STRUCTURE GEOTECHNICAL REPORT
INTERSTATE 80 BRIDGES OVER
JOLIET JUNCTION TRAIL
EX SNs 099-0048 AND 099-0049
PR SNs 099-8320 AND 099-8321
WILL COUNTY, ILLINOIS

For
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11. Abstract

Two new, single-span bridges will replace the existing three-span bridges carrying Interstate 80 over the Joliet Junction Trail in Will County, Illinois. The proposed structures will have back-to-back of abutments length of 90.6 feet and out-to-out widths of 62.8 feet. The proposed abutment cap base elevations range from 625.31 to 626.72 feet. A combination of concrete slope walls and wrap around Mechanically Stabilized Earth (MSE) walls is proposed in front of each of the abutments. The walls will have maximum total heights of 16.9 and 15.9 feet at the east and west abutments, respectively. This report provides geotechnical recommendations for the design and construction of the proposed approach embankments, approach slabs, retaining walls, and bridge foundations.

The pavement structure along I-80 consists of 15.0 to 18.0 inches of asphalt pavement over 6.0 to 26.0 inches of aggregate base whereas the JJT surface consists of 2.5 inches of asphalt over 5.0 inches of aggregate base. Beneath the pavement, the general lithologic profile includes up to 30.0 feet of existing embankment materials consisting of medium stiff to hard silty clay to silty clay loam fill followed by up to 29 feet of stiff to hard silty clay and silty clay loam with lenses of medium dense to dense sand to gravelly sand overlying dense to very dense silty loam to gravelly silty loam. Dolostone bedrock was encountered at elevations of about 572 to 567 feet. The groundwater level was measured at elevations ranging from 593 to 587 feet.

The MSE walls will undergo long-term consolidation settlements of up to 0.8 inches. Global stability analyses at the MSE walls show FOS meeting the IDOT minimum requirement of 1.5. The maximum factored bearing resistance for the approach footings is 2,500 psf.

The bridge abutments could be supported on driven piles. To support the integral abutments, driven 14-inch MSP, 16-inch MSP, HP12x74, and HP14x89 steel piles will provide 100 to 347 kips of factored resistance at total lengths of 29 to 61 feet. Downdrag allowances on the piles are included.

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TRANSYSTEMS CORPORATION

1.0 INTRODUCTION

This report presents the results of our subsurface investigation, laboratory testing, geotechnical evaluations, and recommendations in support of the design and reconstruction of the bridges carrying eastbound and westbound Interstate 80 (I-80) over the Joliet Junction Trail (JJT) in western Will County, Illinois. On the USGS *Plainfield 7.5 Minute Series Quadrangle* map, the bridge is located in Troy Township, SE ¼ of Section 13, Tier 35N, Range 9E of the of the Third Principal Meridian (Exhibit 1). The bridge replacements are part of the proposed widening and reconstruction of I-80 from Houbolt Road to west of Center Street and Larkin Avenue Interchange in Will County, Illinois. These bridges will be reconstructed as part of Contract ML-3.

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 foundations, approach embankments, approach slabs, and retaining walls.

1.1 Existing Structure and Ground Conditions

Based on the *Bridge Condition Reports (BCR)*, dated June 2011 and provided by TranSystems, we understand the existing bridges were originally built in 1964 as three-span, steel beam structures with reinforced concrete decks supported by reinforced concrete piers and abutments. The piers are supported on spreads footings, whereas the concrete stub abutments are supported on concrete piles. The approach slabs are supported on timber piles with estimated lengths of 30.0 feet. The existing bridges have lengths of 164.9 from back to back of abutments and out-to-out widths of 36.6 feet, which accommodates two 12.0-foot wide traffic lanes and two 3.0-foot wide shoulders. Reinforced concrete wingwalls and 4-inch thick concrete slope walls are located at the ends of the structures. At both ends, the concrete slope walls are continuous between the eastbound and westbound bridge structures. The structures were repaired in 1992 and repainted in 2003. The site surface elevation at the bridge site is about 612 feet along Joliet Junction Trail and about 639 to 640 feet along I-80.

In the project area (see Exhibit 2), an about 45-foot thick overburden made up of low to moderate plasticity, high strength, and low to moderate moisture content silty clayey diamicton interbedded with sand and gravel outwash unconformably covers the bedrock (Bauer et al. 1991, Hansel and Johnson 1996, Willman et al. 1971). The bedrock is made up of dolostone and shale. Top of bedrock is mapped at about 670.0 feet elevation. Sinkholes and other dissolution features are not unknown in the project area (Bretz 1940; Otto 1963). The site is located on the northern, downthrown block of the inactive Sandwich Fault Zone that may be traced four miles southwest of the proposed improvements (Kolata 2005). Records of mining activity in the vicinity of the bridge are missing. Neither the overburden nor the upper bedrock is known to include significant sources of water supply (Woller and Sanderson 1983).

1.2 Proposed Structure

Based on the proposed *General Plan and Elevation Drawings* (Appendix E), provided by TranSystems Corporation (TranSystems), dated February 3, 2022, Wang understands the existing three-span bridges will be removed and replaced with two new single-span bridges with integral abutments. The new bridges will have back-to-back of abutments length of 90.6 feet and out-to-out widths of 62.8 feet to accommodate two 12-foot wide lanes, two 12-foot wide shoulders, a 12-foot wide future lane, and parapets.

Based on the provided *Cross-sections* (Appendix F), the existing grade along I-80 is approximately 639.0 to 640.0 feet and the proposed back of abutment elevations are approximately 634.0 to 634.5 feet at the west and east abutments respectively; therefore, the grade will be lowered by up to 5.5 and 5.7 feet along each centerline at the east and west approaches, respectively. Based on the information in the *BCR* provided by TranSystems and the design drawings, we estimate the east and west abutments will be constructed about 40.0 feet in front of the existing ones and will be offset from the existing piers to avoid construction conflicts. This will require the placement of up to 16.0 to 18.0 feet of new fill behind the proposed abutments. A minimal amount of fill, about 1.0 to 2.0 feet, will be placed along the existing median to facilitate the inward widening of the bridges by about 30.0 feet at the north and south sides of the eastbound and westbound bridges.

The plans indicate a portion of the existing concrete end slopes will be removed and in its place a combination of concrete slope walls and wrap around Mechanically Stabilized Earth (MSE) walls is proposed in front of each of the abutments. The MSE walls will be placed along the existing end slopes and will support the new fill placed along the approaches and behind the abutments. The MSE walls will run parallel to the JJT and will wrap around the north and south side of the bridge approaches, extending about 32.0 to 25.0 feet along the southeast and southwest ends and about 29.0

feet along the northeast and northwest ends. The walls will have maximum total heights of 16.9 and 15.9 feet at the east and west abutments, respectively. The new concrete end slopes will start from the proposed finished grade at the front face of the wall of about 615.8 to 617.6 feet and 616.2 to 617.8 feet at the east and west abutments, respectively, and will extend to the existing grade at the JJT. We understand the concrete end slopes will be graded at a slope of 1:2 (V: H).

2.0 METHODS OF INVESTIGATION

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

2.1 Field Investigation

The subsurface investigation consisted of five bridge borings, designated as JJT-BSB-01 to JJT-BSB-05, drilled by Wang in March of 2021. The borings were drilled from elevations of 612.1 to 640.2 feet and were advanced to depths of 45.0 to 87.0 feet bgs. Hard drilling and auger refusal were noted in Boring JJT-BSB-05, drilled along the JJT, at an elevation of 603.6 feet (8.5 feet bgs). The location of Boring JJT-BSB-05 was offset about 10 feet to the north and re-drilled. The as-drilled northings and eastings were acquired with a mapping-grade GPS unit. Stations, offsets, and elevations were provided by TranSystems. 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 3).

A combination of truck- and ATV-mounted drilling rigs, equipped with hollow stem augers, was used to advance and maintain open boreholes. Mud rotary drilling techniques were used below 10.0 feet bgs to advance the 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 30.0 feet bgs and at 5.0-foot intervals thereafter to the boring termination depth or top of bedrock. Bedrock cores were obtained from Borings JJT-BSB-01 to JJT-BSB-03 and JJT-BSB-05 in 2.0- to 10-foot runs with an NWD4-sized core barrel. Soil samples collected from each sampling interval were placed in sealed jars and rock cores were placed into boxes and transported to the laboratory for further examination and testing.

Field boring logs, prepared and maintained by Wang field engineers, included 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.

Groundwater levels were measured while drilling. Since mud rotary drilling techniques were used to advance and maintain open boreholes, groundwater level recordings were not available at completion of each boring. When possible, boreholes were flushed out and left open to record 24 hour water level readings. Each borehole location was backfilled upon completion with lean grout, soil cuttings, and/or bentonite chips and, where necessary, the pavement surface was restored as close as possible to its original condition.

2.2 Laboratory Testing

The soil samples were tested in the laboratory for moisture content (AASHTO T265). Atterberg limits (AASHTO T89 and T90) and particle size analysis (AASHTO T88) tests were performed on selected samples. Unconfined compressive strength tests were performed on selected bedrock cores. Field visual descriptions of the soil samples were verified in the laboratory and index tested soils were classified according to the IDH soil Classification System. The laboratory test results are shown in the *Boring Logs* (Appendix A) and in the *Laboratory Test Results* (Appendix B).

3.0 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 4). 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.

Our subsurface investigation results fit into the local geologic context. The borings drilled in the project area revealed the native sediments consists of silty clay to silty clay loam diamicton (unit 2) with occasional lenses of sand and gravel (unit 3) over dolostone bedrock. The top of dolostone bedrock was reached in the structure borings at an elevation of about 572.1 to 567.2 feet (40.0 to 71.5 feet bgs) as predicted based on geologic data.

3.1 Lithological Profile

Borings JJT-BSB-01 to JJT-BSB-04 were drilled along eastbound and westbound I-80 and revealed a pavement structure of 15 to 18 inches of asphalt overlying 6 to 26 inches of damp, sandy gravel aggregate base. Boring JJT-BSB-05 was drilled along the existing JJT and encountered 2.5 inches of asphalt pavement overlying 5 inches of crushed stone aggregate base. In descending order, the general lithologic succession encountered beneath the pavement includes: 1) man-made ground (fill); 2) stiff to hard silty clay loam to silty clay; 3) medium dense to dense sand to gravelly sand and silt to silty loam; 4) dense to very dense silty loam; and 5) strong to very strong, very poor to fair quality dolostone.

1) Man-made ground (fill)

Beneath the pavement, the borings drilled along I-80 encountered up to 30.0 feet of cohesive fill. Boring JJT-BSB-05, drilled along the JJT, augured through up to 10.5 feet of cohesive and granular fill. The cohesive fill consists of medium stiff to hard, brown and gray silty clay to silty clay loam with unconfined compressive strength (Q_u) values of 0.8 to 8.6 tsf and moisture content values of 16 to 26%. Laboratory index testing showed liquid limit (LL) values of 36 to 39% and plastic limit (PL) values of 16 to 17%.

Hard and slow drilling was encountered at an elevation of 612 feet (27.0 feet bgs) in Boring JJT-BSB-02 where a 12-inch thick layer of concrete fragments was encountered directly beneath the cohesive fill. Hard drilling and auger refusal were also noted in Boring JJT-BSB-05, drilled along the JJT, at an elevation of 603.6 feet (8.5 feet bgs), indicating the possible presence of railroad debris or cobbles. The location of Boring JJT-BSB-05 was offset about 10 feet to the north and re-drilled.

The granular fill encountered in Boring JJT-BSB-05 consists of loose to medium dense, black and brown, damp to wet, sandy gravel with N-values of 4 to 14 blows per foot and moisture content values of 15 to 27%.

2) Stiff to hard silty clay loam to silty clay

Beneath the fill, at elevations of 619.7 to 601.6 feet, the borings advanced through 8.0 to 29.0 feet of stiff to hard, brown to gray silty clay loam to silty clay. The silty clay and silty clay loam is characterized by Q_u values of 1.5 to 10.1 tsf and moisture content values of 17 to 22%. Slow drilling was noted within this layer in Boring JJT-BSB-04 at an elevation of 593.2 feet (47.0 feet bgs) indicating the possible presence of cobbles.

3) Medium dense to dense sand to gravelly sand and silt to silty loam

At elevations of 597.4 to 588.9 feet (19.0 to 49.5 feet bgs), the borings advanced through 5.0 to 15.0 feet of medium dense to dense, brown and gray, damp to saturated sand to gravelly sand and silt to silty loam. This soil unit has N-values of 15 to 41 blows per foot and moisture content values of 13 to 27%.

4) Dense to very dense silty loam

At elevations of 584.1 to 577.9 feet (28.0 to 61.5 feet bgs), the borings augured through 6.0 to 10.0 feet of dense to very dense, gray, damp silty loam with N-values of 35 blows per foot to 50 blows per 2 inches and moisture content values of 8 to 16%. Gravel was indicated throughout this layer. Laboratory index testing shows LL and PL values of 17 and 12%, respectively.

Hard drilling and rig chatter, indicating the possible presence of cobbles, was noted in each boring within this layer at depths of 31.5 to 67.0 feet (elevations of 580.6 to 571.7 feet).

5) Strong to very strong, very poor to fair quality dolostone

At elevations of 575.1 to 571.6 feet (37.0 to 68.0 feet bgs), the borings advanced through 2.0 to 4.5 feet of very dense, gray, damp to saturated, weathered dolostone bedrock. This soil unit has N-values of 57 blows per foot to more than 50 blows per inch and a moisture content value of 19%.

At elevations of 572.1 to 567.2 feet (40.0 to 71.5 feet bgs), borings JJT-BSB-01 to JJT-BSB-03 and JJT-BSB-05 encountered and cored strong to very strong, very poor to fair quality, and moderately to highly weathered dolostone bedrock. The rock quality designation (RQD) ranges from 10 to 66% and uniaxial compressive strength tests revealed Q_u values of 6,408 to 7,495 psi. The bedrock core data is shown in the *Bedrock Core Photographs* (Appendix C).

3.2 Groundwater Conditions

Along I-80, groundwater was encountered while drilling at elevations of 592.9 to 586.7 feet (46.8 to 52.0 feet bgs) within the medium dense sand and silt layers. Boring JJT-BSB-05, drilled from the JJT elevation, encountered groundwater while drilling at an elevation of 609.1 feet (3.0 feet bgs) within the sandy gravel fill. At the completion of drilling, Borings JJT-BSB-01 and JJT-BSB-04 were flushed out and left open to measure 24-hour groundwater levels. The 24-hour groundwater level was recorded at elevations of 634.2 to 616.7 feet (6.0 to 22.0 feet bgs) with measured cave-in depths of 62.0 and 12.0 feet bgs at Borings JJT-BSB-01 and JJT-BSB-04, respectively. For the purpose of analysis, the design groundwater elevation is considered at elevation 593 feet. It should be noted that groundwater levels might change with seasonal rainfall patterns and long-term climate fluctuations or may be influenced by local site conditions. Additionally, water perched within the upper fil layers maybe encountered.

4.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

The *Cross-Section* drawings (Appendix F), provided by TranSystems, indicate the existing grade along I-80 will be lowered by up to 5.5 feet and 5.7 along each centerline at the east and west approaches, respectively. We understand the east and west integral abutments will be constructed about 40.0 feet in front of the existing abutments which will require the placement of up to 16.0 and 18.0 feet of new fill. The new fill placed along the approaches and behind the abutments will be supported by wrap-around MSE walls with maximum total heights ranging from 16.9 to 15.9 feet at the east and west abutments, respectively. A minimal amount of fill, about 1.0 to 2.0 feet, will be placed along the existing median to facilitate the inward widening of the bridges by about 30.0 feet.

The plans indicate a portion of the existing concrete end slopes will be removed and in its place a combination of concrete slope walls and the wrap around MSE walls is proposed in front of each of the abutments. The new end slopes will start from the proposed finished grade at the front face of the walls of 615.8 to 617.6 and 616.2 to 617.8 feet at the east and west abutments, respectively, and will extend to the existing JJT grade. We understand the end slopes will be graded at 1:2 (V: H).

Wang recommends supporting the integral abutments on driven pile foundations. Supporting the substructures on shallow foundations is not feasible due to the large loads anticipated from the abutments. Drilled shaft foundations are not approved for use with integral abutments (IDOT 2020a). Geotechnical evaluations and recommendations for the approach embankments, approach slabs, substructure foundations, and retaining walls are included in the following sections.

4.1 Seismic Design Considerations

The seismic site class was determined in accordance with the IDOT *Geotechnical Manual* (IDOT 2020a). The soils within the top 100 feet have a weighted average N-value of 67 blows/foot (Method C controlling) and the results classify the site in the Seismic Site Class C. The project location belongs to the Seismic Performance Zone 1 (IDOT 2020a). The seismic spectral acceleration parameters recommended for design in accordance with the AASHTO *LRFD Bridge Design Specifications* (AASHTO 2020) are summarized in Table 1. According to the IDOT *Bridge Manual* (IDOT 2012), liquefaction analysis is not required for sites located in Seismic Performance Zone 1.

Table 1: Recommended 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= 4.9	F_{pga}= 1.2	**A_s= 5.9**
0.2	S_s= 10.5	F_a= 1.2	**S_{DS}= 12.6**
1.0	S_1= 4.0	F_v= 1.7	**S_{D1}= 6.8**

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

4.2 Mechanically Stabilized Earth Walls

The plans indicate a portion of the existing concrete end slopes will be removed and in its place a combination of concrete slope walls and wrap around MSE walls is proposed in front of each of the four abutments. The MSE walls are proposed along the existing end slopes and will support the new fill placed along the approaches and behind the abutments. The walls will also wrap around the north and south side of the bridge approaches, extending about extending about 32.0 to 25.0 feet along the southeast and southwest ends and about 29.0 feet along the northeast and northwest ends, respectively. The wall station limits and maximum total wall heights are summarized in Table 2.

Table 2: Proposed MSE Walls

Structure	Retaining Wall	Station Limits	Maximum Total Height (feet)
Eastbound Bridge	West Abutment MSE Wall (SW Corner)	534 +33.46, 80.14 RT to 534+76.32, 81.22 LT	15.64
	East Abutment MSE Wall (SE Corner)	535+67.64, 81.01 RT to 536+10.89, 83.29 LT	16.39
Westbound Bridge	West Abutment MSE Wall (NW Corner)	534 +33.46, 80.14 RT to 534+76.32, 81.22 LT	15.87
	East Abutment MSE Wall (NE Corner)	535+67.64, 81.01 RT to 536+10.89, 83.29 LT	16.98

The following sections provide bearing resistance, settlement, sliding, and global stability analyses for the MSE walls supporting the abutments and approach embankments. The borings show primarily low moisture, cohesive soils within the zone of influence of strength and deformation. Wang estimates these soils will provide adequate bearing resistance and global stability along with suitable total and differential long-term consolidation settlement performance.

4.2.1 Bearing Resistance

The top of the MSE leveling pads should be established at a depth of at least 3.5 feet below the finished grade at the front face of the wall (IDOT 2012). The reinforcement width should be taken as 0.7 times the total height or a minimum of 8.0 feet. We estimate equivalent factored bearing pressures of 4,900 and 4,700 psf for maximum total wall heights of approximately 16.9 and 15.9 feet at the east and west walls, respectively.

The foundations will be established on stiff to hard silty clay to silty clay loam. The estimated factored bearing resistance is 5,500 psf calculated based on a geotechnical resistance factor of 0.65 (AASHTO 2020).

