APPENDIX 11

East Side Profile Memo

IL 18 between IL River Bridge and IL 29
Marshall and Putnam Counties
P-94-007-20
PTB 195-038

Potential for Reducing Flooding - East Side Bridge Approach Profile Evaluation

Executive Summary

IDOT is undergoing a Phase I Engineering Study for the replacement of the IL 18 Bridge over the Illinois River at Henry, Illinois. As part of the study, the design team performed an assessment of the east roadway approach profile to determine if improvements could be made in conjunction with the bridge replacement project, to reduce the flooding along IL 18 between the new river bridge and the intersection of IL 18/IL 26.

Based on the study of the east profile, D4 staff recommends that we should not make improvements to the east approach roadway beyond the "touchdown" point as part of the bridge replacement project for the reasons listed below. Instead, D4 recommends that the proposed east bridge approach roadway follow the 3% policy profile grade until it ties into the existing vertical profile. Both the horizontal and vertical alignments will tie into the existing roadway at about the same location (or as close as practical). The "touchdown" point being referred to is the point at which the new roadway is restored to existing IL 18 alignment and profile. Concurrence with this strategy from the Bureau of Design and Environment and FHWA was received on March 9, 2023.

- The study of the east profile showed that only a very minor reduction in flooding can be realized along IL 18 east of the new river bridge until the IL 18 and IL 26 bridges over Sandy Creek are raised.
- The study showed that the two Sandy Creek bridges would need to be raised 5-7 feet to meet policy. In addition to raising the roadway between the new touchdown point and the IL 26 Sandy Creek bridge, the IL 18/IL 26 intersection plus approximately 5000 feet approach roadway (E and S legs) would also need to be raised to make this a resilient facility. That work is substantially beyond the study limits for this river bridge project. Until the two bridges are raised, the existing infrastructure will still be prone to flooding which will on occasion cause a closure of the new bridge. Some reduction in flood recurrence interval could be realized by raising only the IL 18 Sandy Creek Bridge, but until the entire system is studied, the District is not in a position to determine the best elevation/alignment for reconstruction of the IL 18 Sandy Creek bridge. Likewise, the District is not in a position to determine the best elevation/alignment for IL 18 between the new bridge touch down point and the Sandy Creek Bridge at this time.
- Raising the profile of IL 18 between the new river bridge and the Sandy Creek Bridge ahead of raising the Sandy Creek bridge would relocate the low profile elevation closer to / or at the bridge which is not preferred. Operations prefers to keep the roadway lower than the IL 18 Sandy Creek Bridge so that the roadway floods first.
- The District proposes a separate study for the entire system (within the floodplain) east of the new IL River Bridge. Adding this to the scope of work to the IL River Bridge project at this time could add up to 2 years to the NEPA process. The additional work described above may have significant environmental impacts (including impacts to Duck Ranch and an archeological site immediately adjacent to the IL 18 Sandy Creek Bridge). An

alignment study for the entire facility will need to be undertaken to minimize environmental impacts and to evaluate construction staging opportunities in order to minimize disruption to the travelling public.

- Neither the District nor the public would favor the delay of the IL 18 River Bridge replacement project to complete a more comprehensive study. The IL 18 River Bridge replacement project is currently funded in the MYP. Funding for raising the two Sandy Creek Bridges, the intersection and the additional 5000 feet of roadway is not funded for construction at this time.

Background

IDOT is undergoing a study of a bridge replacement for the IL 18 Bridge over the Illinois River. The approach roadway on the west side of the bridge lies within the municipal boundary of Henry Illinois and is outside of the regulated floodplain. The approach roadway on the east side of the bridge is in rural Marshal and Putnam Counties, and approximately 4000 feet of the existing IL 18 pavement/embankment leading to the bridge lies within the regulated floodplain, and more specifically within the regulated floodway. See Figures 1 and 2.

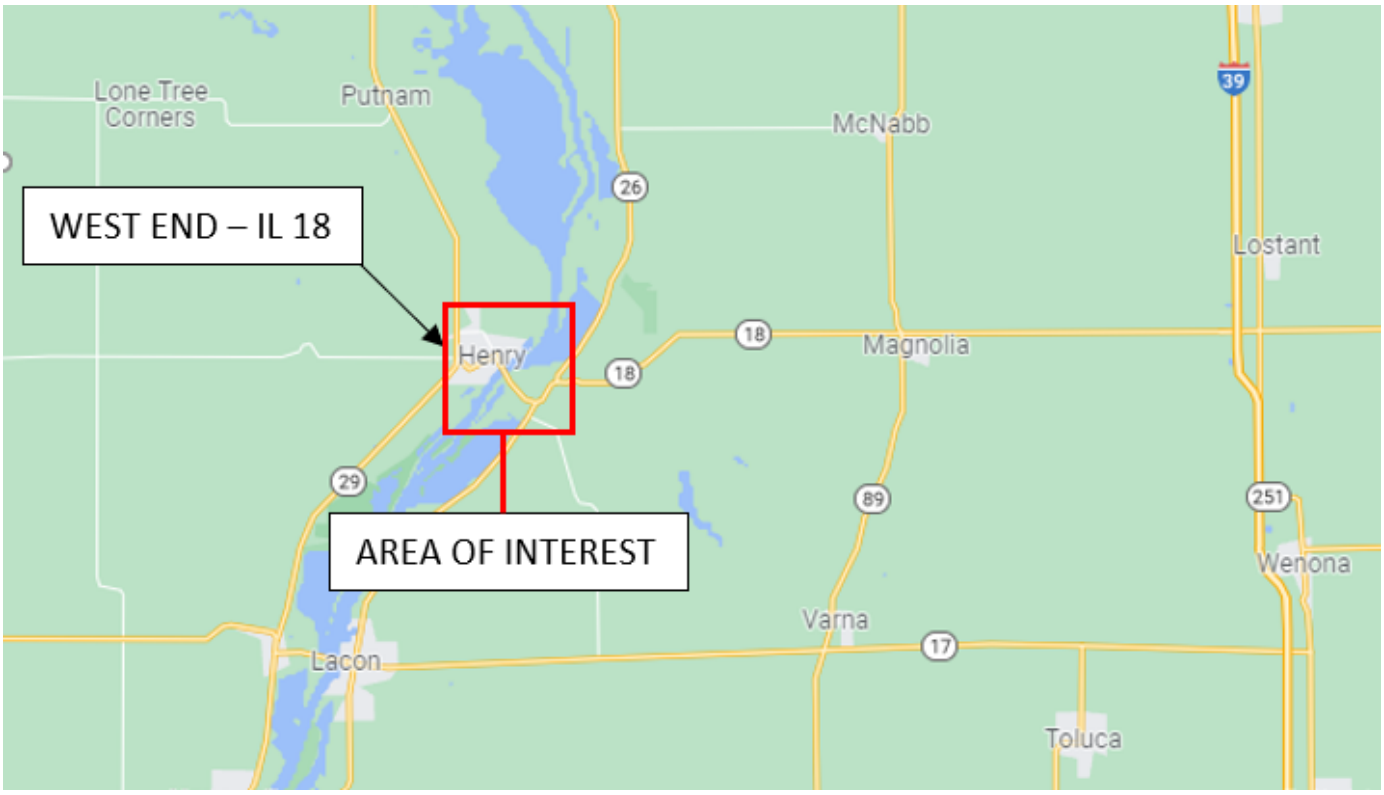


Figure 1. Project Location Map

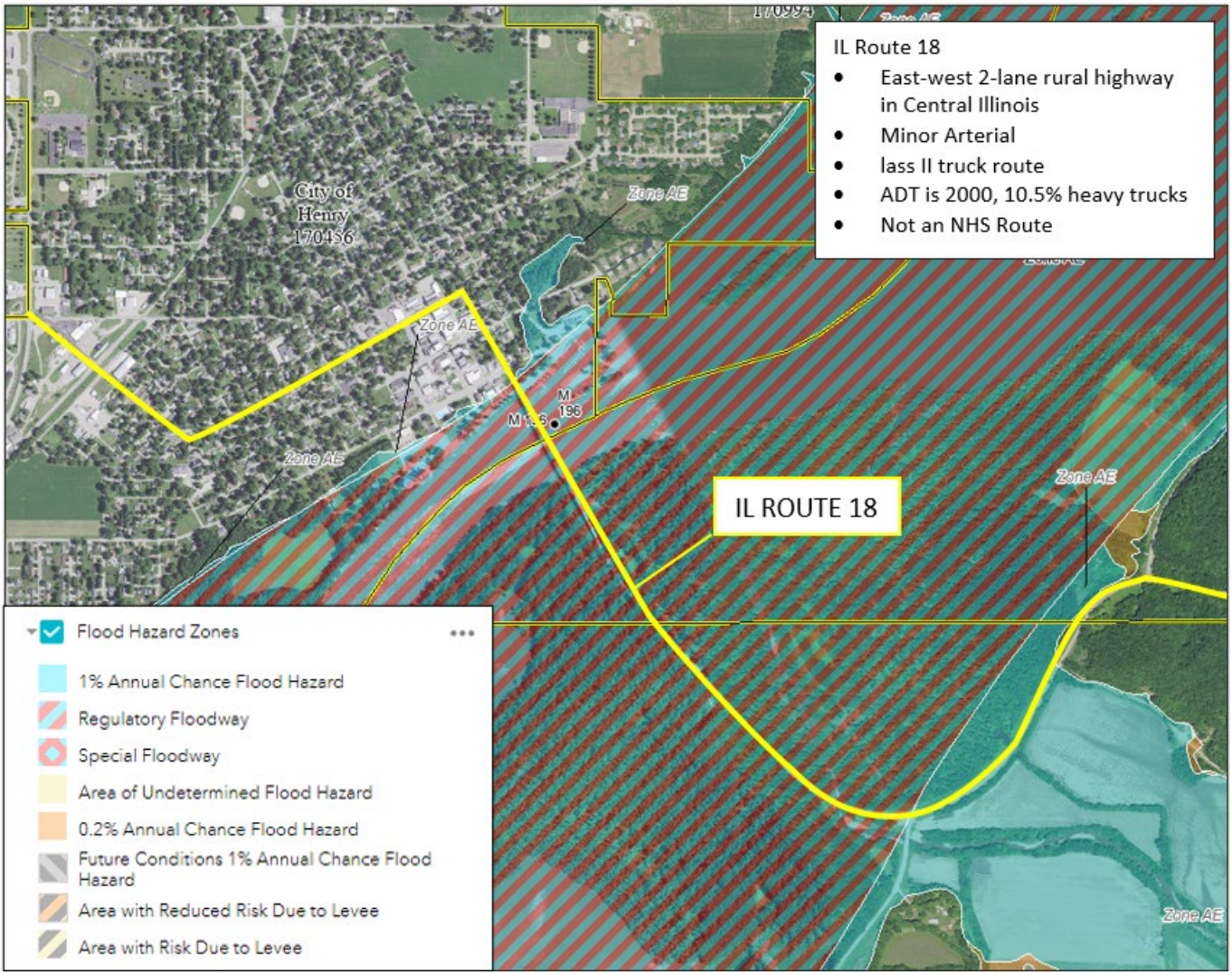


Figure 2. Illinois Route 18 – Flood Hazard Zones

The scope of the project is the replacement of the Illinois River bridge, but the study includes assessing the profile east of the bridge since all of IL 18 between the existing Illinois River bridge and IL 26 is in the floodplain and the Department has records that we have closed highway at this location several times since 2009 due to high water elevations along IL 18. Further, representatives serving on the Community Advisory Group for the project brought the flooding issue to our attention at early coordination meetings. A goal of "reducing flooding" was included in the approved Purpose and Need for the study.

Purpose and Need:
The purpose of the project is to accommodate IL 18 traffic through the project area and across the Illinois River on a transportation system that is structurally sound, meets current design standards, provides a safe crossing for the public, reduces flooding along IL 18, supports regional connectivity needs, and meets the needs of river traffic.

Design Criteria
A determination was previously made that IL 18 at this location does not meet the definition of a critical facility as defined by Executive Order 2006-05, and therefore, the proposed roadway does not need to be reconstructed to the 500-year flood elevation as required for critical facilities constructed within the regulated floodplain. See **Attachment 1.** Since the Executive Order does not apply, IDOT policy should govern. From the IDOT Drainage Manual, for roadways (new construction) which traverse a floodplain, a minimum freeboard of 3-feet must be provided between the 50-year design headwater elevation and the roadway edge of pavement. In addition, for bridges, it is required that a minimum clearance of 2-feet be provided between the 50-year design natural highwater elevation and the low beam elevation.

With proper justification, the low beam clearance and roadway freeboard criteria may be waived if a request for policy waiver is documented, then reviewed and approved by the proper approval authority.

Evaluation of the Existing Infrastructure

Profile grades and elevations

The eastern half of IL 18, from the IL 18/IL 26 intersection to the Illinois River Bridge, is in the regulatory (100-year floodplain). In addition, approximately 3000 feet of IL 26 south of the intersection and 2000 feet of IL 18 east of the intersection are also in the floodplain. The 100-year flood elevation at this location is 461.10.

Sandy Creek flows under IL 26 immediately south of its intersection with IL 18 (SN 062-0058). Sandy Creek also flows under IL 18, immediately west of its intersection with SB IL 26 (SN 062-0037). The low bridge profile elevations are 461.8 (north end) and 457.0 (west end) respectively.

The existing IL River Bridge approach roadway profile grade is essentially flat, ranging from -0.36% to +0.22%. Centerline roadway elevations hover between 457.0 and 457.5 between the existing touch down point to the west end of the IL 18 Sandy Creek Bridge. A 300 LF section of roadway falls just below elevation 457.0 just southeast of the entrance to Duck Ranch. This is this existing low spot. A 350 LF section of roadway rises just above elevation 457.5 just (north) west of the IL 18 Sandy Creek Bridge. Except for the far west end near IL 18 Sandy Creek Bridge, guardrail is present on both sides of the roadway.

See **Attachment 2** for existing elevations at key points within the project study area.
See **Attachment 3** for a table of existing roadway centerline elevations.

Flooding History and Roadway Closures

The District closes IL 18 between the IL River Bridge and the IL 18/IL 26 intersection when water levels approach the shoulder elevation at the existing IL 18 low spot (this corresponds to a river gage reading of about 30.5). When water levels approach the low steel elevation of the Sandy Creek bridge (SN 062-0037), consideration is also given to closing IL

18 to traffic. The District consults with the IDOT Bureau of Bridges and Structures to make the closure determination which considers river velocities and the presence of debris at the bridge. It can be noted that historically, during flood events, Sandy Creek experiences a backwater condition and typically slows to no flow or even a very slow reversed flow. With these very low or negligible velocities, the Sandy Creek bridge has been determined to not require closure even with water 1.5 feet above low steel. Therefore, as mentioned, the concurrent flooding of the roadway historically has controlled the closure requirements of IL 18.

A review of the historical river gage data from the from the National Weather Service website shows that water levels have met or exceeded the existing IL 18 low spot shoulder elevation (~ gage height of 30.5) five times within the past 20 years. Water levels have met or exceeded the IL 18 Sandy Creek Bridge low steel elevation (river gauge 28.8) ten times within the past 20 years.

Recent River Crests at Henry, IL (during the past 20 years)	**Gage Height**	**Elevation**
32.94 ft on 04/22/2013	32.94	458.51
31.62 ft on 05/21/2020	31.62	457.19
31.49 ft on 03/13/2009	31.49	457.06
31.35 ft on 05/06/2019	31.35	456.92
30.98 ft on 09/19/2008	30.98	456.55
30.39 ft on 06/30/2015	30.39	455.96
30.01 ft on 06/01/2019	30.01	455.58
29.78 ft on 01/02/2016	29.78	455.35
29.21 ft on 02/27/2018	29.21	454.78
28.89 ft on 05/19/2009	28.89	454.46

Table 1. Recent River Crests at Henry, Illinois

When IDOT has had the need to close IL 18, the closures have lasted no longer than five days. The Department has no records of major issues arising from the need to close the road leading up to the bridge (and therefore closing the IL River bridge) during these flood events.

Based on initial hydraulic modeling results, elevations corresponding to various flood frequencies at this location are as follows:

Flood Event	Elevation
25-year flood	458.17
Historic Crest (2013)	458.51
50-year flood	459.48
100-year flood	461.06
50-year flood plus 3' freeboard	462.48
500-year flood	463.90

Table 2. Flood Elevations for Various Flood Events

Existing Condition of Sandy Creek Bridges and Replacement Schedule

The timing for future replacement of the Sandy Creek Bridges is unknown. However, it should be noted that the District recently completed a bridge preservation project (in 2019) on the 48-year old IL 18 Sandy Creek Bridge which included a thin concrete deck overlay, joint and bearing replacements and steel beam painting. Per TAMP, the goal for this type of preservation would be to extend the acceptable condition of the bridge for 25-years. The IL 26 Sandy Creek Bridge has not yet had any preservation treatment, though it is a newer structure (constructed in 1993) and is currently in an acceptable condition (current ratings are deck = 5/superstructure = 5/substructure = 7).

Evaluation of the Proposed Infrastructure

Evaluation of a proposed resilient facility

Comparing the elevations of the existing facility with the design criteria for a resilient transportation facility showed that the significant work beyond the IL 18 River Bridge replacement would be required. To address the minimum 3-foot freeboard from the edge of pavement to the 50-year design headwater elevation would require reconstruction and raising of the roadway extending into the east and south legs of the IL 26 intersection and totaling approximately 8000 LF of roadway raised as much as 8.541 feet. Additionally, both Sandy Creek bridges would need to be raised 5-7 feet to meet the minimum 2-foot clearance between the low beam elevation and the 50-year design natural highwater elevation.

Replacement of the Sandy Creek bridges and the roadway reconstruction would require a further study to determine the preferred alignment and environmental impacts. An alignment study for the entire facility will need to be undertaken to minimize environmental impacts and to evaluate construction staging opportunities in order to minimize disruption to the travelling public. The additional work described above may have significant environmental impacts (including impacts to Duck Ranch – a section 4(f) property owned by IDNR – and an archeological site immediately adjacent to the IL 18 Sandy Creek Bridge). Adding this to the scope of work to the IL River Bridge project at this time could add up to 2 years to the NEPA process.

Neither the District nor the public would favor the delay of the IL 18 River Bridge replacement project to complete a more comprehensive study. The river bridge has reached the end of its servable life and is in need of replacement. Construction of the river bridge is currently included in the MYP. The other two structures are not in need of replacement at this time; nor is construction for these two structures included in the current MYP. So even if the more comprehensive study was to be completed at this time, the project would be completed in phases: the river bridge would be constructed first, then the rest of the system would be constructed later once funding becomes available.

The District proposes a separate study for the reconstruction and raising of the two bridges across Sandy Creek, as well as raising the intersection of the IL 18 / IL 26 and the approach legs.



Figure 3. Illinois Route 18 – Proposed Resiliency Study Area

Improvement Options considered for IL 18 between the Sandy Creek Bridge and the new IL 18 River Bridge

Reconstruction of the two Sandy Creek structures and reconstruction of the IL 18 / IL 26 intersection and its south and north approach legs are outside of the scope of this major river bridge replacement project study. Further, neither the bridges nor the intersection are currently funded for construction.

While improvement of the entire transportation facility within the floodplain at this location is out of scope, consideration was given to options for improving the IL 18 between the Sandy Creek Bridge and the new IL River Bridge in conjunction with the bridge replacement project, to reduce the flooding along IL 18 between the new river bridge and the intersection of IL 18/IL 26.

Study ensued to determine the recommended east bridge approach profile, between the new bridge and the IL 18 Sandy Creek Bridge. A range of profiles were evaluated:

- **50-year plus 3' freeboard**
  ~ Elevation 462.5
  Since IL 18 is not a critical facility, this would be policy for new construction. This is the upper limit of the profile study.
- **50-year (no freeboard)**
  ~ Elevation 459.5
  This is an intermediate elevation/flood frequency for consideration. It matches the policy for bridges and roadways, without the required 3' freeboard. With proper justification, the roadway freeboard criteria may be waived by the proper approval authority.
- **25-year**
  ~ Elevation 458.2
  This is an intermediate elevation/flood frequency for consideration. It closely matches the elevation of the IL 18 Sandy Creek Bridge, which would be the east termini for this work.
- **Designed overlay**
  ~ Elevation 457.5 = existing profile plus 4.5"
  This is the lower limit of the profile study.
- **Do Nothing**
  Tie the new bridge approach pavement to the existing roadway as quickly as possible adherent to policy maximum vertical profile grade lines (3%) and minimum horizontal curves.

- **50-year plus 3-feet freeboard**
  50-year (no freeboard)
  25-year

  These three options would require placing additional embankment off of the existing IL 18 alignment in order to support the proposed profile raise, to provide policy lane widths and shoulders, policy side slopes, and to allow for staged construction of IL 18. Additional right-of-way will be required, and additional environmental impacts will be realized. Right-of-way and environmental impacts have not yet been quantified, though we know that there is potential to impact 4(f) parkland, wetlands, and/or archeological sites. Until a detailed alignment study is

undertaken for the entire IL 18 /IL 26 systems within the floodplain, the District is not in a position to determine the best alignment for this section of roadway between the new IL River Bridge and the Sandy Creek Bridge.

The table below details these three options. Profiles are included in **Attachments 4, 5** and **6**.

Design Storm	50-year plus 3' Freeboard	50-year (no freeboard)	25-year
Minimum Profile Elevation	Elevation 462.5	Elevation 459.5	Elevation 458.5
Review of Historic Crests	The historic river crest elevation at this location 45851 (2013) is lower than the proposed design elevation	The historic river crest elevation at this location 458.51 (2013) is lower than the proposed design elevation. This historical data could be used as justification to waive the roadway	The historic river crests at this location shows that only two record flood events since 1943 would have exceeded the proposed profile, thus causing IOOT to close the approach roadway and bridge. (1)
Reference Drawing	Attachment #4	free board criteria.	Attachment #6
Is Desired Level of Flood Protection Achieved?	No. Both Sandy Creek structures, the IL26/IL 18 intersection, and about 5000 feet of the approval roadways are all lower than 462.5. The new low spot will be at the west end of the IL 18 Sandy Creek Bridge. When future flooding at this Sandy Creek bridge occurs, the new IL River Bridge will be shut down as well.	No. The IL 18 Sandy Creek structure, the IL26/IL 18 intersection, and some of the approval roadway are lower than 459.5. The new low spot will be at the west end of the IL 18 Sandy Creek Bridge. When future flooding at this Sandy Creek bridge occurs, the new IL River Bridge will be shut down as well.	No. The west end of the IL 18 Sandy Creek structure is slightly lower than 458.2, thus becoming the new low spot. When future flooding at this Sandy Creek bridge occurs, the new IL River Bridge will be shut down as well.
Footnote (1): Note that consideration is also given to cJosing IL18 to traffic when water levels approach the low steel elevation of the Sandy Creek Bridge (at about elevation 456.5.)			

Table 3. Summary of Options for Raising the IL 18 Embankment

None of the above options meet the purpose and need of "reducing flooding" since none of the options raise the IL 18 Sandy Creek Bridge. While there will be some minor flood reduction by raising the roadway profile between the Sandy Creek Bridge and the new river bridge, once the water elevation approaches the shoulder elevation at the bridge, both the Sandy Creek Bridge, the new IL River Bridge and the highway in between will be closed to traffic. Consideration is also given to closing IL 18 to traffic when water levels approach the low steel elevation of the Sandy Creek Bridge (at about elevation 456.5.

Further, for all of the above options, raising the profile of IL 18 between the new river bridge and the Sandy Creek Bridge ahead of raising the Sandy Creek bridge would relocate the low profile elevation closer to / or at the bridge which is not preferred. Operations prefers to keep the roadway lower than the IL 18 Sandy Creek Bridge so that the roadway floods first.

These options are not recommended as part of the Illinois River Bridge Project.

- **Policy Overlay**
  This option would include an additional 1540' length of improvement between the new bridge "touch down point" and the Sandy Creek Bridge. A policy HMA overlay would raise the existing roadway profile to an average elevation of 457.5. See **Attachment 7**.

  A hydraulic analysis was completed to determine the approximate flood frequency that corresponds to a low elevation of 457.5. The results of the model show that the 457.5 elevation corresponds to about a 14-year flood frequency. The existing roadway low elevation corresponds to about a 10-year flood frequency.

  While this option would provide some minor reduction in flooding, it will still be prone to flooding and short-term road closures since consideration is also given to closing IL 18 to traffic when water levels approach the low steel elevation of the Sandy Creek Bridge (at about elevation 456.5.) Public perception would not be favorable.

  This option is not recommended as part of the Illinois River Bridge Project.

- **Do Nothing**
  As detailed above, the study of the east profile options between the new IL River bridge and the Sandy Creek Bridge showed that only a miniscule reduction in flooding along IL 18 east of the new river bridge can be realized until the IL 18 and IL 26 bridges over Sandy Creek are raised. Therefore, until additional study is completed to look at a resilient facility flood for the entire state transportation system within the floodplain at this location, it was determined that it is best to simply tie the new roadway approach pavement into the existing roadway profile as soon as possible, while ensuring as much of the newly constructed roadway is higher than the existing roadway.

  The "Do Nothing" option is recommended for the Illinois River Bridge Project.

<u>Proposed Profile</u>
The crest of the new bridge will be higher than the existing crest (approximately four feet higher) due to coast guard navigational channel clearance requirements. The east roadway approach grade will also be flatter (3%, per policy) than the existing approach grade of 5%. This results in a new profile that will "touch down" (tie into the existing profile) about 950-feet further east than it does now, and a profile that is significantly higher than the existing one. All but about the last 500 feet of new roadway approach will exceed the minimum policy elevation (corresponding to 3-feet of freeboard above the 50-yr design headwater elevation). The remaining 500 feet dips below the policy elevation as it transitions back to the existing roadway profile. See **Attachment 8**.

Bridge Opening

A hydraulic analysis for the new bridge was completed to ensure that the new bridge opening will accommodate a future raising of the entire roadway system within the floodplain to an elevation of 3' above the 50-yr existing water surface elevation. See **Attachment 9**. While a 1,910 feet 10-span bridge has been shown hydraulically adequate for the bridge replacement as currently proposed, accommodating the future raise condition for IL-18 roadway warrants the addition of 2 spans of 144 feet on the east approach of the bridge as part of the current replacement project. In a future road raise scenario, this additional opening, combined with wide-area grade lowering on the east overbank, will allow flow conditions that can compare favorably with the 2023 existing conditions and meet no rise criteria.

Conclusion

Based on the study of the east profile options, D4 staff recommends that we should not make improvements to the east approach roadway beyond the "touchdown" point as part of the bridge replacement project for the reasons listed above. Instead, D4 recommends that the proposed east bridge approach roadway follow the 3% policy profile grade until it ties into the existing vertical profile. Both the horizontal and vertical alignments will tie into the existing roadway at about the same location (or as close as practical).

In addition, to address resiliency of the highway network at this location, the District proposes a separate Phase I Engineering Study for the reconstruction and raising of the two bridges across Sandy Creek, and for raising the intersection of the IL 18 / IL 26 as well as the roadway approach legs.

Concurrence with this strategy from the Bureau of Design and Environment and FHWA was received in March 2023. It was further determined that the Purpose and Need does not need to be revised, since "reducing flooding along IL 18" is considered a non-critical element, as opposed to a desirable or supportive element, of this IL River bridge replacement project.

Critical Facility Determination
As defined by Executive Order 12-06

IL 18 between IL River Bridge and IL 29
Marshall and Putnam Counties

Background

IDOT is undergoing a study of a bridge replacement for the IL 18 Bridge over the Illinois River. The approach roadway on the west side of the bridge lies within the municipal boundary of Henry Illinois and is outside of the regulated floodplain. The approach roadway on the east side of the bridge is in rural Marshal and Putnam Counties, and approximately 4000 feet of the existing IL 18 pavement/embankment leading to the bridge lies within the regulated floodplain, and more specifically within the regulated floodway.

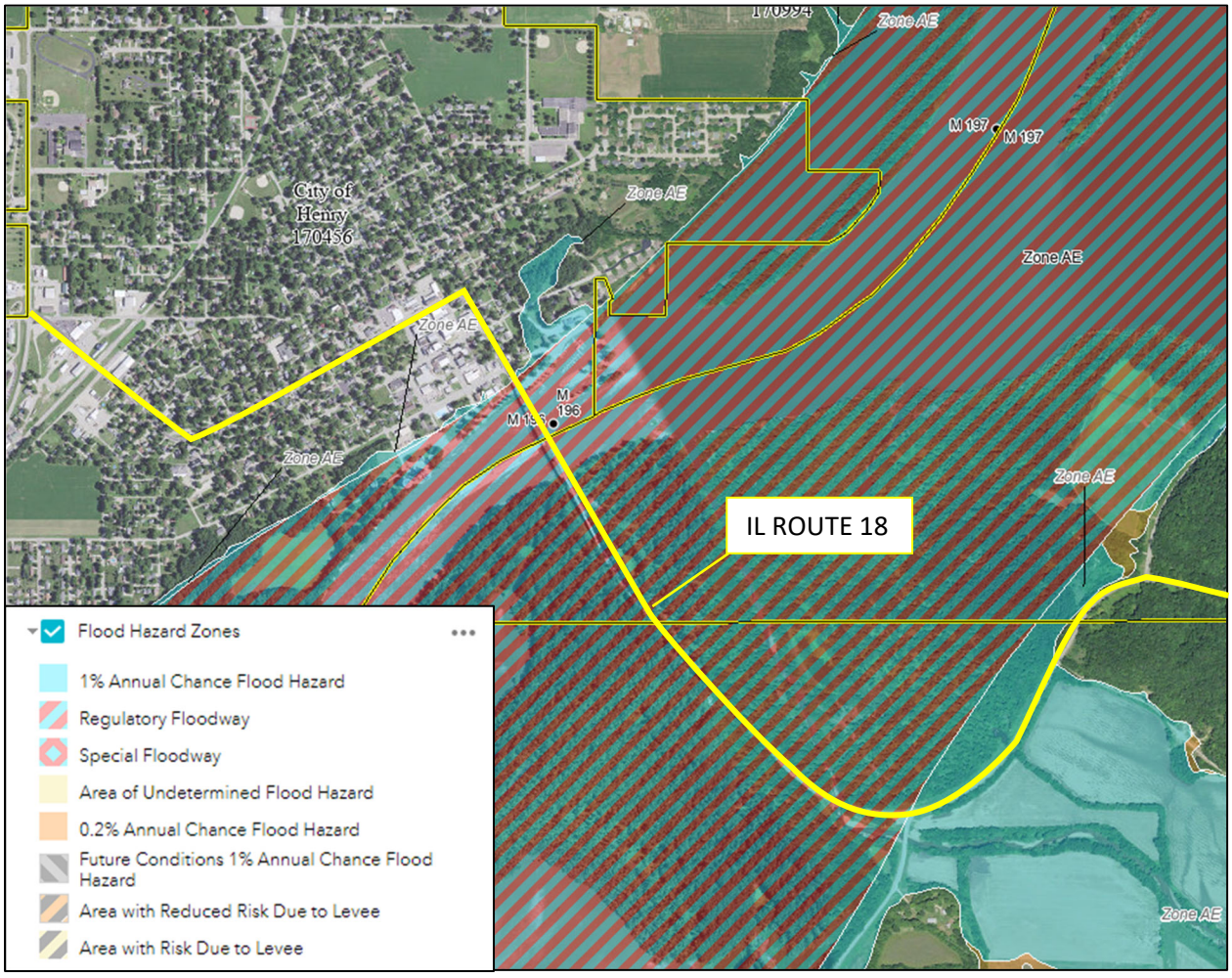


Figure 1. Illinois Route 18 – Flood Hazard Zones

Executive Order 12-06 requires that critical facilities be reconstructed above the 500-year flood elevation. The IL 18 replacement structure is not a concern since meeting USCG navigational requirements will keep the new bridge well above the 500-year flood elevation. However, an assessment is needed to determine if the IL 18 roadway east of the IL River Bridge meets the definition of a critical facility as defined by Executive Order 12-06 since a portion of t lies within the regulatory floodplain. The order defines that Major Highways and Bridges are critical facilities.

Context

- IL 18 is an east-west 2-lane rural highway in Central Illinois
- IL 18 is classified as Minor Arterial
- IL 18 is designated as a Class II truck route
- Current Average Daily Traffic (ADT) is 2000 at the project location, with about 10.5% heavy trucks
- IL 18 is not part of the National Highway System (not an NHS Route)
- IL 18 is approximately 38 miles in length and begins on the west side of Henry, IL at IL 29 and ends about 9 miles east of Streator, Illinois, where it terminates at IL 17.
- IL 18 provides a connection to I-39 near its mid-point.
- IL 18 provides direct access to the following communities:
    - Henry, IL 2020 population of 2,187
    - Magnolia, IL 2020 population of 248
    - Streator, IL 2020 population of 13,031

Assessment

Although IL 18 is a important transportation link in Marshall and Putnam Counties, it is not part of the NHS system. This Minor Arterial, with an average daily traffic of 2000, serves a limited population and limited industry. Should IL 18 between the bridge and IL 26 be closed due to flooding, the rural area local traffic to the bridge is served by the existing highway network. The north-south State Route IL 26 is on the east side of the river and the north-south State Route IL 29 is on the west side of the river. Alternate river crossings include IL 17 at Lacon, Illinois, which is approximately 7 miles downstream, and I-180 which is approximately 11 miles upstream.

Much of IL 18 between the existing Illinois River bridge and IL 26 is currently below the 50-year flood elevation. Based on data from the National Weather Service website,
water begins flooding parts of Illinois Route 18 between Henry and Illinois Route 26 at gauge height of 32.0, and this elevation has been reached or exceeded four time since 1943. A recent review of historic data and the roadway profile indicate the water elevation was sufficient to close the IL 18 3 additional times since 2009. The Department has no records of major issues arising from the need to close the road leading up to the bridge (and therefore closing the bridge) during these flood events.

Historic Crests at Henry, Illinois

	Date	Gauge Height	Elevation (NGVD 29)
1	4/22/2013	32.94	458.82
2	3/22/1979	32.67	458.55
3	5/23/1943	32.2	458.08
4	3/7/1985	32.02	457.90
5	5/21/2020	31.62	457.50
6	3/13/2009	31.49	457.37
7	5/6/2019	31.35	457.23

For a roadway not considered a critical facility as defined by Executive Order 12-06, IDOT policy requires the minimum roadway elevation within a regulatory floodplain to be constructed to the 50-year elevation with three feet of freeboard. At this location, 50-year plus 3-feet of freeboard equals elevation 462.5 This proposed elevation would have eliminated all of the aforementioned road/bridge closures for the historic record flood events.

Flood Event	Elevation	Corresponding Gauge Height
Flooding begins on parts of IL 18 between IL River Bridge and IL 26 (per NWS website)	457.88	32
50-year flood	459.50	33.62
100-year flood	461.10	35.22
50-year flood plus 3-feet freeboard	462.50	36.62
500-year flood	463.90	38.02

Conclusion

IL 18 does not meet the definition of critical facility as defined by Executive Order 12-06, and therefore, the proposed roadway does not need to be reconstructed to the 500-year flood elevation.

Submitted

_____ _____
Kensil Garnett, IDOT Region 3 Engineer Date

Concurred

_____ _____
Jack Elston, Bureau Chief of Design & Environment Date

Concurred

_____ _____
Director, IDNR - Office of Water Resources Date

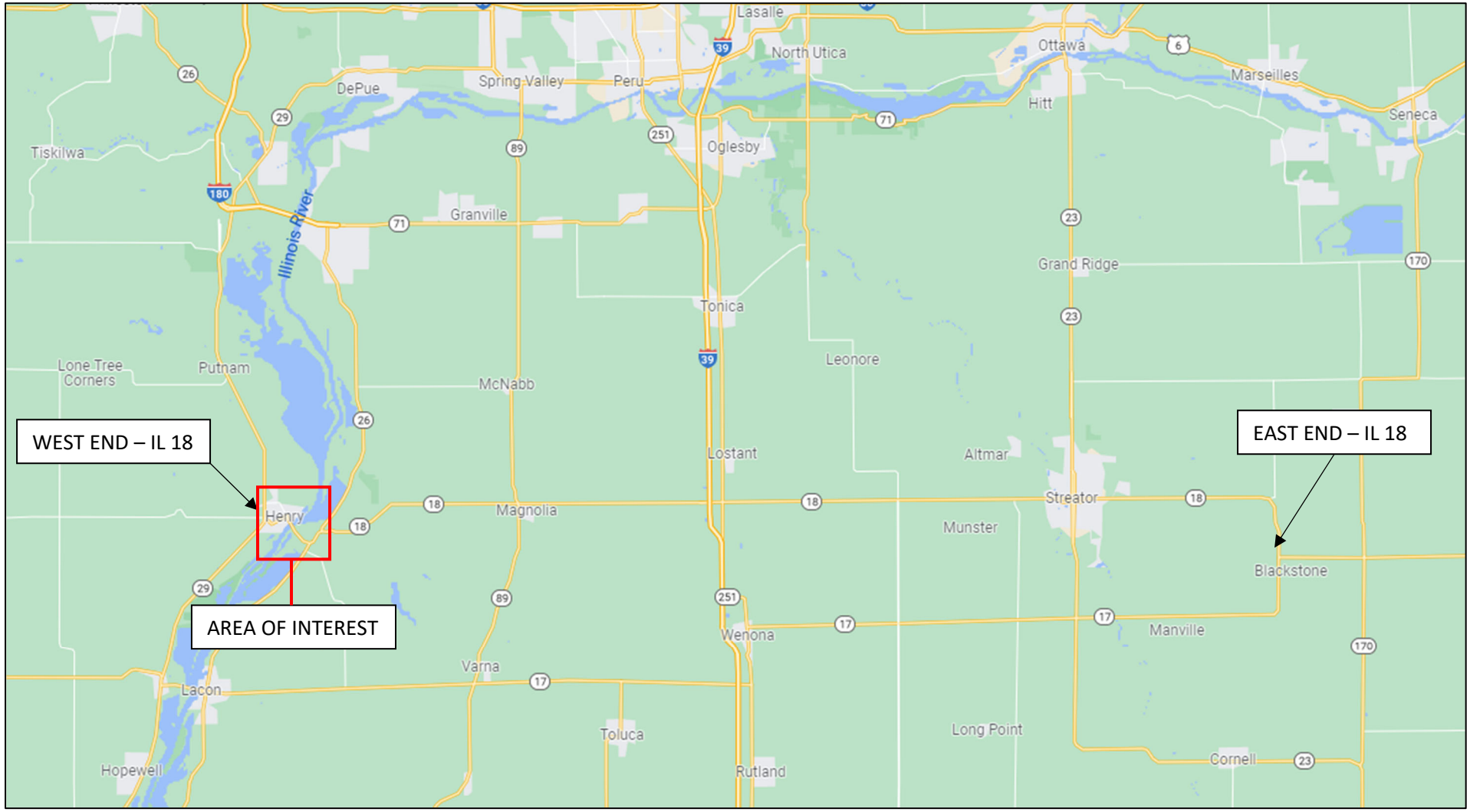


Figure 2. Illinois Route 18 – Location Map

Attachment 2

Flood Event	Elevation
25-year flood	458.17
Historic Crest (2013)	458.51
50-year flood	459.48
100-year flood	461.06
50-year flood plus 3' freeboard	462.48
500-year flood	463.9

Floodplain extends ~2000 feet east; roadway elevations below 50-yr plus 3' entire length

~458.7'

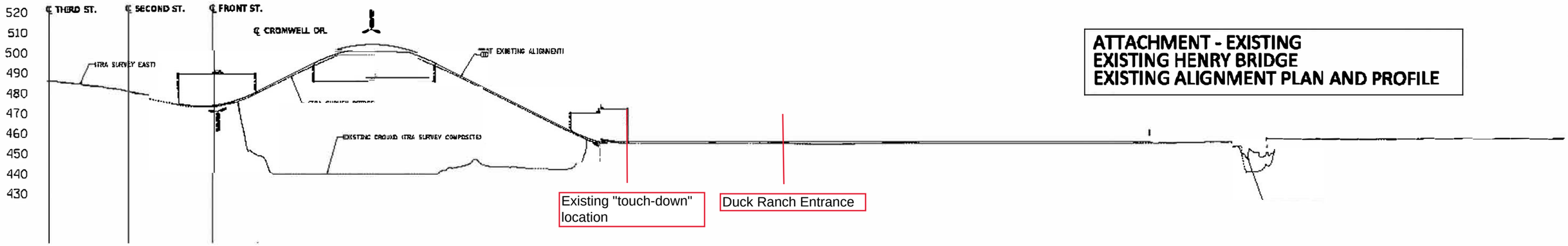
SN 062-0037
West = 457.9
East = 458.4

SN 062-0058
West = 461.8
East = 462.7

Floodplain extends ~3000 feet south; roadway elevation is below 50-yr plus 3', and hovers at ~ Elev. 462.

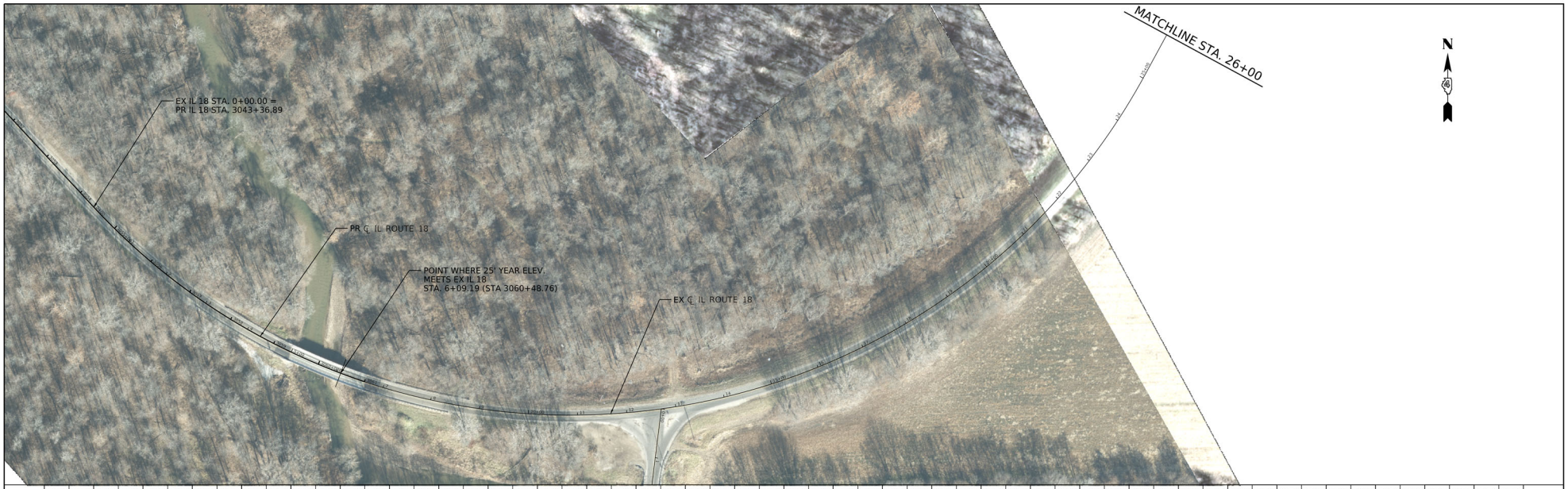
Existing "touch-down" location

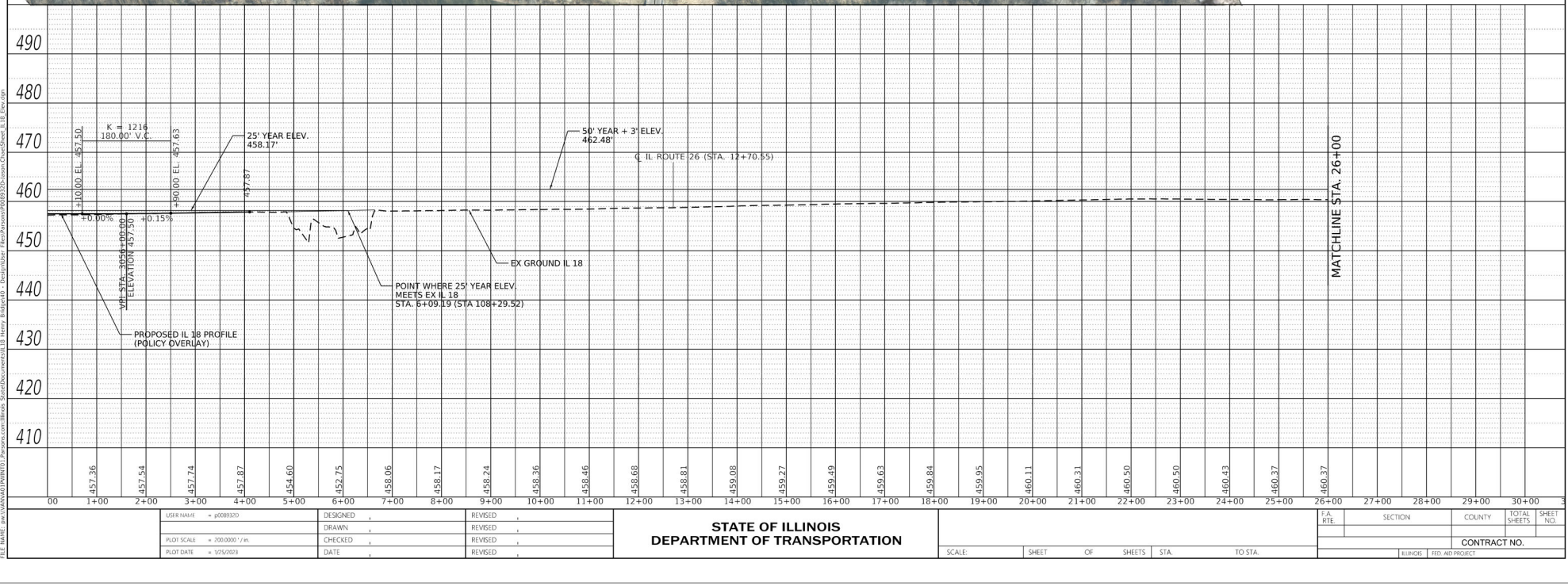
Duck Ranch Entrance



ATTACHMENT - EXISTING
EXISTING HENRY BRIDGE
EXISTING ALIGNMENT PLAN AND PROFILE

Attachment 2





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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

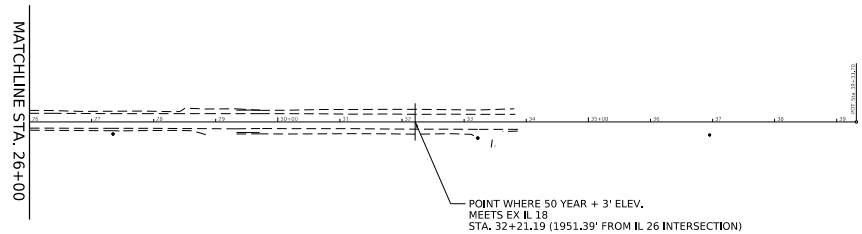
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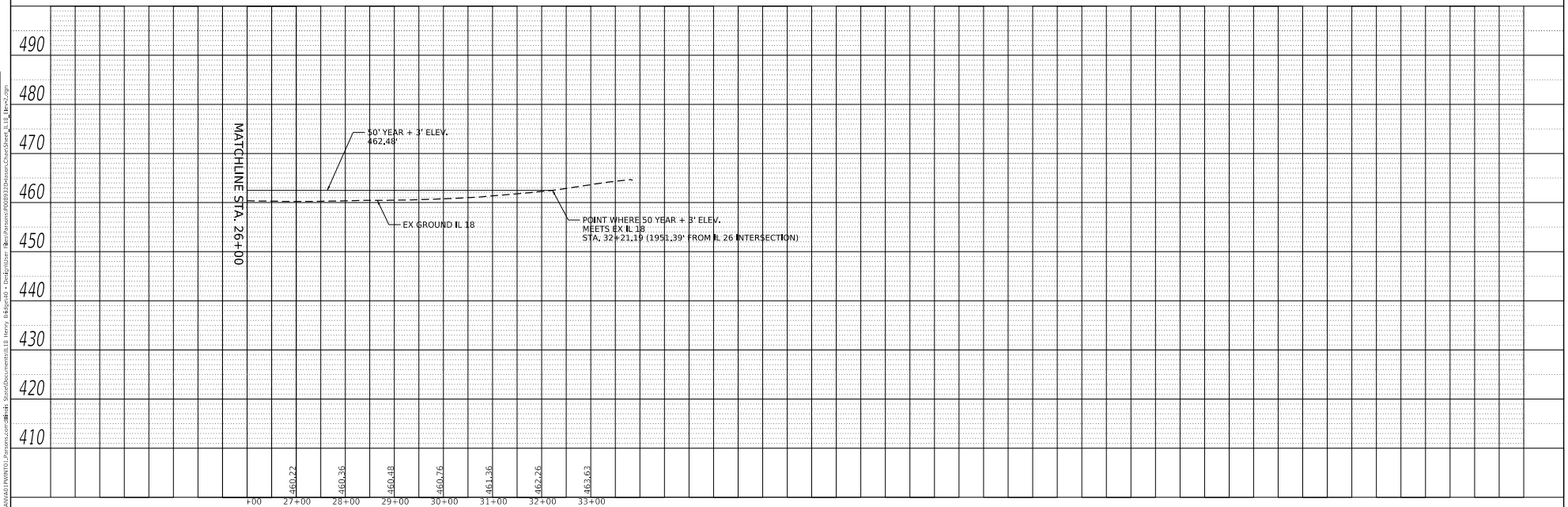
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

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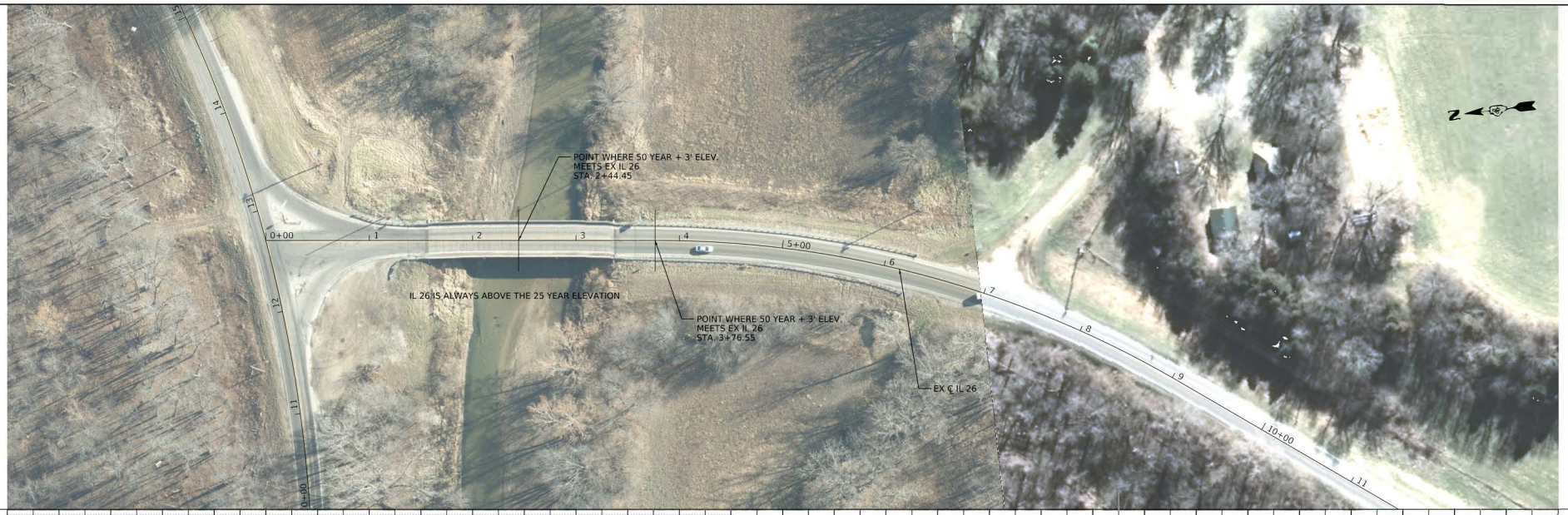
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

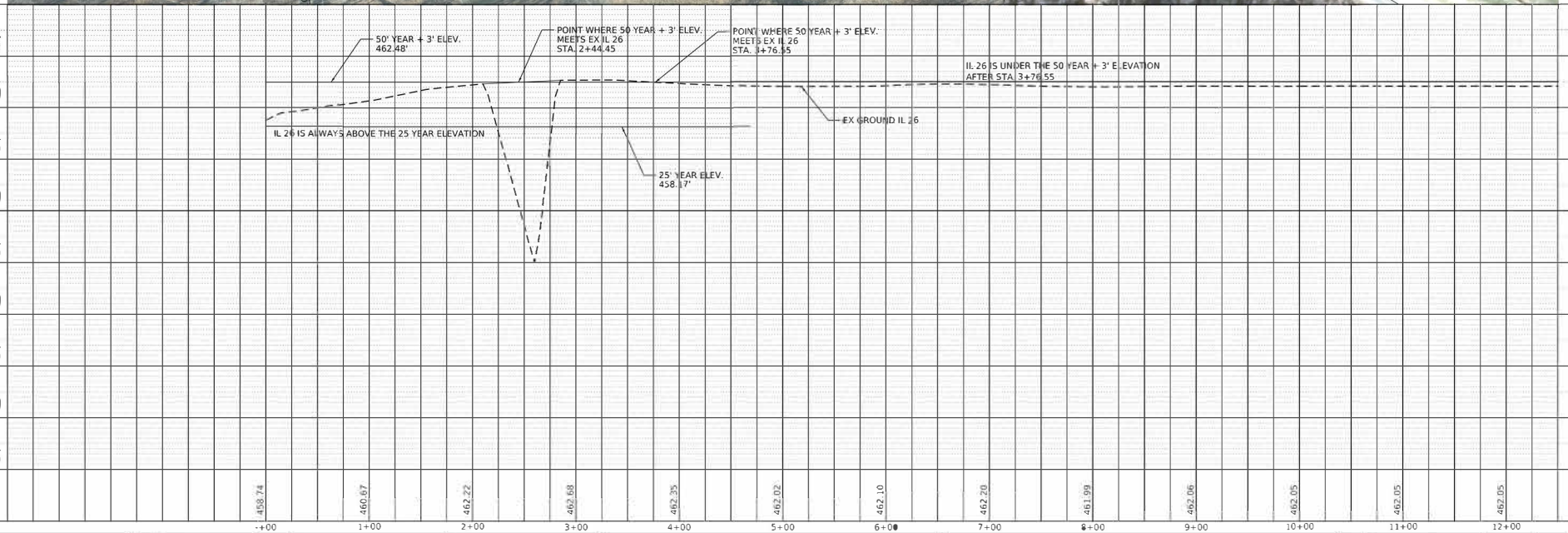
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F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS | FED. AID PROJECT





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NOTE BOOK
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E.M. NOTED
NOTE BOOK
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PLOT DATE = 3/26/2024	DATE	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SCALE | SHEET OF SHEETS | STA. | TO STA.

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

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Attachment 3

IL Route 18, east of the Illinois River Bridge

Existing Roadway Elevations and Profile Grades

Ex. Station	Ex. Elevation	Profile Grade	Notes		Ex. Station	Ex. Elevation	Profile Grade	Notes		Ex. Station	Ex. Elevation	Profile Grade	Notes
77+00	457.54		Existing Bridge Touchdown		90+00	457.26	0.08%			103+00	457.33	0.08%	
77+50	457.36	-0.36%			90+50	457.27	0.02%			103+50	457.42	0.18%	
78+00	457.29	-0.14%			91+00	457.32	0.10%			104+00	457.52	0.20%	
78+50	457.33	0.08%			91+50	457.31	-0.02%			104+50	457.58	0.12%	
79+00	457.36	0.06%			92+00	457.26	-0.10%			105+00	457.69	0.22%	*~350 LF profile above 457.50*
79+50	457.3	-0.12%	*~900 LF profile between*		92+50	457.15	-0.22%			105+50	457.78	0.18%	
80+00	457.32	0.04%	*457 and 457.5*		93+00	457.09	-0.12%			106+00	457.86	0.16%	
80+50	457.34	0.04%			93+50	457.1	0.02%			106+50	457.86	0.00%	
81+00	457.37	0.06%			94+00	457.13	0.06%			107+00	457.89	0.06%	IL 18 over Sandy Creek (west end)
81+50	457.37	0.00%			94+50	457.1	-0.06%	*~1600 LF profile between*		107+50			
82+00	457.32	-0.10%			95+00	457.04	-0.12%	*457 and 457.5*		108+00			
82+50	457.29	-0.06%			95+50	457.04	0.00%			108+50			
83+00	457.28	-0.02%			96+00	457.06	0.04%			109+00	458.15		IL 18 over Sandy Creek (east end)
83+50	457.28	0.00%			96+50	457.07	0.02%			109+50	458.08		
84+00	457.23	-0.10%			97+00	457.08	0.02%			110+00	458.15		
84+50	457.2	-0.06%			97+50	457.14	0.12%			110+50	458.23		
85+00	457.14	-0.12%	Duck Ranch (n side)		98+00	457.18	0.08%			111+00	458.25		
85+50	457.02	-0.24%			98+50	457.2	0.04%			111+50	458.29		*~650 LF profile above 458.0*
86+00	456.87	-0.30%			99+00	457.23	0.06%			112+00	458.35		
86+50	456.84	-0.06%			99+50	457.23	0.00%			112+50	458.42		
87+00	456.82	-0.04%	*~300 LF profile below 457*		100+00	457.18	-0.10%			113+00	458.42		
87+50	456.87	0.10%			100+50	457.15	-0.06%			113+50	458.55		
88+00	456.97	0.20%			101+00	457.24	0.18%			114+00	458.66		
88+50	457.04	0.14%			101+50	457.28	0.08%			114+50	458.72		
89+00	457.14	0.20%			102+00	457.25	-0.06%			115+00	458.75		Intersection IL 18 & 26
89+50	457.22	0.16%	Proposed Bridge Touchdown (3%)		102+50	457.29	0.08%						

50-YEAR + 3'

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PLOTTED
GRADES CHECKED
B.M. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.

PROFILE
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RT. OF WAY CHECKED
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BY
DATE

500
490
480
470
460
450
440
430
420
410
400

450.00' V.C.
+74.00 EL. 469.26
+24.00 EL. 463.18
-3.00%
+0.30%
VPI STA. 3034+99.00
ELEVATION 462.51

50' YEAR + 3' ELEV.
462.48'

VPI STA. 3046+46.00
ELEVATION 465.95
+0.30%
-1.09%
+33.50 EL. 465.6
+58.50 EL. 464.73
225.00' V.C.

STA. 3053+21.00
0% CROSS SLOPE

180.00' V.C.
+59.00 EL. 458.20
+39.00 EL. 457.38
-1.09%
+0.18%
VPI STA. 3054+49.00
ELEVATION 457.22

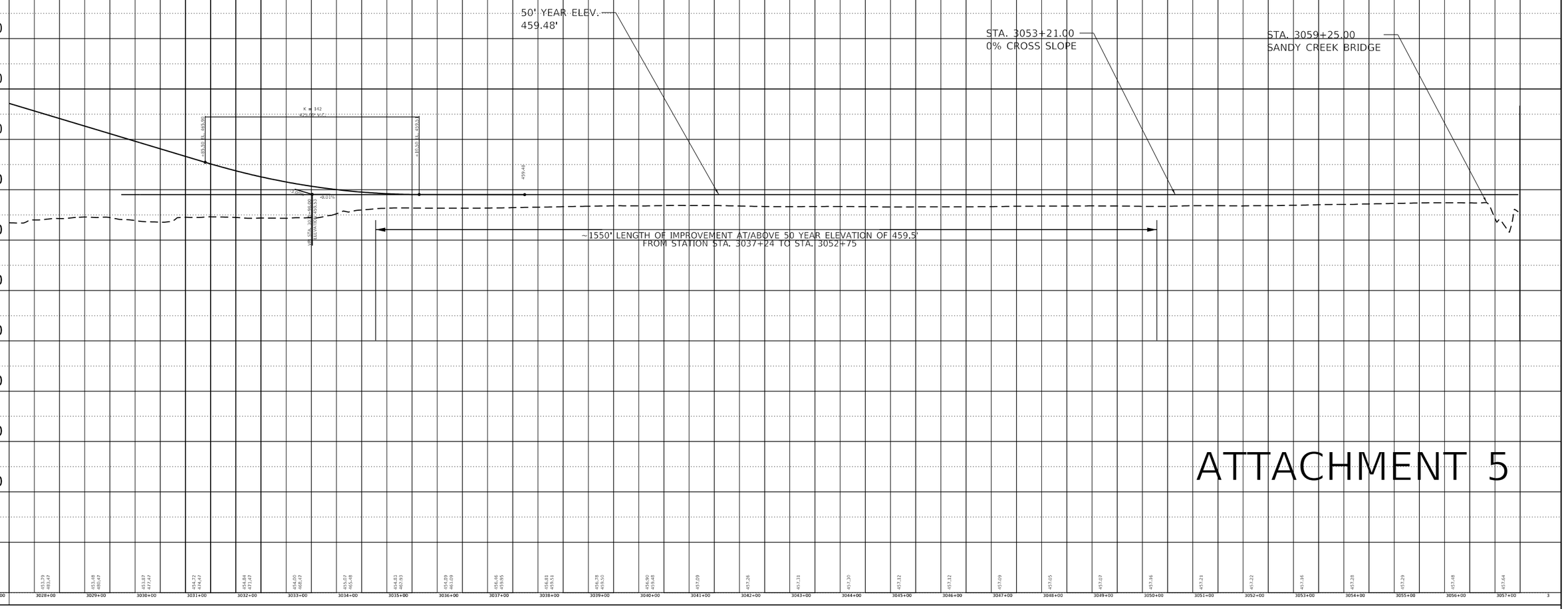
STA. 3059+25.00
SANDY CREEK BRIDGE
457.74

~1225' length of improvement at/above 50-yr + 3' of 462.5, from ~ Station 3037+24 to Station 3049+50.

Attachment 4

| | | |

50-YEAR - TO BE DEVELOPED



ATTACHMENT 5

PLAN
NOTE BOOK
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SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
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GRADES CHECKED
B.M. NOTED
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F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

25-YEAR

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ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
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BY
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PROFILE
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NOTE BOOK
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500
490
480
470
460
450
440
430
420
410
400

25' YEAR ELEV.
458.17'

STA. 3053+21.00
0% CROSS SLOPE

STA. 3059+25.00
SANDY CREEK BRIDGE

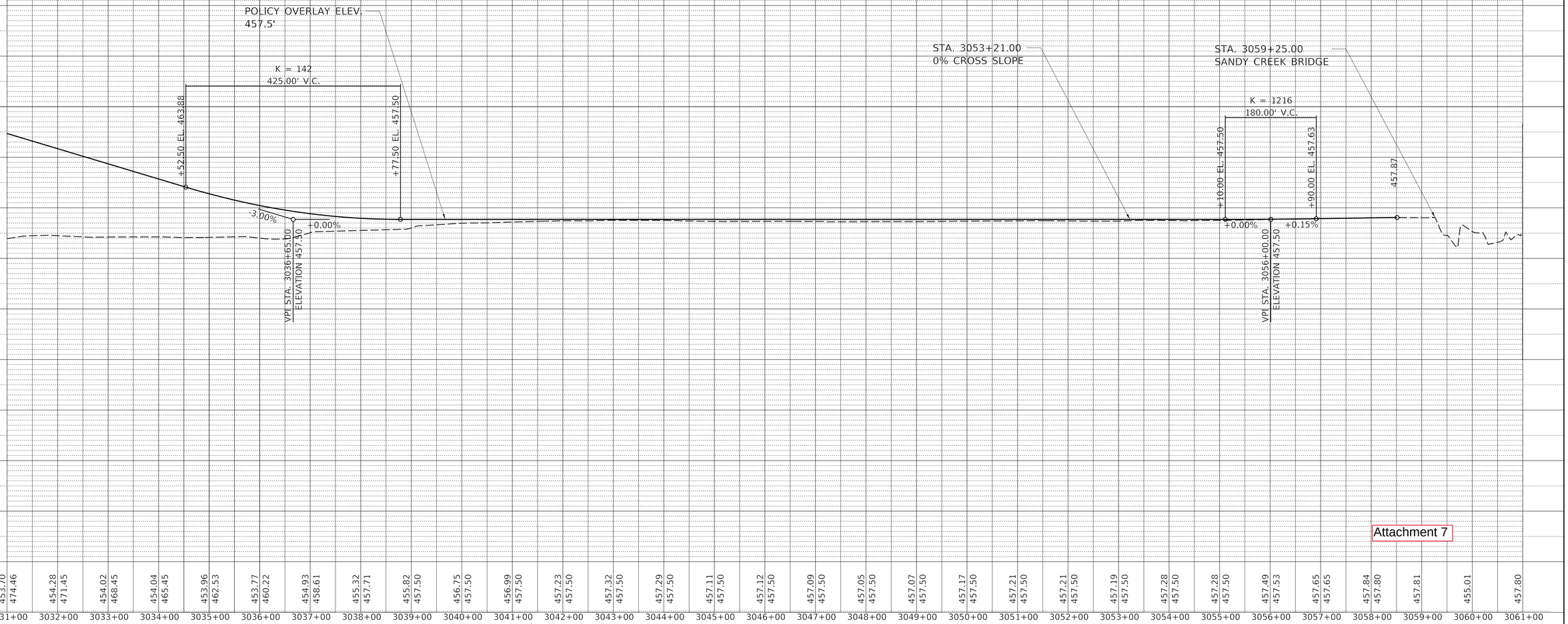
410.00' V.C.
+38.00 EL. 464.32
+48.00 EL. 458.17
-3.00%
+0.00%
VPI STA. 3036+43.00
ELEVATION 458.17

VPI STA. 3057+33.00
ELEVATION 458.17
457.87
+0.00%
-0.26%
+43.00 EL. 458.17
+23.00 EL. 457.94
180.00' V.C.

Attachment 6

| | | |

POLICY OVERLAY



Attachment 7

PLAN
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NOTE BOOK
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BY
DATE

PROFILE
SURVEYED
PLOTTED
CROSS CHECKED
B.M. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
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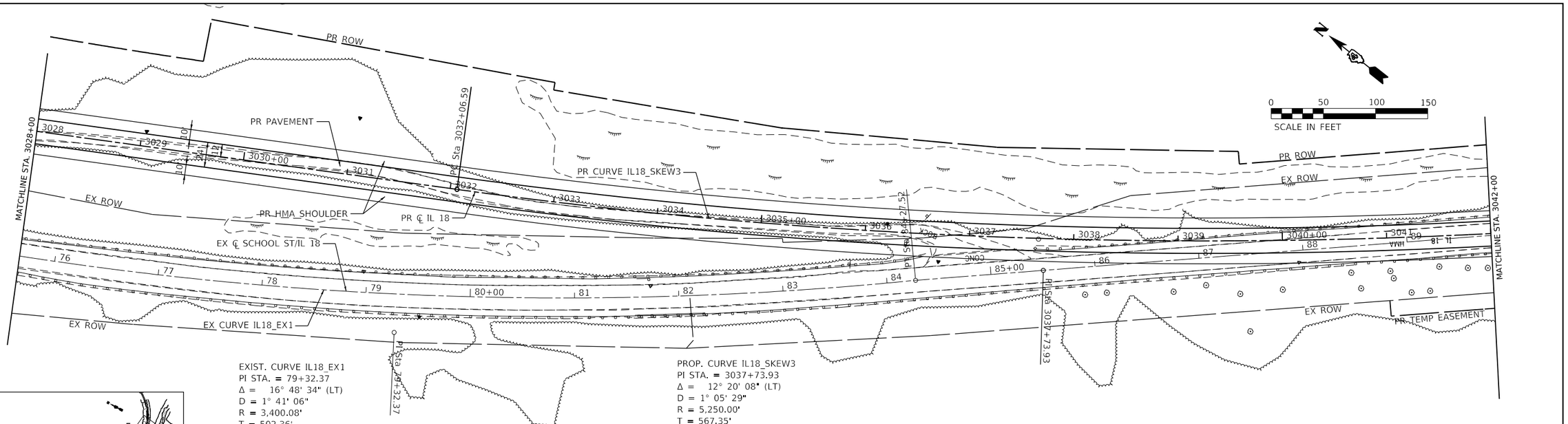
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SCALE: | SHEET OF SHEETS | STA. TO STA.

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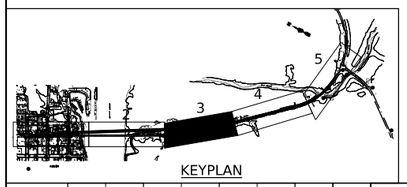
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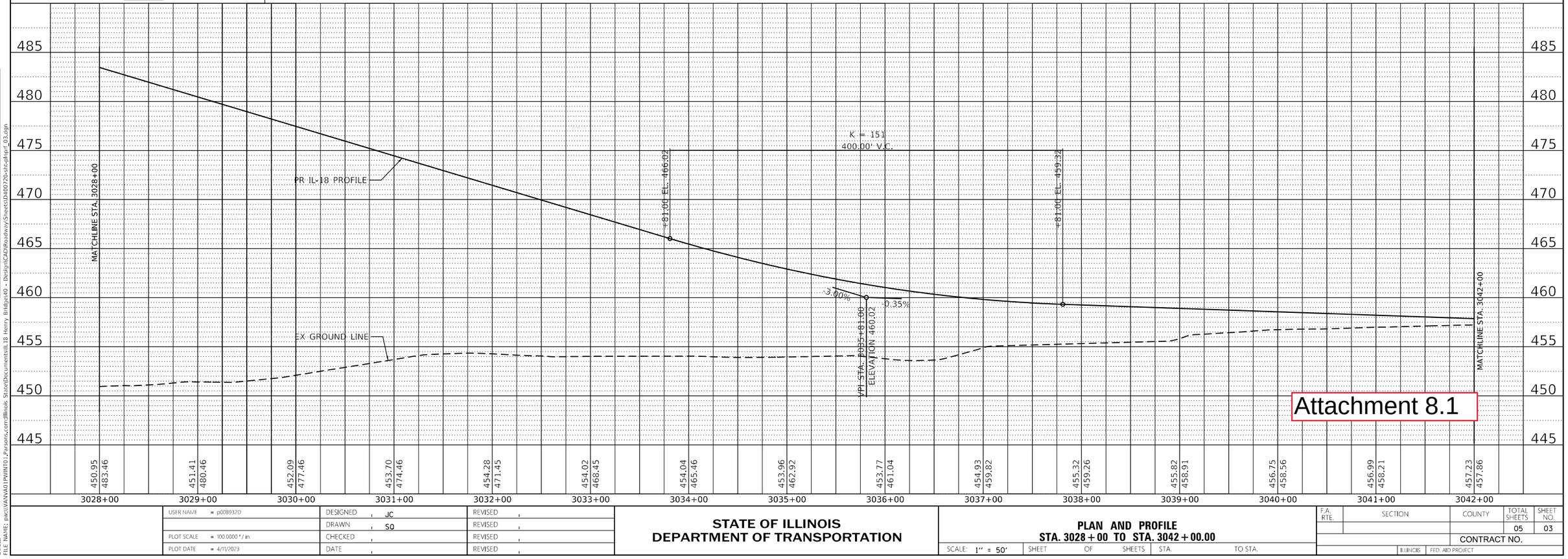
ILLINOIS | FED. AID PROJECT



EXIST. CURVE IL18_EX1
PI STA. = 79+32.37
Δ = 16° 48' 34" (LT)
D = 1° 41' 06"
R = 3,400.08'
T = 502.36'
L = 997.51'
E = 36.91'
e = ____
T.R. = ____
S.E. RUN = ____
P.C. STA. = 74+30.01
P.T. STA. = 84+27.52

PROP. CURVE IL18_SKEW3
PI STA. = 3037+73.93
Δ = 12° 20' 08" (LT)
D = 1° 05' 29"
R = 5,250.00'
T = 567.35'
L = 1,130.31'
E = 30.57'
e = ____
T.R. = ____
S.E. RUN = ____
P.C. STA. = 3032+06.59
P.T. STA. = 3043+36.89





Attachment 8.1

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PLOT DATE = 4/11/2023	DATE	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PLAN AND PROFILE
STA. 3028+00 TO STA. 3042+00.00

SCALE: 1" = 50' | SHEET OF SHEETS | STA. TO STA.

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

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PROFILE — SURVEYED / PLOTTED / AS-BUILT CHECKED / B.M. NOTED / STRUCTURE NO/ATR'S CHKD / NOTE BOOK / NO. / BY / DATE

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PROP. CURVE IL18_SKEW3
PI STA. = 3037+73.93
Δ = 12° 20' 08" (LT)
D = 1° 05' 29"
R = 5,250.00'
T = 567.35'
L = 1,130.31'
E = 30.57'
e = ____
T.R. = ____
S.E. RUN = ____
P.C. STA. = 3032+06.59
P.T. STA. = 3043+36.89

PROP. CURVE IL18_SKEW4
PI STA. = 3057+77.90
Δ = 28° 41' 36" (LT)
D = 4° 20' 56"
R = 1,317.49'
T = 336.97'
L = 659.79'
E = 42.41'
e = ____
T.R. = ____
S.E. RUN = ____
P.C. STA. = 3054+40.93
P.T. STA. = 3061+00.72

N

0 50 100 150
SCALE IN FEET

END IMPROVEMENTS
STA. 3045+10.88

PR ROW
EX ROW
PC Sta 3043+36.89
PR PAVEMENT
MATCHLINE STA. 3042+00
PR ℄ IL 18
PR CURVE IL18_SKEW3
EX ℄ SCHOOL ST/IL 18
PR TEMP EASEMENT
PR HMA SHOULDER
PC Sta 102+21.69
PR CURVE IL18_SKEW4
MATCHLINE STA. 3057+00

KEYPLAN

K = 889
180.00' V.C.
+68.00 EL. 457.63
+48.00 EL. 457.18
457.09
PR IL 18 PROFILE
-0.35%
0.15%
VPI STA. 3043+58.00
ELEVATION 457.31
EX GROUND LINE

457.23 457.86 457.32 457.52 457.29 457.27 457.11 457.11 457.12 457.09 457.05 457.07 457.17 457.21 457.21 457.19 457.28 457.28 457.49 457.65

3042+00 3043+00 3044+00 3045+00 3046+00 3047+00 3048+00 3049+00 3050+00 3051+00 3052+00 3053+00 3054+00 3055+00 3056+00 3057+00

Attachment 8.2

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PLOT DATE = 4/13/2023	DATE	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PLAN AND PROFILE
STA. 3042+00.00 TO STA. 3057+00.00
SCALE: 1" = 50' SHEET OF SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			05	04
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

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NOTE BOOK
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STRUCTURE NOTATNS CHKD
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222 S Riverside PL, Ste 2450, Chicago, IL 60606
Direct: +1 312.930.5264 / parsons.com

September 5, 2023

Ms. Nicole Fayant, PE
Illinois Department of Transportation
401 Main St.
Peoria, IL 61602

RE: Route FAP 653 (IL-18)
Section (104B-D) BR
Marshall County
Job No. P-94-007-20
PTB No. 195-038
Phase I- IL-18 Henry Bridge. Hydraulic Accommodation of Future Road Raise

Inclusions:
Attachment 1- Site Plan
Attachment 2- HEC-RAS Results Table
Attachment 3- HEC-RAS Cross-Sections
Attachment 4- Approximate Excavation Area (2-Span Lengthening)
Attachment 5- Excavation with Duck Ranch Access Reconstruction

Dear Ms. Fayant:

Following selection of a preferred alternate for the subject project, as the Phase I engineering effort was advanced toward Design Approval, concerns surrounding hydraulic performance emerged. The first was recognition of the extents and amount of roadway raise that will be required east of the bridge to meet State policy for roadways in a floodplain. The second was concern with permitting the bridge through IDNR Office of Water Resources as Reconstruction; that original assumption was revised to attempt permitting the bridge as New Construction.

Study of implications of both changes led to concern that major changes in the current bridge project may be required to satisfy State policy for roadways in a floodplain at a future time. A meeting between Parsons, IDOT District 4, IDOT Central Office Hydraulics staff, and the IDNR Office of Water Resources was held 6/23/23 to discuss the situation and brainstorm solutions.

Outcomes of that meeting included:

1. Intent to return to permitting the bridge project (alone) as Reconstruction, not New Construction.
2. Make such changes to the bridge project as required to facilitate future permitting of the road raise on a similar basis as Bridge Reconstruction: that the ultimate condition of new bridge and raised road be no more restrictive to flow than the current (2023), pre-project condition.

The purpose of this letter is to present the results of hydraulic analysis of various civil / structural accommodations considered for inclusion to the bridge replacement project, which could facilitate the future IDOT policy road raise project. Pursuit of such accommodations cannot guarantee approval of future IDNR permits for the road raise work. We do however seek to confirm mutual understanding between IDOT and IDNR on how this reach of river performs under the present and future projects. And we seek IDNR concurrence that maximum practicable efforts have been made within the context of the bridge replacement project to facilitate the future road raise project.

The hydraulic criteria associated with a Reconstruction Project are provided in 17 ILL. ADM. CODE CH. 1 SEC. 3700.70 as follows:

1) The reconstruction (including approach roads) shall be no more restrictive to normal and flood flows than the existing bridge or culvert crossing; and

2) Documentation must be provided that the existing crossing has not caused demonstrable flood damage. In the case of public projects, certification by a District Engineer of the Department of Transportation's Division of Highways, a County Engineer (if a Professional Engineer), or a Municipal Engineer (if a Professional Engineer) that the existing crossing has not caused demonstrable flood damage will be adequate documentation.

The hydraulic modeling discussed herein is pursuant to Item #1 above. The requirement described in Item #2 will be addressed via documentation provided by the IDOT to the Illinois Department of Natural Resources' (IDNR) Office of Water Resources (OWR). The hydraulic modeling work discussed herein incorporates comments on the *Intermediate HEC-RAS Modeling Summary* received from the Illinois Department of Transportation (IDOT) on April 14, 2023.

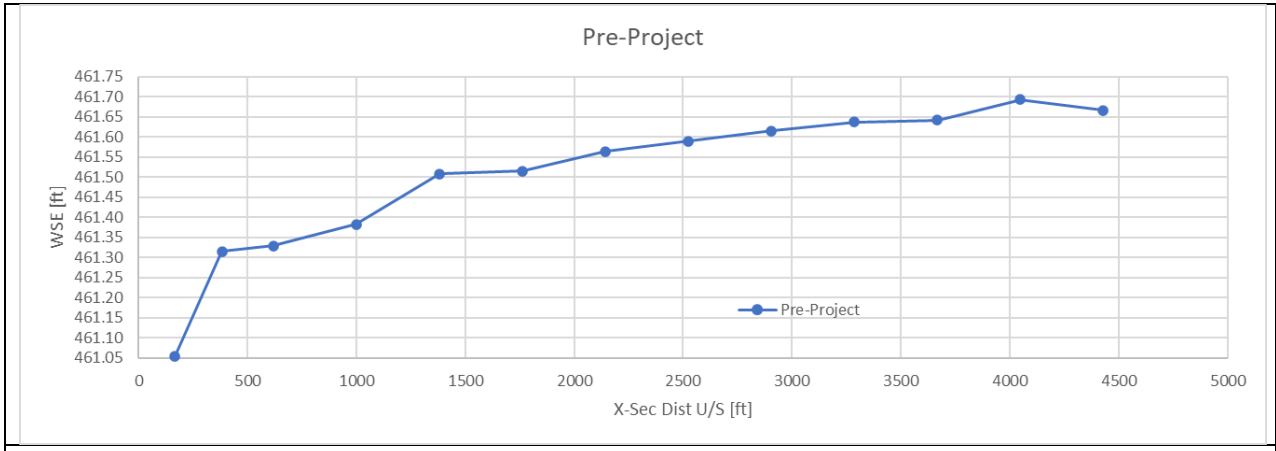
HEC-RAS Modeling Methodology

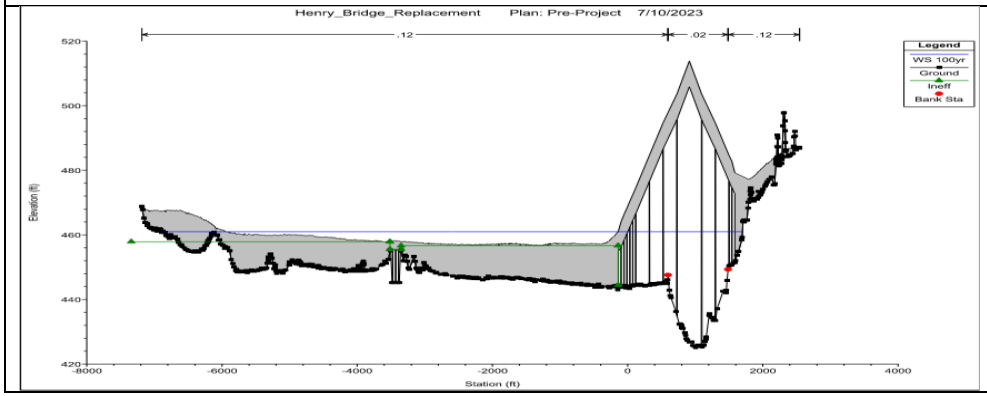
The modeling performed as part of this effort was performed using GeoHECRAS v. 3.1.0.1381 and the HEC-RAS 5.0.7 computational engine. The model includes steady-state flows for the 10, 50, 100, and 500-yr storm events obtained from the Effective Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS). Only the 100-yr flows have been examined as part of this current effort as the 100-yr storm is the source for determining FEMA FIS floodplain impacts. Many physical scenarios were modeled and compared as described below:

1. ***Pre-Project***- Existing bridge is in place, cross-sections have been moved to account for the future modeling of the Proposed Bridge. New LiDAR surface and bathymetry data obtained for the Project have been incorporated into all model cross-sections.
2. ***Proposed Bridge***- A copy of the 'Pre-Project' scenario, with the existing bridge and IL-18 roadway profile and alignment replaced with the new (10-span) bridge and (base) IL-18 roadway.
3. ***Proposed Bridge + Policy Reconstruction***- A copy of the 'Proposed Bridge' scenario, with the future Policy Reconstruction of IL-18 included. The Policy Reconstruction of IL-18 includes a raising of the IL-18 profile such that the edge of pavement is 3-ft above the 50-yr WSE between the proposed bridge and the existing bluff to the east of the IL-18/26 intersection.
4. ***Proposed Bridge + Policy Reconstruction, 1 Extra Span***- A copy of the 'Proposed Bridge + Policy Reconstruction' scenario, with the addition of one 144-ft span on the east end of the proposed bridge. The (future raised) IL-18 profile is unchanged by the added span.
5. ***Proposed Bridge + Policy Reconstruction, 2 Extra Spans***- A copy of the 'Proposed Bridge + Policy Reconstruction' scenario, with the addition of two 144-ft spans on the east end of the proposed bridge. The (future raised) IL-18 profile is unchanged by the added spans.
6. ***Proposed Bridge + Policy Reconstruction, Fill Removed***- A copy of the 'Proposed Bridge + Policy Reconstruction' scenario, with all existing fill above 446-ft in the east (left) overbank area removed.
7. ***Proposed Bridge + Policy Reconstruction, Fill Removed, 1 Extra Span***- A copy of the 'Proposed Bridge + Policy Reconstruction, Fill Removed' scenario, with the addition of one 144-ft span on the east end of the proposed bridge. The (future raised) IL-18 profile is unchanged by the added span.

