engr. of Structural Design	
NO.	DATE	BY	LOWER DES PLAINES TRIBUTARIES WATERSHED SILVER CREEK RESERVOIR		Approved <i>Robert Baubani</i> Assistant Chief Engineer	
			CONTRACT 78-111-2F TRANSITION BASIN		Approved <i>John W. Dombai</i> Chief Engineer	
Designed <i>H. W.C.</i>			Drawn <i>A. M.B.</i>		Checked <i>J.P.</i>	
			Reviewed		DATE JULY, 1988	
					SHEET NO. S-4	

SCALES SHOWN ARE
SCALES OF TRACINGS



BENSENVILLE DITCH

EXISTING CULVERT, 2 - 3.5' H x 13.5' W RCBC
U/S INV. 643.0 ft. D/S INV. 642.6 ft.

ILLINOIS ROUTE 19

60" DIA. PIPE
INV. 642.2 ft.

STRUCTURE 102 - INTAKE WEIR
OVERTOPPING ELEV. +/- 647.0 ft.

STRUCTURE 102



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

**ILLINOIS DEPARTMENT
OF TRANSPORTATION**

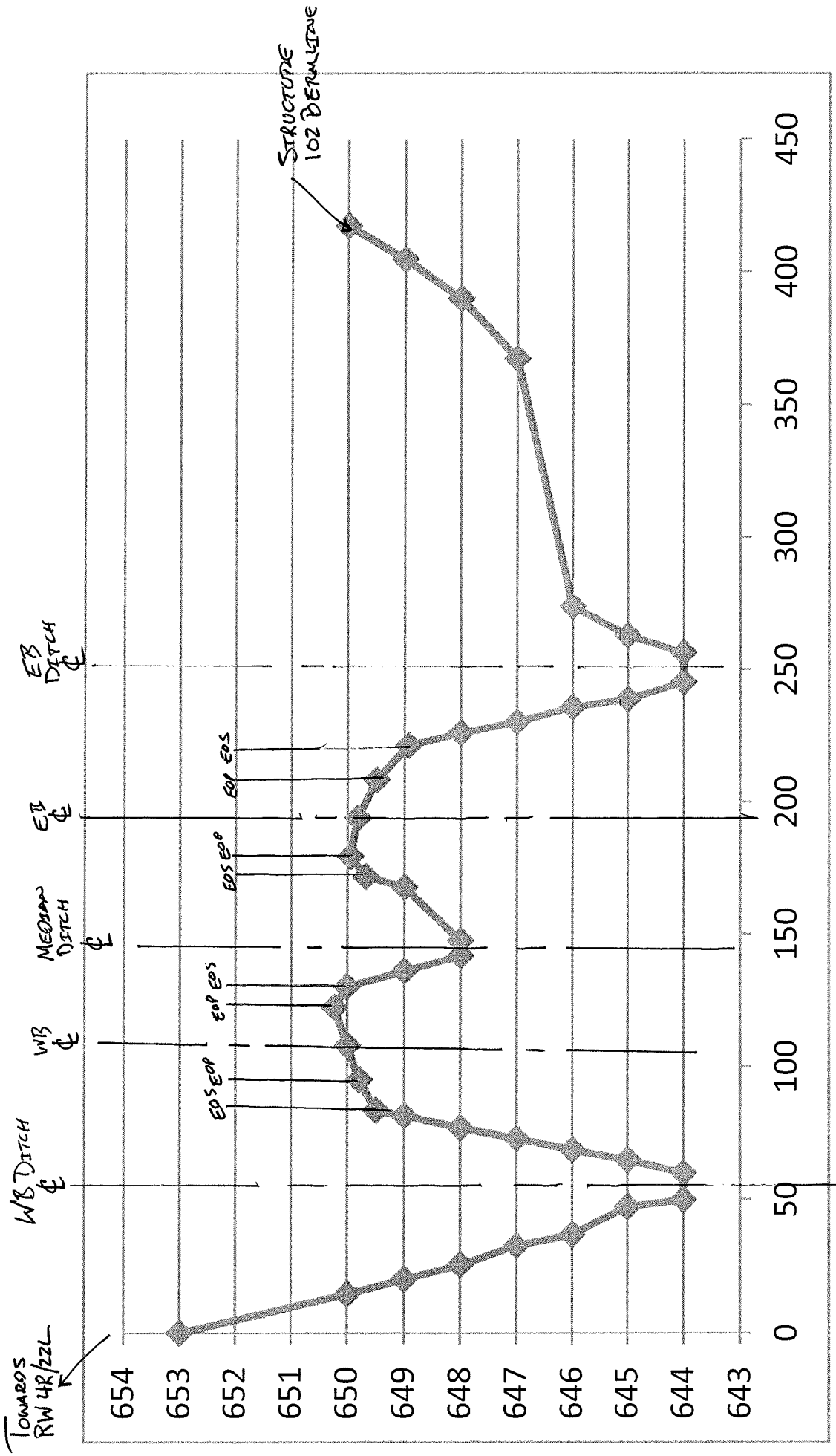
NO.		DATE	NATURE OF REVISION	CHKD.	MODEL
FILE NAME					