4.2.2 Lateral Design Pressure and Resistance

Lateral earth pressure distribution for the design of the MSE walls should be taken as per the 2020 AASHTO LRFD *Bridge Design Specifications* Article 3.11.5.8 (AASHTO 2020); and applicable 2012 IDOT *Bridge Manual* (IDOT 2012). Design lateral pressure from surcharge loads due to roadway traffic and construction equipment should be added to the lateral earth pressure load. The estimated friction angle between the base of the MSE walls and the underlying silty clay to silty clay loam is 28° and the corresponding friction coefficient is 0.53 (AASHTO 2020). MSE retaining walls are designed based on an AASHTO sliding resistance factor of 1.0 for soil-on-soil contact (AASHTO 2020). We estimate the eccentricity lies within the middle 2/3 of the walls and resistance against overturning is sufficient. The MSE walls must have both internal and external stability. The wall supplier is responsible for all internal stability aspects of the wall design.

4.2.3 Settlement

Settlement estimates have been made based on correlations to measured index properties obtained from the laboratory tests (Appendix B). Based on the soil conditions, we estimate the MSE walls will undergo maximum long-term consolidation settlements of up to 0.8 inches. We anticipate that more than 0.4 inches of settlement will remain after construction of the MSE walls. A relative settlement between the pile and surrounding soils of more than 0.4 inches would result in downdrag loads. The estimated settlements are appropriate for the construction of the approach slabs; however, we anticipate downdrag allowances for the proposed abutment piles.

4.2.4 Global Stability

The global stability of the MSE walls was analyzed at the critical sections based on the soil profile described in Section 3.1 and the information provided in the *Plan and Elevation* and *Cross-sections* (Appendixes E and F). The minimum required FOS for both short (undrained) and long-term (drained) conditions is 1.5 (IDOT 2012). Our analysis indicates that the MSE walls have adequate FOS. *Slide2* exhibits employing the Bishop Simplified method of analysis are shown in Appendix D.

4.2.5 Approach Slabs

We assume the approach slabs will be supported on spread footing foundations (IDOT 2012). Based on the design drawings and soil conditions revealed in Borings JJT-BSB-01 to JJT-BSB-04, the approach footings will be supported mainly on the new fill to be placed behind the abutments. We estimate the fill has a maximum factored bearing resistance of 2,500 psf calculated for a geotechnical resistance factor (Φ_b) of 0.45 (AASHTO 2020). Settlement of the approach footing is estimated to be less than 1.0 inch.

4.3 Structure Foundations

The soil conditions along the structure show stiff to hard clayey soils followed by medium dense to very dense sand to silty loam overlying dolostone bedrock. Wang recommends supporting the integral abutments on driven metal shell piles (MSP) or steel H-piles.

The preliminary factored loading information provided and proposed abutment cap base elevations as provided by TranSystems are summarized in Table 3.

Table 3: Preliminary Factored Loads and Proposed Pile Cap Elevations

Direction	Substructure	Pile Cap Elevations (feet)	Total Factored Load (kips)
Eastbound	West Abutment	625.31	2638
	East Abutment	625.77	
Westbound	West Abutment	626.30	
	East Abutment	626.72	

4.3.1 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 and MSP should be based on a geotechnical resistance factor (Φ_G) of 0.55 (IDOT 2012). Nominal tip and side resistance were estimated using the methods and empirical equations presented in the latest *IDOT Geotechnical Pile Design Guide* (IDOT 2020a). Based on the loads provided by TranSystems and the proposed width of the substructures, the load per pile at the abutments will range between about 126 and 336 kips for a single row of piles spaced at 3- to 8-feet.

Based on IDOT standards, piles with greater than 0.4-inch of relative settlement along the sides require allowances for downdrag loads. We estimate that more than 0.4 inch of settlement will remain following the construction of the MSE walls and subsequent pile driving. As such, we estimate that downdrag allowances will be required for the abutment piles.

The R_F, R_N, estimated pile tip elevations, and pile lengths for 14-inch diameter MSP with 0.312-inch thick shells, 16-inch diameter MSP with 0.312-inch thick shells, HP12x74, and HP14x89 steel H-piles for the abutments are summarized in Tables 4 to 7. In accordance with *All Bridge Designers Memo 19.8* (IDOT 2019), a pile sleeve of either corrugated metal or HDPE pipe shall be placed around each pile for the full height of the MSE select backfill. The void between the pile and the pile sleeve shall be filled with bentonite. We assume the piles would be driven through the sleeves. The pile capacity evaluations have been performed assuming that pile driving begins at the base of the MSE walls, elevations 612.3 feet to 613.5 feet at the east and west abutments, respectively. The pile lengths shown in the tables assume a 2-foot pile embedment into the pile cap and include the section of the pile within the MSE reinforced zone.

High blow counts and hard drilling were noted within the borings below an approximate elevation of 584 feet indicating the presence of cobbles. As such, pile shoes should be used for piles driven to or below an elevation of 584 feet to avoid damage to the piles.

Based on the geometry shown in the preliminary and existing plans, we assume the existing pier spread footings may conflict with the driving of some piles. The proposed abutment pile locations should be selected to miss the existing footings.

Table 4: Estimated Pile Lengths and Tip Elevations for 14-inch Diameter MSP with 0.312-inch walls

Structure Unit (Reference Boring)	Pile Cap Base Elevations (feet)	Nominal Required Bearing, RN (kips)	Factored Geotechnical Loss (kips)	Factored Geotechnical Load Loss (kips)	Factored Resistance Available, RF (kips)	Total Estimated Pile Length (feet)	Estimated Pile Tip Elevation (feet)
Eastbound West Abutment (JJT-BSB-01)	625.31	303	22	45	100	41	586
		570(1)	22	45	247	44	583
Westbound West Abutment (JJT-BSB-02)	626.30	316	16	33	125	38	590
		362	16	33	150	47	581
		407	16	33	175	48	580
		570(1)	16	33	265	49	579
Eastbound East Abutment (JJT-BSB-03)	625.77	238	10	21	100	31	597
		284	10	21	125	34	594
		329	10	21	150	36	592
		375	10	21	175	39	589
		420	10	21	200	43	585
		465	10	21	225	44	584
		570(1)	10	21	283	49	579
Westbound East Abutment (JJT-BSB-04)	626.72	329	19	37	125	39	590
		375	19	37	150	43	586
		465	19	37	200	44	585
		511	19	37	225	46	583
		570(1)	19	37	258	49	580

(1) Maximum Nominal Required Bearing

Table 5: Estimated Pile Lengths and Tip Elevations for 16-inch Diameter MSP with 0.312-inch walls

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)
Eastbound West Abutment (JJT-BSB-01)	625.31	365	25	51	125	41	586
		654(1)	25	51	284	44	583
Westbound West Abutment (JJT-BSB-02)	626.30	376	19	38	150	37	591
		422	19	38	175	47	581
		654(1)	19	38	303	49	579
Eastbound East Abutment (JJT-BSB-03)	625.77	247	12	24	100	29	599
		293	12	24	125	30	598
		338	12	24	150	33	595
		384	12	24	175	34	594
		429	12	24	200	38	590
		475	12	24	225	40	588
		520	12	24	250	44	584
		654(1)	12	24	324	49	579
Westbound East Abutment (JJT-BSB-04)	626.72	389	21	43	150	39	590
		480	21	43	200	44	585
		571	21	43	250	45	584
		654(1)	21	43	296	49	580

(1) Maximum Nominal Required Bearing

Table 6: Estimated Pile Lengths and Tip Elevations for HP12x74 Steel 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)
Eastbound West Abutment (JJT-BSB-01)	625.31	313	16	31	125	45	582
		358	16	31	150	48	579
		404	16	31	175	51	576
		449	16	31	200	54	573
		495	16	31	225	56	571
		540	16	31	250	57	570
		589(1)	16	31	277	58	569
Westbound West Abutment (JJT-BSB-02)	626.30	291	12	23	125	54	574
		336	12	23	150	57	571
		382	12	23	175	58	570
		427	12	23	200	59	569(2)
		589(1)	12	23	289	61	567
Eastbound East Abutment (JJT-BSB-03)	625.77	267	7	15	125	53	575
		313	7	15	150	55	574
		358	7	15	175	56	572
		404	7	15	200	57	571(3)
		589(1)	7	15	302	59	569
Westbound East Abutment (JJT-BSB-04)	626.72	253	13	26	100	50	579
		298	13	26	125	53	576

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)
		344	13	26	150	54	575
		389	13	26	175	55	574
		435	13	26	200	56	573
		525	13	26	250	58	571
		589(1)	13	26	284	60	569

(1) Maximum Nominal Required Bearing

(2) Approximate top of bedrock at Boring JJT-BSB-02

(3) Approximate top of bedrock at Boring JJT-BSB-03

Table 7: Estimated Pile Lengths and Tip Elevations for HP14x89 Steel 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)
Eastbound West Abutment (JJT-BSB-01)	625.31	282	18	37	100	41	586
		373	18	37	150	45	582
		418	18	37	175	48	579
		464	18	37	200	50	577
		509	18	37	225	53	574
		555	18	37	250	55	572
		600	18	37	275	57	570
		645	18	37	300	58	569
		705(1)	18	37	332	59	568
Westbound West Abutment (JJT-BSB-02)	626.30	302	14	27	125	49	579
		347	14	27	150	54	574

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)
		393	14	27	175	56	572
		438	14	27	200	58	570
		529	14	27	250	60	568(2)
		705(1)	14	27	347	61	567
Eastbound East Abutment (JJT-BSB-03)	625.77	275	9	17	125	51	577
		320	9	17	150	54	574
		365	9	17	175	55	573
		411	9	17	200	56	572
		456	9	17	225	57	571(3)
		705(1)	9	17	362	59	569
Westbound East Abutment (JJT-BSB-04)	626.72	265	15	31	100	44	585
		311	15	31	125	49	580
		356	15	31	150	53	576
		402	15	31	175	54	575
		447	15	31	200	55	574
		538	15	31	250	56	573
		584	15	31	275	57	572
		629	15	31	300	58	571
		705(1)	15	31	341	60	569

(1) Maximum Nominal Required Bearing

(2) Approximate top of bedrock at Boring JJT-BSB-02

(3) Approximate top of bedrock at Boring JJT-BSB-03

4.3.2 Lateral Loading

Lateral loads on the piles 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 8 to 10.

Table 8: Recommended Soil Parameters for Lateral Load Analysis at West Abutments
Reference Borings JJT-BSB-01 and JJT-BSB-02

Elevation Range (feet) 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} (%)
Proposed Pile Cap Base to Top of Leveling Pad New FILL	125	1000	0	500	0.7
613.0 to 607.0 Very Stiff SILTY CLAY to SILTY CLAY LOAM FILL	120	1500	0	500	0.5
607.0 to 593.0 Very Stiff to Hard SILTY CLAY LOAM to SILTY CLAY	120	4000	0	1000	0.5
593.0 to 587.0 Medium Dense SILTY LOAM to SILT	53(1)	0	32	60	--
587.0 to 584.0 Medium Dense SAND	53(1)	0	33	60	--
584.0 to 578.0 Very Stiff to Hard SILTY CLAY to SILTY CLAY LOAM	58(1)	2900	0	1000	0.5
578.0 to 572.0 Very Dense GRAVELLY SILTY LOAM	58(1)	0	36	125	--
572.0 to Top of Bedrock V Dense WEATHERED BEDROCK	58(1)	0	36	125	--

(1) Submerged unit weight.

Table 9: Recommended Soil Parameters for Lateral Load Analysis at East Abutments
Reference Boring JJT-BSB-03 and JJT-BSB-04

Elevation Range (feet) 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} (%)
Proposed Pile Cap Base to Top of Leveling Pad New FILL	125	1000	0	500	0.7
612.3 to 607.0 Very Stiff SILTY CLAY FILL	120	2000	0	1000	0.5
607.0 to 597.0 Stiff to Hard SILTY CLAY	120	2300	0	1000	0.5
597.0 to 592.0 Medium Dense SILT	120	0	32	90	--
592.0 to 582.0 Medium Dense SAND	53(1)	0	33	60	--
582.0 to 573.0 Dense to Very Dense SILTY LOAM to GRAVELLY SILTY LOAM	58(1)	0	36	125	--
573.0 to Top of Bedrock Very Dense WEATHERED BEDROCK	58(1)	0	36	125	--

(1) Submerged unit weight

Table 10: Bedrock Parameters for Lateral Load Analysis
Reference Borings JJT-BSB-01to JJT-BSB-03 and JJT-BSB-05

Bedrock	Total Unit Weight, γ (pcf)	Modulus of Rock Mass (ksi)	Uniaxial Compressive Strength (psi)	RQD (%)	Strain Factor
Dolostone	140	400	6,000 (Estimated)	10	0.0005
Dolostone	140	700	6408	33	0.0005
Dolostone	140	780	7495	58	0.0005

4.4 Stage Construction

Stage construction is identified in the *GPE* (Appendix E). Wang understands that the bridge replacements will be performed utilizing two main stages of construction to maintain traffic on each bridge. During Stage I, two lanes of traffic would be maintained on the existing bridges so that the widening can advance within the existing median area. During Stage II, the two lanes of traffic would utilize the roadway constructed during Stage I so that the existing bridges can be removed and the outside portion of the widening can be constructed.

The construction activities will likely involve excavations of up to 28.0 and 27.0 feet along the sides of the existing east and west abutments, respectively. Due to the presence of very hard cohesive soils with Q_u values of greater than 4.5 tsf, we estimate these excavations may not be supported with cantilever steel sheet piling and we recommend including the pay item, *Temporary Soil Retention System* for the shoring.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

Vegetation, surface topsoil, and debris should be cleared and stripped where the structures 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.

5.2 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. Any slope that cannot be graded at 1:2 (V: H) should be properly shored.

During the subsurface investigation, the groundwater was encountered at elevations ranging from 593 to 587 feet, as discussed in Section 4.2. At the abutments, the groundwater will be about 33.0 to 38.5 feet below the proposed pile cap base elevations; therefore, we do not anticipate the need for dewatering. The proposed top of leveling pad for the MSE walls will be about 20.6 to 26.0 feet above the estimated groundwater table and we do not anticipate the need for significant dewatering systems. However, perched, or temporary water, such as that encountered within the upper fill in Boring JJT-BSB-05 and within 24-hours in Boring JJT-04, may be encountered during times of heavy precipitation while excavating within the upper fill soils and will require dewatering efforts. Water that does accumulate in open excavations by seepage or runoff should be immediately removed by sump pump.

5.3 Filling and Backfilling

Fill material used to attain final design elevations should be pre-approved, compacted, cohesive or granular soil conforming to Section 204, *Borrow and Furnished Excavation* (IDOT 2016). The fill material should be free of organic matter and debris and should be placed in lifts and compacted according to Section 205, *Embankment* (IDOT 2016). In accordance with IDOT Section 205, *Embankment*, the embankments proposed for widening should be properly benched or deeply plowed prior to placement of new fill along the slopes (IDOT 2016).

Backfill materials for the abutments 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 Supplemental Special and Recurring Special Provisions, *Granular Backfill for Structures* (IDOT 2020b).

5.4 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.

5.5 Pile Installation

The driven piles shall be furnished and installed according to the requirements of IDOT Section 512, *Piling* (IDOT 2016). Wang recommends performing one test pile at each substructure location. Since hard driving is expected below an approximate elevation of 584 feet, pile shoes are required as indicated in Section 5.3.1.

6.0 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 TranSystems Corporation 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.

Azza Hamad, P.E.
Senior Geotechnical Engineer

Mickey Snider, P.E.
QC/QA Reviewer

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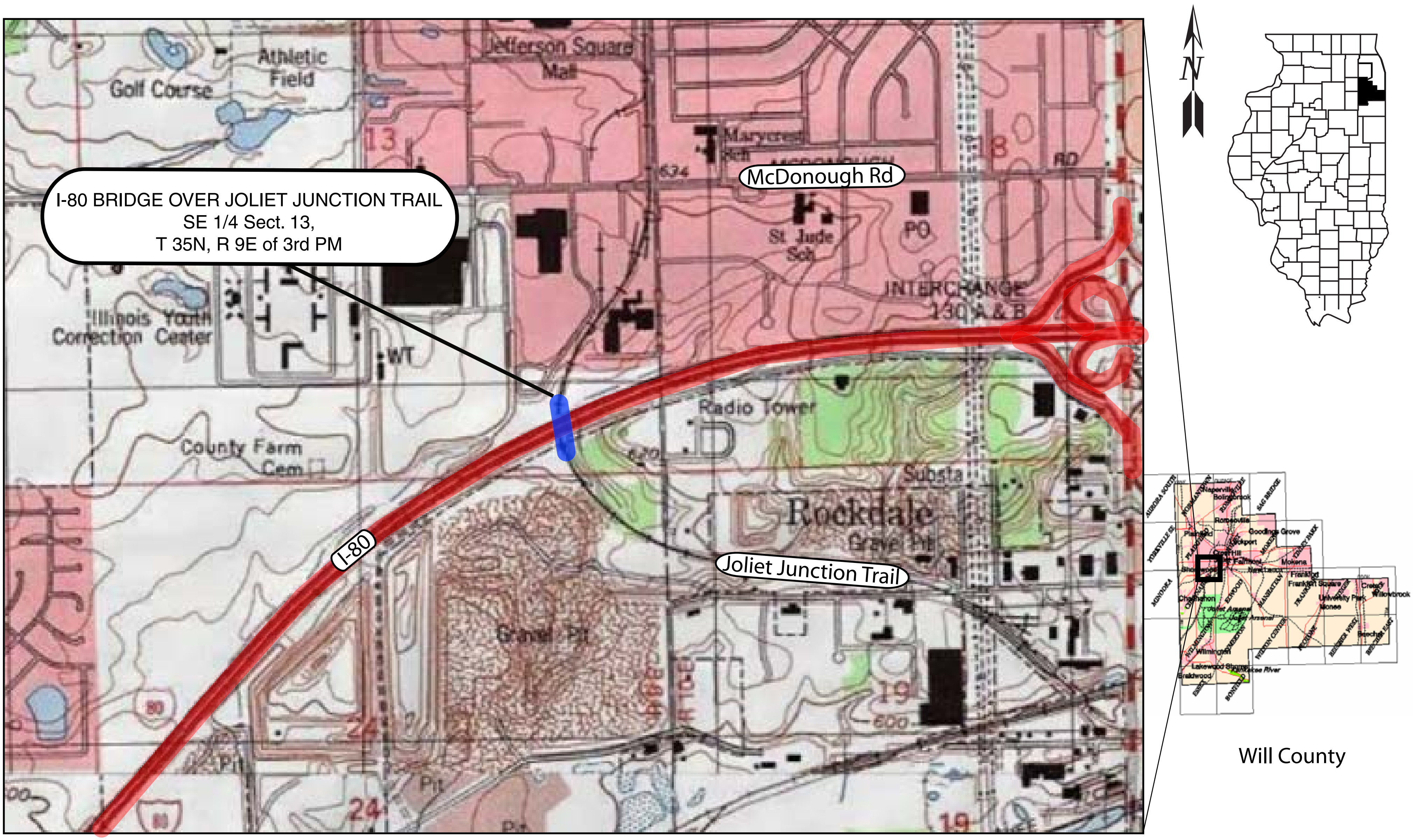
EXHIBITS



0 0.5 1.0 Mile

SITE LOCATION MAP: I-80 BRIDGE OVER JOLIET JUNCTION TRAIL, I-80 RECONSTRUCTION FROM HOUBOLT ROAD TO WEST OF CENTER STREET & LARKIN AVENUE INTERCHANGE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: J. Bensen CHECKED BY: A. Hamad