8. ***Proposed Bridge + Policy Reconstruction, Fill Removed, 2 Extra Spans***- A copy of the 'Proposed Bridge + Policy Reconstruction, Fill Removed' scenario, with the addition of two 144-ft spans on the east end of the proposed bridge. The (future raised) IL-18 profile is unchanged by the added spans.

In the following, the results of these scenarios are compared to the Pre-Project scenario pursuant to the Reconstruction requirements to ensure that the proposed bridge opening is no more hydraulically restrictive than the pre-project (existing) condition.

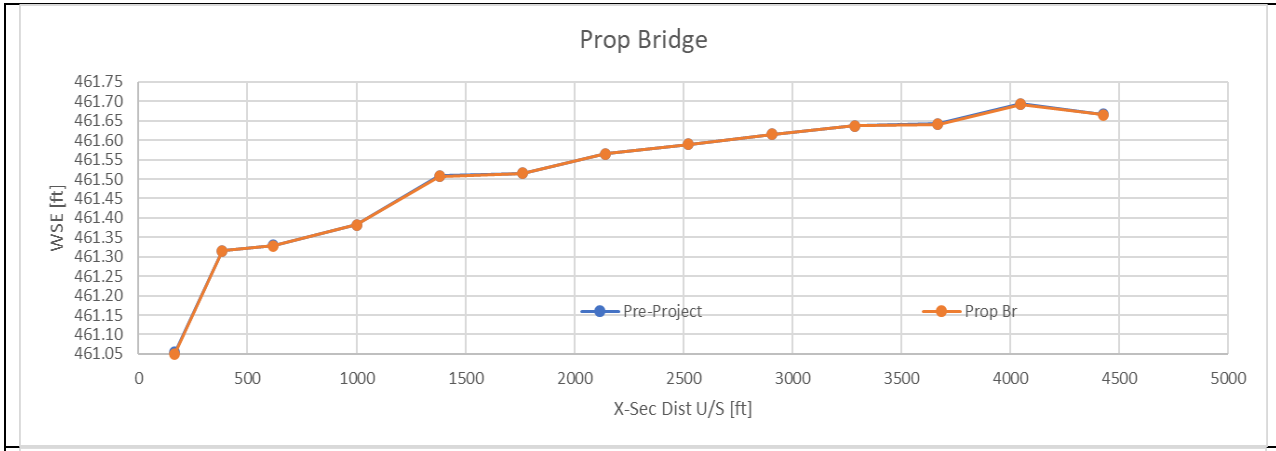


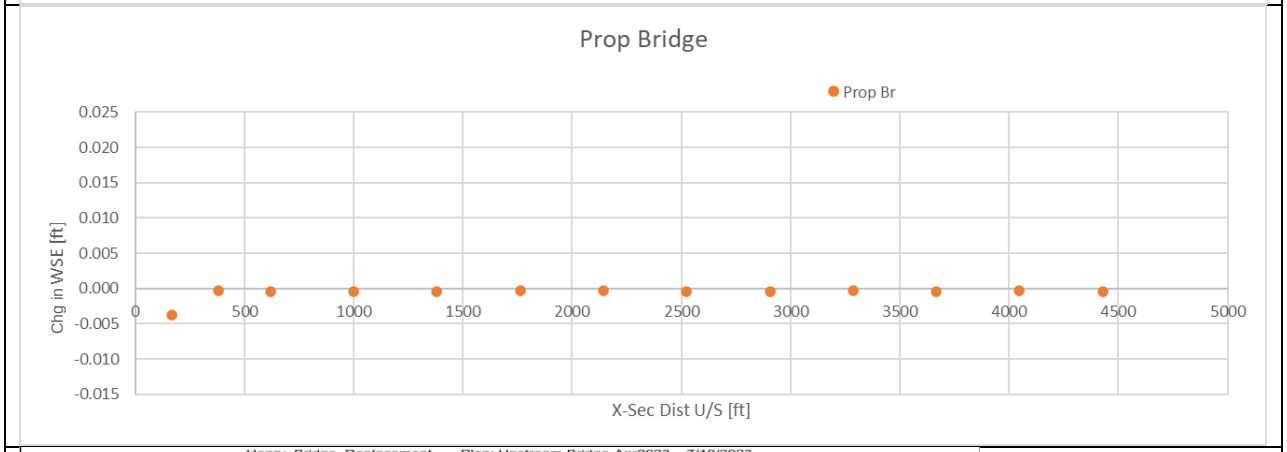


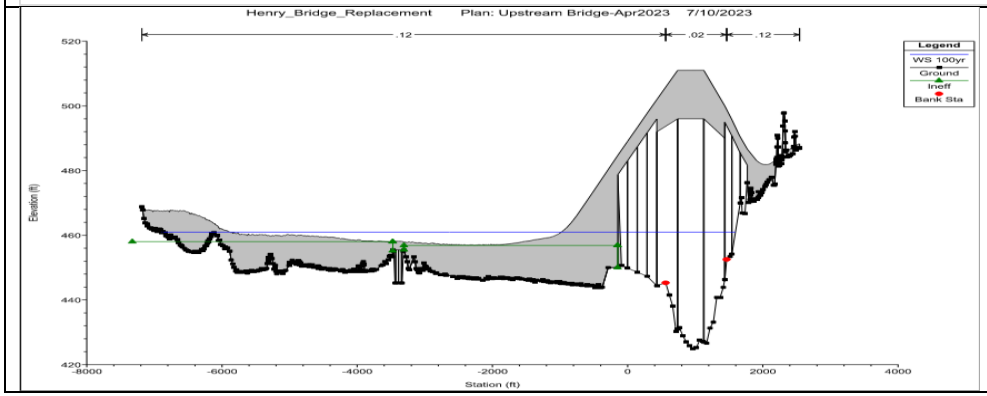
The Pre-Project Condition

The IL-18 bridge as it has stood since the 1930's, along with certain raised grading on the east (left) overbank associated with the Duck Ranch access road.

The existing bridge is 1718 ft back to back of abutment, with 14 spans and 13 piers. All 13 of these piers are presented to the flow in the 100 year condition, and water flows over IL 18 east of the bridge.





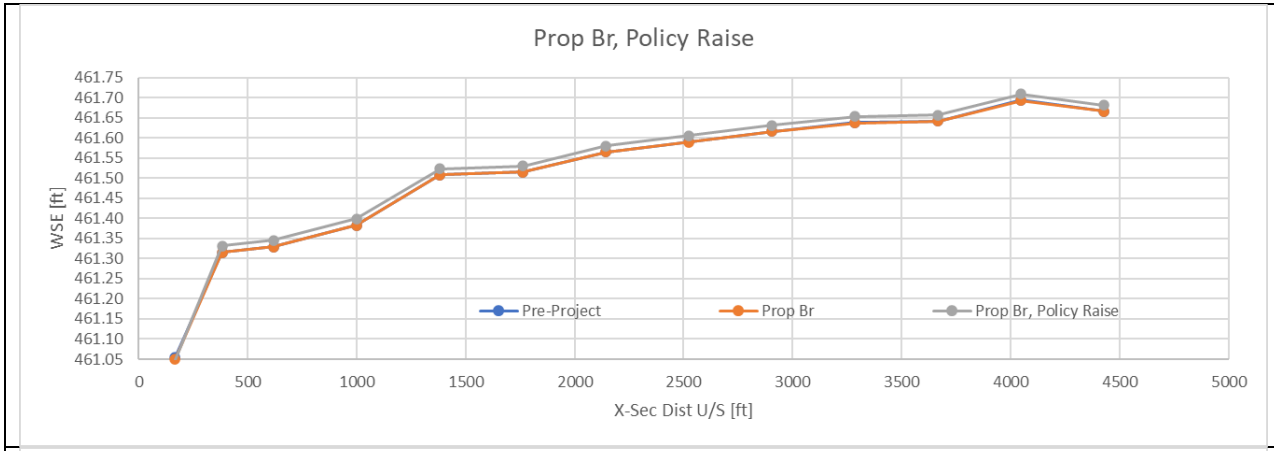


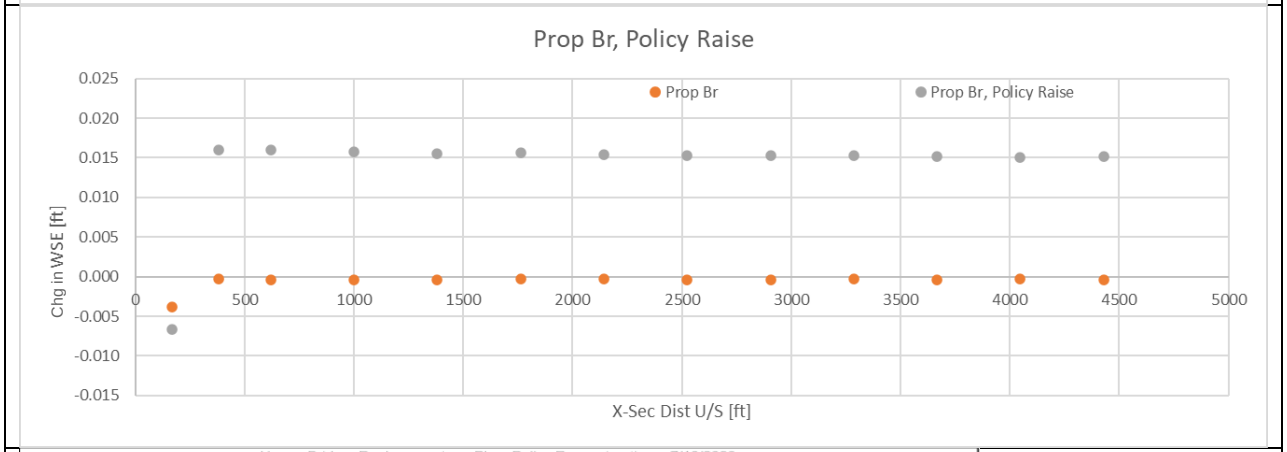
The bridge replacement has initially been developed a 10-span, 1900' bridge between backs of abutments. The abutments move back on both ends of the bridge though only the east (left) move is effective in changing the flow area; the west (right) abutment is above the 100-year WSE.

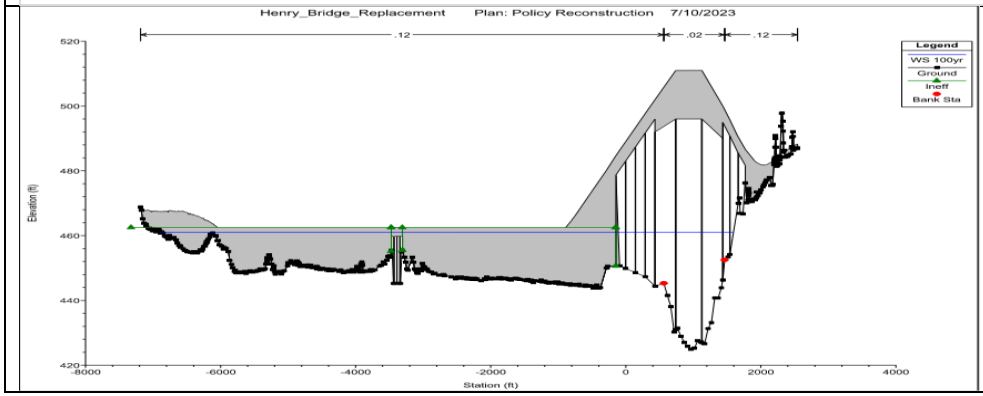
The proposed bridge present 8 piers to the 100-year flow, down from 13 piers of the existing bridge. The proposed piers present a total width of 68 ft to the 100-year flow, down from 78 ft for the existing bridge.

The initial 10-span layout was effective in meeting the Reconstruction target of "not more restrictive to flood flows". The area available for flow is apparently increased, and there is no predicted rise in 100-year WSE for 4500' U/S of the bridge, relative to the pre-project condition.

The cross section illustration, however, continues to indicate the flooding concern for IL-18 east of the river. Over 1000' of roadway, including the Sandy Creek bridge, are submerged during the 100-year event.





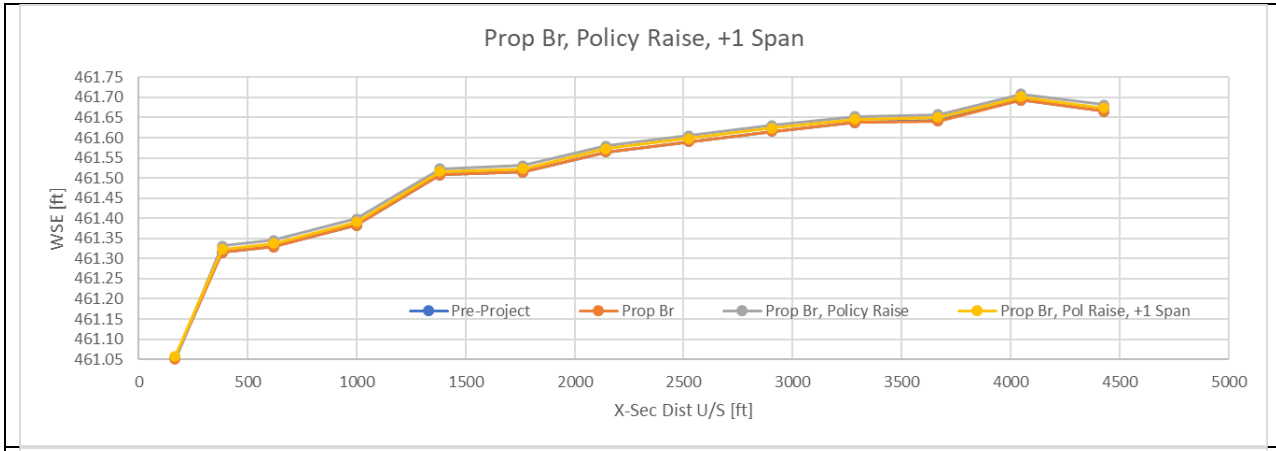


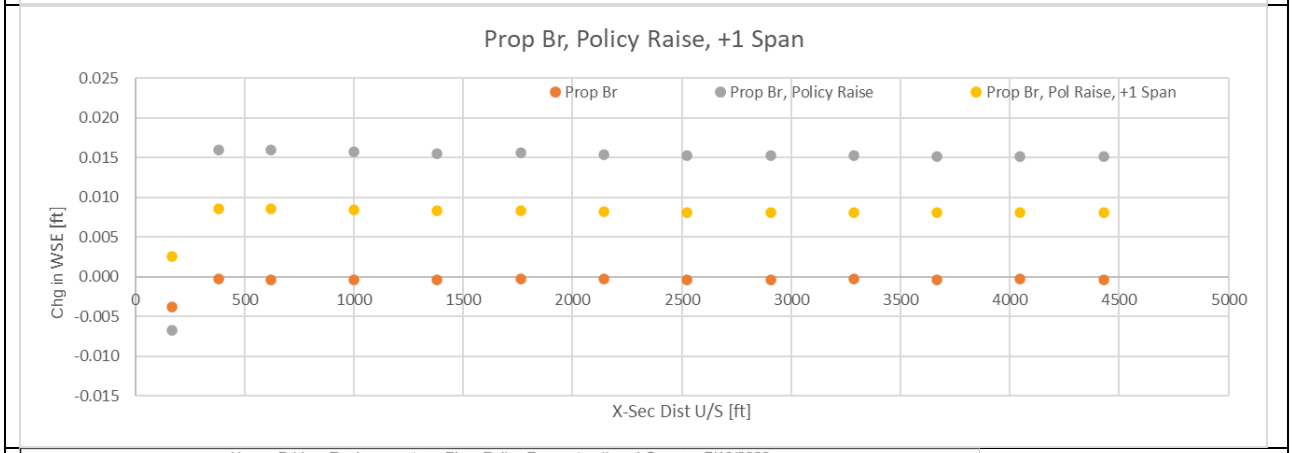
Illinois DOT anticipates a future project to raise IL-18 to meet the State's criteria that roadway elevations be 3' above the 50' year flood elevation. Doing so at some point after construction of the 10-span bridge cuts off the flow-over-the-road pathway (cross section, lower left). Relative to the pre-project condition (existing, 14 span truss bridge and low roadway), the 10-span bridge with policy-compliant road raise causes a consistent 0.015' (3/16") rise from 400' to 4500' U/S.

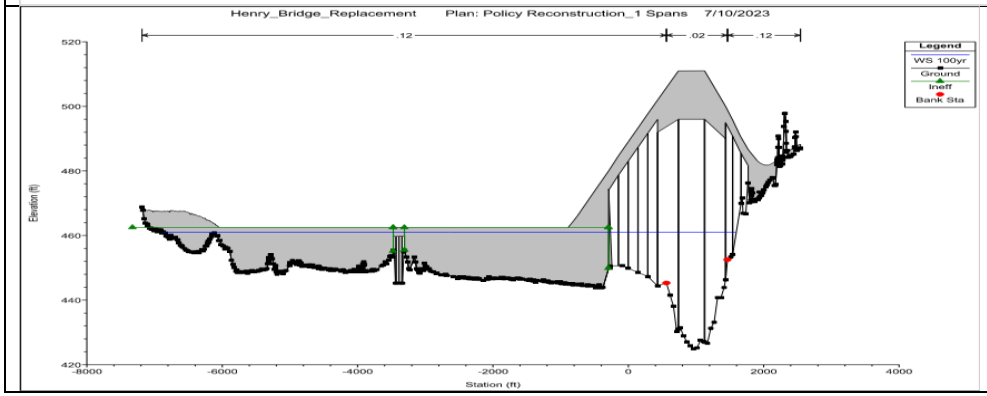
By IDNR conventions, this 0.015' does not round down to a "no-rise" condition. This likely creates difficulty permitting that future road raise work under the Reconstruction category, tested against the pre-bridge-project condition.

(In the last few hundred feet above the proposed bridge, the pattern reverses. Blocking flow over the road leads to a small DECREASE in WSE close to the bridge.)

To comply with the bridge project's Purpose and Need statement pertaining to impoving the flooding on IL-18, we seek practicable adjustments to the current bridge project that will facilitate future permitting of the anticipated road raise work. Options considered include lengthening the bridge by adding spans on the east overbank, and regrading of the east overbank area to knock down fill that was associated with a Duck Ranch access road. That road will be re-aligned and reconstructed as part of the bridge improvement.







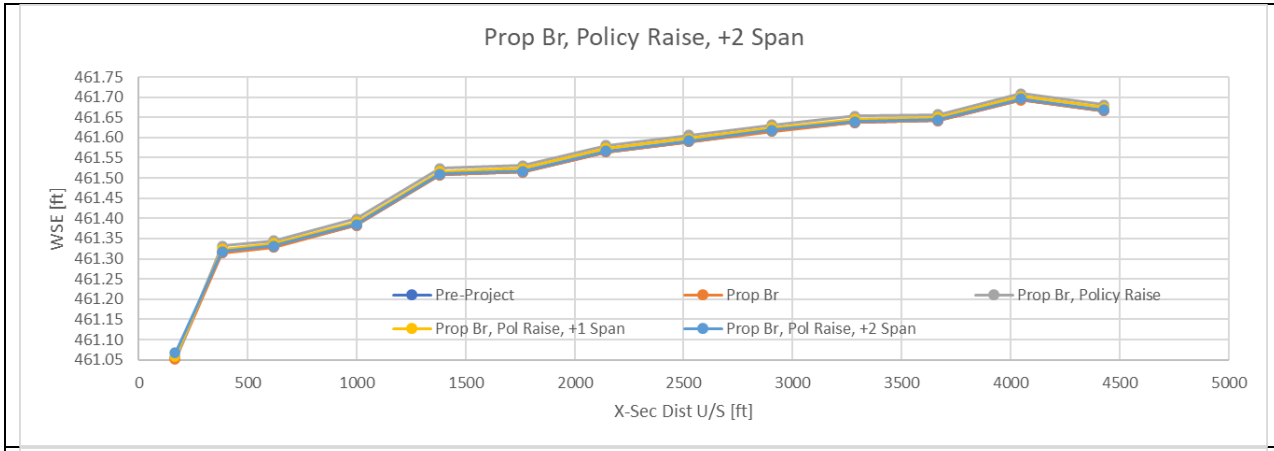
Lengthen by 1 Span

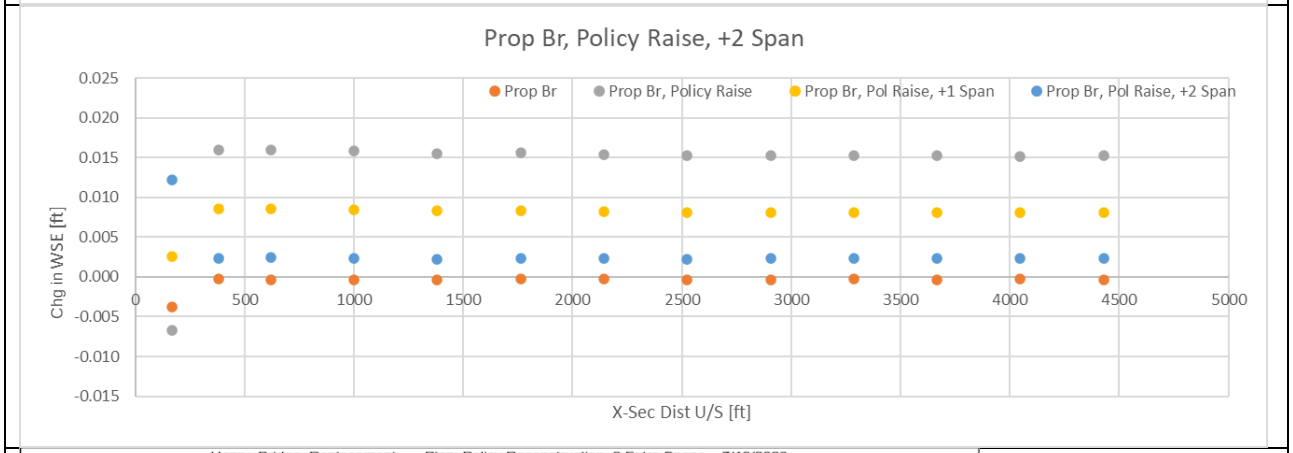
The new 10-span bridge includes an east approach unit of 4 spans at 144'. Consider extending this by 1 span to 5@144'. Assuming a marginal square foot cost for this addition of $250/SF, trading 144' of high fill and pavement for bridge deck may increase the project cost* by about $800,000

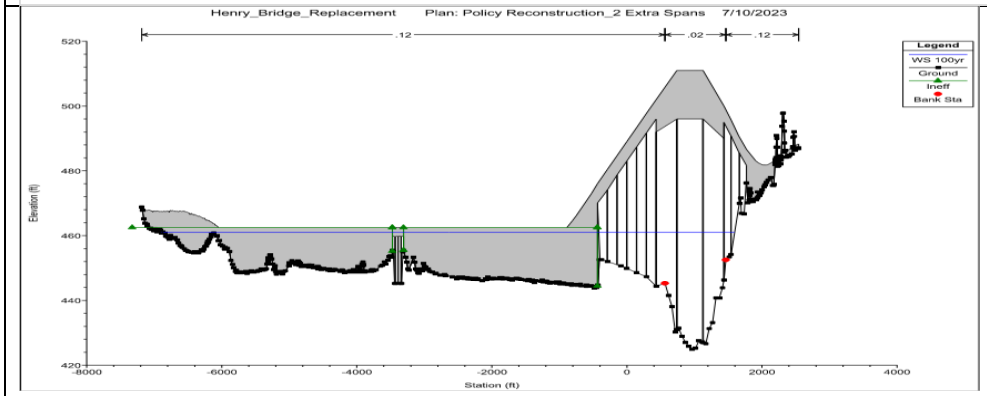
The 11-span bridge with policy road raise is still evidently "more restrictive" to flow than the pre-project condition. A 0.01' (1/8") rise in WSE is still predicted from 500' to 4500' U/S. This rise does not round to zero, and could preclude permitting the future road raise on the basis of Reconstruction relative to the pre-project condition.

In the final couple hundred ft above the bridge section, the pattern reversal continues. The ADDITION of open area (one span) causes a small RISE in WSE (rounds to zero).

* As of the VE Study:
Design Team Project Cost, Excl Removal of Existing Bridge: $65M
VE Team Project Cost, Incl Removal of Existing Bridge: $84M







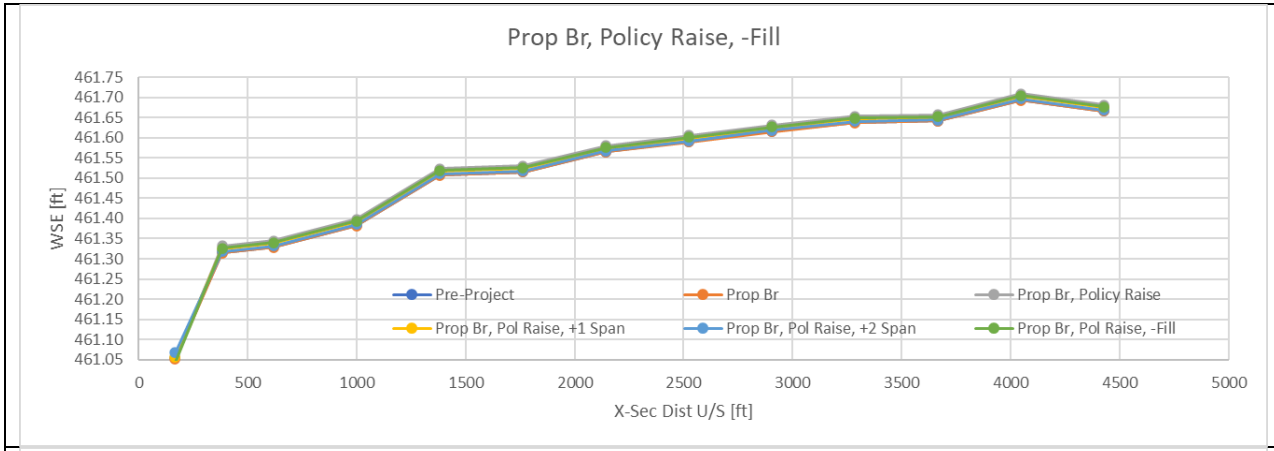
Lengthen by 2 Spans

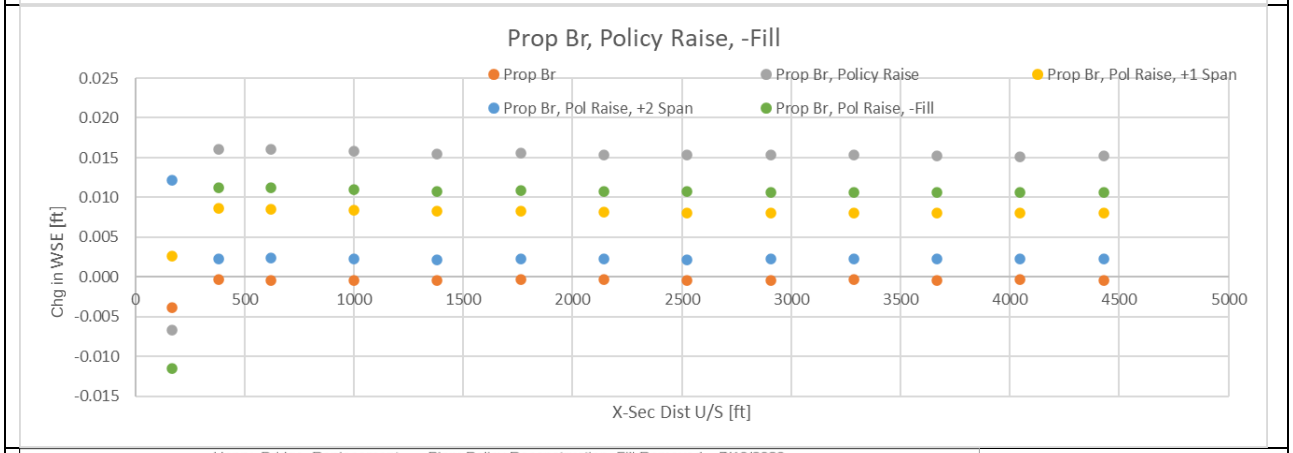
Consider adding 2 spans on the east, moving the abutment back 288' and introducing 2 new piers. Assuming a marginal square foot cost for this addition of $250/SF, trading 288' of high fill and pavement for bridge deck may increase the project cost by about $1,700,000

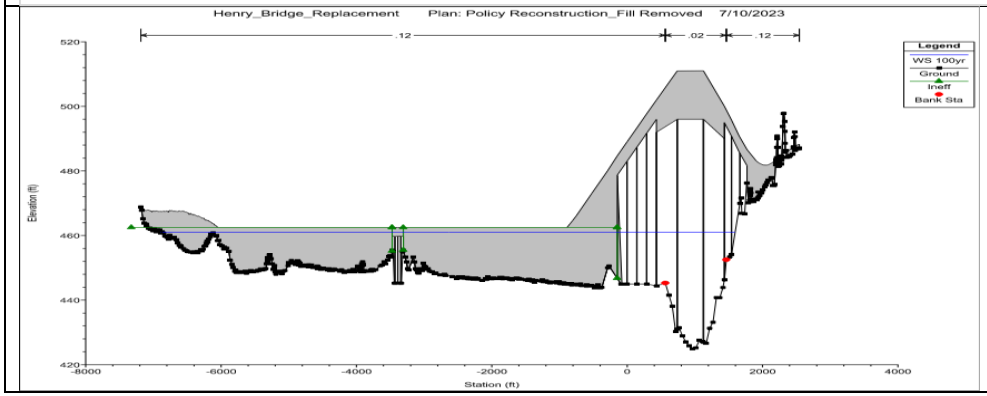
The 12-span bridge with policy road raise is approaching a condition of "not more restrictive to flow than the pre-project existing condition." From 400' to 4500' U/S there is a numerical rise in WSE, but it rounds to zero under IDNR conventions. Unfortunately, the reverse behavior in the last few hundred feet near the bridge continues. The opening up of the cross section with 2 additional spans now causes a WSE rise of more than 0.01' near the bridge.

This behavior is attributed to complexity associated with the strong influence of backwater at the site. Rather than pursuit of additional spans and the continued ambiguity of the rising water at the bridge, the native grade of the east overbank area is considered.

As seen in the cross sections at left, as the bridge is lengthened, the native grade under the proposed bridge alignment continues to rise. This is a manifestation of a modest fill upon which the Duck Ranch access road sits. As part of the bridge reconstruction, this access road will be relocated to the existing IL-18 alignment, downstream of the new IL-18 embankment. The opportunity is thus presented to remove the fill associated with the existing Duck Ranch access, lowering the grade toward or to the original native grade in this area.







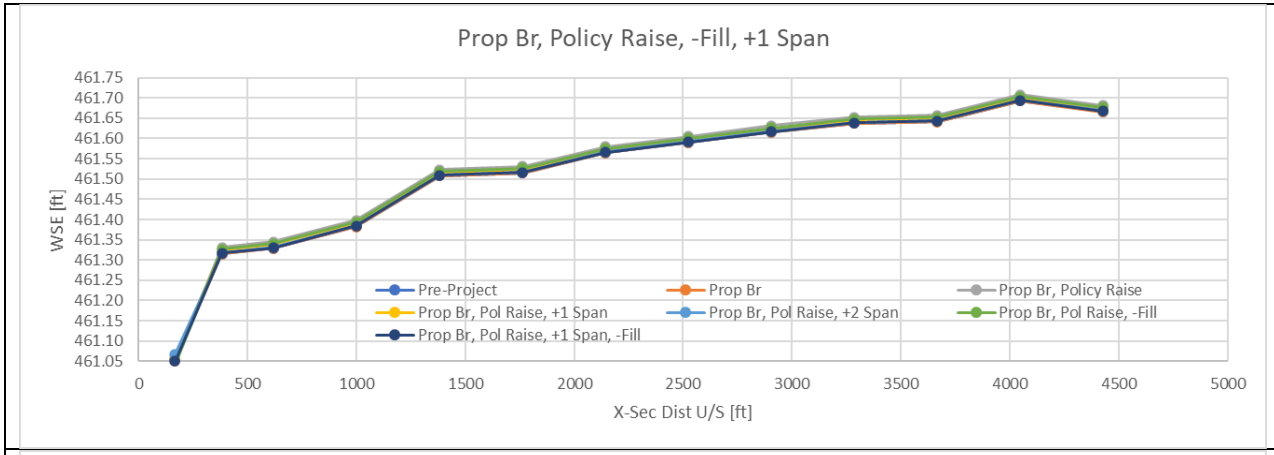
Regrade East Overbank

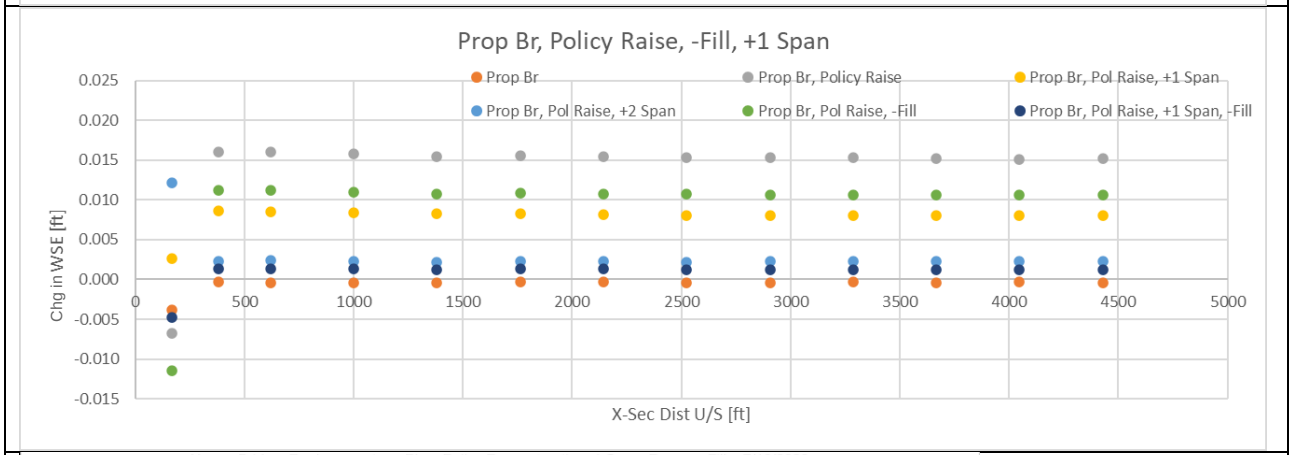
Returning to the 10-span proposed bridge, consider lowering the raised grade of the east overbank from a max elevation of 450' to elevation 446'. Approximately 8500 CY of fill would be removed, increasing the project cost by about $250,000.

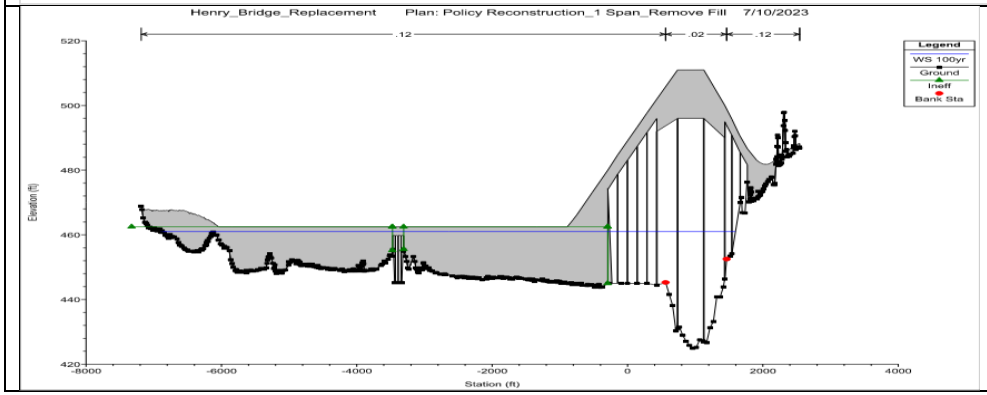
The middle chart at right (green dots) shows that this lowering of grade in the 10-span bridge is similar in effectiveness to the previous increase to an 11-span bridge (without regrading).

The 10-span bridge, with policy road raise, and lowering the east overbank, results in about 0.01 ft of rise in the 400 to 4500 ft U/S of the bridge. Like the addition of 1 span, this is not enough to pass the IDNR test of not-more-restrictive; it creates a small WSE rise.

(Creating flow area thusly, by lowering grade rather than lengthening bridge, does not lead to the same reversal of WSE trend at the bridge. The grey-to-green dot drop of about 0.005' is consistent at all cross sections.)



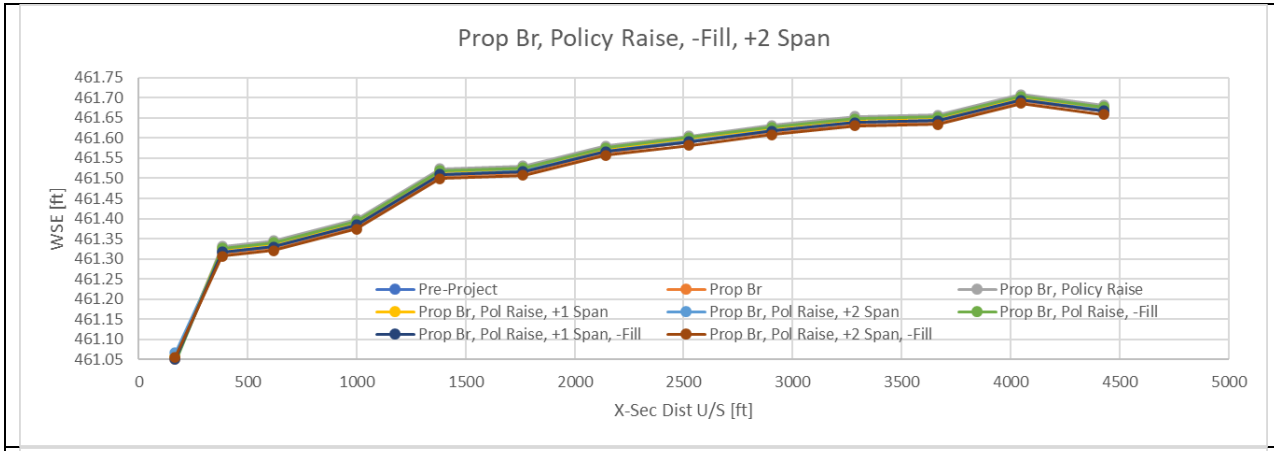


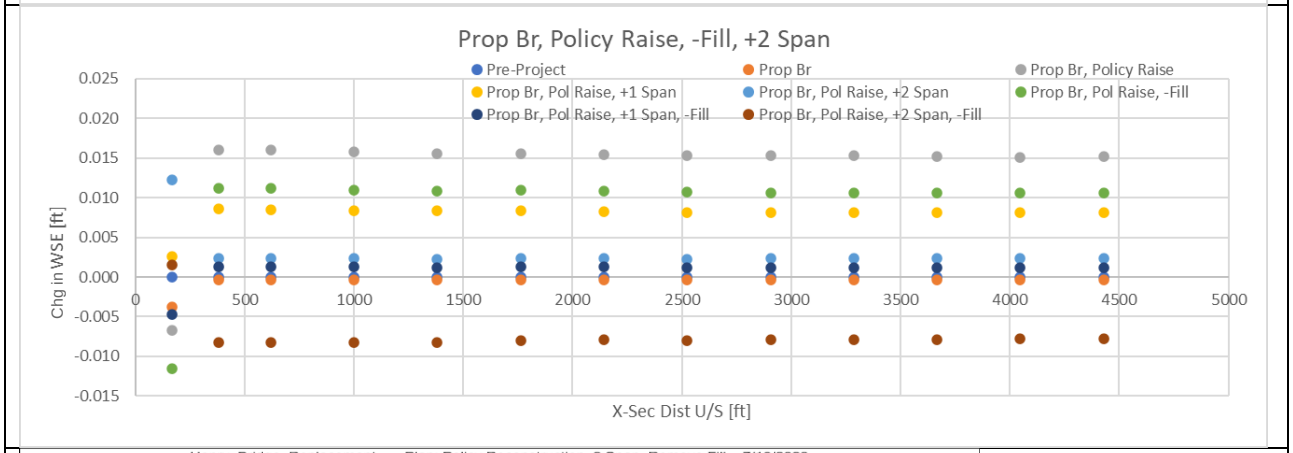


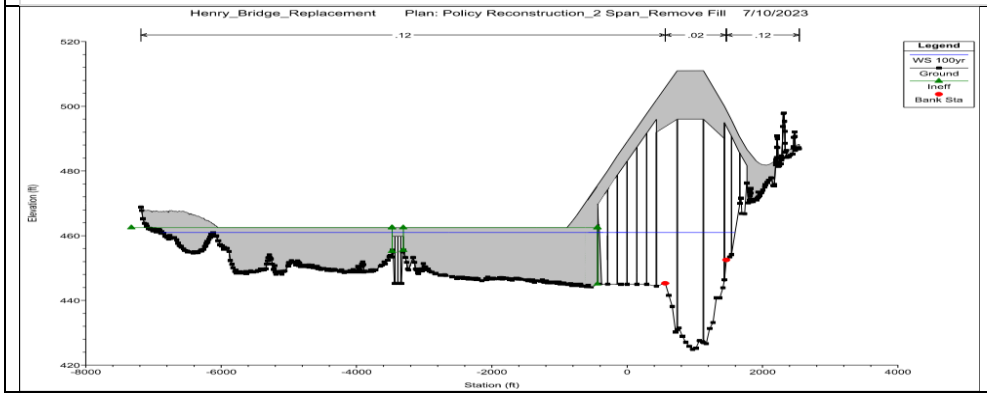
Regrade East Overbank, Add 1 Span

The combination of adding 1 span and lowering the east overbank grade to 446' is the first combination that allows the future road raise without appearing more restrictive to flow than the pre-project condition. The numercial rise value of about 0.001 ft can be rounded to 0.00. The IL-18 roadway meets State policy, and the river is not more restricted than its existing condition today.

The fill removal is estimated at 18,300 CY and the abutment moves 144 ft, shortening the approach embankment and lengthening the bridge. The estimated cost increase for this accomodation is $1,350,000.







Regrade East Overbank, Add 2 Spans

The combination of policy road raise, adding 2 spans, and lowering the east overbank grade to 446' results in a WSE lowering from 400' to 4500' U/S of about 0.01' (1/8"). Again, the extension of bridge length is causing a local increase in WSE close to the bridge, but when combined with the lowering of WSE due to regrading, the effect in the last few hundred feet above the bridge is zero net change in WSE.

The fill removal for this case is estimated at 29,000 CY and the abutment moves 288 ft, shortening the approach embankment and lengthenign the bridge. The estimated cost increase for this accomodation is $2,600,000.

The approximate plan extents of removed fill for this case are illustrated in Attachment 4.

Results & Discussion

Recall the dual objectives of these studies.

1. The present project, reconstruction of the Illinois River Bridge, will be completed with the least work required to tie back into the IL-18 approach roadway. The IDNR-OWR permit for this project will be sought as Reconstruction. Detailed hydraulic modeling of the proposed bridge (and the construction condition) will be compared to the existing condition as part of the Illinois DOT project hydraulic report.
2. In the future, Illinois DOT will likely seek to raise IL-18 east of the bridge, to a policy elevation of 3' above the 50-year water surface. While a path for water crossing the road will be removed, it will be demonstrated at that time that modifications made in the current bridge project accounted for that, and that the raised road and new bridge condition is not more restrictive than what exists today (2023).

While Objective 1 could be met by the 10-span bridge configuration with no fill removal on the east, Objective 2 cannot; consider the orange to grey dots in the figure on page 6.

Adding 2 spans to the proposed bridge without regrading the east overbank, or knocking the east overbank down to elevation 446 and adding 1 span to the proposed bridge are shown to get the future, raised-road condition close to existing; consider the light and dark blue dots lying close to the orange dots in the figure on page 10. The bridge project cost increases associated with these efforts are estimated at $1.7M and $1.35M respectively.

Removal of fill associated with the existing Duck Ranch access road is thus found to be a reasonable and comparably effective means of accommodating the future road raise. The benefit in removing existing fill is understandable considering the hydraulics of this reach of the river. It has been established that this reach is very backwatered with very low flow velocities in the overbank areas. As such, when pursuing options to reduce WSE's via treatments in the overbanks/floodplain, options that reduce velocity head losses have negligible impact on WSE's. Only options that provide additional storage for floodwaters in the overbanks/floodplain impact upstream WSE's effectively.

Not modeled here, however, is the condition in which the new Duck Ranch Access Road is reconstructed downstream of the proposed IL-18, along the existing IL-18 alignment. The reconstruction is required to maintain access to the Duck Ranch property downstream of IL-18, and will also be used under an easement agreement by the upstream property owner to access their property. If that access were similarly held down to elevation 446, that would represent a lowering and thus a limiting of access to those properties; for some number of days per year in which those properties are accessible in the current condition, they could be unreachable via a new lowered road.

Attachment 5 illustrates a reconstruction concept for this access road. Construction of the access road at or around elevation 450 will still represent a large net reduction in fill on the east overbank. If final modeling shows a need, drainage area or storage volume could be provided through the access road via pipe or box culvert sections. But it can be anticipated that the access road fill volume and elevation will have some calculable effect on water surface elevations. In light of this, Parsons recommends the bridge replacement be advanced based on the addition of 2 spans (188' min) to the length, and removal of the existing Duck Ranch Access Road fill to elevation 446.0. This case (without the proposed access road) is represented by the brown dots in the figure on page 11. The apparent lowering of water surface elevation predicted in the brown dots will be mitigated by inclusion of the access road. The estimated cost increase to add the bridge length and remove the existing access road fill is estimated at $2.6M.

Barring significantly different findings when the final hydraulic modeling of the proposed condition is performed, this is considered the maximum practicable accommodation of the permitting requirements for both the current bridge replacement and the future road raise project. It cannot be known at this time exactly how the future IL-18 / IL-26 road raises will be implemented, how they will be modeled, what the fate of the Sandy Creek bridges on IL-18 and IL-26 will be, and what the fate of the double 12x9 Sandy Creek Overflow culvert under IL-18 will be. In light of these uncertainties, it is advisable to move the bridge replacement project forward on the basis of

- 2 additional spans (188' min move of the east abutment)
- lowering of grade under the bridge in the east (left) overbank area
- reconstruction of Duck Ranch Access along the existing IL-18 alignment.

Additional work in the coming weeks will include refining the proposed bridge design to include the additional length, modeling the proposed Duck Ranch access road, and more accurately quantifying the required excavation volume associated with removing existing fill above 446-ft. These revisions will then feed into the official project Hydraulic Report which will be submitted in support of the Type Size and Location plan and which will form basis for IDNR-OWR permitting of the bridge project.

As noted in the introduction, we must seek IDNR acknowledgement that this represents a viable path for future discussion and permitting of the IL-18 policy road raise project. Specifically, that when the roads are raised and that overflow path is restricted, the changed flow regime will be tested against the current existing condition (the pre-project conditions herein) and permitting for that road raise can be pursued on a basis similar to the Reconstruction criteria used for bridge projects. We recommend that District circulate this memo to the attendees of the 6/23/23 call, with request that they either provide comments and questions, or that they provide confirmation of their understanding of IDOT's intent to facilitate future permitting of the future road raise effort based on the reasoning presented herein.

Please do not hesitate to contact me with any questions or concerns.

Sincerely,

Todd C. Ude

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Attachment 1- Site Plan



Attachment 2- HEC-RAS Results Table

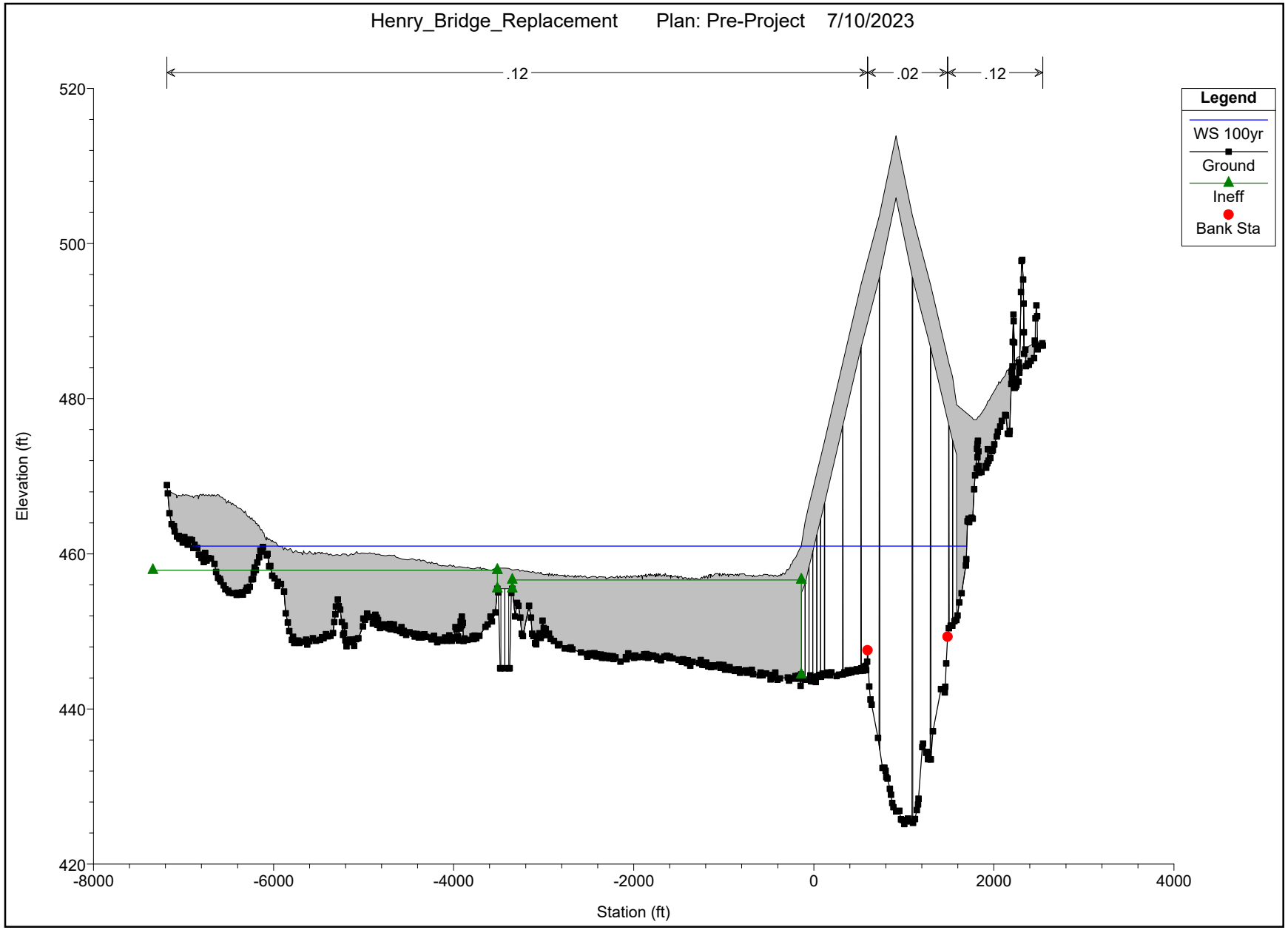
Table 1. Max. Water Surface Elevations

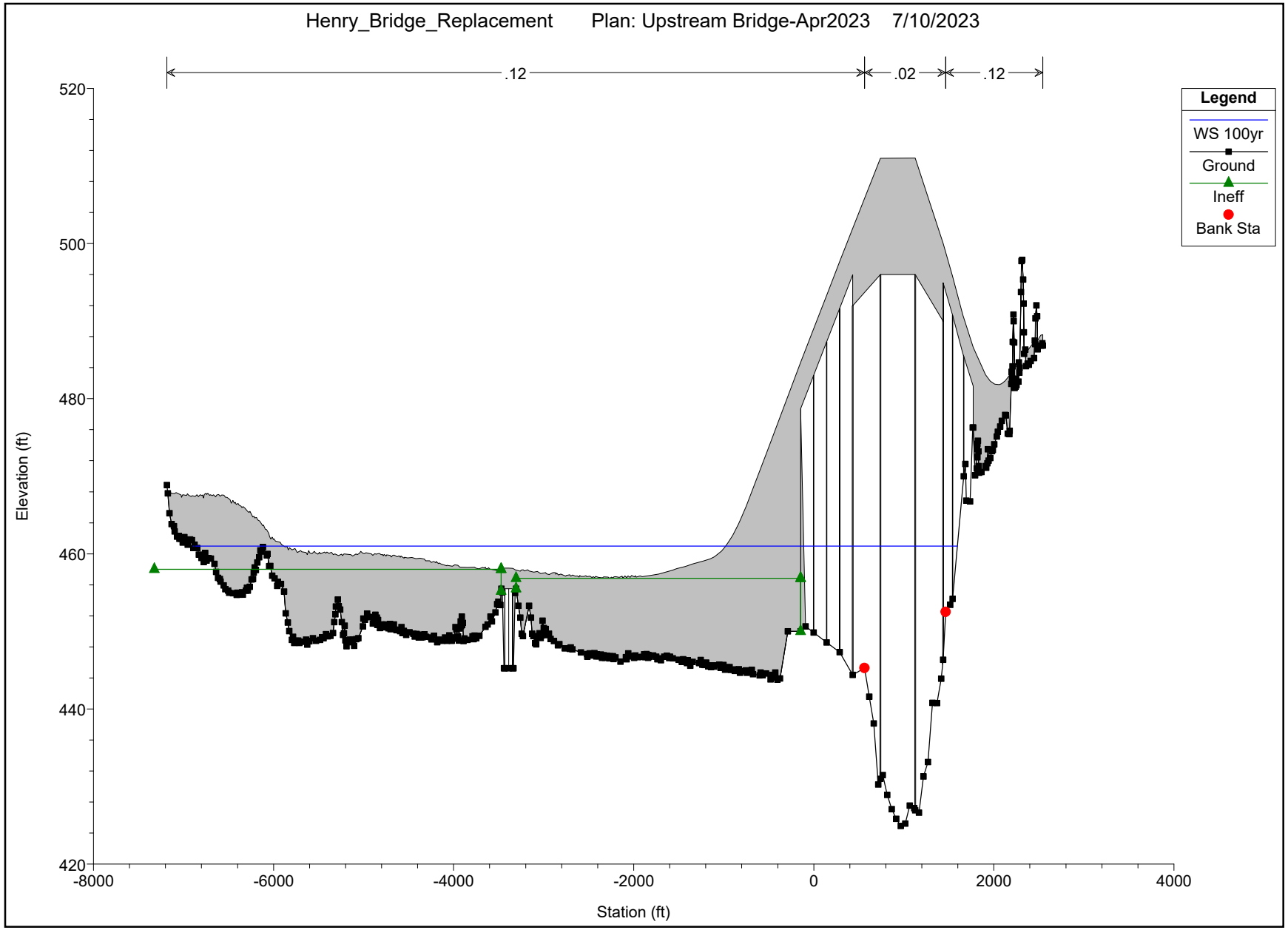
		Scenario								
					Prop. BR + Policy Reconstruction					
									Fill Removed	
Cross-Section	Distance U/S from Prop. BR (ft)	Pre-Project	Prop. BR	Prop. BR + Policy Reconstruction	1 Extra Span	2 Extra Spans	3 Extra Spans	Fill Removed	1 Extra Span	2 Extra Spans
196	167	461.0547	461.0509	461.0480	461.0573	461.0669	461.0759	461.0432	461.0500	461.0562
196.04	383	461.3154	461.3151	461.3314	461.3240	461.3177	461.3119	461.3266	461.3167	461.3072
196.08	619	461.3291	461.3287	461.3451	461.3376	461.3315	461.3256	461.3403	461.3304	461.3209
196.15	1000	461.3827	461.3823	461.3985	461.3911	461.3850	461.3792	461.3937	461.3840	461.3745
196.19	1381	461.5080	461.5076	461.5235	461.5163	461.5102	461.5045	461.5188	461.5092	461.4998
196.42	1762	461.5151	461.5148	461.5307	461.5234	461.5174	461.5117	461.5260	461.5164	461.5071
196.88	2143	461.5648	461.5645	461.5802	461.5730	461.5671	461.5615	461.5756	461.5661	461.5569
197.34	2524	461.5901	461.5897	461.6054	461.5982	461.5923	461.5867	461.6008	461.5913	461.5821
197.67	2905	461.6159	461.6155	461.6312	461.6240	461.6182	461.6125	461.6265	461.6171	461.6080
198.01	3286	461.6377	461.6374	461.6530	461.6458	461.6400	461.6344	461.6483	461.6389	461.6298
198.36	3667	461.6419	461.6415	461.6571	461.6500	461.6442	461.6386	461.6525	461.6431	461.6340
198.67	4048	461.6933	461.6930	461.7084	461.7014	461.6956	461.6900	461.7039	461.6945	461.6855
199.04	4429	461.6662	461.6658	461.6814	461.6743	461.6685	461.6629	461.6768	461.6674	461.6584

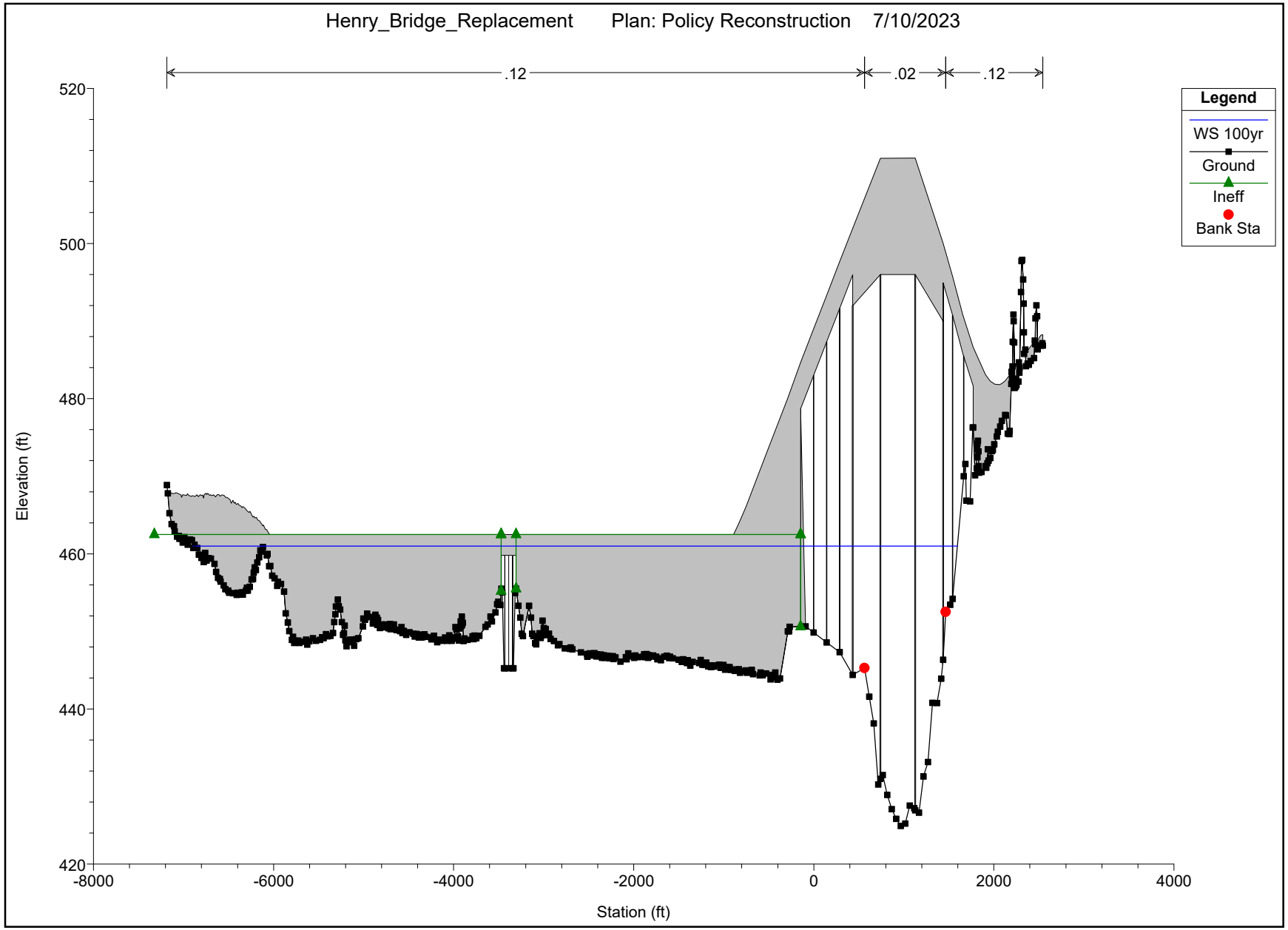
Table 2. Max. Water Surface Elevation Change from Pre-Project

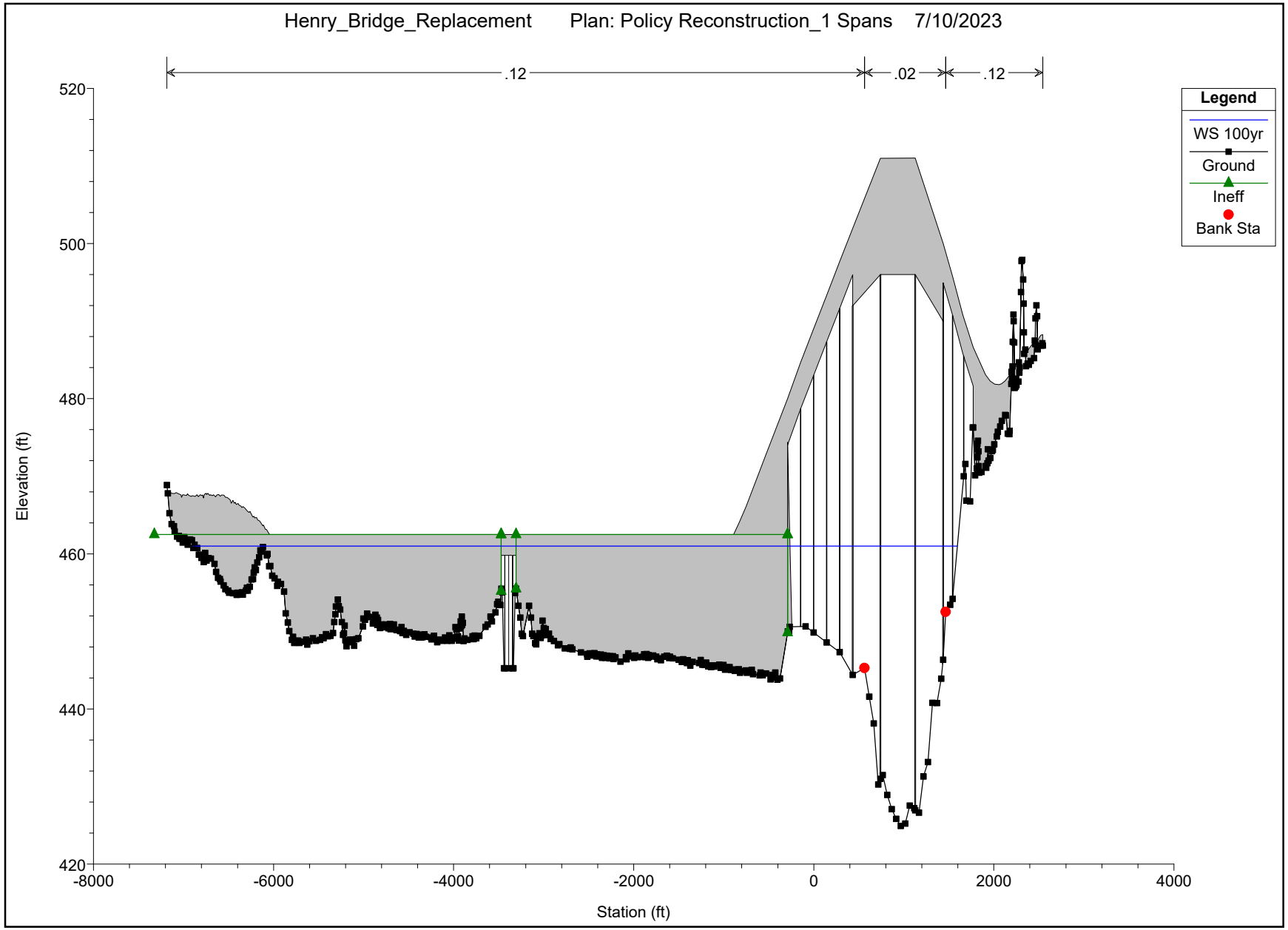
		Scenario								
					Prop. BR + Policy Reconstruction					
									Fill Removed	
Cross-Section	Distance U/S from Prop. BR (ft)	Pre-Project	Prop. BR	Prop. BR + Policy Reconstruction	1 Extra Span	2 Extra Spans	3 Extra Spans	Fill Removed	1 Extra Span	2 Extra Spans
196	167	-	-0.0038	-0.0067	0.0026	0.0122	0.0212	-0.0115	-0.0047	0.0015
196.04	383	-	-0.0003	0.0160	0.0086	0.0023	-0.0035	0.0112	0.0013	-0.0082
196.08	619	-	-0.0004	0.0160	0.0085	0.0024	-0.0035	0.0112	0.0013	-0.0082
196.15	1000	-	-0.0004	0.0158	0.0084	0.0023	-0.0035	0.0110	0.0013	-0.0082
196.19	1381	-	-0.0004	0.0155	0.0083	0.0022	-0.0035	0.0108	0.0012	-0.0082
196.42	1762	-	-0.0003	0.0156	0.0083	0.0023	-0.0034	0.0109	0.0013	-0.0080
196.88	2143	-	-0.0003	0.0154	0.0082	0.0023	-0.0033	0.0108	0.0013	-0.0079
197.34	2524	-	-0.0004	0.0153	0.0081	0.0022	-0.0034	0.0107	0.0012	-0.0080
197.67	2905	-	-0.0004	0.0153	0.0081	0.0023	-0.0034	0.0106	0.0012	-0.0079
198.01	3286	-	-0.0003	0.0153	0.0081	0.0023	-0.0033	0.0106	0.0012	-0.0079
198.36	3667	-	-0.0004	0.0152	0.0081	0.0023	-0.0033	0.0106	0.0012	-0.0079
198.67	4048	-	-0.0003	0.0151	0.0081	0.0023	-0.0033	0.0106	0.0012	-0.0078
199.04	4429	-	-0.0004	0.0152	0.0081	0.0023	-0.0033	0.0106	0.0012	-0.0078

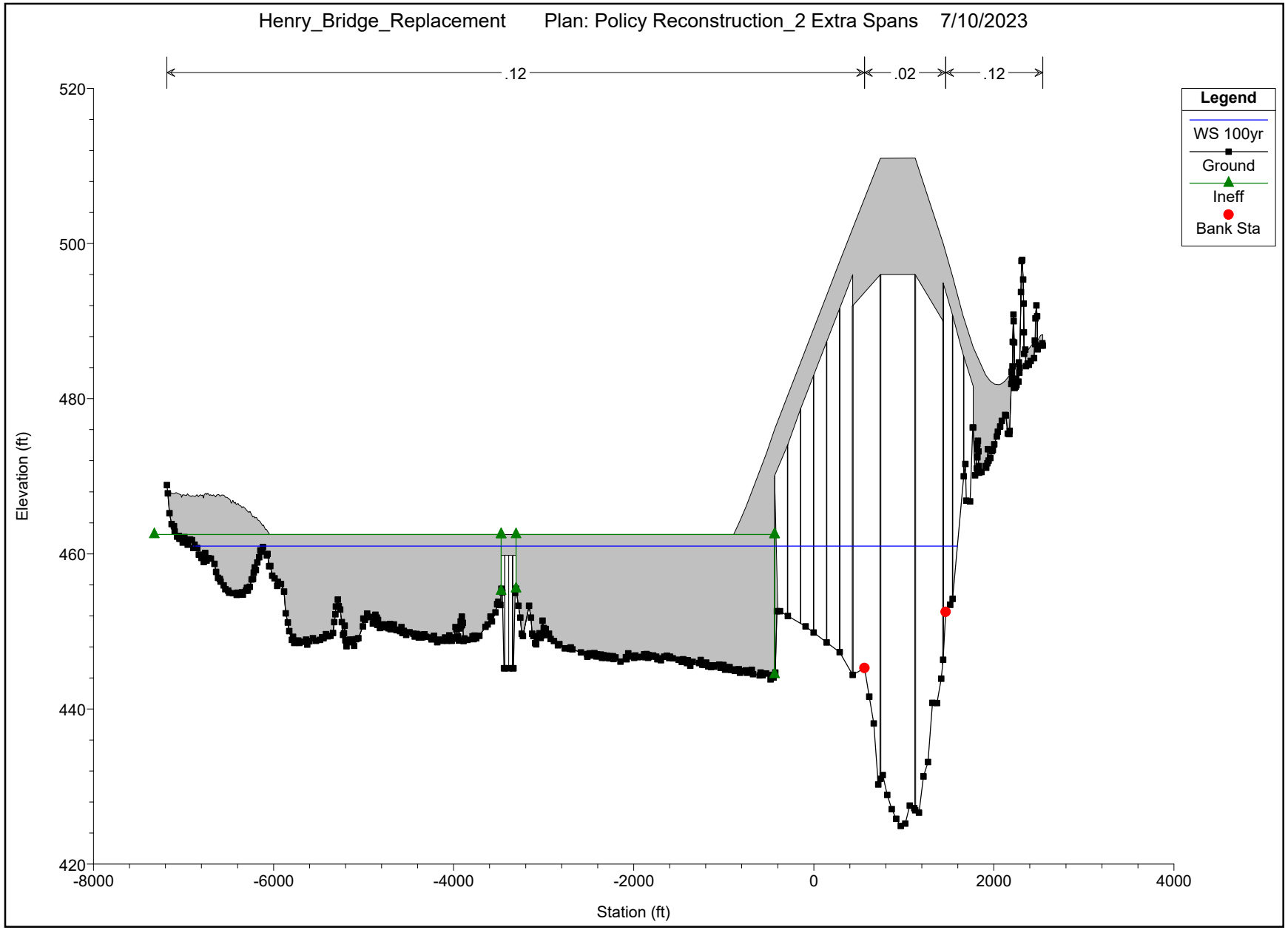
Attachment 3- HEC-RAS Cross-Sections

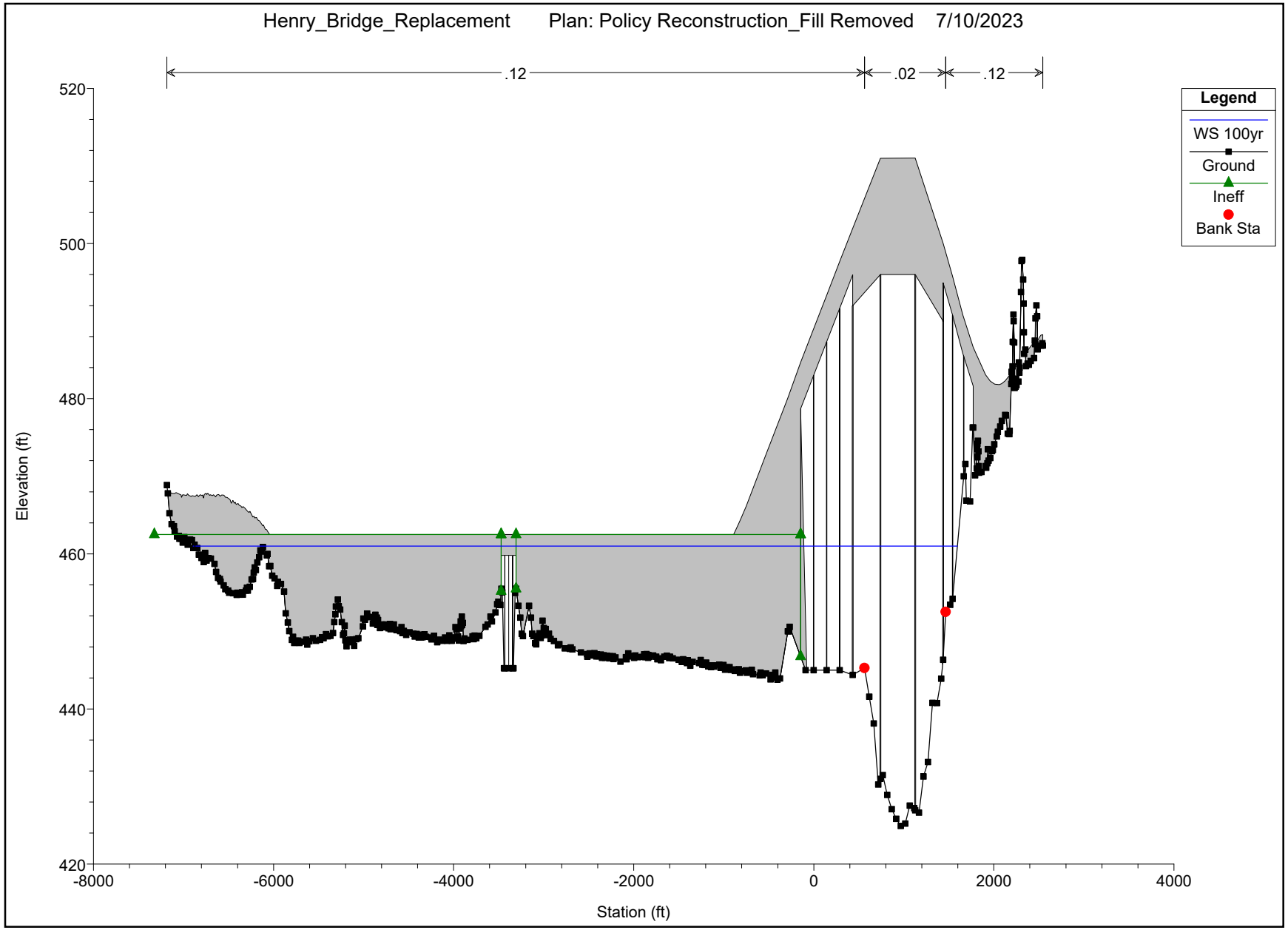


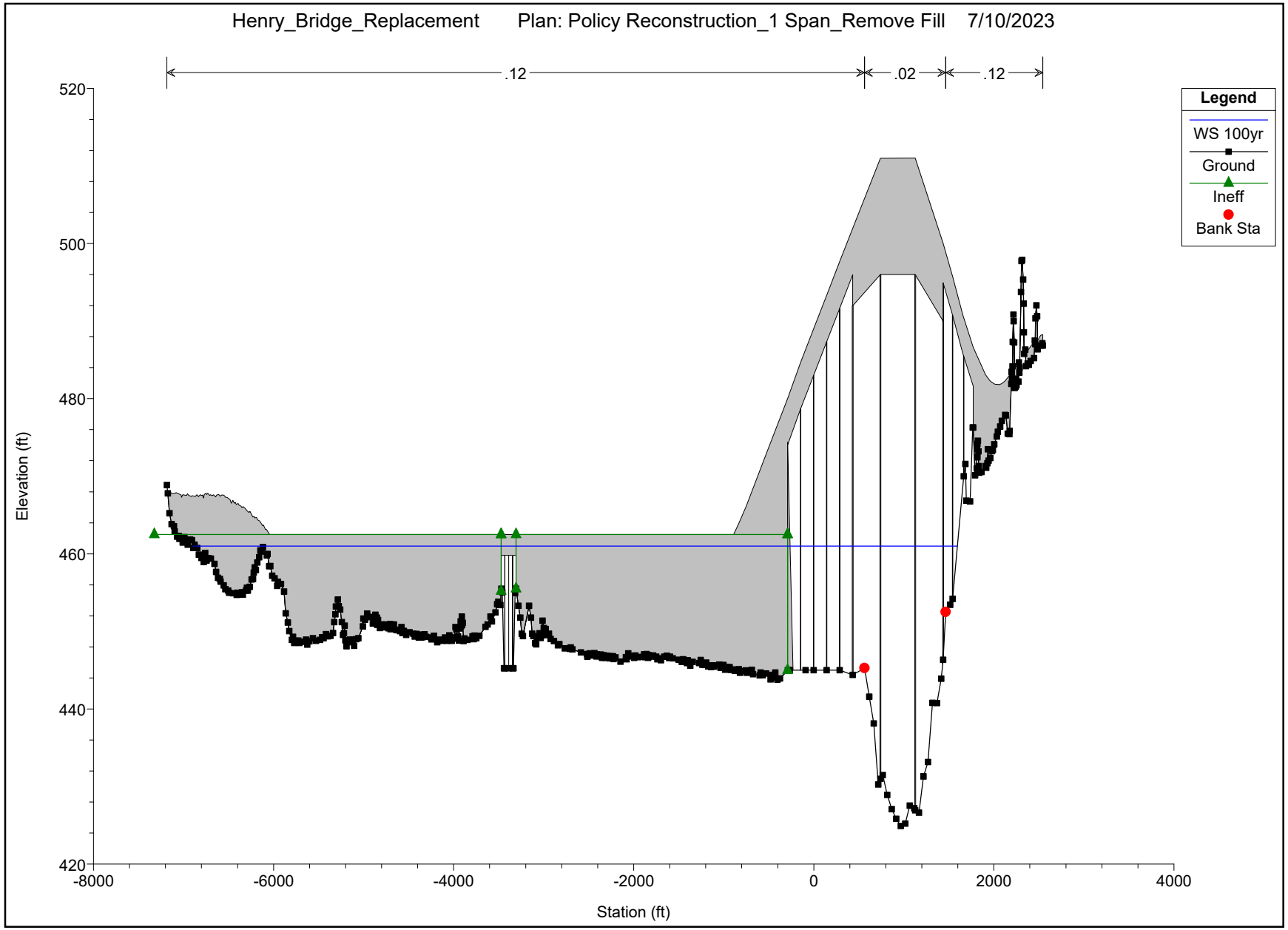

Henry_Bridge_Replacement Plan: Upstream Bridge-Apr2023 7/10/2023
.12
.02
.12
Legend
WS 100yr
Ground
Ineff
Bank Sta
520
500
480
460
440
420
Elevation (ft)
-8000
-6000
-4000
-2000
0
2000
4000
Station (ft)