TITLE:
**ELGIN O'HARE - WEST BYPASS
ILLINOIS ROUTE 19 AT BENSENVILLE DITCH
CROSS-SECTION LOCATION MAP**

PROJ. NO. 07-0404
DATE:
SHEET 1 OF 1
DRAWING NO.
EXH

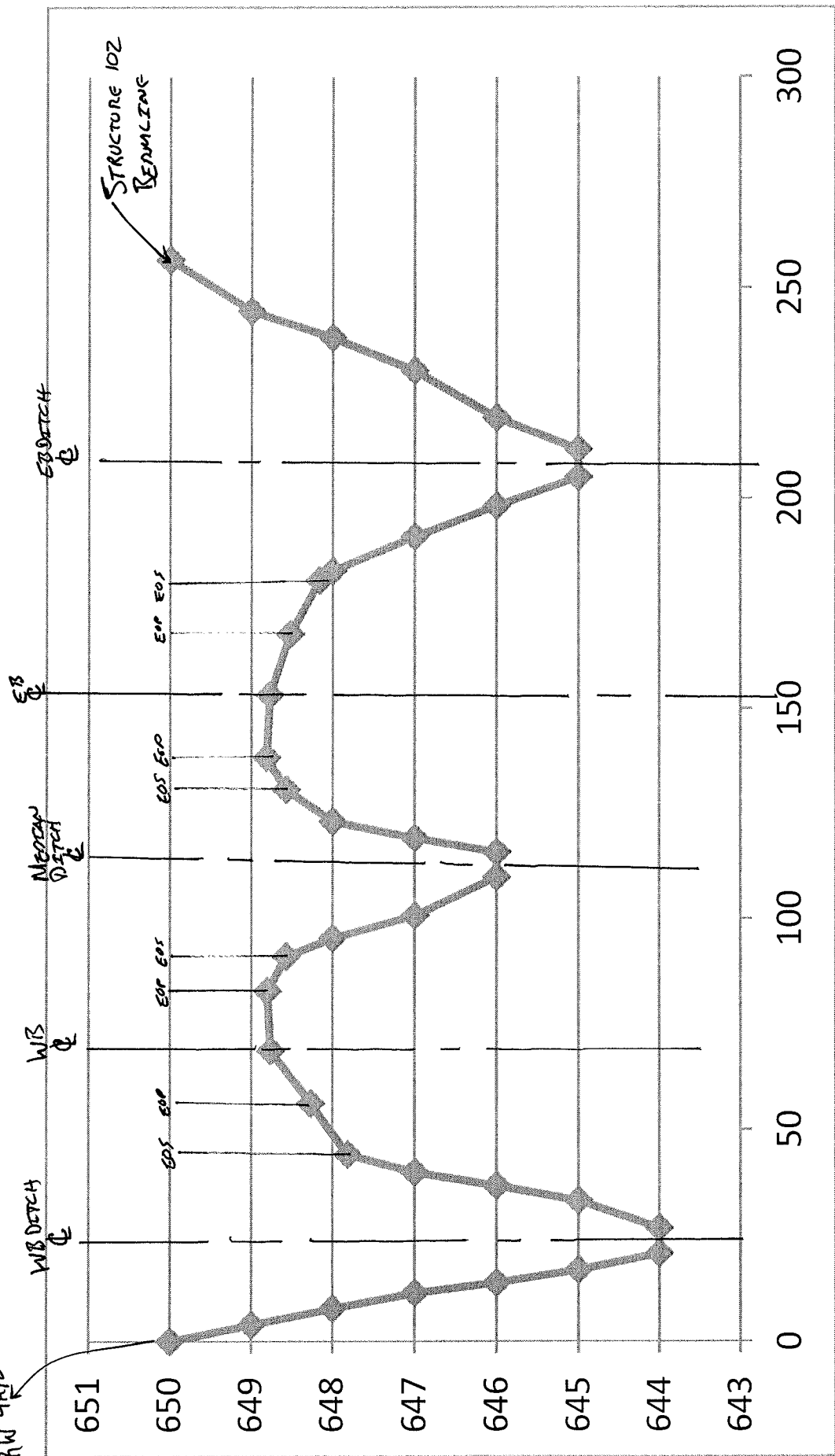
PERPENDICULAR X-SEC NEAR EXISTING CULVERT @ STA 8+60