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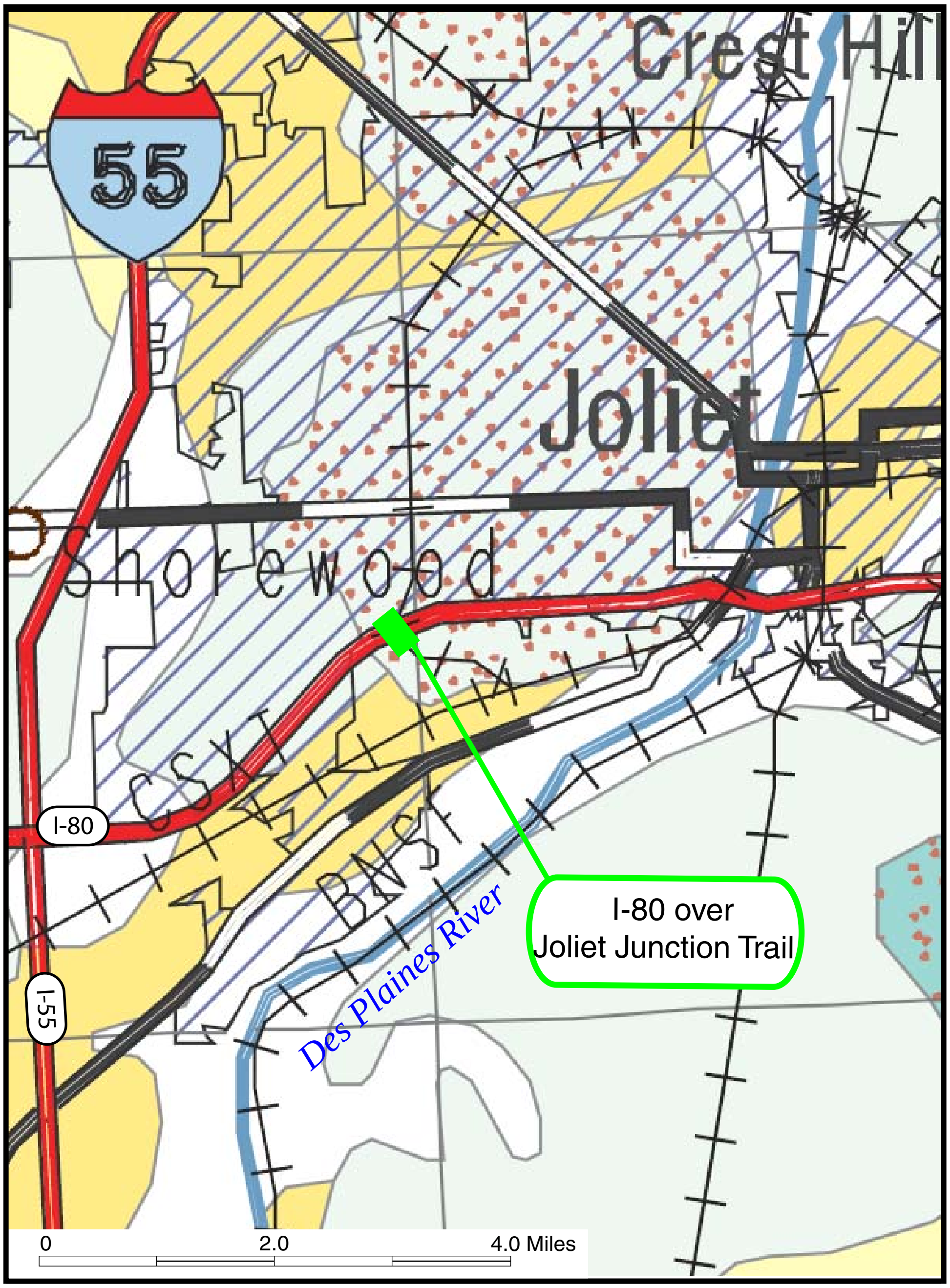
FOR TRANSYSTEMS	7901-15-01



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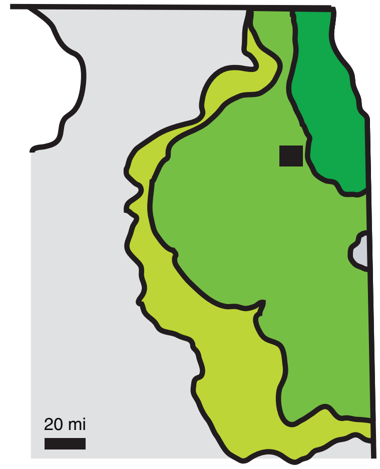
Modified after William W. Shilts (2000)

REGIONAL GEOLOGY



Wedron Group

- Wadsworth Formation
- Lemont Formation
- Tiskilwa Formation

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, clay, or fine sand deposited in slackwater, glacial, and postglacial lakes; massive to bedded, calcareous

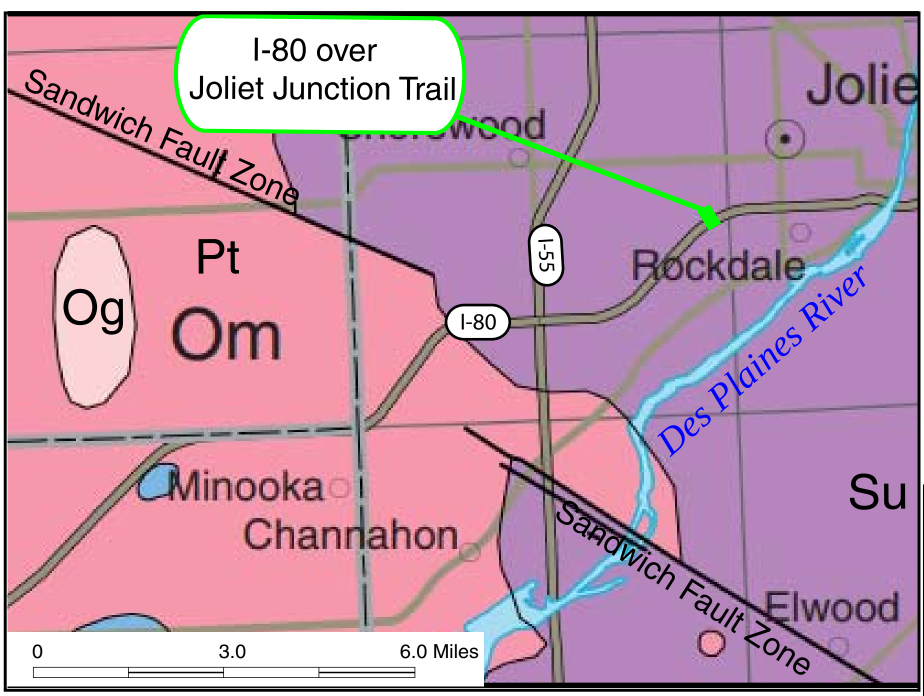
Henry Formation
Predominantly stratified sand and gravel; locally occurring silt, clay, organic debris, wood, shell lenses; outwash on floodplains

Lemont Formation
Diamicton; silty clay loam to silty clay; fine grained matrix; unsorted, unstratified mixture of gravel, sand, silt, and clay; containing lenses of sand, gravel and/or silt.

Bedrock near or at the surface

Major metropolitan area

Modified after William W. Shilts (2000)

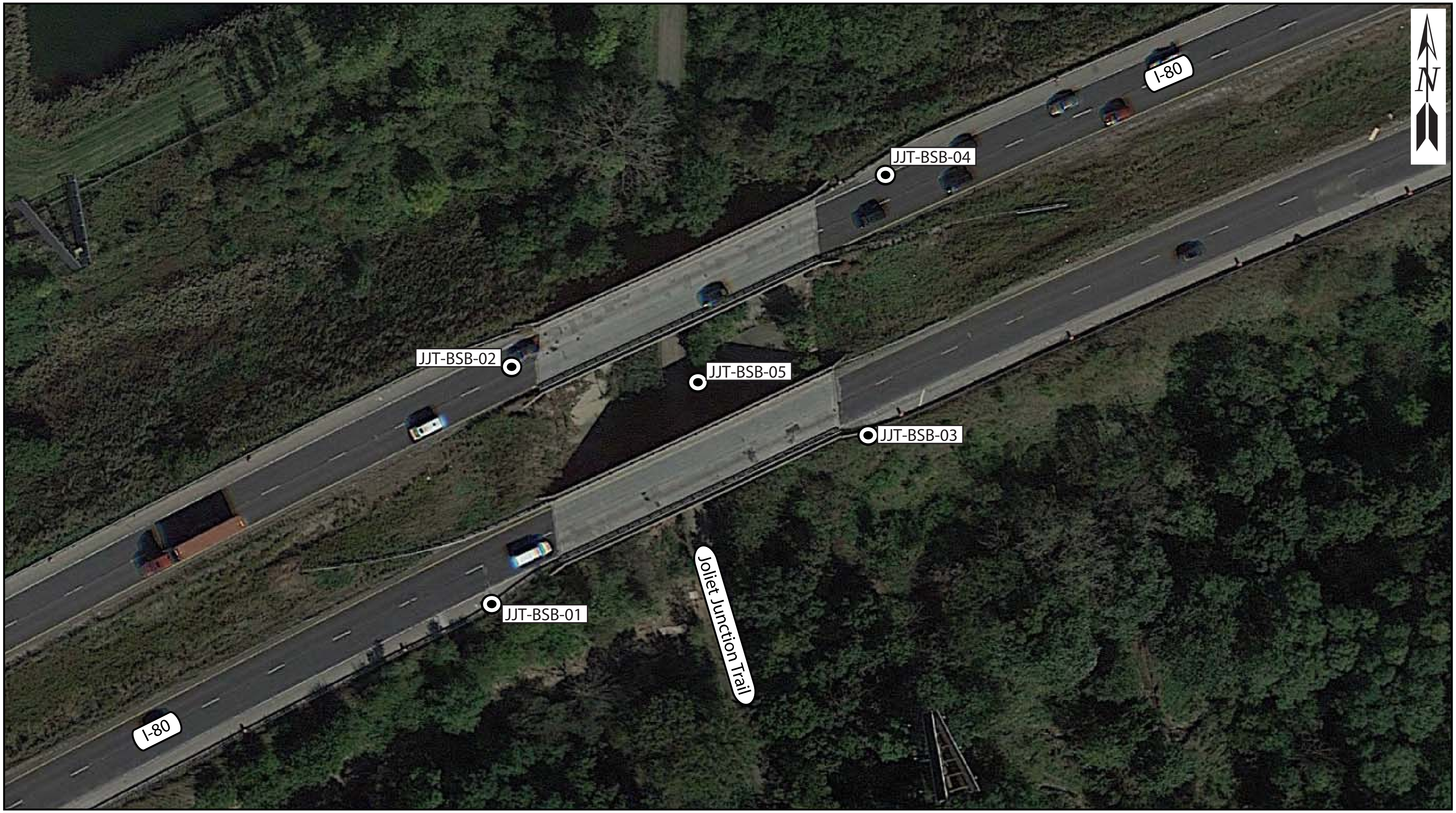


Modified after Dennis R. Kolata (2005)

Legend

- Pt **Pennsylvanian Shale**
  Tadewater Formation
- Su **Silurian Dolomitic Limestone**
- Om **Ordovician Formation**
  Maquoketa Group
- Og **Ordovician Formation**
  Galena Group

SITE AND REGIONAL GEOLOGY: I-80 RECONSTRUCTION, I-80 BRIDGE over JOLIET JUNCTION TRAIL, WILL COUNTY, ILLINOIS		
SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: C. Marin CHECKED BY: L. Iordache
Wang Engineering		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR TRANSYSTEMS CORPORATION		7901-15-01



0 200 400 Feet

Legend

◉ Boring Location

BORING LOCATION PLAN: I-80 BRIDGES OVER JOLIET JUNCTION TRAIL, I-80 RECONSTRUCTION FROM HOUBOLT ROAD TO WEST OF CENTER STREET & LARKIN AVENUE INTERCHANGE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 3	DRAWN BY: J. Bensen CHECKED BY: A. Hamad

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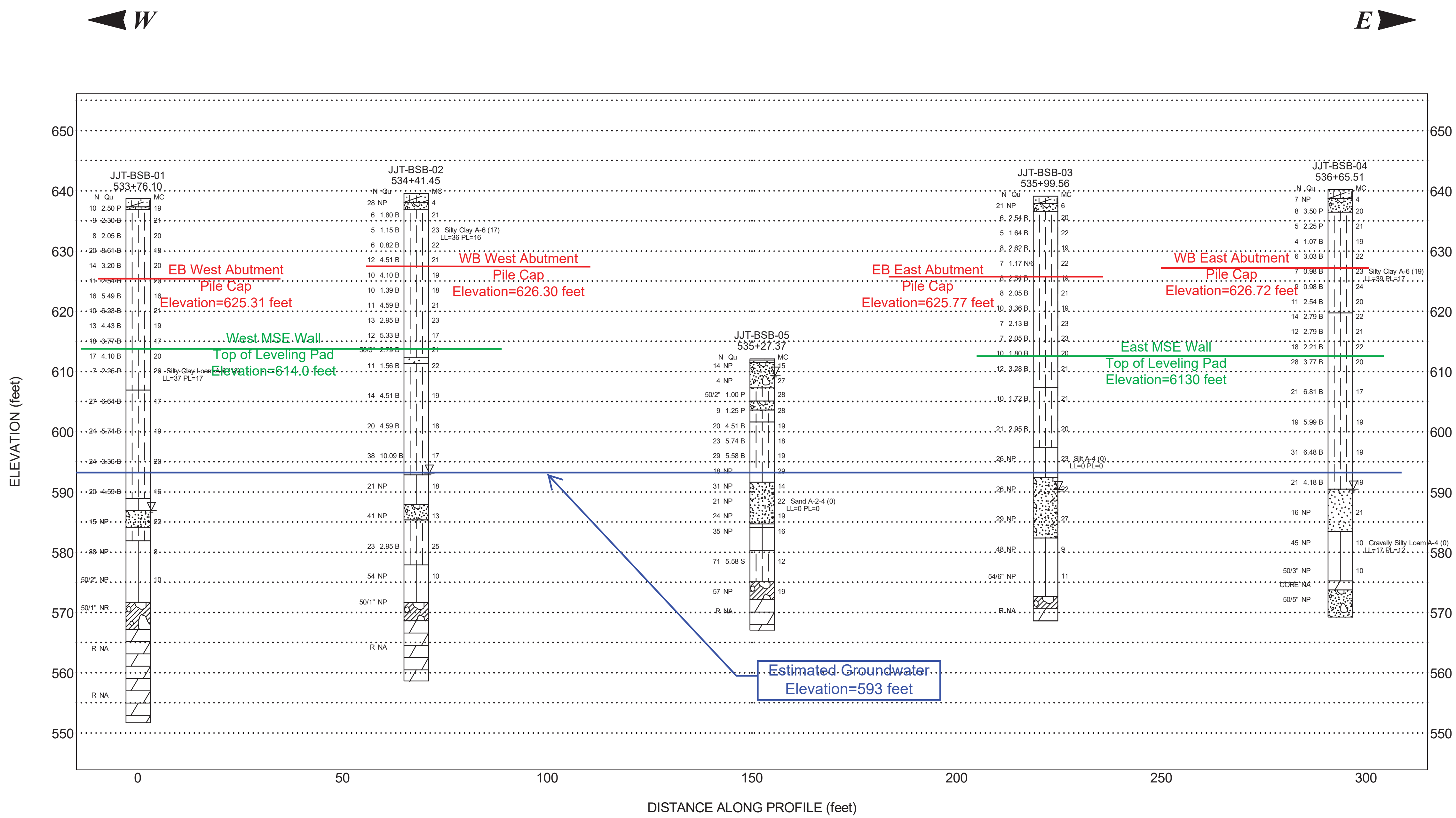
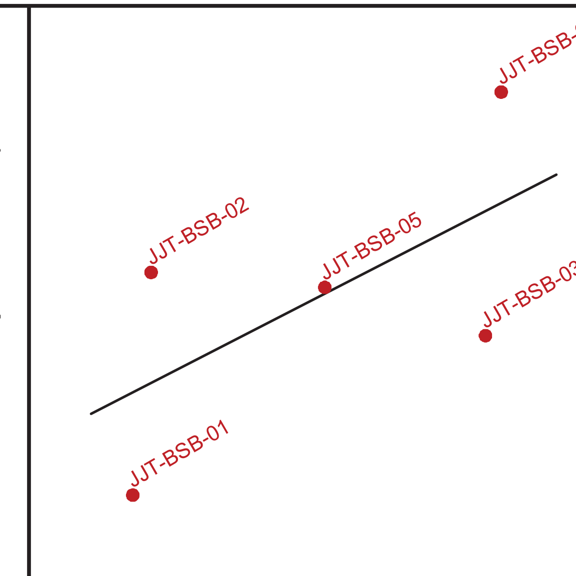
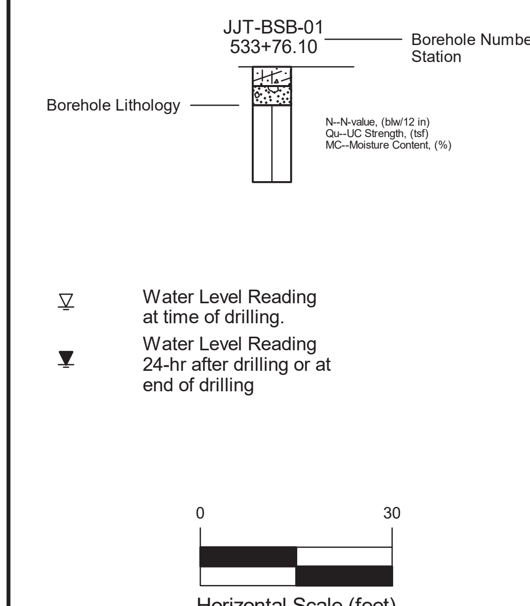




Site Map Scale 1 inch equals 110 feet

Explanation:



Vertical Exaggeration: 1.5x

Lithology Graphics

- Pavement
- Coarse sand
- IDH Sand, Sandy Loam
- Gravelly sand, sandy gravel
- Weathered bedrock
- Crushed stone
- IDH Silty Clay, Silty Clay Loam
- Dolomite or Dolomitic Limestone
- IDH Silt, Silty Loam
- Concrete

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I-80 Bridges over Joliet Junction Trail Soil Profile

WEI SINCE 1982

I-80 Reconstruction (Houbolt Road to Center Street)
Will County, Illinois

JOB NUMBER	PLATE NUMBER
7901-15-01	EXHIBIT 4

WEI 11X17 79011501.GPJ WANGENG.GDT 1/17/22

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APPENDIX A

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BORING LOG JJT-BSB-01

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Road to Center Street)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 638.68 ft
North: 1763574.41 ft
East: 1036121.43 ft
Station: 533+76.10
Offset: 60.29 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	16-inch thick ASPHALT --PAVEMENT--					
637.4						
636.9	5-inch thick, brown and gray SANDY GRAVEL; damp --AGGREGATE BASE--		1	3 4 6	2.50 P	19
	Very stiff to hard, brown and gray SILTY CLAY to SILTY CLAY LOAM, trace gravel; damp --FILL-- --RDR 2--	5	2	3 4 5	2.30 B	21
			3	3 4 4	2.05 B	20
		10	4	5 10 10	8.61 B	18
			5	4 7 7	3.20 B	20
		15	6	3 5 6	2.54 B	20
			7	8 6 10	5.49 B	16
		20	8	7 5 5	6.23 B	21
			9	4 5 8	4.43 B	19
		25	10	6 8 10	3.77 B	17
			11	5 7 10	4.10 B	20
	--trace organic matter-- --L_L(%)=37, P_L(%)=17-- --%Gravel=2.4-- --%Sand=5.3-- --%Silt=66.6-- --%Clay=25.7-- --A-6 (18)--	30	12	3 3 4	2.25 P	26
606.9	Very stiff to hard, brown to gray SILTY CLAY LOAM to SILTY CLAY, trace gravel; damp --RDR 2--					
		35	13	7 12 15	6.64 B	17
		40	14	6 11 13	5.74 B	19
		45	15	6 11 13	3.36 B	20
588.9		50	16	6 8 12	4.59 B	16

GENERAL NOTES

Begin Drilling: **03-14-2021** Complete Drilling: **03-14-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D50T [80%]**
Driller: **J&M** Logger: **M. Sadowski** Checked by: **C. Marin**
Drilling Method: **2.25" IDA HSA to 10 ft; mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **52.00 ft**
At Completion of Drilling: **NA**
Time After Drilling: **24 hours**
Depth to Water: **22 (cave in at 62 ft) ft**