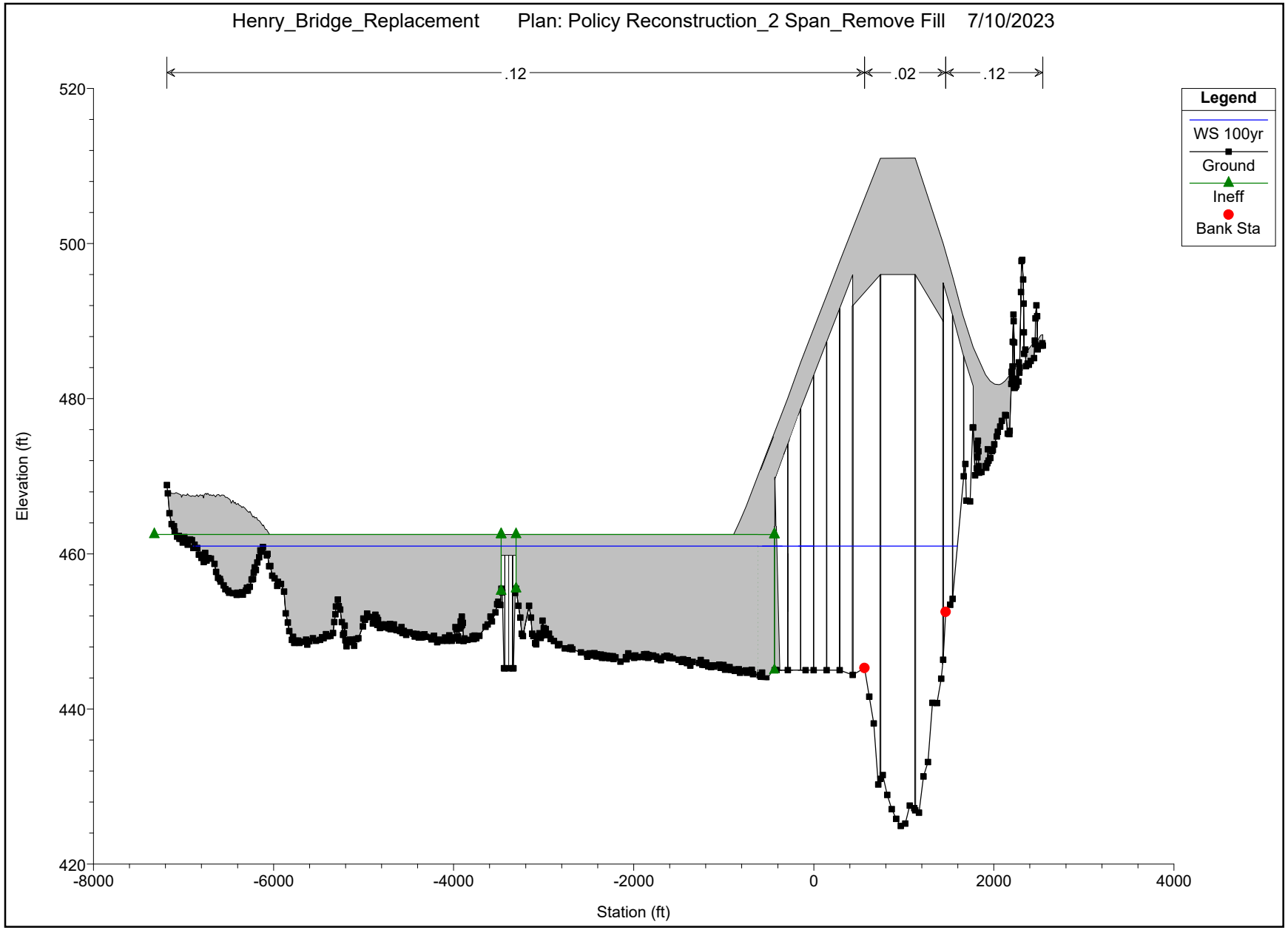

Henry_Bridge_Replacement Plan: Policy Reconstruction 7/10/2023
.12
.02
.12
Legend
WS 100yr
Ground
Ineff
Bank Sta
520
500
480
460
440
420
Elevation (ft)
-8000
-6000
-4000
-2000
0
2000
4000
Station (ft)


Henry_Bridge_Replacement Plan: Policy Reconstruction_1 Spans 7/10/2023
.12
.02
.12
Legend
WS 100yr
Ground
Ineff
Bank Sta
520
500
480
460
440
420
Elevation (ft)
-8000
-6000
-4000
-2000
0
2000
4000
Station (ft)

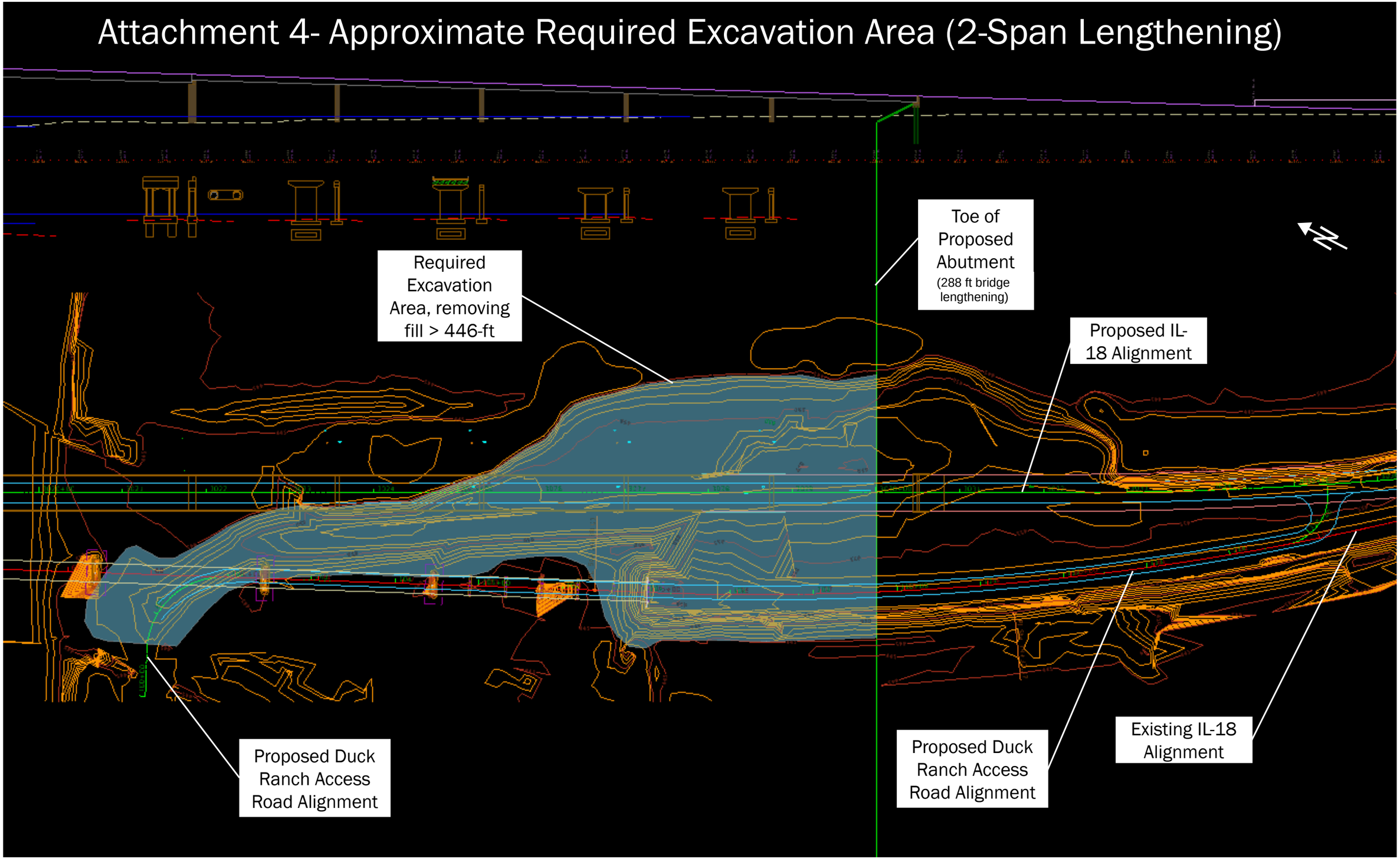

Henry_Bridge_Replacement Plan: Policy Reconstruction_2 Extra Spans 7/10/2023
.12
.02
.12
Legend
WS 100yr
Ground
Ineff
Bank Sta
520
500
480
460
440
420
Elevation (ft)
-8000
-6000
-4000
-2000
0
2000
4000
Station (ft)


Henry_Bridge_Replacement Plan: Policy Reconstruction_Fill Removed 7/10/2023
.12
.02
.12
Legend
WS 100yr
Ground
Ineff
Bank Sta
520
500
480
460
440
420
Elevation (ft)
-8000
-6000
-4000
-2000
0
2000
4000
Station (ft)

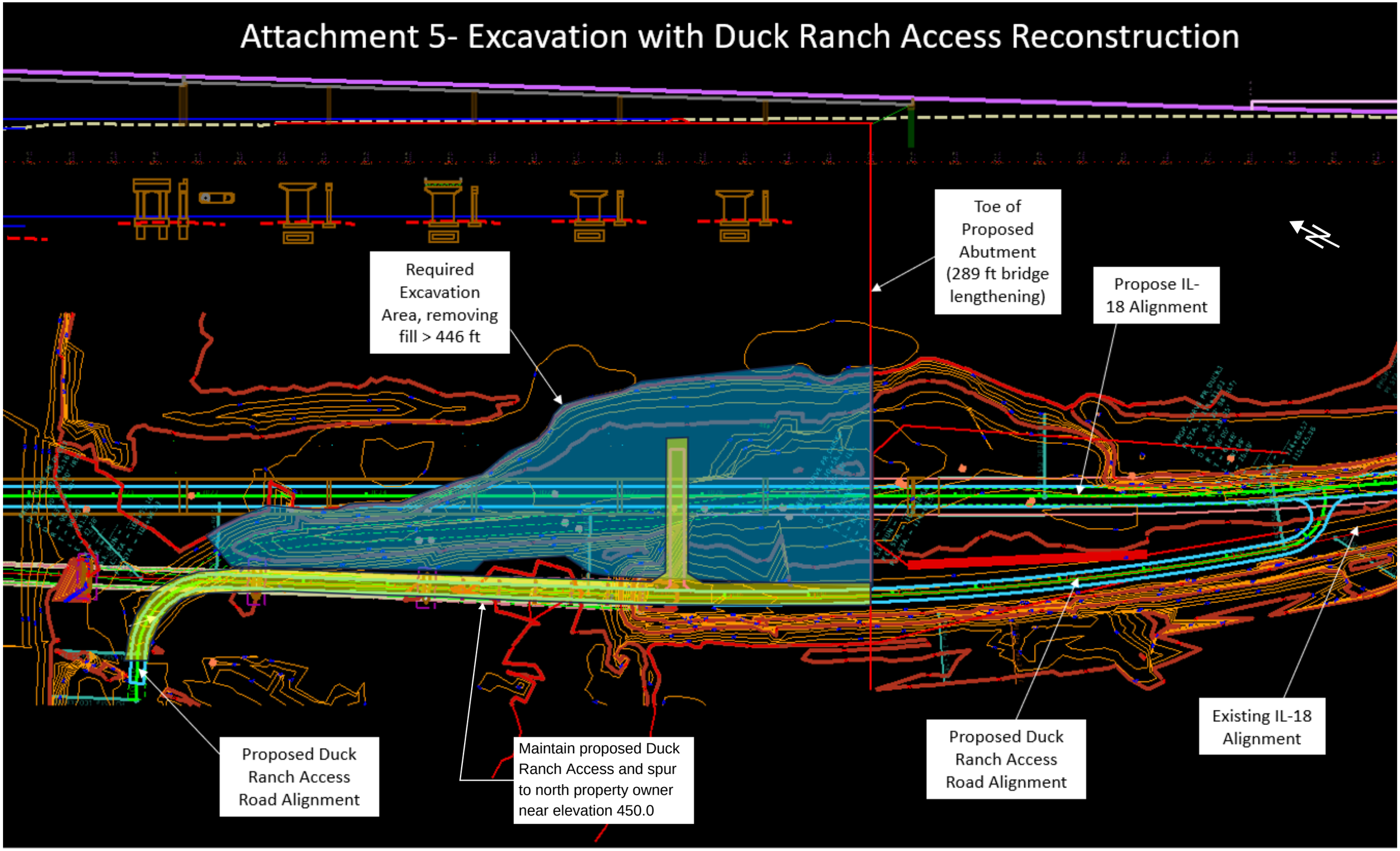

Henry_Bridge_Replacement Plan: Policy Reconstruction_1 Span_Remove Fill 7/10/2023
.12
.02
.12
Legend
WS 100yr
Ground
Ineff
Bank Sta
520
500
480
460
440
420
Elevation (ft)
-8000
-6000
-4000
-2000
0
2000
4000
Station (ft)


Henry_Bridge_Replacement Plan: Policy Reconstruction_2 Span_Remove Fill 7/10/2023
.12
.02
.12
Legend
WS 100yr
Ground
Ineff
Bank Sta
520
500
480
460
440
420
Elevation (ft)
-8000
-6000
-4000
-2000
0
2000
4000
Station (ft)

Attachment 4- Approximate Required Excavation Area (2-Span Lengthening)



Attachment 5- Excavation with Duck Ranch Access Reconstruction



APPENDIX 12

Pavement Design

BDE 5401 Template (Rev. 11/22/2019)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 03/04/2025

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL18
Section: East and West of IL 18 Bridge
County: Marshall
Location: City of Henry
Comments: Parameters of shoulder width set at 6' for the life cycle cost for the full length of the paved segment of the project
Design Date: 04/15/2024 <-- BY
Modify Date: 05/01/2024 <-- BY

	ADT	Year
Current:	2,200	2019
Future:	2,900	2045

Facility Type: Other Marked State Route
# of Lanes = 2 or 3
Part of future 4 lanes or more ? No
One Way Street ? No
Road Class: II
Subgrade Support Rating (SSR): Poor
Construction Year: 2027
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	2,550	95.0%	P = 50%
SU =	250	81	3.0%	S = 50%
MU =	750	54	2.0%	M = 50%

Struct. Design ADT = 2,685 (2037)

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT			RIGID PAVEMENT		
Cpv =	0.15		Cpv =	0.15	
Csu =	112.06		Csu =	135.78	
Cmu =	385.44		Cmu =	567.21	
TF flexible (Actual) =	0.30	(Actual ADT)	TF rigid (Actual) =	0.42	(Actual ADT)
TF flexible (Min) =	3.17	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	4.59	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 3.17
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.O)
Goto Map
HMA Mixture Temp. = 75.8 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 670 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 86 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 10.25 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.07 in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness = 10.25 inches

JPC Pavement

Use TF rigid = 4.59
Edge Support = Tied Shoulder or C&G
Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 4.59
IBR value = 3
CRCP Thickness = 7.75 in. (Fig. 54-4.N)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Pavement Over Rubblized PCC

Use TF flexible = 3.17
HMA Overlay Design Thickness = 7.50 in. (Fig. 54-5.U)
Goto Map
Limiting Strain Criterion Thickness = 10.91 in. (Fig. 54-5.V)
Use HMA Overlay Thickness = 7.50 inches

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA inches

CONTACT RESEARCH FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

	Min. Str. Design Traffic (Fig 54-2.C)		
Facility Type	PV	SU	MU
Interstate or Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
Class	Csu	Cmu	Csu	Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
Number of Lanes	P	S	M	P	S	M
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

BDE 5401 Template (Rev. 11/22/2019) Printed: 03/04/2025

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE	IL 18
SECTION	Job Section
COUNTY	Marshall
LOCATION	City of Henry
FACILITY TYPE	NON-INTERSTATE

PROJECT LENGTH			2042.87 FT = = >	0.39 Miles	USER OVERRIDE COLUMN
# OF CENTERLINES			1 CL		
# OF LANES			2 LANES		
# OF EDGES			2 EP		
LANE WIDTH - AVERAGE			12 FT		
SHOULDER WIDTH	HMA	Left	6 FT		
	HMA	Right	6 FT		
	Total Width of Paved Shoulders		12 FT		

PAVEMENT THICKNESS (FLEXIBLE)	10.25 IN	15.07 IN MAX	
SHOULDER THICKNESS	8.00 IN	HMA_SD Standard Design	
HMA OVERLAY THICKNESS	2.00 IN		

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE	Off User Override
	3.17	0.30	3.17	

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$95.00 / TON
HMA TOP BINDER	$95.00 / TON
HMA LOWER BINDER	$80.00 / TON
HMA BINDER (IL-9.5FG or IL-4.75)	$85.00 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100%	QUANTITY	UNIT	UNIT PRICE	COST	USER SUPPLIED QUANTITY	USER SUPPLIED UNIT PRICE
HMA PAVEMENT (FULL-DEPTH)	(10.25")	5448	5,448	SQ YD	$51.18 / SQ YD	$278,794 ~		
HMA SURFACE COURSE	(2.00")	1.0069	614	TONS	$95.00 / TON	$0		
HMA TOP BINDER COURSE	(2.25")	1.0217	701	TONS	$95.00 / TON	$0		
HMA LOWER BINDER COURSE	(6.00")	1.0503	1,923	TONS	$80.00 / TON	$0		
HMA SHOULDER	(8.00")	2724	1,220	TONS	$72.00 / TON	$87,860 ~		
CURB & GUTTER			0	LIN FT	$30.00 / LIN FT	$0		
SUBBASE GRAN MATL TY C (TONS)			166	TONS	$25.00 / TON	$4,150		
IMPROVED SUBGRADE:	Modified Soil	Width = 38.7'	8,786	SQ YD	$7.00 / SQ YD	$61,502		
Reserved For User Supplied Item			0	UNITS	$0.00 / UNITS	$0		
Reserved For User Supplied Item			0	UNITS	$0.00 / UNITS	$0		
PAVEMENT REMOVAL			5,448	SQ YD	$0.00 / SQ YD	$0		
SHOULDER REMOVAL			2,724	SQ YD	$0.00 / SQ YD	$0		

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST $432,306
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE $45,571

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	T	UNIT COST	Schedule Quantity	Unit Cost Override
ROUTINE MAINTENANCE ACTIVITY				$0.00 / LANE-MILE / YEAR		
HMA OVERLAY	(2.00")		2.00			
HMA OVERLAY PVMT SURF	(2.00")	1.0069	2.00	$10.71 / SQ YD	5448	
HMA OVERLAY PVMT	(2.00")	1.0069	2.00	$10.71 / SQ YD	5448	
HMA SURFACE MIX	(2.00")	1.0069 Surface Mix	2.00	$10.71 / SQ YD	5448	
HMA BINDER MIX	(0.00")	1.0139 4.75 Binder Mix	0.00	$0.00 / SQ YD	5448	
HMA OVERLAY SHLD (Year 30)	(2.00")	Shoulder Mix	2.00	$8.06 / SQ YD	2724	
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	2.00	$8.06 / SQ YD	2724	
MILLING (2.00 IN)			2.00	$3.00 / SQ YD		
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Mix	2.00	$80.64 / SQ YD		
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	2.00	$78.06 / SQ YD		
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Binder Mix	2.00	$79.52 / SQ YD		
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder Mix	2.00	$78.06 / SQ YD		
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				$2.00 / LIN FT		
CENTERLINE JOINT ROUT & SEAL				$2.00 / LIN FT		
RANDOM / THERMAL CRACK ROUT & SEAL	(100% Rehab = 110.00' / Station / Lane)			$2.00 / LIN FT		

FLEXIBLE TOTAL LIFE-CYCLE COST $609,314
FLEXIBLE TOTAL ANNUAL COST PER MILE $64,230

HMA_SD MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 03/04/25

FULL-DEPTH HMA PAVEMENT
HMA PAVEMENT OVER RUBBLIZED PCC PAVEMENT
Figure 54-7.C
STANDARD DESIGN

MAINTENANCE COSTS: ITEM	%QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 5					
LONG SHLD JT R&S	100.00%	4,086 LIN FT	$2.00	$8,172	
CNTR LINE JOINT R&S	100.00%	2,043 LIN FT	$2.00	$4,086	
RNDM / THRM CRACK R&S	50.00%	2,247 LIN FT	$2.00	$4,494	
PD PVMT PATCH M&F SURF	0.10%	5 SQ YD	$80.64	$403	
PWFn = 0.8626		PW = 0.8626 X		$17,155	$14,798
YEAR 10					
LONG SHLD JT R&S	100.00%	4,086 LIN FT	$2.00	$8,172	
CNTR LINE JOINT R&S	100.00%	2,043 LIN FT	$2.00	$4,086	
RNDM / THRM CRACK R&S	50.00%	2,247 LIN FT	$2.00	$4,494	
PD PVMT PATCH M&F SURF	0.50%	27 SQ YD	$80.64	$2,177	
PWFn = 0.7441		PW = 0.7441 X		$18,929	$14,085
YEAR 15					
MILL PVMT & SHLD 2.00"	100.00%	8,171 SQ YD	$3.00	$24,513	
PD PVMT PATCH M&F ADD'L 2.00"	1.00%	54 SQ YD	$79.52	$4,294	
HMA OVERLAY PVMT 2.00"	100.00%	5,448 SQ YD	$10.71	$58,366	
HMA OVERLAY SHLD 2.00 "	100.00%	2,724 SQ YD	$8.06	$21,965	
PWFn = 0.6419		PW = 0.6419 X		$109,138	$70,052
YEAR 20					
LONG SHLD JT R&S	100.00%	4,086 LIN FT	$2.00	$8,172	
CNTR LINE JOINT R&S	100.00%	2,043 LIN FT	$2.00	$4,086	
RNDM / THRM CRACK R&S	50.00%	2,247 LIN FT	$2.00	$4,494	
PD PVMT PATCH M&F SURF	0.10%	5 SQ YD	$80.64	$403	
PWFn = 0.5537		PW = 0.5537 X		$17,155	$9,498
YEAR 25					
LONG SHLD JT R&S	100.00%	4,086 LIN FT	$2.00	$8,172	
CNTR LINE JOINT R&S	100.00%	2,043 LIN FT	$2.00	$4,086	
RNDM / THRM CRACK R&S	50.00%	2,247 LIN FT	$2.00	$4,494	
PD PVMT PATCH M&F SURF	0.50%	27 SQ YD	$80.64	$2,177	
PWFn = 0.4776		PW = 0.4776 X		$18,929	$9,041
HMA_SD					
YEAR 30 NON-INTERSTATE					
MILL PVMT & SHLD 2.00"	100.00%	8,171 SQ YD	$3.00	$24,513	
PD PVMT PATCH M&F ADD'L 2.00"	2.00%	109 SQ YD	$79.52	$8,668	
PD SHLD PATCH M&F ADD'L 2.00"	1.00%	27 SQ YD	$78.06	$2,108	
HMA OVERLAY PVMT 2.00 "	100.00%	5,448 SQ YD	$10.71	$58,366	
HMA OVERLAY SHLD 2.00 "	100.00%	2,724 SQ YD	$8.06	$21,965	
PWFn = 0.4120		PW = 0.4120 X		$115,620	$47,634
YEAR 35					
LONG SHLD JT R&S	100.00%	4,086 LIN FT	$2.00	$8,172	
CNTR LINE JOINT R&S	100.00%	2,043 LIN FT	$2.00	$4,086	
RNDM / THRM CRACK R&S	50.00%	2,247 LIN FT	$2.00	$4,494	
PD PVMT PATCH M&F SURF	0.10%	5 SQ YD	$80.64	$403	
PWFn = 0.3554		PW = 0.3554 X		$17,155	$6,097
YEAR 40					
LONG SHLD JT R&S	100.00%	4,086 LIN FT	$2.00	$8,172	
CNTR LINE JOINT R&S	100.00%	2,043 LIN FT	$2.00	$4,086	
RNDM / THRM CRACK R&S	50.00%	2,247 LIN FT	$2.00	$4,494	
PD PVMT PATCH M&F SURF	0.50%	27 SQ YD	$80.64	$2,177	
PWFn = 0.3066		PW = 0.3066 X		$18,929	$5,803
					$177,008

ROUTINE MAINTENANCE ACTIVITY			0.77 Lane Miles	$0.00	$0
				MAINTENANCE LIFE-CYCLE COST	$177,008
45 YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE	$18,659

PCC PAVEMENT

JPCP

ROUTE	IL 18
SECTION	Job Section
COUNTY	Marshall
LOCATION	City of Henry
FACILITY TYPE	NON-INTERSTATE

PROJECT LENGTH			2042.87 FT = = >	0.39 Miles	USER OVERRIDE COLUMN
# OF CENTERLINES			1 CL		
# OF LANES			2 LANES		
# OF EDGES			2 EP		
LANE WIDTH - AVERAGE			12 FT		
SHOULDER WIDTH	PCC	Left	6 FT		
	PCC	Right	6 FT		
	Total Width of Paved Shoulders		12 FT		

PAVEMENT THICKNESS (RIGID)	JPCP	9.00 IN	TIED SHLD	
SHOULDER THICKNESS		9.00 IN		
HMA OVERLAY THICKNESS		2.75 IN		Off User Override

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE	
	4.59	0.42	4.59	
Worksheet Construction Type is Reconstruction	User Override Pavement Type is		JPCP	JPCP

INITIAL COSTS

ITEM	THICKNESS	100%	QUANTITY	UNIT	UNIT PRICE	COST	USER SUPPLIED QUANTITY
JPC PAVEMENT	(9.00")		5,448	SQ YD	$50.00 / SQ YD	$272,400	
PAVEMENT REINFORCEMENT			0	SQ YD	$22.00 / SQ YD	$0	
STABILIZED SUBBASE	(4.00")		6,129	SQ YD	$19.00 / SQ YD	$116,451	
PCC SHOULDERS			2,724	SQ YD	$40.00 / SQ YD	$108,960	
CURB & GUTTER			0	LIN FT	$30.00 / LIN FT	$0	
SUBBASE GRAN MATL TY C	(~ 1.86")		360	TONS	$25.00 / TON	$9,000	
IMPROVED SUBGRADE:	Modified Soil	Width = 37.0'	8,398	SQ YD	$7.00 / SQ YD	$58,786	
Reserved For User Supplied Item			0	UNITS	$0.00 / UNITS	$0	
Reserved For User Supplied Item			0	UNITS	$0.00 / UNITS	$0	
PAVEMENT REMOVAL			5,448	SQ YD	$0.00 / SQ YD	$0	
SHOULDER REMOVAL			2,724	SQ YD	$0.00 / SQ YD	$0	

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST $565,597
RIGID CONSTRUCTION ANNUAL COST PER MILE $59,621

MAINTENANCE COSTS

ITEM	THICKNESS	MATERIAL	T	UNIT COST	Schedule Quantity	Unit Cost Override
ROUTINE MAINTENANCE ACTIVITY				$0.00 / LANE-MILE / YEAR		
HMA OVERLAY	(2.75")		2.75			
HMA OVERLAY PAVEMENT	(2.75")	1.0095	2.75	$14.06 / SQ YD	5448	
HMA SURFACE MIX	(1.50")	1.0052 Surface Mix	1.50	$8.02 / SQ YD	5448	
HMA BINDER MIX	(1.25")	1.0148 4.75 Binder Mix	1.25	$6.04 / SQ YD	5448	
HMA OVERLAY SHOULDER	(2.75")	Shoulder Mix	2.75	$11.09 / SQ YD	2724	
CLASS A PAVEMENT PATCHING				$195.00 / SQ YD		
CLASS B PAVEMENT PATCHING				$150.00 / SQ YD		
CLASS C SHOULDER PATCHING				$145.00 / SQ YD		
PARTIAL DEPTH PVMT PATCH	(Mill & Fill HMA Surf)	Surface Mix	1.50	$77.98 / SQ YD		
PARTIAL DEPTH PVMT PATCH	(Mill & Fill HMA 2.75")	Surface Mix	2.75	$84.63 / SQ YD		
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				$2.00 / LIN FT		
CENTERLINE JOINT ROUT & SEAL				$2.00 / LIN FT		
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL				$2.00 / LIN FT		
RANDOM CRACK ROUT & SEAL	(100% Rehab = 100.00' / Station / Lane)			$2.00 / LIN FT		

RIGID TOTAL LIFE-CYCLE COST $672,684
RIGID TOTAL ANNUAL COST PER MILE $70,910

JPCP MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 03/04/25

JOINTED PLAIN CONCRETE PAVEMENT
UNBONDED JOINTED PLAIN CONCRETE OVERLAY
Figure 54-7.A

MAINTENANCE COSTS: ITEM	%QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 10					
PAVEMENT PATCH CLASS B	0.10%	5 SQ YD	$150.00	$750	
PWFn = 0.7441		PW = 0.7441 X		$750	$558
YEAR 15					
PAVEMENT PATCH CLASS B	0.20%	11 SQ YD	$150.00	$1,650	
PWFn = 0.6419		PW = 0.6419 X		$1,650	$1,059
YEAR 20					
PAVEMENT PATCH CLASS B	2.00%	109 SQ YD	$150.00	$16,350	
SHOULDER PATCH CLASS C	0.50%	14 SQ YD	$145.00	$2,030	
LONGITUDINAL SHLD JT R&S	100.00%	4,086 LIN FT	$2.00	$8,172	
CENTERLINE JT R&S	100.00%	2,043 LIN FT	$2.00	$4,086	
PWFn = 0.5537		PW = 0.5537 X		$30,638	$16,964
YEAR 25					
PAVEMENT PATCH CLASS B	3.00%	163 SQ YD	$150.00	$24,450	
SHOULDER PATCH CLASS C	1.00%	27 SQ YD	$145.00	$3,915	
PWFn = 0.4776		PW = 0.4776 X		$28,365	$13,547
YEAR 30 NON-INTERSTATE					
PAVEMENT PATCH CLASS B	4.00%	218 SQ YD	$150.00	$32,700	
SHOULDER PATCH CLASS C	1.50%	41 SQ YD	$145.00	$5,945	
HMA OVERLAY 2.75" (PVMT)	100.00%	5,448 SQ YD	$14.06	$76,591	
HMA OVERLAY 2.75" (SHLD)	100.00%	2,724 SQ YD	$11.09	$30,202	
PWFn = 0.4120		PW = 0.4120 X		$145,438	$59,919
YEAR 35 NON-INTERSTATE					
LONGITUDINAL SHLD JT R&S	100.00%	4,086 LIN FT	$2.00	$8,172	
CENTERLINE JT R&S	100.00%	2,043 LIN FT	$2.00	$4,086	
RANDOM CRACK R&S	50.00%	2,043 LIN FT	$2.00	$4,086	
REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,306 LIN FT	$2.00	$2,612	
PD PVMT PATCH M&F HMA 2.75"	0.10%	5 SQ YD	$84.63	$423	
PWFn = 0.3554		PW = 0.3554 X		$19,379	$6,887
YEAR 40 NON-INTERSTATE					
PAVEMENT PATCH CLASS B	0.50%	27 SQ YD	$150.00	$4,050	
LONGITUDINAL SHLD JT R&S	100.00%	4,086 LIN FT	$2.00	$8,172	
CENTERLINE JT R&S	100.00%	2,043 LIN FT	$2.00	$4,086	
REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,958 LIN FT	$2.00	$3,916	
RANDOM CRACK R&S	50.00%	2,043 LIN FT	$2.00	$4,086	
PD PVMT PATCH M&F HMA 2.75"	0.50%	27 SQ YD	$84.63	$2,285	
PWFn = 0.3066		PW = 0.3066 X		$26,595	$8,153
					$107,087

ROUTINE MAINTENANCE ACTIVITY			0.77 Lane Miles	$0.00	$0
				MAINTENANCE LIFE-CYCLE COST	$107,087
45 YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE	$11,288

RECONSTRUCTION - HMA OVER RUBBLIZED PAVEMENT

RECONSTRUCTION - PCC UNBONDED OVERLAY

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 10/31/19 11:36 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$565,597	$432,306
		ANNUAL COST PER MILE	$59,621	$45,571
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$107,087	$177,008
		ANNUAL COST PER MILE	$11,288	$18,659
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$672,684	$609,314
		ANNUAL COST PER MILE	$70,910	$64,230

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	#NAME?	#NAME?	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	#NAME?	#NAME?	#NAME?

BDE 5401 Template (Rev. 11/22/2019)

Printed: 03/04/2025 Lifecycle = 45 Years Interest Rate = 3.00%

Standard Pavement Slope = -0.01563 FT/FT
Standard Shoulder Slope = -0.04167 FT/FT
Tied PCC Shoulder Outside Edge Thickness = 9.00 IN Outside Edge ShldT = 9.00 IN
Standard Stabilized Subbase Thickness = 4.00 IN <=== (See Dark Orange Color in Diagrams Below)
Standard Pavement Subbase Outhang = 1.50 FT <=== (See Dark Orange Color in Diagrams Below)
Standard Shoulder Subbase Outhang = 6.00 IN <=== (See Yellow Color in Diagrams Below)

Standard Foreslope = 4 :1 FT/FT
Standard Wedge = 1 :1 FT/FT
(PCC Pavement) Shoulder Wedge = 0.0001 :1 FT/FT

Standard Surface & Binder SW = 2.01600 TONS / CU YD ==> 112.0 LB per SQYD IN
Standard Shoulder Subbase SW = 2.05000 TONS / CU YD ==> 113.9 LB per SQYD IN

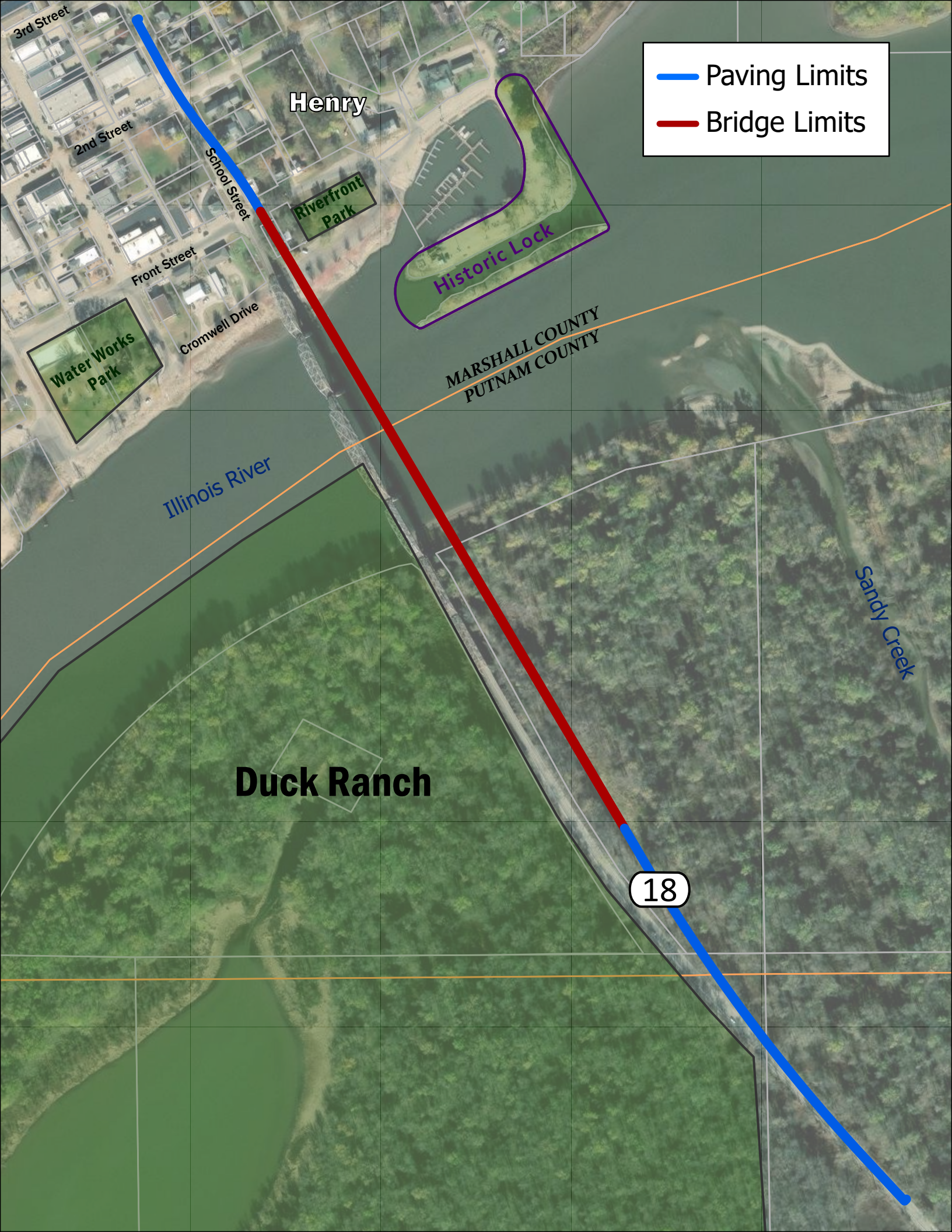
Standard Surface Thickness = 2.00 IN

HMA Surface (New Pavement)	2.00 IN
HMA Top Binder Course	2.25 IN
HMA Lower Binder Course	6.00 IN
HMA Overlay for LSCD	2.00 IN
Interstate HMA Overlay	3.75 IN
Surface	1.50 IN
Top Binder Mix	2.25 IN

Thermal / Random Crack Route & Seal 110 FT / Sta / Lane
Random Crack Route & Seal 100 FT / Sta / Lane
Patching: Additional Labor Cost = $67.00 / SQ YD

	Over HMA	Over PCC
Non-Interstate HMA Overlay	2.00 IN	2.75 IN
Surface	2.00 IN	1.50 IN
WorkSheet Setting: IL-9.5FG or IL-4.75 Binder Mix	0.00 IN	1.25 IN

Standard Design						Mirror LSC Design
HMA_SD	HMA Overlay Thickness	2.00 IN	2.75 IN	2.00 IN	HMA Overlay Thickness	HMA_LSCD
NON-INTERSTATE	Surface	2.00 IN	1.50 IN	2.00 IN	Surface	NON-INTERSTATE
	IL-9.5FG or IL-4.75 Binder Mix	0.00 IN	1.25 IN	0.00 IN	IL-9.5FG or IL-4.75 Binder Mix	


Paving Limits
Bridge Limits
Henry
3rd Street
2nd Street
School Street
Riverfront Park
Historic Lock
Front Street
Cromwell Drive
Water Works Park
MARSHALL COUNTY
PUTNAM COUNTY
Illinois River
Sandy Creek
Duck Ranch
18

APPENDIX 13

Geotechnical Reports

APPENDIX 13-A

Roadway Geotechnical Report

ROADWAY GEOTECHNICAL REPORT
ILLINOIS ROUTE 18
OVER THE ILLINOIS RIVER
FAS 2369; SECTION 104B-D
MARSHALL AND PUTNAM COUNTIES, ILLINOIS

for

Parsons

222 South Riverside Plaza

Chicago, IL 60606

(312) 930-5100

submitted by

Wang Engineering, Inc.

a Terracon Company

1145 North Main Street

Lombard, IL 60148

(630) 953-9928

Draft Report: April 2, 2024

Revised: NA

WEI Ref. No. 342-13-01 IL100/106 RGR

Technical Report Documentation Page

1. Title and Subtitle Roadway Geotechnical Report Illinois Route 18 Station 3002+03 to Station 3030+11		**2. Report Date** April 2, 2024 **3. Report Type** ☐ SGR ☒ RGR ☒ Draft ☐ Final ☐ Revised
4. Route / Section / County FAS 2369/ 104B-D/ Marshall and Putnam/ District 4		**5. Project Numbers** D-94-041-19
6. PTB / Item No. 195/038	**7. Existing Structure Number(s)** n.a.	**8. Proposed Structure Number(s)** n.a.
9. Prepared by Wang Engineering, Inc. 1145 N Main Street Lombard, IL 60148	**Contributor(s)** Author: Mickey Snider, PE QC: Corina T. Farez, P.E., PG PM: Liviu Iordache, PG	**Contact Phone Number** (630) 953-9928 x 1027 msnider@wangeng.com
10. Prepared for Parsons 222 S Riverside Plaza Chicago, IL 60606	**Contact** Mark W. Peterson, PE	**Contact Info** (312) 930-5172 Mark.W.Peterson@Parsons.com

11. Abstract

The reconstruction of Illinois Route 18 extends from Station 3002+03 west of the Illinois River to Station 3045+10.88 east of the river. The roadway will be constructed along a new alignment north and east of the existing, including the proposed river bridge replacement. The realigned roadway west of the river will be constructed through the town of Henry to connect with the new bridge at approximately Station 3008+45. The bridge terminates at a proposed, 25-foot tall embankment along the east side, which extends for approximately 1500 feet through the existing Illinois River floodplain. The embankment slopes will have a "barn roof" section graded at 1:6 (V:H) through the clear zone followed by 1:3 (V:H) and up to 1:2 (V:H) maximum to the natural ground at the east embankment and 1:4 (V:H) to the natural ground at the west embankment.

Borings drilled for the roadway encountered up to 10 feet of various fill materials on both sides of the river. The general lithologic profile beneath the fill includes up to 25 feet of soft to medium stiff silty clay floodplain soils on the east side of the river. The west bank and Henry city side of the river has loose to dense sand and sandy gravel continuing to the top of bedrock elevation. The granular soils transition from loose to medium dense to dense and very dense at elevations of about 410 to 415 feet. The groundwater level was monitored at elevations ranging from 440 to 448 feet, generally fluctuating with the rise and fall of the river level.

The west approach embankments, with a maximum height of 10 feet, will undergo long-term settlement of less than ½ inch and will have adequate FOS against global instability. The east embankment at a maximum height of 25 feet will require attention to alleviate large estimated long-term consolidation settlement and insufficient global stability FOS. The estimated undrained slope stability FOS at Station 3030+00 is 1.1 and the settlement of the embankment is estimate to be 6 to 9 inches. Both the settlement and global stability concerns can be alleviated by installing prefabricated vertical drains and constructing the embankment in stages, allowing for settlement and strength gain within the compressible floodplain soils between stages.

12. Path to archived file

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DRAFT ROADWAY GEOTECHNICAL REPORT
ILLINOIS ROUTE 18 (FAS 2369)
STATION 3002+03 TO STATION 3045+11
FAS 2369; SECTION 104B-D
MARSHALL AND PUTNAM COUNTIES, ILLINOIS

1.0 INTRODUCTION

This report presents the results of our geotechnical subsurface investigation, laboratory testing, and engineering analyses and evaluations for the roadway reconstruction and realignment of Illinois Route 18 (FAS 2369) at the Illinois River crossing in Henry, Marshall and Putnam Counties, Illinois. A *Site Location Map* is presented as Exhibit 1. Geotechnical reporting related to the proposed design and construction of the new IL18 bridge over the Illinois River is being address in a separate Structure Geotechnical Report (SGR).

Drawings provided by Parsons indicate the improvements begin northwest of the intersection of IL18 and Front Street in Henry, Station 3002+03 and continue to the back of the west abutment at Station 3008+45.50. The IL18 Bridge then extends from Station 3008+45.50 to the east side of the river at Station 3030+51.50. The roadway and embankment section continues to the east/southeast before connecting back with the existing IL18 pavement section at Station 3045+10.88.

The west side roadway will be an embankment section with a height of 10 feet and side slopes graded out at 1:4 (V:H). The Front Street elevation will be cut by approximately 10 feet in front of the west abutment to provide clearance beneath the new bridge. The east side will have new embankment running along the north side of the existing embankment with a maximum height of about 25 feet. The typical east side embankments will be graded at 1:3 beyond the 1:6 “barn roof” through the clear zone; locally, in the tallest portion of the embankment, behind the guardrail adjacent to the bridge, the roadway will require slopes increased to 1:2. The barn roof portion of the embankment does not significantly impact the analysis or performance, and therefore the report will focus primarily on the larger, impactful 1:2 slope sections.

The purpose of the investigation was to characterize the site soil and groundwater conditions and provide geotechnical analyses and recommendations for the design and construction of the proposed

embankments and pavements.

2.0 SITE AND REGIONAL GEOLOGY

The project area is located in northcentral Marshall and southwestern Putnam Counties. On the USGS *Henry Quadrangle 7.5 Minute Series* map, the bridge spans through the W ½ of Section 33, Tier 31 North, Range 2 West of the Third Principal Meridian and the SE ¼ of Section 16, Tier 13 North, Range 10 East of the Fourth Principal Meridian.

2.1 Site Physiography and Geologic Features

The project area is located within the Bloomington Ridged Plaine physiographic subsection of the Till Plains Section (Leighton et al. 1948). The Bloomington Ridged plain includes Wisconsian-aged moraines that form a series of loops, roughly concentric with the wider intermorainal areas. The project site spans through the ancient Mississippi valley, todays Illinois River valley, carved by glacial meltwater into the broad intermorainal area bordered on the east by the Marna Moraine and on the west by the Eureka Moraine. Silty clay to silty clay loam ground moraine deposits up to 10-feet thick from the Lemont Formation, Yorkville and Batestown facies cover approximately 30 to 75 feet of sand and gravel outwash deposits of the Henry Formation. The sand and gravel rests unconformably over the bedrock. These glacial and post glacial deposits fill the West Channel Middle Illinois Bedrock Valley.

The bedrock is made of Pennsylvanian-age, interbedded shale, mudstone, sandstone, and coal of the Carbondale Formation. Bedrock is mapped at approximately 385 to 400 feet elevation, about 57 to 80 feet below ground surface.

Our subsurface investigation results fit into the local geologic context. The borings drilled in the project area encountered native sediments consisting of occasional patches of clayey, lacustrine deposits overlying silty clay diamicton and silty loam diamicton interbedded with gravel and sand. The structure borings drilled on site encountered shale bedrock at elevations of 389 to 393 feet.

2.2 Site Pedological Features

After the Wisconsin and Illinois glaciations, several types of soils developed through weathering on glacigenic sediments. In Marshall and Putnam Counties, the soil types were surveyed by the USDA (2021). Summaries of the USDA soil types within the project area, including their relevant

geotechnical index properties and suitability as subgrade and road fill are shown in the *Site Pedological Map and Table* (Exhibits 3-1 and 3-2). The soil information provided by USDA is meant to be used as a general reference in the absence of a site-specific investigation. In this instance, our findings regarding soil features affecting suitability for highway and street construction are generally consistent with the information presented in Exhibit 3. East of the river, the relatively weak floodplain soils will present challenges for embankment construction and some areas will require additional subgrade treatment.

2.3 Climate Data

The subsurface investigation was performed from April to August 2021 and continued in May and June 2023. To assess the possible effects of temperature and precipitation on water table data and soil moisture, the climatic conditions for the investigation period and three months prior to the start of each of the investigation interval are summarized graphically in Figures 1 through 4. The precipitation and temperature data for the investigation period are compared against thirty-year monthly data (1990 to 2020) in box-and-whiskers format to show deviations from "normal" climate conditions during the current investigation. Data were obtained from the Minonk, Illinois Station (NCDC 2023).

The deviations from the historical 30-year climate data show high to average precipitation in 2021. In 2023, February experienced high precipitation and May and June experienced below median precipitation. Temperatures in 2021 were high to average during the investigation period except for February were it experienced lower than median temperatures In 2023 temperatures were high to median during the investigation period. We estimate these climate factors may have influenced the groundwater readings, in particular the potential for perched groundwater on the east side of the river, within the river floodplain.

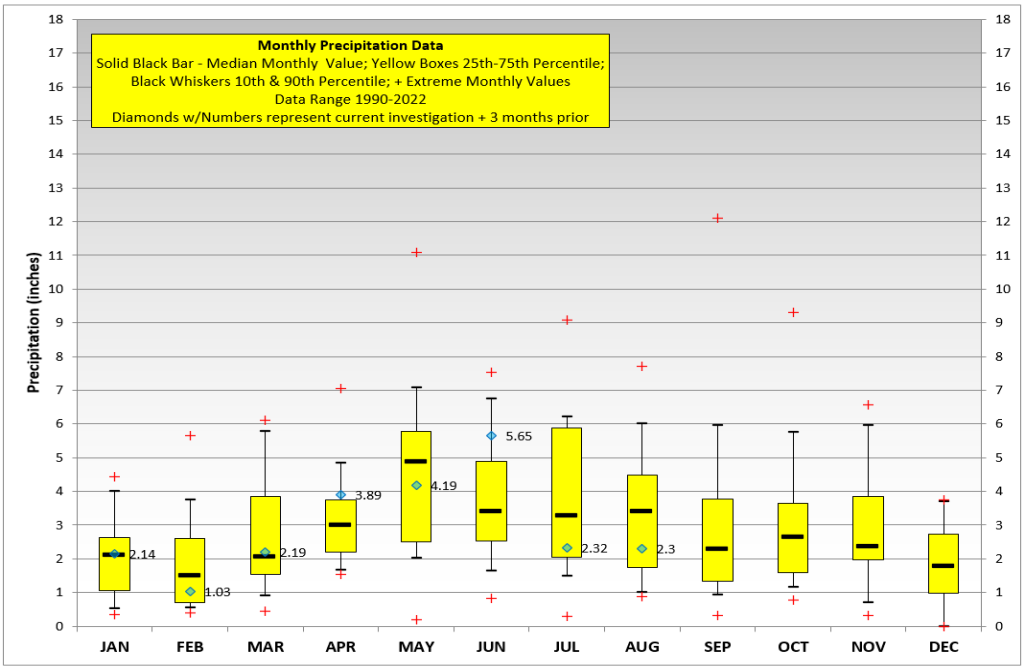


Fig 1: Monthly Precipitation Data (2021)

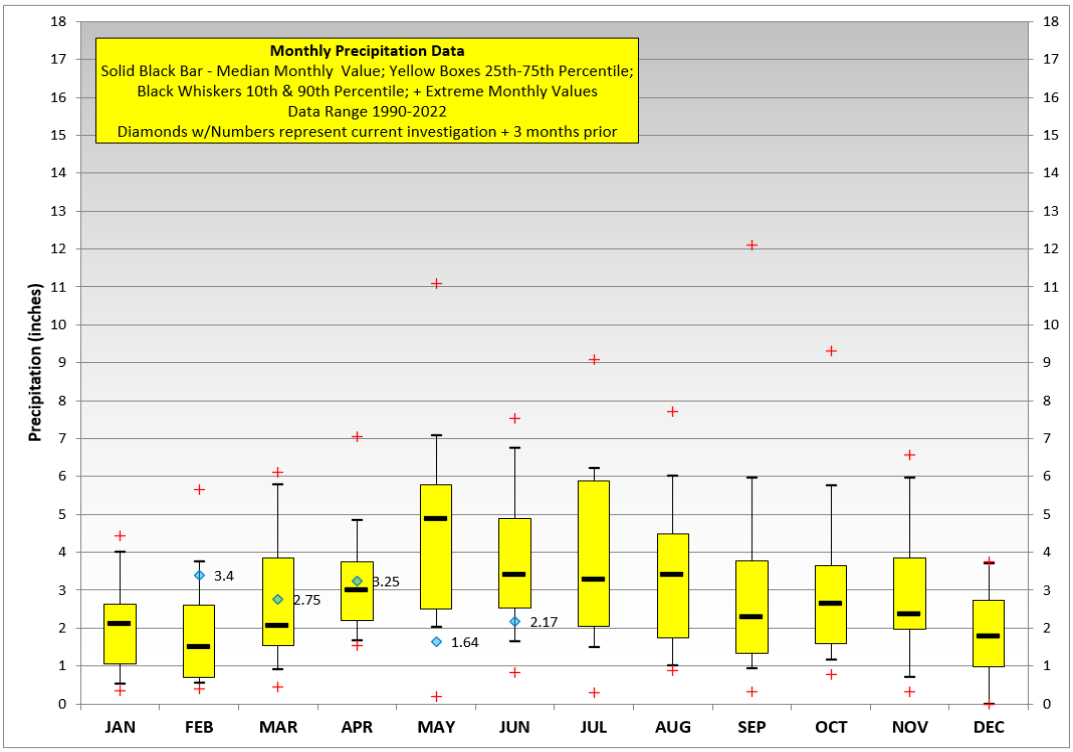


Fig 2: Monthly Precipitation Data (2023)

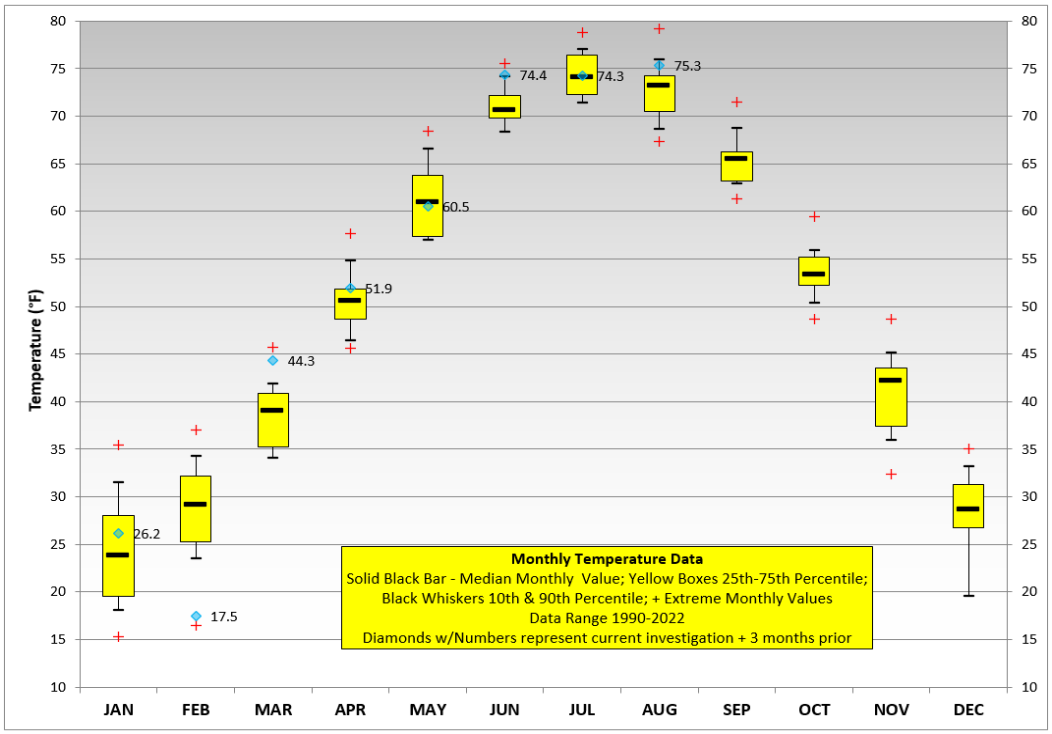


Fig 3: Monthly Temperature Data (2021)

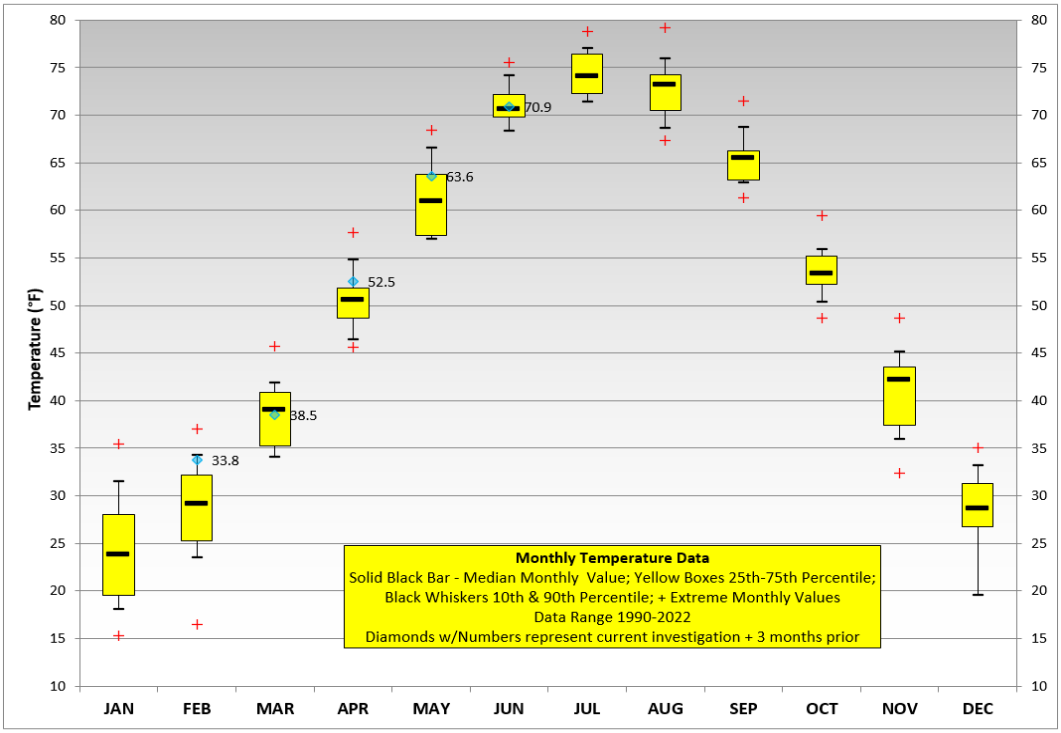


Fig 4: Monthly Temperature Data (2023)

3.0 INVESTIGATION METHODS

3.1 Subsurface Investigation

The subsurface investigation along the IL18 roadway consisted of eight soil borings. Borings EB-01 through EB-06 and EMB-P2-01 through EMB-P2-06 were drilled to investigate the conditions at the east embankment and roadway. These borings were advanced from elevations of 442.9 to 454.6 feet to depths of 27.5 to 40 feet beg. Borings EMB-P2-07 and BSB-01 were advanced to investigate soil conditions at the west embankment. The west borings were advanced from elevations of 476.84 to 477.0 feet to depths of 35 to 108.7 feet bgs. Northings and eastings were surveyed by Wang with a mapping-grade GPS unit and elevations were surveyed by others and provided by Parsons. Stations and offsets were provided by Parsons. The boring locations are shown in the *Boring Logs* (Appendix A) and in the *Soil Boring Location Plans and Soil Profiles* (Appendix E).

Truck- and ATV-mounted drilling rigs, equipped with hollow stem augers and rotary equipment, were used to advance and maintain open boreholes. Soil sampling was performed according to AASHTO T 206, "*Penetration Test and Split Barrel Sampling of Soils*." The SPT borings were either continuously sampled or sampled at 2.5-foot intervals to 30 feet bgs and at 5.0-foot intervals thereafter. Samples collected from each interval were placed in sealed jars for further examination and laboratory testing. Bedrock at Boring BSB-01 was sampled and tested in accordance with the IDOT *Modified Standard Penetration Test* method. Undisturbed Shelby tube samples of east embankment foundation soils were collected in accordance with AASHTO T 207, "*Thin-Walled Tube Sampling of Soils.*"

Field boring logs, prepared and maintained by a Wang geologist, include lithological descriptions, visual-manual soil classifications (IDH Soil Classification System), results of Rimac and pocket penetrometer unconfined compressive strength tests, and results of Standard Penetration Tests (SPT), recorded as blows per 6 inches of penetration.

Groundwater levels were measured while drilling and at completion of each boring. The boreholes were backfilled upon completion with soil cuttings and/or bentonite chips and, where necessary, the pavement surface was restored to its original condition. Groundwater monitoring piezometers were installed with TROLL data loggers at Borings EB-04-PZ and EB-08-PZ at depths of 26 to 44 feet below existing grade.

3.2 Laboratory Testing

Cohesive samples were tested in the laboratory for moisture content (AASHTO T265). Atterberg limits (T89/90) and particle size (T88) analyses were performed to classify selected samples. Shelby tube samples were tested for one-dimensional consolidation (T216) and consolidated-undrained (CU) triaxial (T297) shear strength. Field visual descriptions of the soil samples were verified in the laboratory. The soils were classified according to the IDH Soil Classification System and an *IDH Subgrade Support Rating Chart* (Appendix B). Laboratory test results are shown in the *Boring Logs* (Appendix A), in the *Laboratory Test Results* (Appendix B).

4.0 INVESTIGATION RESULTS

The subsurface investigation revealed two distinctly different subsurface profiles. The west approach investigation was performed within the town of Henry, whereas the east approach investigation explored river floodplain deposits through a vast area isolated to the east side of the river. Detailed descriptions of the soil conditions encountered during the subsurface investigation are presented in the attached boring logs (Appendix A) and in the *Soil Boring Location Plans and Soil Profiles* (Appendix E). Please note that strata contact lines represent approximate boundaries between soil types. The actual transition between soil types in the field may be gradual in horizontal and vertical directions.

4.1 Lithological Profile

Borings EMB-P2-07 and BSB-01 were drilled on the Henry side of the bridge adjacent to the existing IL18. The surface at these borings consists of bare ground or 1 inch of deteriorated pavement. Below the surface the general lithological profile within the zone of influence for the roadway and embankment includes 1) man-made ground; and 2) medium dense sand and sandy gravel.

1) *Man-made ground (fill)*

The fill on the Henry side of the river is about 8 to 12 feet thick and consists of stiff, brown and gray silty clay loam with an unconfined compressive strength (Q_u) of 1.0 tsf overlying loose to dense sand and gravelly sand. The fill material, placed to build out the embankment, contains noticeable amounts of concrete debris and wood fragments.

2) *Loose to very dense sand and sandy gravel*

Beneath the fill the borings encountered loose to medium dense, brown and gray, medium to coarse sand and sandy gravel extending through the zone of influence for the embankment, or about 20 to 30

feet. The sand has SPT values of 6 to 28 blows per foot of penetration and provides a stable foundation for embankment and roadway construction.

The borings drilled on the east side of the bridge were advanced primarily along an existing access road off IL18. The surface at these borings consists of 6 to 8 inches of silty clay loam topsoil. Below the surface the general lithological profile within the zone of influence for the roadway and embankment includes 1) man-made ground; and 2) medium dense sand and sandy gravel.

1) *Man-made ground (fill)*

The fill encountered on the east side of the river ranges in thickness from about 5 to 8 feet, but thins out to natural ground near the edge of the river. The fill on this side of the river generally consists of medium stiff to stiff, brown silty clay and silty clay loam with Q_u values of 0.8 to 1.8 tsf and moisture content values of 20 to 27%. A portion of the fill near the surface includes loose to medium dense, brown gravelly loam and sandy gravel with SPT values of 3 to 20 blows per foot of penetration. Some of the fill material on the east side was also encountered containing fragments of brick, glass, and other deleterious materials indicating an uncontrolled manner of fill placement.

2) *Soft to medium stiff silty clay*

Beneath the fill along the east side of the river the borings encountered up to 25 feet of soft to stiff, gray silty clay floodplain deposits extending down to an elevation of about 423 to 420 feet. The silty clay has Qu values primarily between 0.4 and 0.7 tsf and moisture content values around 27 to 37%. While this soil deposit is soft and compressible, it has a relatively low organic content of 4 to 5% and medium plasticity, with liquid limit (L_L) values of 33 to 46% and plastic limit (P_L) values of 16 to 17%. Liquidity indices are about 0.5 to 0.7, which indicates a soil that will be prone to excessive deformation under the weight of new embankment fill, but the low organic content and plasticity indicate a soil that could be improved through one of several method options.

3) *Loose to very dense sand and sandy gravel*

Immediately beneath the floodplain deposits the borings encountered loose to very dense, brown and gray, medium to coarse sand and sandy gravel extending to the top of bedrock. The sand is initially loose to medium dense, with SPT values of 5 to 21 blows per foot of penetration down to an elevation of about 415 to 420 feet before grading to a very dense consistency. The very dense sandy gravel measured SPT value greater than 50 blows per foot of penetration, with widespread measurements of rig chatter and the possibility of cobble-size soil fractions.

4) *Weak, poor quality shale*

At a relatively consistent elevation of around 389 to 393 feet the borings encountered weak, poor quality shale bedrock. The bedrock has no impact on the roadway or embankment design or construction. Detailed information on the bedrock can be found in the IL18 Bridge SGR.

4.2 Groundwater Conditions

Groundwater was observed while drilling at 3 to 35 feet bgs; notably the groundwater was recorded at the first granular layer or interbed encountered below the river level in each boring. Groundwater monitoring piezometers, designated as EB-04-PZ and EB-08-PZ, were installed along the west and east sides of the river, respectively. Piezometer screens were installed within the granular aquafer on both sides with depths of 26 to 44 feet, or elevations of 426 to 408 feet. Summaries of the groundwater monitoring data between September 2021 and June 2023 are shown in Figure 5. The information from the piezometers shows groundwater levels correlating to the elevation of the surface water in the river, fluctuating between elevations of 440 to 448 feet.

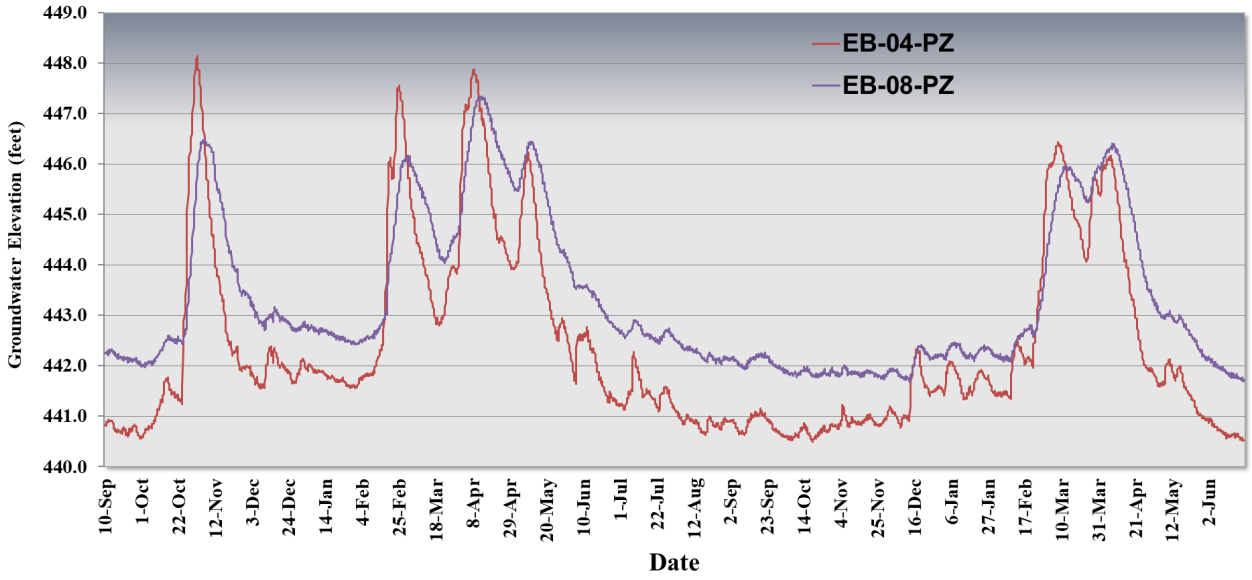


Fig. 5: Groundwater Monitoring Data

5.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

The roadway improvements along IL18 begin northwest of the intersection of IL18 and Front Street in Henry at Station 3002+03 and continue to the back of the west abutment at Station 3008+45.50. The portion of the existing roadway between the west limit and Station 3005+50 will be at existing grade and will involve pavement reconstruction. The new west approach embankment begins at Station 3005+50 and continues to the back of the abutment. The IL18 Bridge omission extends from Station 3008+45.50 to the east side of the river at Station 3030+51.50. The roadway and embankment section continues to the east/southeast before connecting back with the existing IL18 roadway at Station 3045+10.88.

The west side embankment section will have a maximum height of about 10 feet and side slopes graded out at 1:4 (V:H). There may be some retaining walls required in front of the west abutment along Front Street that will be included in an SGR during final design. The east side approach will have new embankment running along the north side of the existing roadway embankment with a maximum height of about 25 feet. The highest portions of the east side embankment will be graded as steep as 1:2.

The following sections present site preparation and subgrade treatment, roadway drainage, and recommendations concerning the proposed embankment fill sections.

5.1 Site Preparation and Earthwork

It is recommended the existing topsoil be stripped and pavement be removed within the limits of the proposed embankment fill placement and grading. Along the west approach the soil borings encountered either bare ground or parking lot pavement with a thickness of 1 inch. The east side embankment will be placed in an area with an estimated average topsoil stripping thickness of 7 inches. The east embankment area will also involve significant tree and other vegetation removal.

We recommend a shrinkage factor of 15% to be used to measure borrowed and furnished excavation quantities. The areas along the east approach where new fill is to be placed against existing embankments should be benched or deeply plowed prior to fill placement in accordance with IDOT Section 205.03 (2022).

5.2 Subgrade Treatment and Recommendations

The embankment borings advanced along the proposed alignment show a combination of medium dense granular fill capable of providing a stable working platform along the west reconstruction and soft cohesive soils south and east of Station 3033+00 that will require a stable working platform to be constructed at the east embankment. The soft subgrade in this area will make compaction efforts, such as achieving a specified maximum dry density, difficult. We recommend establishing a working platform consisting of fine or coarse aggregate that can be tamped into place and does not require manual compaction.

According to IDOT Mechanistic Pavement Design (MPD), a minimum 12 inches of improved subgrade should be included beneath the pavement section (IDOT 1999). At the west end of the roadway pavement reconstruction is proposed between Stations 3002+03 and 3005+50. Along this 250-foot stretch, the actual need for removal and replacement along the reconstructed length should be determined in the field at the time of construction. The subgrade should be proof rolled in accordance with the IDOT *Subgrade Stability Manual* (2005) to check for deflection under the wheels of heavy construction equipment. Any potentially unstable soils should be tested by dynamic cone penetrometer and evaluated and treated in accordance with IDOT Section 301 (2022) and the *Subgrade Stability Manual* (IDOT, 2005). Unsuitable and unstable subgrade soils encountered during proof rolling should be removed and replaced with IDOT *Aggregate Subgrade Improvement*, as determined by the engineer in the field. Any highly moist soils, if not otherwise unsuitable or unstable, encountered within the exposed roadway subgrade should be disked or tilled, dried and compacted before placement of pavement materials.

5.3 Subgrade Support Rating

The subgrade soils will exhibit a Subgrade Support Rating (SSR) of POOR. Due to the unknown nature of the fill materials along both embankment sections, an SSR rating of POOR should be used project wide. The pavement could also be designed based on an IBR of 3.

5.4 Roadway Drainage

The proposed subgrade and pavement should have proper surface grading to remove water accumulations and prevent the pooling of water. If clayey soils are used to construct the embankments, they will exhibit poor drainage characteristics. Therefore, Wang recommends the installation of 4.0-inch diameter transverse underdrains at the low points in the proposed profile and at 300-foot intervals between. The underdrains should be installed at a depth of 30 inches below the

top of pavement elevations. Transverse underdrains should also be installed to drain any areas determined to require undercut and backfill during construction. The underdrains should be designed and installed in accordance with IDOT Section 601 (2022).

5.5 West Approach Embankment

Based on the drawings provided by Parsons in September 2023, the proposed alignment begins at grade along IL18 at Station 3002+03 and remains at approximately existing grade until Station 3005+50. The approach embankment to the west end of the bridge will be constructed between Station 3005+50 and 3008+45.50. The embankment will have a maximum height of approximately 10 feet where Front Street is being lowered. Backslopes along the lowered Front Street will be 1:3 along the west side. Slopes at 1:2.5 may be used locally in front of the abutment with the slopewall, if required. Grading to the east side will be flattened to approximately level grade. The Front Street cut in front of the west abutment will be made through granular soils. These materials can be reused as fill in accordance with Section 6.2.

5.5.1 Settlement

Settlement evaluations have been performed at Station 3008+00 using correlations to the soil conditions encountered in Boring BSB-01. The foundation soils are dry and granular, which are not prone to settlement or deformation. We estimate the long-term settlement of the embankment will be less than ½ inch.

5.5.2 Global Stability

The proposed embankment along the west side will be a relatively low-lying fill section with 1:4 side slopes and absent any potential groundwater source. The foundation soils will provide sufficient support for the side slopes and we estimate they have adequate FOS against global instability.

5.6 East Approach Embankment

Wang has performed settlement and global stability analyses for the east approach embankment at locations immediately behind the east abutment, Station 3030+50 where the embankment height is a maximum of approximately 25 feet. Settlement estimates indicate large, long-term deformations can be expected across the length of the alignment profile extending back near the tangent with the existing roadway. Global stability at the tallest embankment section, Station 3030+50, is insufficient for the steepened 1:2 (V:H) side slope. Grading out to 1:3 improves this condition, but the FOS against global instability remains less than the IDOT requirement.

5.6.1 Settlement

Evaluations were performed to estimate the total and differential long-term settlement of the proposed east approach embankment that will be constructed above the soft floodplain deposits described in Section 4.2. The embankment height ranges from about 7 feet at Station 3036+00 where it begins to increase to the north and west at 3% to a maximum of 25 feet at the back of the east bridge abutment, Station 3030+50. The new embankment will apply additional loads of approximately 3,100 psf at Station 3030+50, 1,800 psf at Station 3033+00, and 900 psf at Station 3036+00.

Compressible soils begin within 5 to 6 feet beneath the ground surface in the borings. The soft silty clay loam samples have L_I from 0.4 to as high as 1.2, indicating large deformations should be expected. The laboratory testing shows compression indices (c_c) of 0.25 up to 0.36 and in-situ void ratios of 0.7 to as high as 1.2. The consolidation coefficients (c_v) are low at approximately 0.06 ft^2/day at loads of around 2,000 to 4,000 psf, indicating slow time rates should be expected.

The long-term settlement of the embankment has been calculated using two methods. The laboratory test data has been processed considering Terzhagi's one-dimensional consolidation equation and the boring log data has been input into IDOT Spreadsheet BBS 150, *Cohesive Soil Settlement Estimate*. The results of these settlement estimates are shown graphically in Figure 6, between the back of the east abutment at Station 3037+00. The results show fair agreement across the methods with the equation estimating larger settlements at the abutment and the spreadsheet estimating larger settlements at the lower embankment. The estimates indicate that the embankment will undergo long-term consolidation settlements of at least 6 to 9 inches at the highest portions of the embankment.

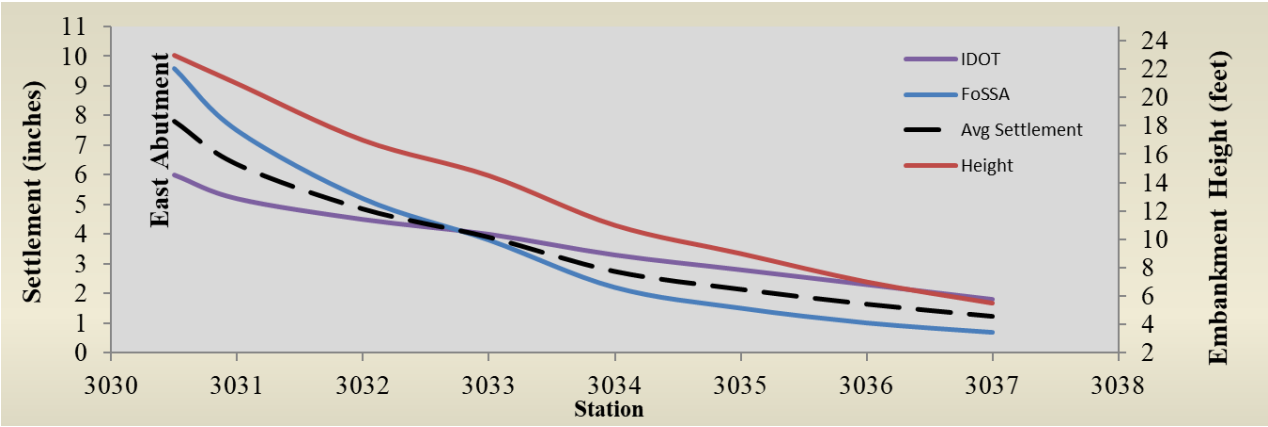


Fig 6: Summary of East Embankment Settlement Estimates

At the back of the abutment, Station 3030+50, we estimate the foundation soils will achieve 50% of primary consolidation settlement, or about 4 inches of residual settlement, after 330 days assuming double drainage is provided by installing a sand blanket. If only single drainage is provided, however, the soils will not achieve 2 inches of residual settlement until approximately 3,000 days (about 8 years) and 1 inch of residual settlement until 5,000 days (13 years). Due to the need to complete high levels of primary consolidation prior to pavement placement, we recommend providing double drainage beneath the embankment by installing a sand blanket with a minimum thickness of 24 inches at the base (see below). This sand blanket ensures a vertical pore water drainage path out of the foundation soils.

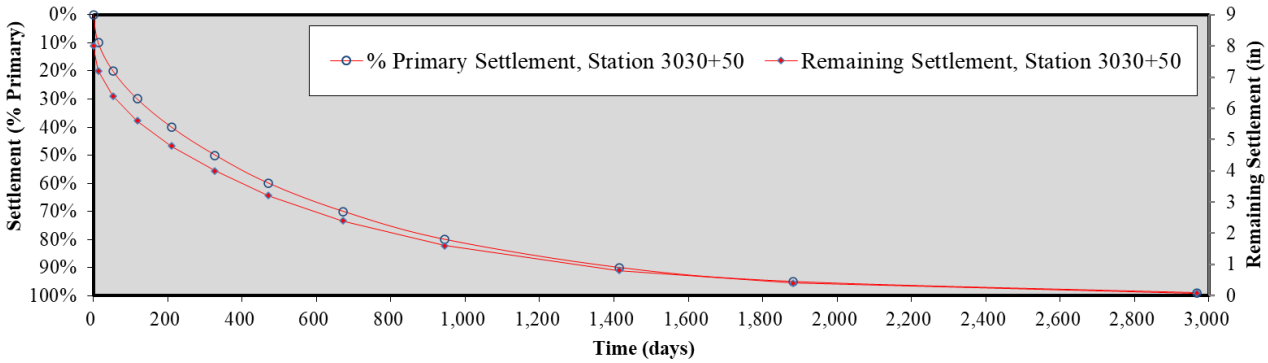


Fig 7: Time Rate of East Embankment Settlement

Due to the large, predicted settlement and long settlement periods, the ground will not be appropriate for the placement of pavement without improvement. To reach a tolerable residual settlement of 1.0 inch for the construction of the approach slab and pavement, as well as the 0.4-inch requirement to avoid downdrag loading at the east abutment, the embankment foundation soils will require prefabricated vertical drains (PVDs) beneath the embankment prior to fill placement.

5.6.2 Global Stability

The global stability of the approach embankment slopes was analyzed based on the soil profiles described in Section 4.1 and the preliminary drawings provided by Parsons. At the east embankment the proposed side slopes will be graded at 1:2 (V:H) and the embankment will be filled with either clay borrow or reuse of in-situ excavated soils.

The global stability of the east approach embankments at Station 3030+50 was analyzed based on the soil profile described in Section 4.1 and the information provided in the drawings. The side slopes are also graded at 1:2 (V:H). The minimum required FOS for both short (undrained) and long-term

(drained) conditions is 1.3 for fill slopes analyzed with undisturbed Shelby tube data (IDOT 2012). *Slide v6.0* evaluation exhibits employing the Bishop Simplified method of analysis are shown in Appendix C. We estimate the slopes have a minimum undrained FOS of 1.1 (Appendix C-1) and a drained FOS of 1.7 (Appendix C-2). The FOS in the undrained condition will need to be increased by way of the ground remediation or improvement meant to mitigate the embankment settlement.

The slopes at this location fail to meet the IDOT required FOS of 1.3 for fill embankments investigated with undisturbed sampling. In addition, Wang has performed sensitivity analyses for both embankment fill scenarios. The results of the sensitivity analysis, and subsequent stability analyses each assuming slopes graded at 1:2, indicate the FOS of the embankment system can be increased to a level greater than 1.3 by increasing the shear strength of the underlying soft clayey foundation soils to a minimum of 660 psf and to a FOS of 1.5 by increasing the shear strength to about 800 psf (Appendix C-1).

Preliminary estimates indicate the consolidation of these soil layers by the addition of the embankment will, by default, result in this level of strength increase. Therefore, the embankment could be constructed in two stages with allowance for settlement and strength gain between stages. Alternatively, roadway and drainage design may allow for slopes flatter than 1:2. Further geotechnical investigation is scoped for performance during Phase 2 design, whereby Wang and Parsons will evaluate the cost, time, and constructability of the 1:2 embankment against potentially flattening the slopes. Findings and design guidance will be documented in a memorandum addendum to the RGR and circulated to IDOT for review and approval.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Excavation, Dewatering, and Utilities

Excavations should be performed in accordance with local, state, and federal regulations. The potential effect of ground movements upon nearby roadways and utilities should be considered during construction. Excavations east of the river should be sloped at no steeper than 1:2 (V:H); slopes west of the river could be cut at 1:1.5 (V:H). In locations where new fill is to be placed along existing slopes, should be benched in accordance with the IDOT Standard Detail for Benching or deeply plowed prior to adding the additional fill along the side. Excavations deeper than elevation 443 feet will require dewatering. The Contractor should ensure proper surface grading to prevent the pooling of run-off into open excavations. Any water allowed to enter excavations should immediately be removed via sump pump.