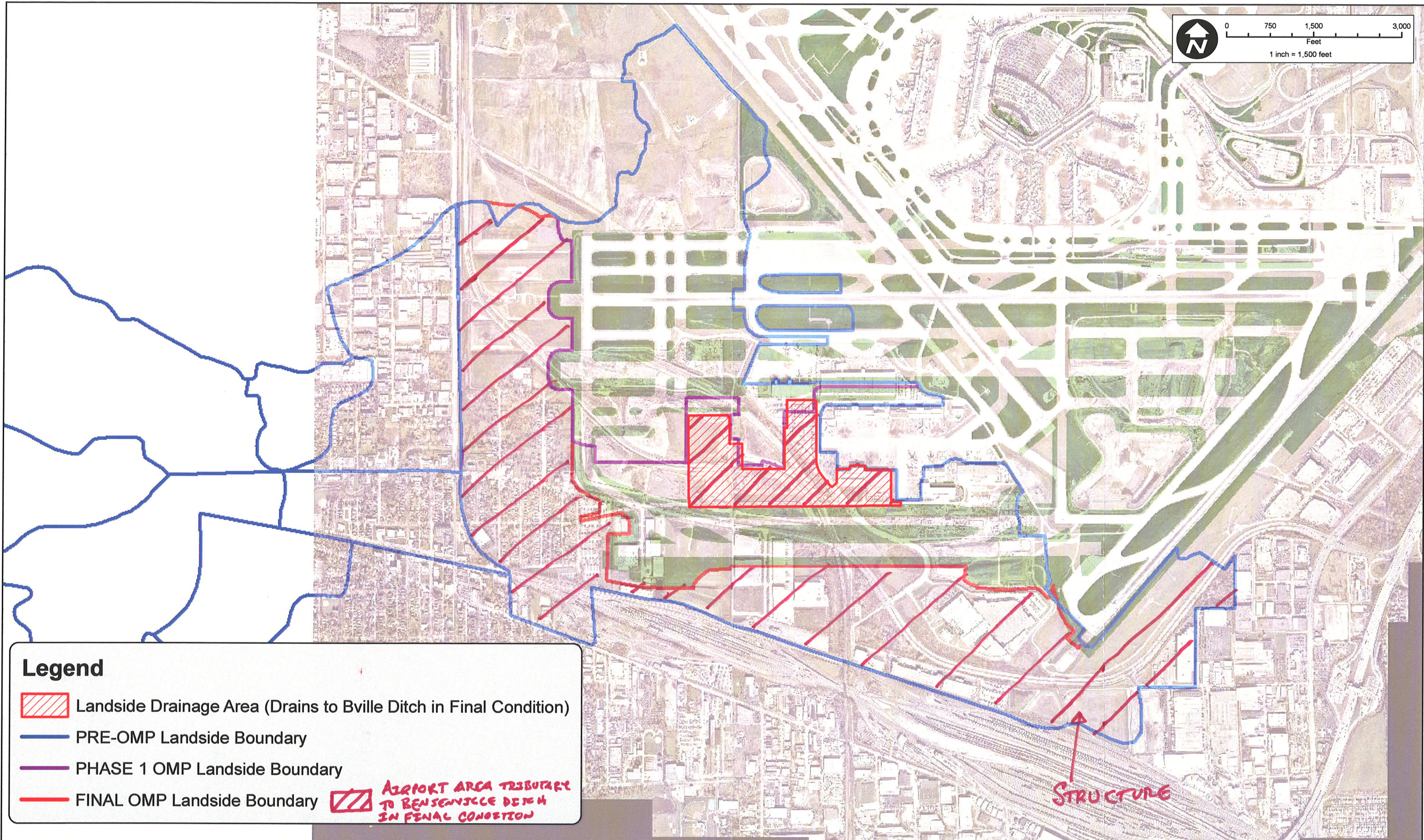
TOWARDS
RW 4R/22L



PERPENDICULAR X-SEC NEAR LOW-SLOT @ STA 12+80

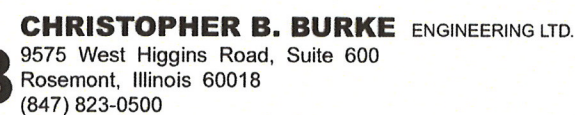
TRANS
RW 4/1/20





 Landside Drainage Area (Drains to Bville Ditch in Final Condition)