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

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BORING LOG JJT-BSB-01

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Road to Center Street)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 638.68 ft
North: 1763574.41 ft
East: 1036121.43 ft
Station: 533+76.10
Offset: 60.29 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	Gray SILTY LOAM; damp --RDR 2--					
586.9	Medium dense, gray and brown, coarse SAND; wet to saturated --RDR 2--		17	9 8 7	NP	22
584.2	Hard (4.00P), gray SILTY CLAY; damp --RDR 2--	55				
581.9	Very dense, gray Gravelly SILTY LOAM; damp --RDR 2-3-- --hard drilling at 58 feet-- --possible cobbles--	60	18	34 45 43	NP	8
	--RDR 3-4--	65	19	38 50/2"	NP	10
	--slow hard drilling from 67 feet-- --possible cobbles--					
571.7	WEATHERED BEDROCK --RDR 4--	70	20	50/1"	NR	
567.2	Very strong, light yellowish gray, fair quality DOLOSTONE; closely spaced, moderately weathered, horizontal and oblique joints, with <0.05 inch opening, slightly rough walls, and <0.2 inch thick sand infill, few chert nodules. --RUN 1: 71.5 to 79.0 feet-- --Recovery= 98%-- --RQD= 66%--	75	21	CORE		
	--RUN 2: 79.0 to 87.0 feet-- --Recovery=100%-- --RQD= 56%--	80, 85	22	CORE		
551.7	Boring terminated at 87.00 ft	90, 95, 100				

GENERAL NOTES

Begin Drilling **03-14-2021** Complete Drilling **03-14-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20D50T [80%]**
Driller **J&M** Logger **M. Sadowski** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA to 10 ft; mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **52.00 ft**
At Completion of Drilling **NA**
Time After Drilling **24 hours**
Depth to Water **22 (cave in at 62 ft) ft**

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BORING LOG JJT-BSB-02

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Road to Center Street)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 639.61 ft
North: 1763702.19 ft
East: 1036132.01 ft
Station: 534+41.45
Offset: 50.05 LT

Elevation (ft)	Soil and Rock Description	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	18-inch thick ASPHALT --PAVEMENT--					
638.1	Medium dense, brown and gray SANDY GRAVEL; damp --AGGREGATE BASE--		1	20 22 6	NP	4
636.9	Medium stiff to hard, brown and gray SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--	5	2	2 3 3	1.80 B	21
	--L_L(%)=36, P_L(%)=16-- --%Gravel=2.0-- --%Sand=9.1-- --%Silt=54.2-- --%Clay=34.6-- --A-6 (17)--		3	2 3 2	1.15 B	23
		10	4	2 3 3	0.82 B	22
			5	4 5 7	4.51 B	21
		15	6	4 5 5	4.10 B	19
			7	4 5 5	1.39 B	18
		20	8	3 4 7	4.59 B	21
			9	4 6 7	2.95 B	23
		25	10	6 6 6	5.33 B	17
			11	5 6 50/3"	2.79 B	21
612.4	--very hard and slow drilling at 27 feet, concrete fragments-- --FILL-- --RDR 4-5--					
611.4	Hard, brown and gray SILTY CLAY; damp --RDR 2--	30	12	5 5 6	1.56 B	22
		35	13	4 7 7	4.51 B	19
		40	14	8 10 10	4.59 B	18
		45	15	8 18 20	10.09 B	17
592.9	Medium dense, gray SILT; wet --RDR 2--					
		50	16	8 9 12	NP	18

GENERAL NOTES

Begin Drilling: **03-11-2021** Complete Drilling: **03-11-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D50T [80%]**
Driller: **NC&EG** Logger: **M. Sadowski** Checked by: **C. Marin**
Drilling Method: **2.25" IDA HSA to 10 ft; mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **46.75 ft**
At Completion of Drilling: **mud in borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG JJT-BSB-02

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Road to Center Street)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 639.61 ft
North: 1763702.19 ft
East: 1036132.01 ft
Station: 534+41.45
Offset: 50.05 LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
587.9	Brown and gray Gravelly SAND; saturated --RDR 2-3--						
585.4	Very stiff to hard (>4.5P), gray SILTY CLAY LOAM, trace gravel; damp	55		17	10 30 11	NP	13
	--RDR 3-- --rig chatter and slow drilling at 55.5 feet, possible cobbles-- --silt seams--	60		18	10 11 12	2.95 B	25
577.9	Very dense, gray Gravelly SILTY LOAM; damp --RDR 2-3--	65		19	18 27 27	NP	10
	--rig chatter at 65 feet; possible cobbles--						
571.6	Very dense, gray GRAVEL; damp --WEATHERED BEDROCK-- --RDR 3-4-- --slow drilling, rock fragments--	70		20	50/1"	NP	
568.6	Very strong, light yellowish gray, poor quality DOLOSTONE; closely spaced, moderately weathered, horizontal joints, with <0.05 inch opening, slightly rough walls, and <0.2 inch thick sand infill.	75			CORE		
	--RUN 1: 71.0 to 81.0 feet-- --Recovery = 98%-- --RQD= 33%-- --Q_u= 6,408 psi-- --no water return from 78 to 79 feet--	80		21			
558.6	Boring terminated at 81.00 ft	85 90 95 100					

GENERAL NOTES

Begin Drilling **03-11-2021** Complete Drilling **03-11-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20D50T [80%]**
Driller **NC&EG** Logger **M. Sadowski** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA to 10 ft; mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **46.75 ft**
At Completion of Drilling **mud in borehole**
Time After Drilling **NA**
Depth to Water **NA**

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BORING LOG JJT-BSB-03

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Road to Center Street)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 639.13 ft
North: 1763665.90 ft
East: 1036323.57 ft
Station: 535+99.56
Offset: 64.22 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	15-inch thick ASPHALT --PAVEMENT--					
637.9	Medium dense, brown and gray SANDY GRAVEL; damp --AGGREGATE BASE--		1	28 18 3	NP	6
636.6	Stiff to very stiff, brown and gray SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--	5	2	2 3 3	2.54 B	20
			3	2 2 3	1.64 B	22
		10	4	4 4 4	2.62 B	19
			5	3 3 4	1.17 N/6	22
		15	6	3 4 4	2.54 B	19
			7	3 3 5	2.05 B	21
		20	8	4 4 6	3.36 B	19
			9	3 3 4	2.13 B	23
		25	10	3 3 4	2.05 B	23

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			11	4 4 6	1.80 B	20
		30	12	5 6 6	3.28 B	21
607.4	Stiff to very stiff, brown and gray SILTY CLAY; damp --RDR 2--					
		35	13	4 5 5	1.72 B	21
		40	14	7 9 12	2.95 B	20
597.4	Medium dense, brown SILT; damp to moist --RDR 2-- --L_L(%)=NP, P_L(%)=NP-- --%Gravel=0.6-- --%Sand=3.1-- --%Silt=91.2-- --%Clay=5.0-- --A-4 (0)--	45	15	12 13 13	NP	23
592.4	Medium dense, brown and gray, medium to coarse SAND; moist to saturated --RDR 2--	50	16	12 14 12	NP	22

GENERAL NOTES

Begin Drilling **03-15-2021** Complete Drilling **03-15-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20D50T [80%]**
Driller **J&M** Logger **M. Sadowski** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA to 10 ft; mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **49.00 ft**
At Completion of Drilling ▼ **mud in borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG JJT-BSB-03

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Road to Center Street)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 639.13 ft
North: 1763665.90 ft
East: 1036323.57 ft
Station: 535+99.56
Offset: 64.22 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		55		17	8, 12, 17	NP	27
582.4	Dense to very dense, gray SILTY LOAM, little to some gravel; damp --RDR 2-3--	60		18	27, 27, 21	NP	9
	--slow hard drilling and rig chatter at 61.5 feet-- --possible cobbles--			19	54/6"	NP	11
		65					
572.6	--hard drilling from 66.5 feet-- --WEATHERED BEDROCK--						
570.6	Very strong, light brownish gray, fair quality, DOLOSTONE; closely spaced, moderately weathered, horizontal joints, with 0.05 - 0.2 inch opening, slightly rough walls, and <0.2 inch thick sand infill. --RUN 1: 68.5 to 70.5 feet-- --Recovery = 96%-- --RQD= 58%-- --Q_u= 7,495 psi-- --no water return at 69.5 feet--	70		20	CORE		
568.6		75					

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	Boring terminated at 70.50 ft						
		80					
		85					
		90					
		95					
		100					

GENERAL NOTES

Begin Drilling **03-15-2021** Complete Drilling **03-15-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20D50T [80%]**
Driller **J&M** Logger **M. Sadowski** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA to 10 ft; mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **49.00 ft**
At Completion of Drilling ▼ **mud in borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG JJT-BSB-04

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Road to Center Street)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 640.22 ft
North: 1763805.61 ft
East: 1036332.58 ft
Station: 536+65.51
Offset: 59.29 LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	18-inch thick ASPHALT --PAVEMENT--					
638.7	Loose, brown and gray SANDY GRAVEL; damp --AGGREGATE BASE--		1	8 4 3	NP	4
636.5	Medium stiff to very stiff, brown and gray SILTY CLAY, trace to little gravel; damp --FILL-- --RDR 2--	5	2	9 5 3	3.50 P	20
			3	2 2 3	2.25 P	21
		10	4	2 2 2	1.07 B	19
			5	2 3 3	3.03 B	22
	--L_L(%)=39, P_L(%)=17-- --%Gravel=0.5-- --%Sand=11.3-- --%Silt=54.7-- --%Clay=33.5-- --A-6 (19)--	15	6	3 3 4	0.98 B	23
			7	3 4 5	0.98 B	24
		20	8	5 5 6	2.54 B	20
619.7	Very stiff to hard, brown and gray SILTY CLAY, trace gravel; damp --RDR 2-3--		9	3 6 8	2.79 B	22
		25	10	6 6 6	2.79 B	21
			11	5 7 11	2.21 B	22
		30	12	5 7 21	3.77 B	20
		35	13	3 9 12	6.81 B	17
		40	14	8 8 11	5.99 B	19
		45	15	8 13 18	6.48 B	19
	--slow drilling at 47.0 feet-- --possible cobbles--					
590.5		50	16	7 8 13	4.18 B	19

GENERAL NOTES

Begin Drilling **03-10-2021** Complete Drilling **03-10-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20D50T [80%]**
Driller **NC&EG** Logger **M. Sadowski** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA to 10 ft; mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **50.00 ft**
At Completion of Drilling **NA**
Time After Drilling **24 hours**
Depth to Water **6 (cave in at 12 ft) ft**

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BORING LOG JJT-BSB-04

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Road to Center Street)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 640.22 ft
North: 1763805.61 ft
East: 1036332.58 ft
Station: 536+65.51
Offset: 59.29 LT

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 and gray, medium to coarse SAND; wet --RDR 2 to 3--	55	SS	17	8 8 8	NP	21
583.5	Dense to very dense, gray Gravelly SILTY LOAM; damp --RDR 2-3-- --L_L(%)=17, P_L(%)=12-- --%Gravel=17.6-- --%Sand=29.7-- --%Silt=44.6-- --%Clay=8.1-- --A-4 (0)-- --rig chatter-- --possible cobbles--	60	SS	18	19 21 24	NP	10
	--very hard drilling at 65 feet; possible boulder--		SS	19	31 50/3"	NP	10
575.2	--RDR 4--	65					
	Very strong, light grayish gray, highly weathered DOLOSTONE BOULDER, --RUN 1: 66.0 to 66.5 feet-- --Recovery = 67%-- --RQD= 0%--		Core	20	CORE		
573.7	--loss of drilling mud-- Very dense, gray, fine to coarse GRAVEL; saturated --RDR 4-- --gravel cave-in at 70 feet--	70	SS	21	50/5"	NP	
569.2	Boring terminated at 71.00 ft						
		75					

GENERAL NOTES

Begin Drilling: **03-10-2021** Complete Drilling: **03-10-2021**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D50T [80%]**
Driller: **NC&EG** Logger: **M. Sadowski** Checked by: **C. Marin**
Drilling Method: **2.25" IDA HSA to 10 ft; mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **50.00 ft**
At Completion of Drilling: **NA**
Time After Drilling: **24 hours**
Depth to Water: **6 (cave in at 12 ft) ft**

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BORING LOG JJT-BSB-05

WEI Job No.: 7901-15-01

Client: **TransSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Road to Center Street)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 612.10 ft
North: 1763693.55 ft
East: 1036231.49 ft
Station: 535+27.37
Offset: 0.41 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
611.9	2.5-inch thick ASPHALT --PAVEMENT--					
611.5	5-inch thick, gray CRUSHED STONE --AGGREGATE BASE--		1	7 / 4 / 10	NP	15
	Loose to medium dense, dark brown and black SANDY GRAVEL; damp to wet --FILL-- --RDR 2--	5	2	2 / 2 / 2	NP	27
607.3	Stiff, black and brown SILTY CLAY --FILL-- --RDR 2--		3	2 / 4 / 50/2"	1.00 P	28
605.1	--hard drilling; possible cobbles-- --RDR 4--					
603.6	--auger refusal at 8.5 feet-- --offset boring 10 feet north--	10	4	2 / 3 / 6	1.25 P	28
601.6	Stiff, brown SILTY CLAY LOAM, trace gravel; damp --FILL--					
	Hard, brown to gray SILTY CLAY, trace gravel; damp --RDR 2--		5	5 / 8 / 12	4.51 B	19
		15	6	8 / 8 / 15	5.74 B	18
			7	8 / 12 / 17	5.58 B	19
593.3	Medium dense, gray SILT; saturated --RDR 2--	20	8	5 / 8 / 10	NP	29
591.6	Medium dense to dense, brown, medium to coarse SAND; saturated --RDR 2--		9	13 / 15 / 16	NP	14
	--L_L(%)=NP, P_L(%)=NP-- --%Gravel=1.1-- --%Sand=84.5-- --%Silt=12.9--	25	10	7 / 8 / 13	NP	22
	--%Clay=1.4-- --A-2-4 (0)--		11	8 / 11 / 13	NP	19
584.7						
584.1	Hard (>4.50P), gray SILTY CLAY; damp					
	Dense, gray SILTY LOAM, few silt seams; damp --RDR 2--	30	12	13 / 19 / 16	NP	16
	--hard drilling and rig chatter at 31.5; possible cobbles-- --RDR 3 to 4--					
580.4	Hard, gray SILTY CLAY LOAM, trace gravel; damp --RDR 4--	35	13	24 / 33 / 38	5.58 S	12
	--hard drilling, 37.0 to 38.5 feet-- --possible cobbles--					
575.1	Very dense, gray weathered DOLOSTONE fragments; wet --WEATHERED BEDROCK-- --RDR 4--	40	14	12 / 26 / 31	NP	19
572.1	Strong, light brownish brown, very poor quality, DOLOSTONE; Closely spaced, highly weathered, horizontal, oblique, and vertical joints, with 0.05 - > 0.2 inch opening, slightly rough to rough walls, and no infill. --RUN 1: 40.0 to 45.0 feet-- --Recovery = 100%-- --RQD= 10%--	45	15	CORE		
567.1	Boring terminated at 45.00 ft	50				

GENERAL NOTES

Begin Drilling **03-22-2021** Complete Drilling **03-24-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20D25A [83%]**
Driller **J&M** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA to 10 ft; mud rotary thereafter; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **3.00 ft**
At Completion of Drilling ▼ **mud in borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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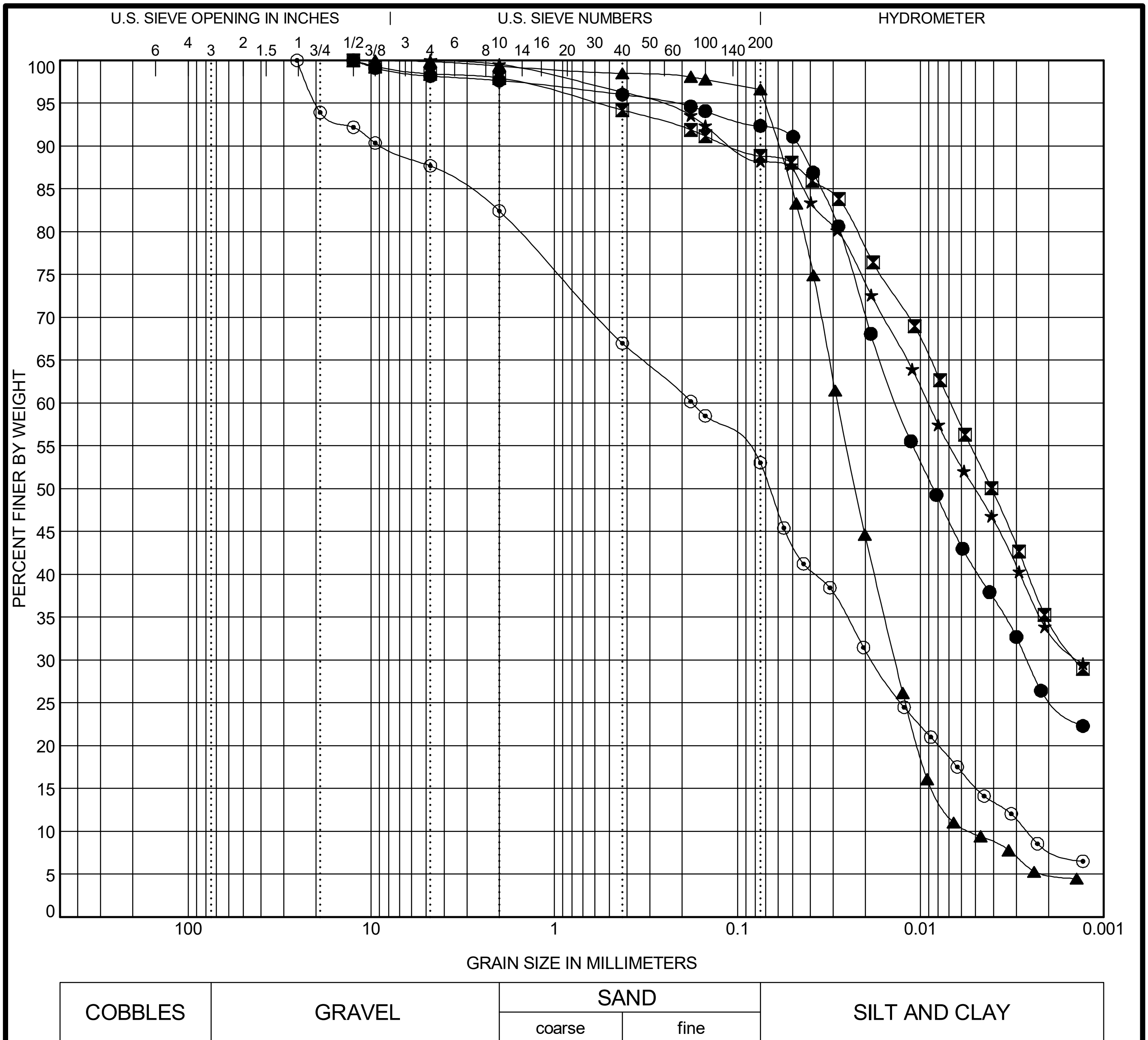
APPENDIX B