6.2 Filling and Backfilling

Fill used as embankment material should be structural fill. Pre-approved, compacted, cohesive or granular soil conforming to IDOT Section 204, *Borrow and Furnished Excavation* would be acceptable as structural fill (2022). The fill material should be free of organic matter and debris and should be placed in lifts and compacted in accordance with Section 205, *Embankment*. If the east embankment is to be constructed of cohesive fill material without stage construction, the embankment material will require a special provision to ensure an undrained cohesion of 1,500 psf. This special provision should include a testing requirement specifying one three-point unconsolidated-undrained (UU) triaxial test on every 10% the of compacted fill volume placed within the embankment.

The east embankment, regardless of fill material, should be bedded with a minimum 24-inch-thick sand blanket immediately above the existing subgrade following topsoil removal. The sand blanket should consist of IDOT gradation FA-1 or FA-2 placed in lifts no greater than 8 inches thick (IDOT 2022). A special provision will be required for the material, placement, and cost of the sand blanket item.

The onsite materials excavated during construction can be reused as embankment fill assuming it is either granular or, if cohesive, have a L_L less than 50%, plasticity index (P_I) greater than 12, and an organic content less than 10%. The soil excavated from the lowering of Front Street is granular and will meet the above criteria. The material excavated from the east side is cohesive and meets the above criteria. However, the east side excavated material will have in-situ moisture contents that are above the 110% of optimum moisture content required for embankment fill in IDOT Section 205.06 (2022). These soils will require conditioning after excavation but before placement and compaction.

6.3 Earthwork Operations

The required earthwork can be accomplished with conventional construction equipment. Moisture and traffic will cause deterioration of exposed subgrade soils. Precautions should be taken by the contractor to prevent water erosion of the exposed subgrade. A compacted subgrade will minimize water runoff erosion.

Earth moving operations should be scheduled to not coincide with excessive cold or wet weather (early spring, late fall or winter). Any soil allowed to freeze or soften due to the standing water should be removed. Wet weather can cause problems with subgrade compaction.

It is recommended that an experienced geotechnical engineer be retained to inspect the exposed

subgrade, monitor earthwork operations, and provide material inspection services during the construction phase of this project.

7.0 QUALIFICATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown on the boring logs and in Appendix E. This report does not reflect any variations that may occur between the borings or elsewhere on the site, variations whose nature and extent may not become evident until the course of construction. In the event that any changes in the design and/or location of the roadway realignment and reconstruction are planned, we should be timely informed so that our recommendations can be adjusted accordingly.

It has been a pleasure to assist Parsons and the Illinois Department of Transportation on this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

WANG ENGINEERING, INC.

Mickey L. Snider, PE
Senior Geotechnical Engineer

Corina T. Farez, PE, PG
Senior Engineering Consultant

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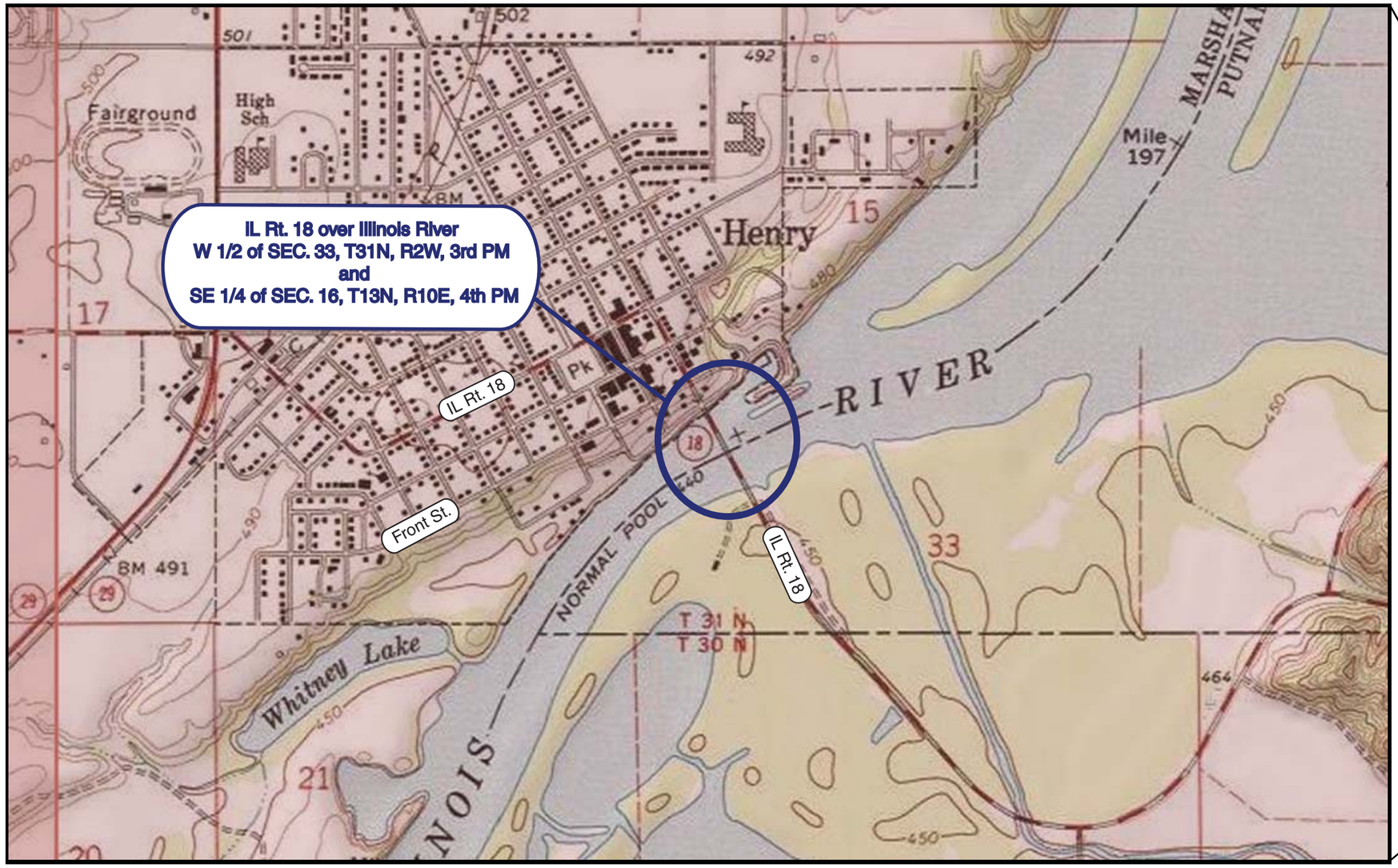
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EXHIBITS



0 0.3 0.6 Mile



Illinois



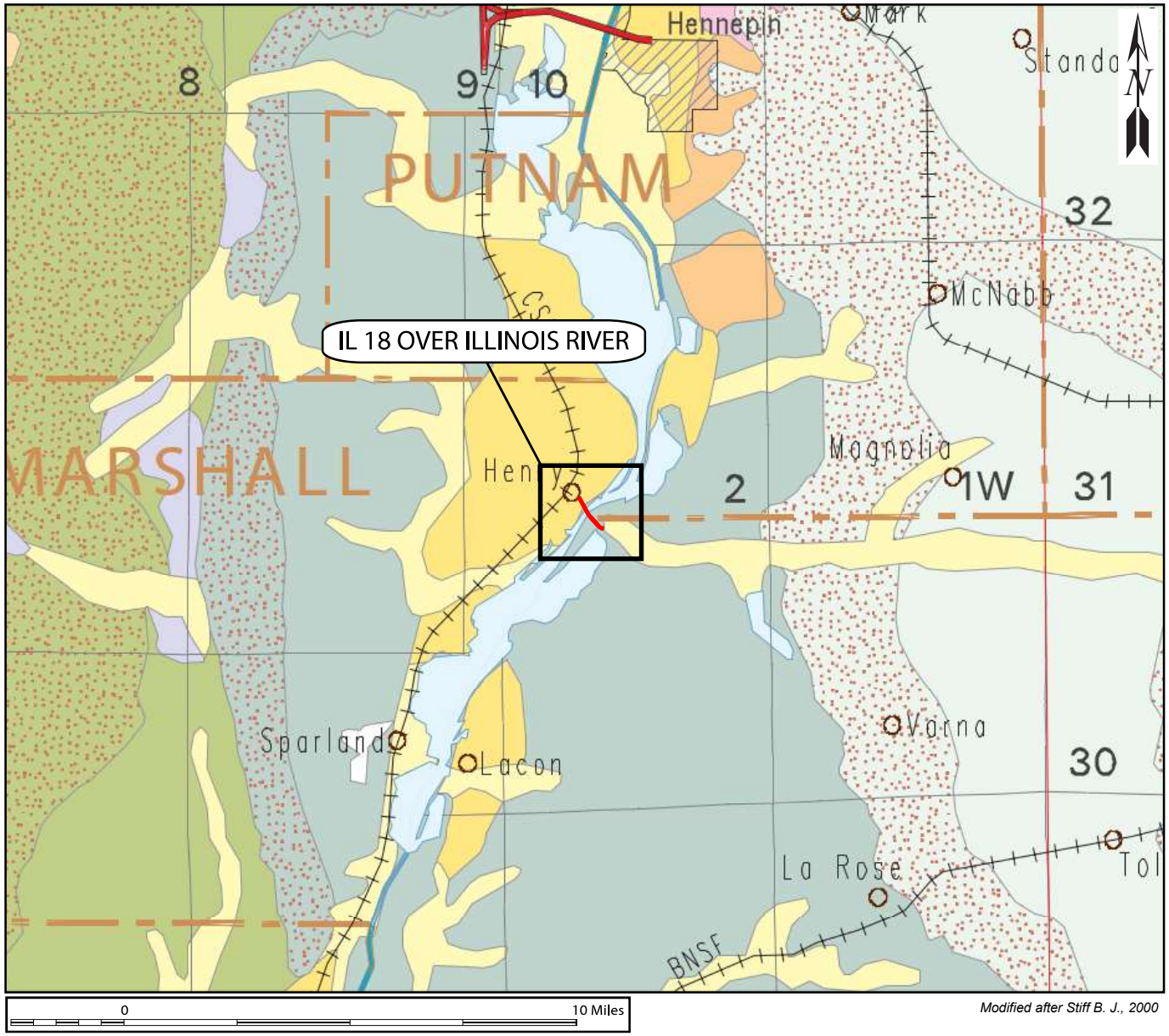
Marshall and Putnam Counties

SITE LOCATION MAP: ILLINOIS ROUTE 18 OVER THE ILLINOIS RIVER, MARSHALL AND PUTNAM COUNTIES, ILLINOIS

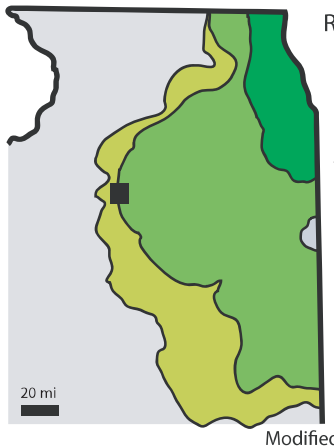
SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: E. Greenwood CHECKED BY: C. Marin

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FOR PARSONS	342-14-01



Modified after Stiff B. J., 2000



Modified after Hansel and Johnson (1996)

LEGEND

Cahokia Formation
Bedded silts, clays and sand and gravel deposited in floodplains and channels of modern rivers and streams.

Equality Formation
Laminated silt and clay deposited in slack water, glacial, and postglacial lakes.

Henry Formation (Parkland facies)
Stratified sand and gravel; dunes and sheetlike deposits.

Henry Formation (Mackinaw facies)
Stratified sand and gravel; outwash on floodplains (valley trains).

Lemont Formation (Yorkville member)
Till diamicton, unsorted, unstratified mixture of gravel, sand, silt, and clay containing lenses of sand, gravel and/or silt; medium grained matrix.

Lemont Formation (Batestown member)
Till diamicton, unsorted, unstratified mixture of gravel, sand, silt, and clay containing lenses of sand, gravel and/or silt; fine grained matrix.

Tiskilwa Formation
Till diamicton; red hue, medium grained matrix.

Modified after Stiff B. J., 2000

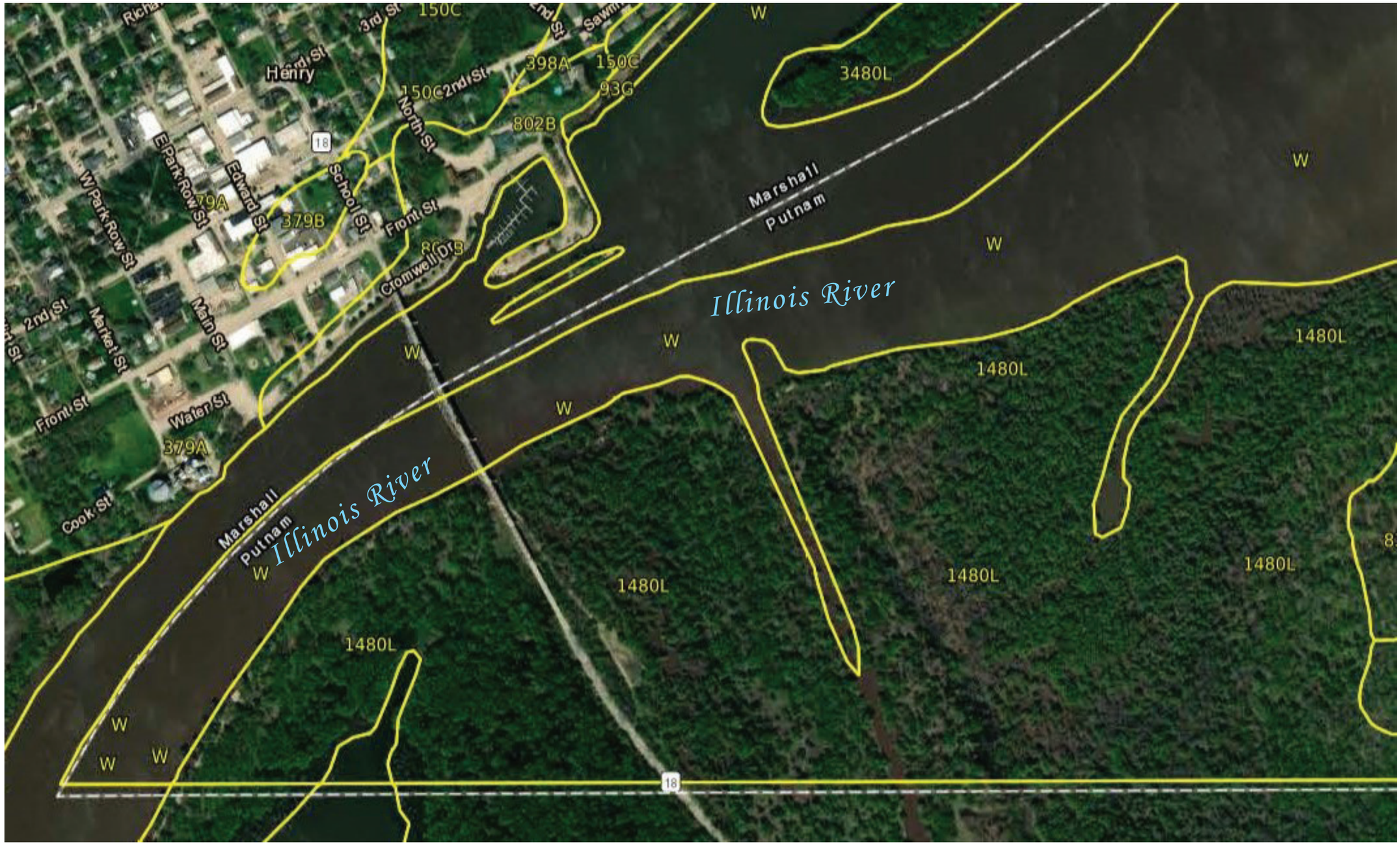
SITE AND REGIONAL GEOLOGY: ILLINOIS ROUTE 18 OVER THE ILLINOIS RIVER, MARSHALL AND PUTNAM COUNTIES, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: J. Bensen CHECKED BY: M. Snider

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342-14-01



0 250 500 750 1000 Feet

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: Coordinate System: Web Mercator (EPSG:3857)
Soil Survey Area: Pike County, Illinois
Survey Area Data: Version 16, August 31, 2021
Soil Survey Area: Scott County, Illinois
Survey Area Data: Version 13, August 31, 2021

SITE PEDOLOGICAL MAP: ILLINOIS ROUTE 18 OVER THE ILLINOIS RIVER
MARSHALL AND PUTNAM COUNTIES, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 3-1	DRAWN BY: C. Marin CHECKED BY: L. Iordache

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Map unit symbol and soil name	Depth	USDA texture	Classification	Pct Fragments		Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Organic matter	Liquid limit	Plasticity index	Erosion factors			Potential as a source of roadfill	Local Roads and Streets	Shallow Excavations
			AASHTO	>10 inches	3-10 inches									Kw	Kf	T	Rating class; and Limiting features	Rating class; and Limiting features	Rating class; and Limiting features
	In			*L-R-H*	*L-R-H*	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*Pct*	*L-R-H*	*L-R-H*						
379A—Dakota loam, 0 to 2 percent slopes																			
Dakota	0-14	Loam	A-4, A-6	0-0-0	0- 0- 0	42	38	14-21-27	1.40-1.45 -1.5	4.23-9.17-14.11	2.0- 3.5-5.0	25-30-35	7-11-15	0.24	0.24	3	Poor; Low strength Dusty	Very limited; Frost action, Low strength	Somewhat limited; Dusty, Unstable excavation walls
	14-29	Loam, sandy clay loam, clay loam	A-4, A-6	0- 0- 0	0- 0- 0	39	37	18-25-32	1.30-1.43 -1.55	4.23-9.17-14.11	0.5- 1.3-2.0	25-33-40	9-15-20	0.32	0.32				
	29-37	Sandy loam, loamy sand, gravelly loamy coarse	A-1, A-2, A-3, A-4	0-1-1	0-2-3	69	24	4 8 11	1.55-1.60 -1.65	14.11-28.23-42.34	0.0- 0.3-0.5	0-11 -21	NP-2 -4	0.15	0.28				
	37-80	Sand, gravelly coarse sand, loamy sand	A-1, A-2, A-3	0-1-1	0-2-3	96	2	1 3 4	1.55-1.60 -1.65	42.34-91.74-141.14	0.0- 0.3-0.5	0-7 -14	NP	0.02	0.05				
379B—Dakota loam,																			
Dakota	0-10	Loam	A-4, A-6	0- 0- 0	0- 0- 0	5-18- 30	50-62- 80	15-20- 25	1.40-1.45 -1.5	4.23-9.17-14.11	2.0- 3.5-5.0	25-30-35	7-11-15	0.24	0.24	3	Poor; Low strength Dusty	Very limited; Frost action, Low strength	Somewhat limited; Dusty, Unstable excavation walls
	10 30	Loam, sandy clay loam, clay loam	A-4, A-6	0- 0- 0	0- 0-0	5-18- 30	50-50- 77	18-32- 35	1.30-1.43 -1.55	4.23-9.17-14.11	0.5- 1.3-2.0	25-33-40	9-15-20	0.32	0.32				
	30-35	Sandy loam, loamy sand, gravelly loamy coarse	A-1, A-2, A-3, A-4	0- 1- 1	0- 2-3	20-42- 75	5-26- 50	18-32- 35	1.55-1.60 -1.65	14.11-28.23-42.34	0.0- 0.3-0.5	0-11 -21	NP-2 -4	0.15	0.28				
	35-80	Sand, gravelly coarse sand, loamy sand	A-1,A-2,A-3	0- 1- 1	0- 2-3	90-92- 98	0- 7- 10	0- 1- 2	1.55-1.60-1.65	42.34-91.74-141.14	0.0- 0.3-0.5	0-7 -14	NP	0.02	0.05				
802B—Orthents, loamy, 1 to 7 percent slopes																			
Orthents, loamy	0-6	Loam	A-6, A-7-6	0- 0- 0	0- 2-4	30-44- 52	28-41- 50	10-15- 20	1.70-1.73 -1.75	1.41-2.82-4.23	0.5- 1.3-2.0	32-37-41	13-16-18	0.37	0.37	5	Fair; Low strength Dusty	Somewhat limited; Frost action, Low strength	Somewhat limited, Depth to saturated zone, Dusty, Unstable excavation walls
	6 79	Loam, silt loam, clay loam	A-6, A-7-6	0- 0- 0	0-2-4	23-35- 40	20-38- 53	18-27- 40	1.70-1.75-1.8	1.41-2.82-4.23	0.2- 0.6-1.0	31-39-41	13-19-21	0.32	0.32				
1480L—Moundpraire silty clay loam, undrained, 0 to 2 percent slopes, frequently flooded, long duration																			
Moundprairie	0-9	Silty clay loam	A-7-5, A-7-6	0- 0- 0	0- 0- 0	5-10- 15	68-69- 80	15-21- 27	1.30-1.35-1.4	4.23-9.17-14.11	2.0- 3.0-4.0	42-47-53	19-22-25	0.28	0.28	5	Poor; Wetness; Low Strength, Dusty, Shrink-swell	Very limited; Frost action, Low strength, Ponding, Depth to saturated zone, Flooding	Very limited; Depth to saturated zone, Flooding, Dusty, Unstable excavation walls
	9 43	Stratified silt loam to silty clay loam	A-7-6, A-6	0- 0- 0	0- 0- 0	5-10- 15	50-60- 70	25-30- 35	1.35-1.40-1.45	4.23-9.17-14.11	1.0- 1.5-2.0	29-37-47	12-17-24	0.43	0.43				
	43-60	Silt loam, silty clay loam	A-7-6, A-4, A-6	0- 0- 0	0- 0- 0	35-55- 75	5-26- 50	10-19- 30	1.35-1.43-1.5	4.23-9.17-14.11	2.0- 2.5-3.0	31-47-51	22-10-25	0.32	0.32				

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: Coordinate System: Web Mercator (EPSG:3857)
Soil Survey Area: Kane County, Illinois
Survey Area Data: Version 15, Aug 31, 2021

SITE PEDOLOGICAL TABLE: ILLINOIS ROUTE 18 OVER THE ILLINOIS RIVER
MARSHALL AND PUTNAM COUNTIES ILLINOIS

SCALE: GRAPHICAL | EXHIBIT 3-2 | DRAWN BY: C. Marin, CHECKED BY: M. Snider

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APPENDIX A

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BORING LOG BSB-01

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 476.84 ft
North: 1619406.45 ft
East: 2520675.91 ft
Station: 3008+48.88
Offset: 17.09 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	476.7	1-inch thick ASPHALT --PAVEMENT--						
	475.8	11-inch thick, brown SANDY GRAVEL --BASE COURSE--			1	3 5 3	1.00 P	18
	473.8	Stiff, dark brown and black SILTY CLAY LOAM --FILL--						
		Medium dense, brown SANDY GRAVEL; dry --FILL-- --RDR 2--	5		2	4 8 8	NP	7
					3	4 6 10	NP	4
	468.8	Medium dense, brown, coarse Gravelly SAND; dry --RDR 2--	10		4	8 11 11	NP	3
					5	9 12 11	NP	4
			15		6	8 8 5	NP	6
					7	16 13 15	NP	6
	458.8	Medium dense, brown, fine to medium SAND; dry to damp --RDR 2--	20		8	13 12 11	NP	4
		--trace gravel--	25		10	6 8 11	NP	4
					11	7 10 12	NP	4
			30		12	9 10 13	NP	4
	445.1	Medium dense to dense, brown GRAVELLY SAND to SANDY GRAVEL; wet to saturated --RDR 2--	35		13	13 14 20	NP	19
			40		14	8 8 10	NP	7

GENERAL NOTES

Begin Drilling: **06-20-2023** Complete Drilling: **06-20-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&J&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 30', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **31.50 ft**
At Completion of Drilling: **9' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-01

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 476.84 ft
North: 1619406.45 ft
East: 2520675.91 ft
Station: 3008+48.88
Offset: 17.09 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	425.1	Dense to very dense, brown, fine to coarse SAND; saturated --RDR 2--	45		15	10 8 7	NP	10
			50		16	15 11 8	NP	9
			55		17	14 18 20	NP	18
			60		18	15 15 18	NP	17
		--coarse grained--	65		19	25 29 37	NP	17
			70		20	29 39 50/5"	NP	17
			75		21	22 25 28	NP	14
			80		22	16 22 27	NP	16

GENERAL NOTES

Begin Drilling: **06-20-2023** Complete Drilling: **06-20-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&J&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 30', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **31.50 ft**
At Completion of Drilling: **9' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-01

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 476.84 ft
North: 1619406.45 ft
East: 2520675.91 ft
Station: 3008+48.88
Offset: 17.09 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--rig chatter; possible cobbles--						
	395.1	Very dense, brown SANDY GRAVEL; saturated						
		--RDR 3-5--						
					23	50/5"	NP	12
			85					
		--rig chatter; possible cobbles--						
					24	24 32 50/4"	> 4.50 P	13
	387.3	Hard, gray to dark gray SHALE	90					
		--RDR 5--						
		--6 mins to drill from 90' to 93.5' at 500psi--						
		--MSPT 1--			25	100/2.52"	> 4.50 P	17
			95					
		--10 mins to drill from 95' to 98.5' at 500psi--						
		--MSPT 2--			26	100/3.12"	> 4.50 P	16
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--9 mins to drill from 100' to 103.5' at 500psi--						
		--MSPT 3--			27	100/3"	> 4.50 P	14
			105					
	368.1	--MSPT 4--			28	100/2.04"	> 4.50 P	20
		Boring terminated at 108.70 ft	110					
			115					
			120					

GENERAL NOTES

Begin Drilling: **06-20-2023** Complete Drilling: **06-20-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&J&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 30', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **31.50 ft**
At Completion of Drilling: **9' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG EB-01

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 450.94 ft
North: 1617579.46 ft
East: 2521871.89 ft
Station: 3030+33.05
Offset: 17.01 LT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
0	450.4	6-inch thick, black SILTY CLAY LOAM --TOPSOIL-- Very loose, brown GRAVELLY LOAM; moist to wet --FILL-- --RDR 1--		1	2 1 2	NP	22
5				2	1 1 0	NP	27
	445.4	Soft, brown SILTY CLAY LOAM; damp --RDR 1--		3	1 0 1	0.33 B	30
	442.9	Soft to stiff, brown to gray SILTY CLAY; damp --RDR 1-2--		4	2 3 4	1.64 B	27
10				5	1 0 0	0.25 P	31
		--trace organic matter--		6	0 2 2	0.57 B	34
15				7	0 1 2	0.41 B	35
		--trace organic matter--		8	0 2 2	0.57 B	31
20							
		--trace organic matter--		9	0 1 2	0.57 B	32
25				10	0 1 2	0.49 B	36
	425.4	Very soft, gray SILTY CLAY LOAM, few sand seams; saturated --RDR 1--		11	0 0 0	0.16 B	30
	422.9	--heaving sand-- Loose to medium dense, gray, medium SAND; saturated --RDR 1--		12	1 2 3	NP	27
30							
		--heaving sand--		13	13 13 9	NP	24
	415.9	Boring terminated at 35.00 ft					
35							
40							

GENERAL NOTES

Begin Drilling: **04-13-2021** Complete Drilling: **04-13-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **3.00 ft**
At Completion of Drilling: **15' wash**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EB-02

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 451.90 ft
North: 1617761.84 ft
East: 2521727.17 ft
Station: 3028+02.43
Offset: 14.95 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	451.7	2-inch thick, black SILTY CLAY LOAM						
	450.9	--TOPSOIL--						
		10-inch thick, brown GRAVELLY LOAM; damp						
		--FILL--			1	3 8 7	NP	5
	448.9	Medium dense, brown SANDY GRAVEL; dry						
		--FILL--						
		Stiff, brown SILTY CLAY, trace gravel; damp			2	3 3 7	1.75 P	26
		--FILL--	5					
		--RDR 2--			3	2 3 4	1.75 P	24
	443.9							
		Medium stiff to very stiff, brown to gray SILTY CLAY; damp						
		--trace gravel--			4	2 3 4	1.64 B	26
		--RDR 2--	10					
					5	1 3 5	2.05 B	25
					6	2 3 4	1.23 B	27
			15					
					7	4 3 3	0.98 B	32
	434.4							
	433.9	SAND; wet						
		Soft to medium stiff, brown to gray SILTY CLAY; damp						
		--RDR 1--			8	0 2 3	0.41 B	31
			20 ▽					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					9	0 1 2	0.41 B	33
			25		10	1 1 2	0.57 B	32
					11	0 2 2	0.41 B	28
	423.9							
		Loose to medium dense, brown SANDY GRAVEL; saturated						
		--RDR 1-2--			12	6 5 4	0.25 P	13
			30					
	416.9		35		13	2 6 6	NP	8
		Boring terminated at 35.00 ft						
			40					

GENERAL NOTES

Begin Drilling: **04-13-2021** Complete Drilling: **04-13-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **17.50 ft**
At Completion of Drilling ▼ **20.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG EB-03

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.35 ft
North: 1617896.39 ft
East: 2521629.20 ft
Station: 3026+36.77
Offset: 30.97 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Medium dense, brown SANDY GRAVEL; dry						
		--FILL--						
		--RDR 3--			1	10 11 9	NP	5
	448.1	Stiff to very stiff, brown SILTY CLAY LOAM to SILTY CLAY; damp	5		2	3 3 3	NR	
		--FILL--						
		--RDR 2--			3	1 2 3	1.00 P	25
			10		4	3 6 6	3.75 P	21
	441.9	Soft to very stiff, gray SILTY CLAY; damp						
		--RDR 1-2--			5	2 3 3	2.05 B	27
			15		6	1 2 3	0.50 P	35
					7	0 2 2	0.74 B	34
			20		8	0 2 2	0.49 B	32

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	432.1							
	431.6	Possible SAND						
		--wet spoon recovery--						
		Soft to medium stiff, brown to gray SILTY CLAY; damp			9	0 2 2	0.49 B	31
		--RDR 1--						
			25		10	0 2 3	0.66 B	31
					11	0 2 2	0.74 B	31
			30		12	0 0 1	0.25 B	29
	420.6	--heaving sand--						
		Medium dense, brown GRAVELLY SAND; saturated			13	6 8 8	NP	22
	417.4	Boring terminated at 35.00 ft	35					
			40					

GENERAL NOTES

Begin Drilling: **04-13-2021** Complete Drilling: **04-13-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **20.50 ft**
At Completion of Drilling: **14' wash**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EB-04

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.53 ft
North: 1618022.63 ft
East: 2521530.41 ft
Station: 3024+77.83
Offset: 51.92 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	452.0	6-inch thick, brown GRAVELLY LOAM; damp						
		--FILL--						
		Medium stiff to very stiff, brown SILTY CLAY LOAM, trace to little gravel; damp			1	3 3 2	1.00 P	14
		--FILL--						
		--RDR 1-2--.			2	3 3 5	2.00 P	20
			5					
					3	3 2 1	0.75 P	15
	444.5							
		Soft to medium stiff, gray SILTY CLAY; damp						
		--RDR 1--			4	2 2 2	0.66 B	31
			10					
					5	1 1 2	0.66 B	32
					6	1 2 2	0.57 B	33
			15					
		--trace organic matter--			7	1 1 3	0.41 B	34
					8	1 2 2	0.69 B	28
			20					
					9	1 2 2	0.82 B	30
					10	1 2 2	0.66 B	34
			25					
					11	1 2 2	0.49 B	32
					12	0 0 0	0.41 B	30
			30					
	417.8							
		Loose to very dense, brown SANDY GRAVEL; saturated						
		--RDR 3-4--			13	0 2 7	0.41 B	27
			35					
					14	7 3 3	NP	12
			40					

GENERAL NOTES

Begin Drilling: **04-12-2021** Complete Drilling: **04-12-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **34.75 ft**
At Completion of Drilling: **10' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EB-04

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.53 ft
North: 1618022.63 ft
East: 2521530.41 ft
Station: 3024+77.83
Offset: 51.92 RT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--rig chatter; possible cobbles--					
45		--loss in drilling mud-- --hard drilling from 45 to 51 feet; possible cobbles--		15	19 14 35	NP	13
50				16	50/5"	NP	5
55		--hard drilling, 55 to 56 feet; possible cobbles--		17	39 33 30	NP	8
60				18	50/5"	NP	9
		--rig chatter; possible cobbles--					
65	387.5	Very dense, dark gray SHALE --RDR 5--		19	34 42 37	NP	8
		--MSPT 1--		20	100/3.5"	NP	14
70		--MSPT 2--		21	100/4"	NP	16
		--MSPT 3--		22	100/4"	NP	10
75		--MSPT 4--		23	100/3.5"	NP	18
		--MSPT 5--		24	100/2.5"	NP	18
80	372.5	--MSPT 6--		25	100/2.5"	NP	8
		Boring terminated at 80.00 ft					

GENERAL NOTES

Begin Drilling **04-12-2021** Complete Drilling **04-12-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **R&J** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **34.75 ft**
At Completion of Drilling ▼ **10' mud**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG EB-05

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 445.39 ft
North: 1618135.89 ft
East: 2521215.93 ft
Station: 3022+18.01
Offset: 197.87 RT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	444.4	12-inch thick, black SILTY CLAY LOAM; damp					
		--TOPSOIL--					
		Soft, brown SILTY CLAY LOAM, trace organic matter; damp		1	1 1 1	0.25 P	36
		--RDR 1--					
	442.6						
	442.1	Possible SAND					
		--wet spoon recovery--					
5		Very soft to soft, dark brown to brown SILTY CLAY LOAM; damp		2	1 1 2	0.41 B	37
		--RDR 1--					
				3	0 0 1	0.25 B	38
		--trace organic matter--		4	1 1 1	0.16 B	28
10				5	1 1 1	0.25 B	32
15				6	1 1 1	0.33 B	30
				7	0 1 1	0.33 B	30
20				8	1 1 1	0.41 B	31
	424.9	--measured 5 foot ground water before mud rotary--					
		Soft, gray SILTY CLAY, trace organic matter; damp		9	1 1 1	0.25 B	29
		--RDR 1--					
25				10	0 0 1	0.25 B	31
				11	1 0 1	0.25 B	32
	417.4	Loose, gray SANDY LOAM; wet					
		--RDR 1--		12	1 1 5	NP	24
30							
	413.6	Medium dense, brown SANDY GRAVEL; saturated					
		--RDR 3-4--					
		--rig chatter, 33.5 to 36.5 feet; possible cobbles--		13	12 10 10	NP	7
35							
	408.6	Medium dense, brown, gravelly, coarse SAND					
		--RDR 2--					
				14	12 14 15	NP	19
40							

GENERAL NOTES

Begin Drilling: **04-15-2021** Complete Drilling: **04-16-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **3.00 ft**
At Completion of Drilling: **8' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EB-05

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 445.39 ft
North: 1618135.89 ft
East: 2521215.93 ft
Station: 3022+18.01
Offset: 197.87 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	404.9							
		--hard drilling, 40.5 to 43.5 feet; possible cobbles--						
		Very dense, brown SANDY GRAVEL; saturated						
		--RDR 4--						
					15	33 50/5"	NP	13
			45					
		--hard drilling; possible cobbles--						
					16	50/5"	NP	12
			50					
		--rig chatter; possible cobbles--						
	393.6							
		Dense, brown, medium SAND; saturated						
		--RDR 3--						
					17	16 20 27	NP	17
			55					
	387.4							
		Very dense, dark gray SHALE						
		--RDR 5--						
		--MSPT 1--			18	100/6"	NP	16
			60					
		--MSPT 2--			19	100/2.5"	NP	11
		--MSPT 3--			20	100/3.5"	NP	12
			65					
		--MSPT 4--			21	100/5"	NP	15
		--MSPT 5--			22	100/2"	NR	
			70					
		--MSPT 6--			23	100/2.5"	NP	10
	372.9							
		Boring terminated at 72.50 ft						
			75					
			80					

GENERAL NOTES

Begin Drilling: **04-15-2021** Complete Drilling: **04-16-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **3.00 ft**
At Completion of Drilling: **8' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG EB-06

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 445.50 ft
North: 1618394.29 ft
East: 2521353.45 ft
Station: 3020+67.82
Offset: 15.49 RT

Elevation (ft)	Depth (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
444.5		12-inch thick, black SILTY CLAY LOAM; damp					
		--TOPSOIL--					
		Medium stiff, dark brown SILTY CLAY LOAM, trace organic matter; damp		1	1 4 3	0.98 B	28
442.5		--RDR 1-- ▽					
		Very loose, gray SANDY LOAM, trace organic matter and shell fragments; wet		2	1 2 1	NP	33
	5	--RDR 1--					
440.0		Soft, dark gray to gray SILTY CLAY LOAM, trace organic matter; damp		3	1 1 1	0.41 B	50
		--RDR 1--					
437.5		Soft to medium stiff, gray SILTY CLAY, trace organic matter; damp		4	0 1 1	0.25 B	29
	10	--RDR 1--					
				5	1 2 2	0.57 B	37
				6	0 1 1	0.25 B	33
	15						
				7	0 1 1	0.25 P	34
427.5		Very loose, gray SANDY LOAM, few sand seams; wet					
		--RDR 1--		8	1 1 1	NP	30
	20						

Elevation (ft)	Depth (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
425.0		Loose to medium dense, gray, medium to coarse SAND, trace gravel; saturated					
		--RDR 1--		9	3 4 6	NP	22
		--few clay seams--		10	2 2 2	NP	25
	25						
		--few clay seams-- --trace shell fragments--		11	3 4 5	NP	21
		--few clay seams-- --trace shell fragments--		12	1 2 3	NP	46
	30						
413.8		Medium dense to very dense, brown SANDY GRAVEL; wet to saturated					
		--RDR 3-4--		13	10 7 5	NP	15
	35						
		--rig chatter; possible cobbles-- --mud loss, 37 feet--					
				14	13 16 12	NP	9
	40						

GENERAL NOTES

Begin Drilling: **04-14-2021** Complete Drilling: **04-15-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽: **3.00 ft**
At Completion of Drilling ▼: **10' mud**
Time After Drilling: **NA**
Depth to Water ▼: **NA**

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BORING LOG EB-06

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 445.50 ft
North: 1618394.29 ft
East: 2521353.45 ft
Station: 3020+67.82
Offset: 15.49 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	--rig chatter, 41.5 to 43.5 feet; possible cobbles--						
		45		15	49 50/4"	NP	18
	--mud loss-- --rig chatter; possible cobbles--						
		50		16	50/5"	NP	7
	--rotary bit refusal, 50 feet-- --offset boring 5 feet west--						
		55		17	12 28 29	NP	16
	--rig chatter; possible cobbles--						
387.5	Very dense, gray SHALE --RDR 5-- --MSPT 1--	60		18	100/4.5"	NP	12
	--MSPT 2--	65		19	100/4.5"	NP	11
	--MSPT 3--			20	100/3"	NP	9
	--MSPT 4--	70		21	100/4"	NP	22
374.5	--MSPT 5--			22	100/3"	NP	10
	--MSPT 6-- Boring terminated at 72.50 ft	75		23	100/4"	NP	15
		80					

GENERAL NOTES

Begin Drilling: **04-14-2021** Complete Drilling: **04-15-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **3.00 ft**
At Completion of Drilling: **10' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EB-07

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 453.94 ft
North: 1619136.44 ft
East: 2520763.34 ft
Station: 3011+28.77
Offset: 146.64 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	453.8	2-inch thick ASPHALT --PAVEMENT--						
		Loose to medium dense, dark brown GRAVELLY LOAM; moist --FILL-- --RDR 2--			1	4 5 5	NP	14
			5		2	2 3 3	NP	18
					3	2 3 3	NP	12
			10		4	1 1 3	NP	18
	443.4							
		Very loose to loose, brown, medium SAND to SANDY LOAM, trace gravel; wet to saturated --RDR 1--			5	1 1 0	NP	32
			15		6	1 1 2	NP	25
					7	1 2 3	NP	24
	435.9							
		Medium dense, brown SANDY GRAVEL; saturated --RDR 3-4--	20		8	10 10 7	NR	
		--lost drilling mud--			9	5 7 7	NP	10
		--rig chatter; possible cobbles--	25		10	10 6 7	NP	21
					11	6 7 7	NP	10
		--rig chatter; possible cobbles--	30		12	12 13 9	NP	16
	422.2							
		Medium dense to dense, brown, medium to coarse SAND, trace gravel; saturated --RDR 2-4--			13	6 7 8	NP	21
			35					
					14	8 8 9	NP	17
			40					

GENERAL NOTES

Begin Drilling **04-08-2021** Complete Drilling **04-09-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20D50T [80%]**
Driller **R&J** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **10.50 ft**
At Completion of Drilling ▼ **10' mud**
Time After Drilling **24 hrs hours**
Depth to Water ▼ **11.00 ft**

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BORING LOG EB-07

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 453.94 ft
North: 1619136.44 ft
East: 2520763.34 ft
Station: 3011+28.77
Offset: 146.64 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	15 15 21	NP	18
			50		16	13 18 19	NP	19
			55		17	18 23 26	NP	14
		--hard drilling, 57 to 58 feet-- --possible cobbles-- --lost drilling mud--						
	394.4				18	22 50/5"	NP	17
		Very dense, brown SANDY	60					
		GRAVEL; saturated --RDR 4-5-- --lost drilling mud-- --hard drilling, 60 to 67 feet-- --possible cobbles--	65		19	21 29 29	NP	9
	386.9							
		Very dense, dark gray to gray SHALE --RDR 4-- --MSPT 1--	70		20	100/3"	NP	14
		--MSPT 2--	75		21	100/3.5"	NP	14
		--MSPT 3--			22	100/3.5"	NP	16
		--MSPT 4--			23	100/4"	NP	15
		--MSPT 5--	80		24	100/4"	NP	20

GENERAL NOTES

Begin Drilling: **04-08-2021** Complete Drilling: **04-09-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D50T [80%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **10.50 ft**
At Completion of Drilling: **10' mud**
Time After Drilling: **24 hrs hours**
Depth to Water: **11.00 ft**

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BORING LOG EB-07

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 453.94 ft
North: 1619136.44 ft
East: 2520763.34 ft
Station: 3011+28.77
Offset: 146.64 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	372.4	--MSPT 6--			25	100/3"	NP	16
		Boring terminated at 81.50 ft	85					
			90					
			95					
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)

GENERAL NOTES

Begin Drilling **04-08-2021** Complete Drilling **04-09-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20D50T [80%]**
Driller **R&J** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **10.50 ft**
At Completion of Drilling ▼ **10' mud**
Time After Drilling **24 hrs hours**
Depth to Water ▼ **11.00 ft**

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BORING LOG EB-08

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.44 ft
North: 1619193.94 ft
East: 2520906.33 ft
Station: 3011+51.90
Offset: 5.73 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	452.2	2.5-inch thick ASPHALT --PAVEMENT-- Loose, brown GRAVELLY LOAM; damp --FILL-- --RDR 3--			1	4 2 4	NP	8
	449.4	CONCRETE DEBRIS --hard drilling-- --RDR 5--			2	50/2"	NR	
	447.4	Very dense, brown GRAVELLY LOAM, some concrete fragments	5		3	3 50/1"	NP	9
	445.9	--FILL-- Very dense, gray CONCRETE fragments --FILL-- --RDR 4-5--			4	50/1"	NP	
	441.9	Loose, gray SANDY GRAVEL; saturated --RDR 1--	10		5	3 5 2	NP	15
	440.6	Medium stiff, black SILTY CLAY LOAM, trace organic matter; moist --RDR 1--			6	0 1 4	0.57 B	38
	436.9	Loose to medium dense, brown GRAVELLY SAND to SANDY GRAVEL; wet to saturated --RDR 2-4--	15		7	3 8 15	NP	21
			20		8	13 7 5	NP	14
		--lost drilling mud--	25		9	7 5 5	NR	
					10	11 16 9	NP	12
					11	3 3 2	NP	19
		--hard drilling, 27.5 to 33.0 feet-- --possible cobbles--	30		12	12 9 10	NP	
		--lost drilling mud--						
	419.4	Medium dense to dense, brown, medium to coarse SAND; wet to saturated --RDR 2--	35		13	11 10 11	NP	23
			40		14	9 16 22	NP	20

GENERAL NOTES

Begin Drilling: **04-07-2021** Complete Drilling: **04-08-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D50T [80%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: ▽ **10.50 ft**
At Completion of Drilling: ▼ **10' mud**
Time After Drilling: **24 hrs hours**
Depth to Water: ▼ **12.50 ft**

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BORING LOG EB-08

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.44 ft
North: 1619193.94 ft
East: 2520906.33 ft
Station: 3011+51.90
Offset: 5.73 LT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
45	387.4			15	16 20 20	NP	17
50		--trace gravel--		16	12 11 14	NP	15
		--hard drilling, 51.5 to 52.5 feet-- --possible cobbles--					
55		--trace gravel--		17	16 15 21	NP	13
	395.7	Very dense, brown SANDY GRAVEL; saturated --RDR 3-4-- --hard drilling, 57 to 65 feet-- --possible cobbles--		18	50/5"	NP	21
60							
65	387.4	Very dense, dark gray SHALE --RDR 4-- --lost drilling mud--		19	50/5"	NP	14
70		--MSPT 1--		20	100/2"	NP	16
75		--MSPT 2--		21	100/4.5"	NP	18
		--MSPT 3--		22	100/4"	NP	19
80	372.4	--MSPT 4--		23	100/4"	NP	17
		--MSPT 5--		24	100/4"	NP	14
		Boring terminated at 80.00 ft					

GENERAL NOTES

Begin Drilling: **04-07-2021** Complete Drilling: **04-08-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D50T [80%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **10.50 ft**
At Completion of Drilling: **10' mud**
Time After Drilling: **24 hrs hours**
Depth to Water: **12.50 ft**

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BORING LOG EMB-P2-01

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.12 ft
North: 1617634.54 ft
East: 2521713.60 ft
Station: 3029+02.66
Offset: 23.97 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	451.6	6-inch thick, dark brown SILTY CLAY LOAM --TOPSOIL--						
		Medium dense, brown SANDY GRAVEL; damp --FILL--			1	16 8 6	NP	7
	449.1	Soft to very stiff, brown to gray SILTY CLAY, trace gravel; damp to moist --FILL-- --RDR 2--	5		2	3 4 10	2.54 B	22
					3	3 5 6	1.80 B	24
			10		4	6 7 8	1.23 B	24
					5	2 3 6	1.15 B	27
		--trace wood chip fragments--	15		6	3 3 4	0.41 B	32
	436.6	--wet spoon recovery-- Soft to medium stiff, gray SILTY CLAY, trace gravel; wet --RDR 2--			7	2 2 3	0.66 B	30
			20		8	2 4 4	0.74 B	28
	427.6	Loose to medium dense, brown to gray GRAVELLY SAND to SANDY GRAVEL; moist to saturated --RDR 2--	25		9	2 3 4	0.33 B	30
					10	4 2 3	0.66 B	29
			30		11	2 4 11	NP	9
					12	2 3 2	NP	17
			35		13	12 9 14	NP	13
	412.1	Boring terminated at 40.00 ft	40		14	6 8 6	NP	11

GENERAL NOTES

Begin Drilling: **06-12-2023** Complete Drilling: **06-12-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **16.00 ft**
At Completion of Drilling: **20.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EMB-P2-02

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.61 ft
North: 1617486.14 ft
East: 2521867.62 ft
Station: 3031+08.73
Offset: 33.27 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	452.1	6-inch thick, dark brown SILTY CLAY LOAM --TOPSOIL--						
		Very loose to medium dense, brown GRAVELLY SAND, trace glass and brick fragments; damp to wet --FILL-- --RDR 2--			1	8 7 5	NP	18
					2	3 2 1	NP	30
			5 ▽					
					3	2 2 2	NP	29
					4	1 1 1	NP	19
			10					
	442.1	Medium dense, brown and gray GRAVEL, some wood chip fragments; moist --FILL--			5	6 6 10	NP	69
	439.6	Very soft to medium stiff, gray SILTY CLAY, trace gravel; moist --RDR 2--			6	2 2 2	< 0.25 P	44
			15 ▼					
					7	4 4 2	< 0.25 P	37
					8	0 0 1	0.50 P	32
			20					
					9	2 3 2	0.41 B	31
					10	2 1 1	< 0.25 P	33
			25					
	427.1	Very loose, gray SANDY CLAY; moist --RDR 2--			11	1 0 1	NP	23
	424.6	Medium dense, brown and gray GRAVELLY SAND; damp to moist --RDR 2--			12	3 5 5	NP	18
			30					
					13	3 5 6	NP	16
			35					
					14	6 8 12	NP	16
	412.6	Boring terminated at 40.00 ft	40					

GENERAL NOTES

Begin Drilling: **06-12-2023** Complete Drilling: **06-12-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **5.50 ft**
At Completion of Drilling ▼ **15.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG EMB-P2-03

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 454.50 ft
North: 1617395.53 ft
East: 2521876.50 ft
Station: 3032+91.29
Offset: 5.11 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	454.0	6-inch thick, dark brown SILTY CLAY LOAM --TOPSOIL--						
		Medium dense, brown GRAVELLY SAND, trace brick fragments; damp --FILL-- --RDR 2--			1	10 14 12	NP	5
			5		2	8 5 11	NP	6
	449.0	Medium stiff, brown SILTY CLAY LOAM, trace gravel; damp --FILL--			3	5 5 5	0.50 P	23
	446.5	Very soft to stiff, brown to gray SILTY CLAY, trace gravel; damp to moist --RDR 2--	10		4	2 4 5	1.50 P	27
					5	2 2 2	< 0.25 P	32
			15		6	1 2 3	0.16 B	30
					7	3 3 3	< 0.25 P	33
			20		8	2 2 2	0.41 B	29
		--wet spoon recovery--	25		9	2 2 2	< 0.25 P	33
					10	2 1 1	0.41 B	31
					11	1 0 1	< 0.25 P	26
	426.5	Loose to medium dense, brown and gray, medium SAND, trace gravel; moist to wet --RDR 2--	30		12	3 5 5	NP	17
			35		13	3 5 4	NP	
	417.8	Medium dense, brown and gray SANDY GRAVEL; moist --RDR 2--						
					14	3 5 5	NP	
	414.5	Boring terminated at 40.00 ft	40					

GENERAL NOTES

Begin Drilling: **06-13-2023** Complete Drilling: **06-13-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **21.00 ft**
At Completion of Drilling: **25.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EMB-P2-04

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 443.81 ft
North: 1617308.02 ft
East: 2521962.65 ft
Station: 3033+10.92
Offset: 23.59 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	443.2	7-inch thick, dark brown SILTY CLAY LOAM						
		--TOPSOIL--						
		Very soft to stiff, gray SILTY CLAY, trace gravel; damp to wet						
		--RDR 1-2--			1	0 0 0	1.00 P	48
			5		2	0 0 0	< 0.25 P	41
		--wet spoon recovery--			3	1 1 1	< 0.25 P	35
			10		4	0 0 1	0.25 B	33
					5	1 2 1	< 0.25 P	33
			15		6	1 1 1	< 0.25 P	38
					7	0 0 1	< 0.25 P	36
	425.8	Loose, gray, fine to medium SAND, trace gravel; wet						
		--RDR 2--	20		8	2 2 2	NP	22
	423.3	Loose to medium dense, brown and gray GRAVELLY SAND; moist						
		--RDR 2--			9	2 3 3	NP	14
			25		10	3 3 3	NP	16
					11	2 5 3	NP	18
					12	2 4 6	NP	21
	413.8	Boring terminated at 30.00 ft	30					
			35					
			40					

GENERAL NOTES

Begin Drilling: **06-13-2023** Complete Drilling: **06-13-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **6.00 ft**
At Completion of Drilling: **10.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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Fax:

BORING LOG EMB-P2-05

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 442.87 ft
North: 1617217.65 ft
East: 2522040.41 ft
Station: 3034+29.59
Offset: 40.98 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	442.2	8-inch thick, dark brown SILTY CLAY LOAM						
		--TOPSOIL--						
		Very soft, gray SILTY CLAY, trace gravel; moist			1	0 0 1	< 0.25 P	33
		--RDR 2--						
	439.9							
		Very loose, gray, fine to medium SAND; wet to saturated			2	0 1 1	NP	24
		--RDR 2--	5					
	437.4							
		Very soft to stiff, gray SILTY CLAY, trace gravel; moist			3	1 0 1	0.50 P	34
		--RDR 2--						
					4	1 2 3	1.00 P	32
			10					
					5	1 0 1	0.25 B	32
					6	1 2 1	0.66 B	33
			15					
					7	0 0 1	< 0.25 P	33
	424.9							
		Very loose to medium dense, brown and gray, fine to medium SAND, trace gravel; moist to wet			8	1 5 5	NP	24
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--RDR 2--			9	2 1 2	NP	27
					10	2 3 4	NP	22
			25					
	417.4							
		Medium dense, brown and gray GRAVELLY SAND to SANDY GRAVEL; moist			11	3 5 5	NP	19
		--RDR 2--						
					12	5 5 5	NP	13
	412.9		30					
		Boring terminated at 30.00 ft						
			35					
			40					

GENERAL NOTES

Begin Drilling: **06-13-2023** Complete Drilling: **06-13-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **4.00 ft**
At Completion of Drilling: **6.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EMB-P2-06

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 443.03 ft
North: 1617053.40 ft
East: 2522158.38 ft
Station: 3036+33.47
Offset: 46.63 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	442.4	8-inch thick, dark brown SILTY CLAY LOAM --TOPSOIL-- Very soft, gray SILTY CLAY, trace gravel; wet --RDR 2--			1	0 0 0	< 0.25 P	49
	440.0	Very loose, gray, fine SAND, trace gravel; saturated --RDR 2--	5		2	0 0 1	NP	27
	437.5	Very loose, gray GRAVELLY SAND; wet --RDR 2--			3	0 0 1	NP	22
	435.0	Soft to stiff, gray SILTY CLAY, trace gravel moist --RDR 2--	10		4	1 2 2	1.07 B	32
					5	1 1 1	0.98 B	36
			15		6	1 1 1	0.33 B	23
	427.5	Very loose to loose, gray and brown, medium SAND, trace gravel; moist to saturated --RDR 2--			7	0 0 0	NP	20
			20		8	1 2 2	NP	21
	422.5	Loose, brown and gray GRAVELLY SAND; wet --RDR 2--			9	11 5 4	NP	16
			25		10	1 4 3	NP	17
	417.5	Medium dense, orange GRAVEL; moist --RDR 2--			11	4 4 7	NP	8
	415.5	Boring terminated at 27.50 ft	30					
			35					
			40					

GENERAL NOTES

Begin Drilling: **06-13-2023** Complete Drilling: **06-13-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **4.00 ft**
At Completion of Drilling: **10.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG EMB-P2-07

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 477.03 ft
North: 1619477.16 ft
East: 2520625.80 ft
Station: 3007+61.10
Offset: 19.93 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	--Bare Ground--						
	Stiff, brown SILTY CLAY LOAM, trace gravel; damp						
	--FILL--			1	6 2 3	1.07 B	21
474.0							
	Loose, brown, fine SAND, trace gravel; damp						
	--FILL--			2	2 3 3	NP	11
	--RDR 2--	5					
471.5							
	Medium dense, brown GRAVELLY SAND, trace gravel; damp						
	--FILL--			3	10 11 12	NP	5
	--RDR 2--						
				4	6 12 10	NP	5
		10					
				5	9 10 11	NP	4
464.0							
	Medium dense, brown, fine SAND, trace gravel; damp to wet						
	--RDR 2--			6	5 10 14	NP	4
		15					
				7	9 10 10	NP	5
				8	8 10 15	NP	4
		20					

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
				9	8 11 13	NP	4
		25		10	7 9 9	NP	5
				11	10 15 11	NP	5
		30		12	6 9 10	NP	4
				13	6 11 12	NP	
442.0		35 ▼					
	Boring terminated at 35.00 ft						
		40					

GENERAL NOTES

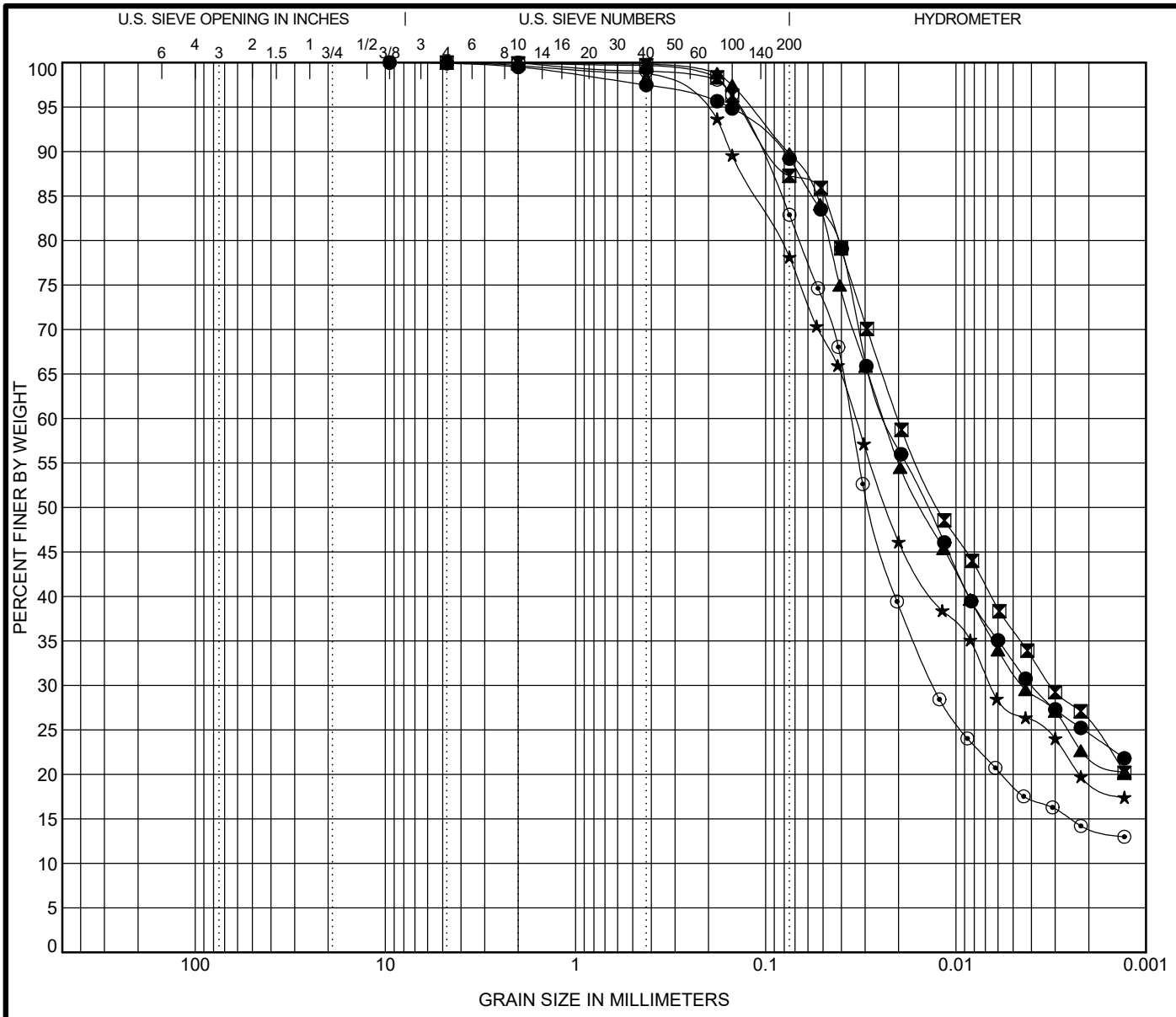
Begin Drilling: **06-15-2023** Complete Drilling: **06-15-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **35.00 ft**
At Completion of Drilling ▼ **35.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification			IDH Classification	LL	PL	PI	Cc	Cu
●	EB-01#7	16.0 ft	**Silty Clay Loam**	**44**	**17**	**27**		
⊠	EB-03#8	18.5 ft	**Silty Clay Loam**	**45**	**17**	**28**		
▲	EB-04#6	13.5 ft	**Silty Clay Loam**	**46**	**17**	**29**		
★	EB-05#3	6.0 ft	**Silty Loam**	**39**	**16**	**23**		
⊙	EB-05#10	23.5 ft	**Silty Loam**	**31**	**17**	**14**		

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	EB-01#7	16.0 ft	**9.5**	**0.023**	**0.004**		**0.5**	**10.3**	**64.4**	**24.6**
⊠	EB-03#8	18.5 ft	**4.75**	**0.02**	**0.003**		**0.1**	**12.6**	**61.4**	**25.8**
▲	EB-04#6	13.5 ft	**2**	**0.024**	**0.004**		**0.0**	**10.2**	**67.3**	**22.2**
★	EB-05#3	6.0 ft	**4.75**	**0.034**	**0.007**		**0.3**	**21.5**	**58.5**	**19.3**
⊙	EB-05#10	23.5 ft	**2**	**0.036**	**0.013**		**0.0**	**17.1**	**68.6**	**14.0**

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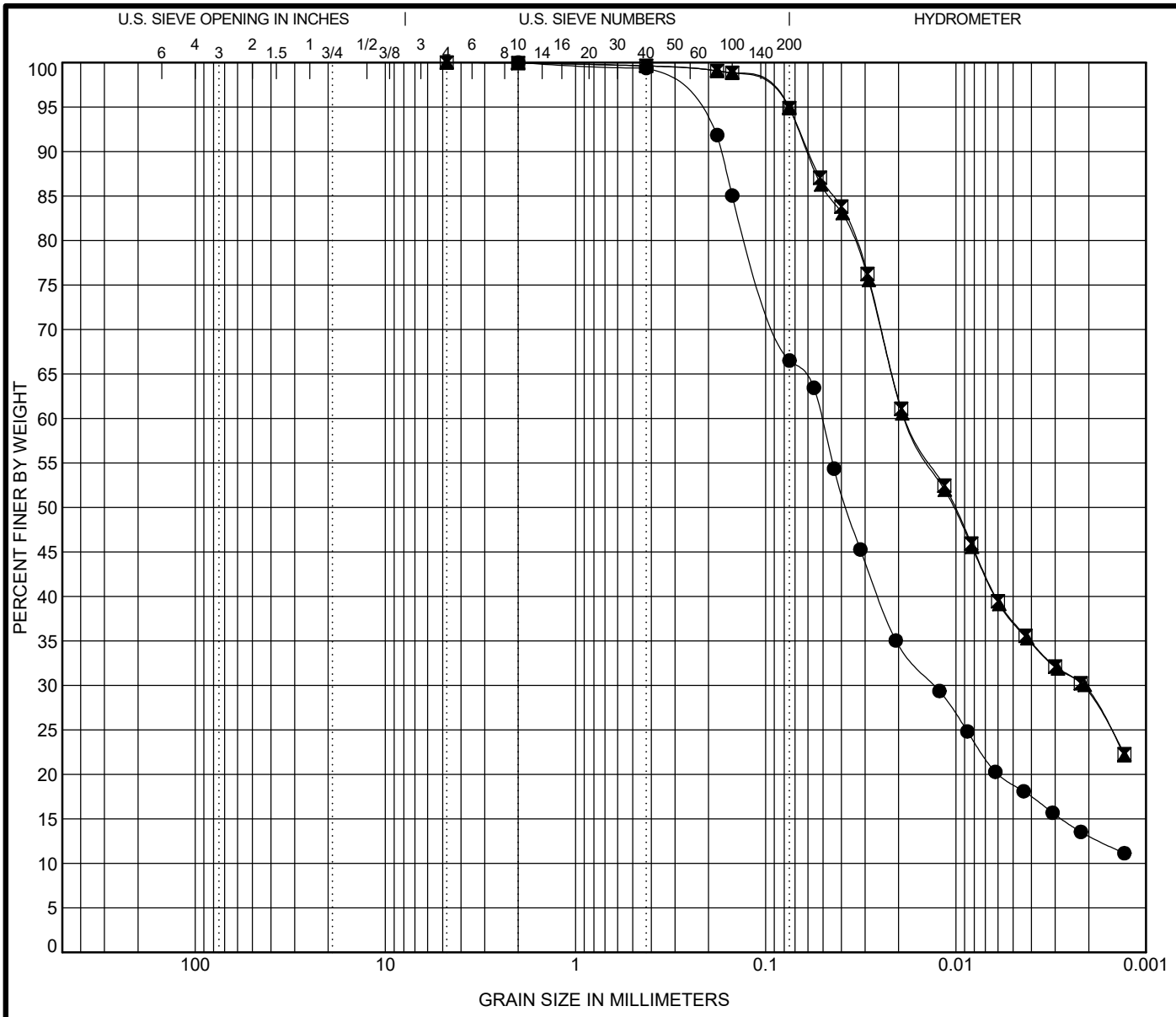
GRAIN SIZE DISTRIBUTION

Project: IL 18 over the Illinois River

Location: Henry, Illinois

Number: 342-14-01

WEI GRAIN SIZE IDH 3421401.GPJ US LAB.GDT 1/17/24



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	EB-06#5	11.0 ft	Silty Loam	33	16	17		
⊠	EMB-P2-03#	13.0 ft	Silty Clay Loam					
▲	EMB-P2-03ST#2	13.0 ft	Silty Clay Loam	51	21	30		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	EB-06#5	11.0 ft	2	0.051	0.013		0.0	33.5	53.3	13.1
⊠	EMB-P2-03#	13.0 ft	4.75	0.018	0.002		0.1	5.1	65.8	28.8
▲	EMB-P2-03ST#2	13.0 ft	4.75	0.019	0.002		0.1	5.1	65.4	29.1

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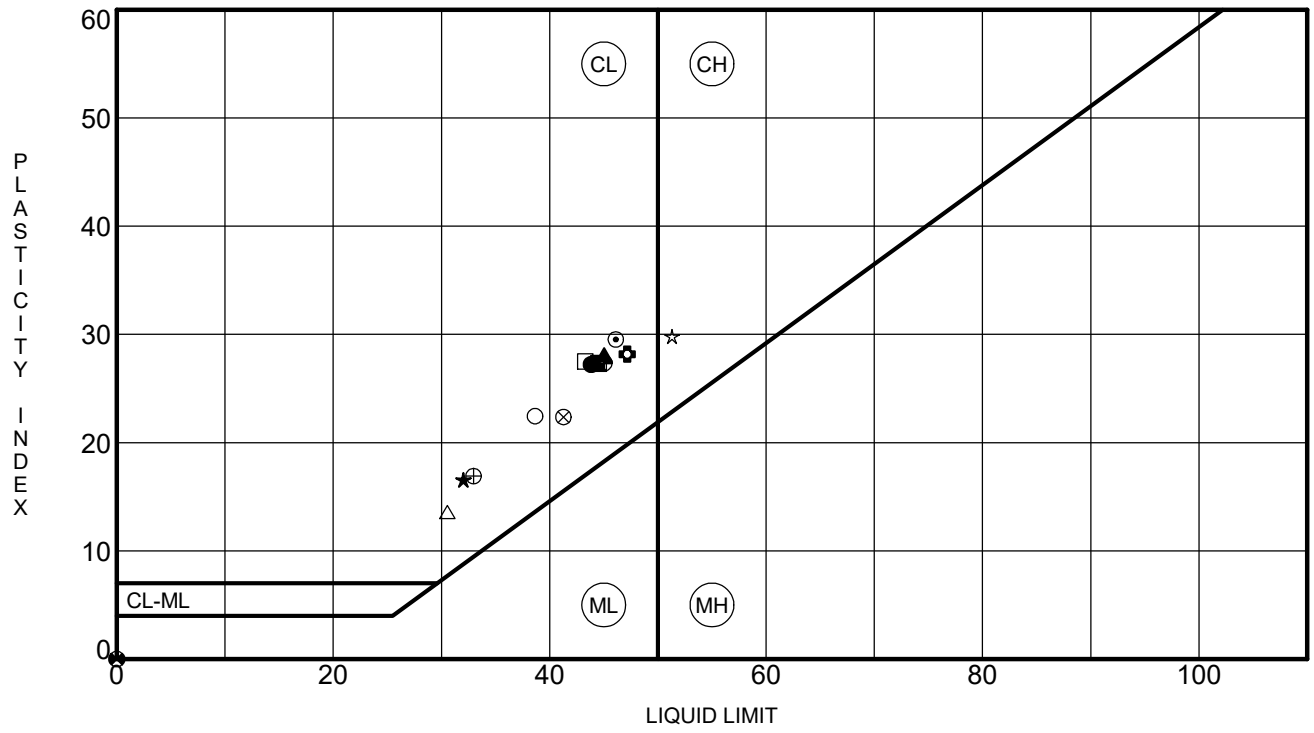
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Project: IL 18 over the Illinois River

Location: Henry, Illinois

Number: 342-14-01

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	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	EB-01#7	16.0 ft	44	17	27	89	Silty Clay Loam
⊠	EB-02#2	3.5 ft	45	17	28		
▲	EB-03#8	18.5 ft	45	17	28	87	Silty Clay Loam
★	EB-04#2	3.5 ft	32	15	17		
⊙	EB-04#6	13.5 ft	46	17	29	90	Silty Clay Loam
✿	EB-05#2	3.5 ft	47	19	28		
○	EB-05#3	6.0 ft	39	16	23	78	Silty Loam
△	EB-05#10	23.5 ft	31	17	14	83	Silty Loam
⊗	EB-06#3	6.0 ft	41	19	22		
⊕	EB-06#5	11.0 ft	33	16	17	67	Silty Loam
□	EMB-P2-01#2	3.5 ft	43	16	27		
⊛	EMB-P2-02#2	3.5 ft	NP	NP	NP		
◕	EMB-P2-03#4	8.5 ft	45	18	27		
☆	EMB-P2-03ST#2	13.0 ft	51	21	30	95	Silty Clay Loam

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ATTERBERG LIMITS' RESULTS

Project: IL 18 over the Illinois River

Location: Henry, Illinois

Number: 342-14-01

WEI ATTERBERG LIMITS IDH 3421401.GPJ US LAB.GDT 1/17/24

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ONE-DIMENSIONAL CONSOLIDATION TEST

AASHTO T 216 / ASTM D 2435

Project: IL Route 18
Client: Parsons
Soil Sample ID: Boring EB-01ST, ST#4, 23 to 25 feet
Sample Description: Gray SILTY CLAY LOAM

Tested by: M. Snider
Prepared by: M. Snider
Test date: 10/4/2021
WEI: KE225055

Initial sample height =	0.760	in	Ring diameter =	2.508	in
Initial sample mass =	116.66	g	Ring mass =	62.40	g
Initial water content =	34.63%		Initial sample and ring mass =	179.06	g
Initial dry unit weight =	87.94	pcf	Tare mass =	11.51	g
Initial void ratio =	0.951		Final ring and sample mass =	167.58	g
Initial degree of saturation =	100.10%		Mass of wet sample and tare =	116.94	g
			Mass of dry sample and tare =	98.16	g
Final sample mass =	105.43	g	Initial dial reading =	0.01000	in
Final dry sample mass =	86.65	g	Final dial reading =	0.16882	in
Final water content =	21.67%		LL =	45	%
Final dry unit weight =	111.17	pcf	PL =	17	%
Final void ratio =	0.544		% Sand =	n.a.	%
Final degree of saturation =	100.00%		% Silt =	n.a.	%
Estimated specific gravity =	2.75		% Clay =	n.a.	%

Compression and Swelling Indices

Compression index C_c =	0.305
Field corrected C_c =	0.329
Swelling index C_s =	0.047

Preconsolidation pressure, s_C
Casagrande Method = 1169 psf

Load number	Vertical stress	Dial reading	System deflection	Vertical strain	Void ratio	C_v	Cae	Elapsed time
	psf	in	in	%		ft^2/day	%	min
1	100.0	0.01050	0.00010	0.08	0.950	N/A	N/A	1440
2	200.0	0.01212	0.00023	0.31	0.945	0.1117	0.06	1440
3	500.0	0.01945	0.00058	1.32	0.926	0.0865	0.17	1440
4	1000.0	0.03358	0.00090	3.22	0.889	0.0669	0.38	1440
5	2000.0	0.05781	0.00135	6.47	0.825	0.0588	0.50	1440
6	4000.0	0.08961	0.00193	10.73	0.742	0.0527	0.67	1440
7	8000.0	0.12507	0.00253	15.47	0.649	0.0623	0.65	1440
8	16000.0	0.15988	0.00324	20.15	0.558	0.0669	0.67	1440
9	32000.0	0.19264	0.00413	24.57	0.472	0.0698	0.57	1440
10	8000.0	0.19148	0.00295	24.27	0.478	N/A	N/A	1440
11	2000.0	0.18214	0.00198	22.91	0.504	N/A	N/A	720
12	500.0	0.17108	0.00123	21.36	0.535	N/A	N/A	1440

Prepared by: _____ Date: _____

Checked by: _____ Date: _____

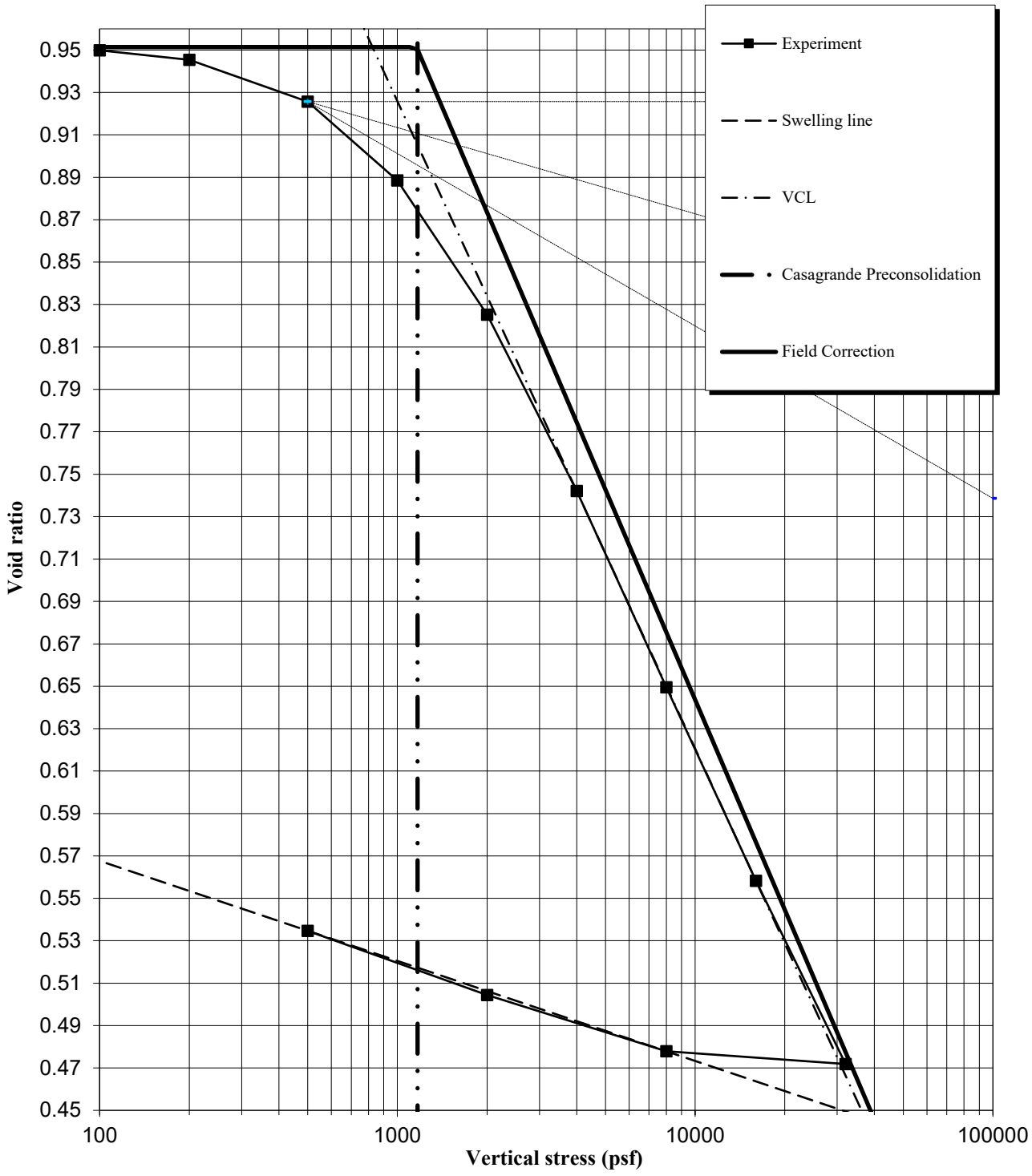
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CONSOLIDATION CURVE

Sample EB-01ST, ST#4, 23 to 25 feet

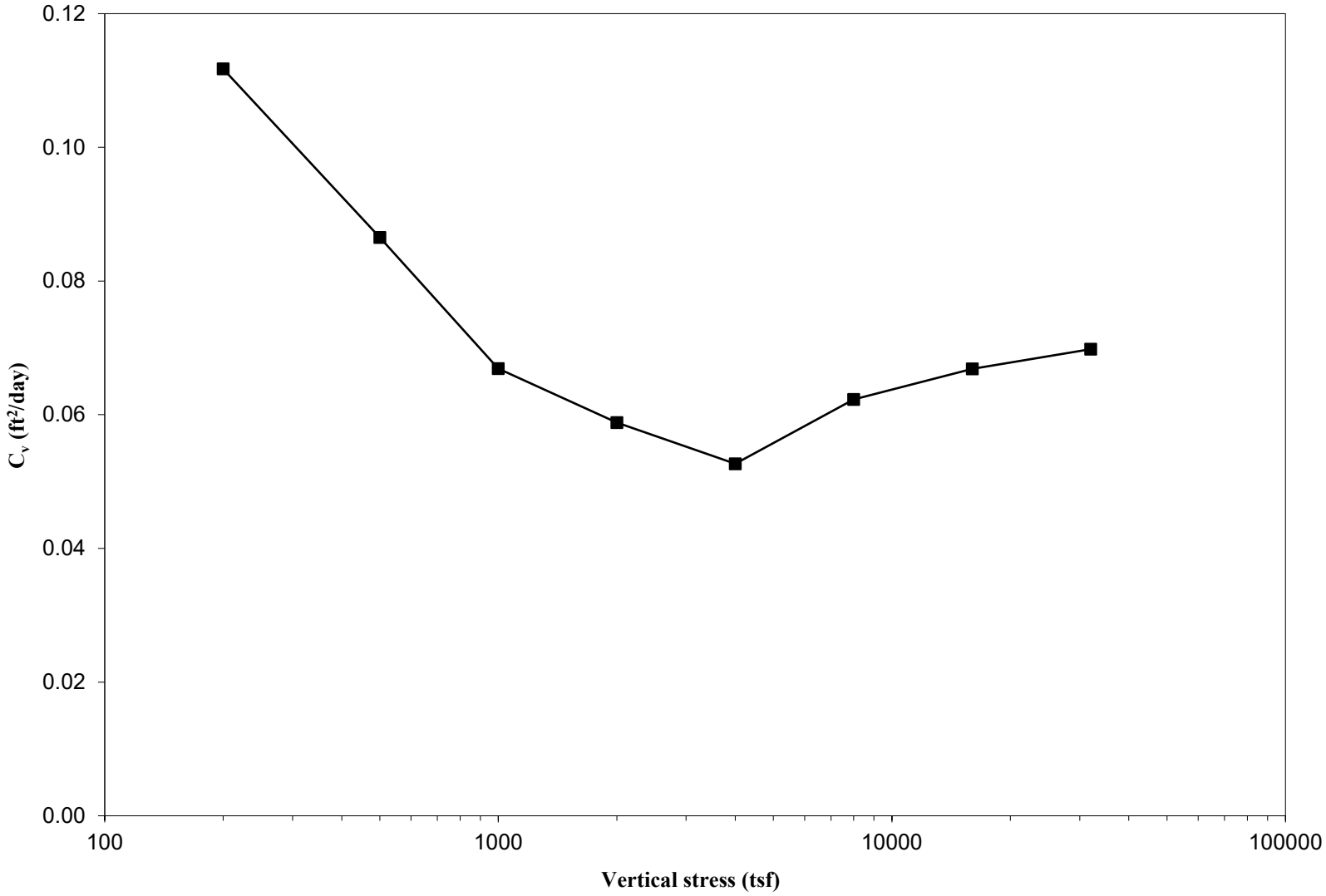


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CONSOLIDATION COEFFICIENT (C_v) vs. VERTICAL STRESS

Sample EB-01ST, ST#4, 23 to 25 feet



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ONE-DIMENSIONAL CONSOLIDATION TEST

AASHTO T 216 / ASTM D 2435

Project: Illinois Route 18
Client: Parsons
Soil Sample ID: Boring EMB-P2-01ST, ST3, 13 to 15 feet
Sample Description: Gray SILTY CLAY LOAM