 PRE-OMP Landside Boundary
 PHASE 1 OMP Landside Boundary
 FINAL OMP Landside Boundary

 AIRPORT AREA TRIBUTARY TO BENSENVILLE DITCH

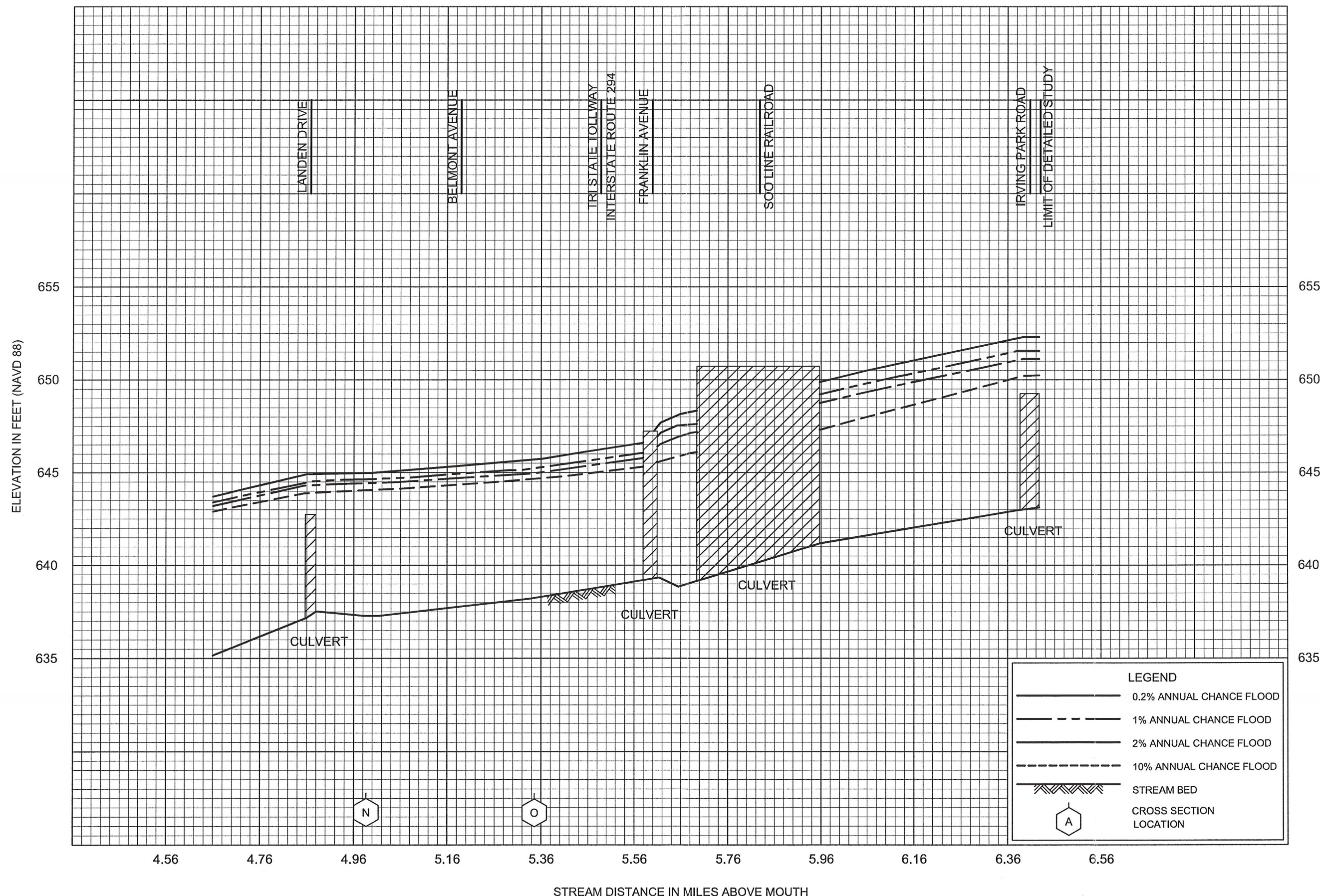
 AIRPORT AREA TRIBUTARY
TO BENSEN/CLE DETEH
IN FINAL CONOSTION