	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	JJT-BSB-01#12	28.5 ft	**Silty Clay Loam**	**37**	**17**	**20**		
⧗	JJT-BSB-02#3	6.0 ft	**Silty Clay**	**36**	**16**	**20**		
▲	JJT-BSB-03#15	43.5 ft	**Silt**	**NP**	**NP**	**NP**	**1.26**	**5.34**
★	JJT-BSB-04#6	13.5 ft	**Silty Clay**	**39**	**17**	**22**		
⊙	JJT-BSB-04#18	58.5 ft	**Gravelly Silty Loam**	**17**	**12**	**5**	**0.73**	**66.95**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	JJT-BSB-01#12	28.5 ft	**12.5**	**0.014**	**0.003**		**2.4**	**5.3**	**66.6**	**25.7**
⧗	JJT-BSB-02#3	6.0 ft	**12.5**	**0.007**	**0.001**		**2.0**	**9.1**	**54.2**	**34.6**
▲	JJT-BSB-03#15	43.5 ft	**9.5**	**0.028**	**0.014**	**0.005**	**0.6**	**3.1**	**91.2**	**5.0**
★	JJT-BSB-04#6	13.5 ft	**4.75**	**0.009**	**0.001**		**0.5**	**11.3**	**54.7**	**33.5**
⊙	JJT-BSB-04#18	58.5 ft	**25.4**	**0.176**	**0.018**	**0.003**	**17.6**	**29.7**	**44.6**	**8.1**

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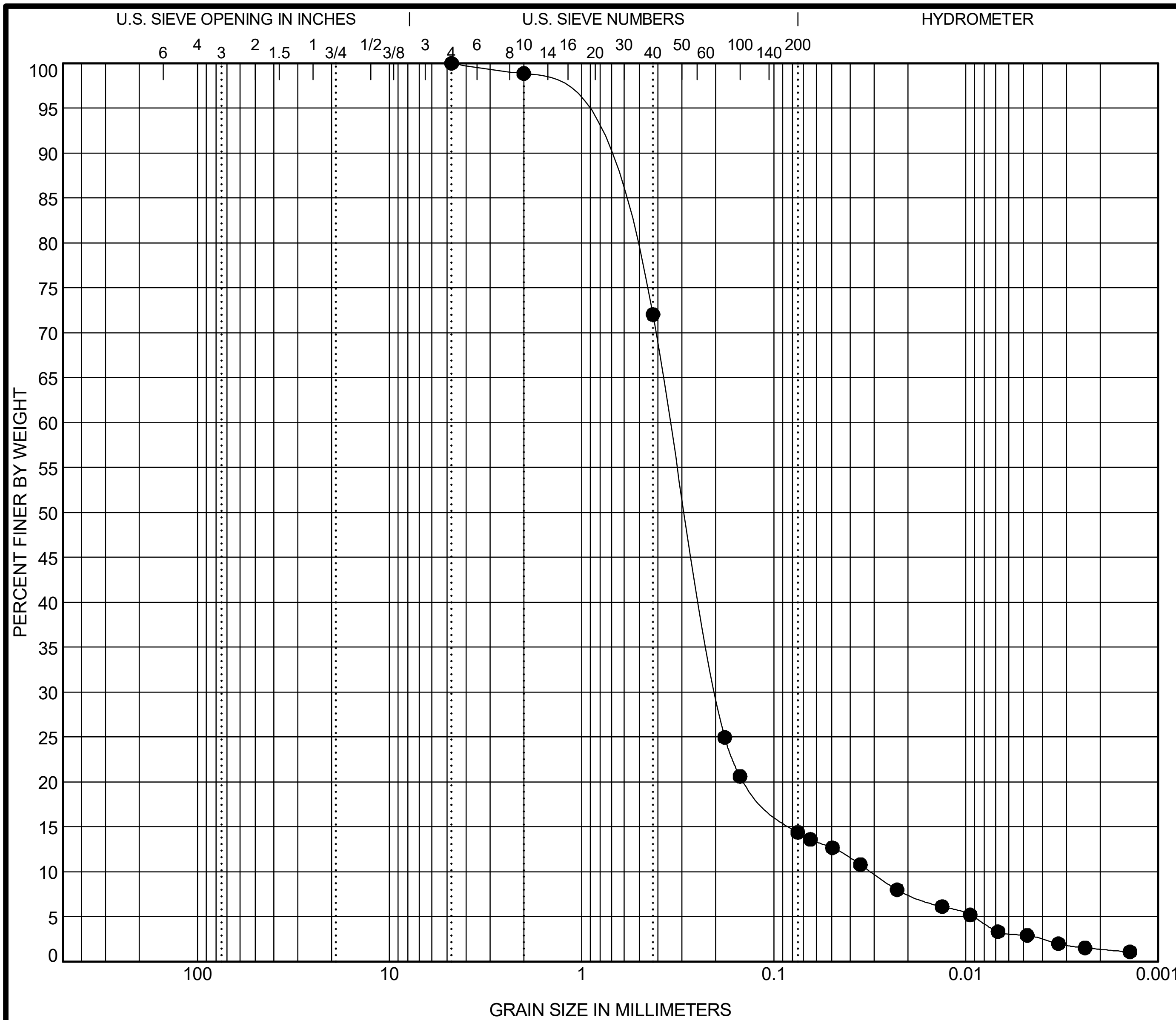
GRAIN SIZE DISTRIBUTION

Project: I-80 Reconstruction (Houbolt Road to Center Street)

Location: Will County, Illinois

Number: 7901-15-01



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	JJT-BSB-05#10	23.5 ft	Sand	NP	NP	NP	3.66	10.94

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	JJT-BSB-05#10	23.5 ft	4.75	0.341	0.197	0.031	1.1	84.5	12.9	1.4

WEI GRAIN SIZE IDH 79011501.GPJ US LAB.GDT 5/20/21

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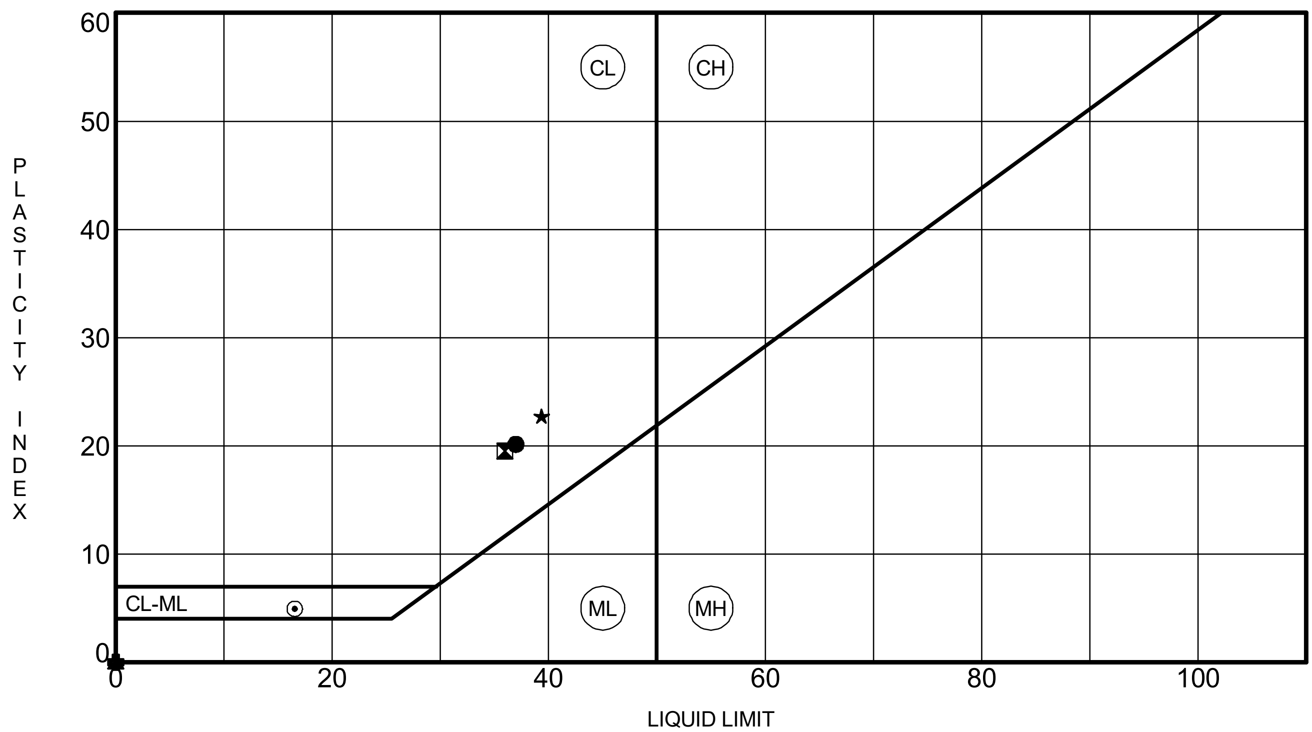
GRAIN SIZE DISTRIBUTION

Project: I-80 Reconstruction (Houbolt Road to Center Street)

Location: Will County, Illinois

Number: 7901-15-01



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	**JJT-BSB-01#12**	**28.5 ft**	**37**	**17**	**20**	**92**	**Silty Clay Loam**
⧗	**JJT-BSB-02#3**	**6.0 ft**	**36**	**16**	**20**	**89**	**Silty Clay**
▲	**JJT-BSB-03#15**	**43.5 ft**	**NP**	**NP**	**NP**	**97**	**Silt**
★	**JJT-BSB-04#6**	**13.5 ft**	**39**	**17**	**22**	**88**	**Silty Clay**
⊙	**JJT-BSB-04#18**	**58.5 ft**	**17**	**12**	**5**	**53**	**Gravelly Silty Loam**
✿	**JJT-BSB-05#10**	**23.5 ft**	**NP**	**NP**	**NP**	**14**	**Sand**

WEI
SINCE 1982
Wang Engineering, Inc.
1145 N MAin Street
Lombard, IL 60148
Telephone: (630) 953-9928
Fax: (630) 953-9938

ATTERBERG LIMITS' RESULTS

Project: I-80 Reconstruction (Houbolt Road to Center Street)

Location: Will County, Illinois

Number: 7901-15-01

Unconfined Compressive Strength of Intact Rock Core Specimens

Project: I-80 Reconstruction

Client: Transystems

WEI Job No.: 7901-15-01

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)
JJT-BSB-02 Run 1	1	71.5	West Abutment	Dolostone	4.20	NA	2.05	21110	6408.2	3	4/16/21	MAC	3.29
JJT-BSB-03 Run 1	2	68.5	East Abutment	Dolostone	4.23	NA	2.05	24690	7495	3	4/16/21	MAC	3.29

*** 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

Run #1

0 6 inches

Boring JJT-BSB-01:
Run #1, 71.5 to 79.0 feet, RECOVERY=88%, RQD=66%

BEDROCK CORE: I-80 BRIDGE OVER JOLIET JUNCTION TRAIL; I-80 RECONSTRUCTION FROM HOUBOLT RD TO W CENTER ST & LARKIN AVE INTERCHANGE; CONTRACT D-91-207-19, PTB 194/11, WILL COUNTY, ILLINOIS		
SCALE: GRAPHICAL	APPENDIX C-1	DRAWN BY: J. Bensen CHECKED BY: A. Hamad
Wang Engineering		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR TRANSYSTEMS		7901-15-01

Run #2

Boring JJT-BSB-01:
Run #2, 79.0 to 87.0 feet, RECOVERY=100%, RQD=56%

BEDROCK CORE: I-80 BRIDGE OVER JOLIET JUNCTION TRAIL; I-80 RECONSTRUCTION FROM HOUBOLT RD TO W CENTER ST & LARKIN AVE INTERCHANGE; CONTRACT D-91-207-19, PTB 194/11, WILL COUNTY, ILLINOIS		
SCALE: GRAPHICAL	APPENDIX C-2	DRAWN BY: J. Bensen CHECKED BY: A. Hamad
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FOR TRANSYSTEMS		7901-15-01

Run #1

0 6 inches

Boring JJT-BSB-02:
Run #1, 71.0 to 81.0 feet, RECOVERY=98%, RQD=33%

BEDROCK CORE: I-80 BRIDGE OVER JOLIET JUNCTION TRAIL; I-80 RECONSTRUCTION FROM HOUBOLT RD TO W CENTER ST & LARKIN AVE INTERCHANGE; CONTRACT D-91-207-19, PTB 194/11, WILL COUNTY, ILLINOIS		
SCALE: GRAPHICAL	APPENDIX C-3	DRAWN BY: J. Bensen CHECKED BY: A. Hamad
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Run #1

Boring JJT-BSB-03:
Run #1, 68.5 to 70.5 feet, RECOVERY=96%, RQD=58%

BEDROCK CORE: I-80 BRIDGE OVER JOLIET JUNCTION TRAIL; I-80 RECONSTRUCTION FROM HOUBOLT RD TO W CENTER ST & LARKIN AVE INTERCHANGE; CONTRACT D-91-207-19, PTB 194/11, WILL COUNTY, ILLINOIS		
SCALE: GRAPHICAL	APPENDIX C-4	DRAWN BY: J. Bensen CHECKED BY: A. Hamad
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Run #1

0 6 inches

Boring JJT-BSB-05:
Run #1, 40.0 to 45.0 feet, RECOVERY=100%, RQD=10%

BEDROCK CORE: I-80 BRIDGE OVER JOLIET JUNCTION TRAIL; I-80 RECONSTRUCTION FROM HOUBOLT RD TO W CENTER ST & LARKIN AVE INTERCHANGE; CONTRACT D-91-207-19, PTB 194/11, WILL COUNTY, ILLINOIS		
SCALE: GRAPHICAL	APPENDIX C-5	DRAWN BY: J. Bensen CHECKED BY: A. Hamad
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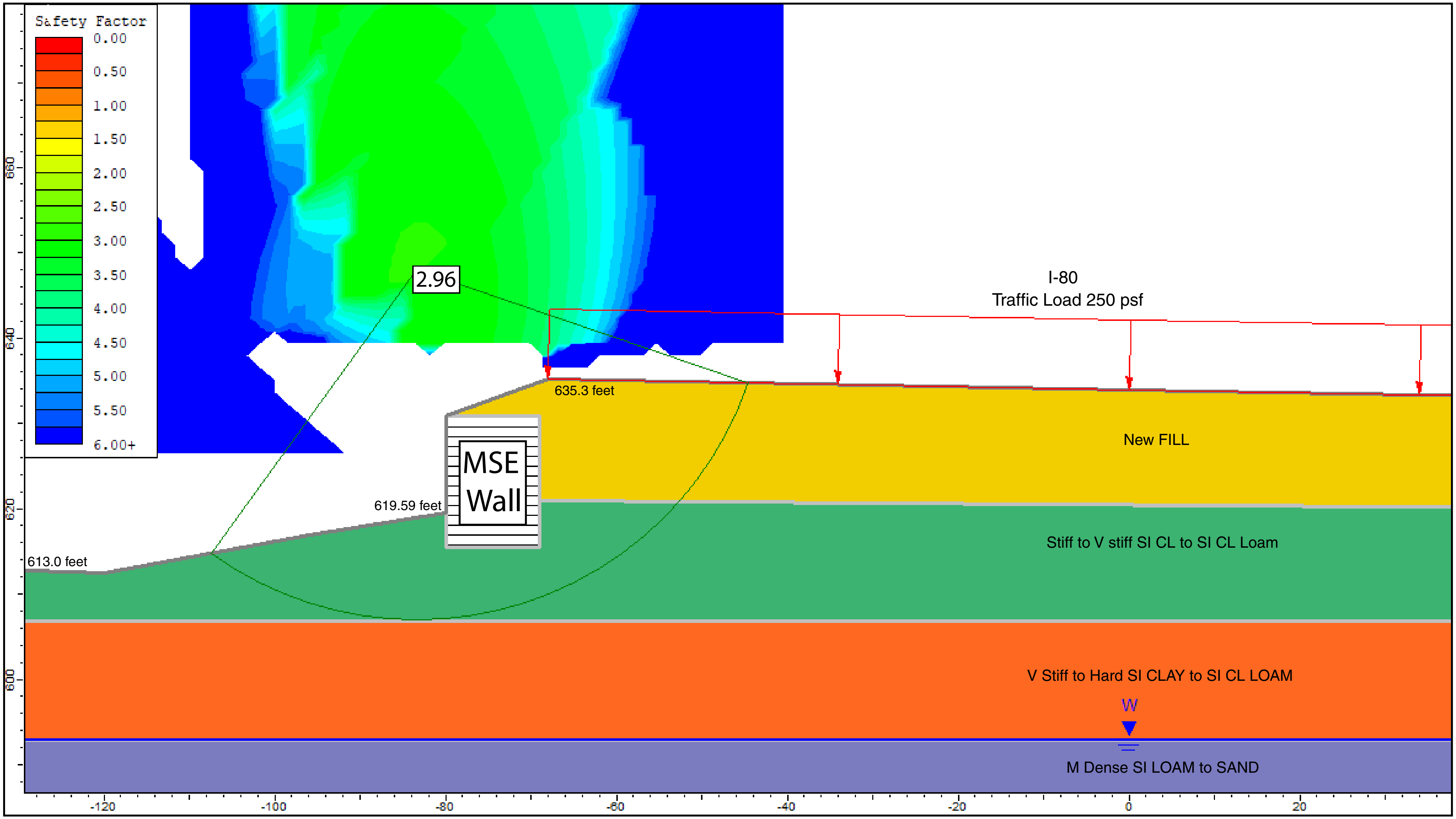
APPENDIX D



Undrained Analysis, WB West Abutment Side Slope, STA 534+74.64, Reference Borings: JJT-BSB-01 and JJT-BSB-02

Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	New Fill	125	1000	0
2	Stiff to V Stiff SI CL to SI CL Loam	120	1500	0
3	V Stiff to Hard SI CLAY to SI CL LOAM	120	4000	0
4	M Dense SI LOAM to SAND	115	0	32

GLOBAL STABILITY: I-80 BRIDGES OVER JOLIET JUNCTION TRAIL; I-80 RECONSTRUCTION FROM HOUBOLT ROAD TO WEST OF CENTER STREET AND LARKIN AVENUE INTERCHANGE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL

APPENDIX D-1

DRAWN BY: A. Hamad
CHECKED BY: M. Snider

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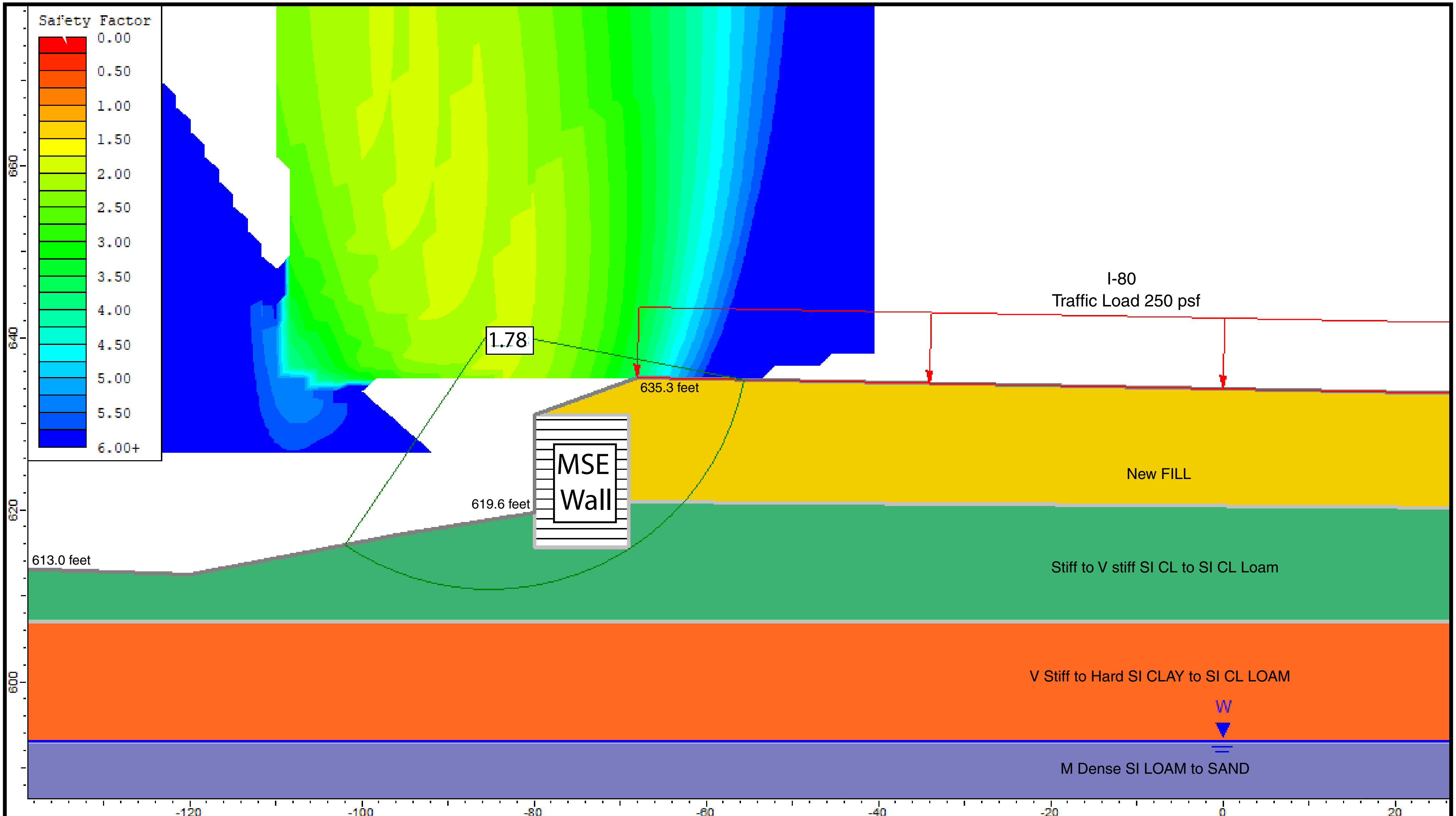
FOR TRANSYSTEMS