Tested by: M. Ciapas
Prepared by: M. Snider
Test date: 9/11/2023
WEI: KE225055

Initial sample height =	0.790	in	Ring diameter =	2.499	in
Initial sample mass =	116.95	g	Ring mass =	62.12	g
Initial water content =	36.74%		Initial sample and ring mass =	179.07	g
Initial dry unit weight =	84.14	pcf	Tare mass =	11.95	g
Initial void ratio =	1.054		Final ring and sample mass =	169.04	g
Initial degree of saturation =	96.52%		Mass of wet sample and tare =	118.63	g
			Mass of dry sample and tare =	97.48	g
Final sample mass =	106.68	g	Initial dial reading =	0.01000	in
Final dry sample mass =	85.53	g	Final dial reading =	0.15913	in
Final water content =	24.73%		LL =	51	%
Final dry unit weight =	103.72	pcf	PL =	21	%
Final void ratio =	0.667		% Sand =	5.1	%
Final degree of saturation =	100.00%		% Silt =	65.4	%
Estimated specific gravity =	2.77		% Clay =	29.1	%

Compression and Swelling Indices

Compression index C_c =	0.357
Field corrected C_c =	0.397
Swelling index C_s =	0.064

Preconsolidation pressure, s_C

Casagrande Method = 2582 psf

Load number	Vertical stress	Dial reading	System deflection	Vertical strain	Void ratio	C_v	Cae	Elapsed time
	psf	in	in	%		ft^2/day	%	min
1	100.0	0.01000	0.00010	0.01	1.054	N/A	N/A	480
2	200.0	0.01175	0.00023	0.25	1.049	0.0638	0.09	480
3	500.0	0.01866	0.00058	1.17	1.030	0.0741	0.15	480
4	1000.0	0.02992	0.00090	2.64	1.000	0.0720	0.25	480
5	2000.0	0.04737	0.00135	4.90	0.954	0.0721	0.41	1080
6	4000.0	0.07214	0.00193	8.11	0.888	0.0595	0.61	480
7	8000.0	0.10573	0.00253	12.44	0.799	0.0486	0.84	1500
8	16000.0	0.14649	0.00324	17.69	0.691	0.0408	1.02	1500
9	32000.0	0.18695	0.00413	22.92	0.583	0.0343	1.07	1500
10	8000.0	0.18678	0.00295	22.75	0.587	N/A	N/A	480
11	2000.0	0.17495	0.00198	21.13	0.620	N/A	N/A	480
12	500.0	0.15902	0.00123	19.02	0.664	N/A	N/A	625

Prepared by: _____ Date: _____

Checked by: _____ Date: _____

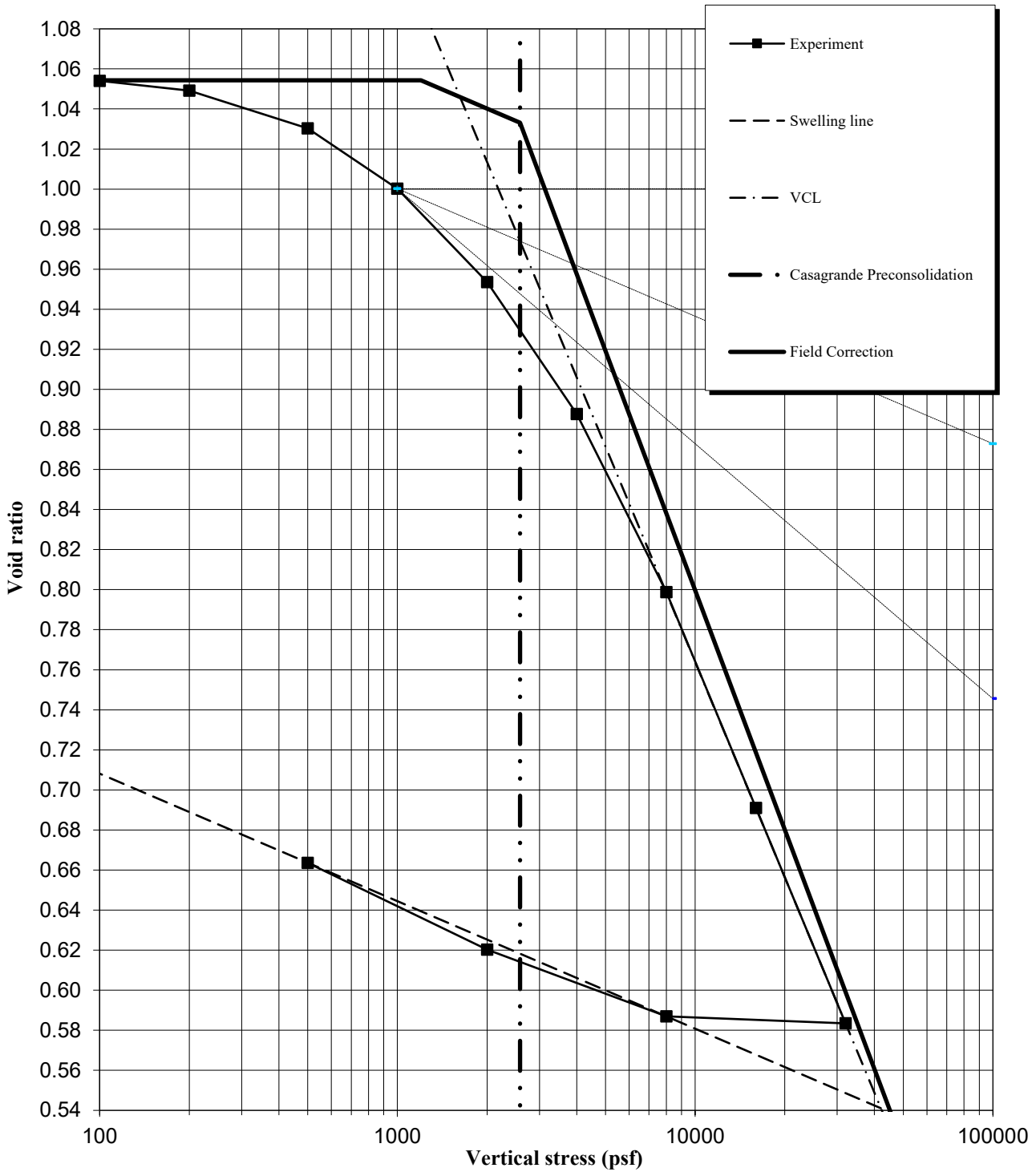
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CONSOLIDATION CURVE

Boring EMB-P2-01, ST#2, 13 to 15 feet

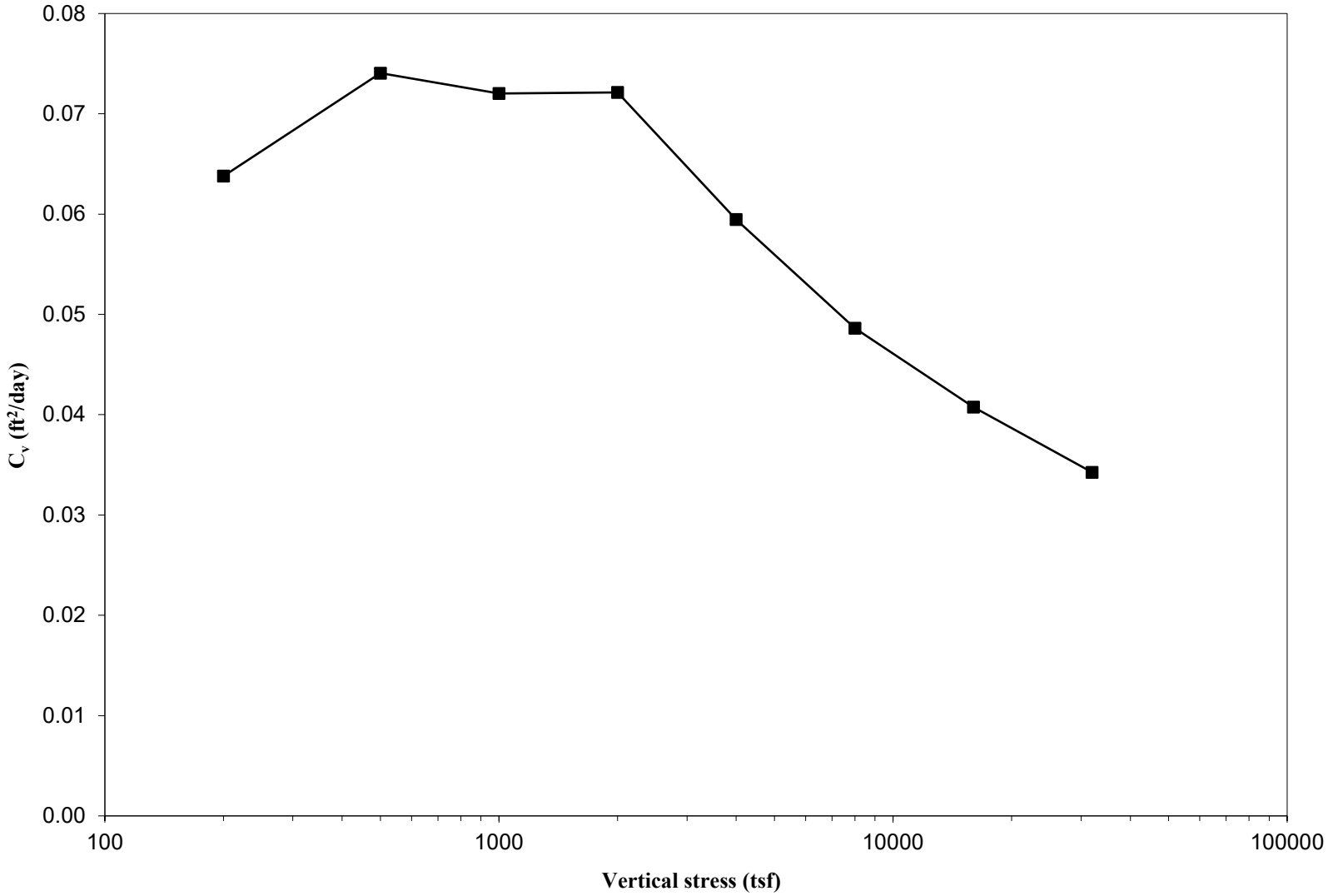


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CONSOLIDATION COEFFICIENT (C_v) vs. VERTICAL STRESS

Boring EMB-P2-01, ST#2, 13 to 15 feet



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ONE-DIMENSIONAL CONSOLIDATION TEST

AASHTO T 216 / ASTM D 2435

Project: Illinois Route 18
Client: Parsons
Soil Sample ID: Boring EMB-P2-01ST, ST3, 21 to 23 feet
Sample Description: Gray SILTY CLAY LOAM

Tested by: M. Ciapas
Prepared by: M. Snider
Test date: 9/11/2023
WEI: KE225055

Initial sample height =	0.997	in	Ring diameter =	2.489	in
Initial sample mass =	155.02	g	Ring mass =	109.79	g
Initial water content =	30.95%		Initial sample and ring mass =	264.81	g
Initial dry unit weight =	93.03	pcf	Tare mass =	13.48	g
Initial void ratio =	0.858		Final ring and sample mass =	254.92	g
Initial degree of saturation =	99.92%		Mass of wet sample and tare =	158.41	g
			Mass of dry sample and tare =	131.86	g
Final sample mass =	144.93	g	Initial dial reading =	0.01000	in
Final dry sample mass =	118.38	g	Final dial reading =	0.15472	in
Final water content =	22.43%		LL =	n.a.	%
Final dry unit weight =	108.83	pcf	PL =	n.a.	%
Final void ratio =	0.588		% Sand =	n.a.	%
Final degree of saturation =	100.00%		% Silt =	n.a.	%
Estimated specific gravity =	2.77		% Clay =	n.a.	%

Compression and Swelling Indices

Compression index C_c =	0.248
Field corrected C_c =	0.268
Swelling index C_s =	0.044

Preconsolidation pressure, s_C

Casagrande Method = 2187 psf

Load number	Vertical stress	Dial reading	System deflection	Vertical strain	Void ratio	C_v	Cae	Elapsed time
	psf	in	in	%		ft^2/day	%	min
1	100.0	0.01110	0.00010	0.12	0.856	N/A	N/A	480
2	200.0	0.01353	0.00023	0.38	0.851	0.0268	0.09	480
3	500.0	0.02101	0.00058	1.16	0.836	0.0482	0.15	480
4	1000.0	0.03344	0.00090	2.44	0.813	0.0538	0.22	480
5	2000.0	0.05038	0.00135	4.19	0.780	0.0642	0.30	1080
6	4000.0	0.07535	0.00193	6.75	0.733	0.0579	0.41	480
7	8000.0	0.10642	0.00253	9.93	0.674	0.0533	0.52	1500
8	16000.0	0.14295	0.00324	13.67	0.604	0.0502	0.62	1500
9	32000.0	0.18217	0.00413	17.69	0.529	0.0482	0.67	1500
10	8000.0	0.18122	0.00295	17.48	0.533	N/A	N/A	480
11	2000.0	0.17139	0.00198	16.39	0.553	N/A	N/A	480
12	500.0	0.15458	0.00123	14.63	0.586	N/A	N/A	600

Prepared by: _____ Date: _____

Checked by: _____ Date: _____

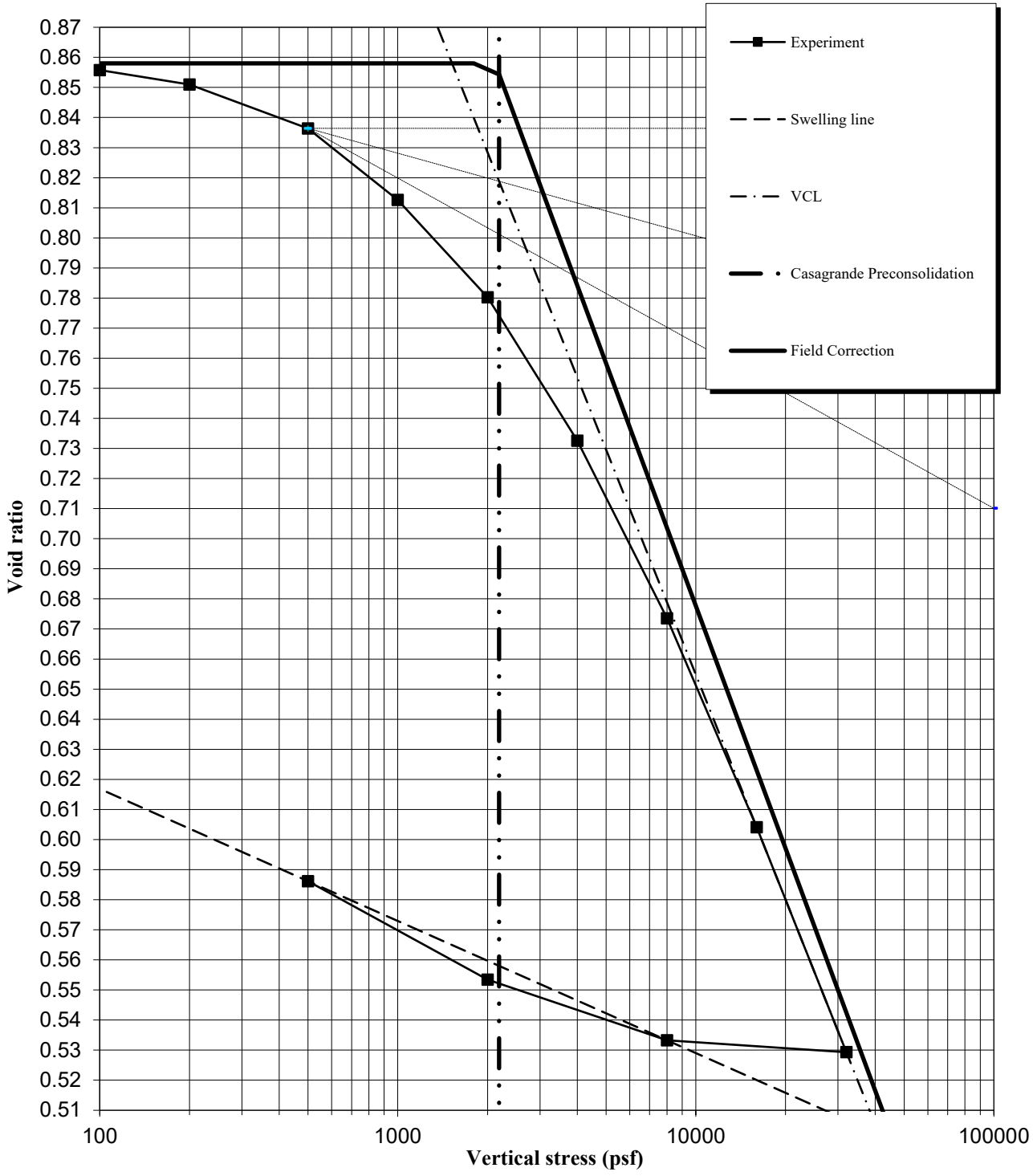
AASHTO ACCREDITATION PROGRAM

Wang Engineering

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Lombard, Illinois 60148
Phone (630) 953-9928
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CONSOLIDATION CURVE

Boring EMB-P2-01, ST#3, 21 to 23 feet

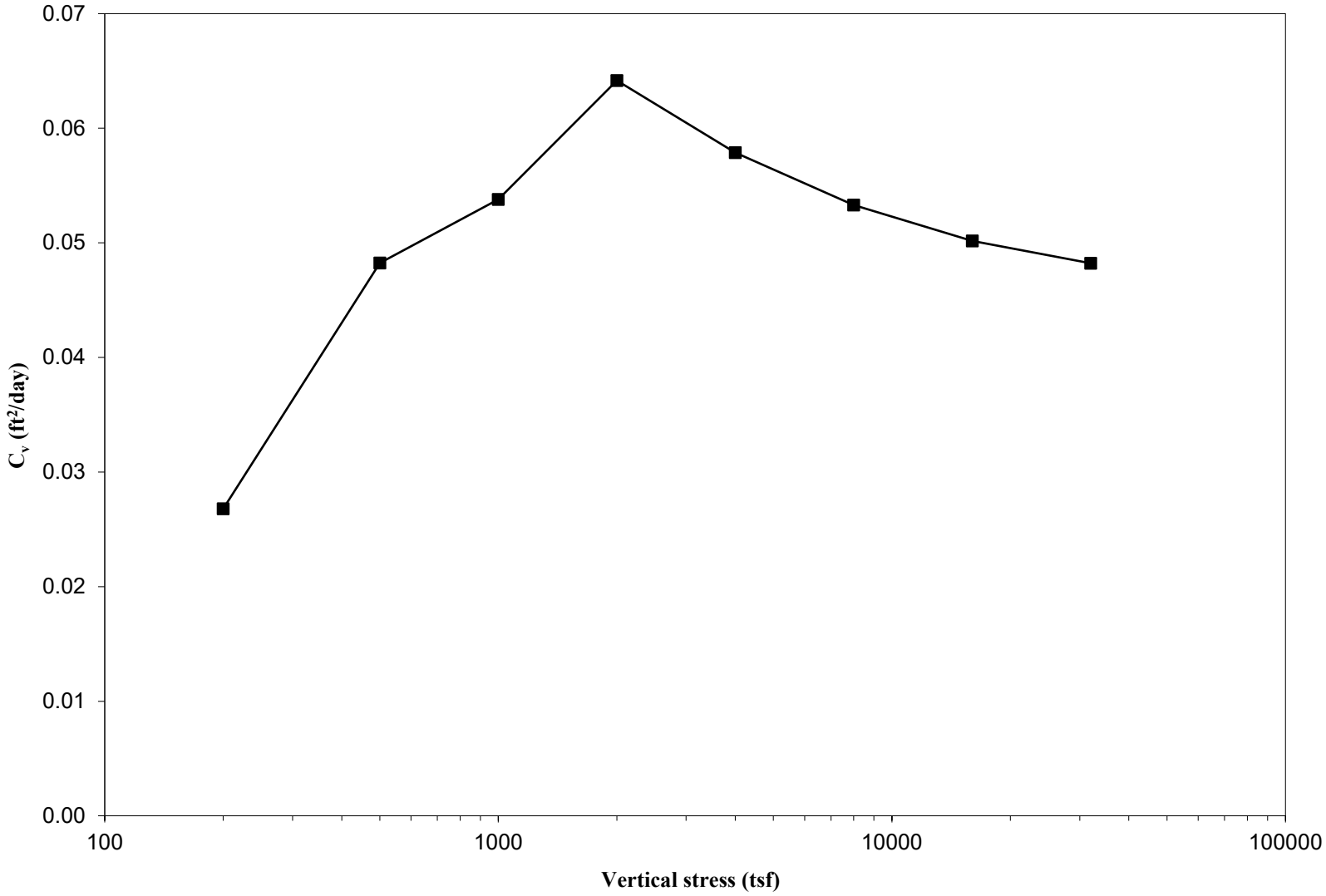


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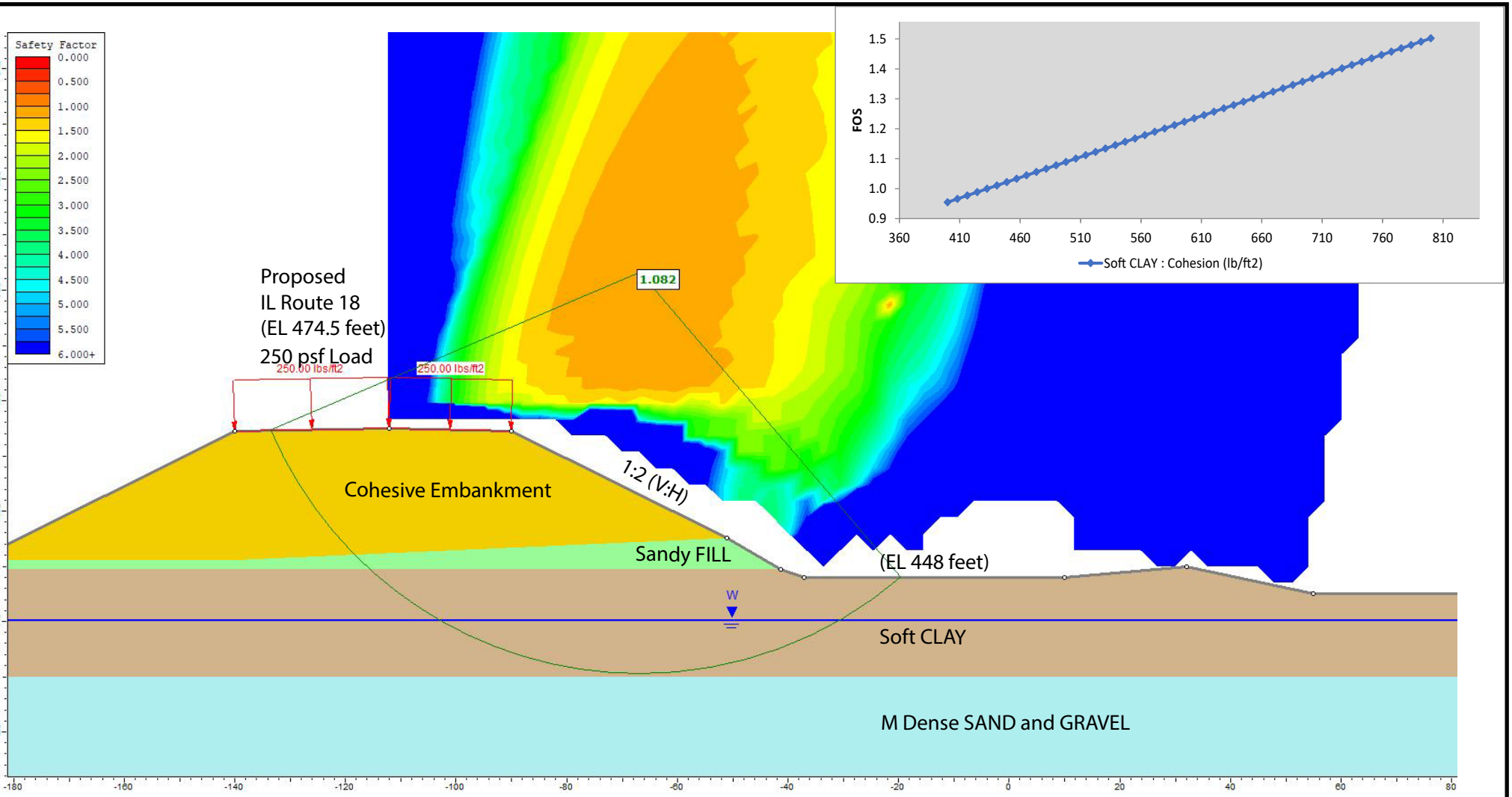
CONSOLIDATION COEFFICIENT (C_v) vs. VERTICAL STRESS

Boring EMB-P2-01, ST#3, 21 to 23 feet



AASHTO R18

APPENDIX C



Undrained Stability Analysis, East Embankment, Station 3030+00, Ref EB-01 and EMB-P2-02

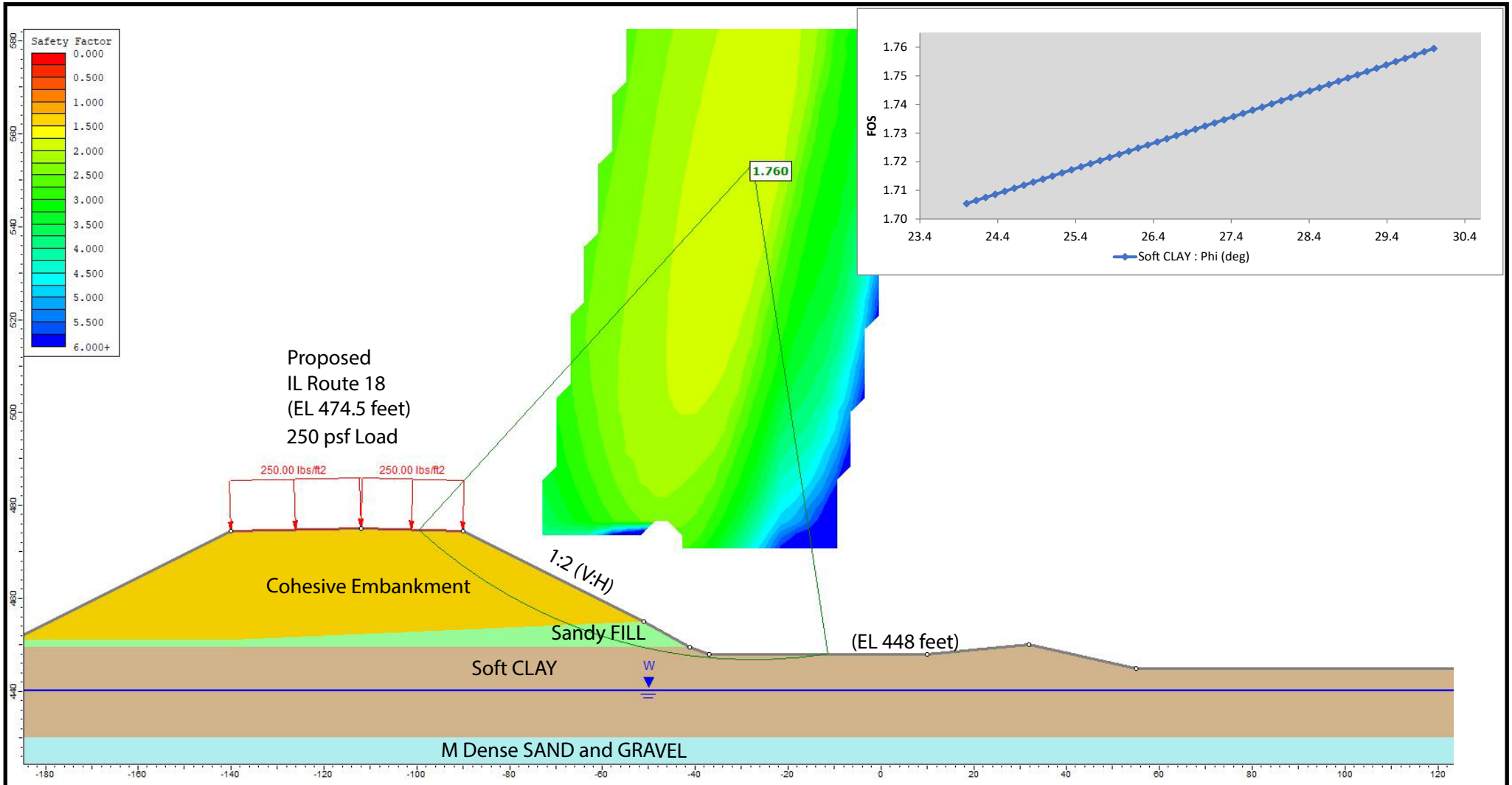
Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	Cohesive Embankment	125	1000	0
2	Sandy FILL	120	0	32
3	Soft CLAY	115	500	0
4	Medium Dense SAND and GRAVEL	110	0	34

GLOBAL STABILITY ANALYSIS: IL ROUTE 18 OVER THE ILLINOIS RIVER
MARSHALL AND PUTNAM COUNTIES, IL

SCALE: GRAPHICAL | APPENDIX C-1 | DRAWN BY: NSB | CHECKED BY: MLS

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FOR PARSONS | 342-14-01



Drained Stability Analysis, East Embankment, Station 3030+00, Ref EB-01 and EMB-P2-02

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	Cohesive Embankment	125	100	30
2	Sandy FILL	120	0	32
3	Soft CLAY	115	80	30
4	Medium Dense SAND and GRAVEL	110	0	34

GLOBAL STABILITY ANALYSIS: IL ROUTE 18 OVER THE ILLINOIS RIVER MARSHALL AND PUTNAM COUNTIES, IL

SCALE: GRAPHICAL | APPENDIX C-2 | DRAWN BY: NSB | CHECKED BY: MLS

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APPENDIX D

KEYPLAN

PROP. CURVE IL18_SKEW1
PI STA. = 3004+72.86
¬ = 9° 08' 26" (LT)
D = 3° 58' 44"
R = 1,440.00'
T = 115.11'
L = 229.72'
E = 4.59'
e = 4.0%
T.R. = 31'
S.E. RUN = 83'
P.C. STA. = 3003+57.75
P.T. STA. = 3005+87.48

PROP. CURVE IL18_SKEW2
PI STA. = 3007+88.54
¬ = 7° 08' 26" (RT)
D = 3° 58' 44"
R = 1,440.00'
T = 89.85'
L = 179.46'
E = 2.80'
e = 4.0%
T.R. = 31'
S.E. RUN = 83'
P.C. STA. = 3006+98.70
P.T. STA. = 3008+78.16

POT Sta 3000+00.00
POT Sta 48+38.96
PC Sta 3003+57.75
PT Sta 3005+87.48
PC Sta 3006+98.70
PT Sta 3008+78.16
PI Sta 3004+72.86
MATCHLINE STA. 3013+00

BORING EMB-P2-07, EL. 477.0 ft
STATION 3007+61.10, 19.93 RT

BORING BSB-01, EL. 476.8 ft
STATION 3008+48.88, 17.09 RT

0 50 100 150
SCALE IN FEET

-0.98%
-1.85%
+0.00%
VPI STA 3004+75.00
ELEVATION 489.67
+96.50 EL. 486.22
K = 121
105.00 V.C.
+01.50 EL. 484.73

EMB-P2-07 3007+61.10
BSB-01 3008+48.88

Stiff, black and dark brown SILTY CLAY LOAM - Fill -
Loose to medium dense, brown GRAVELLY SAND to SANDY GRAVEL - Fill -
Medium dense, brown, coarse GRAVELLY SAND to fine SAND

	N	Qu		N	MC
	5	1.07 B		8	12.0 P
	5			16	NP
	5			16	NP
	5			22	NP
	4			23	NP
	4			13	NP
	5			28	NP
	4			23	NP
	4			21	NP
	5			19	NP
	5			22	NP
	4			23	NP
	4			34	▼

	MC
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	19

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489.05 488.59 488.25 487.73 487.17 486.46 486.68 485.64 486.19 485.41 485.58 484.71 484.76 483.78 483.84 482.66 482.97 481.74 482.44 480.99 482.26 479.48 482.44 477.99 482.98 477.26 483.88 476.52 485.13 476.29 486.73 476.26 488.67 470.32 490.67 461.43 492.67 457.48 494.67 453.43 496.67 452.52 498.67 443.90 500.67 440.82 502.67 440.99 504.67

3000+00 3001+00 3002+00 3003+00 3004+00 3005+00 3006+00 3007+00 3008+00 3009+00 3010+00 3011+00 3012+00 3013+00

485 480 475 470 465 460 455 450 445

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

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

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PLOT SCALE = 100.0000 ' / in.	CHECKED	REVISED	
PLOT DATE = 1/26/2024	DATE 10/10/2023	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PLAN AND PROFILE
BEGIN TO STA. 3013+00.00

SCALE: 1" = 50' | SHEET | OF | SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			06	01
		CONTRACT NO.		
		ILLINOIS	FED. AID PROJECT	

BORING EB-01, EL. 450.9 ft
STATION 3030+33.05, 17.01 RT

BORING EB-02, EL. 451.9 ft
STATION 3028+02.43, 14.95 RT

BORING EMB-P2-02, EL. 452.6 ft
STATION 3031+08.73, 33.27 RT

BORING EMB-P2-04, EL. 443.8 ft
STATION 3033+10.92, 23.59 RT

BORING EMB-P2-05, EL. 442.8 ft
STATION 3034+29.59, 40.98 RT

BORING EMB-P2-06, EL. 443.0 ft
STATION 3036+33.47, 46.63 RT

BORING EMB-P2-01, EL. 452.1 ft
STATION 3029+02.66, 23.97 RT

BORING EMB-P2-03, EL. 454.5 ft
STATION 3031+91.29, 5.11 RT

N

0 50 100 150
SCALE IN FEET

MATCHLINE STA. 3028+00

MATCHLINE STA. 3042+00

P.I. Sta. 79+32.37

P.I. Sta. 81+17.52

KEYPLAN

EB-02
3028+02.43

EMB-P2-01
3029+02.66

EB-01
3030+33.05

EMB-P2-02
3031+08.73

EMB-P2-03
3032+91.29

EMB-P2-04
3033+10.92

EMB-P2-05
3034+29.59

EMB-P2-06

-3.00%

-0.35%

VPI STA. 3035+81.00
ELEVATION 460.02

Very Loose to medium dense, brown GRAVELLY SAND to SANDY GRAVEL

Fill

Soft to medium stiff, gray SILTY CLAY

Loose to very dense, gray, medium to coarse SAND to SANDY GRAVEL

LL=45 PL=18

ATTACHMENT 8.1

USER NAME = kamadan	DESIGNED SC
PLOT SCALE = 100.0000 ' / in.	DRAWN SO
PLOT DATE = 1/26/2024	CHECKED
	DATE 10/10/2023

REVISED
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PLAN AND PROFILE
STA. 3028+00 TO STA. 3042+00.00

SCALE: 1" = 50' | SHEET OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			06	03
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

PLAN / PROFILE
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APPENDIX 13-B

Structural Geotechnical Report

STRUCTURE GEOTECHNICAL REPORT
ILLINOIS ROUTE 18 BRIDGE
OVER THE ILLINOIS RIVER
EX SN 062-0036, PR SN 062-0089
MARSHALL AND PUTNAM COUNTIES, ILLINOIS

For

Parsons

222 South Riverside Plaza, Suite 2450

Chicago, IL 60606

(312) 930-5100

Submitted by

Wang Engineering, Inc.

1145 North Main Street

Lombard, IL 60148

Original Report: December 15, 2023
Revised Report: n.a.

Technical Report Documentation Page

1. Title and Subtitle Structure Geotechnical Report Illinois Route 18 over the Illinois River		**2. Original Date:** December 15, 2023 **Revised Date:** n.a. **3. Report Type** ☒ SGR ☐ RGR ☒ Draft ☐ Final ☐ Revised
4. Route / Section / County/ District/ Region FAS 2369/ 104B-D/ Marshall and Putnam/ 4/ 1		**5. Contract** d72F08
6. PSB / Item No.	**7. Existing Structure Number(s)** SN 062-0036	**8. Proposed Structure Number(s)** SN 062-0089
9. Prepared by Wang Engineering, Inc. 1145 N Main Street Lombard, IL 60148	**Contributor(s)** Author: Mickey L. Snider, PE QC/QA: Corina Farez, PE, PG PM: Liviu Iordache, PG	**Contact** (630) 953-9928 ext. 1027 msnider@wangeng.com
10. Prepared for Parsons 222 S Riverside Plaza Suite 2450 Chicago, IL 60606	**Contact** Yinghong Cao, SE, PE	**Contact Info** (312) 930-5172 yinghong.cao@parsons.com

11. Abstract

A new, realigned, 11-span structure will carry Illinois Route 18 over the Illinois River. The proposed bridge, offset north and east of the existing bridge by 60 to 120 feet, will have a length of 2206 feet and an out-to-out width of 42.83 feet. The west approach embankment will consist of approximately 8 to 10 feet with side slopes graded out at 1:4 (V:H) The east approach will be about 20 to 25 feet of fill graded out at 1:3. This report provides geotechnical recommendations for the design and construction of the proposed bridge, approach embankments, and approach slabs.

Beneath the surface course, borings drilled for the bridge encountered up to 10 feet of various fill materials on both sides of the river. The general lithologic profile beneath the fill includes up to 25 feet of soft to medium stiff silty clay floodplain soils on the east side of the river. The west bank and Henry city side of the river has floodplain deposits only near the riverbank and at much thinner limits. Beneath the soft silty clay, and beneath the fill on the west side, the lithology includes loose to dense sand and sandy gravel continuing to the top of bedrock elevation. The granular soils transition from loose to medium dense to dense and very dense at elevations of about 410 to 415 feet. Weak, poor quality shale was encountered at elevations of 389 to 393 feet. The groundwater level was monitored at elevations ranging from 440 to 448 feet, generally fluctuating with the rise and fall of the river level.

The west approach embankment will have adequate stability and undergo minimal settlements. The east approach embankment will undergo 6 to 8 inches of total, long-term settlement and will require remediation or soil improvement. The global stability of the east approach embankment has FOS from 1.3 to 2.2.

The bridge abutments and land-based Piers 1, 2, 7, 8, 9, and 10 will be supported on steel H-piles driven to maximum nominal bearing at the top of, or up to 5 feet into, the underlying shale bedrock. River Piers 3, 4, 5, and 6 subject to vessel collision loading will be supported on pairs of drilled shafts socketed into the shale. The shale sockets will extend up to 20 feet into the bedrock to resist lateral loading and achieve displacement fixity at the tip.

Some of the pier caps constructed for the land-based piers will require Type 1 cofferdams due to relatively high groundwater levels.

12. Path to archived file

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STRUCTURE GEOTECHNICAL REPORT
ILLINOIS ROUTE 18 BRIDGE
OVER THE ILLINOIS RIVER
EX SN 062-0036, PR SN 062-0089
MARSHALL AND PUTNAM COUNTY, ILLINOIS
FOR
PARSONS

1.0 INTRODUCTION

This report presents the results of Wang Engineering, Inc.'s (Wang) subsurface investigation, laboratory testing, geotechnical evaluations, and recommendations to support the design and reconstruction of the Illinois Route 18 Bridge over the Illinois River in Henry, Marshall and Putnam Counties, Illinois. A *Site Location Map* is presented as Exhibit 1.

1.1 Proposed Structure

Based on the preliminary General Plan and Elevation (GPE) drawings provided by Parsons in August 2023, Wang understands that SN 062-0089 will be a new, eleven-span structure with stub-type abutments, and a combination of hammerhead and multi-column piers. The structure will have a back-to-back of abutment length of 2206.0 feet divided into three units; Unit 1 will be 333.0 feet long and extends from the west abutment to Pier 3 at the west edge of the river, Unit 2 includes the river spans from Pier 3 to Pier 6 at 1001.0 feet long, and Unit 3 will extend from Pier 6 to the east abutment at 865.0 feet long. The individual span lengths range from a minimum of 105 feet at Span 1 to the main channel, Span 5, which will be 385 feet long. The out-to-out width will measure 42.83 feet to accommodate two 12-foot wide lanes and two 8-foot wide shoulders.

The alignment of the new bridge will be offset from the existing alignment by about 60 to 120 feet. The west end of the bridge will be situated above Front Street, with Span 1 extending over the local roadway. A fill section of about 8 to 10 feet will be necessary to increase the profile grade at the back of the west abutment. The east abutment will be constructed about 321 feet behind the existing one, offset southeast and 20 to 25 feet of fill will be required to construct the east abutment profile grade. The side slope of the west approach is graded at 1:4 (V:H) while the east approach will be graded at 1:3. The end slopes will be graded at 1:2 (V: H).

1.2 Existing Structure and Land Use

The existing IL18 Bridge over the Illinois River is 1719 feet long and 23 feet wide. The foundations consist of timber and concrete pile supported bent piers. On the west side, the bridge connects into the southeast quadrant of Henry, Illinois, while the east side of the bridge is forested.

The project area surface topography is relatively flat. However, the west end of the project shows slopes facing east at a maximum of 30%. Gentler slopes of about 1 to 15% and a relatively flat surface characterize the topography east of the river. The surface elevation varies from 480 feet to 445 feet declining from west to east.

The purpose of this investigation was to characterize the site soil and groundwater conditions, perform geotechnical analyses, and provide recommendations for the design and construction of the proposed bridge, approach embankments, and slabs.

2.0 GEOLOGICAL SETTING

The project area is located in northcentral Marshall and southwestern Putnam Counties. On the USGS *Henry Quadrangle 7.5 Minute Series* map, the bridge spans through the W ½ of Section 33, Tier 31 North, Range 2 West of the Third Principal Meridian and the SE ¼ of Section 16, Tier 13 North, Range 10 East of the Fourth Principal Meridian.

The project area is located within the Bloomington Ridged Plaine physiographic subsection of the Till Plains Section (Leighton et al. 1948). The Bloomington Ridged plain includes Wisconsian-aged moraines that form a series of loops, roughly concentric with the wider intermorainal areas. The project site spans through the ancient Mississippi valley, todays Illinois River valley, carved by glacial meltwater into the broad intermorainal area bordered on the east by the Marna Moraine and on the west by the Eureka Moraine. Silty clay to silty clay loam ground moraine deposits up to 10-feet thick from the Lemont Formation, Yorkville and Batestown facies cover approximately 30 to 75 feet of sand and gravel outwash deposits of the Henry Formation. The sand and gravel rests unconformably over the bedrock. These glacial and post glacial deposits fill the West Channel Middle Illinois Bedrock Valley.

The bedrock is made of Pennsylvanian-age, interbedded shale, mudstone, sandstone, and coal of the

Carbondale Formation. Bedrock is mapped at approximately 385 to 400 feet elevation, about 57 to 80 feet below ground surface.

Our subsurface investigation results fit into the local geologic context. The borings drilled in the project area encountered native sediments consisting of occasional patches of clayey, lacustrine deposits overlying silty clay diamicton and silty loam diamicton interbedded with gravel and sand. The structure borings drilled on site encountered shale bedrock at elevations of 389 to 393 feet.

3.0 METHODS OF INVESTIGATION

The following sections outline the subsurface and laboratory investigations performed by Wang.

3.1 Field Investigation

The subsurface investigation for the bridge consisted of 13 structure borings, designated as BSB-01 thru BSB-13 at the piers and abutments, with embankment Borings EMB-P2-01 thru EMB-P2-07 and EB-01 thru EB-09 used to supplement the structure borings. The borings were drilled in two phases by Wang in April 2021 and June 2023. The borings were drilled from elevations of 446.4 to 453.9 feet and were advanced to depths of 35.0 to 81.5 feet below ground surface (bgs). The as-drilled northings and eastings were surveyed by Wang with elevations surveyed by Terra Engineering and adjusted coordinates, stations, and offsets provided by Parsons. Boring location data are presented in the Boring Logs (Appendix A) and the as-drilled boring locations are shown in the Boring Location Plan (Exhibit 2).

Truck-mounted drilling rigs, equipped with combinations of hollow stem augers and rotary wash equipment, were used to advance and maintain open boreholes. Soil sampling was performed according to AASHTO T206, *"Penetration Test and Split Barrel Sampling of Soils."* The soil was sampled at 2.5-foot intervals to 30 feet bgs and at 5.0-foot intervals from 30 feet to the boring termination depth or the top of sound bedrock. Bedrock cores were obtained in Phase 1 Boring EB-09, in 5-foot runs with an NWD4-sized core barrel. The bedrock in the majority of the borings was sampled in accordance with the IDOT Modified Standard Penetration Test for weak rock formations (Stark et al 2017). Soil samples collected from each sampling interval were placed in sealed jars and transported to the laboratory for further examination and laboratory testing.

Field boring logs, prepared and maintained by Wang geologists, include lithological descriptions,

visual-manual soil (IDH Textural) classifications, results of Rimac and pocket penetrometer unconfined compressive strength tests, and results of Standard Penetration Tests (SPT) recorded as blows per 6 inches of penetration and Modified Standard Penetration Test (MSPT) results recorded as sampler penetration per 100 hammer blows.

Groundwater levels were measured while drilling and at completion of each boring. The boreholes were backfilled upon completion with soil cuttings and/or bentonite chips and, where necessary, the pavement surface was restored to its original condition. Groundwater monitoring piezometers were installed with TROLL data loggers adjacent to Borings EB-04 and EB-08 at depths of 26 to 44 feet below existing grade.

3.2 Laboratory Testing

The soil samples were tested in the laboratory for moisture content (AASHTO T265). Atterberg limits (AASHTO T89 and T90) and particle size (AASHTO T88) analyses were performed on selected samples. Field visual descriptions of the soil samples were verified in the laboratory. Laboratory test results are shown in the *Boring Logs* (Appendix A) and in the *Laboratory Test Results* (Appendix B).

4.0 INVESTIGATION RESULTS

Detailed descriptions of the soil conditions encountered during the subsurface investigation are presented in the attached *Boring Logs* (Appendix A) and in the *Soil Profile* (Exhibit 3). Please note that strata contact lines represent approximate boundaries between soil types. The actual transition between soil types in the field may be gradual in horizontal and vertical directions.

4.1 Lithological Profile

Borings EB-07 and EB-08 were drilled on the Henry side of the bridge from the frontage road leading along the river. The frontage road pavement consists of 2 to 2.5 inches of asphalt pavement. The remaining land-based borings were drilled through natural ground. Borings BSB-05, BSB-06, BSB-07, and BSB-08 were advanced from a barge within the river. Below the surface the general lithological profile includes 1) man-made ground; 2) soft to medium stiff silty clay; 3) loose to very dense sand and sandy gravel; and 4) weak, poor quality shale.

1) *Man-made ground (fill)*

Beneath the surface, borings encountered up to 10 feet of fill materials. The fill encountered on the

east side of the river ranges in thickness from about 5 to 8 feet, but thins out to natural ground near the edge of the river. The fill on this side of the river generally consists of medium stiff to stiff, brown silty clay and silty clay loam with unconfined compressive strength (Qu) values of 0.8 to 1.8 tsf and moisture content values of 20 to 27%. A portion of the fill near the surface includes loose to medium dense, brown gravelly loam and sandy gravel with SPT values of 3 to 20 blows per foot of penetration. Some of the fill material on the east side was also encountered containing fragments of brick, glass, and other deleterious materials indicating an uncontrolled manner of fill placement.

On the Henry side of the river, the fill is generally the same thickness, about 5 to 10 feet, and consist of loose to dense sand, gravelly sand, and gravelly loam. The fill material on this side, placed to build out the embankment as well as the shoreline in this area, also contains noticeable amounts of concrete debris and wood fragments.

2) *Soft to medium stiff silty clay*

Beneath the fill along the east side of the river the borings encountered up to 25 feet of soft to stiff, gray silty clay floodplain deposits extending down to an elevation of about 423 to 420 feet. The silty clay has Qu values primarily between 0.4 and 0.7 tsf and moisture content values around 27 to 37%. While this soil deposit is soft and compressible, it has a relatively low organic content of 4 to 5% and medium plasticity, with liquid limit (L_L) values of 33 to 46% and plastic limit (P_L) values of 16 to 17%. Liquidity indices are about 0.5 to 0.7, which indicates a soil that will be prone to excessive deformation under the weight of new embankment fill, but the low organic content and plasticity indicate a soil that could be improved through one of several method options.

The borings drilled from the Henry side of the bridge encountered the soft clayey soils in thinner deposits and only down near the shoreline. The thickest deposit was encountered in BSB-04, where medium stiff, dark brown silty clay was encountered down to about 10 feet. The west silty clay has Q_u values of 0.6 tsf and slightly higher moisture contents than the east side at 42 to 70%.

3) *Loose to very dense sand and sandy gravel*

Immediately beneath the floodplain deposits on the east side of the bridge and beneath the fill on the west side of the bridge the borings encountered loose to very dense, brown and gray, medium to coarse sand and sandy gravel extending to the top of bedrock. The sand is initially loose to medium dense, with SPT values of 5 to 21 blows per foot of penetration down to an elevation of about 415 to 420 feet before grading to a very dense consistency. The very dense sandy gravel measured SPT value greater

than 50 blows per foot of penetration, with widespread measurements of rig chatter and the possibility of cobble-size soil fractions.

4) *Weak, poor quality shale*

At a relatively consistent elevation of around 389 to 393 feet the borings encountered weak, poor quality shale bedrock. The bedrock in Stage 1 Borings EB-05 through EB-08 and each of the Stage 2 BSB-series borings was tested using the IDOT Modified SPT (MSPT) method (Stark et al, 2017). Moisture contents of the shale fragments range from about 9 to 19%. The shale was cored in Boring EB-09 in three runs; the first two runs provided no recovery; the third run provided 83% recovery and a corresponding 41% Rock Quality Designation (RQD). An axial compressive strength test on the recovery measured 433 psi (62 ksf). Bedrock core photographs are presented in Appendix C and the compressive strength test results are included in Appendix B.

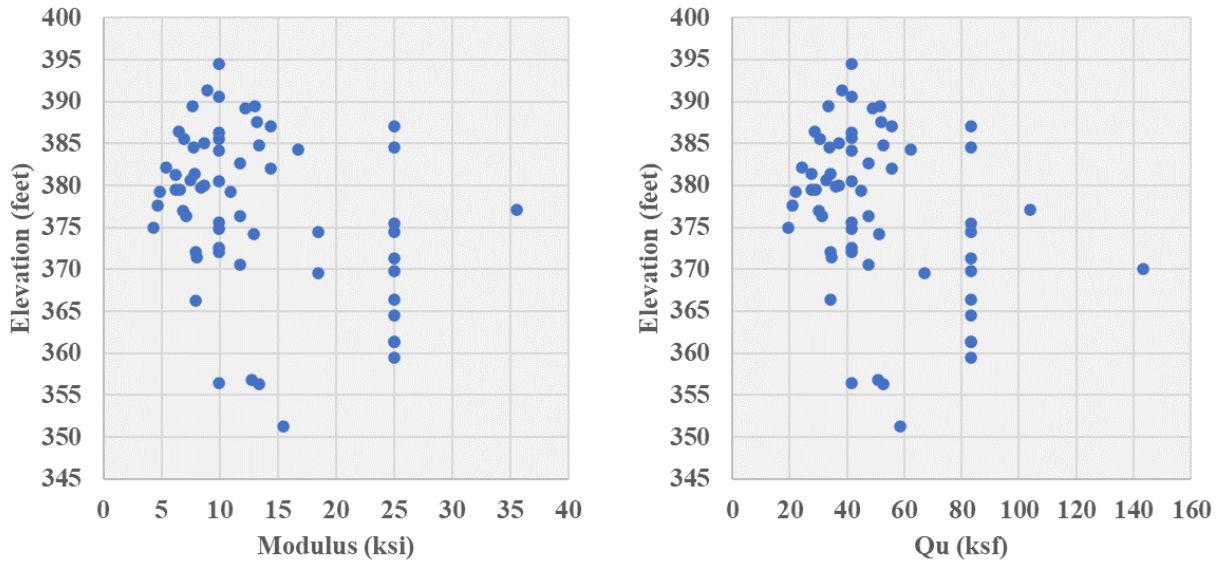


Figure 1: Bedrock Strength and Modulus Data

4.2 Groundwater Conditions

Groundwater was observed while drilling at 3 to 35 feet bgs; notably the groundwater was recorded at the first granular layer or interbed encountered below the river level in each boring. After 24 hours, groundwater measurements in Borings EB-07 and EB-08 on the Henry side of the bridge were taken at 11 to 12.5 feet bgs, or at elevations of 443 to 440 feet.

Groundwater monitoring piezometers, designated as EB-04-PZ and EB-08-PZ, were installed along the west and east sides of the river, respectively. Piezometer screens were installed within the granular aquafer on both sides with depths of 26 to 44 feet, or elevations of 426 to 408 feet. Summaries of the groundwater monitoring data between September 2021 and June 2023 are shown in Figure 1. The information from the piezometers shows groundwater levels correlating to the elevation of the surface water in the river, fluctuating between elevations of 440 to 448 feet.

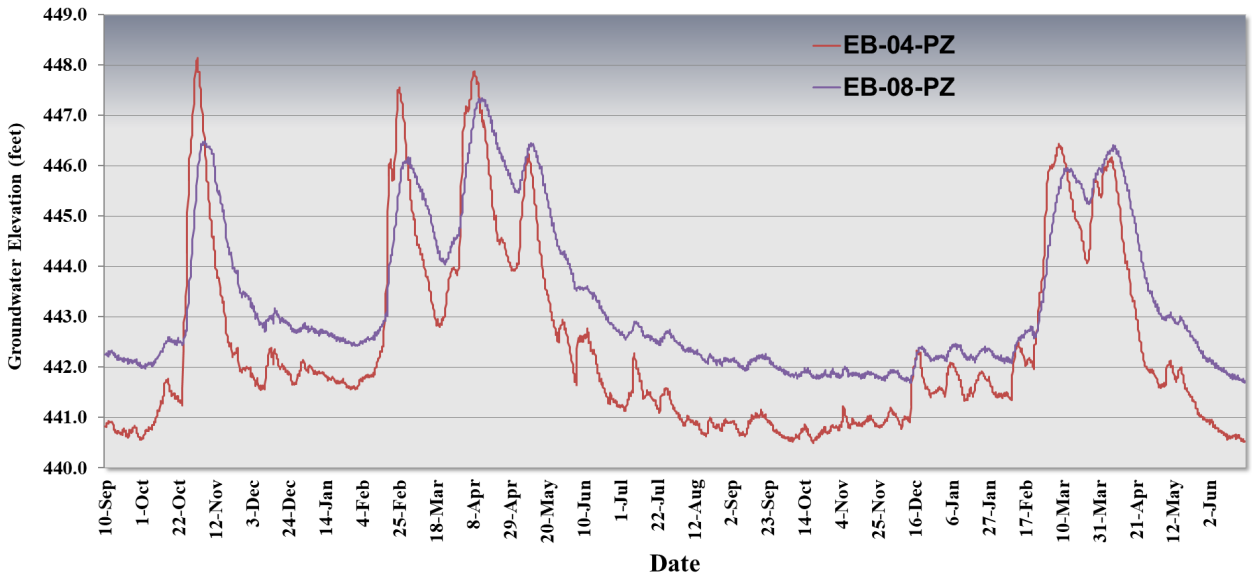


Figure 2: Groundwater Monitoring Data

5.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

Geotechnical evaluations and recommendations for the approach embankments, approach slabs, and substructure foundations are included in the following sections. The west approach embankment will require a new fill section of about 8 to 10 feet behind the abutment while the east approach embankment will require 20 to 25 feet of new fill material. The west embankment will have side slopes graded at 1:4 (V:H) while the east embankment will be at 1:3 based on cross sections provided by Parsons.

We recommend supporting the substructures on deep foundations. The abutments should be supported on driven piling, whereas the piers should be supported on either steel H-piles or drilled shafts. The estimated embankment settlements range from less than 1 inch at the west abutment to up to 8 inches at the east abutment. The east abutment will require either stage construction and a waiting period or

ground improvement to improve the settlement in the final condition.

We understand the piers will be supported on a combination of drilled shafts and driven piling. The TSL plan indicates land-based Piers 1, 2, 7, 8, 9, and 10 will be supported on steel H-Piles driven to refusal within the underlying bedrock, while river-based Piers 2, 4, 5, and 6 will be supported on drilled shafts socketed into the bedrock.

5.1 Seismic Design Considerations

The seismic site class was determined in accordance with the IDOT *All Geotechnical Manual Users (AGMU) 9.1* (IDOT 2009) method of analysis. The soils within the top 100 feet have a weighted average N value of 74 blows per foot to the west of the river and 53 blows per foot east of the river. The combined results across the length of the bridge classify the site in the Seismic Site Class C.

The project location belongs to the Seismic Performance Zone 1. The seismic spectral acceleration parameters recommended for design in accordance with AASHTO (2020) are summarized in Table 1. According to the IDOT *Bridge Manual* (2012), liquefaction analysis is not required for a site located in Seismic Performance Zone 1.

Table 1: Seismic Design Parameters

Spectral Acceleration Period (sec)	Spectral Acceleration Coefficient[1)] (% g)	Site Factors	Design Spectrum for Site Class C[2)] (% g)
0.0	PGA= 4.5	F_{pga}= 1.2	**A_s= 5.4**
0.2	S_s= 10.2	F_a= 1.2	**S_{DS}= 12.3**
1.0	S_1= 4.3	F_v= 1.7	**S_{D1}= 7.3**

1) Spectral acceleration coefficients based on Site Class C

2) Site Class C Spectrum to be included on plans; $A_s = PGA*F_{pga}$; $S_{DS}= S_s*F_a$; $S_{D1}= S_1*F_v$

5.2 Scour Considerations

The hydraulic model has been prepared by the hydraulic team and provides 10-, 50-, 100- and 200-year short-term and long-term scour results for each of the piers. The bridge piers are divided into three general sections: the west overbank containing Pier 1, the river channel containing Piers 2, 3, 4, 5, and

6, and the east overbank containing Piers 7, 8, 9, and 10. The scour data provided by the hydraulic team are summarized in Tables 2, 3, and 4. The D_{50} value of the sand to sandy gravel at the streambed level is 0.4 mm to 1.5 mm in the west overbank and river channel units. The D_{50} value of the clayey soils at the east overbank is 0.02 mm. The design high water elevation (DHWE) is to be determined and the Estimated Water Surface Elevation provided in the TSL plan (EWSE) is 447.0 feet.

Table 2: Preliminary Scour Data, West Overbank

	Pier 1
Channel Bed Elevation (feet)	470.0
Minimum Section Elevation (feet)	470.0
10-year Total Scour Estimate (feet)	0.24
10-year Total Section Scour Estimate (feet)	0.24
50-year Total Scour Estimate (feet)	8.40
50-year Total Section Scour Estimate (feet)	8.40
100-year Total Scour Estimate (feet)	9.18
100-year Total Section Scour Estimate (feet)	9.18
200-year Total Scour Estimate (feet)	9.41
200-year Total Section Scour Estimate (feet)	9.41

Table 3: Preliminary Scour Data, Channel

	Pier 2	Pier 3	Pier 4	Pier 5	Pier 6
Channel Bed Elevation (feet)	454.24	446.37	426.92	431.0	444.45
Minimum Section Elevation (feet)			426.92		
10-year Total Scour Estimate (feet)	35.40	20.40	16.15	17.29	22.60

10-year Total Section Scour Estimate (feet)			35.40		
50-year Total Scour Estimate (feet)	26.77	19.26	14.85	15.79	19.54
50-year Total Section Scour Estimate (feet)			26.77		
100-year Total Scour Estimate (feet)	25.76	17.95	13.37	14.16	17.15
100-year Total Section Scour Estimate (feet)			25.76		
200-year Total Scour Estimate (feet)	23.61	15.83	11.17	11.91	14.28
200-year Total Section Scour Estimate (feet)			23.61		

Table 4: Preliminary Scour Data, East Overbank

	Pier 7	Pier 8	Pier 9	Pier 10
Channel Bed Elevation (feet)	443.58	451.78	447.53	451.48
Minimum Section Elevation (feet)		443.58		
10-year Total Scour Estimate (feet)	21.46	20.39	13.55	15.54
10-year Total Section Scour Estimate (feet)		21.46		
50-year Total Scour Estimate (feet)	19.76	18.69	14.25	15.76
50-year Total Section Scour Estimate (feet)		19.75		
100-year Total Scour Estimate (feet)	17.31	16.37	13.19	14.95
100-year Total Section Scour Estimate (feet)		17.31		
200-year Total Scour Estimate (feet)	15.00	14.16	11.95	14.02
200-year Total Section Scour Estimate (feet)		15.00		

The design and check scour elevations at each bridge unit are summarized in Tables 5, 6, and 7. Pier 2

will be constructed at a greater than 100-foot setback to the edge of the waterway, behind the limits of Cromwell Drive, and at the base of a riprap revetment intended to protect the slope off Front Street. Due to these factors, we recommend shifting Pier 2 for design into the West Overbank unit (see Table 5) and providing a 75% reduction in design scour elevation. Scour at the Pier 2 footing will be easily observable and will not be impacted by channel migration. While they are rarely employed by the department, we anticipate this is a location where hydraulic countermeasures will be effective.

Table 5: Design Scour Elevations, West Overbank

	Pier 1		Pier 2	Item 113
Q100 Elevation (feet)	460.82	Q10 Elevation (feet)	445.39	
Q200 Elevation (feet)	460.59	Q50 Elevation (feet)	447.54	
Design Elevation (feet)	460.82	Design Elevation (feet)	447.54	5 ✓
Check Elevation (feet)	460.59	Check Elevation (feet)	445.39	

But Structural Engineer takes exception to scour elevations. See scour attachments to Structure Report Form BBS-153, submitted with TS&L.
- T. Ude, Parsons, 1/30/24

At the river channel unit, the Q10 and Q50 events produce the largest pier scour and are listed as the Design and Check Scour elevations in Table 6. Due to the granular nature of the streambed soils, we do not recommend scour reductions at Piers 3, 4, 5, or 6.

Table 6: Design Scour Elevations, Channel

	Pier 3	Pier 4	Pier 5	Pier 6	Item 113
Q10 Elevation (feet)	391.52	391.52	391.52	391.52	
Q50 Elevation (feet)	400.15	400.15	400.15	400.15	
Design Elevation (feet)	400.15	400.15	400.15	400.15	5 ✓
Check Elevation (feet)	391.52	391.52	391.52	391.52	

But Structural Engineer takes exception to scour elevations. See scour attachments to Structure Report Form BBS-153, submitted with TS&L.
- T. Ude, Parsons, 1/30/24

The Q10 and Q50 events also produce the largest pier scour at the east overbank section. The soil

conditions at this location are primarily medium stiff to stiff cohesive soils. We recommend a 25% reduction in the estimated scour elevations along the east overbank reflected in Table 7.

Table 7: Design Scour Elevations, East Overbank

	Pier 7	Pier 8	Pier 9	Pier 10
Q10 Elevation (feet)	422.12	422.12	422.12	422.12
Q50 Elevation (feet)	423.81	423.81	423.81	423.81
Design Elevation (feet)	423.81	423.81	423.81	423.81
Check Elevation (feet)	422.12	422.12	422.12	422.12

Item 113

5 ✓

But Structural Engineer takes exception to scour elevations. See scour attachments to Structure Report Form BBS-153, submitted with TS&L.
- T. Ude, Parsons, 1/30/24

5.3 Approach Embankments

Wang has performed evaluations of the settlement and global stability for the approach embankments. The proposed embankments will be graded at side slopes of 1:4 at the west and 1:3 at the east. The proposed top of pavement elevation along the back of the west abutment is 486.5 feet or about 10 feet above the existing grade, whereas the proposed back of abutment elevation along the east is 476.0 feet, or 25 feet above the existing elevation of 451.0 feet.

5.3.1 Settlement

The profile grade along the new offset alignment will require up to 25 feet of fill materials at the east approach embankment and about 8 to 10 feet of total fill materials at the west approach. Settlement estimates have been made based on the combination of oedometer testing (Appendix B), as well as correlations to measured index properties. We estimate the dry, granular soils encountered in Boring BSB-01 at the west abutment will settle a total of less than 0.5-inch. The saturated, clayey floodplain soils beneath the east abutment location will undergo approximately 6 to 8 inches of long-term consolidation settlement under the applied load of the full, 25-foot tall embankment. Without improvement we estimate the soil will achieve 50% of primary consolidation in approximately 140 days and 90% of primary consolidation in 900 days. We anticipate that soil remediation or improvement will be required prior to driving the abutment piles and finishing the roadway work. These recommendations and further discussion are included in the Roadway Geotechnical Report prepared for this project.

5.3.2 Global Stability

The west approach will be 8 to 10 feet of fill constructed above generally medium dense granular soils with a 1:3 slope. We anticipate global stability at this approach embankment will be sufficient. At the end slope, we understand that Front Street will be cut down and alternatively graded. Stability of these slopes and the impact on the end slope at the west abutment will be discussed in an addendum to this report. The global stability of the east approach embankments at Station 3030+50 was analyzed based on the soil profile described in Section 4.1 and the information provided in the GPE. The side slopes are graded at 1:4 (V:H). The minimum required FOS for both short (undrained) and long-term (drained) conditions is 1.3 for fill slopes analyzed with undisturbed Shelby tube data (IDOT 2012). *Slide v6.0* evaluation exhibits employing the Bishop Simplified method of analysis are shown in Appendix C. We estimate the slopes have a minimum undrained FOS of 1.2 (Appendix C-1) and a drained FOS of 2.2 (Appendix C-2). The FOS in the undrained condition will need to be increased by way of the ground remediation or improvement meant to mitigate the embankment settlement.

5.4 Structure Foundations

Wang recommends supporting the stub abutments on steel H-piles with the piers supported on either driven steel H-piles or drilled shafts. The soil conditions along the west side of the structure show medium dense sandy to gravelly soils overlying shale bedrock, while the conditions on the east side include soft to medium stiff, clayey floodplain deposits over medium dense to very dense sandy to gravelly soils and shale bedrock.

The preliminary factored loadings for representative piers provided by Parsons are summarized in Table 8. We assume the abutments will have axial loads of about 3,500 kips each. The abutment base elevations are set at 473 feet on the west and 465 feet on the east. Land pier cap base elevation are 462.5 to 449.5 feet on the west side and 440.0 to 442.0 feet on the east side.

Table 8: Maximum Factored Loading

Substructure ID Pier Type	Factored Vertical Load (kips)	Factored Lateral Load, R_x (kips)	Factored Moment, M_x (kip-feet)	Factored Lateral Load, R_z (kips)	Factored Moment, M_z (kip-feet)	Applied Load Elevation (feet)
Pier 1, Town Land Fixed, Top Footing	4214	81	3696	104	5454	466

Pier 2, Town Land Free, Top Footing	4846	27	4457	86	4506	453
Pier 3, West Shoreline Expansion, Top Strut	6501	220	10360	209	6441	449
Pier 4, River Channel Fixed, Top Strut	14184	3520	28577	1785	14653	449
Pier 5, River Channel Fixed, Top Strut	14184	3520	28577	1785	14653	449
Pier 6, East Shoreline Expansion, Top Strut	7071	220	12768	231	8124	449
Pier 7, East Overbank Free, Top Footing	5928	52	8271	135	7349	446
Pier 8, East Overbank Fixed, Top Footing	7037	50	13063	240	6692	446
Pier 9, East Overbank Free, Top Footing	5603	48	6182	128	6272	446
Pier 10, East Overbank Free, Top Footing	5458	47	5574	125	5919	446

5.4.1 Driven Piles

IDOT specifies the maximum nominal required bearing (R_{NMAX}) for each pile and states the factored resistance available (R_F) for steel H-piles should be based on a geotechnical resistance factor (Φ_G) of 0.55 (2012). Nominal tip and side resistance were estimated using the methods and empirical equations presented in *AGMU Memorandum 10.2 – Geotechnical Pile Design* (IDOT 2011). Based on the estimated preliminary anticipated loads and the length of the foundations, the load per pile at the abutments will range between about 100 and 300 kips for two rows of piles spaced at 3- to 8-feet. Piles driven at the piers will range between 150 and 350 kips for three rows spaced at 3- to 8-feet.

The R_F estimates are governed by the relationship $R_F = \phi_G R_N - \phi_G(DD_R+S_C+L_{iq})I_G - (\gamma_p)(\lambda_{IS})DD_L$ (IDOT 2012). Assuming the embankment and pile driving are performed concurrently, we estimate that at least 4 to 6 inches of settlement will remain at the east abutment following the construction of the embankment and prior to the pile driving. Therefore, the foundation soils will require remediation prior to pile driving, either by preloading and stage construction or by ground improvement. If the piles are driven following the ground improvement and the remaining settlement is confirmed to be less than 0.4 inch, downdrag allowances will not be required. However, if the piles are driven prior to achieving 0.4 inches of residual settlement they should be sleeved within the proposed embankment and downdrag allowances should be applied through the soft clay layer.

At the west abutment, less than 0.4-inches of settlement will remain following construction of the embankment and the pile driving can occur at any point during construction of the bridge and embankment.

The R_F, R_N, estimated pile tip elevations, and pile lengths for 16-inch diameter MSP and various sizes of steel H-Pile driven to refusal at the top of bedrock for the abutments are summarized in Tables 9 and 10. The lengths shown in the tables assume a 1-foot pile embedment into the pile cap and include east abutment analyses both with and without downdrag allowances.

Table 9: Estimated Pile Lengths and Tip Elevations for Steel H-Piles Driven to R_{Nmax} at Top of Bedrock

Substructure Unit (Reference Boring)	Pile Cap Base Elevations (feet)	Pile Size	Maximum Nominal Bearing, R_N (kips)	Factored Downdrag Losses (kips)	Factored Resistance Available, R_F (kips)	Total Estimated Pile Length (feet)	Estimated Pile Tip Elevation (feet)
West Abutment BSB-01	473.0	HP12x53	418	0	230	80	394 (TOR)
		HP12x63	497	0	273	80	394 (TOR)
		HP14x73	578	0	318	90	393
		HP14x89	705	0	388	91	392
East Abutment EMB-P2-03 and BSB-13	465.0	HP12x53	418	0	225	71	395 (TOR)
		HP12x63	497	0	268	71	395 (TOR)
		HP14x73	578	0	313	73	393
		HP14x89	705	0	383	74	392
East Abutment EMB-P2-03 and BSB-13 (w/DD)	465.0	HP12x53	418	17	213	71	395 (TOR)
		HP12x63	497	18	255	71	395 (TOR)
		HP14x73	578	21	297	73	393
		HP14x89	705	21	367	74	392

Table 10: Estimated Pile Lengths and Tip Elevations for 16-inch Diameter MS Abutment Piles

Structure Unit (Reference Boring)	Pile Cap Base Elevations (feet)	Nominal Required Bearing, R_N (kips)	Factored Geotechnical Loss (kips)	Factored Geotechnical Load Loss (kips)	Factored Resistance Available, R_F (kips)	Total Estimated Pile Length (feet)	Estimated Pile Tip Elevation (feet)
West Abutment BSB-01	473.0	545	0	0	300	15	459
		455	0	0	250	14	460
		364	0	0	200	13	461
		182	0	0	100	12	462
East Abutment EMB-P2-03 and BSB-13	465.0	545	0	0	300	36	430
		455	0	0	250	34	432
		364	0	0	200	33	433
		182	0	0	100	26	440
East Abutment EMB-P2-03 and BSB-13 (w/DD)	465.0	647	0	56	300	36	430
		556	0	56	250	34	432
		465	0	56	200	33	433
		284	0	56	100	26	440

Due to the anticipated scour depths along the east overbank, we anticipate a larger section may be necessary to ensure lateral pile stability at the pier footings. We have provided pile capacities and lengths for 36-inch diameter, open-ended pipe piles at Piers 7, 8, 9, and 10 in Table 11. These piles will incur scour losses, as summarized in the table. Table 12 provides pile lengths for HP12x63, HP14x73, HP14x89, and HP14x117 steel H-piles for Piers 1, 2, 7, 8, 9, and 10. These piles are driven to refusal at the top of rock and do not require scour reductions. The driving elevation was taken from the proposed cap elevations as shown on the GPE. The lengths shown in the tables assume a 1-foot pile embedment into the pile cap. To achieve maximum nominal pile capacity at the piers the analysis shows

that H-piles would need to be driven to the top of the bedrock (TOR) and in most instances the piles will advance 1 to 10 feet into the bedrock. These piles should be considered end bearing and designed for the maximum nominal capacity of the pile.

Table 11: Estimated Pile Lengths and Tip Elevations for 36-inch Diameter MS Pier Piles

Structure Unit (Reference Boring)	Pile Cap Base Elevations (feet)	Nominal Required Bearing, R_N (kips)	Factored Geotechnical Loss (kips)	Factored Geotechnical Load Loss (kips)	Factored Resistance Available, R_F (kips)	Total Estimated Pile Length (feet)	Estimated Pile Tip Elevation (feet)
Pier 7 BSB-10	442.0/392	2952	59	0	1565	62	381
		2500	59	0	1316	61	382
		2000	59	0	1041	60	383
		1500	59	0	766	59	384
Pier 8 BSB-11	442.0/393	2952	58	0	1566	58	385
		2500	58	0	1317	57	386
		2000	58	0	1042	52	391
		1500	58	0	767	49	394
Pier 9 BSB-12	442.0/391	2952	74	0	1550	54	389
		2500	74	0	1301	50	393
		2000	74	0	1026	47	396
		1500	74	0	751	41	402
Pier 10 BSB-13	442.0/391	2952	42	0	1582	44	399
		2500	42	0	1333	43	400
		2000	42	0	1058	42	401

Structure Unit (Reference Boring)	Pile Cap Base Elevations (feet)	Nominal Required Bearing, R_N (kips)	Factored Geotechnical Loss (kips)	Factored Geotechnical Load Loss (kips)	Factored Resistance Available, R_F (kips)	Total Estimated Pile Length (feet)	Estimated Pile Tip Elevation (feet)
		1500	42	0	783	40	403

Table 12: Estimated Pile Lengths and Tip Elevations for Steel H-Piles Driven to R_{Nmax} in Bedrock

Substructure Unit (Reference Boring)	Pile Cap Base/TOR Elevations (feet)	Pile Size	Maximum Nominal Bearing, R_N (kips)	Factored Downdrag Losses (kips)	Factored Resistance Available, R_F (kips)	Total Estimated Pile Length (feet)	Estimated Pile Tip Elevation (feet)
Pier 1 BSB-02	462.5/390	HP12x63	497	0	227	74	390
		HP14x73	578	0	264	74	390
		HP14x89	705	0	334	75	389
		HP14x117	929	0	511	78	386
Pier 2 BSB-03	449.5/387	HP12x63	497	0	227	67	384
		HP14x73	578	0	264	66	385
		HP14x89	705	0	334	68	383
		HP14x117	929	0	511	71	380
Pier 7 BSB-10	442.0/392	HP12x63	497	0	227	57	386
		HP14x73	578	0	264	56	387
		HP14x89	705	0	334	58	385
		HP14x117	929	0	511	61	382
Pier 8 BSB-11	442.0/393	HP12x63	497	0	227	54	389
		HP14x73	578	0	264	53	390

Substructure Unit (Reference Boring)	Pile Cap Base/TOR Elevations (feet)	Pile Size	Maximum Nominal Bearing, R_N (kips)	Factored Downdrag Losses (kips)	Factored Resistance Available, R_F (kips)	Total Estimated Pile Length (feet)	Estimated Pile Tip Elevation (feet)
		HP14x89	705	0	334	55	388
		HP14x117	929	0	511	58	385
Pier 9 BSB-13	442.0/391	HP12x63	497	0	227	53	390
		HP14x73	578	0	264	53	390
		HP14x89	705	0	334	54	389
		HP14x117	929	0	511	57	386
Pier 10 EMB-P2-01/ BSB-13	442.0/391	HP12x63	497	0	227	53	390
		HP14x73	578	0	264	53	390
		HP14x89	705	0	334	54	389
		HP14x117	929	0	511	57	386

5.4.2 Drilled Shafts

We understand river Piers 3, 4, 5, and 6 will be supported on drilled shafts established into the shale bedrock. The shafts should be designed for side resistance and end bearing resistance factors of 0.50 in bedrock (AASHTO 2022). The axial capacity of the shafts in the shale bedrock is evaluated using the IDOT Sheet *Drilled Shaft Axial Capacity in Shale < 100 ksf*, which evaluates the load-settlement relationship of the shaft socket based on the results of the modified SPT testing discussed in Section 4.1. We understand from information provided by Parsons that the drilled shaft socket diameters supporting River Piers 4 and 5 will be about 10 to 11 feet in diameter, while the loading provided in Table 4 indicates the shafts at shoreline Piers 3 and 6 could be supported by shafts with slightly smaller diameters around 8 to 9 feet. The shafts will be seated into the underlying bedrock and we do not anticipate that axial group effect reductions will be necessary.

The R_F, R_N, estimated socket lengths, and estimated base elevations are summarized below in Table 13.

For the anticipated loads, we estimate shaft settlements of approximately 0.4 to 0.7 inches. While the axial capacity is provided in the drilled shaft table, the shaft socket lengths and shaft diameters at River Piers 4 and 5 will almost certainly be controlled by the lateral shaft load (see Section 5.4.3) analysis considering the vessel collision loading.

The recommended construction method for shafts in bedrock is to install permanent casing to the top of the rock to maintain clean, open shafts during excavation with the large excess groundwater pressure within the river. An alternative construction method for top of rock shafts is to excavate under polymer slurry and tremie concrete from the bottom of the shaft up. While the slurry method is often faster and more cost effective than the cost of installing permanent casing in each of the shafts, it is a more advanced construction technique that will demand a Contractor experienced in slurry excavations. The Contractor should be required to demonstrate previous experience excavating shafts under these conditions. In addition, shafts constructed under polymer slurry as opposed to permanent casing will require either cross-hole sonic logging (CSL) or thermal image profile (TIP) testing of each shaft after construction to check the cross section of the concrete placed under the slurry. If permanent casing is provided, the verification testing is not required.

Table 13: Estimated Drilled Shaft Resistances, Socket Lengths, and Base Elevations

Structure Unit	Cap Base/ TOR Elevation (feet)	Shaft Diameter (feet)	Nominal Shaft Resistance, R_N (kips)	Factored Resistance Available, R_F (kips)	Socket Length (feet)	Shaft Base Elevation (feet)	Estimated Settlement (inches)
Pier 3 BSB-04	440.0/391	8	15,700	7,880	20	371	0.5
		9	18,800	9,400	20	371	0.5
		10	19,400	9,700	10	381	0.5
		10	23,500	11,700	15	376	0.6
		11	24,400	12,100	10	381	0.6
		11	26,000	13,000	20	371	0.6
Pier 4, East Shaft	437.0/390	8	14,000	7,000	20	370	0.4

Structure Unit	Cap Base/ TOR Elevation (feet)	Shaft Diameter (feet)	Nominal Shaft Resistance, R_N (kips)	Factored Resistance Available, R_F (kips)	Socket Length (feet)	Shaft Base Elevation (feet)	Estimated Settlement (inches)
BSB-05		9	16,800	8,400	20	370	0.5
		10	15,000	7,500	10	380	0.5
		10	17,500	8,750	15	375	0.5
		11	17,700	8,850	10	380	0.6
		11	23,000	11,500	20	370	0.6
Pier 4, West Shaft BSB-06	437.0/397	8	19,700	9,850	20	377	0.6
		9	24,200	12,100	20	377	0.6
		10	18,400	9,200	10	387	0.6
		10	23,500	11,750	15	382	0.6
		11	22,600	11,300	10	387	0.7
		11	34,600	17,300	20	377	0.7
Pier 5, East Shaft BSB-07	437.0/389	8	18,400	9,200	20	369	0.5
		9	22,000	11,000	20	369	0.5
		10	20,900	10,450	10	379	0.6
		10	23,500	11,700	15	374	0.6
		11	24,300	12,150	10	379	0.7
		11	30,500	15,250	20	369	0.6
Pier 5, West Shaft	437.0/394	8	17,300	8,600	20	374	0.4

Structure Unit	Cap Base/ TOR Elevation (feet)	Shaft Diameter (feet)	Nominal Shaft Resistance, R_N (kips)	Factored Resistance Available, R_F (kips)	Socket Length (feet)	Shaft Base Elevation (feet)	Estimated Settlement (inches)
BSB-08		9	20,500	10,250	20	374	0.5
		10	16,000	8,000	10	384	0.6
		10	21,300	10,600	15	389	0.6
		11	20,100	10,050	10	384	0.7
		11	27,400	13,700	20	374	0.6
Pier 6 BSB-09	661.0/393	8	15,500	7,750	20	373	0.4
		9	18,600	9,300	20	373	0.5
		10	17,200	8,600	10	383	0.6
		10	20,100	10,050	15	388	0.6
		11	20,200	10,100	10	383	0.7
		11	24,500	12,250	20	373	0.6

5.4.3 Lateral Loading

Lateral loads on the piles and drilled shafts should be analyzed for maximum moments and lateral deflections. Recommended lateral soil modulus and strain parameters required for analysis via the p-y curve method are included in Tables 14, 15, and 16. Tables 14 and 15 provide soil parameters for analysis on the east and west sides, respectively, while Table 16 provides bedrock parameters for use across the length of the bridge. The front row of piles at the abutments will be battered and we estimate there will be no lateral capacity concern. Once final lateral loads are determined, the pile groups should be checked for maximum moments and lateral deflections. The piles will be cast within a pile cap can be considered as a fixed-head condition. The drilled shafts can be considered as a fixed head condition in the direction of the preliminary vessel collision but should be considered free head in the direction perpendicular to the direction of flow. Piles and shafts constructed in rows or columns will require P-

multipliers for group effects. The group effect multipliers are discussed in AASHTO (2022) Section 10.7.2.4, with values dependent on pile and shaft spacing, provided in Table 10.7.2.4-1 and Figure 10.7.2.4-1.