**ILLINOIS DEPARTMENT
OF TRANSPORTATION**

					DSGN.			
					DWN.			
					CHKD.			
					SCALE:		1"= 1,500'	
					PLOT DATE:			
					CAD USER:			
NO.	DATE		NATURE OF REVISION	CHKD.	MODEL:			
EJF	E NAME							

BENSENVILLE DITCH WATERSHED COMPARISON

EXH



FLOOD PROFILES

SILVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

COOK COUNTY, IL
AND INCORPORATED AREAS

334P

8/19/08

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
Silver Creek					
At mouth at Des Plaines River	11.6	465	712	842	1,125
At North Avenue	10.3	443	680	802	1,075
At Armitage Avenue	9.1	351	620	768	1,145
Approximately 800 feet upstream of Fullerton Avenue	9.1	425	645	770	1,010
Just upstream of Scott Street	8.7	420	640	760	1,000
At Grand Avenue	7.4	303	545	669	1,015
Approximately 1,800 feet upstream of Grand Avenue	6.8	370	570	670	890
Approximately 800 feet upstream of Belmont Avenue	6.6	360	560	660	880
At Franklin Avenue	6.4	355	550	655	875
At Railroad yard	6.1	350	535	640	850
Skokie River (See entry following Chicago River, North Branch)					
Skokie River, Botanical Garden Diversion					
At confluence with Skokie River	* ³	54	388	543	690
Skokie River, West Ditch					
At confluence with Skokie River	1.2	72	333	638	1,141
At Tower Road	0.8	54	67	73	74
South Navy Ditch					
Just downstream from Soo Line Railroad	1.9	217	351	410	527
South Tributary to Tinley Creek					
At 88 th Avenue	0.4	*	*	51	*
Spring Creek					
At 118 th Avenue	2.3	108	205	259	396
At 159 th Street	1.6	61	90	97	117
At 151 st Street and Wolf Road	0.8	64	112	139	195
Stony Creek (East)					
At confluence with Calumet-Sag Channel	4.5	260	395	459	620
At Sacramento Avenue	4.3	255	390	454	615
At Central Park Avenue	3.6	205	315	365	495
At Crawford Avenue	2.4	158	239	277	372
At Cicero Avenue	0.2	50	75	100	150

* Data not available

³ Includes split flow from Skokie River downstream of Lake Cook Road plus local drainage

8/19/08

Tab 4

Appendix 4
FAA Documentation

Donald C. Oliphant

From: Chinliang R. Wang [cwang@cbbel.com]
Sent: Tuesday, January 17, 2012 9:01 AM
To: Larry.Martin@CH2M.com
Cc: 'Santos Batista'; doliphant@cbbel.com
Subject: FW: EOWB - Irving Park Road Profile
Attachments: Elgin O - Irving Park Analysis_16JAN2012.pdf; CP-Irving Park Road_PART 77 and Lightplane_100scale-22x34.pdf; CP-Irving Park Road_TERPS approach_100scale-22x34.pdf; CP-Irving Park Road_TERPS departure_100scale-22x34.pdf

Larry:

Thanks.