7901-15-01



Drained Analysis, WB West Abutment Side Slope, STA 534+74.64, Reference Borings: JJT-BSB-01 and JJT-BSB-02

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	New Fill	125	100	30
2	Stiff to V Stiff SI CL to SI CL Loam	120	100	30
3	V Stiff to Hard SI CLAY to SI CL LOAM	120	100	30
4	M Dense SI LOAM to SAND	115	0	32

GLOBAL STABILITY: I-80 BRIDGES OVER JOLIET JUNCTION TRAIL; I-80 RECONSTRUCTION FROM HOUBOLT ROAD TO WEST OF CENTER STREET AND LARKIN AVENUE INTERCHANGE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL | APPENDIX D-2 | DRAWN BY: A. Hamad | CHECKED BY: M. Snider

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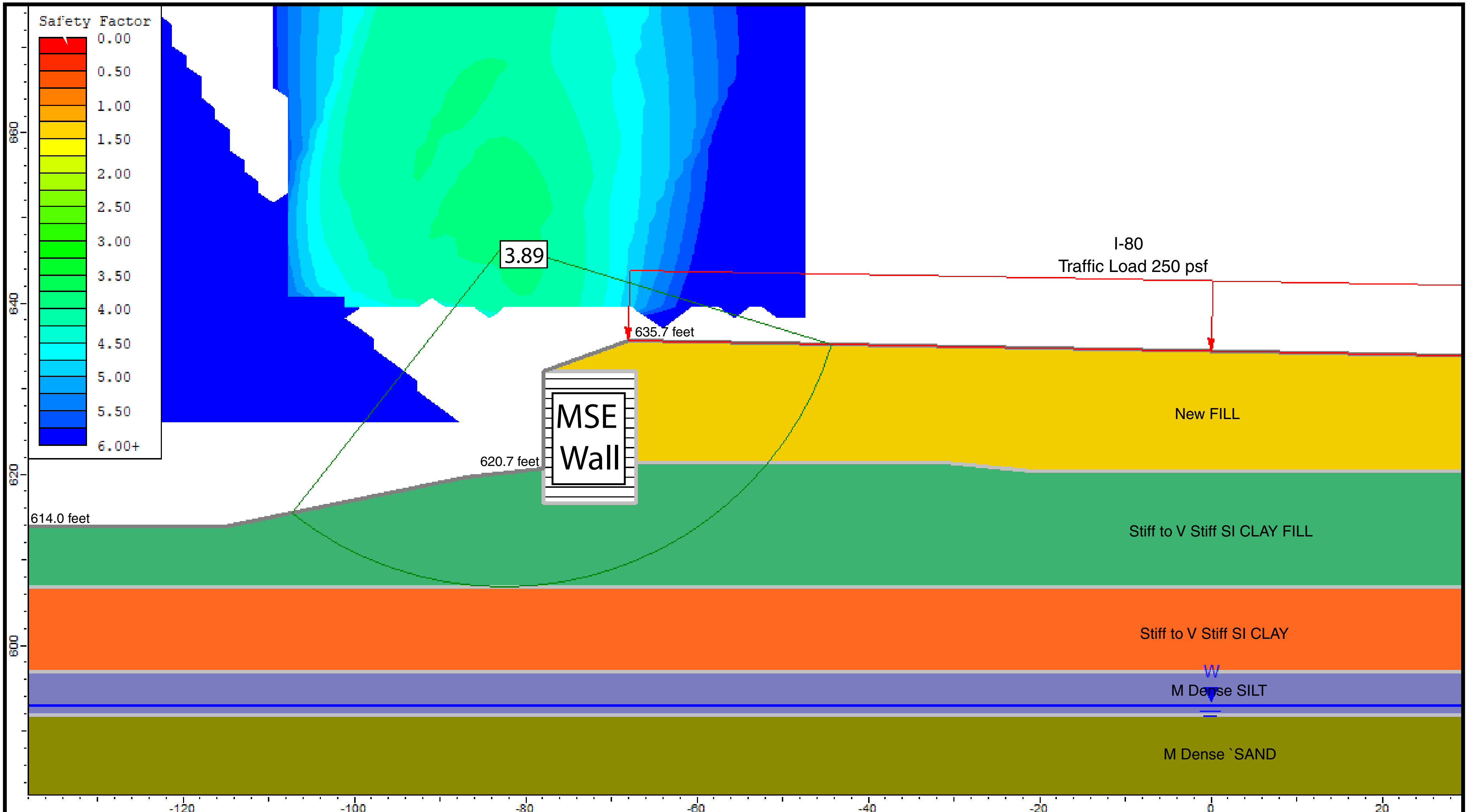
7901-15-01



Undrained Analysis, WB East Abutment Side Slope, STA 535+66.30, Reference Borings: JJT-BSB-03 and JJT-BSB-04

Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	New Fill	125	1000	0
2	Stiff to V Stiff SI CLAY FILL	120	2000	0
3	Stiff to V Stiff SI CLAY	120	2300	0
4	M Dense SILT	115	0	32
5	M Dense SAND	115	0	33

GLOBAL STABILITY: I-80 BRIDGES OVER JOLIET JUNCTION TRAIL; I-80 RECONSTRUCTION FROM HOUBOLT ROAD TO WEST OF CENTER STREET AND LARKIN AVENUE INTERCHANGE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL | APPENDIX D-3 | DRAWN BY: A. Hamad | CHECKED BY: M. Snider

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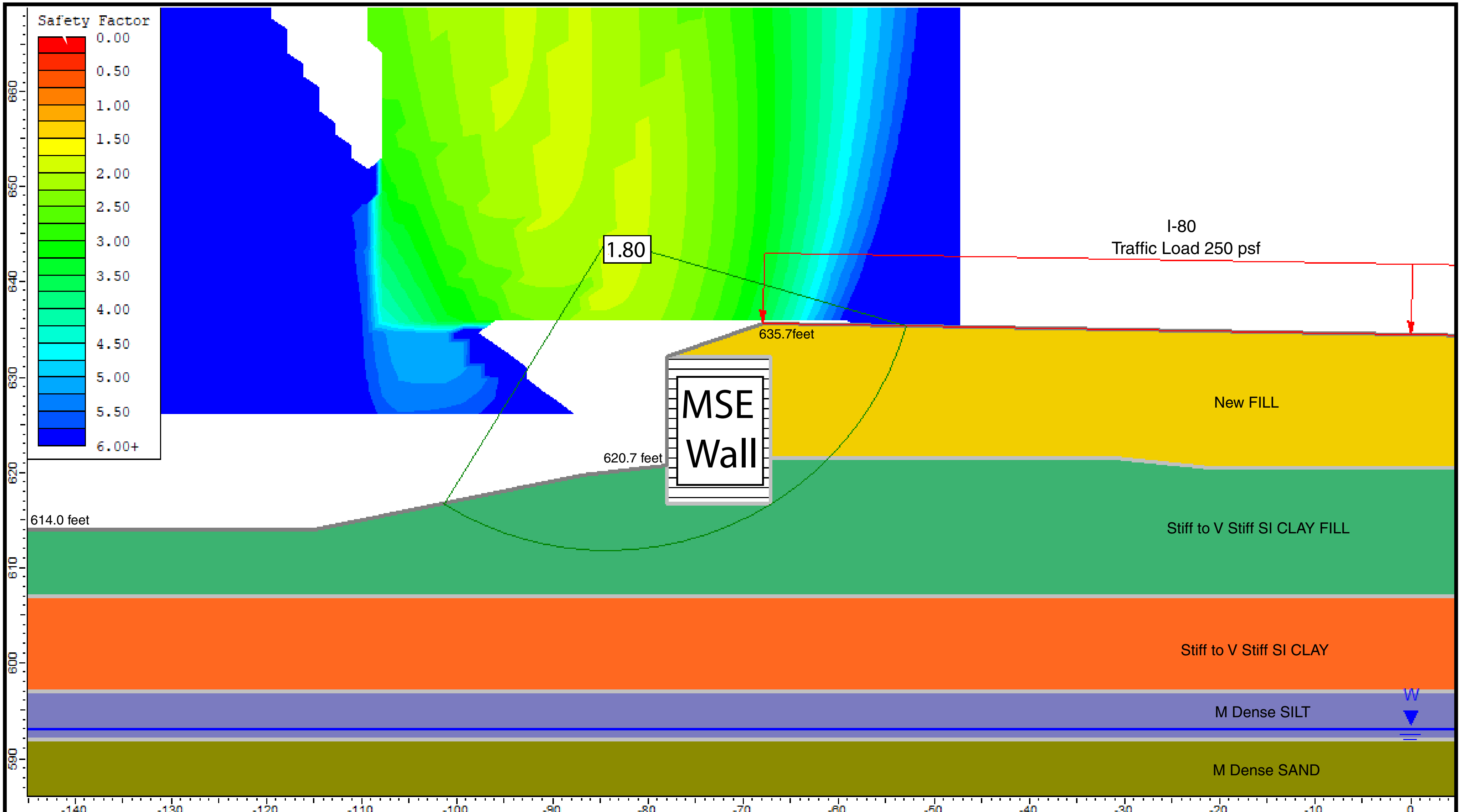

Drained Analysis, EB East Abutment Side Slope, STA 535+66.30, Reference Borings: JJT-BSB-03 and JJT-BSB-04

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	New Fill	125	100	30
2	Stiff to V Stiff SI CLAY FILL	120	100	30
3	Stiff to V Stiff SI CLAY	120	100	30
4	M Dense SILT	115	0	32
5	M Dense SAND	115	0	33

GLOBAL STABILITY: I-80 BRIDGES OVER JOLIET JUNCTION TRAIL; I-80 RECONSTRUCTION FROM HOUBOLT ROAD TO WEST OF CENTER STREET AND LARKIN AVENUE INTERCHANGE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL | APPENDIX D-4 | DRAWN BY: A. Hamad | CHECKED BY: M. Snider

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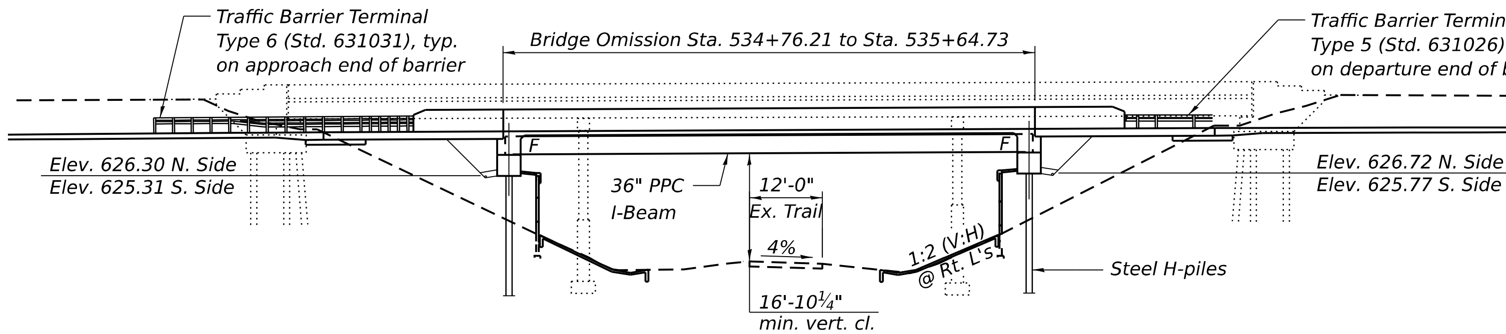
APPENDIX E

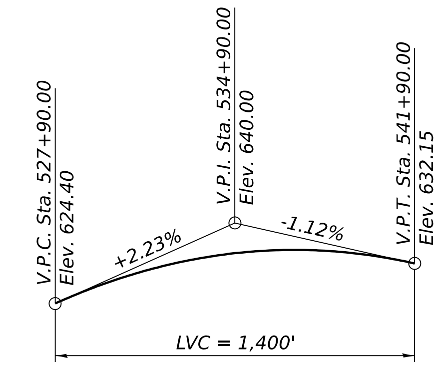
Benchmark: BM 23 Set cut square on northwesterly corner of northerly bridge wall of westbound I-80 bridge over Joliet Junction bike trail. Elev. = 641.669.

Existing Structures: S.N. 099-0048 and S.N. 099-0049. Built in 1964 as F.A.I. Rte. 80, Section 99-2VB. at Sta. 242+41.64. Existing dual structres each consist of 3-span reinf. concrete deck on continuous steel WF beams supported by spill-thru pile bent abuts. and multi-column piers. 164'-11½" Bk. to Bk. abutments. 36'-7" out-to-out deck. Structures to be removed and replaced. Traffic to be maintained using staged construction.

Salvage: None.



ELEVATION



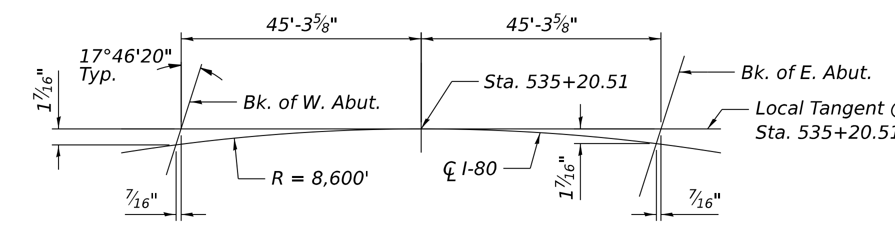
PROFILE GRADE F.A.I. 80

HIGHWAY CLASSIFICATION

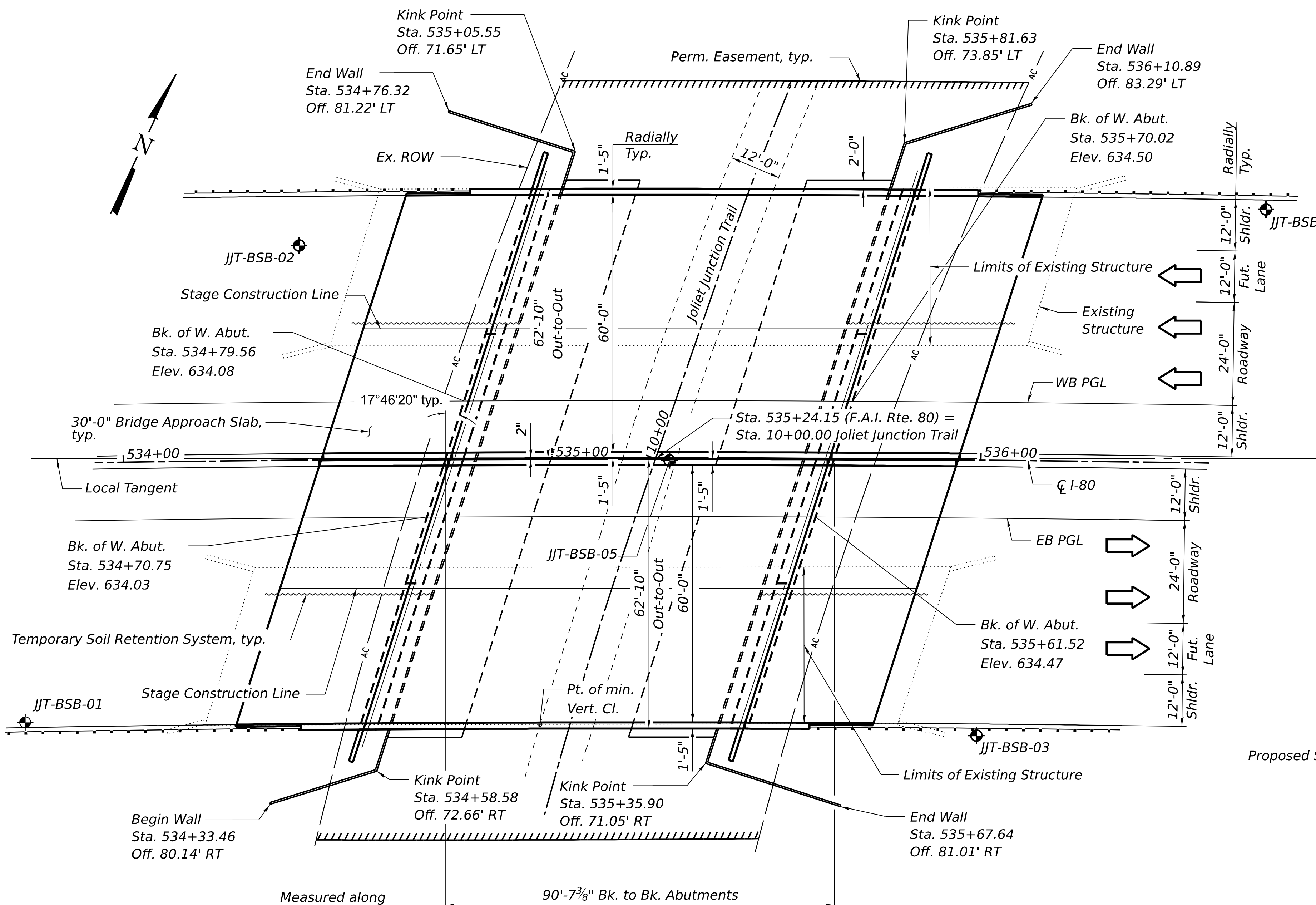
F.A.I. Rte. 80 - I-80
Functional Class: Interstate
ADT: 60,100 (2019); 92,700 (2050)
ADTT: 16,227 (2019); 25,029 (2050)
DHV: 8,720 (2030)
Design Speed: 70 m.p.h.
Posted Speed: 65 m.p.h.
Two-Way Traffic
Directional Distribution: 50:50

CURVE DATA

P.I. Sta. = 537+23.60
Δ = 45° 35' 36" (RT)
D = 0° 39' 58"
R = 8,600.00'
T = 3,614.53'
L = 6,843.50'
E = 728.71'
e = 2.4%
T.R. = 89'
S.E. Run = 144'
P.C. Sta. = 501+09.07
P.T. Sta. = 569+52.57



OFFSET SKETCH



PLAN

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

LOADING HL 93

Allow 50#/sq. ft. for future wearing surface

DESIGN STRESSES

FIELD UNITS

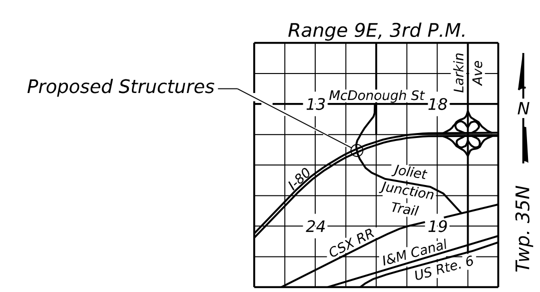
f'c = 4,000psi (Superstructure)
f'c = 3,500psi (Substructure)
fy = 60,000 psi (Reinforcement)

PRECAST PRESTRESSED UNITS

f'c = 8,500 psi
f'ci = 6,500 psi
fpu = 270,000 psi (0.6" ∅ low lax. strands)
fpbt = 202,300 psi (0.6" ∅ low lax. strands)

SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (SD1) = 0.068
Design Spectral Acceleration at 0.2 sec. (SDS) = 0.126
Soil Site Class = C



LOCATION SKETCH

GENERAL PLAN
I-80 OVER JOLIET JUNCTION TRAIL
F.A.I. RTE. 80 - SEC. XXXXX
WILL COUNTY
STATION 535+24.15
S.N. 099-8320 (E.B.)
S.N. 099-8321 (W.B.)