Table 14: Recommended Soil Parameters for Lateral Load Analysis; East Side

Soil Type (Layer)	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
M Stiff Clayey FILL (1)	115	900	0	200	1.0
Soft to Medium Stiff SILTY CLAY to SILTY CLAY LOAM (2)	110	600	0	100	1.5
Loose to M Dense SAND and SANDY GRAVEL (3)	53 (submerged)	0	32	60	--
Dense to V Dense SAND and SANDY GRAVEL (3)	63 (submerged)	0	36	90	--

Table 15: Recommended Soil Parameters for Lateral Load Analysis; West Side

Soil Type (Layer)	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
M Dense Sandy FILL (1)	115	0	32	60	--
Loose to M Dense SAND and SANDY GRAVEL (3)	53 (submerged)	0	32	60	--
Dense to V Dense SAND and SANDY GRAVEL (3)	63 (submerged)	0	36	90	--

Table 16: Recommended Bedrock Parameters for Lateral Load Analysis

Rock Type	Total Unit Weight, γ (pcf)	Modulus of Rock Mass (ksi)	Uniaxial Compressive Strength (ksf)	RQD (%)	Lateral Rock Modulus Parameter

SHALE, above EL 375 feet	135	10	45	40	0.0005
SHALE, below EL 375 feet	135	20	65	60	0.0005

5.5 Stage Construction

The proposed IL18 Bridge will be constructed along a new alignment to the north/east of the existing bridge. Stage construction will not be necessary, although we understand Front Street will be excavated down to facilitate head room beneath the bridge. This condition will be discussed in future addendums once they are set.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Site Preparation

Vegetation, surface topsoil, and debris should be cleared and stripped where the structure will be placed. If unstable or unsuitable materials are exposed during excavation, they should be removed and replaced with compacted structural fill as described in Section 6.3.

6.2 Excavation, Dewatering, and Utilities

Excavations should be performed in accordance with local, state, and federal regulations. The potential effect of ground movements upon nearby utilities should be considered during construction. Excavations for the construction of the west abutment will be cut into the top of the existing embankment above Front Street and the pile bent piers will involve excavations for pile caps. These excavations should be sloped at no steeper than 1:1.5 (V:H) or shored with temporary steel sheeting. Temporary steel sheeting should be designed in accordance with the charts provided in IDOT *Design Guide 3.13.1.*

During the subsurface investigation, the groundwater was measured at elevations ranging from 440 to 448 feet, fluctuating consistently with the surface elevation of the river. On the west side of the river the groundwater is slightly lower than the base of Pile Bent Pier 2 and is above the base of the shaft cap elevation at Pier Bents 3 and 6. The installation of the Pier 3 cap will require a Type 1 cofferdam with a seal coat at the base. On the east side, the Pile Bent Pier caps are set at 442 feet, which will also sit below the groundwater elevation. We estimate these cap installations will require dewatering prior to

construction.

6.3 Filling and Backfilling

Fill material used to attain final design elevations should be pre-approved, compacted, cohesive or granular soil conforming to IDOT Section 205, *Embankment* (2022). The fill material should be free of organic matter and debris and should be placed in lifts and compacted according to the Specification.

Backfill materials for the abutments and piers must be pre-approved by the Resident Engineer. To backfill the abutments, we recommend porous granular material conforming to the requirements specified in the IDOT Section 587, *Granular Backfill for Structures*. Backfill material should be placed and compacted in accordance with the Specification.

6.4 Earthwork Operations

The required earthwork can be accomplished with conventional construction equipment. Moisture and traffic will cause deterioration of exposed subgrade soils. Precautions should be taken by the Contractor to prevent water erosion of the exposed subgrade. A compacted subgrade will minimize water runoff erosion.

Earth moving operations should be scheduled to not coincide with excessive cold or wet weather (early spring, late fall or winter). Any soil allowed to freeze or soften due to the standing water should be removed. Wet weather can cause problems with subgrade compaction.

It is recommended that an experienced geotechnical engineer be retained to inspect the exposed subgrade, monitor earthwork operations, and provide material inspection services during the construction phase of this project.

6.5 Pile Installation

The driven piles shall be furnished and installed according to the requirements of IDOT Section 512, *Piling* (2022). Wang recommends performing test piles, at a minimum, at both abutments as well as Piers 2, 7, 9, and 10 to confirm the top of bedrock elevations across the length of the bridge. The test piles shall be driven to 110 percent of the nominal required bearing indicated in the Pile Tables in Section 5.

6.6 Drilled Shaft Construction

Drilled shafts should be constructed in accordance with IDOT Section 516, *Drilled Shafts* (2022). Control of the groundwater will be of high importance during the excavation of shafts. The shafts are designed socketed into the underlying bedrock and either a permanent steel casing to the top of bedrock elevation or excavation under polymer slurry will be required. The permanent casing method is recommended unless specialty Contractors can be mandated in the plans and specifications. If the shafts are constructed under polymer slurry as opposed to permanent casing, cross-hole sonic logging or impulse response testing of each shaft should be performed to check the cross section of the concrete placed under the slurry.

7.0 QUALIFICATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown on the boring logs and in Exhibit 3. This report does not reflect any variations that may occur between the borings or elsewhere on the site, variations whose nature and extent may not become evident until the course of construction. In the event that any changes in the design and/or location of the structure are planned, we should be timely informed so that our recommendations can be adjusted accordingly.

It has been a pleasure to assist Parsons and the Illinois Department of Transportation on this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

WANG ENGINEERING, INC.

Mickey L. Snider, P.E.
Senior Geotechnical Engineer

Corina T. Farez, P.E., P.G.
Senior Engineering Consultant

REFERENCES

AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS (2020) *AASHTO LRFD Bridge Design Specifications.* United States Depart of Transportation, Washington, D.C.

BERG, R.C., C.P. WEIBEL, A.J. STUMPF, AND E.D. MCKAY III (2009) *Bedrock Topography of the Middle Illinois River Valley, Bureau, Marshall, Peoria, Putnam, and Woodford Counties, Illinois*: Illinois State Geological Survey, Illinois Map 15, 1:62,500.

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IDOT (2009) *All Geotechnical Manual Users Memorandum 09.1 - Seismic Site Class Definition*. Illinois Department of Transportation.

IDOT (2011) *All Geotechnical Manual Users Memorandum 10.2 - Static Method of Estimating Pile Length*. Illinois Department of Transportation.

IDOT (2019) *Geotechnical Manual.* Illinois Department of Transportation.

IDOT (2022) *Standard Specifications for Road and Bridge Construction.* Illinois Department of Transportation.

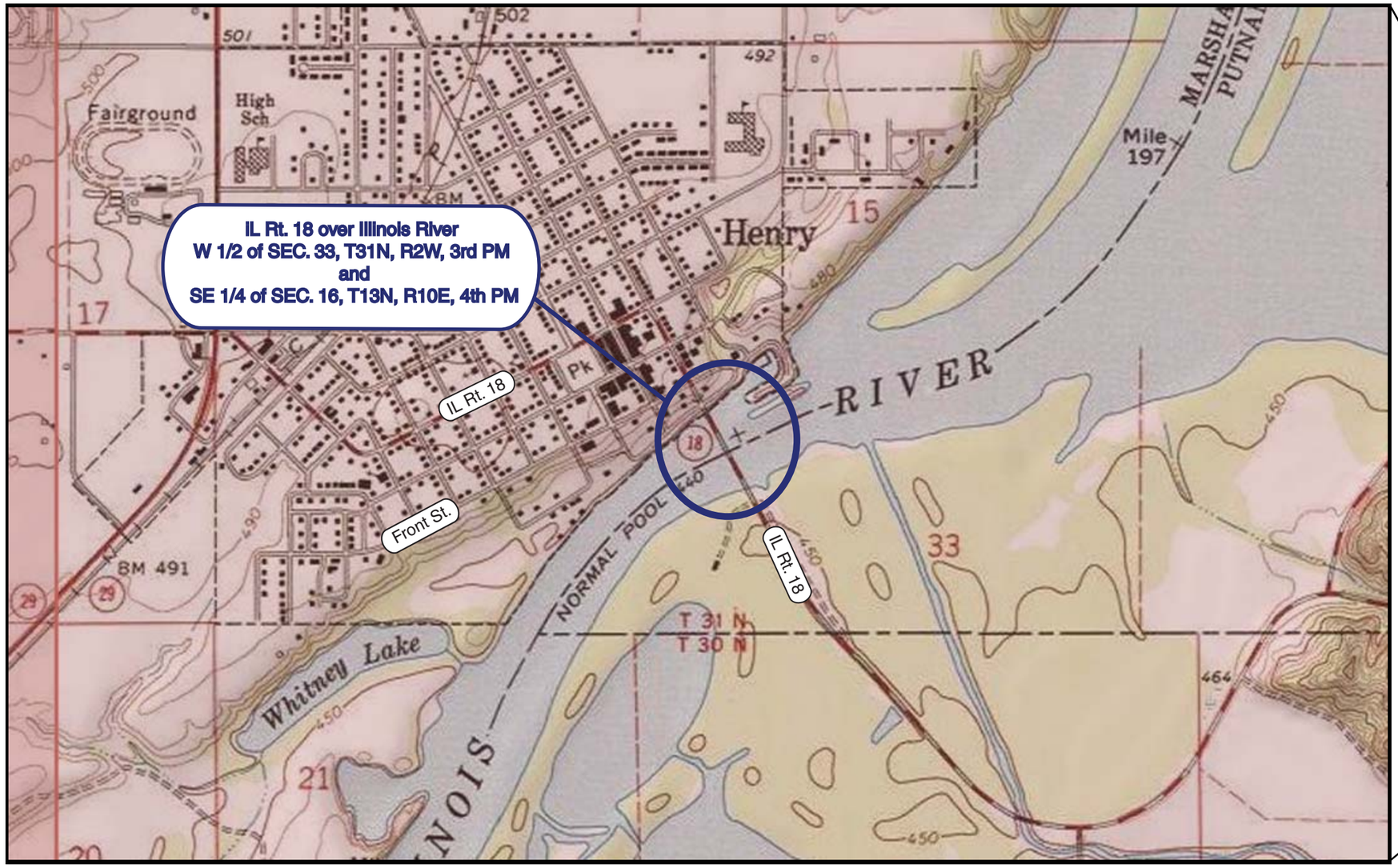
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STARK, T.D., LONG, J. A, AND BAGHDADY, A. K. (2017) *Modified Standard Penetration Test-Based Drilled Shaft Design Method for Weak Rocks.* Illinois Center for Transportation, Champaign, IL

Wang Engineering
A Terracon Company

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Phone (630) 953-9928
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EXHIBITS



0 0.3 0.6 Mile



Illinois



Marshall and Putnam Counties

SITE LOCATION MAP: ILLINOIS ROUTE 18 OVER THE ILLINOIS RIVER, MARSHALL AND PUTNAM COUNTIES, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: E. Greenwood CHECKED BY: C. Marin

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FOR PARSONS	342-14-01

BENCHMARK:

BM-111, CHIS, Square on North End of Existing East Abutment. Elev. 461.535. Additional BM-907. Calc'D, Using Total Station. Square at South End of Existing West Abutment. Elev. 480.372

EXISTING STRUCTURE:

062-0036 Steel truss with concrete deck fixed spans and steel beams with concrete approach spans. Concrete piers on timber pile-supported footings and driven reinforced concrete pile bent piers. Approximately xxx ft upstream. Approximately 1719 ft long by 23 ft wide. Originally constructed in 1924 as Route SBI-89C, Section 104-B. It was reconstructed in 1988 as Route FAS2369, Section 140B-D. C. and D. To be removed after new structure is complete.

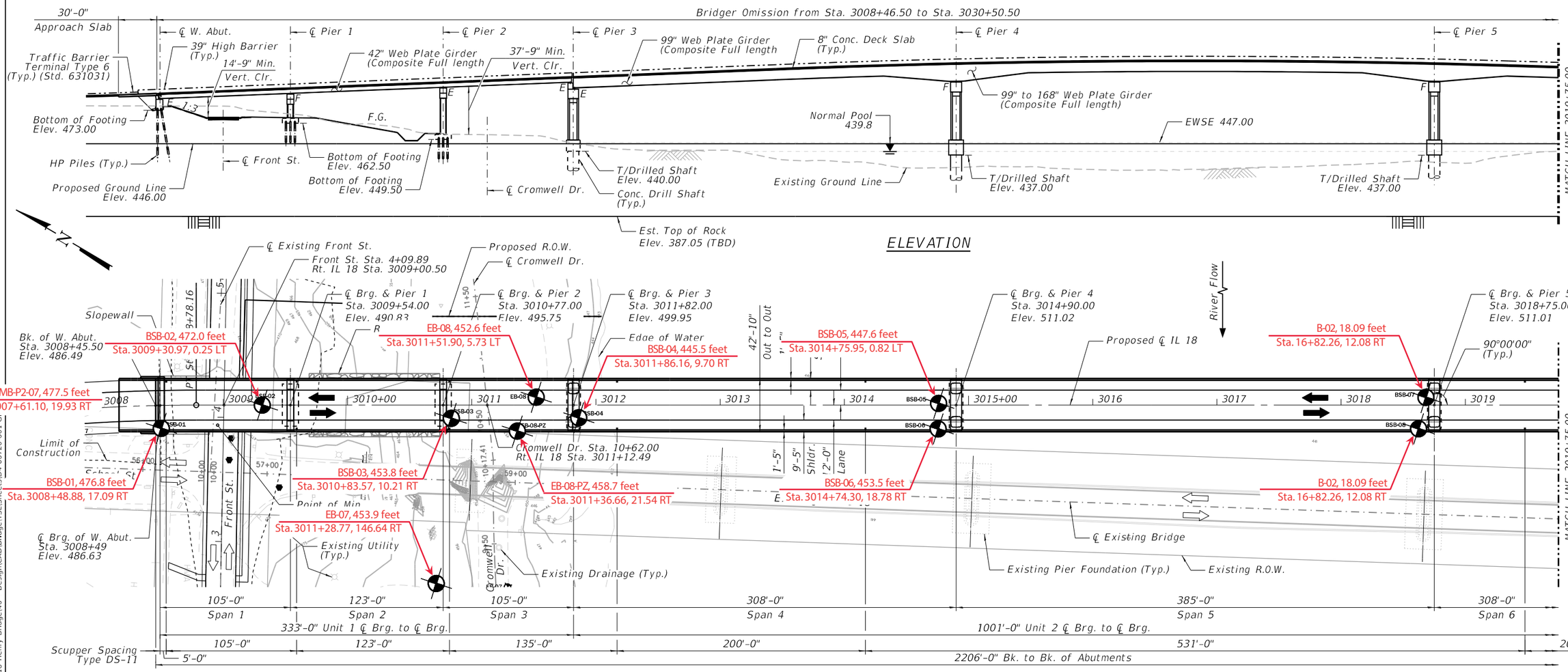
Traffic Control: None.
Salvage:

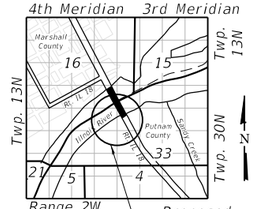
NOTES:

1. All Elevations are given in NAVD 1988 Datum unless noted.
2. EWSE = Estimated Water Surface Elevation.
3. HWE = High Water Elevation.
4. ✥ Denotes Soil boring.
5. For ground Elevation see Sheet 3.
6. Exterior surface of the fascia girder shall be painted full length.
7. Unit 1 Deck drainage shall be collected in a closed system and piped to ground.

SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Desgin Spectral Acceleration at 1.0 sec. (SD1) = xxx g
Design Spectral Acceleration at 0.2 sec. (SDS) = xxx g
Soil Site Class = xxx





LOCATION SKETCH

DESIGN SCOUR ELEVATION TABLE

Event / Limit State	W. Abut.	Pier 1	Pier 2	Pier 3	Pier 4	Pier 5	Pier 6	Pier 7	Pier 8	Pier 9	E. Abut.	Item 113
Q100												
Q200												
Design												
Check												

WATERWAY INFORMATION TABLE

			Existing Overtopping Elev. =				at Sta.		
Drainage Area		sq. mi.	Proposed Overtopping Elev. =				at Sta.		
		Discharge	Waterway Opening (sf)		Natural	Head (ft)		Headwater Elev. (ft)	
Flood	Freq. Yr.	(cfs)	Existing	Proposed	H.W.E. (ft)	Existing	Proposed	Existing	Proposed
Ten-Year	10								
Design									
Base									
Max. Calc.									

GENERAL PLAN

Highway Cla
IL 18 (FAS
Functional C
ADT: 2,200
ADTT: 1
DHV: 220
Design Spee

Posted Spee

Two-Way Tr
Directional

BORING LOCATION PLAN: ILLINOIS ROUTE 18 OVER THE ILLINOIS RIVER, MARSHALL AND PUTNAM COUNTIES, ILLINOIS

SCALE: GRAPHICAL | EXHIBIT 2-1 | DRAWN BY: E. Greenwood | CHECKED BY: C. Marin

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FOR PARSONS | 342-14-01

GENERAL PLAN & ELEVATION - 1
ILLINOIS ROUTE 18
F.A.S. 2369 - SEC. 104B-D
COOK COUNTY
STATION 13+91.88
STRUCTURE NO. 062-0089

PARSONS

USER NAME =	DESIGNED - YC	REVISED -	
	CHECKED -	REVISED -	
PLOT SCALE =	DRAWN - NTE	REVISED -	
PLOT DATE =	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL PLAN & ELEVATION
STRUCTURE NO. 062-0089
SHEET 1 OF 2 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
757	104B-D	SCOTT	4	1
		CONTRACT NO. 72F08		
	ILLINOIS FED. AID PROJECT			

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Bridger Omission from Sta. 3008+46.50 to Sta. 3030+50.50

99" to 168" Web Plate Girder (Composite Full Length)
℄ Pier 6
39" High Barrier (Typ.)
℄ Pier 7
8" Conc. Deck Slab (Typ.)
℄ Pier 8
70" Web Plate Girder (Composite Full Length)
℄ Pier 9
℄ Pier 10
℄ E. Abut.
30'-0" Approch Slab

MATCH LINE 3019+75.00

EWSE 447.00

T/Drilled Shaft Elev. 440.00
Conc. Drill Shaft (Typ.)
Bottom of Footing Elev. 442.00
Bottom of Footing Elev. 442.00
Bottom of Footing Elev. 442.00
Proposed Ground Line Elev. 446.00
Bottom of Footing Elev. 442.00
Existing Ground Line
Bottom of Footing Elev. 465.00
HP Piles (Typ.)

Est. Top of Rock Elev. 387.50 (TBD)

ELEVATION

N

River Flow
Edge of Water (Typ.)
0' Cut

℄ Brg. & Pier 6 Sta. 3021+75.00 Elev. 501.98
℄ Brg. & Pier 7 Sta. 3023+27.00 Elev. 497.66
℄ Brg. & Pier 8 Sta. 3024+71.00 Elev. 493.34
Proposed R.O.W.
90°00'00" (Typ.)
Proposed ℄ IL 18
Limit of Construction

BSB-09, 445.0 feet Sta. 3021+92.54, 1.02 LT
BSB-11, 451.1 feet Sta. 3024+73.93, 18.69 RT
BSB-12, 450.7 feet Sta. 3026+24.64, 2.97 LT
EB-03, 452.4 feet Sta. 3026+36.77, 30.97 RT
BSB-13, 451.6 feet Sta. 3037+66.10, 14.18 RT
EMB-P2-02, 452.7 feet Sta. 3031+08.73, 33.27 LT
Riprap
Bk. of W. Abut. Sta. 3030+51.50 Elev. 475.93
EB-01, 450.8 feet Sta. 3030+33.05, 17.01 RT Elev. 476.03
EMB-P2-03, 454.5 feet Sta. 3032.91.29, 5.11 RT
EMB-P2-01, 451.0 feet Sta. 3029+02.66, 23.97 RT
EB-06, 445.5 feet Sta. 3020+67.82, 15.49 RT
BSB-10, 448.5 feet Sta. 3023+10.57, 14.40 RT
EB-04-PZ, 453.2 feet Sta. 3024+63.15, 52.52 RT
EB-04, 452.5 feet Sta. 3024+77.83, 51.92 RT
EB-02, 451.8 feet Sta. 3028+02.43, 14.95 RT

3020+00 3021 3022 3023 3024 3025+00 3026 3027 3028 3029 3030+00 3031 3032

PC Sta 3032+

1'-5" 8'-0" Shldr. 12'-0" Lane

MATCH LINE 3019+75.00

Existing Pier Foundation (Typ.)
Existing Utility (Typ.)
Existing Traffic Signal (Typ.)
Route 18
℄ Existing Bridge
Existing R.O.W.

308'-0" Span 6
173'-0" Span 7
173'-0" Span 8
173'-0" Span 9
173'-0" Span 10
173'-0" Span 11

1001'-0" Unit 2 ℄ Brg. to ℄ Brg.
865'-0" Unit 1 ℄ Brg. to ℄ Brg.

200'-0" 288'-0" 288'-0" 321'-0"

2206'-0" Bk. to Bk. of Abutments
3 Spa. @ 1'-0" = 3'-0"

Scupper Spacing Type DS-11

GENERAL PLAN

K=84 590.00' VC
K=67 375.00' VC
+4.00% -3.00%
K=151 400.00' V.C.
-1.58% +4.00% -3.00% -0.35%

Sta. 3004+87.50 Elev. 482.64
VPI Sta. 3006+75.00 Elev. 479.67
Sta. 3008+62.50 Elev. 487.17
Sta. 3013+45.00 Elev. 506.47
VPI Sta. 3016+40.00 Elev. 518.27
Sta. 3019+35.00 Elev. 509.42
Sta. 3033+81.00 Elev. 466.02
VPI Sta. 3035+81.00 Elev. 460.02
Sta. 3037+81.00 Elev. 459.32

IL18 PROFILE

K=16 100.00' V.C.
K=30 100.00' V.C.
K=36 100.00' V.C.
-0.30% -6.62% -3.23% -5.98%

Sta. 2+00.00 Elev. 477.52
VPI Sta. 2+50.00 Elev. 477.52
Sta. 3+00.00 ELEV. 474.21
VPI Sta. 4+15.00 Elev. 466.59
STA. 3+65.00 ELEV. 469.90
STA. 4+65.00 ELEV. 464.98
Sta. 6+05.00 Elev. 460.45
Sta. 6+55.00 Elev. 458.83
Sta. 7+05.00 Elev. 455.84

FRONT STRET PROFILE

BORING LOCATION PLAN: ILLINOIS ROUTE 18 OVER THE ILLINOIS RIVER, MARSHALL AND PUTNAM COUNTIES, ILLINOIS

SCALE: GRAPHICAL | EXHIBIT 2-2 | DRAWN BY: E. Greenwood CHECKED BY: C. Marin

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FOR PARSONS | 342-14-01

GENERAL PLAN & ELEVATION - 2
ILLINOIS ROUTE 18
F.A.S. 2369 - SEC. 104B-D
COOK COUNTY
STATION 13+91.88
STRUCTURE NO. 062-0089

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PARSONS

USER NAME =	DESIGNED - YC	REVISED -	
	CHECKED -	REVISED -	
PLOT SCALE =	DRAWN - NTE	REVISED -	
PLOT DATE =	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL PLAN AND ELEVATION
STRUCTURE NO. 062-0089
SHEET 2 OF 2 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
757	104B-D	SCOTT	4	2
		CONTRACT NO. 72F08		
	ILLINOIS	FED. AID PROJECT		

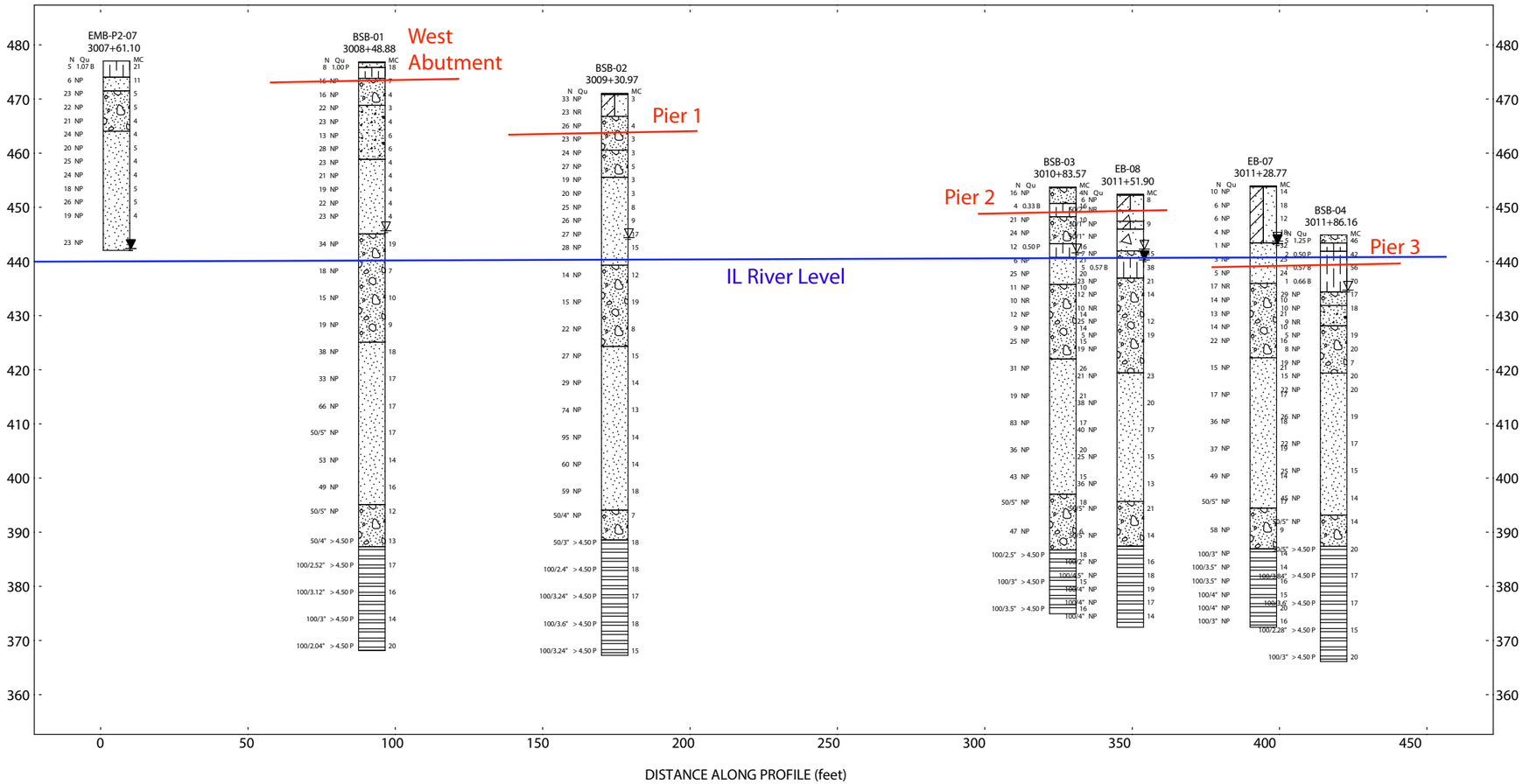
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A

E

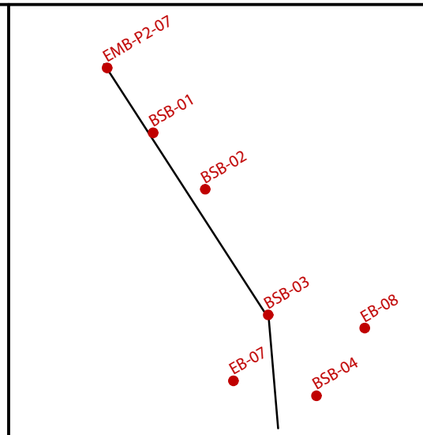
A'

N



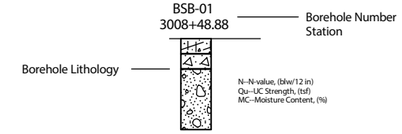
Lithology Graphics

- Pavement
- Crushed stone
- IDH Silty Clay, Silty Clay Loam
- Gravelly sand, sandy gravel
- Coarse sand
- IDH Sand, Sandy Loam
- Shale
- Topsoil
- IDH Loam
- Concrete



Site Map Scale 1 inch equals 165 feet

Explanation:



Water Level Reading at time of drilling.

Water Level Reading 24-hr after drilling or at end of drilling



Horizontal Scale (feet)

Vertical Exaggeration: 2x

Wang Engineering, Inc.
1145 N Main Street
Lombard, IL 60148

Soil Profile A-A'
West Land Segment; SN 062-0089

WEI SINCE 1982

IL 18 over the Illinois River
Henry, Illinois

JOB NUMBER	PLATE NUMBER
342-14-01	EXHIBIT 3-1

WEI 11X17 3421401.GPJ WANGENG.GDT 9/20/23

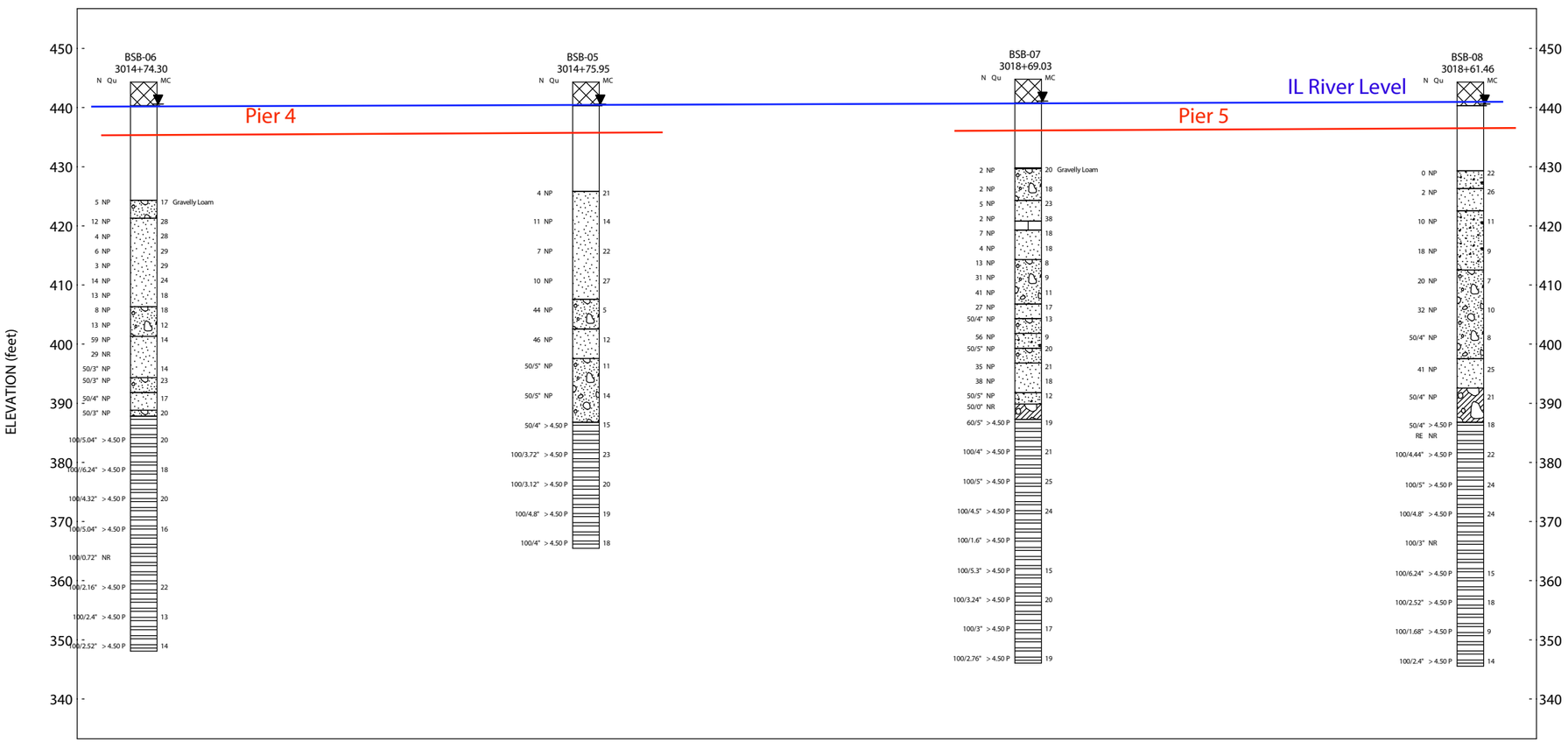
W

B

E

B'

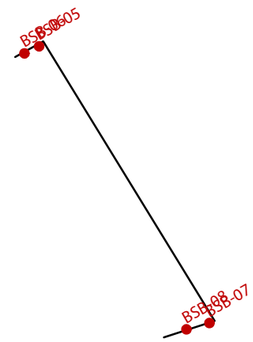
N



DISTANCE ALONG PROFILE (feet)

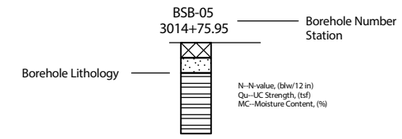
Lithology Graphics

- Fill (made ground)
- IDH Sand, Sandy Loam
- Gravelly sand, sandy gravel
- Shale
- IDH Silt, Silty Loam
- Coarse sand
- Weathered bedrock

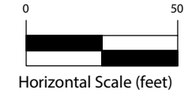


Site Map Scale 1 inch equals 185 feet

Explanation:



- Water Level Reading at time of drilling.
- Water Level Reading 24-hr after drilling or at end of drilling



Horizontal Scale (feet)

Vertical Exaggeration: 2x

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1145 N Main Street
Lombard, IL 60148

Soil Profile B-B'
Main River Channel Segment
SN 062-0089

WEI SINCE 1982

IL 18 over the Illinois River
Henry, Illinois

JOB NUMBER	PLATE NUMBER
342-14-01	EXHIBIT 3-2

WEI 11X17 3421401.GPJ WANGENG.GDT 9/20/23

W

C

C'

E

N

East Abutment

Pier 6

Pier 7

Pier 8

Pier 9

Pier 10

IL River Level

BSB-09
3021+92.54

BSB-10
3023+10.57

BSB-11
3024+73.93

BSB-12
3026+24.64

BSB-13
3037+66.10

EMB-P2-01
3029+02.66

EB-01
3030+33.05

EMB-P2-02
3031+08.73

Silty Clay Loam A-7-6 (24)
LL=44 PL=19.50 P

ELEVATION (feet)

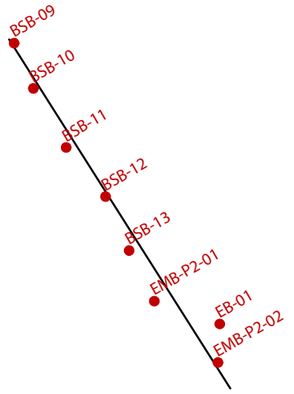
460
450
440
430
420
410
400
390
380
370
360

0
100
200
300
400
500
600
700
800
900
1,000

DISTANCE ALONG PROFILE (feet)

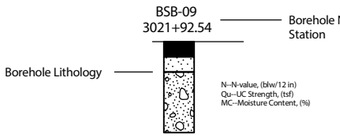
Lithology Graphics

- Topsoil
- IDH Sand, Sandy Loam
- IDH Silt, Silty Loam
- Gravelly sand, sandy gravel
- IDH Silty Clay, Silty Clay Loam
- Shale
- IDH Loam
- Weathered bedrock
- Coarse sand
- IDH Sandy Clay, Sandy Clay Loam



Site Map Scale 1 inch equals 365 feet

Explanation:



Water Level Reading at time of drilling.

Water Level Reading 24-hr after drilling or at end of drilling

0 100

Horizontal Scale (feet)

Vertical Exaggeration: 5x

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Lombard, IL 60148

Soil Profile C-C'
East Land Segment; SN 062-0089

WEI SINCE 1982

IL 18 over the Illinois River
Henry, Illinois

JOB NUMBER	PLATE NUMBER
342-14-01	EXHIBIT 3-3

WEI 11X17 3421401.GPJ WANGENG.GDT 9/20/23

Wang Engineering
A Terracon Company

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APPENDIX A

Wang Engineering
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Telephone: (630) 953-9928
Fax:

BORING LOG BSB-01

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 476.84 ft
North: 1619406.45 ft
East: 2520675.91 ft
Station: 3008+48.88
Offset: 17.09 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	476.7	1-inch thick ASPHALT --PAVEMENT--						
	475.8	11-inch thick, brown SANDY GRAVEL --BASE COURSE--			1	3 5 3	1.00 P	18
	473.8	Stiff, dark brown and black SILTY CLAY LOAM --FILL--						
		Medium dense, brown SANDY GRAVEL; dry --FILL-- --RDR 2--	5		2	4 8 8	NP	7
					3	4 6 10	NP	4
	468.8	Medium dense, brown, coarse Gravelly SAND; dry --RDR 2--	10		4	8 11 11	NP	3
					5	9 12 11	NP	4
			15		6	8 8 5	NP	6
					7	16 13 15	NP	6
	458.8	Medium dense, brown, fine to medium SAND; dry to damp --RDR 2--	20		8	13 12 11	NP	4
		--trace gravel--	25		10	6 8 11	NP	4
					11	7 10 12	NP	4
			30		12	9 10 13	NP	4
	445.1	Medium dense to dense, brown GRAVELLY SAND to SANDY GRAVEL; wet to saturated --RDR 2--	35		13	13 14 20	NP	19
			40		14	8 8 10	NP	7

GENERAL NOTES

Begin Drilling **06-20-2023** Complete Drilling **06-20-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **N&J&N** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **2.25" ID HSA to 30', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **31.50 ft**
At Completion of Drilling ▼ **9' mud**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC 3421401.GPJ WANGENG.GDT 9/20/23

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Lombard, IL 60148
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Fax:

BORING LOG BSB-01

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 476.84 ft
North: 1619406.45 ft
East: 2520675.91 ft
Station: 3008+48.88
Offset: 17.09 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	10 8 7	NP	10
			50		16	15 11 8	NP	9
	425.1	Dense to very dense, brown, fine to coarse SAND; saturated --RDR 2--	55		17	14 18 20	NP	18
			60		18	15 15 18	NP	17
			65		19	25 29 37	NP	17
			70		20	29 39 50/5"	NP	17
		--coarse grained--	75		21	22 25 28	NP	14
			80		22	16 22 27	NP	16

GENERAL NOTES

Begin Drilling: **06-20-2023** Complete Drilling: **06-20-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&J&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 30', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **31.50 ft**
At Completion of Drilling: **9' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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Fax:

BORING LOG BSB-01

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 476.84 ft
North: 1619406.45 ft
East: 2520675.91 ft
Station: 3008+48.88
Offset: 17.09 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--rig chatter; possible cobbles--						
	395.1	Very dense, brown SANDY GRAVEL; saturated						
		--RDR 3-5--						
					23	50/5"	NP	12
			85					
		--rig chatter; possible cobbles--						
					24	24 32 50/4"	> 4.50 P	13
	387.3	Hard, gray to dark gray SHALE						
		--RDR 5--	90					
		--6 mins to drill from 90' to 93.5' at 500psi--						
		--MSPT 1--			25	100/2.52"	> 4.50 P	17
			95					
		--10 mins to drill from 95' to 98.5' at 500psi--						
		--MSPT 2--			26	100/3.12"	> 4.50 P	16
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--9 mins to drill from 100' to 103.5' at 500psi--						
		--MSPT 3--			27	100/3"	> 4.50 P	14
			105					
	368.1	--MSPT 4--			28	100/2.04"	> 4.50 P	20
		Boring terminated at 108.70 ft						
			110					
			115					
			120					

GENERAL NOTES

Begin Drilling **06-20-2023** Complete Drilling **06-20-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **N&J&N** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **2.25" ID HSA to 30', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **31.50 ft**
At Completion of Drilling ▼ **9' mud**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-02

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 471.07 ft
North: 1619345.00 ft
East: 2520732.64 ft
Station: 3009+30.97
Offset: 0.25 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	470.8	3-inch thick, dark brown SILTY LOAM --TOPSOIL-- Dense, brown Gravelly LOAM; dry --FILL-- --RDR 2--			1	23 19 14	NP	3
	466.8	Medium dense, brown SANDY GRAVEL; dry --FILL-- --RDR 2--	5		2	11 11 12	NR	
					3	10 14 12	NP	4
			10		4	9 11 12	NP	3
	460.6	Medium dense, brown SANDY GRAVEL; dry --RDR 2--			5	7 11 13	NP	3
			15		6	10 14 13	NP	5
	455.6	Medium dense, brown, medium to coarse SAND, trace to little gravel; dry to saturated --RDR 2--			7	7 8 11	NP	3
			20		8	9 10 10	NP	3
			25		9	8 10 15	NP	8
					10	10 13 13	NP	9
		--fine grained--			11	10 13 14	NP	17
			30		12	10 13 15	NP	15
	439.3	Medium dense, brown SANDY GRAVEL; saturated --RDR 2--			13	7 7 7	NP	12
			35					
			40		14	7 8 7	NP	19

GENERAL NOTES

Begin Drilling: **06-21-2023** Complete Drilling: **06-21-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&J&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **27.00 ft**
At Completion of Drilling: **7' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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Fax:

BORING LOG BSB-02

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 471.07 ft
North: 1619345.00 ft
East: 2520732.64 ft
Station: 3009+30.97
Offset: 0.25 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	10 12 10	NP	8
	424.3	Medium dense to very dense, brown, medium to coarse SAND, trace gravel; wet to saturated --RDR 2--	50		16	9 12 15	NP	15
			55		17	10 13 16	NP	14
			60		18	13 29 45	NP	13
			65		19	24 45 50	NP	14
			70		20	13 25 35	NP	14
			75		21	14 28 31	NP	18
		--rig chatter; possible cobbles--						
	394.1	Very dense, brown SANDY GRAVEL; saturated --RDR 3-4--	80		22	50/4"	NP	7

GENERAL NOTES

Begin Drilling: **06-21-2023** Complete Drilling: **06-21-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&J&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **27.00 ft**
At Completion of Drilling: **7' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-02

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 471.07 ft
North: 1619345.00 ft
East: 2520732.64 ft
Station: 3009+30.97
Offset: 0.25 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	388.6	Hard, gray SHALE						
		--RDR 5--						
					23	50/3"	> 4.50 P	18
			85					
		--7 mins to drill from 85' to 88.5' at 500psi--						
		--MSPT 1--			24	100/2.4"	> 4.50 P	18
			90					
		--8 mins to drill from 90' to 93.5' at 500psi--						
		--MSPT 2--			25	100/3.24"	> 4.50 P	17
			95					
		--MSPT 3--			26	100/3.6"	> 4.50 P	18
			100					
		--9 mins to drill from 100' to 103.5' at 500psi--						
	367.3	--MSPT 4--			27	100/3.24"	> 4.50 P	15
		Boring terminated at 103.80 ft	105					
			110					
			115					
			120					

GENERAL NOTES

Begin Drilling **06-21-2023** Complete Drilling **06-21-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **N&J&N** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **27.00 ft**
At Completion of Drilling ▼ **7' mud**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-03

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 453.75 ft
North: 1619208.26 ft
East: 2520801.17 ft
Station: 3010+83.57
Offset: 10.21 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	453.6	2-inch thick ASPHALT --PAVEMENT--						
		Medium dense, brown, black, and gray SANDY GRAVEL; damp --FILL--			1	17 11 5	NP	4
	450.8	Soft, brown and gray SILTY CLAY LOAM, trace gravel and wood fragments; damp --FILL-- --RDR 2-3--	5		2	1 2 2	0.33 B	16
	448.3	Medium dense, brown and gray GRAVELLY SAND to SANDY GRAVEL, trace wood and brick fragments; damp --FILL-- --RDR 2-3--			3	7 10 11	NP	10
		--rig chatter--	10		4	5 12 12	NP	
	443.3	Medium stiff, brown SILTY CLAY, trace gravel; moist --RDR 2--			5	4 4 8	0.50 P	16
	440.8	Loose to medium dense, brown, fine SAND, trace gravel; saturated --RDR 2--	15		6	4 3 3	NP	21
					7	7 10 15	NP	20
	435.8	Medium dense, brown SANDY GRAVEL; moist to wet --RDR 2--	20		8	3 4 7	NP	10
					9	7 4 6	NR	
			25		10	8 7 5	NP	14
					11	4 4 5	NP	14
			30		12	7 12 13	NP	15
	422.0	Medium dense to very dense, brown, fine SAND, trace gravel; wet --RDR 2--			13	16 14 17	NP	26
			35		14	9 9 10	NP	21
			40					

GENERAL NOTES

Begin Drilling: **06-15-2023** Complete Drilling: **06-16-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **12.50 ft**
At Completion of Drilling: **MUD**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-03

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 453.75 ft
North: 1619208.26 ft
East: 2520801.17 ft
Station: 3010+83.57
Offset: 10.21 RT

Depth (ft)	Elevation (ft)	Profile	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
45					15	16 40 43	NP	17
50					16	13 16 20	NP	20
55					17	18 12 31	NP	15
	397.0		Dense to very dense, brown GRAVELLY SAND to SANDY GRAVEL; wet --RDR 2-3--					
60					18	31 50/5"	NP	18
65					19	16 16 31	NP	6
	386.8		Hard, gray SHALE --RDR 5--					
70			--MSPT 1--		20	100/2.5"	> 4.50 P	18
75			--MSPT 2--		21	100/3"	> 4.50 P	15
	375.0		--MSPT 3-- Boring terminated at 78.80 ft		22	100/3.5"	> 4.50 P	16
80								

GENERAL NOTES

Begin Drilling: **06-15-2023** Complete Drilling: **06-16-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **12.50 ft**
At Completion of Drilling: **MUD**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC 342401.GPJ WANGENG.GDT 9/20/23

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BORING LOG BSB-04

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.88 ft
North: 1619120.16 ft
East: 2520853.72 ft
Station: 3011+86.16
Offset: 9.70 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Loose, brown GRAVELLY SAND; damp --FILL--						
	443.4							
		Stiff, brown SILTY CLAY LOAM; damp --RDR 1--			1	6 3 2	1.25 P	46
	441.9							
		Medium stiff, dark gray SILTY CLAY to SILTY CLAY LOAM, trace organic matter --RDR 1--			2	2 1 1	0.50 P	42
			5					
					3	1 0 1	0.57 B	56
					4	1 0 1	0.66 B	70
			10					
	434.4			▽				
		Medium dense, gray SANDY GRAVEL; saturated --RDR 2--			5	15 16 13	NP	17
	431.9							
		Medium dense, brown, coarse Gravelly SAND; saturated --RDR 1-2--			6	6 4 6	NP	18
			15					
	428.1				7	4 4 5	NR	
		Loose to medium dense, brown SANDY GRAVEL; saturated --RDR 1-3--						
					8	4 3 2	NP	19
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--2-inch thick, black clay loam seam, trace organics--			9	3 4 4	NP	20
			25		10	11 10 9	NP	7
	419.4	--rig chatter; possible cobbles--						
		Medium dense to dense, brown, fine to coarse SAND; saturated --RDR 2--			11	9 6 9	NP	20
			30		12	9 10 12	NP	20
		--fine grained--			13	8 12 14	NP	19
			35					
					14	8 10 12	NP	17
			40					

GENERAL NOTES

Begin Drilling: **06-19-2023** Complete Drilling: **06-19-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&J&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **10.50 ft**
At Completion of Drilling ▼ **5' mud**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-04

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.88 ft
North: 1619120.16 ft
East: 2520853.72 ft
Station: 3011+86.16
Offset: 9.70 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	--coarse grained--	45		15	9 11 14	NP	15
		50		16	12 21 24	NP	14
	--rig chatter; possible cobbles--						
393.1	Very dense, brown SANDY GRAVEL; saturated --RDR 4--	55		17	50/5"	NP	14
	--rig chatter; possible cobbles--						
387.4	Hard, gray to dark gray SHALE --RDR 5--	60		18	50/5"	> 4.50 P	20
	--5 mins to drill from 60' to 63.5' at 500psi--						
	--MSPT 1--	65		19	100/3.84"	> 4.50 P	17
	--7 mins to drill from 65' to 68.5' at 500psi--						
	--MSPT 2--	70		20	100/3.6"	> 4.50 P	17
	--7 mins to drill from 70' to 73.5' at 500psi--						
	--MSPT 3--	75		21	100/2.28"	> 4.50 P	15
	--8 mins to drill from 75' to 78.5' at 500psi--						
366.1	--MSPT 4-- Boring terminated at 75.75 ft	80		22	100/3"	> 4.50 P	20

GENERAL NOTES

Begin Drilling: **06-19-2023** Complete Drilling: **06-19-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&J&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **10.50 ft**
At Completion of Drilling: **5' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-05

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.32 ft
North: 1618875.92 ft
East: 2521010.04 ft
Station: 3014+75.95
Offset: 0.82 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Barge Deck--						
	440.3	--Illinois River--	5					
			10					
			15					
	425.8	Loose to medium dense, gray, fine to medium SAND, trace gravel and shell fragments;	20		1	3 3 1	NP	21
		saturated --RDR 1-2--	25		2	7 6 5	NP	14
		--silt seams--	30		3	5 4 3	NP	22
		--silt seams--	35		4	4 5 5	NP	27
	407.6	Dense, brown SANDY GRAVEL; saturated --RDR 3--	40		5	21 26 18	NP	5

GENERAL NOTES

Begin Drilling: **05-31-2023** Complete Drilling: **06-01-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **K&T** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **mud rotary from 18.5'**

WATER LEVEL DATA

While Drilling: **4.00 ft**
At Completion of Drilling: **4.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG BSB-05

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.32 ft
North: 1618875.92 ft
East: 2521010.04 ft
Station: 3014+75.95
Offset: 0.82 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--rig chatter; large gravel--						
	402.6	Dense, brown, coarse SAND, little gravel; saturated --RDR 2-3--						
			45		6	17 25 21	NP	12
	397.6	Very dense, brown GRAVELLY SAND to SANDY GRAVEL, trace cobble fragments; saturated --RDR 4--			7	50/5"	NP	11
			50					
		--hard drilling; possible cobbles--						
					8	50/5"	NP	14
			55					
		--hard drilling; possible cobbles--						
	386.8	Hard, gray and dark gray SHALE --RDR 5--			9	50/4"	> 4.50 P	15
			60					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--10 mins to drill from 60' to 63.5' at 1,250psi--						
		--MSPT 1--	65		10	100/3.72"	> 4.50 P	23
		--12 mins to drill from 65' to 68.5' at 1,250psi--						
		--MSPT 2--	70		11	100/3.12"	> 4.50 P	20
		--13 mins to drill from 70' to 73.5' at 1,250psi--						
		--MSPT 3--	75		12	100/4.8"	> 4.50 P	19
	365.5	--MSPT 4--			13	100/4"	> 4.50 P	18
		Boring terminated at 78.83 ft	80					

GENERAL NOTES

Begin Drilling: **05-31-2023** Complete Drilling: **06-01-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **K&T** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **mud rotary from 18.5'**

WATER LEVEL DATA

While Drilling: **4.00 ft**
At Completion of Drilling: **4.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-06

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.32 ft
North: 1618867.37 ft
East: 2520992.32 ft
Station: 3014+74.30
Offset: 18.78 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Barge Deck--						
	440.3	--Illinois River--	5					
			10					
			15					
	424.3		20					
	421.3	Loose, gray GRAVELLY SAND, trace shell fragments; saturated --RDR 1--			1	2 2 3 4	NP	17
		Very loose to medium dense, gray and brown, fine to coarse SAND, trace shell fragments; saturated --RDR 1--	25		2	10 8 4	NP	28
					3	2 2 2	NP	28
			30		4	2 2 4	NP	29
					5	2 1 2	NP	29
			35		6	8 9 5	NP	24
					7	7 6 7	NP	18
	406.3	Loose to medium dense, brown SANDY GRAVEL; saturated --RDR 3--			8	5 4 4	NP	18
			40					

GENERAL NOTES

Begin Drilling **05-31-2023** Complete Drilling **05-31-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **K&T** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **mud rotary from 20'**

WATER LEVEL DATA

While Drilling ▽ **4.00 ft**
At Completion of Drilling ▼ **4.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG BSB-06

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.32 ft
North: 1618867.37 ft
East: 2520992.32 ft
Station: 3014+74.30
Offset: 18.78 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					9	7 6 7	NP	12
	401.3	Very dense, brown, medium to coarse SAND, trace gravel; wet --RDR 2-4--	45		10	22 31 28	NP	14
					11	11 14 15	NR	
		--rig chatter; possible cobbles--			12	20 36 50/3"	NP	14
	394.3	Very dense, brown SANDY GRAVEL, trace cobble fragments; wet --RDR 4--	50		13	50/3"	NP	23
	391.8	Very dense, brown, medium SAND, trace gravel and cobble fragments; wet --RDR 3-4--			14	26 29 50/4"	NP	17
		--rig chatter; possible cobbles--	55					
	388.8	Very dense, brown SANDY GRAVEL; wet			15	21 26 50/3"	NP	20
	387.8	Hard, dark and light gray SHALE --RDR 5--						
		--9.5 mins to drill from 57.5' to 61' at 1,250psi--	60					
		--MSPT 1--			16	100/5.04"	> 4.50 P	20
		--9 mins to drill from 62.5' to 66' at 1,250psi--	65					
		--MSPT 2--			17	100//6.24"	> 4.50 P	18
		--10 mins to drill from 67.5' to 71' at 1,250psi--	70					
		--MSPT 3--			18	100/4.32"	> 4.50 P	20
		--8.5 mins to drill from 72.5' to 76' at 1,250psi--	75					
		--MSPT 4--			19	100/5.04"	> 4.50 P	16
		--11 mins to drill from 77.5' to 81' at 1,250psi--	80					

GENERAL NOTES

Begin Drilling: **05-31-2023** Complete Drilling: **05-31-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **K&T** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **mud rotary from 20'**

WATER LEVEL DATA

While Drilling: **4.00 ft**
At Completion of Drilling: **4.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG BSB-06

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.32 ft
North: 1618867.37 ft
East: 2520992.32 ft
Station: 3014+74.30
Offset: 18.78 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--MSPT 5--			20	100/0.72"	NR	
		--13 mins to drill from 82.5' to 86' at 1,250psi--	85					
		--MSPT 6--			21	100/2.16" P	> 4.50	22
		--11 mins to drill from 87.5' to 91' at 1,250psi--	90					
		--MSPT 7--			22	100/2.4" P	> 4.50	13
		--10 mins to drill from 92.5' to 96' at 1,250psi--	95					
	348.1	--MSPT 8--			23	100/2.52" P	> 4.50	14
		Boring terminated at 96.25 ft	100					

GENERAL NOTES

Begin Drilling **05-31-2023** Complete Drilling **05-31-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **K&T** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **mud rotary from 20'**

WATER LEVEL DATA

While Drilling ▽ **4.00 ft**
At Completion of Drilling ▼ **4.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG BSB-07

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.80 ft
North: 1618541.13 ft
East: 2521216.14 ft
Station: 3018+69.03
Offset: 8.22 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Barge Deck--						
	440.8	--Illinois River--	5					
			10					
	429.8		15					
	429.6	Gray SILT; saturated						
		Very loose, gray SANDY GRAVEL; saturated --RDR 1--			1	1 1 0	NP	20
			20		2	1 1 1	NP	18
	424.3	Very loose to loose, gray, medium to coarse SAND; saturated --RDR 1--			3	2 3 2	NP	23
	420.8	Very loose, gray SILT; saturated	25		4	1 1 1	NP	38
	419.3	Loose, gray, coarse SAND, few silt seams; saturated --RDR 1--			5	2 3 4	NP	18
			30		6	2 1 3	NP	18
	414.3	Medium dense to dense, brown SANDY GRAVEL, trace shell fragments; wet --RDR 2--			7	3 6 7	NP	8
			35		8	14 15 16	NP	9
					9	21 23 18	NP	11
	406.8	Medium dense, brown, coarse SAND; saturated --RDR 2--			10	8 12 15	NP	17
			40					

GENERAL NOTES

Begin Drilling **05-23-2023** Complete Drilling **05-24-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **K&T** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **mud rotary from 15'**

WATER LEVEL DATA

While Drilling ▽ **4.00 ft**
At Completion of Drilling ▼ **4.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG BSB-07

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.80 ft
North: 1618541.13 ft
East: 2521216.14 ft
Station: 3018+69.03
Offset: 8.22 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	404.3							
		Very dense, brown GRAVEL; saturated			11	50/4"	NP	13
		--RDR 2-3--						
		--rig chatter; possible cobbles--						
	401.8							
		Very dense, brown, coarse Gravelly SAND; saturated						
		--RDR 2--			12	37 31 25	NP	9
			45					
	399.3							
		Very dense, brown SANDY GRAVEL; saturated			13	50/5"	NP	20
		--cobbles fragments--						
		--RDR 4-5--						
		--hard drilling--						
	396.8							
		Dense, brown, medium to coarse SAND, trace gravel; wet to saturated						
		--RDR 2--			14	29 19 16	NP	21
			50					
					15	24 18 20	NP	18
	391.8							
		Very dense, brown, coarse Gravelly SAND; saturated						
		--RDR 4-5--			16	18 20 50/5"	NP	12
	389.9		55					
		Possible BOULDER						
		--RDR 5--			17	50/0"	NR	
	387.3							
		Hard, dark gray and gray SHALE						
		--RDR 5--			18	60/5"	> 4.50 P	19
			60					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--20 mins to drill from 60' to 63.5' at 1,750psi--						
		--MSPT 1--			19	100/4"	> 4.50 P	21
			65					
		--18 mins to drill from 65' to 68.5' at 1,750psi--						
		--MSPT 2--			20	100/5"	> 4.50 P	25
			70					
		--17 mins to drill from 70' to 73.5' at 1,750psi--						
		--MSPT 3--			21	100/4.5"	> 4.50 P	24
			75					
		--21 mins to drill from 75' to 78.5' at 1,250psi--						
		--MSPT 4--			22	100/1.6"	> 4.50 P	
			80					

GENERAL NOTES

Begin Drilling: **05-23-2023** Complete Drilling: **05-24-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **K&T** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **mud rotary from 15'**

WATER LEVEL DATA

While Drilling: **4.00 ft**
At Completion of Drilling: **4.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-07

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.80 ft
North: 1618541.13 ft
East: 2521216.14 ft
Station: 3018+69.03
Offset: 8.22 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--27 mins to drill from 80' to 83.5' at 1,250psi--						
		--MSPT 5--			23	100/5.3"	> 4.50 P	15
			85					
		--25 mins to drill from 85' to 88.5' at 1,200psi--						
		--MSPT 6--			24	100/3.24"	> 4.50 P	20
			90					
		--25 mins to drill from 90' to 93.5' at 1,200psi--						
		--MSPT 7--			25	100/3"	> 4.50 P	17
			95					
		--29 mins to drill from 95' to 98.5' at 1,200psi--						
	346.1	--MSPT 8--			26	100/2.76"	> 4.50 P	19
		Boring terminated at 98.75 ft	100					

GENERAL NOTES

Begin Drilling **05-23-2023** Complete Drilling **05-24-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **K&T** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **mud rotary from 15'**

WATER LEVEL DATA

While Drilling ▽ **4.00 ft**
At Completion of Drilling ▼ **4.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG BSB-08

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.30 ft
North: 1618533.52 ft
East: 2521188.33 ft
Station: 3018+61.46
Offset: 19.59 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Barge Deck--						
	440.3	--Illinois River--	5					
			10					
	429.3	Very loose, gray, coarse Gravelly SAND; saturated --RDR 1--	15		1	1 0 0 0	NP	22
	426.3	Very loose, gray, medium SAND; saturated --RDR 1--	20		2	1 1 1	NP	26
	422.6	Medium dense, gray to brown, coarse Gravelly SAND; saturated --RDR 2-- --few silt seams and shell fragments--	25		3	4 6 4	NP	11
			30		4	11 10 8	NP	9
	412.6	Medium dense to very dense, brown SANDY GRAVEL; saturated --RDR 2-4--	35		5	8 11 9	NP	7
		--hard drilling; possible cobbles--	40		6	11 14 18	NP	10

GENERAL NOTES

Begin Drilling **05-25-2023** Complete Drilling **05-30-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **K&T** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **mud rotary from 15'**

WATER LEVEL DATA

While Drilling ▽ **4.00 ft**
At Completion of Drilling ▼ **4.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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Fax:

BORING LOG BSB-08

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.30 ft
North: 1618533.52 ft
East: 2521188.33 ft
Station: 3018+61.46
Offset: 19.59 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--hard drilling; possible cobbles--						
			45		7	45 50/4"	NP	8
	397.6	--hard drilling; possible cobbles--						
		Dense, brown, medium SAND; saturated						
		--RDR 3--						
			50		8	16 20 21	NP	25
		--rig chatter; possible cobbles--						
	392.6	Very dense, brown SANDY GRAVEL, cobble and boulder fragments; saturated						
		--RDR 4-5--						
			55		9	45 50/4"	NP	21
	386.8	Hard, dark gray SHALE						
		--RDR 5--						
			60		10	50/4"	> 4.50 P	18
		--rig break down during rock coring--			11	CORE	NR	
		--7 mins to drill from 61' to 63.5' at 1,250psi--						
		--MSPT 1--	65		12	100/4.44"	> 4.50 P	22
		--8 mins to drill from 65' to 68.5' at 1,250psi--						
		--MSPT 2--	70		13	100/5"	> 4.50 P	24
		--8 mins to drill from 70' to 73.5' at 1,250psi--						
		--MSPT 3--	75		14	100/4.8"	> 4.50 P	24
		--9 mins to drill from 75' to 78.5' at 1,250psi--						
		--MSPT 4--	80		15	100/3"	NR	

GENERAL NOTES

Begin Drilling: **05-25-2023** Complete Drilling: **05-30-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **K&T** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **mud rotary from 15'**

WATER LEVEL DATA

While Drilling: **4.00 ft**
At Completion of Drilling: **4.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-08

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.30 ft
North: 1618533.52 ft
East: 2521188.33 ft
Station: 3018+61.46
Offset: 19.59 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--10 mins to drill from 80' to 83.5' at 1,250psi--						
		--MSPT 5--			16	100/6.24"	> 4.50 P	15
			85					
		--9 mins to drill from 85' to 88.5' at 1,250psi--						
		--MSPT 6--			17	100/2.52"	> 4.50 P	18
			90					
		--11 mins to drill from 90' to 93.5' at 1,250psi--						
		--MSPT 7--			18	100/1.68"	> 4.50 P	9
			95					
		--9 mins to drill from 95' to 98.5' at 1,250psi--						
	345.6	--MSPT 8--			19	100/2.4"	> 4.50 P	14
		Boring terminated at 98.75 ft						
			100					

GENERAL NOTES

Begin Drilling: **05-25-2023** Complete Drilling: **05-30-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **K&T** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **mud rotary from 15'**

WATER LEVEL DATA

While Drilling: **4.00 ft**
At Completion of Drilling: **4.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types: the actual transition may be gradual.

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BORING LOG BSB-09

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.94 ft
North: 1618258.85 ft
East: 2521374.31 ft
Station: 3021+92.54
Offset: 1.02 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	443.8	14-inch thick, brown SILTY LOAM --TOPSOIL--						
		Loose, brown SAND; wet --RDR 1--			1	7 3 2	NP	22
	441.9	Medium dense, dark gray SILTY LOAM, trace wood fragments						
	440.6	Medium dense, gray SANDY GRAVEL; wet --RDR 3--	5		2	2 5 6	NP	40
					3	8 10 13	NP	8
	436.9	Very soft to soft, brown and gray SILTY CLAY LOAM, trace organic matter --RDR 1--	10		4	1 1 2	< 0.25 P	35
					5	0 1 1	0.16 B	30
			15		6	0 0 1	0.25 B	29
					7	1 2 2	0.08 B	31
		--trace shell fragments--	20		8	1 1 2	0.16 B	29
					9	0 1 1	0.25 B	28
	420.9	Loose to very dense, brown GRAVELLY SAND to SANDY GRAVEL; saturated --trace shell fragments-- --RDR 2-4--	25		10	0 2 3	NP	15
					11	7 6 7	NP	13
			30		12	5 5 6	NP	11
			35		13	8 9 9	NP	6
		--rig chatter; possible cobbles--						
			40		14	18 20 20	NP	16

GENERAL NOTES

Begin Drilling: **06-05-2023** Complete Drilling: **06-06-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&A&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 18.5', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **1.50 ft**
At Completion of Drilling: **7' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-09

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.94 ft
North: 1618258.85 ft
East: 2521374.31 ft
Station: 3021+92.54
Offset: 1.02 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--rig chatter; possible cobbles--						
			45		15	6 37 50/4"	NP	7
		--rig chatter; possible cobbles--						
	398.2	Dense to very dense, brown, medium SAND, trace to little gravel; saturated --RDR 2-3--						
			50		16	18 21 24	NP	22
			55		17	16 30 50/4"	NP	15
	387.4	Hard, gray and dark gray SHALE; dry --RDR 5--						
			60		18	50/4"	> 4.50 P	18

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--MSPT 1--	65		19	100/5.4"	> 4.50 P	17
		--8 mins to drill from 65' to 68.5' at 500psi--						
		--MSPT 2--	70		20	100/4.8"	> 4.50 P	20
		--8 mins to drill from 70' to 73.5' at 500psi--						
		--MSPT 3--	75		21	100/8.52"	> 4.50 P	15
	366.3	--MSPT 4-- Boring terminated at 78.60 ft	80		22	100/1.2"	> 4.50 P	21

GENERAL NOTES

Begin Drilling: **06-05-2023** Complete Drilling: **06-06-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&A&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 18.5', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **1.50 ft**
At Completion of Drilling: **7' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-10

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.92 ft
North: 1618149.31 ft
East: 2521420.92 ft
Station: 3023+10.57
Offset: 14.4 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		12-inch thick TOPSOIL						
	443.9							
		Medium stiff, brown and gray SILTY CLAY --RDR 1--			1	2 3 3	0.74 B	43
					2	2 2 2	0.90 B	26
	440.4		5					
		Brown SANDY GRAVEL; wet						
	439.4							
		Soft to medium stiff, gray to brown SILTY CLAY LOAM, trace gravel --RDR 1--			3	1 1 1	0.25 B	34
					4	0 1 1	0.41 B	29
			10					
		--trace shell fragments--			5	2 2 3	0.33 B	30
	431.9							
		Soft to medium stiff, brown SILTY CLAY --RDR 1--			6	1 1 1	0.57 B	29
			15					
					7	1 2 2	0.49 B	31
					8	1 2 3	0.41 B	32
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					9	0 0 1	0.33 B	30
					10	0 0 1	0.25 B	31
			25					
	419.4							
		Medium dense, brown, medium to coarse SAND, trace gravel; saturated --RDR 2--			11	5 6 6	NP	20
	416.9							
		Medium dense to dense, brown SANDY GRAVEL; saturated --RDR 2-3--			12	7 11 9	NP	15
			30					
					13	5 7 9	NP	8
			35					
		--rig chatter; possible cobbles--						
					14	7 17 12	NP	8
			40					

GENERAL NOTES

Begin Drilling: **06-06-2023** Complete Drilling: **06-07-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&A&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 18.5', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **4.50 ft**
At Completion of Drilling: **6' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG BSB-10

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 444.92 ft
North: 1618149.31 ft
East: 2521420.92 ft
Station: 3023+10.57
Offset: 14.4 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--rig chatter; possible cobbles--						
			45		15	28 18 19	NP	13
		--rig chatter; possible cobbles--						
	398.2	Medium dense to dense, brown, medium to coarse SAND; saturated --RDR 3--						
			50		16	30 21 20	NP	26
			55		17	7 9 15	NP	20
	388.4	Hard, gray and black SHALE --RDR 5--						
			60		18	50/4"	> 4.50 P	12

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--8 mins to drill from 60' to 63.5' at 500psi--						
		--MSPT 1--	65		19	100/3.6"	> 4.50 P	20
		--6 mins to drill from 65' to 68.5' at 500psi--						
		--MSPT 2--	70		20	100/2.4"	> 4.50 P	35
		--8 mins to drill from 70' to 73.5' at 500psi--						
		--MSPT 3--	75		21	100/6"	> 4.50 P	16
		--8 mins to drill from 75' to 78.5' at 500psi--						
	366.2	--MSPT 4-- Boring terminated at 78.70 ft	80		22	100/1.56"	> 4.50 P	21

GENERAL NOTES

Begin Drilling: **06-06-2023** Complete Drilling: **06-07-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&A&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 18.5', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **4.50 ft**
At Completion of Drilling: **6' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG BSB-11

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 449.22 ft
North: 1618006.47 ft
East: 2521500.31 ft
Station: 3024+73.93
Offset: 18.69 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	448.7	6-inch thick, dark brown SILTY LOAM						
		--TOPSOIL--						
		Very loose to loose, dark brown Gravelly LOAM, trace glass fragments; damp			1	2 1 2	NP	13
		--FILL--						
		--RDR 1--			2	3 3 3	NP	12
	443.7	Soft to medium stiff, gray to brown SILTY CLAY LOAM, trace organic matter	5		3	2 1 2	0.49 B	34
		--RDR 1--			4	2 2 2	0.41 B	29
			10		5	1 2 1	0.49 B	34
					6	1 1 2	0.33 B	29
			15	▽				
		--wet spoon recovery--			7	0 2 2	0.90 B	32
	431.2	Soft to medium stiff, gray SILTY CLAY						
		--RDR 1--	20		8	1 1 1	0.57 B	33
			25		9	1 1 2	0.66 B	33
					10	1 1 1	0.33 B	33
	423.7	Soft, gray SILTY CLAY LOAM						
		--RDR 1--			11	1 0 1	0.33 B	29
			30		12	0 0 1	0.25 B	26
	417.5	Medium dense, brown, coarse SAND, little gravel						
		--RDR 2--	35		13	5 7 8	NP	15
	412.5	Medium dense to very dense, brown SANDY GRAVEL; wet						
		--RDR 3-4--	40		14	7 9 3	NP	17

GENERAL NOTES

Begin Drilling: **06-07-2023** Complete Drilling: **06-08-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&A&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 18.5', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **15.50 ft**
At Completion of Drilling ▼ **5' mud**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG BSB-11

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 449.22 ft
North: 1618006.47 ft
East: 2521500.31 ft
Station: 3024+73.93
Offset: 18.69 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--rig chatter; possible cobbles--						
			45		15	11 15 16	NP	5
		--rig chatter; possible cobbles--						
			50		16	48 50/3"	NP	9
			55		17	19 14 15	NP	7
	392.7	Weathered BOULDER BEDROCK --RDR 5--						
	391.2	--22 mins to drill from 56.5' to 58'-- Hard, gray, dark gray, and black SHALE --RDR 5--	60		18	50/5"	> 4.50 P	18
		--8 mins to drill from 60' to 63.5' at 500psi--						
		--MSPT 1--	65		19	100/4.8"	> 4.50 P	23
		--10 mins to drill from 65' to 68.5' at 500psi--						
		--MSPT 2--	70		20	100/3.24"	> 4.50 P	24
		--MSPT 3--	75		21	100/3.84"	> 4.50 P	25
	370.4	--MSPT 4-- Boring terminated at 78.80 ft	80		22	100/4.08"	> 4.50 P	27

GENERAL NOTES

Begin Drilling: **06-07-2023** Complete Drilling: **06-08-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&A&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 18.5', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **15.50 ft**
At Completion of Drilling: **5' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-12

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 449.28 ft
North: 1617887.68 ft
East: 2521595.54 ft
Station: 3026+24.64
Offset: 2.97 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	448.7	7-inch thick, brown SILTY LOAM --TOPSOIL--						
		Loose, dark brown SANDY GRAVEL --FILL--			1	5 2 2	NP	18
	446.3	Very loose, dark brown Gravelly LOAM, trace brick fragments --FILL--	5		2	1 2 1	NP	14
	443.8	Stiff, dark brown SILTY CLAY LOAM, trace glass, brick, and asphalt fragments --FILL--			3	2 2 3	1.00 P	30
	441.3	Stiff, brown and gray SILTY CLAY --RDR 2--	10		4	2 2 3	1.25 P	26
	438.8	Medium stiff, dark gray to gray SILTY CLAY LOAM, trace organic matter --RDR 1--			5	1 1 2	0.57 B	41
			15		6	1 1 1	0.57 B	27
					7	1 2 3	0.66 B	32
	431.3	Very soft to medium stiff, brown to gray SILTY CLAY to SILTY CLAY LOAM --RDR 1--	20		8	1 2 3	0.90 B	31
	421.3	Very loose to medium dense, gray to brown, fine to coarse SAND, trace gravel; saturated --RDR 1-2--	25		9	1 1 2	0.49 B	33
					10	1 1 2	0.49 B	32
					11	0 1 1	0.16 B	28
			30		12	1 0 1	NP	22
	412.5	Dense to very dense, brown SANDY GRAVEL; saturated --RDR 3-4--	35		13	5 5 6	NP	21
			40		14	7 22 19	NP	10

GENERAL NOTES

Begin Drilling: **06-08-2023** Complete Drilling: **06-09-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&A&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 18.5', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **28.00 ft**
At Completion of Drilling: **5' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-12

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 449.28 ft
North: 1617887.68 ft
East: 2521595.54 ft
Station: 3026+24.64
Offset: 2.97 LT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--rig chatter; possible cobbles--					
45				15	8 31 37	NP	6
50				16	10 15 16	NP	14
		--rig chatter; possible cobbles--					
55				17	12 34 26	NP	11
		--rig chatter; possible cobbles--					
60	390.1	Hard, gray SHALE --RDR 5--		18	22 20 28	> 4.50 P	22
65		--8 mins to drill from 60' to 63.5' at 500psi-- --MSPT 1--		19	100/3.96"	> 4.50 P	17
70		--10 mins to drill from 65' to 68.5' at 500psi-- --MSPT 2--		20	100/4.08"	> 4.50 P	16
75		--11 mins to drill from 70' to 73.5' at 500psi-- --MSPT 3--		21	100/8.16"	> 4.50 P	17
80	370.5	--10 mins to drill from 75' to 78.5' at 500psi-- --MSPT 4-- Boring terminated at 78.80 ft		22	100/3.24"	> 4.50 P	23

GENERAL NOTES

Begin Drilling: **06-08-2023** Complete Drilling: **06-09-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **N&A&N** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 18.5', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **28.00 ft**
At Completion of Drilling: **5' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-13

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 451.73 ft
North: 1617757.12 ft
East: 2521652.64 ft
Station: 3037+66.10
Offset: 14.18 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	451.2	6-inch thick, dark brown SILTY CLAY LOAM						
		--TOPSOIL--						
		Very loose to loose, brown and gray GRAVELLY SAND, trace brick fragments; damp			1	9 5 3	NP	36
		--FILL--						
		--RDR 2--			2	1 1 2	NP	18
	446.2	Very soft to medium stiff, brown to gray SILTY CLAY, trace gravel; moist	5					
		--RDR 2--			3	1 1 2	0.90 B	27
					4	1 1 2	0.82 B	29
			10					
					5	1 1 1	< 0.25 P	37
					6	1 1 1	0.33 B	33
			15					
					7	1 2 3	0.41 B	33
					8	1 2 2	0.25 B	34
			20 ▽					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					9	0 0 0	0.08 B	35
			25		10	1 1 1	< 0.25 P	36
	423.7	Loose to medium dense, brown and gray SANDY GRAVEL; moist			11	0 1 1	< 0.25 P	31
		--RDR 2--	30		12	1 3 6	NP	17
			35		13	8 7 4	NP	15
			40		14	16 12 10	NP	11

GENERAL NOTES

Begin Drilling: **06-13-2023** Complete Drilling: **06-13-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **20.00 ft**
At Completion of Drilling ▼ **MUD**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG BSB-13

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 451.73 ft
North: 1617757.12 ft
East: 2521652.64 ft
Station: 3037+66.10
Offset: 14.18 RT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	410.0	--rig chatter--					
		Dense to very dense, orange, brown and gray SANDY GRAVEL; damp to moist					
		--RDR 3-4--					
45				15	26 39 17	NP	5
		--rig chatter; possible cobbles--					
50				16	50/3"	NP	12
		--rig chatter; possible cobbles--					
55				17	50/4"	NP	9
		--rig chatter; possible cobbles--					
60				18	18 16 18	NP	8
	389.7	Hard, gray SHALE					
		--RDR 5--					
65		--MSPT 1--		19	100/4.2"	> 4.50 P	19
70		--MSPT 2--		20	100/5"	> 4.50 P	25
75		--MSPT 3--		21	100/2"	> 4.50 P	18
	372.7	--MSPT 4--		22	100/6"	> 4.50 P	24
80		Boring terminated at 79.00 ft					

GENERAL NOTES

Begin Drilling: **06-13-2023** Complete Drilling: **06-13-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **20.00 ft**
At Completion of Drilling: **MUD**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EB-01

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 450.94 ft
North: 1617579.46 ft
East: 2521871.89 ft
Station: 3030+33.05
Offset: 17.01 LT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	450.4	6-inch thick, black SILTY CLAY LOAM					
		--TOPSOIL--					
		Very loose, brown GRAVELLY LOAM; moist to wet		1	2 1 2	NP	22
		--FILL--					
		--RDR 1-- ▽					
5				2	1 1 0	NP	27
	445.4	Soft, brown SILTY CLAY LOAM; damp					
		--RDR 1--		3	1 0 1	0.33 B	30
	442.9	Soft to stiff, brown to gray SILTY CLAY; damp					
		--RDR 1-2--		4	2 3 4	1.64 B	27
10				5	1 0 0	0.25 P	31
		--trace organic matter--		6	0 2 2	0.57 B	34
15							
		--trace organic matter--		7	0 1 2	0.41 B	35
		--trace organic matter--		8	0 2 2	0.57 B	31
20							
		--trace organic matter--		9	0 1 2	0.57 B	32
25				10	0 1 2	0.49 B	36
	425.4	Very soft, gray SILTY CLAY LOAM, few sand seams; saturated					
		--RDR 1--		11	0 0 0	0.16 B	30
	422.9	--heaving sand--					
		Loose to medium dense, gray, medium SAND; saturated		12	1 2 3	NP	27
30		--RDR 1--					
		--heaving sand--		13	13 13 9	NP	24
35	415.9	Boring terminated at 35.00 ft					
40							

GENERAL NOTES

Begin Drilling: **04-13-2021** Complete Drilling: **04-13-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **3.00 ft**
At Completion of Drilling ▼ **15' wash**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG EB-02

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 451.90 ft
North: 1617761.84 ft
East: 2521727.17 ft
Station: 3028+02.43
Offset: 14.95 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	451.7	2-inch thick, black SILTY CLAY LOAM						
	450.9	--TOPSOIL--						
		10-inch thick, brown GRAVELLY LOAM; damp --FILL--			1	3 8 7	NP	5
	448.9	Medium dense, brown SANDY GRAVEL; dry --FILL--						
		Stiff, brown SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--	5		2	3 3 7	1.75 P	26
					3	2 3 4	1.75 P	24
	443.9	Medium stiff to very stiff, brown to gray SILTY CLAY; damp --trace gravel-- --RDR 2--	10		4	2 3 4	1.64 B	26
					5	1 3 5	2.05 B	25
			15		6	2 3 4	1.23 B	27
					7	4 3 3	0.98 B	32
	434.4			▽				
	433.9	SAND; wet						
		Soft to medium stiff, brown to gray SILTY CLAY; damp --RDR 1--	20	▼	8	0 2 3	0.41 B	31
	423.9	Loose to medium dense, brown SANDY GRAVEL; saturated --RDR 1-2--	25		9	0 1 2	0.41 B	33
					10	1 1 2	0.57 B	32
					11	0 2 2	0.41 B	28
			30		12	6 5 4	0.25 P	13
	416.9	Boring terminated at 35.00 ft	35		13	2 6 6	NP	8
			40					

GENERAL NOTES

Begin Drilling: **04-13-2021** Complete Drilling: **04-13-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **17.50 ft**
At Completion of Drilling ▼ **20.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG EB-03

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.35 ft
North: 1617896.39 ft
East: 2521629.20 ft
Station: 3026+36.77
Offset: 30.97 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Medium dense, brown SANDY GRAVEL; dry						
		--FILL--						
		--RDR 3--			1	10 11 9	NP	5
	448.1	Stiff to very stiff, brown SILTY CLAY LOAM to SILTY CLAY; damp	5		2	3 3 3	NR	
		--FILL--						
		--RDR 2--			3	1 2 3	1.00 P	25
			10		4	3 6 6	3.75 P	21
	441.9	Soft to very stiff, gray SILTY CLAY; damp						
		--RDR 1-2--			5	2 3 3	2.05 B	27
			15		6	1 2 3	0.50 P	35
					7	0 2 2	0.74 B	34
			20		8	0 2 2	0.49 B	32