Chinliang R. Wang, PE

Vice President

Head, Drainage Department

Christopher B. Burke Engineering, Ltd.

9575 W. Higgins Road, Suite 600 Rosemont, IL 60018

Phone: (847) 823-0500 Fax: (847) 823-0520

E-Mail: cwang@cbbel.com

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From: Larry.Martin@CH2M.com [mailto:Larry.Martin@CH2M.com]
Sent: Tuesday, January 17, 2012 8:37 AM
To: cwang@cbbel.com
Cc: Lidia.Pilecky@CH2M.com; Ronald.Krall@illinois.gov
Subject: FW: EOWB - Irving Park Road Profile

Chin...here are the elevations that you were looking for at IL19...note Tracy's comments below that elevations vary depending on the reg and the location. Regards, Larry

From: Victorine, Tracy/BPC
Sent: Monday, January 16, 2012 4:54 PM
To: Martin, Larry/CHI
Subject: EOWB - Irving Park Road Profile

Larry –

You had asked me to run an analysis of how far the profile of Irving Park Road could be raised in an attempt to alleviate some drainage concerns. The amount of the raise is variable – I've calculated at both the centerline of the runway as well as on the east side which is the most critical as the roadway curves towards the runway threshold (end).

Please review and advise if you have any questions or would like additional information,

Tracy Victorine Lewis
OMP-MCE
773-462-7521
10510 W. Zemke Road
Chicago, IL 60666

Elgin O'Hare West Bypass - Proposal to Raise Existing Irving Park Road Profile in the Vicinity of 4R Approach

A) PART 77

Existing PART 77 Surface Elevation at closest point of Roadway (east of RW CL)~ 668.98
Existing Roadway Elevation ~ 648
Existing Δ 20.98
Allowable to raise roadway by 3.98' and maintain 17' roadway clearance

Existing PART 77 Surface Elevation at RW centerline along Roadway ~ 678.37
Existing Roadway Elevation ~ 650
Existing Δ 28.37
Allowable to raise roadway by 11.37' and maintain 17' roadway clearance

B) TERPS Departure

Existing TERPS Departure (RW 22L) Surface Elevation at closest point of Roadway (east of RW CL)~ 673.8
Existing Roadway Elevation ~ 648
Existing Δ 25.8
Allowable to raise roadway by 8.8' and maintain 17' roadway clearance

Existing TERPS Departure Surface Elevation at RW centerline along Roadway ~ 687.6
Existing Roadway Elevation ~ 650
Existing Δ 37.6
Allowable to raise roadway by 20.6' and maintain 17' roadway clearance

C) TERPS Approach

Existing TERPS Approach (RW 22L) Surface Elevation at closest point of Roadway (east of RW CL)~ 676.4
Existing Roadway Elevation ~ 648
Existing Δ 28.4
Allowable to raise roadway by 11.4' and maintain 17' roadway clearance

Existing TERPS Approach Surface Elevation at RW centerline along Roadway ~ 686.4
Existing Roadway Elevation ~ 650
Existing Δ 36.4
Allowable to raise roadway by 19.4' and maintain 17' roadway clearance

D) Lightplane

Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR)
Existing MALSR Lightplane Elevation at closest point of Roadway (east of RW CL)~ 674.5
Existing Roadway Elevation ~ 649
Existing Δ 25.5'
Allowable to raise roadway by 8.5' and maintain 17' roadway clearance