TranSystems	USER NAME =	DESIGNED - TJA	REVISED -
		CHECKED - AMD	REVISED -
	PLOT SCALE =	DRAWN - TJA	REVISED -
	PLOT DATE =	CHECKED - AMD	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 4 SHEETS

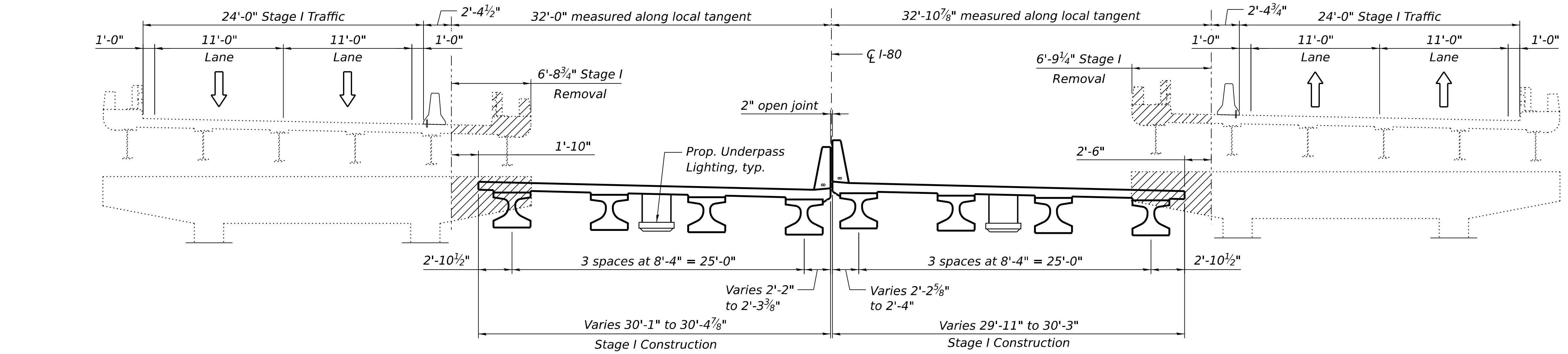
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80		WILL		
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

MODEL: Default
FILE NAME: pw://transystems-pw.bentley.com:transyscorp-pw1-hosted/Documents/Projects_2018/CH401/401180022/02-TranSystems/CAD/ML-03E/Sheets/23-Structural/099-8320 & 099-8321/XXXXX_099-8320&8321_TSL_001.dgn

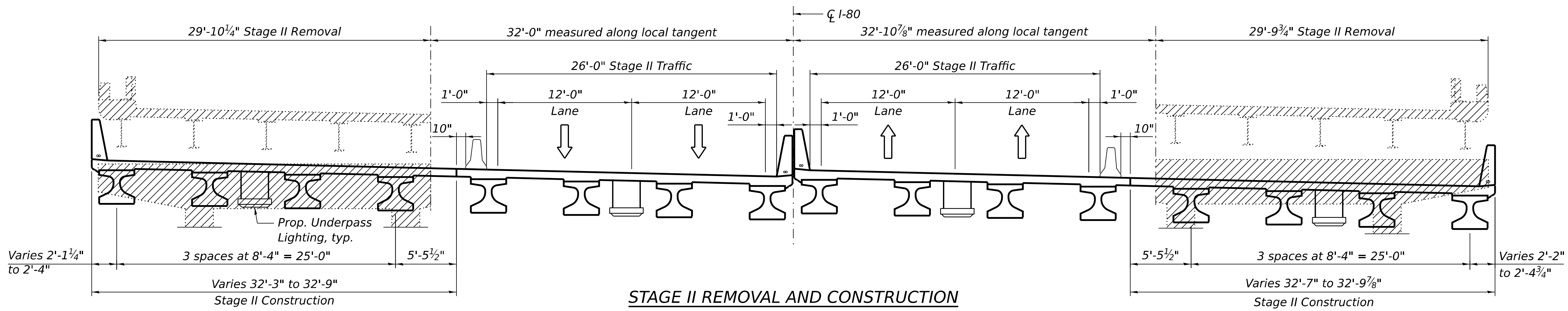
2/3/2022 8:57:46 AM

NOTES:

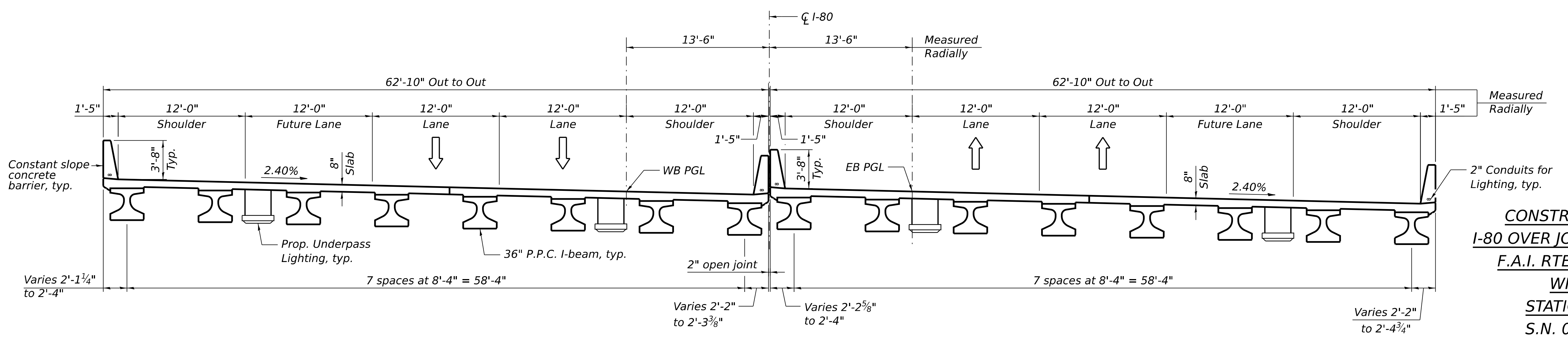
1. Hatched areas indicate removal of existing structures.
2. Dimensions shown are taken perpendicular to beams unless otherwise noted.
3. Underpass Lighting System to be determined in Final Design.



STAGE I REMOVAL AND CONSTRUCTION
(Looking East)



STAGE II REMOVAL AND CONSTRUCTION
(Looking East)



FINAL CROSS SECTION
(Looking East)

CONSTRUCTION STAGING
I-80 OVER JOLIET JUNCTION TRAIL
F.A.I. RTE. 80 - SEC. XXXXX
WILL COUNTY
STATION 535+24.15
S.N. 099-8320 (E.B.)
S.N. 099-8321 (W.B.)

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TranSystems

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PLOT SCALE =	DRAWN - TJA	REVISED -
PLOT DATE =	CHECKED - AMD	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 2 OF 4 SHEETS

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

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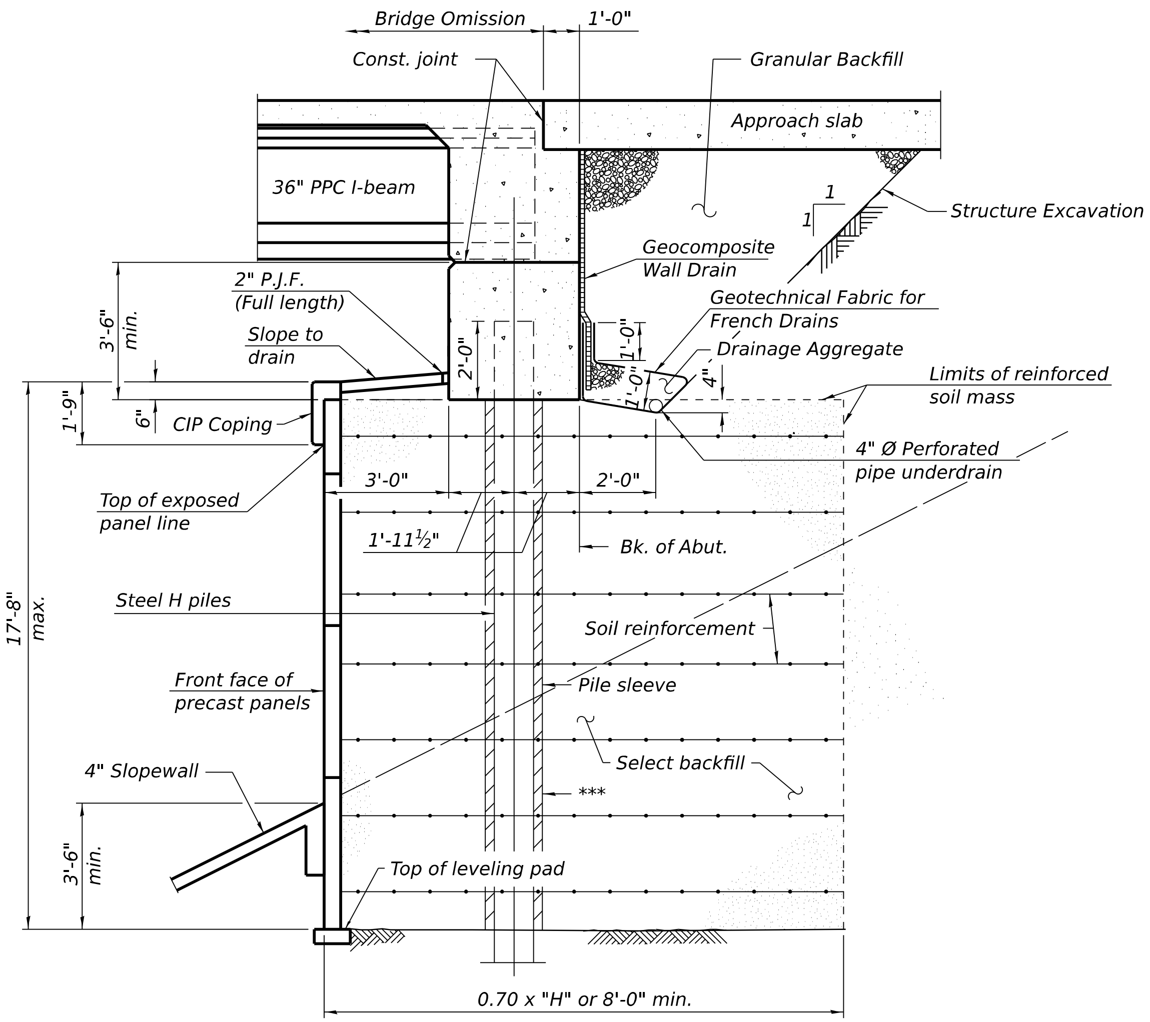
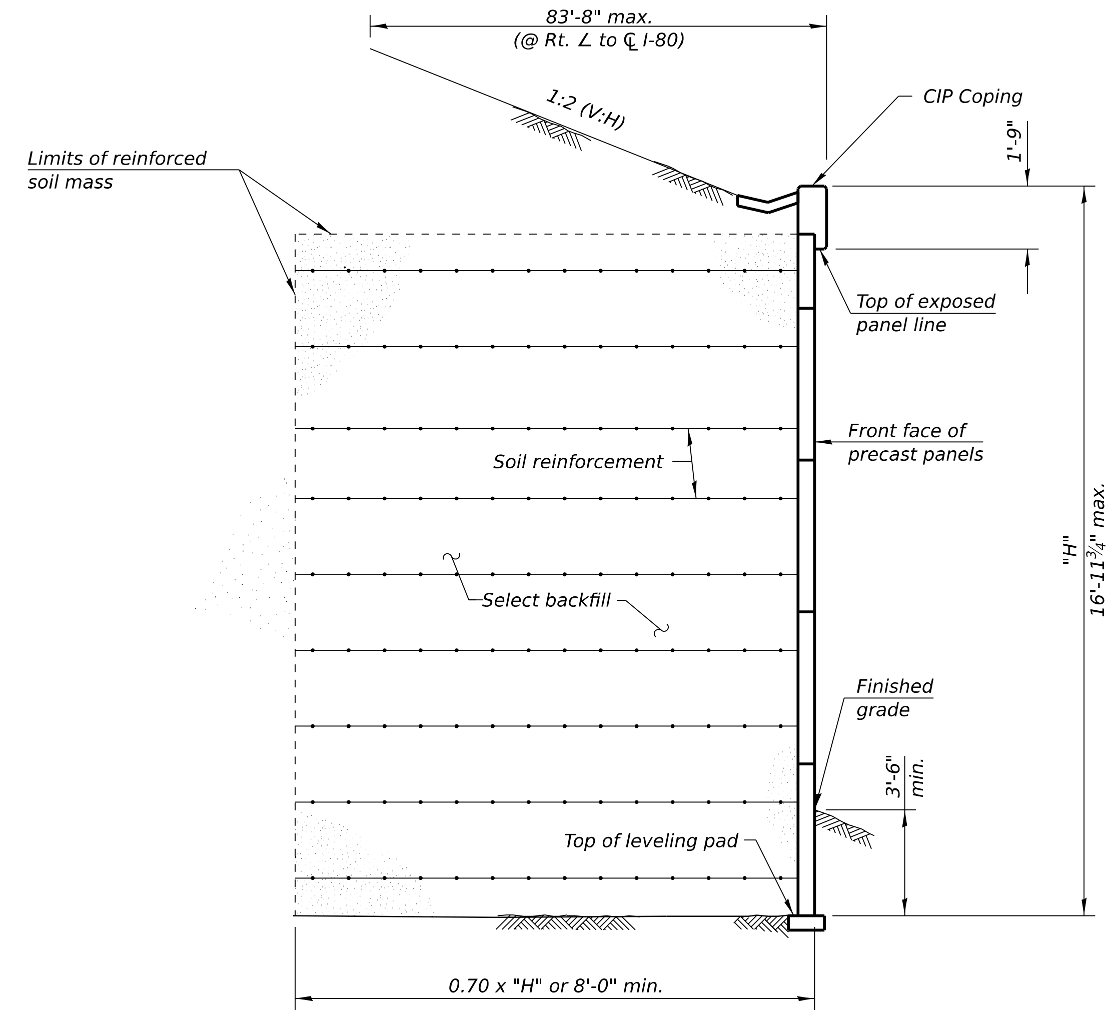


SECTION THRU ABUTMENT

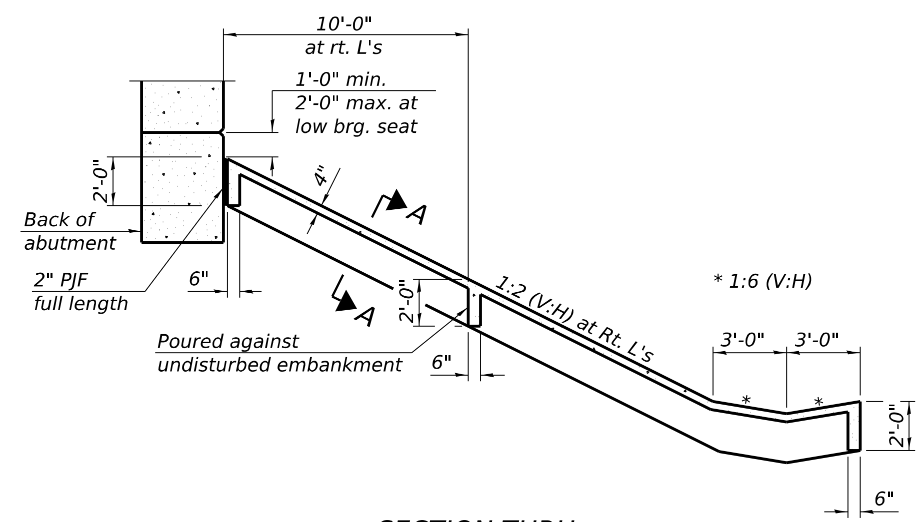
(Horiz. dim. @ Rt. ∠'s)

*** Place Bentonite between pile sleeve and pile.

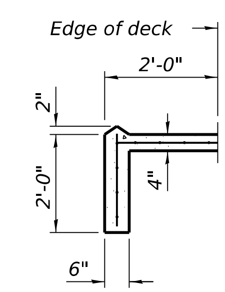


SECTION THRU MSE WALL

(Horiz. dim. @ Rt. ∠'s)



SECTION THRU
CONCRETE SLOPEWALL



SECTION A-A

SECTION THRU ABUTMENT
I-80 OVER JOLIET JUNCTION TRAIL
F.A.I. RTE. 80 - SEC. XXXXX
WILL COUNTY
STATION 535+24.15
S.N. 099-8320 (E.B.)
S.N. 099-8321 (W.B.)

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TranSystems

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	CHECKED - AMD	REVISED -
PLOT SCALE =	DRAWN - TJA	REVISED -
PLOT DATE =	CHECKED - AMD	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 3 OF 4 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80		WILL		

CONTRACT NO.