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	432.1							
	431.6	Possible SAND						
		--wet spoon recovery--						
		Soft to medium stiff, brown to gray SILTY CLAY; damp			9	0 2 2	0.49 B	31
		--RDR 1--						
			25		10	0 2 3	0.66 B	31
					11	0 2 2	0.74 B	31
			30		12	0 0 1	0.25 B	29
	420.6	--heaving sand--						
		Medium dense, brown GRAVELLY SAND; saturated			13	6 8 8	NP	22
	417.4	Boring terminated at 35.00 ft	35					
			40					

GENERAL NOTES

Begin Drilling: **04-13-2021** Complete Drilling: **04-13-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **20.50 ft**
At Completion of Drilling: **14' wash**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EB-04

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.53 ft
North: 1618022.63 ft
East: 2521530.41 ft
Station: 3024+77.83
Offset: 51.92 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	452.0	6-inch thick, brown GRAVELLY LOAM; damp						
		--FILL--						
		Medium stiff to very stiff, brown SILTY CLAY LOAM, trace to little gravel; damp			1	3 3 2	1.00 P	14
		--FILL--						
		--RDR 1-2--.			2	3 3 5	2.00 P	20
			5					
					3	3 2 1	0.75 P	15
	444.5							
		Soft to medium stiff, gray SILTY CLAY; damp						
		--RDR 1--			4	2 2 2	0.66 B	31
			10					
					5	1 1 2	0.66 B	32
					6	1 2 2	0.57 B	33
			15					
		--trace organic matter--			7	1 1 3	0.41 B	34
					8	1 2 2	0.69 B	28
			20					
			25		9	1 2 2	0.82 B	30
					10	1 2 2	0.66 B	34
					11	1 2 2	0.49 B	32
			30		12	0 0 0	0.41 B	30
	417.8		35		13	0 2 7	0.41 B	27
		Loose to very dense, brown SANDY GRAVEL; saturated						
		--RDR 3-4--						
					14	7 3 3	NP	12
			40					

GENERAL NOTES

Begin Drilling: **04-12-2021** Complete Drilling: **04-12-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **34.75 ft**
At Completion of Drilling: **10' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EB-04

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.53 ft
North: 1618022.63 ft
East: 2521530.41 ft
Station: 3024+77.83
Offset: 51.92 RT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--rig chatter; possible cobbles--					
45		--loss in drilling mud-- --hard drilling from 45 to 51 feet; possible cobbles--		15	19 14 35	NP	13
50				16	50/5"	NP	5
55		--hard drilling, 55 to 56 feet; possible cobbles--		17	39 33 30	NP	8
60				18	50/5"	NP	9
		--rig chatter; possible cobbles--					
65	387.5	Very dense, dark gray SHALE --RDR 5--		19	34 42 37	NP	8
		--MSPT 1--		20	100/3.5"	NP	14
70		--MSPT 2--		21	100/4"	NP	16
		--MSPT 3--		22	100/4"	NP	10
75		--MSPT 4--		23	100/3.5"	NP	18
		--MSPT 5--		24	100/2.5"	NP	18
80	372.5	--MSPT 6--		25	100/2.5"	NP	8
		Boring terminated at 80.00 ft					

GENERAL NOTES

Begin Drilling **04-12-2021** Complete Drilling **04-12-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **R&J** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **34.75 ft**
At Completion of Drilling ▼ **10' mud**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG EB-05

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 445.39 ft
North: 1618135.89 ft
East: 2521215.93 ft
Station: 3022+18.01
Offset: 197.87 RT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	444.4	12-inch thick, black SILTY CLAY LOAM; damp					
		--TOPSOIL--					
		Soft, brown SILTY CLAY LOAM, trace organic matter; damp		1	1 1 1	0.25 P	36
		--RDR 1--					
	442.6						
	442.1	Possible SAND					
		--wet spoon recovery--					
5		Very soft to soft, dark brown to brown SILTY CLAY LOAM; damp		2	1 1 2	0.41 B	37
		--RDR 1--					
				3	0 0 1	0.25 B	38
		--trace organic matter--		4	1 1 1	0.16 B	28
10				5	1 1 1	0.25 B	32
15				6	1 1 1	0.33 B	30
				7	0 1 1	0.33 B	30
20				8	1 1 1	0.41 B	31
	424.9	--measured 5 foot ground water before mud rotary--					
		Soft, gray SILTY CLAY, trace organic matter; damp		9	1 1 1	0.25 B	29
		--RDR 1--					
25				10	0 0 1	0.25 B	31
				11	1 0 1	0.25 B	32
	417.4	Loose, gray SANDY LOAM; wet					
		--RDR 1--		12	1 1 5	NP	24
30							
	413.6	Medium dense, brown SANDY GRAVEL; saturated					
		--RDR 3-4--					
		--rig chatter, 33.5 to 36.5 feet; possible cobbles--		13	12 10 10	NP	7
35							
	408.6	Medium dense, brown, gravelly, coarse SAND					
		--RDR 2--					
40				14	12 14 15	NP	19

GENERAL NOTES

Begin Drilling: **04-15-2021** Complete Drilling: **04-16-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **3.00 ft**
At Completion of Drilling: **8' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EB-05

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 445.39 ft
North: 1618135.89 ft
East: 2521215.93 ft
Station: 3022+18.01
Offset: 197.87 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	404.9	--hard drilling, 40.5 to 43.5 feet; possible cobbles-- Very dense, brown SANDY GRAVEL; saturated --RDR 4--						
					15	33 50/5"	NP	13
			45					
		--hard drilling; possible cobbles--						
					16	50/5"	NP	12
			50					
		--rig chatter; possible cobbles--						
	393.6	Dense, brown, medium SAND; saturated --RDR 3--						
					17	16 20 27	NP	17
			55					
	387.4	Very dense, dark gray SHALE --RDR 5-- --MSPT 1--						
					18	100/6"	NP	16
			60					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--MSPT 2--			19	100/2.5"	NP	11
		--MSPT 3--			20	100/3.5"	NP	12
			65					
		--MSPT 4--			21	100/5"	NP	15
		--MSPT 5--			22	100/2"	NR	
			70					
		--MSPT 6--			23	100/2.5"	NP	10
	372.9	Boring terminated at 72.50 ft						
			75					
			80					

GENERAL NOTES

Begin Drilling: **04-15-2021** Complete Drilling: **04-16-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **3.00 ft**
At Completion of Drilling: **8' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EB-06

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 445.50 ft
North: 1618394.29 ft
East: 2521353.45 ft
Station: 3020+67.82
Offset: 15.49 RT

Elevation (ft)	Depth (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
444.5		12-inch thick, black SILTY CLAY LOAM; damp					
		--TOPSOIL--					
		Medium stiff, dark brown SILTY CLAY LOAM, trace organic matter; damp		1	1 4 3	0.98 B	28
442.5		--RDR 1-- ▽					
		Very loose, gray SANDY LOAM, trace organic matter and shell fragments; wet		2	1 2 1	NP	33
	5	--RDR 1--					
440.0		Soft, dark gray to gray SILTY CLAY LOAM, trace organic matter; damp		3	1 1 1	0.41 B	50
		--RDR 1--					
437.5		Soft to medium stiff, gray SILTY CLAY, trace organic matter; damp		4	0 1 1	0.25 B	29
	10	--RDR 1--					
				5	1 2 2	0.57 B	37
				6	0 1 1	0.25 B	33
	15						
				7	0 1 1	0.25 P	34
427.5		Very loose, gray SANDY LOAM, few sand seams; wet					
		--RDR 1--		8	1 1 1	NP	30
	20						
425.0		Loose to medium dense, gray, medium to coarse SAND, trace gravel; saturated		9	3 4 6	NP	22
		--RDR 1--					
		--few clay seams--		10	2 2 2	NP	25
	25						
		--few clay seams-- --trace shell fragments--		11	3 4 5	NP	21
		--few clay seams-- --trace shell fragments--		12	1 2 3	NP	46
	30						
413.8		Medium dense to very dense, brown SANDY GRAVEL; wet to saturated					
		--RDR 3-4--		13	10 7 5	NP	15
	35						
		--rig chatter; possible cobbles-- --mud loss, 37 feet--					
				14	13 16 12	NP	9
	40						

GENERAL NOTES

Begin Drilling: **04-14-2021** Complete Drilling: **04-15-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽: **3.00 ft**
At Completion of Drilling ▼: **10' mud**
Time After Drilling: **NA**
Depth to Water ▼: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC 3421401.GPJ WANGENG.GDT 9/20/23

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BORING LOG EB-06

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 445.50 ft
North: 1618394.29 ft
East: 2521353.45 ft
Station: 3020+67.82
Offset: 15.49 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--rig chatter, 41.5 to 43.5 feet; possible cobbles--						
					15	49 50/4"	NP	18
			45					
		--mud loss-- --rig chatter; possible cobbles--						
					16	50/5"	NP	7
			50					
		--rotary bit refusal, 50 feet-- --offset boring 5 feet west--						
					17	12 28 29	NP	16
			55					
		--rig chatter; possible cobbles--						
	387.5	Very dense, gray SHALE --RDR 5-- --MSPT 1--			18	100/4.5"	NP	12
			60					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--MSPT 2--			19	100/4.5"	NP	11
		--MSPT 3--			20	100/3"	NP	9
			65					
		--MSPT 4--			21	100/4"	NP	22
		--MSPT 5--			22	100/3"	NP	10
			70					
	374.5				23	100/4"	NP	15
		--MSPT 6-- Boring terminated at 72.50 ft						
			75					
			80					

GENERAL NOTES

Begin Drilling: **04-14-2021** Complete Drilling: **04-15-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 20', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **3.00 ft**
At Completion of Drilling: **10' mud**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG EB-07

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 453.94 ft
North: 1619136.44 ft
East: 2520763.34 ft
Station: 3011+28.77
Offset: 146.64 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	453.8	2-inch thick ASPHALT --PAVEMENT--						
		Loose to medium dense, dark brown GRAVELLY LOAM; moist --FILL-- --RDR 2--			1	4 5 5	NP	14
			5		2	2 3 3	NP	18
					3	2 3 3	NP	12
			10		4	1 1 3	NP	18
	443.4							
		Very loose to loose, brown, medium SAND to SANDY LOAM, trace gravel; wet to saturated --RDR 1--			5	1 1 0	NP	32
			15		6	1 1 2	NP	25
					7	1 2 3	NP	24
	435.9							
		Medium dense, brown SANDY GRAVEL; saturated --RDR 3-4--	20		8	10 10 7	NR	
		--lost drilling mud--			9	5 7 7	NP	10
		--rig chatter; possible cobbles--	25		10	10 6 7	NP	21
					11	6 7 7	NP	10
		--rig chatter; possible cobbles--	30		12	12 13 9	NP	16
	422.2							
		Medium dense to dense, brown, medium to coarse SAND, trace gravel; saturated --RDR 2-4--	35		13	6 7 8	NP	21
			40		14	8 8 9	NP	17

GENERAL NOTES

Begin Drilling **04-08-2021** Complete Drilling **04-09-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20D50T [80%]**
Driller **R&J** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **10.50 ft**
At Completion of Drilling ▼ **10' mud**
Time After Drilling **24 hrs hours**
Depth to Water ▼ **11.00 ft**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG EB-07

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 453.94 ft
North: 1619136.44 ft
East: 2520763.34 ft
Station: 3011+28.77
Offset: 146.64 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	15 15 21	NP	18
			50		16	13 18 19	NP	19
			55		17	18 23 26	NP	14
		--hard drilling, 57 to 58 feet-- --possible cobbles-- --lost drilling mud--						
	394.4				18	22 50/5"	NP	17
		Very dense, brown SANDY	60					
		GRAVEL; saturated --RDR 4-5-- --lost drilling mud-- --hard drilling, 60 to 67 feet-- --possible cobbles--	65		19	21 29 29	NP	9
	386.9							
		Very dense, dark gray to gray SHALE --RDR 4-- --MSPT 1--	70		20	100/3"	NP	14
		--MSPT 2--	75		21	100/3.5"	NP	14
		--MSPT 3--			22	100/3.5"	NP	16
		--MSPT 4--			23	100/4"	NP	15
		--MSPT 5--	80		24	100/4"	NP	20

GENERAL NOTES

Begin Drilling: **04-08-2021** Complete Drilling: **04-09-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D50T [80%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **10.50 ft**
At Completion of Drilling: **10' mud**
Time After Drilling: **24 hrs hours**
Depth to Water: **11.00 ft**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG EB-07

WEI Job No.: 342-14-01

Client **Parsons Transportation Group**
Project **IL 18 over the Illinois River**
Location **Henry, Illinois**

Datum: NAVD 88
Elevation: 453.94 ft
North: 1619136.44 ft
East: 2520763.34 ft
Station: 3011+28.77
Offset: 146.64 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	372.4	--MSPT 6--			25	100/3"	NP	16
		Boring terminated at 81.50 ft	85					
			90					
			95					
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)

GENERAL NOTES

Begin Drilling **04-08-2021** Complete Drilling **04-09-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20D50T [80%]**
Driller **R&J** Logger **F. Bozga** Checked by **M. Snider**
Drilling Method **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **10.50 ft**
At Completion of Drilling ▼ **10' mud**
Time After Drilling **24 hrs hours**
Depth to Water ▼ **11.00 ft**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG EB-08

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.44 ft
North: 1619193.94 ft
East: 2520906.33 ft
Station: 3011+51.90
Offset: 5.73 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	452.2	2.5-inch thick ASPHALT --PAVEMENT--						
		Loose, brown GRAVELLY LOAM; damp --FILL-- --RDR 3--			1	4 2 4	NP	8
	449.4	CONCRETE DEBRIS --hard drilling-- --RDR 5--			2	50/2"	NR	
	447.4	Very dense, brown GRAVELLY LOAM, some concrete fragments	5		3	3 50/1"	NP	9
	445.9	--FILL-- Very dense, gray CONCRETE fragments --FILL-- --RDR 4-5--			4	50/1"	NP	
	441.9	Loose, gray SANDY GRAVEL; saturated --RDR 1--	10		5	3 5 2	NP	15
	440.6	Medium stiff, black SILTY CLAY LOAM, trace organic matter; moist --RDR 1--	15		6	0 1 4	0.57 B	38
	436.9	Loose to medium dense, brown GRAVELLY SAND to SANDY GRAVEL; wet to saturated --RDR 2-4--			7	3 8 15	NP	21
			20		8	13 7 5	NP	14
		--lost drilling mud--			9	7 5 5	NR	
			25		10	11 16 9	NP	12
					11	3 3 2	NP	19
		--hard drilling, 27.5 to 33.0 feet-- --possible cobbles--	30		12	12 9 10	NP	
		--lost drilling mud--						
	419.4	Medium dense to dense, brown, medium to coarse SAND; wet to saturated --RDR 2--	35		13	11 10 11	NP	23
			40		14	9 16 22	NP	20

GENERAL NOTES

Begin Drilling: **04-07-2021** Complete Drilling: **04-08-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D50T [80%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **10.50 ft**
At Completion of Drilling: **10' mud**
Time After Drilling: **24 hrs hours**
Depth to Water: **12.50 ft**

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BORING LOG EB-08

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.44 ft
North: 1619193.94 ft
East: 2520906.33 ft
Station: 3011+51.90
Offset: 5.73 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	16 20 20	NP	17
		--trace gravel--	50		16	12 11 14	NP	15
		--hard drilling, 51.5 to 52.5 feet-- --possible cobbles--						
		--trace gravel--	55		17	16 15 21	NP	13
	395.7	Very dense, brown SANDY GRAVEL; saturated --RDR 3-4-- --hard drilling, 57 to 65 feet-- --possible cobbles--	60		18	50/5"	NP	21
	387.4	--lost drilling mud-- Very dense, dark gray SHALE --RDR 4--	65		19	50/5"	NP	14
		--MSPT 1--	70		20	100/2"	NP	16
		--MSPT 2--			21	100/4.5"	NP	18
		--MSPT 3--	75		22	100/4"	NP	19
		--MSPT 4--			23	100/4"	NP	17
	372.4	--MSPT 5--	80		24	100/4"	NP	14
		Boring terminated at 80.00 ft						

GENERAL NOTES

Begin Drilling: **04-07-2021** Complete Drilling: **04-08-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D50T [80%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **10.50 ft**
At Completion of Drilling: **10' mud**
Time After Drilling: **24 hrs hours**
Depth to Water: **12.50 ft**

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BORING LOG EB-09

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 446.18 ft
North: 1619280.05 ft
East: 2521308.92 ft
Station: 3012+82.29
Offset: 396.23 LT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	445.7	6-inch thick, brown SANDY GRAVEL; damp					
		--FILL--					
		Medium stiff to stiff, brown to dark brown SILTY CLAY LOAM, trace gravel; damp		1	3 4 6	1.75 P	28
		--FILL--					
		--RDR 1-2--		2	1 2 2	0.75 P	34
5							
	440.7	Soft, black SILTY CLAY, trace organic matter; damp					
		--RDR 1--		3	0 0 2	0.41 B	57
	438.2	Medium dense, gray SANDY GRAVEL; saturated	▽				
		--RDR 2--		4	4 6 10	NP	11
10				5	7 6 5	NP	28
	433.2	Very loose to loose, gray GRAVELLY SAND, some shell fragments; saturated					
		--RDR 1--		6	4 4 2	NP	20
15				7	2 1 1	NP	22
				8	1 1 1	NP	20
20							
	425.7	Soft, gray SILTY CLAY, trace organic matter; moist					
		--RDR 1--		9	2 1 1	0.33 B	41
25				10	0 0 1	0.41 B	40
	420.7	Soft, dark gray SILTY CLAY LOAM, trace shell fragments; moist					
		--RDR 1--		11	0 0 2	0.49 B	46
		--few sand seams--		12	1 1 3	0.25 P	50
30							
	412.4	Medium dense, brown SANDY GRAVEL; saturated		13	13 11 7	NP	8
35		--RDR 3--					
		--rig chatter, 34 to 38.5 feet--					
	407.7	Medium dense, brown, medium SAND; saturated					
		--RDR 2--		14	11 12 12	NP	20
40							

GENERAL NOTES

Begin Drilling: **04-05-2021** Complete Drilling: **04-06-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D50T [80%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **8.00 ft**
At Completion of Drilling ▼ **7' wash**
Time After Drilling: **NA**
Depth to Water ▼ **NA**

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BORING LOG EB-09

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 446.18 ft
North: 1619280.05 ft
East: 2521308.92 ft
Station: 3012+82.29
Offset: 396.23 LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
405.7	Very dense, brown SANDY GRAVEL; saturated --RDR 3-5-- --rig chatter, 40.5 to 44 feet--						
402.2	--hard drilling, 44 to 46 feet-- BOULDER FRAGMENTS	45		15	50/4"	NP	12
				16	CORE		
398.2	Loose to dense, brown, coarse SAND; saturated --RDR 2--	50		17	8 4 4	NP	23
		55		18	18 16 19	NP	22
388.7	--hard drilling, 57.5 to 58.5 feet-- Very dense, weak, dark grayish black, poor quality, SHALE; Closely spaced, highly weathered, horizontal JOINTS, with 0-0.2 inch opening, slicken	60		19	50/5"	NP	16
	walls. --RDR 4-5--	65		20	CORE	NR	
				21	CORE	NR	
				22		NP	9
	--RUN 1: 68.0 to 78.0 feet-- --RECOVERY: 83%-- --RQD: 41%--	70			75/2"		
		75		23	CORE		
368.2	Boring terminated at 78.00 ft	80					

GENERAL NOTES

Begin Drilling: **04-05-2021** Complete Drilling: **04-06-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D50T [80%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **M. Snider**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **8.00 ft**
At Completion of Drilling: **7' wash**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EMB-P2-01

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.12 ft
North: 1617634.54 ft
East: 2521713.60 ft
Station: 3029+02.66
Offset: 23.97 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	451.6	6-inch thick, dark brown SILTY CLAY LOAM						
		--TOPSOIL--						
		Medium dense, brown SANDY GRAVEL; damp			1	16 8 6	NP	7
		--FILL--						
	449.1	Soft to very stiff, brown to gray SILTY CLAY, trace gravel; damp to moist			2	3 4 10	2.54 B	22
		--FILL--						
		--RDR 2--	5		3	3 5 6	1.80 B	24
					4	6 7 8	1.23 B	24
			10					
					5	2 3 6	1.15 B	27
		--trace wood chip fragments--			6	3 3 4	0.41 B	32
			15					
	436.6	--wet spoon recovery--						
		Soft to medium stiff, gray SILTY CLAY, trace gravel; wet			7	2 2 3	0.66 B	30
		--RDR 2--						
					8	2 4 4	0.74 B	28
			20					
	427.6	Loose to medium dense, brown to gray GRAVELLY SAND to SANDY GRAVEL; moist to saturated	25		9	2 3 4	0.33 B	30
		--RDR 2--			10	4 2 3	0.66 B	29
					11	2 4 11	NP	9
					12	2 3 2	NP	17
			30					
					13	12 9 14	NP	13
			35					
					14	6 8 6	NP	11
	412.1		40					

Boring terminated at 40.00 ft

GENERAL NOTES

Begin Drilling: **06-12-2023** Complete Drilling: **06-12-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **16.00 ft**
At Completion of Drilling: **20.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG EMB-P2-02

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 452.61 ft
North: 1617486.14 ft
East: 2521867.62 ft
Station: 3031+08.73
Offset: 33.27 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	452.1	6-inch thick, dark brown SILTY CLAY LOAM --TOPSOIL--						
		Very loose to medium dense, brown GRAVELLY SAND, trace glass and brick fragments; damp to wet --FILL-- --RDR 2--			1	8 7 5	NP	18
					2	3 2 1	NP	30
			5 ▽					
					3	2 2 2	NP	29
					4	1 1 1	NP	19
			10					
	442.1	Medium dense, brown and gray GRAVEL, some wood chip fragments; moist --FILL--			5	6 6 10	NP	69
	439.6	Very soft to medium stiff, gray SILTY CLAY, trace gravel; moist --RDR 2--			6	2 2 2	< 0.25 P	44
			15 ▼					
					7	4 4 2	< 0.25 P	37
					8	0 0 1	0.50 P	32
			20					
					9	2 3 2	0.41 B	31
					10	2 1 1	< 0.25 P	33
			25					
	427.1	Very loose, gray SANDY CLAY; moist --RDR 2--			11	1 0 1	NP	23
	424.6	Medium dense, brown and gray GRAVELLY SAND; damp to moist --RDR 2--			12	3 5 5	NP	18
			30					
					13	3 5 6	NP	16
			35					
					14	6 8 12	NP	16
	412.6	Boring terminated at 40.00 ft	40					

GENERAL NOTES

Begin Drilling: **06-12-2023** Complete Drilling: **06-12-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽: **5.50 ft**
At Completion of Drilling ▼: **15.00 ft**
Time After Drilling: **NA**
Depth to Water ▼: **NA**

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BORING LOG EMB-P2-03

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 454.50 ft
North: 1617395.53 ft
East: 2521876.50 ft
Station: 3032+91.29
Offset: 5.11 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	454.0	6-inch thick, dark brown SILTY CLAY LOAM --TOPSOIL--						
		Medium dense, brown GRAVELLY SAND, trace brick fragments; damp --FILL-- --RDR 2--			1	10 14 12	NP	5
			5		2	8 5 11	NP	6
	449.0	Medium stiff, brown SILTY CLAY LOAM, trace gravel; damp --FILL--			3	5 5 5	0.50 P	23
	446.5	Very soft to stiff, brown to gray SILTY CLAY, trace gravel; damp to moist --RDR 2--	10		4	2 4 5	1.50 P	27
					5	2 2 2	< 0.25 P	32
			15		6	1 2 3	0.16 B	30
					7	3 3 3	< 0.25 P	33
			20		8	2 2 2	0.41 B	29
		--wet spoon recovery--	25		9	2 2 2	< 0.25 P	33
					10	2 1 1	0.41 B	31
					11	1 0 1	< 0.25 P	26
	426.5	Loose to medium dense, brown and gray, medium SAND, trace gravel; moist to wet --RDR 2--	30		12	3 5 5	NP	17
			35		13	3 5 4	NP	
	417.8	Medium dense, brown and gray SANDY GRAVEL; moist --RDR 2--						
					14	3 5 5	NP	
	414.5	Boring terminated at 40.00 ft	40					

GENERAL NOTES

Begin Drilling: **06-13-2023** Complete Drilling: **06-13-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **21.00 ft**
At Completion of Drilling: **25.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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Fax:

BORING LOG EMB-P2-04

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 443.81 ft
North: 1617308.02 ft
East: 2521962.65 ft
Station: 3033+10.92
Offset: 23.59 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	443.2	7-inch thick, dark brown SILTY CLAY LOAM						
		--TOPSOIL--						
		Very soft to stiff, gray SILTY CLAY, trace gravel; damp to wet						
		--RDR 1-2--			1	0 0 0	1.00 P	48
					2	0 0 0	< 0.25 P	41
			5					
		--wet spoon recovery--			3	1 1 1	< 0.25 P	35
					4	0 0 1	0.25 B	33
			10					
					5	1 2 1	< 0.25 P	33
					6	1 1 1	< 0.25 P	38
			15					
					7	0 0 1	< 0.25 P	36
	425.8	Loose, gray, fine to medium SAND, trace gravel; wet						
		--RDR 2--			8	2 2 2	NP	22
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	423.3	Loose to medium dense, brown and gray GRAVELLY SAND; moist						
		--RDR 2--			9	2 3 3	NP	14
			25		10	3 3 3	NP	16
					11	2 5 3	NP	18
					12	2 4 6	NP	21
	413.8	Boring terminated at 30.00 ft	30					
			35					
			40					

GENERAL NOTES

Begin Drilling: **06-13-2023** Complete Drilling: **06-13-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **6.00 ft**
At Completion of Drilling: **10.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG EMB-P2-05

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 442.87 ft
North: 1617217.65 ft
East: 2522040.41 ft
Station: 3034+29.59
Offset: 40.98 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	442.2	8-inch thick, dark brown SILTY CLAY LOAM						
		--TOPSOIL--						
		Very soft, gray SILTY CLAY, trace gravel; moist			1	0 0 1	< 0.25 P	33
		--RDR 2--						
	439.9							
		Very loose, gray, fine to medium SAND; wet to saturated			2	0 1 1	NP	24
		--RDR 2--	5					
	437.4							
		Very soft to stiff, gray SILTY CLAY, trace gravel; moist			3	1 0 1	0.50 P	34
		--RDR 2--						
					4	1 2 3	1.00 P	32
			10					
					5	1 0 1	0.25 B	32
					6	1 2 1	0.66 B	33
			15					
					7	0 0 1	< 0.25 P	33
	424.9							
		Very loose to medium dense, brown and gray, fine to medium SAND, trace gravel; moist to wet			8	1 5 5	NP	24
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--RDR 2--			9	2 1 2	NP	27
					10	2 3 4	NP	22
			25					
	417.4							
		Medium dense, brown and gray GRAVELLY SAND to SANDY GRAVEL; moist			11	3 5 5	NP	19
		--RDR 2--						
					12	5 5 5	NP	13
	412.9		30					
		Boring terminated at 30.00 ft						
			35					
			40					

GENERAL NOTES

Begin Drilling: **06-13-2023** Complete Drilling: **06-13-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **4.00 ft**
At Completion of Drilling: **6.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG EMB-P2-06

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 443.03 ft
North: 1617053.40 ft
East: 2522158.38 ft
Station: -
Offset: -

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	442.4	8-inch thick, dark brown SILTY CLAY LOAM						
		--TOPSOIL--						
		Very soft, gray SILTY CLAY, trace gravel; wet			1	0 0 0	< 0.25 P	49
		--RDR 2--						
	440.0	Very loose, gray, fine SAND, trace gravel; saturated						
		--RDR 2--	5		2	0 0 1	NP	27
	437.5	Very loose, gray GRAVELLY SAND; wet						
		--RDR 2--			3	0 0 1	NP	22
	435.0	Soft to stiff, gray SILTY CLAY, trace gravel moist						
		--RDR 2--	10		4	1 2 2	1.07 B	32
					5	1 1 1	0.98 B	36
			15		6	1 1 1	0.33 B	23
	427.5	Very loose to loose, gray and brown, medium SAND, trace gravel; moist to saturated						
		--RDR 2--			7	0 0 0	NP	20
			20		8	1 2 2	NP	21
	422.5	Loose, brown and gray GRAVELLY SAND; wet						
		--RDR 2--			9	11 5 4	NP	16
			25		10	1 4 3	NP	17
	417.5	Medium dense, orange GRAVEL; moist						
		--RDR 2--			11	4 4 7	NP	8
	415.5	Boring terminated at 27.50 ft						
			30					
			35					
			40					

GENERAL NOTES

Begin Drilling: **06-13-2023** Complete Drilling: **06-13-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **4.00 ft**
At Completion of Drilling: **10.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC 3421401.GPJ WANGENG.GDT 9/20/23

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BORING LOG EMB-P2-07

WEI Job No.: 342-14-01

Client: **Parsons Transportation Group**
Project: **IL 18 over the Illinois River**
Location: **Henry, Illinois**

Datum: NAVD 88
Elevation: 477.03 ft
North: 1619477.16 ft
East: 2520625.80 ft
Station: 3007+61.10
Offset: 19.93 RT

Elevation (ft)	Depth (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Bare Ground--					
		Stiff, brown SILTY CLAY LOAM, trace gravel; damp					
		--FILL--		1	6 2 3	1.07 B	21
474.0							
		Loose, brown, fine SAND, trace gravel; damp					
		--FILL--					
		--RDR 2--		2	2 3 3	NP	11
	5						
471.5							
		Medium dense, brown GRAVELLY SAND, trace gravel; damp					
		--FILL--					
		--RDR 2--		3	10 11 12	NP	5
				4	6 12 10	NP	5
	10						
				5	9 10 11	NP	4
464.0							
		Medium dense, brown, fine SAND, trace gravel; damp to wet					
		--RDR 2--		6	5 10 14	NP	4
	15						
				7	9 10 10	NP	5
				8	8 10 15	NP	4
	20						
	25			9	8 11 13	NP	4
				10	7 9 9	NP	5
				11	10 15 11	NP	5
	30			12	6 9 10	NP	4
				13	6 11 12	NP	
442.0	35	Boring terminated at 35.00 ft					
	40						

GENERAL NOTES

Begin Drilling: **06-15-2023** Complete Drilling: **06-15-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **21D120A[78%]**
Driller: **NC&JD** Logger: **M. Rojo** Checked by: **M. Snider**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **35.00 ft**
At Completion of Drilling: **35.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

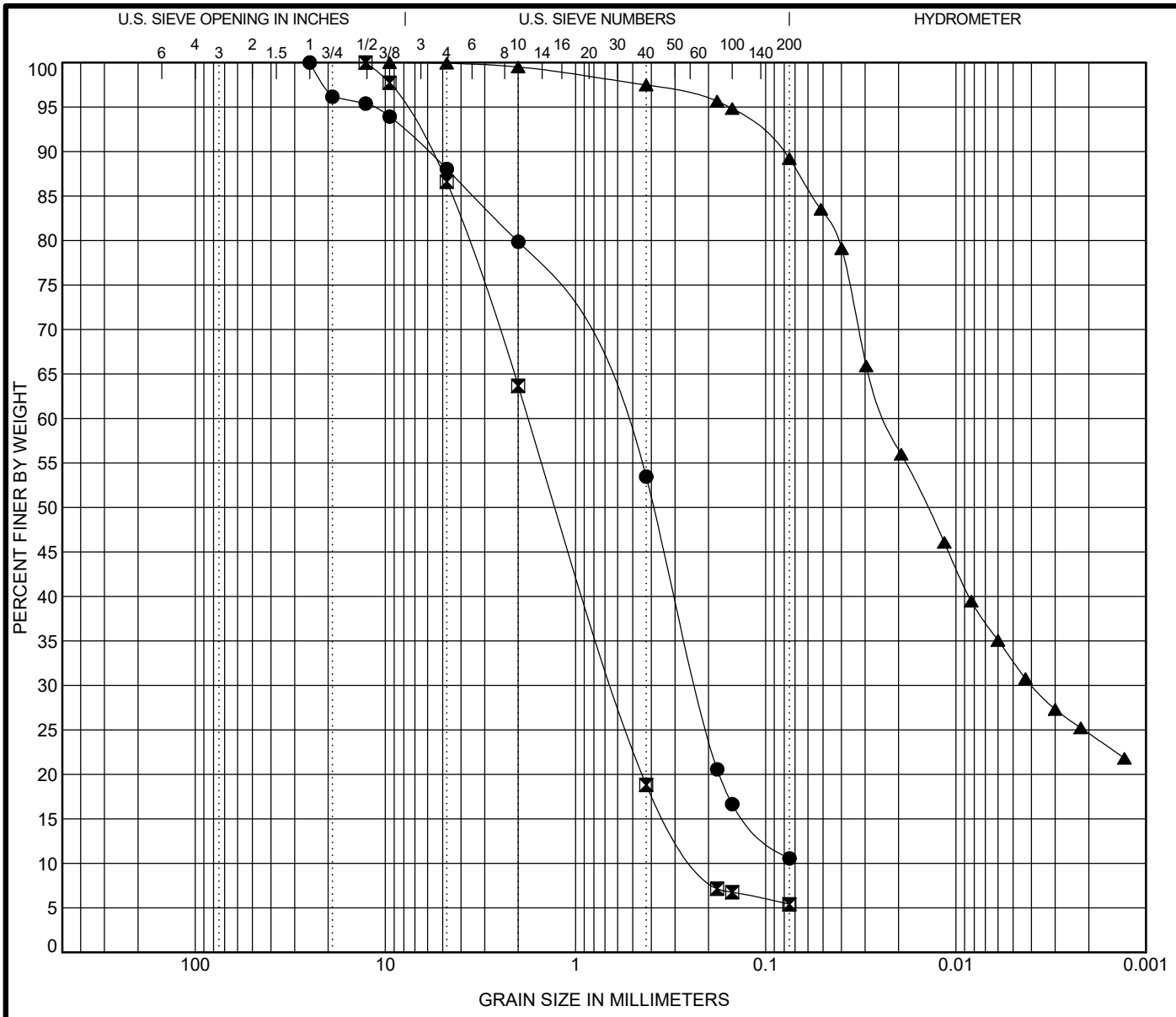
The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification			IDH Classification	LL	PL	PI	Cc	Cu
●	BSB-06#1	20.0 ft	**Gravelly Loam**				**1.21**	**8.86**
⊠	BSB-07#1	15.0 ft	**Gravelly Loam**				**1.00**	**7.94**
▲	EB-01#7	16.0 ft	**Silty Clay Loam**	**44**	**17**	**27**		

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BSB-06#1	20.0 ft	**25**	**0.624**	**0.23**		**20.1**		**10.6**	
⊠	BSB-07#1	15.0 ft	**12.7**	**1.763**	**0.625**	**0.222**	**36.3**		**5.4**	
▲	EB-01#7	16.0 ft	**9.5**	**0.023**	**0.004**		**0.5**	**10.5**	**64.4**	**24.6**

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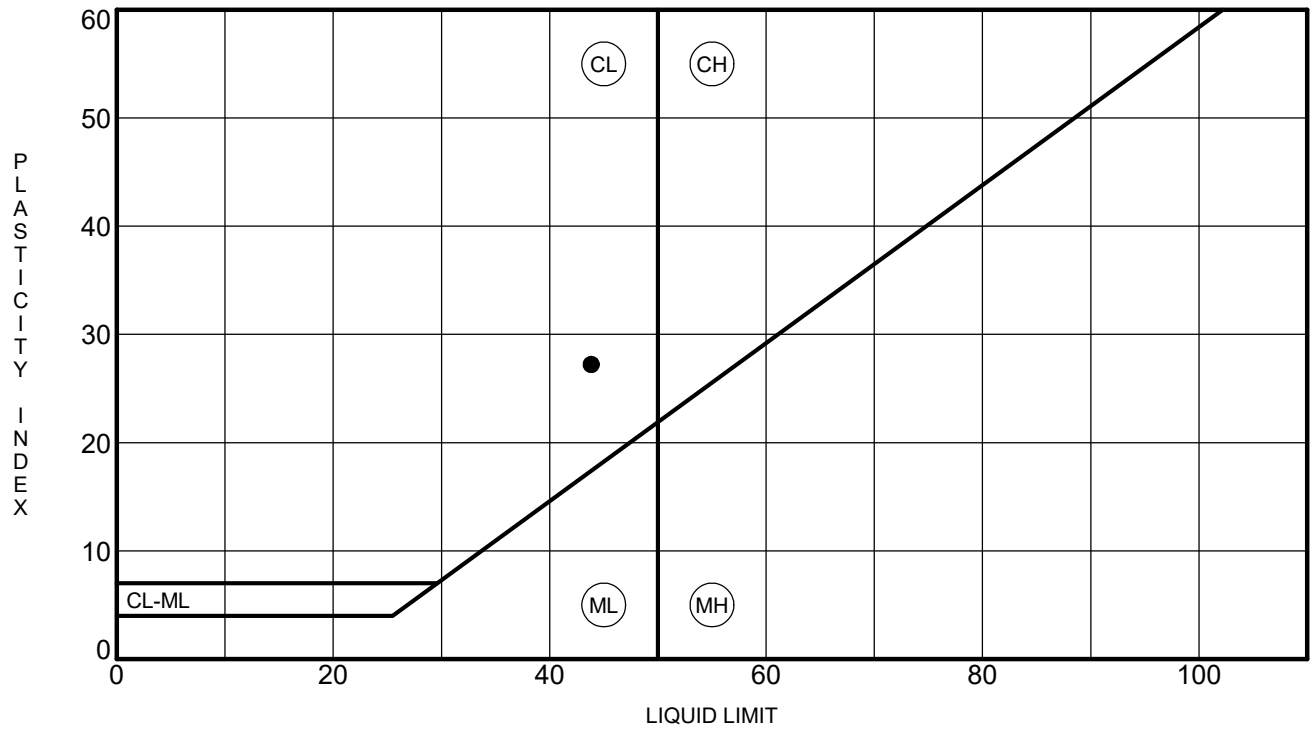
GRAIN SIZE DISTRIBUTION

Project: IL 18 over the Illinois River

Location: Henry, Illinois

Number: 342-14-01

WEI GRAIN SIZE IDH 3421401.GPJ US LAB.GDT 9/20/23



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	**EB-01#7**	**16.0 ft**	**44**	**17**	**27**	**89**	**Silty Clay Loam**

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ATTERBERG LIMITS' RESULTS

Project: IL 18 over the Illinois River

Location: Henry, Illinois

Number: 342-14-01

WEI ATTERBERG LIMITS IDH 3421401.GPJ US LAB.GDT 9/20/23

Unconfined Compressive Strength of Intact Rock Core Specimens

Project: IL Route 18 over the Illinois River

Client: Parsons

WEI Job No.: 342-14-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Sample Description	Length (in) Before Capping	Length (in) After Capping	Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in^2)
EB-09 Run #3	1	68.5	North Limit	Weak Shale 41% RQD	4.18	n.a.	2.08	1499.4	433	3	6/14/21	MAC	3.40

*** Fracture Types:**

Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by:_____

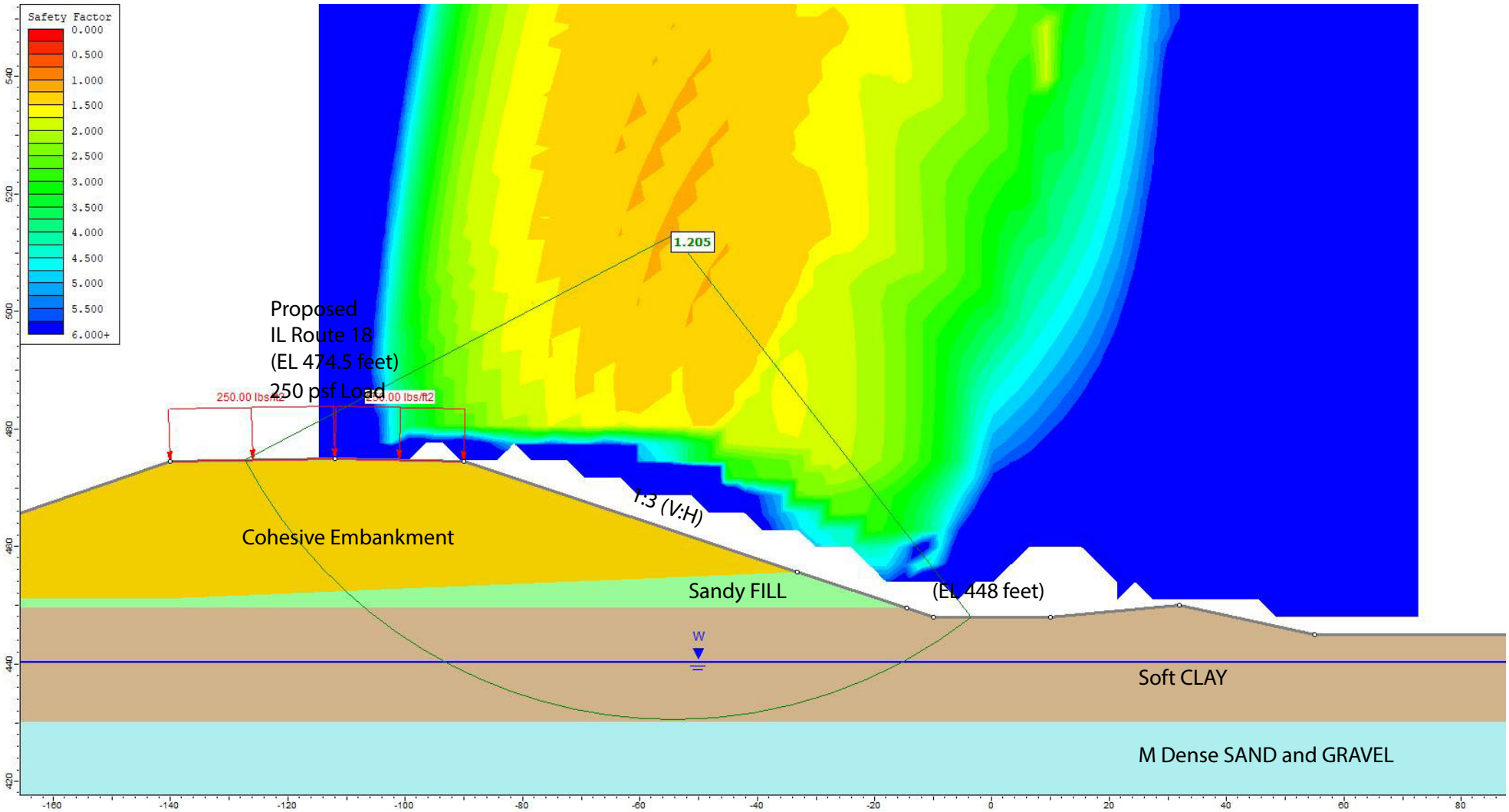
Checked by: _____

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APPENDIX C



Undrained Stability Analysis, East Embankment, Station 3030+00, Ref EB-01 and EMB-P2-02

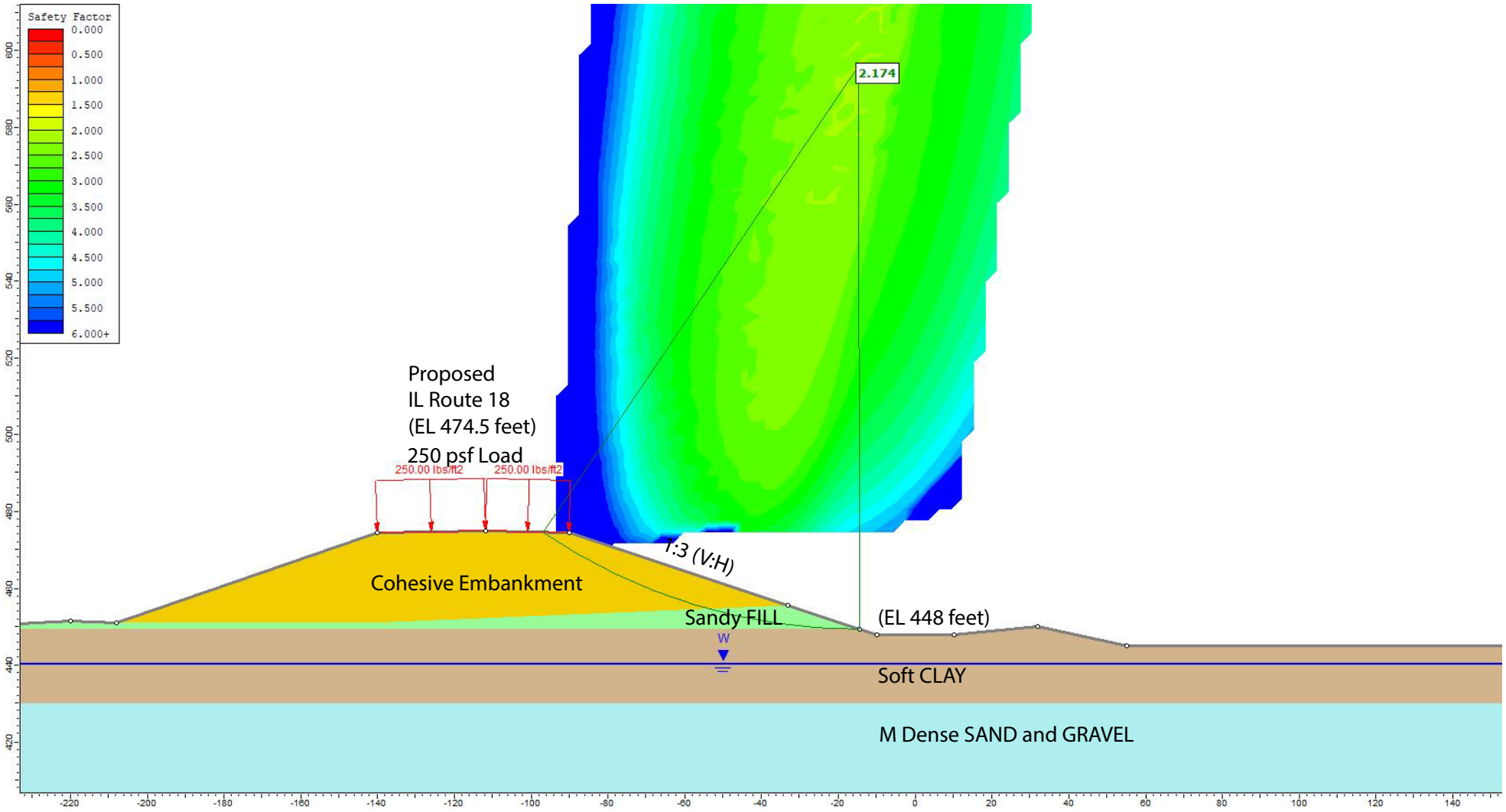
Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	Cohesive Embankment	125	1000	0
2	Sandy FILL	120	0	32
3	Soft CLAY	115	500	0
4	Medium Dense SAND and GRAVEL	110	0	34

GLOBAL STABILITY ANALYSIS: IL ROUTE 18 OVER THE ILLINOIS RIVER
MARSHALL AND PUTNAM COUNTIES, IL

SCALE: GRAPHICAL | APPENDIX C-1 | DRAWN BY: NSB | CHECKED BY: MLS

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FOR PARSONS | 342-14-01



Drained Stability Analysis, East Embankment, Station 3030+00, Ref EB-01 and EMB-P2-02

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	Cohesive Embankment	125	100	30
2	Sandy FILL	120	0	32
3	Soft CLAY	115	80	30
4	Medium Dense SAND and GRAVEL	110	0	34

GLOBAL STABILITY ANALYSIS: IL ROUTE 18 OVER THE ILLINOIS RIVER
MARSHALL AND PUTNAM COUNTIES, IL

SCALE: GRAPHICAL | APPENDIX C-2 | DRAWN BY: NSB CHECKED BY: MLS

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FOR PARSONS | 342-14-01

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APPENDIX D

Run #1



Boring EB-09:
Run #1, 68.0 to 78.0 feet, RECOVERY=83%, RQD=41%

BEDROCK CORE: ILLINOIS ROUTE 18 OVER THE ILLINOIS RIVER, MARSHALL AND PUTNAM COUNTIES, ILLINOIS		
SCALE: GRAPHICAL	APPENDIX D-1	DRAWN BY: J. Bensen CHECKED BY: L. Iordache
Wang Engineering		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR PARSONS		342-14-01

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APPENDIX E

BENCHMARK:

BM-111, CHIS, Square on North End of Existing East Abutment. Elev. 461.535. Additional BM-907. Calc'D, Using Total Station. Square at South End of Existing West Abutment. Elev. 480.372

EXISTING STRUCTURE:

062-0036 Steel truss with concrete deck fixed spans and steel beams with concrete approach spans. Concrete piers on timber pile-supported footings and driven reinforced concrete pile bent piers. Approximately xxx ft upstream. Approximately 1719 ft long by 23 ft wide. Originally constructed in 1924 as Route SBI-89C, Section 104-B. It was reconstructed in 1988 as Route FAS2369, Section 140B-D. C. and D. To be removed after new structure is complete.

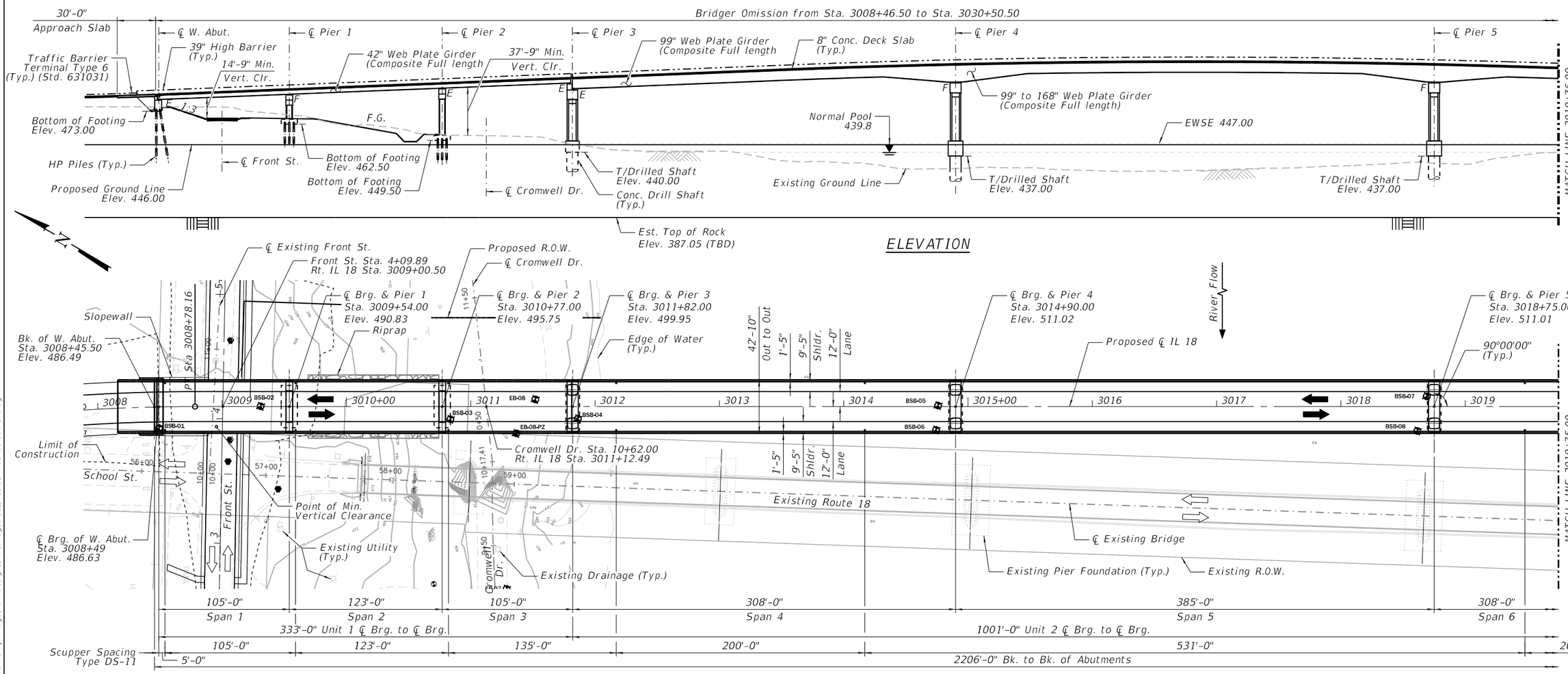
Traffic Control: None.
Salvage:

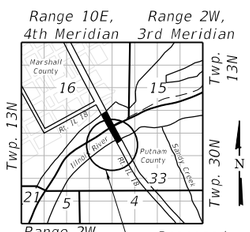
NOTES:

1. All Elevations are given in NAVD 1988 Datum unless noted.
2. EWSE = Estimated Water Surface Elevation.
3. HWE = High Water Elevation.
4. ✥ Denotes Soil boring.
5. For ground Elevation see Sheet 3.
6. Exterior surface of the fascia girder shall be painted full length.
7. Unit 1 Deck drainage shall be collected in a closed system and piped to ground.

SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Desgin Spectral Acceleration at 1.0 sec. (SD1) = xxx g
Design Spectral Acceleration at 0.2 sec. (SDS) = xxx g
Soil Site Class = xxx





LOCATION SKETCH

DESIGN SCOUR ELEVATION TABLE

Event / Limit State	W. Abut.	Pier 1	Pier 2	Pier 3	Pier 4	Pier 5	Pier 6	Pier 7	Pier 8	Pier 9	E. Abut.	Item 113
Q100												
Q200												
Design												
Check												

WATERWAY INFORMATION TABLE

			Existing Overtopping Elev. =				at Sta.		
Drainage Area		sq. mi.	Proposed Overtopping Elev. =				at Sta.		
		Discharge	Waterway Opening (sf)		Natural	Head (ft)		Headwater Elev. (ft)	
Flood	Freq. Yr.	(cfs)	Existing	Proposed	H.W.E. (ft)	Existing	Proposed	Existing	Proposed
Ten-Year	10								
Design									
Base									
Max. Calc.									

GENERAL PLAN

Highway Classification

IL 18 (FAS 2369)
Functional Class: Rural Minor Arterial
ADT: 2,200 (2019); 2900 (2045)
ADTT: 110 (2019); 145 (2045)
DHV: 220
Design Speed: 40 m.p.h, West
60 m.p.h. East
Posted Speed: 35 m.p.h West
55 m.p.h East
Two-Way Traffic
Directional Distribution: 50/50

Design Specifications

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

Loading HL-93

Allow 50#/sq. ft for future wearing Surface.
Vessel collision applied to Piers 3 to 6.

In Progress, For Information Only

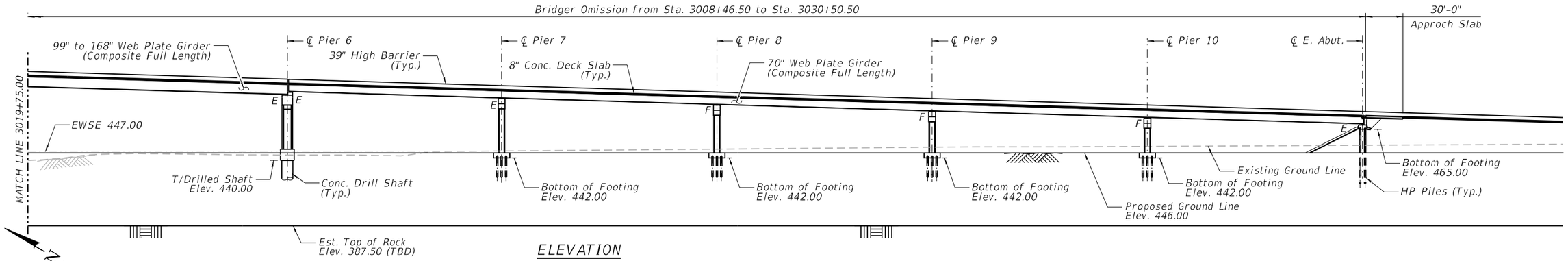
GENERAL PLAN & ELEVATION - 1
ILLINOIS ROUTE 18
F.A.S. 2369 - SEC. 104B-D
COOK COUNTY
STATION 13+91.88
STRUCTURE NO. 062-0089

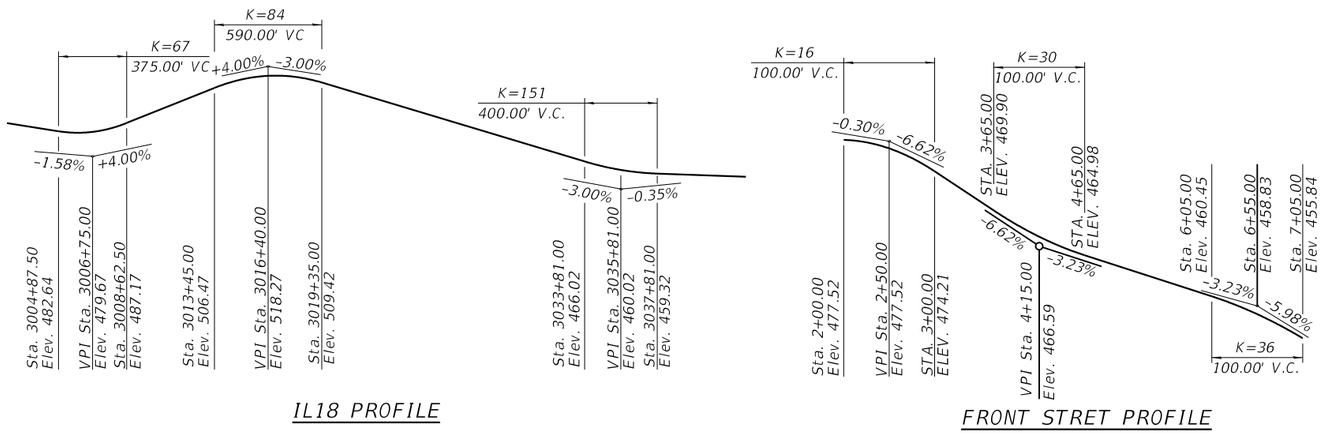
PARSONS

USER NAME =		DESIGNED - YC	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	GENERAL PLAN & ELEVATION STRUCTURE NO. 062-0089
		CHECKED -	REVISED -		
PLOT SCALE =		DRAWN - NTE	REVISED -		SHEET 1 OF 2 SHEETS
PLOT DATE =		CHECKED -	REVISED -		

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
757	104B-D	SCOTT	4	1
		CONTRACT NO. 72F08		
		ILLINOIS	FED. AID PROJECT	

MODEL: D4-00720-TSL-001
FILE NAME: pw:\\WANVA01:PWINT01:Parsons.com:Illinois State\Documents\IL18 Henry Bridge\40 - Design\CAD\Bridge\TSL\Sheets\D4-00720-001-GPE.dgn
8/8/2023 10:13:52 AM





In Progress, For Information Only

DESIGN STRESSES

FIELD UNITS

f'c = 3,500 psi (Substructure)
f'c = 4,000 psi (Superstructure & Drilled Shafts)
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50-Steel H-Piles)
fy = 50,000 psi (M270 Grade 50)
Note: Epoxy coated reinforcement shall be used in the Superstructure and all substructure element except drilled shafts.

GENERAL PLAN & ELEVATION - 2
ILLINOIS ROUTE 18
F.A.S. 2369 - SEC. 104B-D
COOK COUNTY
STATION 13+91.88
STRUCTURE NO. 062-0089

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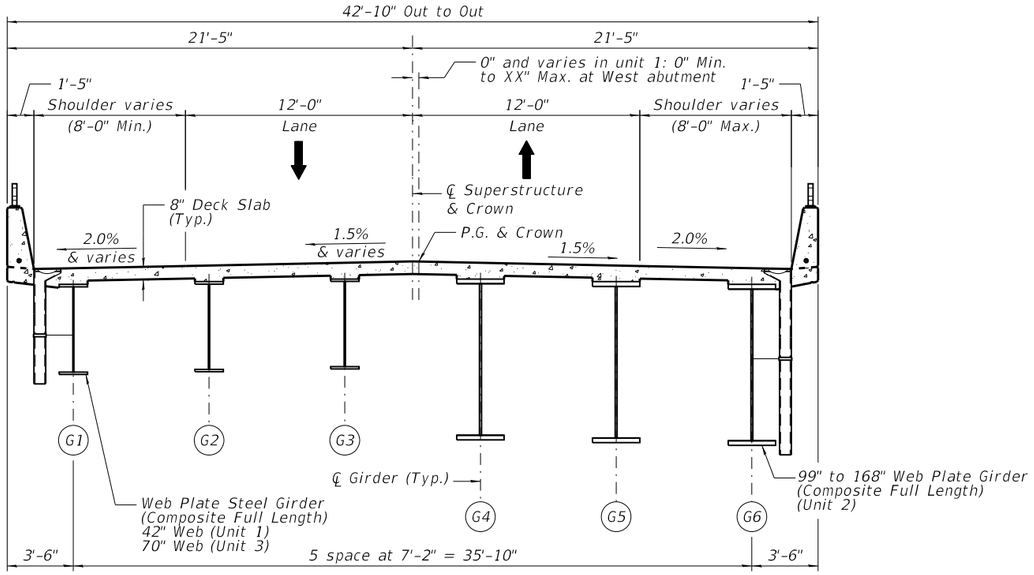
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DEPARTMENT OF TRANSPORTATION

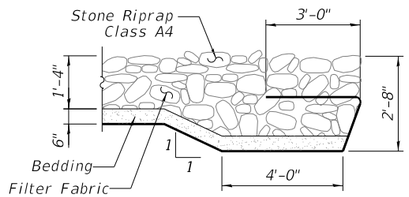
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STRUCTURE NO. 062-0089
SHEET 2 OF 2 SHEETS

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		CONTRACT NO. 72F08		
	ILLINOIS	FED. AID PROJECT		

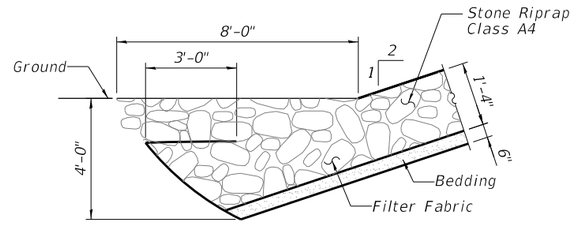


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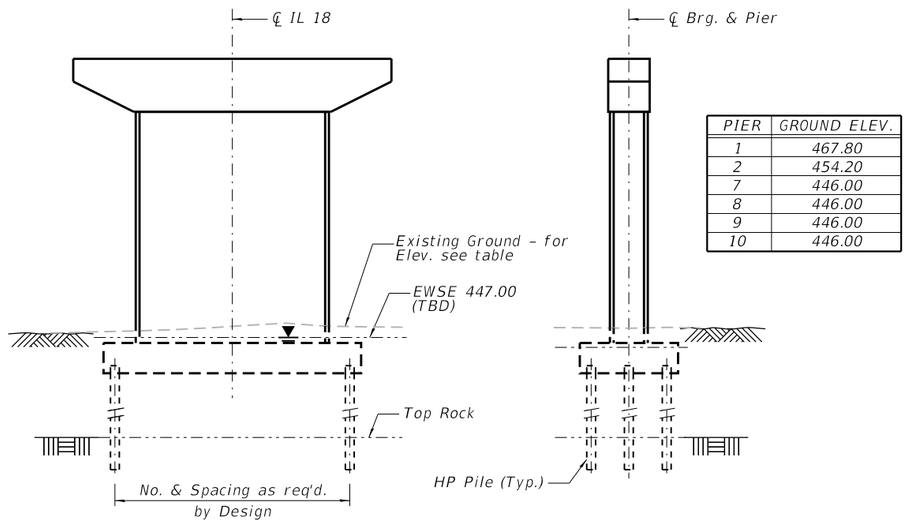
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SECTION A-A



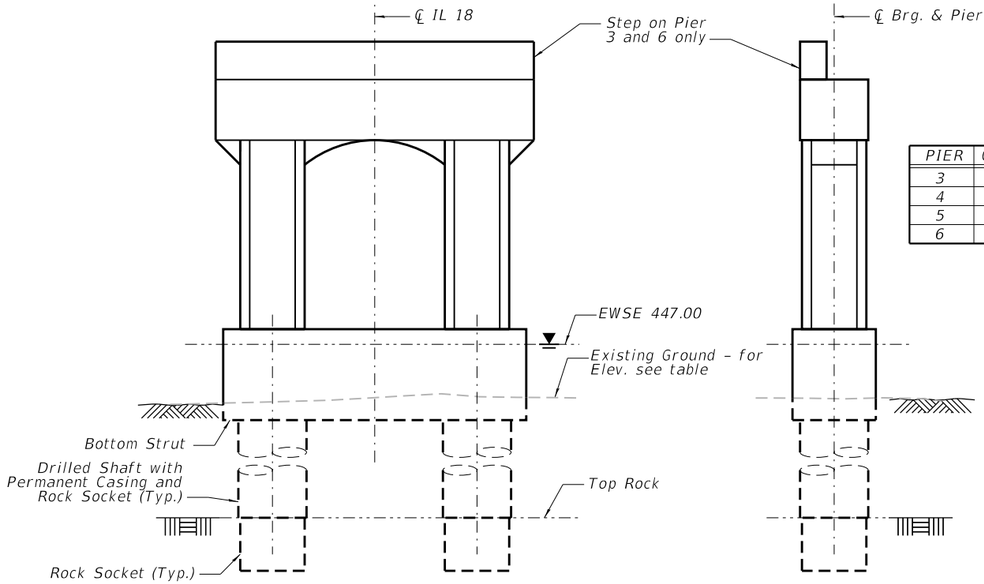
SECTION B-B



PIER	GROUND ELEV.
1	467.80
2	454.20
7	446.00
8	446.00
9	446.00
10	446.00

PIER SKETCH

Pier 1-2 & 7-10
(Unit 1 & 3)



PIER	GROUND ELEV.
3	446.30
4	426.90
5	431.00
6	444.40

PIER SKETCH

Pier 3-6
(Unit 2)

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TYPICAL PIER SECTION AND DETAILS

ILLINOIS ROUTE 18

F.A.S. 2369 - SEC. 104B-D

COOK COUNTY

STATION 13+91.88

STRUCTURE NO. 062-0089

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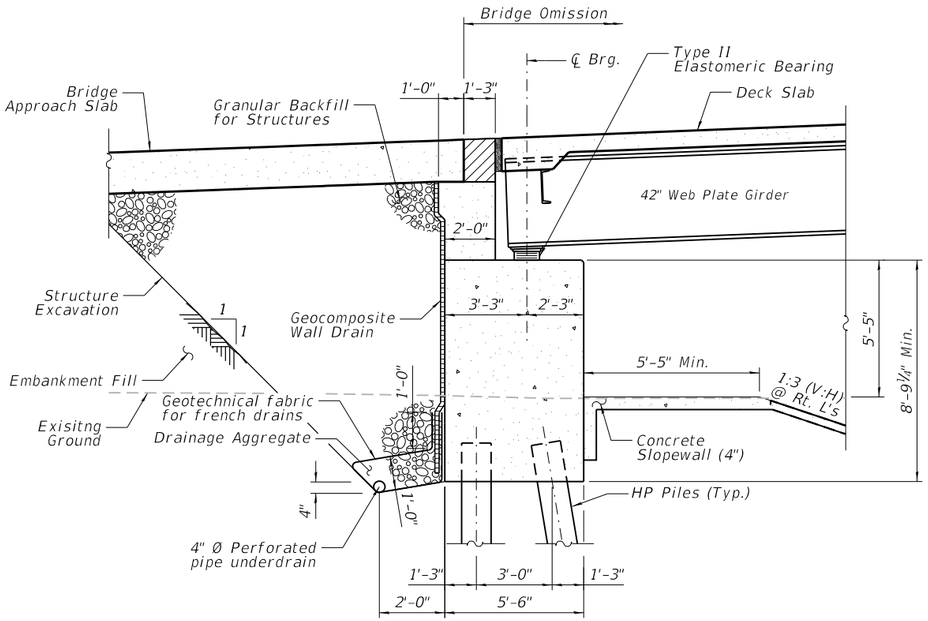
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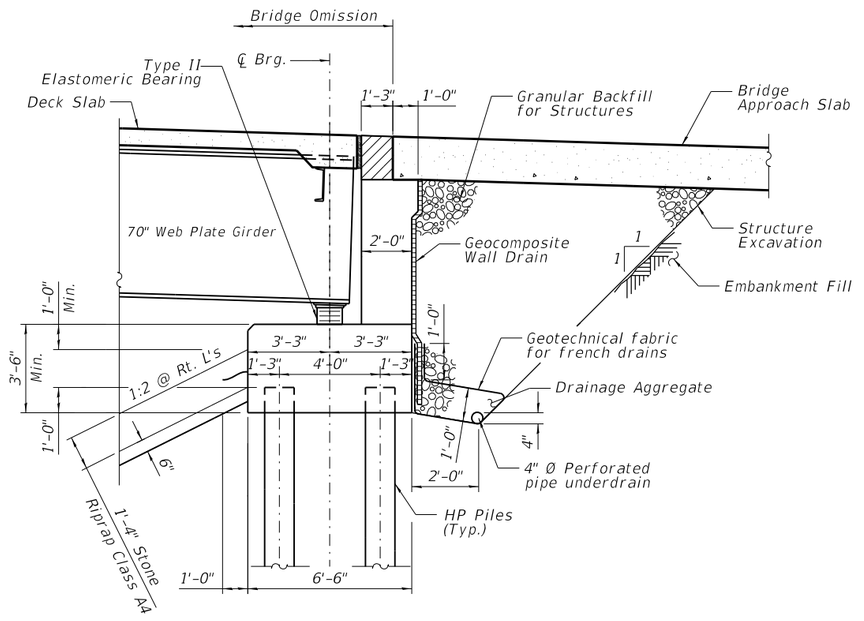
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTIONS
STRUCTURE NO. 062-0089
SHEET OF SHEETS

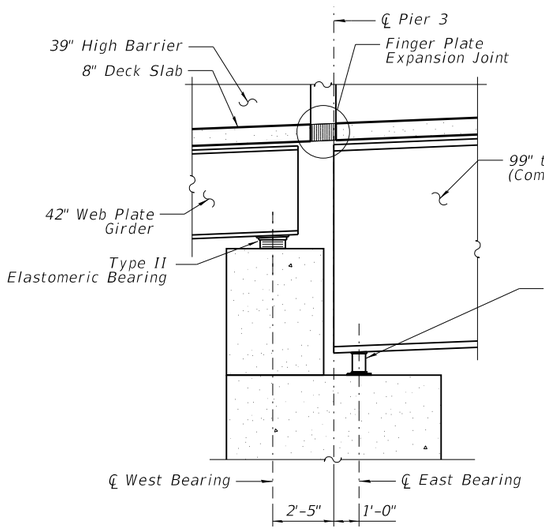
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		CONTRACT NO. 72F08		
	ILLINOIS	FED. AID PROJECT		



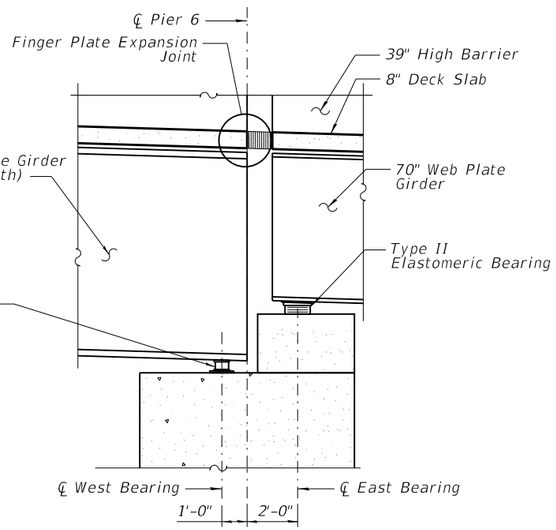
SECTION THROUGH WEST ABUTMENT



SECTION THROUGH EAST ABUTMENT



SECTION AT EXPANSION JOINT (Pier 3)



SECTION AT EXPANSION JOINT (Pier 6)

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TYPICAL SECTION AND DETAILS
ILLINOIS ROUTE 18
F.A.S. 2369 - SEC. 104B-D
COOK COUNTY
STATION 13+91.88
STRUCTURE NO. 062-0089

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APPENDIX 14

Conceptual Traffic Management Plan

INFRASTRUCTURE ENGINEERING | INCORPORATED

Transportation Management Plan

FAP 653 (IL 18)

Study Limits: IL Route 18 – East of Third Street to East of Illinois River

Henry, IL

March 2024

Prepared For:

Illinois Department of Transportation (IDOT)

Illinois Department of Transportation

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TRANSPORTATION MANAGEMENT PLAN

1.0 EXECUTIVE SUMMARY:

Replacement of the existing IL Route 18 Bridge at Henry, Illinois is proposed with a new structure on a new alignment just north of the existing bridge. The anticipated duration for the construction of the proposed bridge is about 2 to 3 years. The existing bridge will remain in place during the construction of the new structure. This will allow for traffic to be maintained on the existing alignment and bridge for most of the project duration.

Tie-in of proposed IL Route 18 alignment to the existing alignment, which will be about 4 to 6 months duration, will be constructed after the bridge construction. Two alternatives were considered for the Tie-in of the proposed alignment to the existing alignment. Alternative A involved closure of IL Route 18 from IL Route 18 intersection with Third Street to IL Route 18 intersection with IL Route 26 for the estimated 4-month construction duration. Alternative B involved staging of traffic for the Tie-in construction. Alternative B construction is estimated to be of 6 months duration because of the additional time needed for temporary pavement widening for the traffic staging on IL Route 18, east of the Illinois River.

Based on the comparison of impact on safety and mobility and costs associated with the alternatives, Alternative A - Closure of IL Route 18 and Detour is the recommended alternative for construction of the tie-ins to the existing alignment.

The final stage of construction will include completion of Front Street reconstruction under the new bridge and demolition of the existing bridge. During this stage, IL 18 traffic will utilize the new bridge and Front Street will be closed to traffic. The final stage of construction is expected to take about one year.

3.0 PROJECT DESCRIPTION:

3.1 Background:

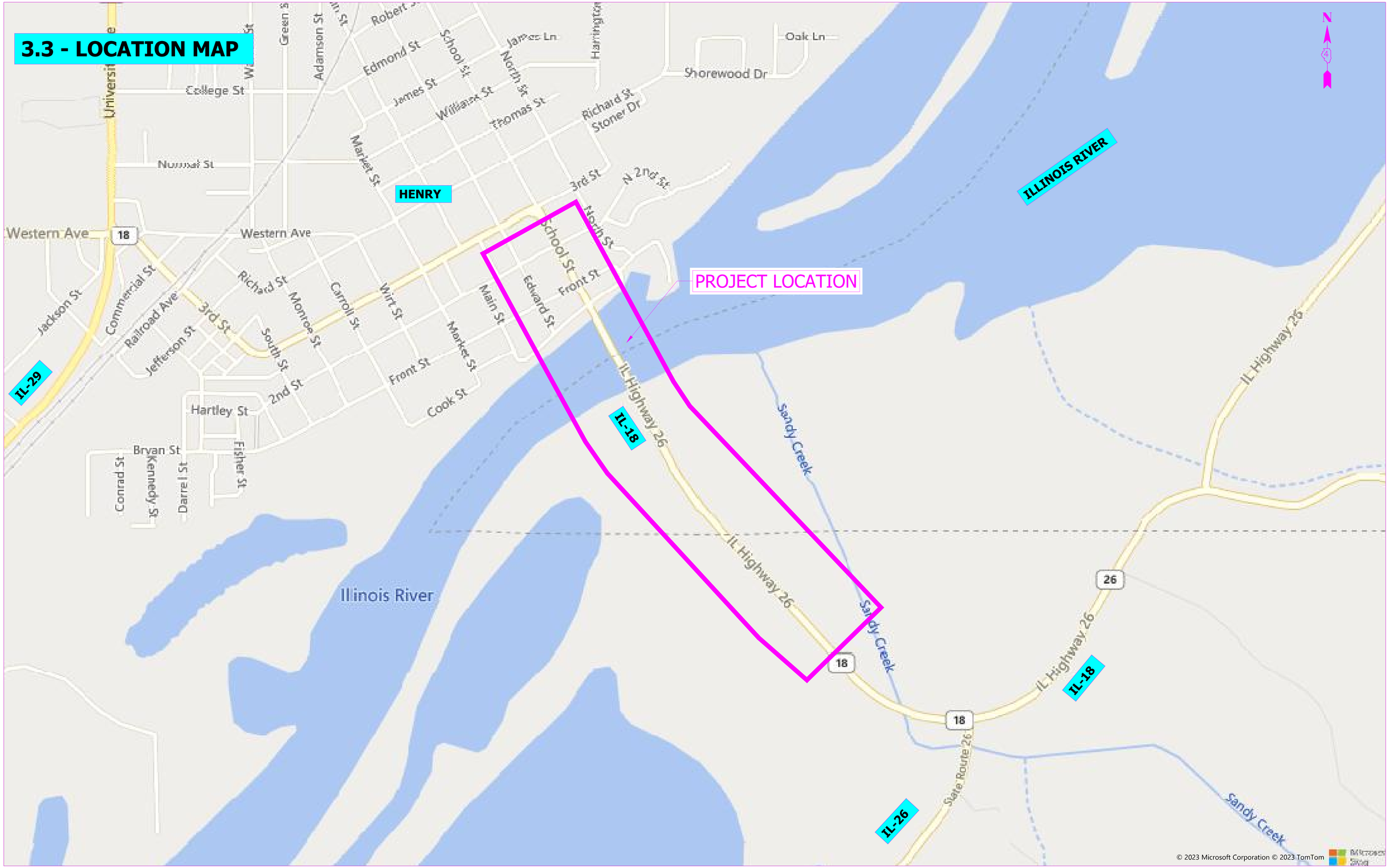
The existing bridge on IL Route 18 spanning the Illinois River at Henry, Illinois was constructed in 1934, is functionally obsolete, and is at the end of its service life.

The project envisions the development of a modern and resilient bridge structure spanning about 2,100 LF over the Illinois river, facilitating enhanced connectivity and accessibility for residents, commuters, and commercial entities within the area.

3.2 Project Description:

The proposed replacement of the existing IL Route 18 Bridge at Henry, Illinois, stretching from the intersection of 3rd Street and School Street to the junction of IL 18 and IL 26 east of the Illinois River, traverses the areas encompassing Henry and unincorporated Hopewell and Magnolia Townships within Marshall and Putnam Counties. Located within the Henry quadrangle (USGS

3.3 - LOCATION MAP



7.5-minute topographic map) and spanning various sections, including T13N, R10E, Sections 15 and 16; T30N, R2W, Section 4; T31N, R2W, Section 33. ***See attached Exhibit – Location Map on page 2.***

3.4 Construction Staging/Phasing:

Construction will be staged as described under section 5.0 of the Traffic Control Plan (TCP). The proposed bridge construction on new alignment will be constructed first. Tie-in of proposed alignment to existing alignment will be constructed after the bridge construction.

The construction is proposed in three stages:

- **Stage I** – Off alignment bridge construction
- **Stage II** – Tie-in of new alignment to existing alignment
- **Stage III** – Reconstruction of Front Street and Duck Ranch Entrance, Demolition of existing off alignment pavement, grading, landscaping, and Demolition of existing Bridge.

3.5 Construction Schedule/Timeline:

The proposed bridge construction, which will have minimum disruption to traffic, will last 2 to 3 years. Tie-in of proposed alignment to existing alignment will be about 4 months duration. Reconstruction of Front Street and Duck Ranch Entrance and demolition of existing off alignment pavement, grading, landscaping, and demolition of existing bridge will happen after Tie-in.

The estimated construction schedule/Timeline for the proposed three stages:

- **Stage I –** 2 to 3 years
- **Stage II –** 4 Months
- **Stage III –** 1 year

3.6 Interaction with Other Projects:

No major projects are known to have been planned in this area during the construction of this project.