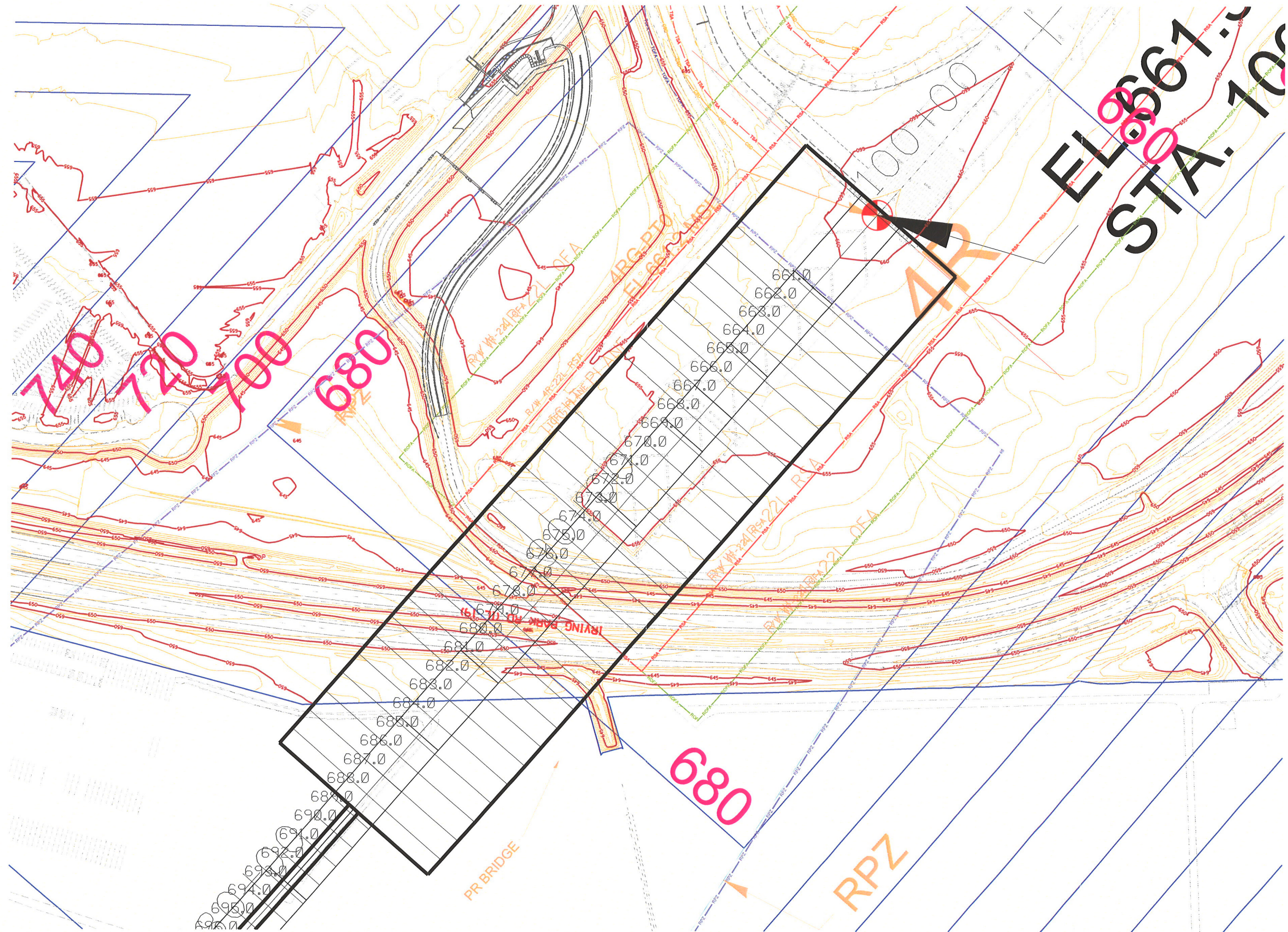
Existing MALSR Lightplane Elevation at RW centerline along Roadway ~ 677.8
Existing Roadway Elevation ~ 650
Existing Δ 27.8'
Allowable to raise roadway by 10.8' and maintain 17' roadway clearance

Notes:

1. Runway 4R-22L has an engineered materials arrestor system (EMAS) system installed on both ends so reduced Runway Safety Area.
2. Analysis performed with height of traffic above roadway = 17' per 14 CFR PART 77 for interstates or other major roadways designed with overcrossings with 17' clearance. If roadway type is such that only 15' of clearance is being provided at the overpasses for other roadway, then roadway profile can be adjusted by an additional 2'.

LEGEND

_____ = MOST RESTRICTIVE CRITERIA



Tab 5

Appendix 5
DVD Containing Supporting Documentation & HEC-HMS/HEC-RAS Files

CD

Tab 6

Appendix 6
Correspondence

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