ILLINOIS FED. AID PROJECT

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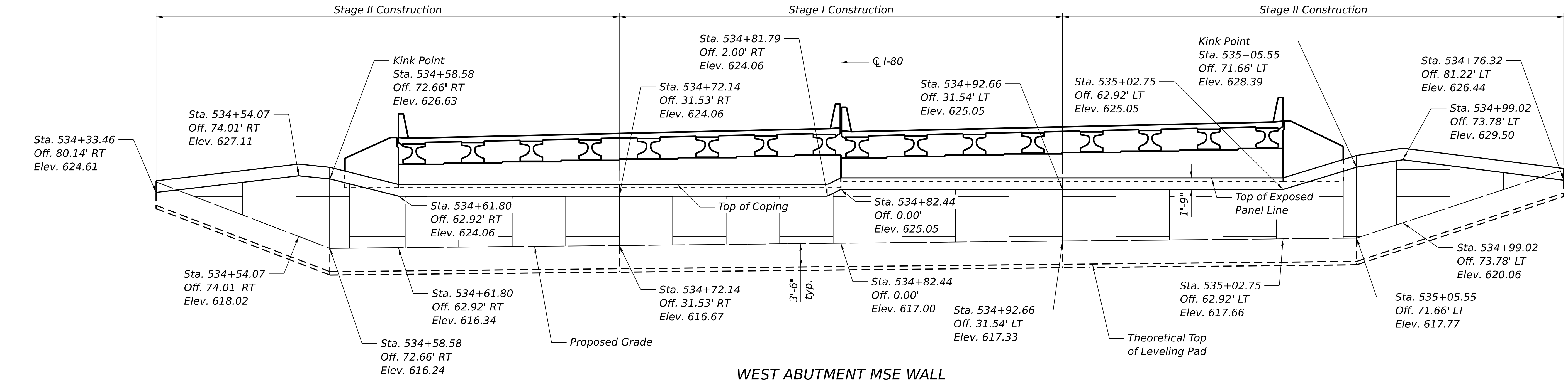
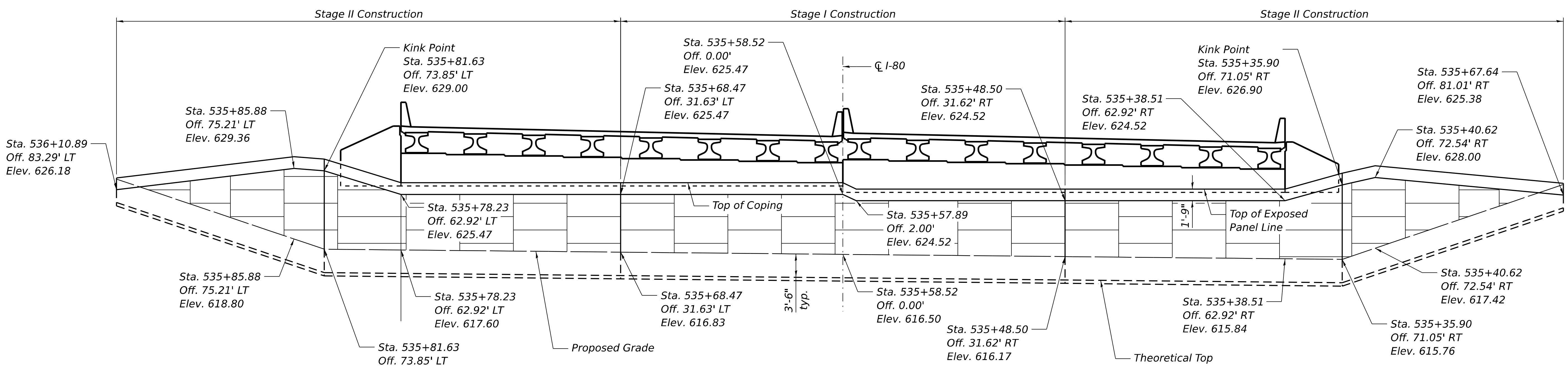


WEST ABUTMENT MSE WALL
(Developed elevation along front face)



EAST ABUTMENT MSE WALL
(Developed elevation along front face)

Note:
Wall offsets measured from ℄ I-80 to Front Face of wall.

MSE WALL DETAILS
I-80 OVER JOLIET JUNCTION TRAIL
F.A.I. RTE. 80 - SEC. XXXXX
WILL COUNTY
STATION 535+24.15
S.N. 099-8320 (E.B.)
S.N. 099-8321 (W.B.)

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 4 OF 4 SHEETS

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

2/3/2022 9:05:50 AM

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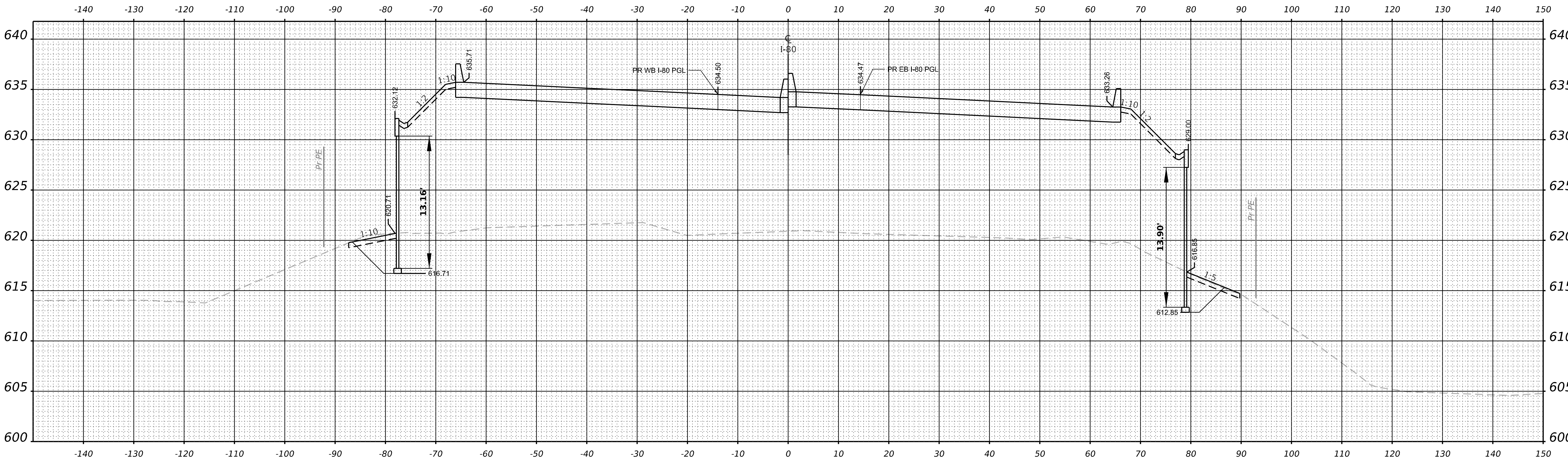
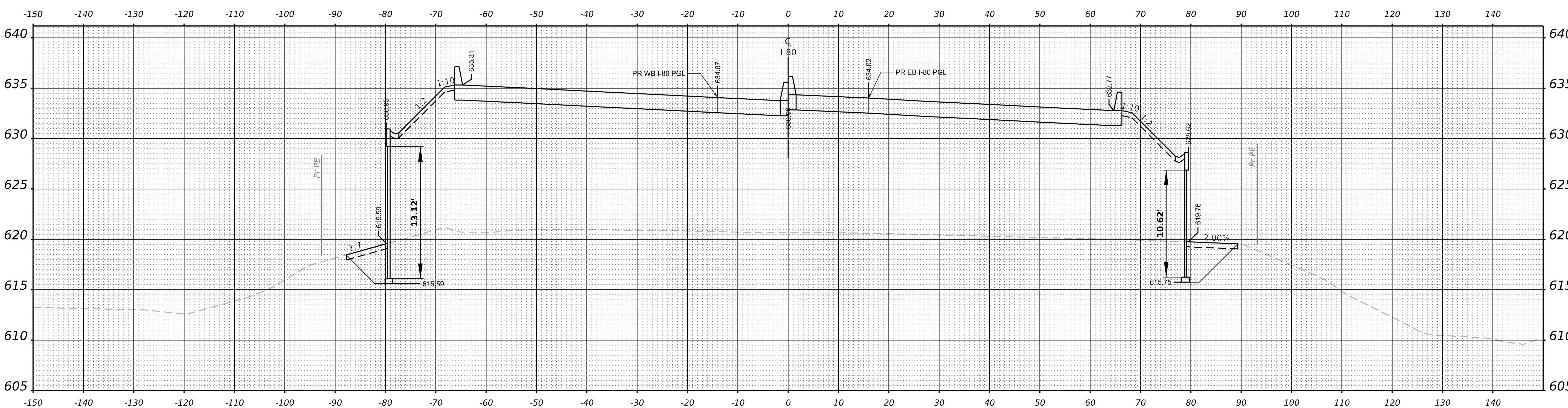
APPENDIX F



STA 535+66.30 SKEWED



STA 534+74.64 SKEWED

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PLOT DATE = 1/11/2022	DATE -	REVISED -	

I-80 OVER JOLIET JUNCTION TRAIL
EAST & WEST ABUTMENTS

SCALE: 10H:5V | SHEET 1 OF 5 SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	5	1
		CONTRACT NO. ML-3		
		ILLINOIS	FED. AID PROJECT	

Long Section Number

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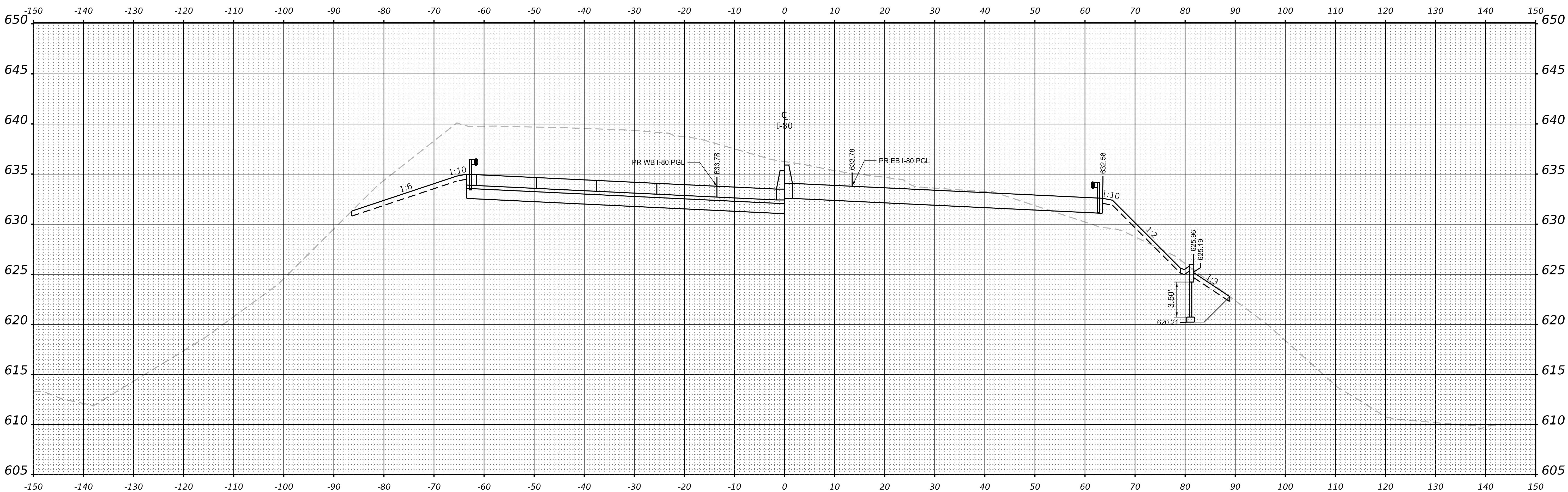

STA 534+33.34

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	DRAWN -	REVISED -	
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PLOT DATE = 1/11/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-80 OVER JOLIET JUNCTION TRAIL
END OF RETAINING WALL - EAST APPROACH - EASTBOUND

SCALE: 10H:5V | SHEET 2 OF 5 SHEETS | STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	5	2
		CONTRACT NO. ML-3		
		ILLINOIS	FED. AID PROJECT	

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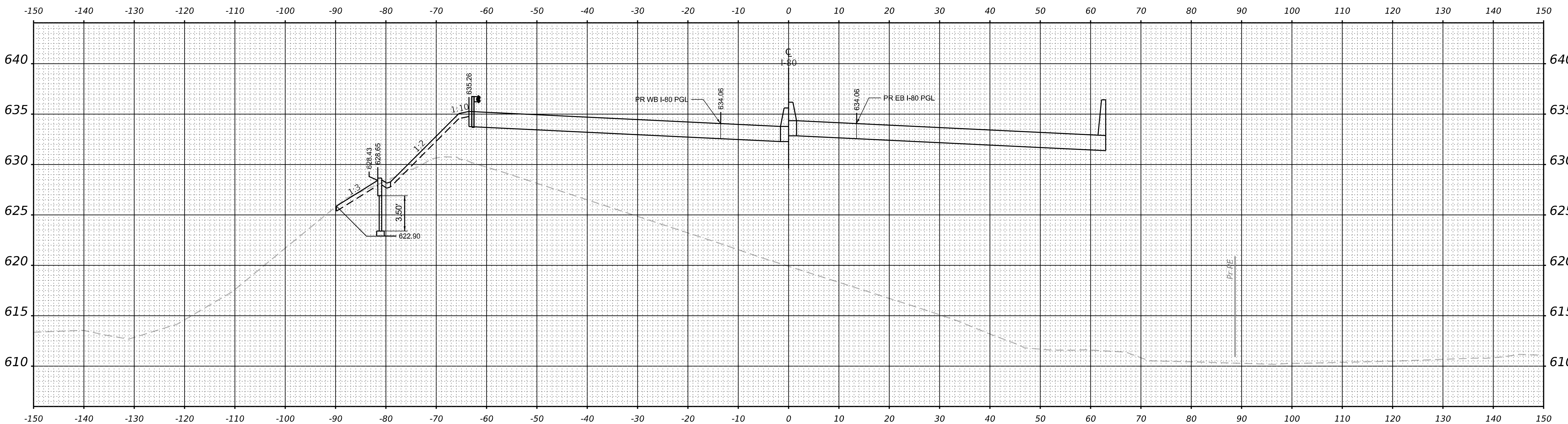
FINAL SURVEY | NOTE BOOK | NO. | SURVEYED | PLOTTED | TEMPLATE | AREAS | AREAS CHECKED | BY | DATE

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



STA 534+76.19

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	DRAWN -	REVISED -	
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PLOT DATE = 1/11/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-80 OVER JOLIET JUNCTION TRAIL
END OF RETAINING WALL - EAST APPROACH - WESTBOUND

SCALE: 10H:5V | SHEET 3 OF 5 SHEETS | STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	5	3
		CONTRACT NO. ML-3		
	ILLINOIS	FED. AID PROJECT		

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

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

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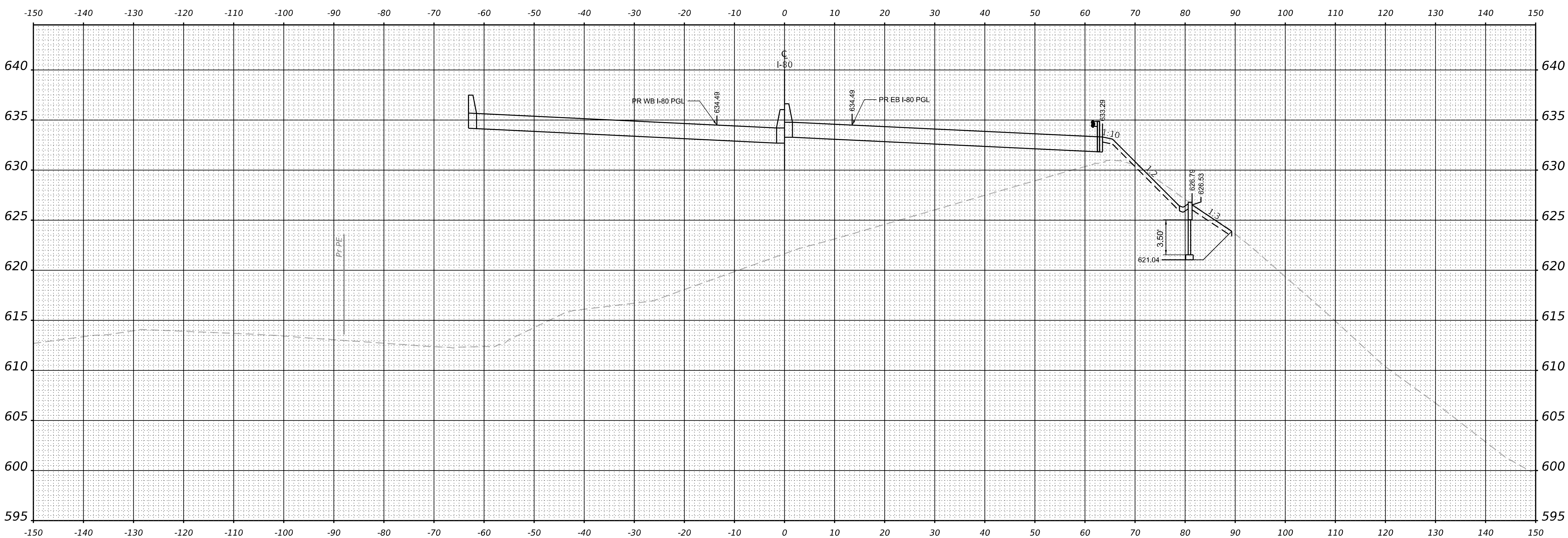

STA 535+67.77

USER NAME = vljanachione	DESIGNED -	REVISED -	
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PLOT SCALE = 0.16666633 ' / in.	CHECKED -	REVISED -	
PLOT DATE = 1/11/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-80 OVER JOLIET JUNCTION TRAIL
END OF RETAINING WALL - WEST APPROACH - EASTBOUND

SCALE: 10H:5V | SHEET 4 OF 5 SHEETS | STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	5	4
		CONTRACT NO. ML-3		
	ILLINOIS	FED. AID PROJECT		

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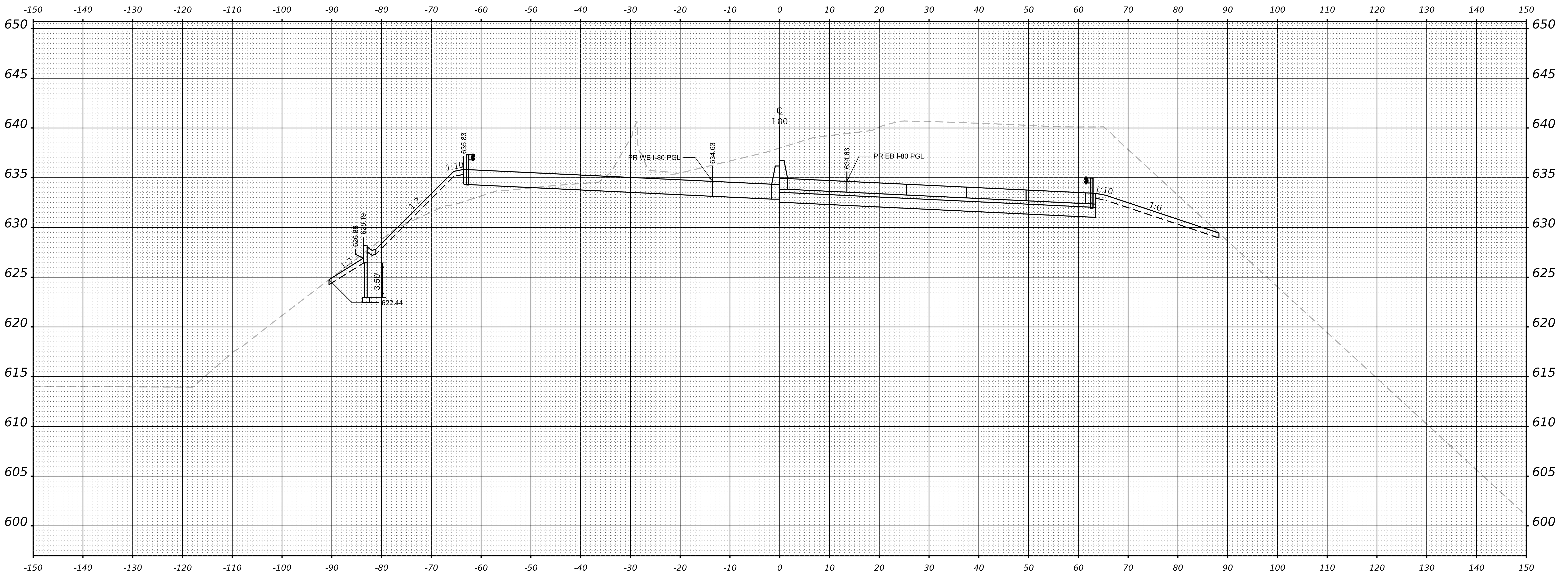
FINAL SURVEY — NOTE BOOK NO. — SURVEYED, PLOTTED, TEMPLATE, AREAS, AREAS CHECKED — BY — DATE

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



STA 536+11.01

USER NAME = vljanachione	DESIGNED -	REVISED -	
	DRAWN -	REVISED -	
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PLOT DATE = 1/11/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-80 OVER JOLIET JUNCTION TRAIL
END OF RETAINING WALL - WEST APPROACH - WESTBOUND

SCALE: 10H:5V | SHEET 5 OF 5 SHEETS | STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	5	5
		CONTRACT NO. ML-3		
	ILLINOIS	FED. AID PROJECT		

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

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

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