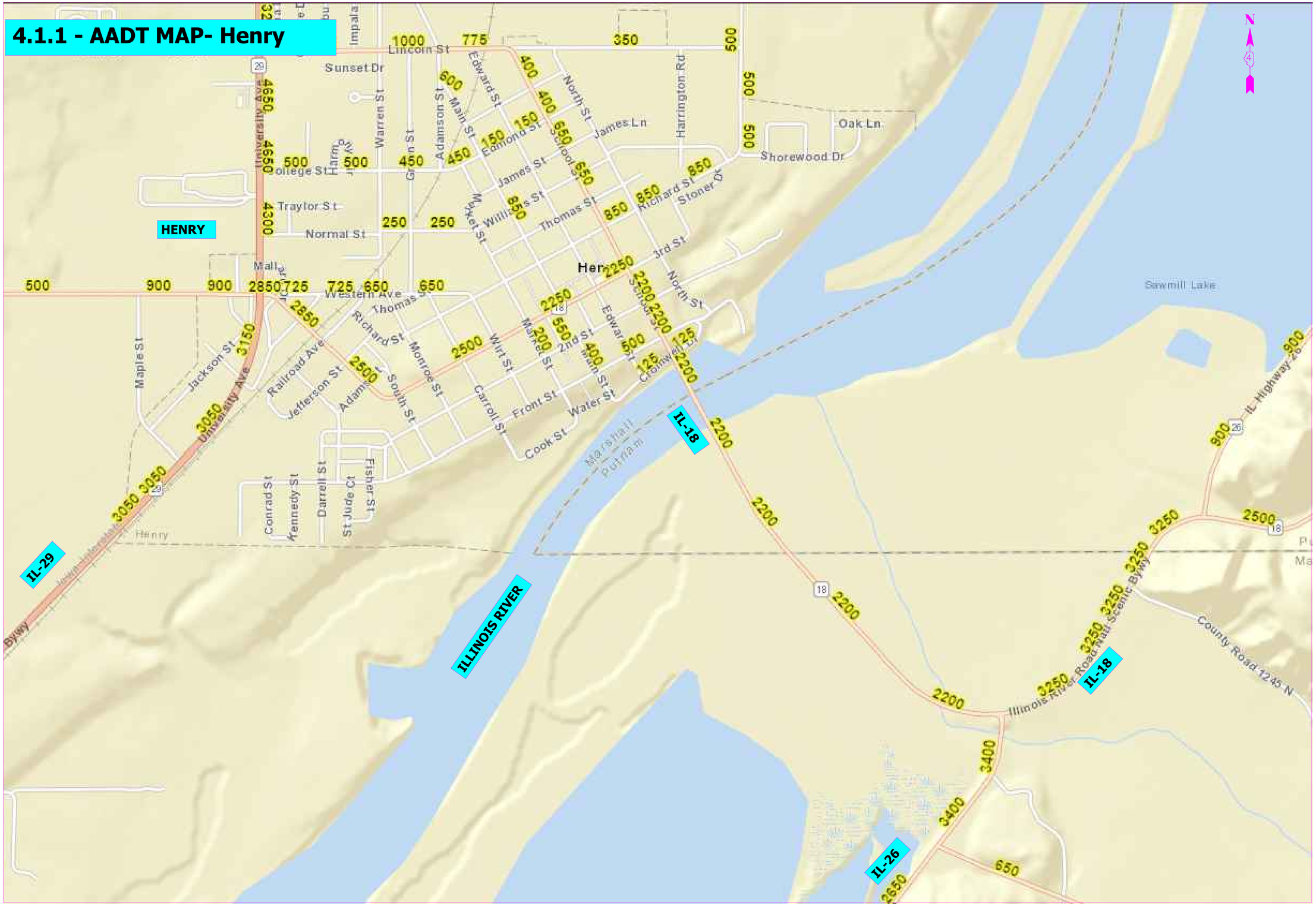
4.0 EXISTING CONDITIONS:

4.1 Existing Traffic Data, Counts and Queues:

The average daily traffic volume on IL Route 18 is 2,200 vehicles per day as of the year 2021. Average daily truck traffic is 170 vehicles per day as of the year 2021. ***See attached Exhibit – AADT Maps on page 4 & 5.***

Based on 4/23/2019 traffic count at IL Route 18 and IL Route 26 intersection, AM hourly peak volume on IL Route 18 is 251 and PM peak is 422.

4.1.1 - AADT MAP- Henry



4.1.2 - AADT MAP- Lacon



4.2 Incident, Crash Data and Analysis:

Based on the reported 2016-2020 crash data, the project area has been the site of 22 crashes, ***as shown in Table on page 7,*** primarily attributed to adverse weather conditions and driver negligence. These incidents have led to disruptions in traffic flow and occasional closures, impacting local businesses and overall commerce in both counties.

The collision types range from sideswipes to angular collisions and fixed-object impacts.

CRASH SEVERITY DESCRIPTIONS:

Fatal - A traffic crash involving a motor vehicle in which at least one person dies within 30 days of the crash.

Type A - (Incapacitating Injury) **-** Any injury, other than fatal, that prevents the injured person from walking, driving, or normally continuing the activities he/she was capable of performing before the injury occurred.

Type B - (Non-Incapacitating Injury) – Any injury, other than a fatal or incapacitating injury, that is evident to observers at the scene of the crash.

Type C - (Reported, Injury not Evident) – Any injury reported or claimed which is not either an "A" or "B" injury.

Property Damage – No injuries or fatalities, but damage is caused to either vehicle.

4.3 Concerns from Local Community and Businesses:

Consultations with local community members and businesses have highlighted concerns about potential disruptions to local commerce and emergency services during the construction period. Residents have expressed worries about detours impacting their daily commutes and businesses foresee possible economic repercussions during the bridge's temporary closure.

TOTAL CRASHES: TYPE AND NUMBER

Type of Collision	Third Street Intersection	Between Third Street and Second street	Second Street Intersection	Between Second Street and Front Street	Front Street Intersection	Bridge	Between Bridge and IL 26 Intersection	Total
Rear End	0	0	0	0	0	0	0	**0**
Turning	1	0	0	0	1	0	0	**2**
Fixed Object	0	0	0	0	0	1	6	**7**
Other Object	0	0	0	0	0	0	0	**0**
Head on	0	0	0	0	0	0	0	**0**
Pedestrian	0	0	0	1	0	0	0	**1**
Bicycle	0	0	0	0	0	0	0	**0**
Parked Vehicle	0	1	0	0	0	0	1	**2**
Animal	0	0	0	0	0	0	3	**3**
Sideswiped - Same Direction	0	0	0	0	0	0	0	**0**
Sideswiped - Opposite Direction	0	0	0	0	0	1	1	**2**
Angle	2	1	0	0	1	0	1	**5**
Overturned	0	0	0	0	0	0	0	**0**
Other Non Collision	0	0	0	0	0	0	0	**0**
Total	**3**	**2**	**0**	**1**	**2**	**2**	**12**	**22**
% of Total Crashes	**14%**	**9%**	**0%**	**5%**	**9%**	**9%**	**55%**	**100%**
Fatalities	0	0	0	0	0	0	1	**1**
Fatal Crashes	0	0	0	0	0	0	1	**1**
Total Injured	2	0	0	1	0	0	4	**7**
Type A Injury Crashes	0	0	0	0	0	0	1	**1**
Type B Injury Crashes	1	0	0	0	0	0	3	**4**
Type C Injury Crashes	1	0	0	1	0	0	0	**2**
Total Injury Crashes	2	0	0	1	0	0	4	**7**

5.0 TRAFFIC CONTROL PLAN (TCP):

The construction is proposed in three stages:

- **Stage I** – Off alignment bridge construction
- **Stage II** – Tie-in of new alignment to existing alignment
- **Stage III** – Reconstruction of Front Street and Duck Ranch Road, Demolition of existing off alignment pavement, grading, landscaping, and Demolition of existing Bridge.

5.1 Stage I:

Initially it is proposed that traffic will remain on the existing IL Route 18 alignment. Off-alignment construction of the new bridge structure will occur from east of Second Street to east of Illinois River. This stage will last 2 to 3 years. ***See attached Exhibit – Maintenance of Traffic Stage I on pages 9-11.***

Major work items during this stage include:

- Clearing trees and constructing embankments, primarily on the east side from STA 77+20 (proposed STA. 3029+50) to STA 83+50 (proposed STA 3035+80), with some selective demolition on the west side. The east embankment will require additional settlement time due to compressible soils from the high fill.
- Building the new bridge, spanning from the west abutment at STA 56+25 (proposed STA 3008+47) to the east abutment at 77+25 (proposed STA. 3029+50).
- Constructing the roadway on the new alignment from the bridge's east abutment to STA 3035+80, ensuring minimal disruption to operations on the existing alignment.
- The temporary closure of Front Street north of IL Route 18 will be necessary for the bridge construction above it.

Operations within this stage will largely adhere to IDOT Highway Standards 701001 and 701006 for Off-Road Operations.

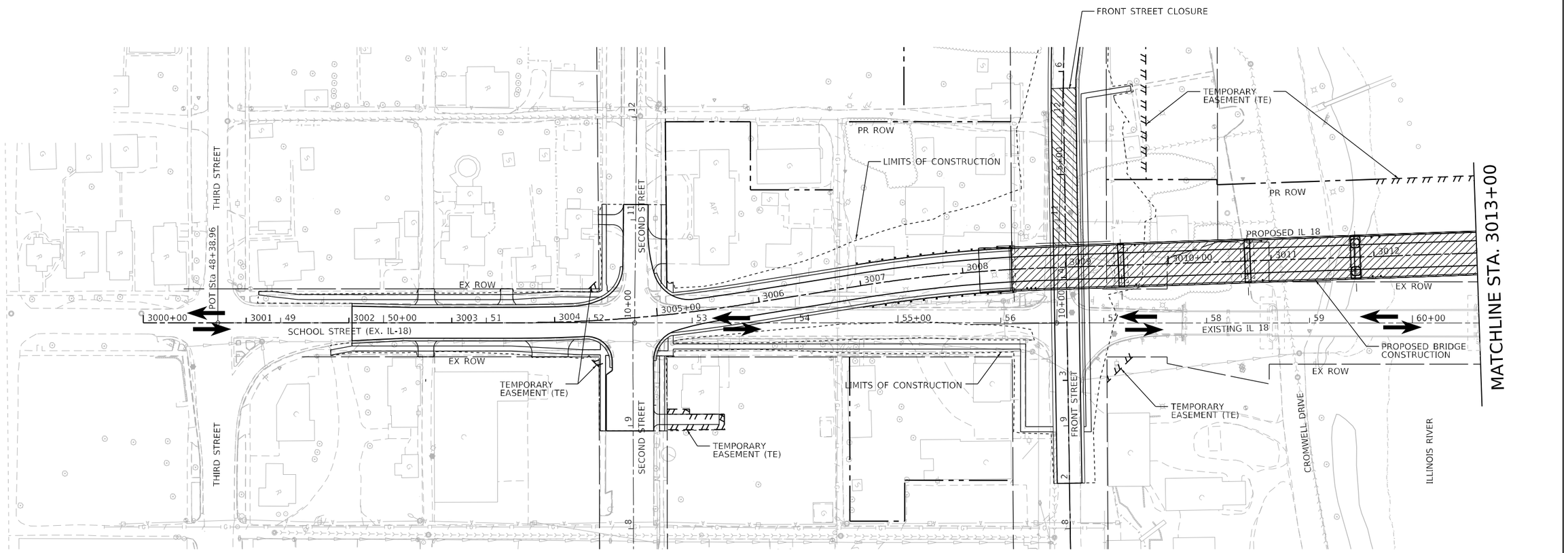
The complete closure of Front Street, from the current IL Route 18 to 150 feet north, will be essential for the construction of the new bridge. Residences beyond this point will be accessible from Cromwell Drive and North Street. According to the current IDOT AADT Map for this segment, the average daily traffic is approximately 100 vehicles, including those heading to the Riverbank Motel and the Henry Marina. This work will be executed in accordance with IDOT Highway Standards BLR 21.

Mobility: Minimal impact to existing IL Route 18 traffic is anticipated during Stage I for the off-alignment construction of the new bridge structure.

5.1.1 MAINTENANCE OF TRAFFIC - STAGE I

NOTES:

1. CONSTRUCTION OF PROPOSED WEST ABUTMENT, BRIDGE, EAST ABUTMENT AND ROADWAYS FROM STA 3008+47 TO STA 3034+50.
2. TRAFFIC WILL BE MAINTAINED ON EXISTING SCHOOL STREET AND EXISTING BRIDGE DURING THIS STAGE.



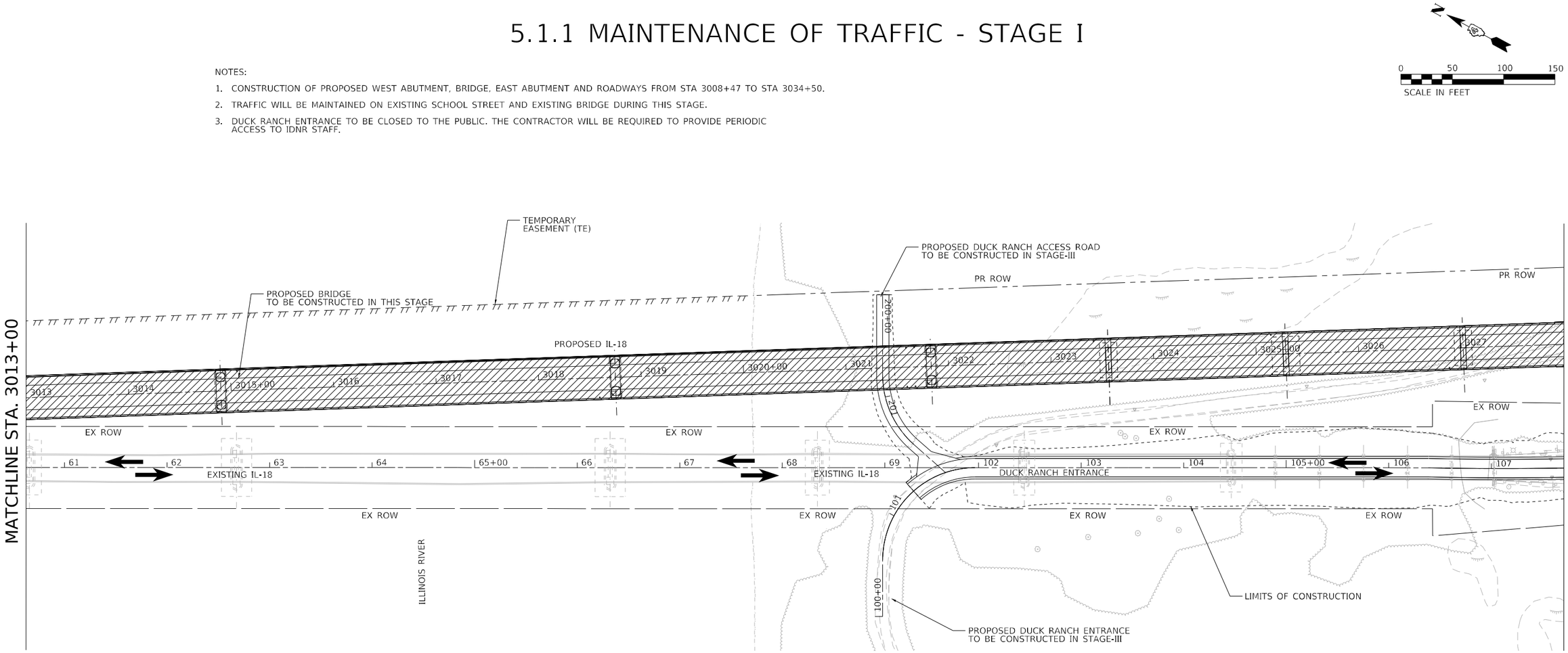
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5.1.1 MAINTENANCE OF TRAFFIC - STAGE I

NOTES:

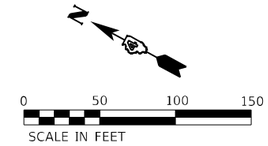
1. CONSTRUCTION OF PROPOSED WEST ABUTMENT, BRIDGE, EAST ABUTMENT AND ROADWAYS FROM STA 3008+47 TO STA 3034+50.
2. TRAFFIC WILL BE MAINTAINED ON EXISTING SCHOOL STREET AND EXISTING BRIDGE DURING THIS STAGE.
3. DUCK RANCH ENTRANCE TO BE CLOSED TO THE PUBLIC. THE CONTRACTOR WILL BE REQUIRED TO PROVIDE PERIODIC ACCESS TO IDNR STAFF.



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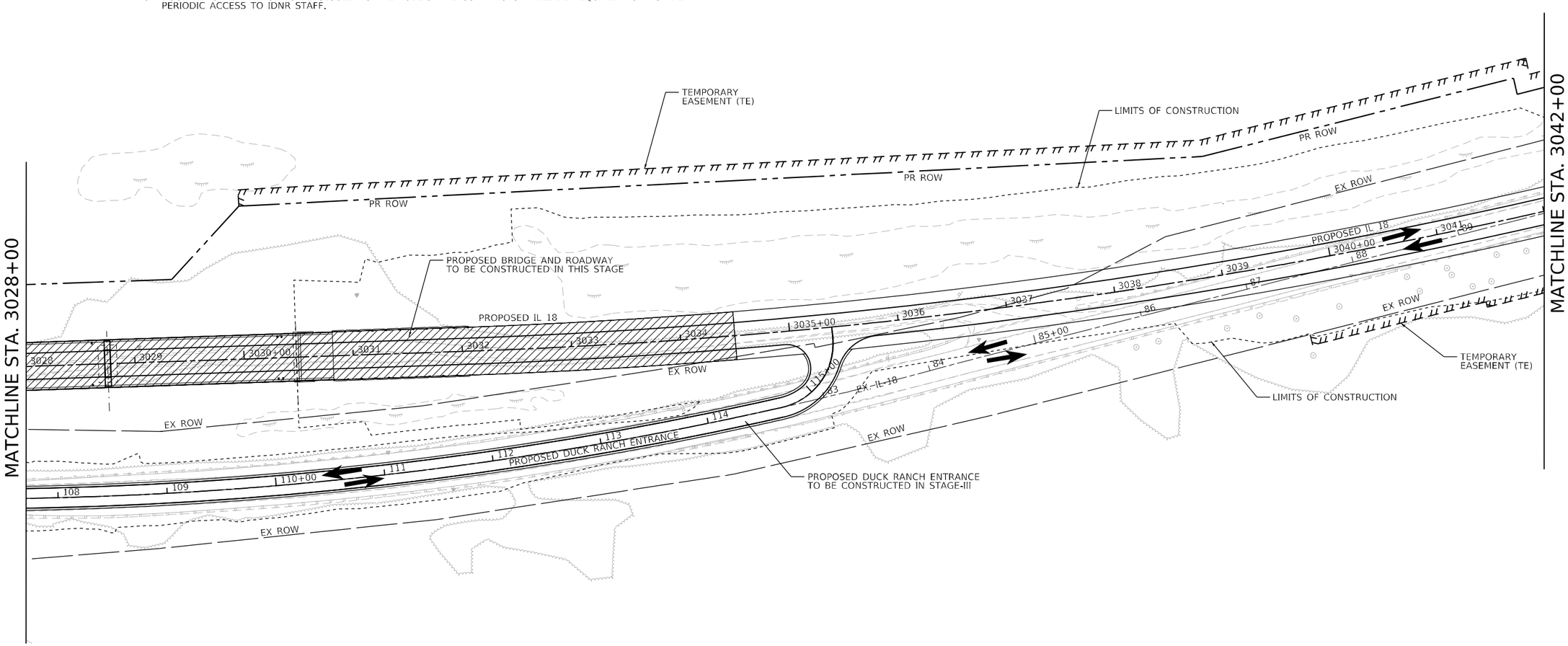
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5.1.1 MAINTENANCE OF TRAFFIC - STAGE I



NOTES:

1. CONSTRUCTION OF PROPOSED WEST ABUTMENT, BRIDGE, EAST ABUTMENT AND ROADWAYS FROM STA 3008+47 TO STA 3034+50.
2. TRAFFIC WILL BE MAINTAINED ON EXISTING SCHOOL STREET AND EXISTING BRIDGE DURING THIS STAGE.
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INFRASTRUCTURE ENGINEERING INCORPORATED 456 Fulton Street | Suite 265 | Peoria, IL 61602 P 309.637.0100 | F 309.637.0110 | www.infrastructureeng.com	USER NAME = RDabbaluti	DESIGNED - RB	REVISED -	**STATE OF ILLINOIS** **DEPARTMENT OF TRANSPORTATION**	**MAINTENANCE OF TRAFFIC – STAGE 1**
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5.2 Stage II:

Two alternatives are studied for the Tie-in of the proposed IL Route 18 alignment to the existing alignment.

5.2.1 Alternative A - Closure of IL Route 18 and Detour:

For Alternative A, IL Route 18 would be closed to traffic from IL Route 18 intersection with Third Street to IL Route 18 intersection with IL Route 26 for the estimated 4-month construction duration. By closure, the Tie-in construction can be completed in shorter construction duration as compared to staging construction. IL Route 18 traffic would be detoured via IL Route 29, IL Route 17, and IL Route 26. IL Route 18, IL Route 29, IL Route 17, and IL Route 26 have two-lane and two-way traffic. ***See attached Exhibit – Detour Map – IL 18 Complete Closure on page 13.***

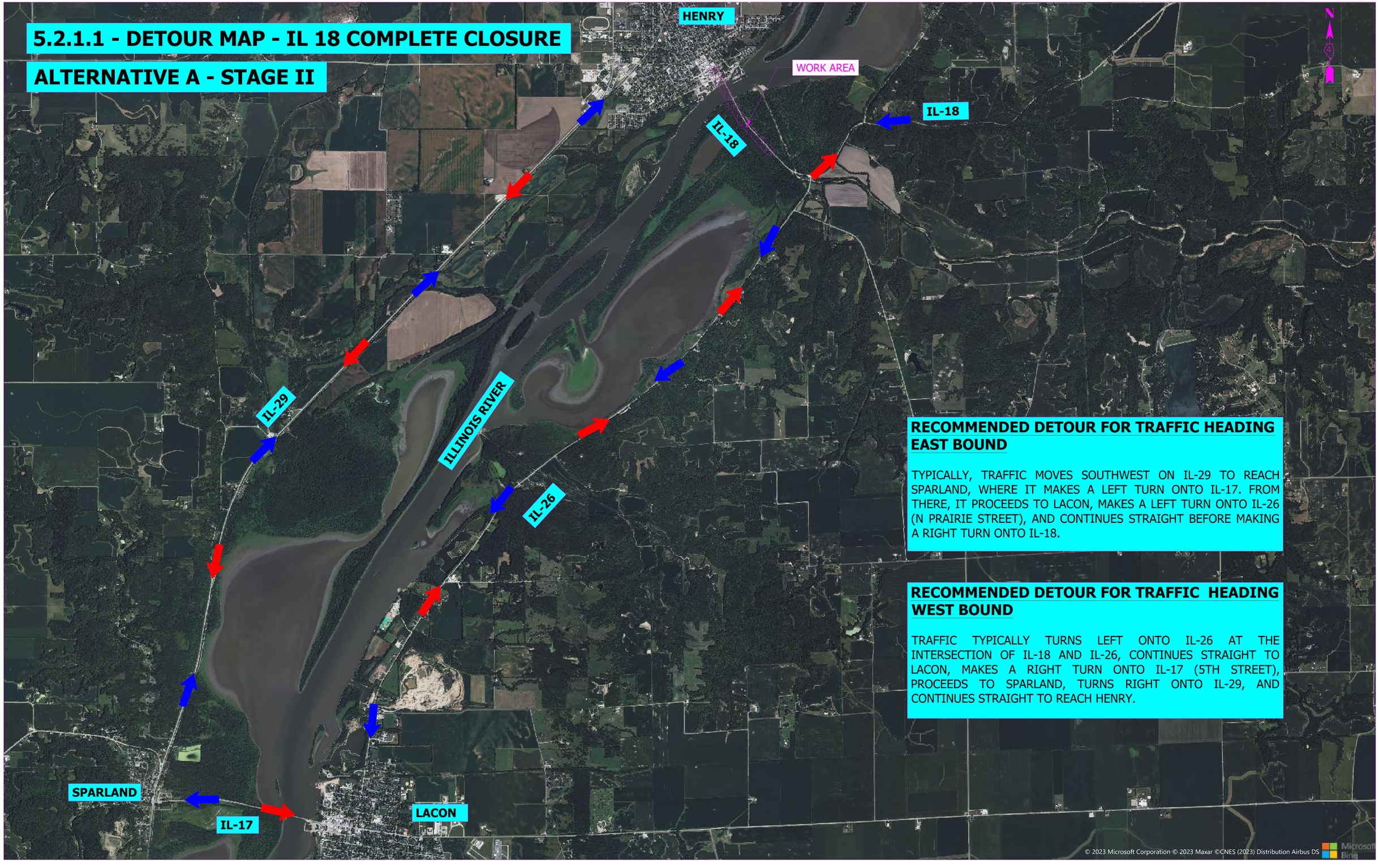
Current maximum ADT along these detour routes is as following:

- IL Route 29: 4,550
- IL Route 17: 7,150
- IL Route 26: 4,100

The detour routes can handle the additional IL Route 18 2,200 ADT without significant queuing and delays. This assessment is based on recent IDOT experience with the closure of the IL 17 bridge over the Illinois River at Lacon in 2023. The IL 17 bridge closure detoured traffic onto IL 29, IL 18, and IL 26, and did not result in significant queuing or delays.

5.2.1.1 - DETOUR MAP - IL 18 COMPLETE CLOSURE

ALTERNATIVE A - STAGE II



RECOMMENDED DETOUR FOR TRAFFIC HEADING EAST BOUND

TYPICALLY, TRAFFIC MOVES SOUTHWEST ON IL-29 TO REACH SPARLAND, WHERE IT MAKES A LEFT TURN ONTO IL-17. FROM THERE, IT PROCEEDS TO LACON, MAKES A LEFT TURN ONTO IL-26 (N PRAIRIE STREET), AND CONTINUES STRAIGHT BEFORE MAKING A RIGHT TURN ONTO IL-18.

RECOMMENDED DETOUR FOR TRAFFIC HEADING WEST BOUND

TRAFFIC TYPICALLY TURNS LEFT ONTO IL-26 AT THE INTERSECTION OF IL-18 AND IL-26, CONTINUES STRAIGHT TO LACON, MAKES A RIGHT TURN ONTO IL-17 (5TH STREET), PROCEEDS TO SPARLAND, TURNS RIGHT ONTO IL-29, AND CONTINUES STRAIGHT TO REACH HENRY.

5.2.2 Alternative B - Staging of Construction:

For Alternative B, IL Route 18 would not be closed for Tie-in construction. The work would be performed by staging. Alternative B construction is estimated to be of 6 months duration because of additional time needed for temporary pavement widening for traffic staging on IL Route 18, east of the Illinois River.

West Of Illinois River:

IL Route 18 would be closed to through traffic from east of Third Street to west of Front Street for Tie-in construction between Second Street and Front Street, and reconstruction of IL Route 18 between Third Street and Second Street.

Eastbound traffic would be detoured via Edward Street and Front Street. Westbound traffic would be detoured via Front Street, Main Street, Second Street, and E Park Row Street. ***See attached Exhibit – Detour Map – West of Illinois River on page 15.***

Major work items during this stage include:

- Embankment construction between Second Street and west bridge abutment STA 3008+47.
- Pavement construction from east of Third Street to west bridge abutment.
- Construction of Sidewalk and ADA ramps at the intersection of Second Street and IL Route 18.
- Drainage and storm sewers construction from Third Street to Front Street.
- Removal of existing mainline pavement from Third Street to Front Street.
- Front Street, north of IL Route 18, will remain closed as in Stage I for construction.

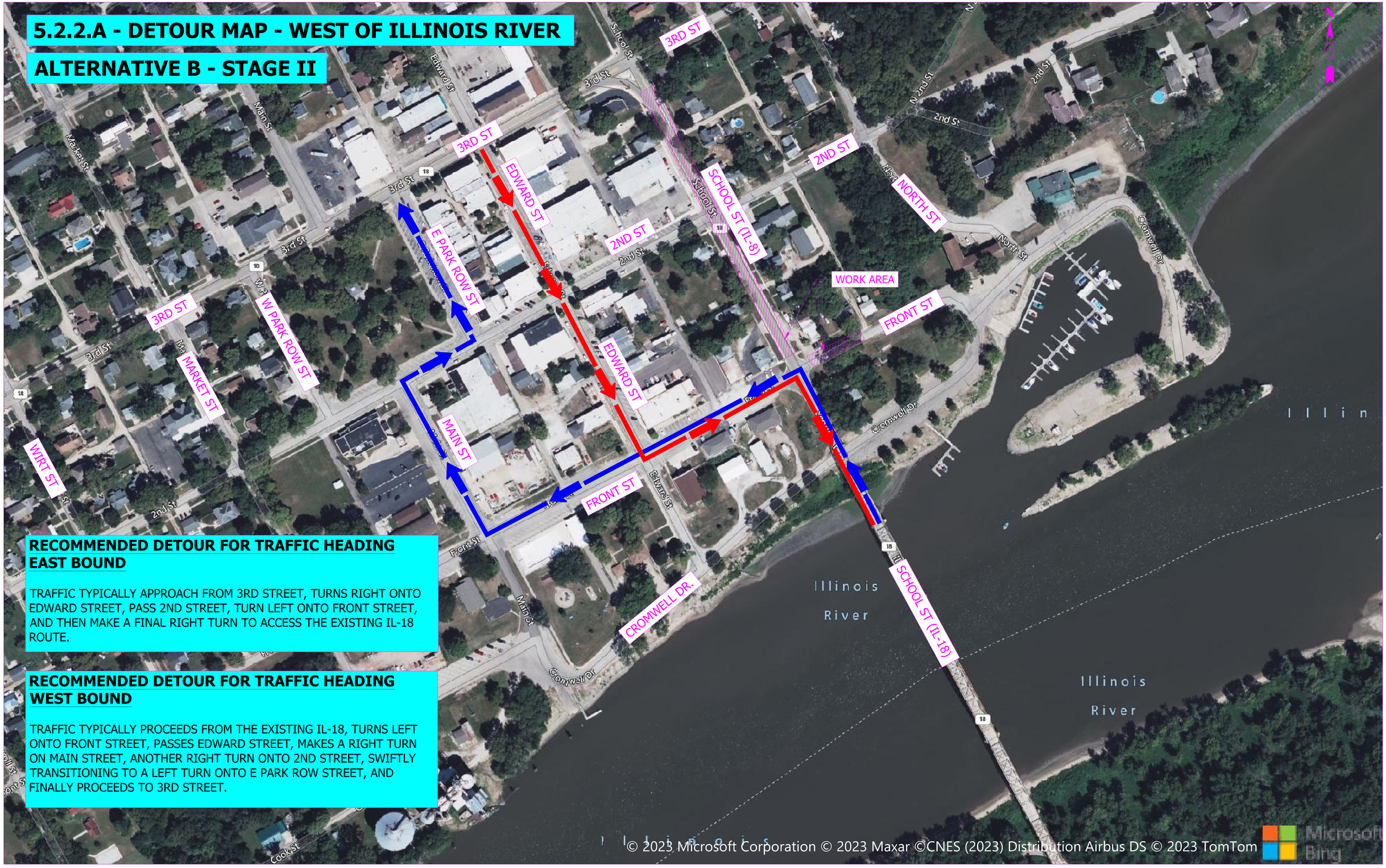
Operations within this stage would largely adhere to IDOT Highway Standard BLR 21.

East Of Illinois River:

The traffic would be staged to one lane of traffic for Tie-in construction. One lane would be maintained for two-way traffic operation, while the other lane is under construction. The Tie-in construction would be performed on 3 substages – II A, II B and II C. ***See attached Exhibits Traffic Control – Cross Sections on pages 16, 17 & 18.***

5.2.2.A - DETOUR MAP - WEST OF ILLINOIS RIVER

ALTERNATIVE B - STAGE II



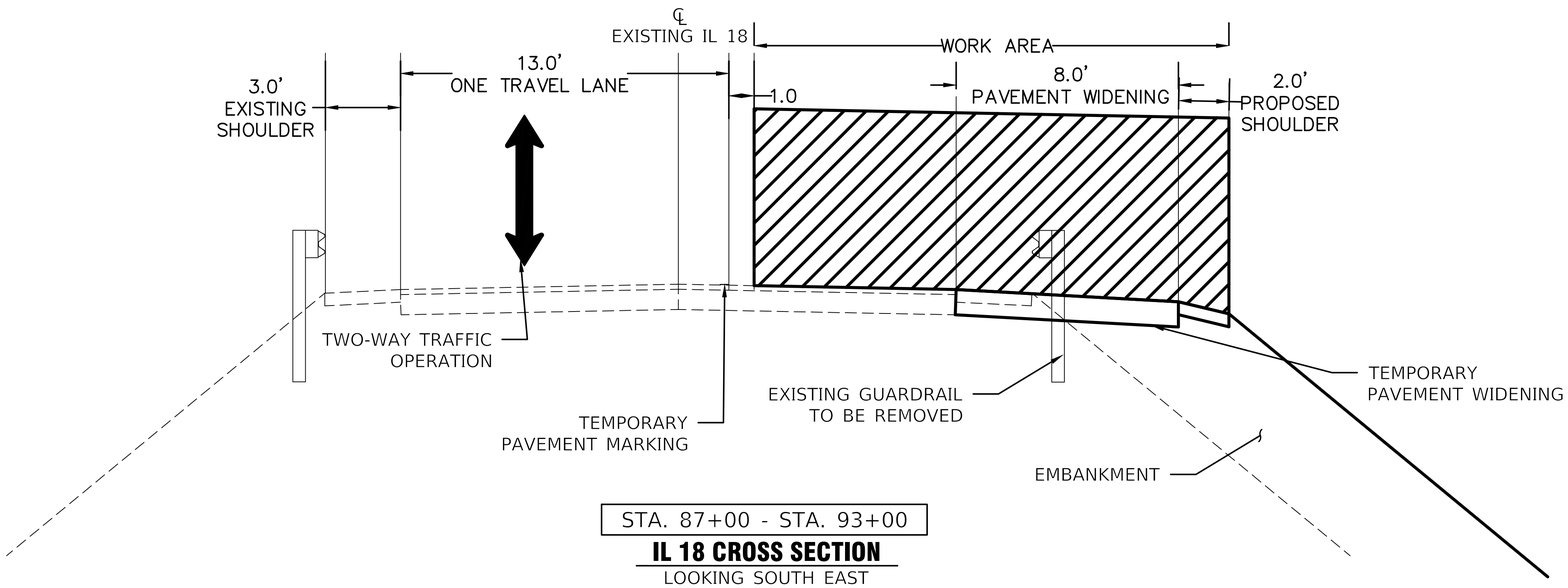
RECOMMENDED DETOUR FOR TRAFFIC HEADING EAST BOUND

TRAFFIC TYPICALLY APPROACH FROM 3RD STREET, TURNS RIGHT ONTO EDWARD STREET, PASS 2ND STREET, TURN LEFT ONTO FRONT STREET, AND THEN MAKE A FINAL RIGHT TURN TO ACCESS THE EXISTING IL-18 ROUTE.

RECOMMENDED DETOUR FOR TRAFFIC HEADING WEST BOUND

TRAFFIC TYPICALLY PROCEEDS FROM THE EXISTING IL-18, TURNS LEFT ONTO FRONT STREET, PASSES EDWARD STREET, MAKES A RIGHT TURN ON MAIN STREET, ANOTHER RIGHT TURN ONTO 2ND STREET, SWIFTLY TRANSITIONING TO A LEFT TURN ONTO E PARK ROW STREET, AND FINALLY PROCEEDS TO 3RD STREET.

5.2.2.B - TRAFFIC CONTROL - CROSS SECTIONS
ALTERNATIVE B - SUBSTAGE II-A



STA. 87+00 - STA. 93+00

IL 18 CROSS SECTION

LOOKING SOUTH EAST

FILE NAME
MODEL NAME

INFRASTRUCTURE ENGINEERING INCORPORATED
456 Fulton Street | Suite 265| Peoria, IL 61602
P 309.637.9200 | F 309.637.9210 | www.infrastructure-eng.com

USER NAME = rdabbakuti	DESIGNED –	RB	REVISED –	
	DRAWN –	RD	REVISED –	
PLOT SCALE = AS SHOWN	CHECKED –	RB	REVISED –	
PLOT DATE = 12/12/2023	DATE –	06/12/23	REVISED –	

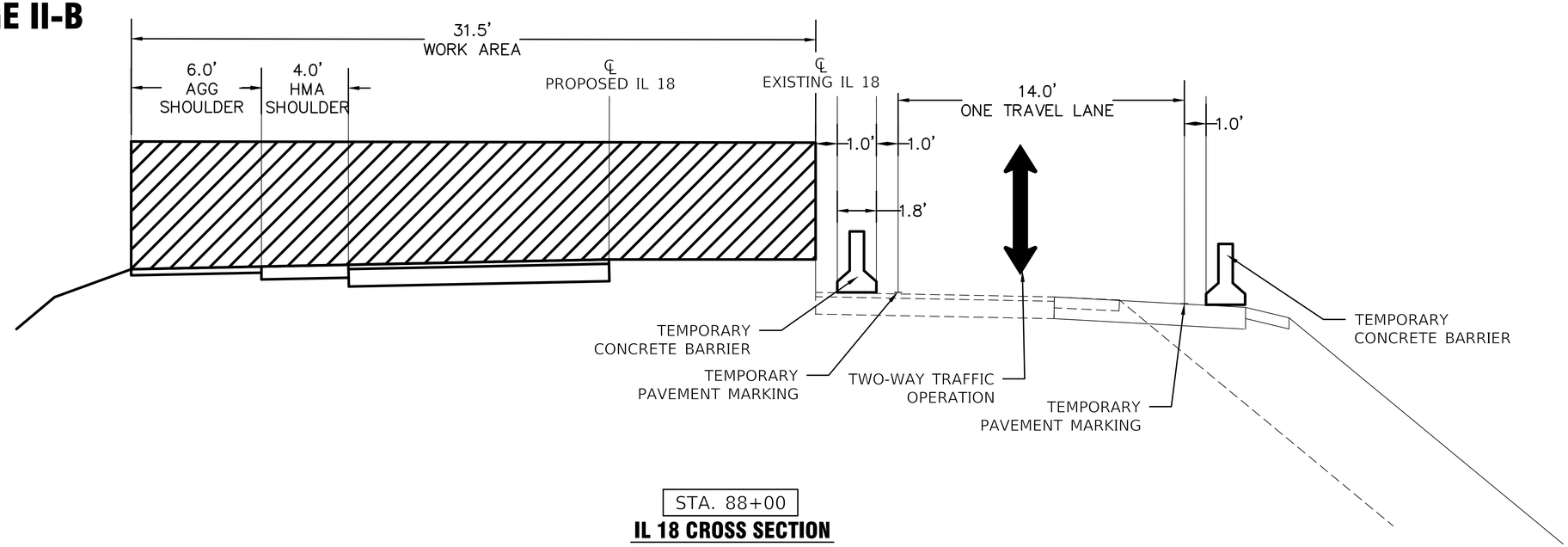
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL – CROSS SECTIONS

SCALE: AS SHOWN | SHEET 1 OF 1 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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		CONTRACT NO	68F09	
	ILLINOIS	FED. AID PROJECT	N/A	

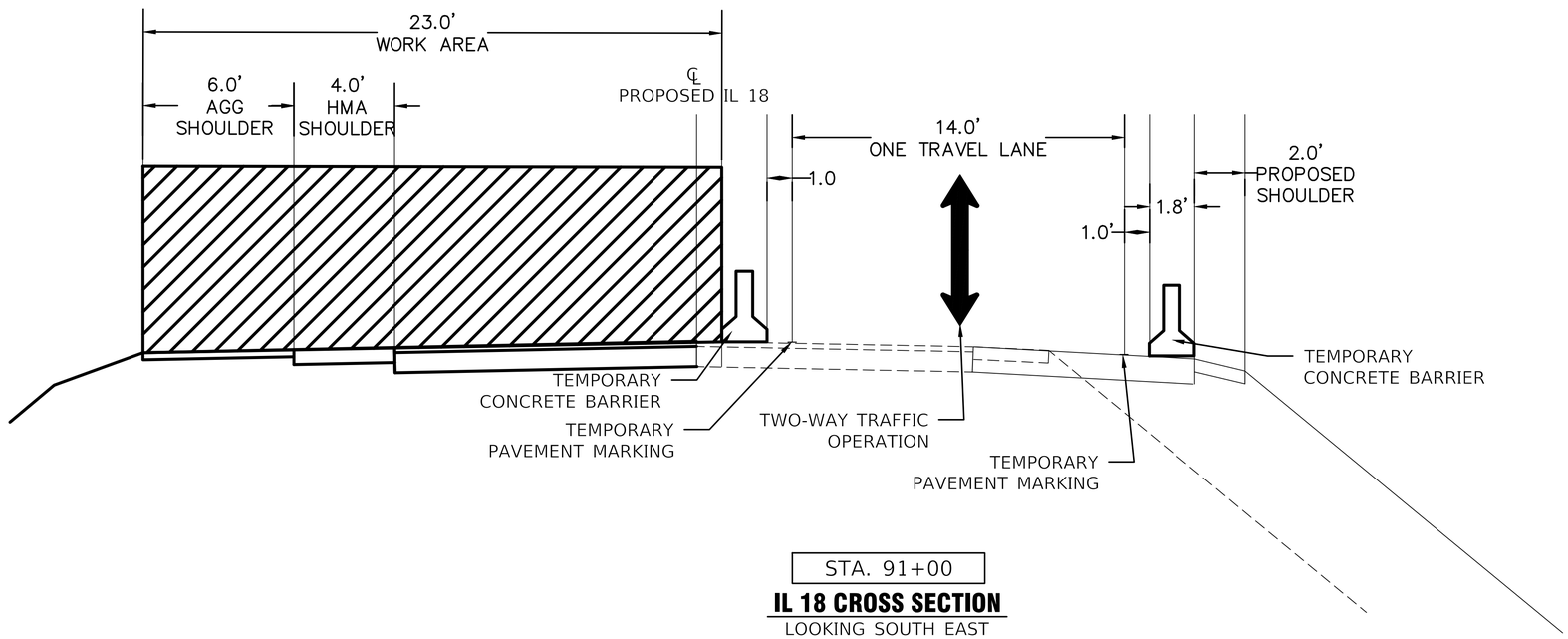
5.2.2.B - TRAFFIC CONTROL - CROSS SECTIONS
ALTERNATIVE B - SUBSTAGE II-B



STA. 88+00

IL 18 CROSS SECTION

LOOKING SOUTH EAST



STA. 91+00

IL 18 CROSS SECTION

LOOKING SOUTH EAST

FILE NAME
MODEL NAME

INFRASTRUCTURE ENGINEERING INCORPORATED
456 Fulton Street | Suite 265| Peoria, IL 61602
P 309.637.9200 | F 309.637.9210 | www.infrastructure-eng.com

USER NAME = rdabbakuti	DESIGNED –	RB	REVISED –	
	DRAWN –	RD	REVISED –	
PLOT SCALE = AS SHOWN	CHECKED –	RB	REVISED –	
PLOT DATE = 12/12/2023	DATE –	06/12/23	REVISED –	

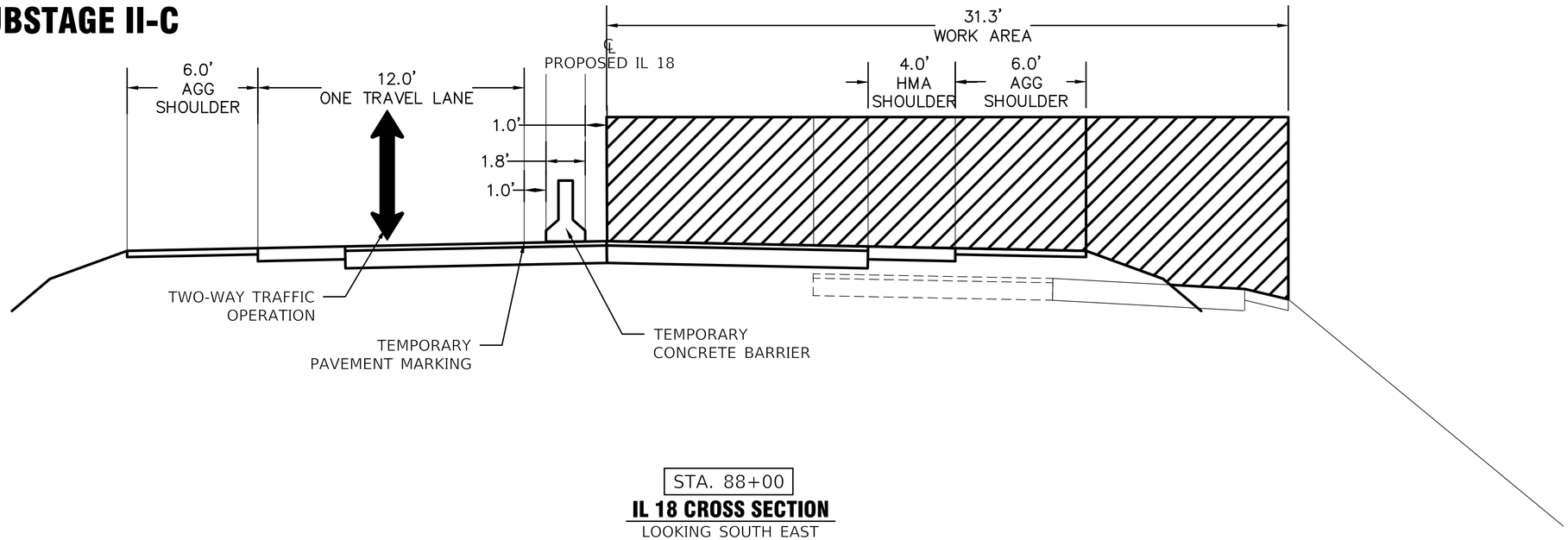
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL – CROSS SECTIONS

SCALE: AS SHOWN | SHEET 1 OF 1 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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		CONTRACT NO	68F09	
	ILLINOIS	FED. AID PROJECT	N/A	

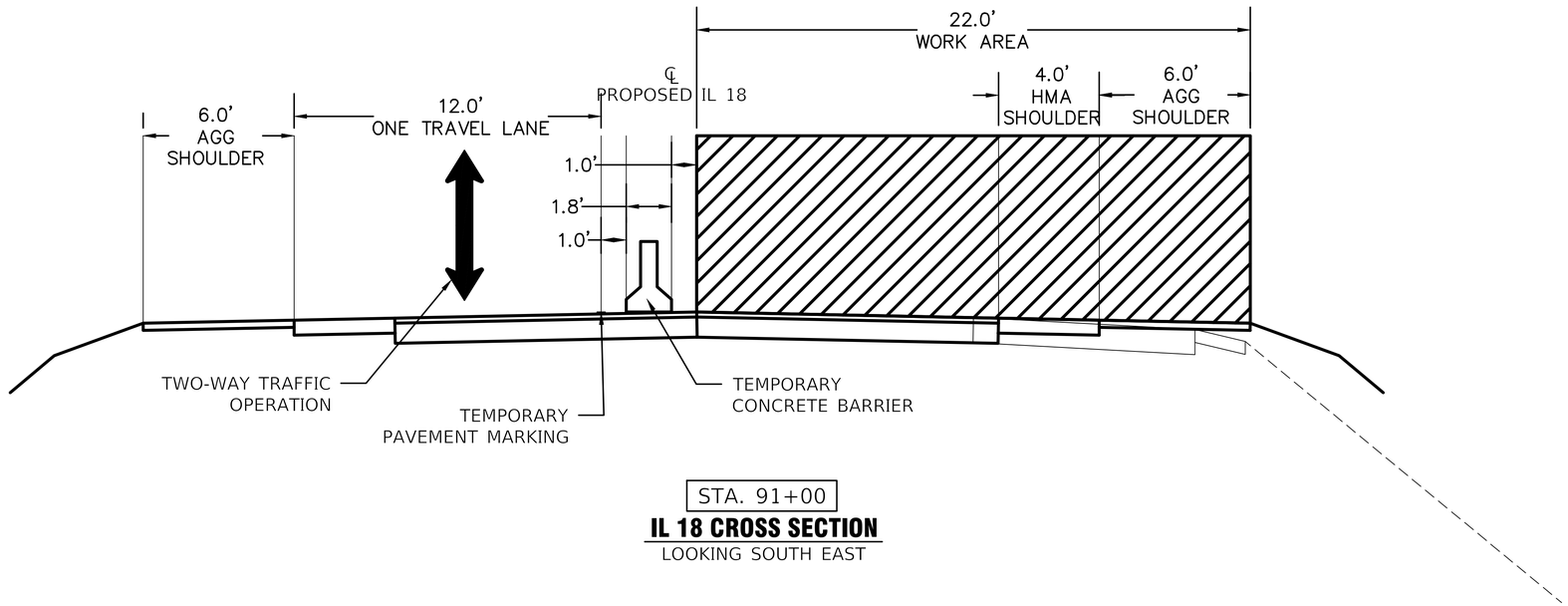
5.2.2.B - TRAFFIC CONTROL - CROSS SECTIONS
ALTERNATIVE B - SUBSTAGE II-C



STA. 88+00

IL 18 CROSS SECTION

LOOKING SOUTH EAST



STA. 91+00

IL 18 CROSS SECTION

LOOKING SOUTH EAST

FILE NAME
MODEL NAME

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456 Fulton Street | Suite 265| Peoria, IL 61602
P 309.637.9200 | F 309.637.9210 | www.infrastructure-eng.com

USER NAME = rdabbakuti	DESIGNED –	RB	REVISED –	
	DRAWN –	RD	REVISED –	
PLOT SCALE = AS SHOWN	CHECKED –	RB	REVISED –	
PLOT DATE = 12/12/2023	DATE –	06/12/23	REVISED –	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL – CROSS SECTIONS

SCALE: AS SHOWN | SHEET 1 OF 1 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
653	1048-D-BR	MARSHALL &PUTNAM	3	3
		CONTRACT NO	68F09	
	ILLINOIS	FED. AID PROJECT	N/A	

5.2.2.1 Alternative B - Substage II-A

During Substage II A, the pavement widening would be provided for the right lane of the current IL Route 18, spanning from STA 87+00 to STA 93+00. This widening is to ensure adequate lane width for the traffic for Substage II B for the Tie-in. ***See attached Exhibit – Maintenance of Traffic – Substage II-A on page 20.***

During this stage, vehicular traffic would be directed to the left lane of the IL Route 18 alignment for two-way traffic operation. Temporary traffic signals would be provided to maintain two-way operation in one lane.

Major work items during this stage include:

- Removing guardrail from STA 87+00 to STA 93+00
- Clearing and removing trees
- Pavement widening from STA 87+00 to STA 93+00 with necessary embankment fill.
- Providing Temporary traffic signal, and pavement markings

Operations within this stage would largely adhere to IDOT Highway Standards 701316 Lane closure, 2L,2W, Bridge repair for speeds > 45MPH.

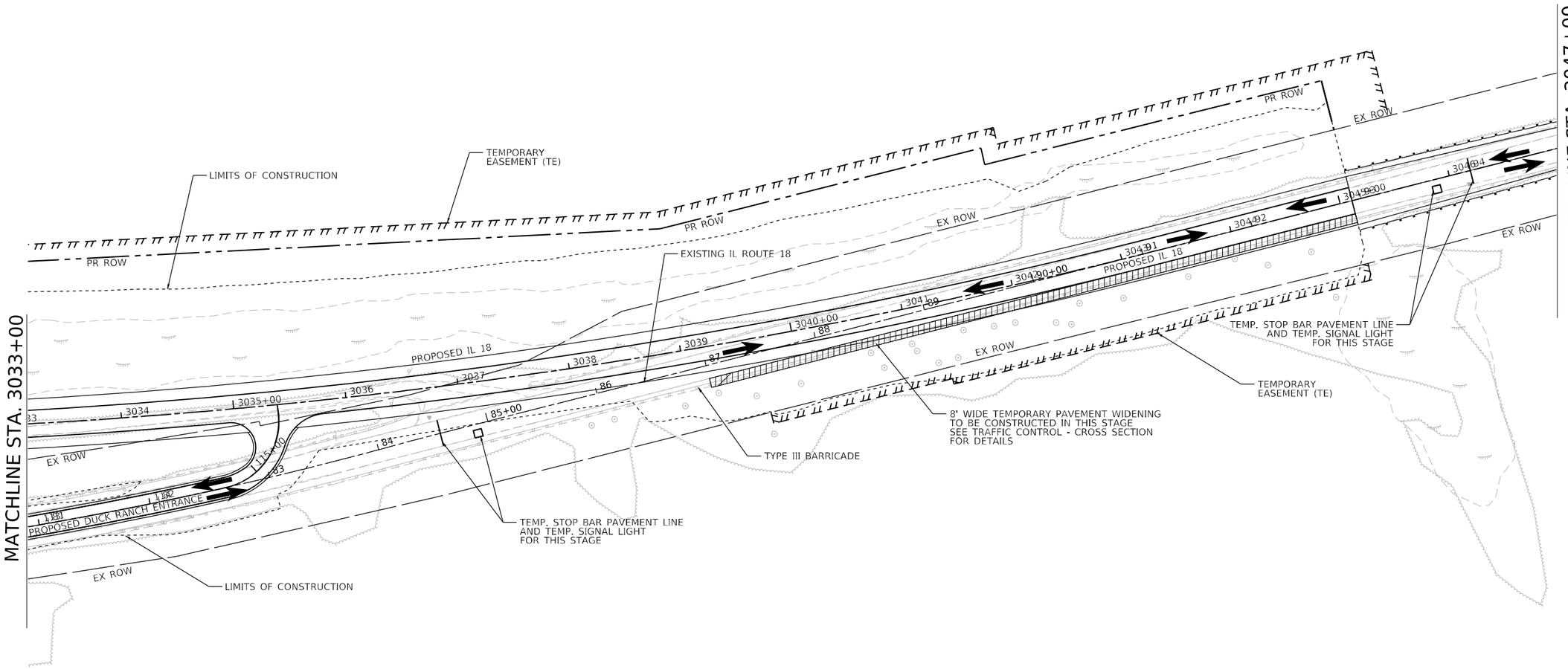
5.2.2.1A MAINTENANCE OF TRAFFIC - SUBSTAGE II-A
ALTERNATIVE B

NOTES:

1. CONSTRUCTION OF TEMPORARY PAVEMENT WIDENING ON EXISTING RIGHT SHOULDER FROM STA 87+00 TO 93+00.
2. TRAFFIC WILL BE MAINTAINED WITH TEMPORARY TRAFFIC SIGNAL AND ONE LANE TWO-WAY OPERATION FROM STA 84+50 TO STA 94+00

N

0 50 100 150
SCALE IN FEET



INFRASTRUCTURE ENGINEERING INCORPORATED 456 Fulton Street | Suite 265| Peoria, IL 61602 P 309.637.0700 | F 309.207.9010 | www.infrastructureeng.com	USER NAME = RDabbaluti	DESIGNED - RB	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	MAINTENANCE OF TRAFFIC – SUBSTAGE II–A	F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		DRAWN - RD	REVISED -			653	1048-D-BR	MARSHALL & PUTNAM		
	PLOT SCALE = 100.0000 ' / in.	CHECKED - RB	REVISED -					CONTRACT NO. 68F09		
	PLOT DATE = 2/28/2024	DATE - 06/12/2023	REVISED -		SCALE: 1"=50' SHEET 1 OF 1 SHEETS STA. TO STA.			ILLINOIS FED. AID PROJECT N/A		

Date:
FILE NAME: pw:\\ANVA01PWINT01.parsons.com:Illinois StateDocuments\118 Henry 84\dgn\40 - Design\CAD\ROTE\Plans\D4007\Sheets\40T-Main_STAGE-IIA-02.dgn

5.2.2.2 Alternative B - Substage II-B

During Substage II B, Tie-in construction would be performed in the left lane of the new IL Route 18 alignment. The traffic would be directed to the right lane of the existing IL Route 18 alignment for two-way traffic operation. Temporary traffic signals would be used to maintain two-way operation. ***See attached Exhibit – Maintenance of Traffic – Substage II-B on page 22.***

Major work items during this stage include:

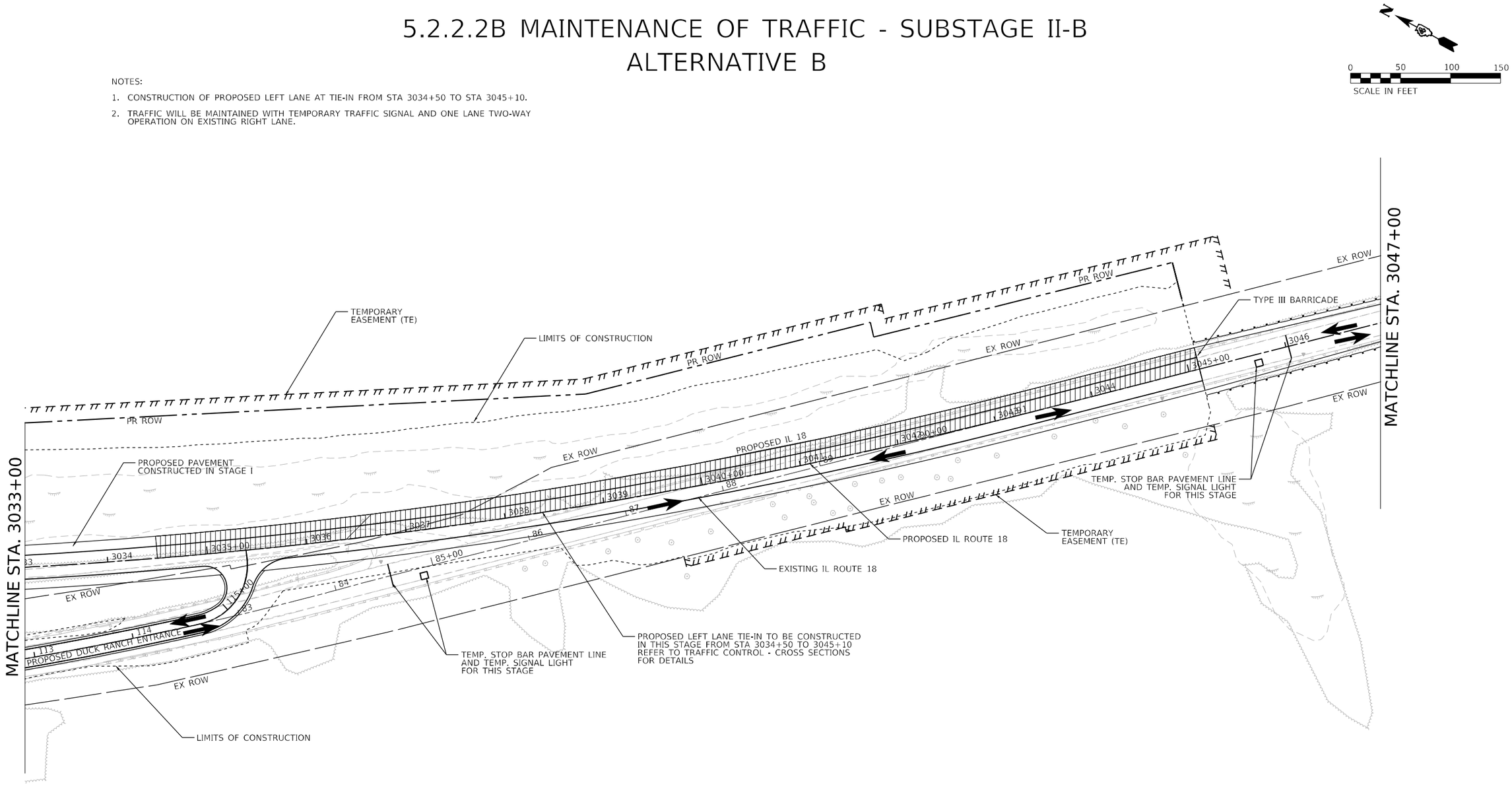
- Clearing trees along the Proposed IL Route 18 from STA 3034+50 to 3045+10
- Removal of the existing guardrail and pavement
- Construction of left lane pavements from STA 3034+50 to STA 3045+10

Operations within this stage would largely adhere to IDOT Highway Standard 701321 Lane closure, 2L,2W, Bridge repair with Barrier.

5.2.2.2B MAINTENANCE OF TRAFFIC - SUBSTAGE II-B
ALTERNATIVE B

NOTES:

1. CONSTRUCTION OF PROPOSED LEFT LANE AT TIE-IN FROM STA 3034+50 TO STA 3045+10.
2. TRAFFIC WILL BE MAINTAINED WITH TEMPORARY TRAFFIC SIGNAL AND ONE LANE TWO-WAY OPERATION ON EXISTING RIGHT LANE.



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		DRAWN - RD	REVISED -			653	1048-D-BR	MARSHALL & PUTNAM		
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	PLOT DATE = 2/28/2024	DATE - 06/12/2023	REVISED -		SCALE: 1"=50' SHEET 1 OF 1 SHEETS STA. TO STA.			ILLINOIS FED. AID PROJECT N/A		

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5.2.2.3 Alternative B - Substage II-C

During Substage II C, construction of the right lane of the new IL Route 18 alignment would be completed. The traffic would be directed to the left lane constructed in Substage II B for two-way traffic operation. Temporary traffic signals would be used to maintain two-way operation. ***See attached Exhibit – Maintenance of Traffic – Substage II-C on page 24.***

Major work items during this stage include:

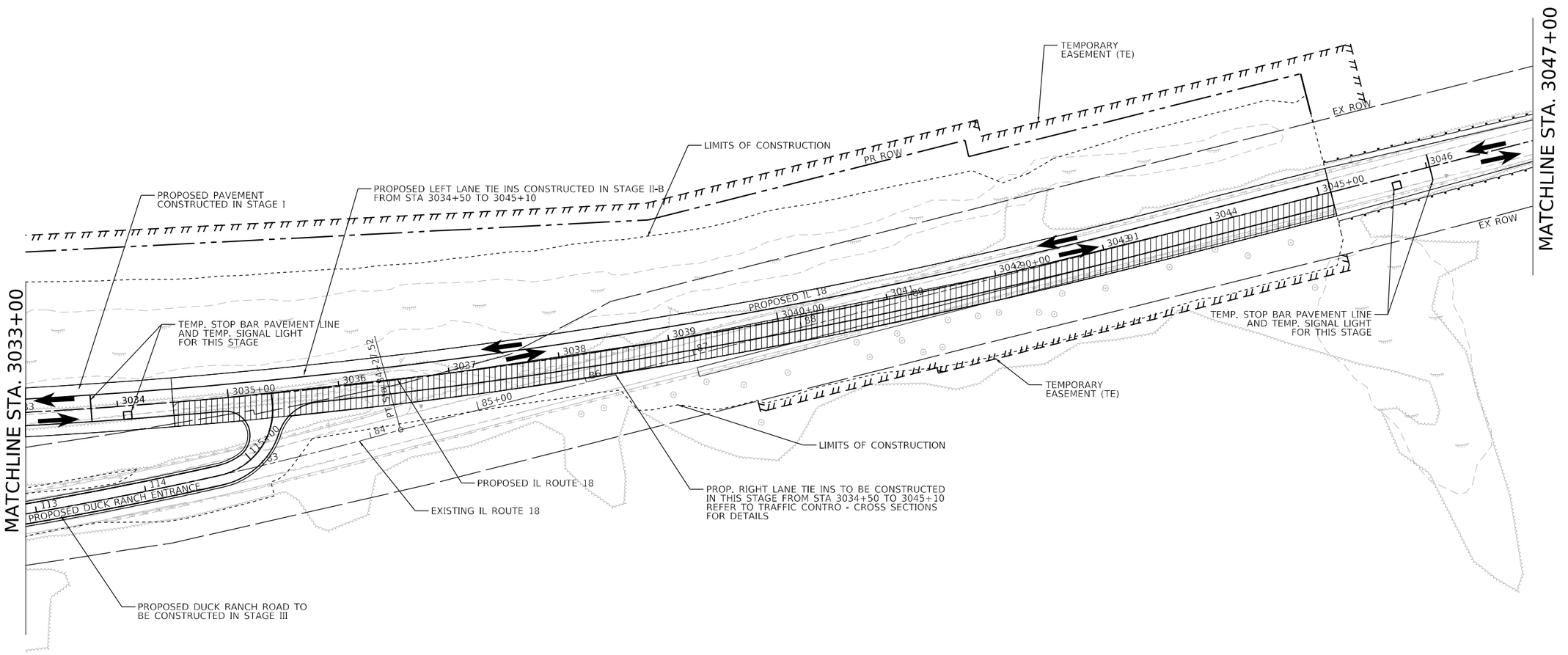
- Completion of Tie-in construction
- Restoration and landscaping

Operations within this stage would largely adhere to IDOT Highway Standard 701321 Lane closure, 2L,2W, Bridge repair with Barrier.

5.2.2.3C MAINTENANCE OF TRAFFIC - SUBSTAGE II-C
ALTERNATIVE B

NOTES:

1. CONSTRUCTION OF PROPOSED RIGHT LANE TIE-IN FROM STA 3034+50 TO STA 3045+10.
2. TRAFFIC WILL BE MAINTAINED WITH TEMPORARY TRAFFIC SIGNAL AND ONE LANE TWO-WAY OPERATION ON LEFT LANE CONSTRUCTED IN STAGE II-B.



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		DRAWN - RD	REVISED -		
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	PLOT DATE = 3/12/2024	DATE - 06/12/2023	REVISED -		SCALE: 1"=50' SHEET 1 OF 1 SHEETS STA. TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
653	1048-D-BR	MARSHALL & PUTNAM		
		CONTRACT NO. 68F09		
	ILLINOIS	FED. AID PROJECT N/A		

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FILE NAME: p:\IV\AV\AO1PW\NTO1.parsons.com\Ill\Ill\StateDocuments\IL 18 Henry Bridge\40 - Design\CADM\OTE\Initial\D1240972\0-SH-HOT-Illus_STAGE-IIC-02.dgn

5.2.3 Stage II TCP Alternatives Comparison:

5.2.3.1 Safety Impact of TCP Alternatives:

Minimal impact on safety is anticipated from **Alternative A – Closure of IL Route 18 and Detour** when compared to existing conditions. When compared to **Alternative B – Staging of Construction**, Alternative A eliminates the need to put workers and traffic in close proximity to each other, which increases safety for both workers and traffic. Additionally, Alternative A would eliminate the need to change signage between sub-stages, and to alert drivers of the changes in traffic flow.

For **Alternative B - Staging of Construction**, the IL Route 18 traffic would be detoured through the local streets in Henry. Additional traffic on local streets, including truck traffic, would make the local streets less safe and may result in an increase in crashes. For the construction of the tie-in on the east side of the bridge, Alternative B would require workers and traffic to be in close proximity to each other, which decreases safety for both workers and vehicular traffic. Additionally, the multiple sub-stages for Alternative B would require changing signage between sub-stages and alerting drivers of the changes in traffic flow.

5.2.3.2 Mobility Impact of TCP Alternatives:

A minor reduction in mobility is anticipated on detour routes (IL 26, IL 17 and IL 29) from **Alternative A - Closure of IL Route 18 and Detour**. The heaviest traffic locations along the detour route are the intersection of IL 26 and IL 17 and the intersection of IL 17 and IL 29. At these intersections, peak hour traffic would increase by approximately 20 percent – from 800 vph to 1,000 vph. The detour routes are expected to handle the additional IL Route 18 detour traffic (2,200 ADT) without significant queuing and delays. This is because the same routes were successfully used to detour a higher volume of vehicles (7,000 ADT) during the closure of the IL 17 bridge over the Illinois River at Lacon from Spring 2023 through Fall 2023 without any significant queuing or delays.

For **Alternative B - Staging of Construction**, the mobility on local streets would be significantly reduced in the City of Henry. Based on WB-55 truck turning movements, a WB-55 can negotiate the turns via local streets, but it would be very tight. To accommodate truck traffic, some of the parking along Edwards Street and E Park Row Street would need to be prohibited. Traffic would almost come to a complete stop during a WB-55 turning at a local street intersection. Additionally, more restrictive traffic control at local street intersections may be needed such as all-way stop control or temporary traffic signals. For the construction of the tie-in on the east side of the bridge, the temporary traffic signals for maintenance of two-way traffic on one-lane of pavement are not expected to cause significant queuing or delays.

5.2.3.3 Cost Associated with TCP Alternatives:

The cost associated with the two alternatives is comparable. The details are as follow:

ALTERNATIVE A - IL ROUTE 18 FULL CLOSURE COST FOR THE TIE-IN CONSTRUCTION					
Data:					
Duration of Closure	120	days (4 months)			
AADT	2200	per day			
Truck (SU)	100	per day			
Truck (MU)	70	per day			
Cars/Pickups/Vans per day	2030	per day			
Detour (see exhibit)	13	miles			
***BDE 13-6.02 c Detour User Costs = 0.5 Adverse Travel Costs**					
Adverse Travel Costs:					
Cars/Pickups/Vans					
Gasoline & oil	0.159	$/mi			
Maint./access/parts/tires	0.098	$/mi			
Taxes	0.051	$/mi			
Total	**0.308**	$/mi			
Trucks (SU)			***Trucks (MU)***		
Gasoline & oil	0.717	$/mi	Gasoline & oil	0.876	$/mi
Tires	0.442	$/mi	Tires	0.541	$/mi
Maintenance	0.442	$/mi	Maintenance	0.541	$/mi
Oper depreciation	1.359	$/mi	Oper depreciation	1.661	$/mi
Total	**2.961**	$/mi	Total	**3.618**	$/mi
Cars/Pickups/Vans	$976,641	over 120 days			
Trucks (SU)	$461,846	over 120 days			
Trucks (MU)	$395,135	over 120 days			
Total Adverse Travel Costs	**$1,833,622**	over 120 days			
DETOUR USER - COST	**$916,810**	**120 Closure Duration**			

ALTERNATIVE B - IL ROUTE 18 STAGE CONSTRUCTION		
Staging for IL-18 Tie-Ins Construction		
Duration of Staging:	180	Days
A. West of IL River: Close IL-18 for through traffic between Third Street and Front Street		
Route IL-18 traffic through Local Streets		
B. East of IL River: Station 83+00 to Station 93+00 one lane open		
One-way operation using temporary traffic signal to maintain two-way traffic in one open lane.		
West of IL River: Items for Cost for Comparison		
Reimbursement to City for use of Streets	$100,000	Estimate
Repair & Maintenance of City Streets		
One-way traffic (800'+960'+420') 2180 ft	$29,000	
Two-way traffic 375 ft	$10,000	
Additional Traffic Control & Flaggers	$50,000	
East of IL River: Items for Cost for Comparison		
Temporary Traffic Signal	$60,000	
Temporary Concrete Barrier, 650 ft x 2	$39,000	
Temporary Concrete Barrier Relocation, 650 ft	$6,500	
Temporary Attenuators, 4 units	$22,000	
Relocate Temporary Attenuators	$7,000	
Pavement Widening, 600 SY	$36,000	
Removal	$25,000	
Earthwork, 2200 CY @ $36.00 (Temporary fill and removal)	$79,200	
Wetland and Landscape Restoration, approx. 1 acre	$75,000	
Additional Traffic Control	$50,000	
Engineering and Management	$25,000	
Total	**$668,700**	

5.2.4 Recommendation for Stage II Alternative:

- Alternative A has a moderately higher cost than Alternative B; however, Alternative B costs do not reflect overall higher bid prices that are typically expected for project elements constructed under stage construction. Additionally, Alternative A has much less impacts to safety and mobility. For these reasons, **Alternative A - Closure of IL Route 18 and Detour** is the recommended alternative for maintenance of traffic during Stage II.

5.3 Stage III:

During Stage III, the traffic will transition to the new alignment, and construction work will happen on Front Street. Simultaneously, the construction of the Duck Ranch Entrance will span from STA 100+00 to STA 115+60 and the construction of the two Duck Ranch access roads will span from STA 200+00 to STA 201+84 & STA 300+00 to STA 302+80. ***See attached Exhibit – Maintenance of Traffic – Stage III on page 29 & 30.***

Throughout this stage, a complete closure of Front Street is necessary from south of existing IL Route 18 to North Street. Residences beyond this point will be accessible via Cromwell Drive and North Street. Based on the current IDOT AADT Map for this segment, an average daily traffic flow of approximately 100 vehicles is recorded, including those traveling to the Riverbank Motel and the Henry Marina. These operations will be conducted in compliance with IDOT Highway Standards BLR 21.

Major work items during this stage include:

- Removal of the existing mainline pavement from Front Street to the old bridge abutment.
- Demolition of the existing Front Street in the westbound direction and the existing IL Route 18 for the proposed Duck Ranch Entrance in the eastbound direction.
- Construction of the two Duck Ranch access roads.
- Reconstruction of Front Street from south of existing IL Route 18 to south of North Street in the westbound direction and constructing the Duck Ranch Entrance in the eastbound direction.
- Implementing drainage and storm sewer construction along Front Street.
- Relocation of existing 4-inch water line and adjustment of existing sanitary manholes.
- Demolition of existing IL18 bridge, landscaping, and grading.

Operations within this stage will largely adhere to IDOT Highway Standard BLR 21.

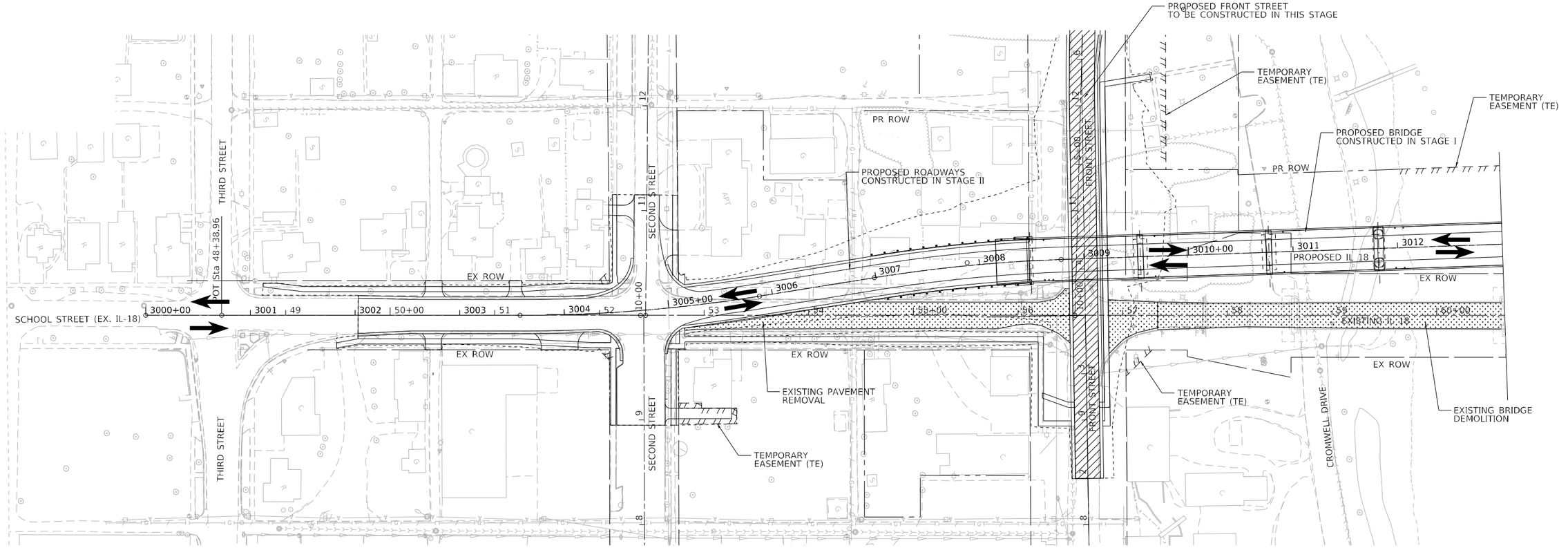
5.3.1 MAINTENANCE OF TRAFFIC - STAGE III

N

0 50 100 150
SCALE IN FEET

NOTES:

1. CONSTRUCTION OF PROPOSED FRONT STREET AND DUCK RANCH ACCESS ROADS.
2. TRAFFIC WILL BE MAINTAINED ON PROPOSED SCHOOL STREET (IL-18) AND PROPOSED BRIDGE DURING THIS STAGE.

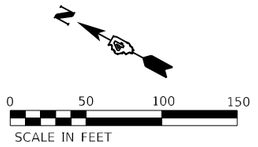


INFRASTRUCTURE ENGINEERING | INCORPORATED 456 Fulton Street | Suite 265 | Peoria, IL 61602 P: 309.637.2100 | F: 309.637.3018 | www.infrastructure-eng.com	USER NAME = RDabbaluti	DESIGNED - RB	REVISED -	**STATE OF ILLINOIS** **DEPARTMENT OF TRANSPORTATION**	**MAINTENANCE OF TRAFFIC – STAGE III**
		DRAWN - RD	REVISED -		
	PLOT SCALE = 100.0000 ' / in.	CHECKED - RB	REVISED -		
	PLOT DATE = 2/28/2024	DATE - 06/12/2023	REVISED -		SCALE: 1"=50' SHEET 1 OF 2 SHEETS STA. TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
653	1048-D-BR	MARSHALL & PUTNAM		
		CONTRACT NO. 68F09		
		ILLINOIS	FED. AID PROJECT N/A	

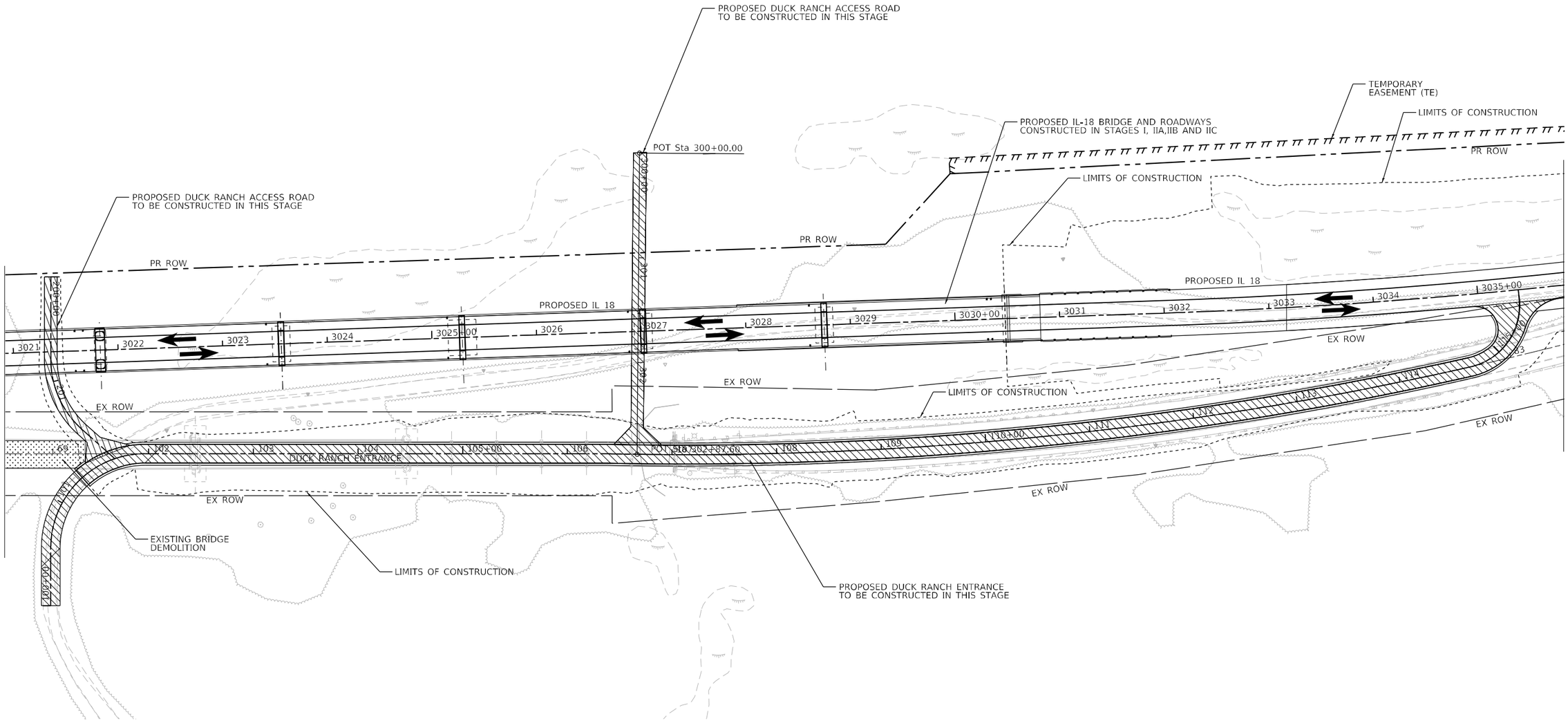
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5.3.1 MAINTENANCE OF TRAFFIC - STAGE III



NOTES:

1. CONSTRUCTION OF PROPOSED FRONT STREET AND DUCK RANCH ACCESS ROADWAYS.
2. TRAFFIC WILL BE MAINTAINED ON PROPOSED SCHOOL STREET (IL-18) AND PROPOSED BRIDGE DURING THIS STAGE.



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		DRAWN - RD	REVISED -			653	1048-D-BR	MARSHALL & PUTNAM		
	PLOT SCALE = 100.0000 ' / in.	CHECKED - RB	REVISED -					CONTRACT NO. 68F09		
	PLOT DATE = 2/28/2024	DATE - 06/12/2023	REVISED -		SCALE: 1"=50' SHEET 2 OF 2 SHEETS STA. TO STA.			ILLINOIS FED. AID PROJECT N/A		

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