June 14, 2012
Exp 11/2013

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Structure Geotechnical Report

F.A.I. Route 74
Section 81-1HVB
Rock Island County
Job No. P-92-032-01
Contract No. 64C08
PTB No. N/A
Retaining Wall IL-RW16
Structure Number 081-6018

September 2011 / Revised June 2012

Prepared for:
Illinois Department of
Transportation, District 2
819 Depot Avenue
Dixon, Illinois 61021

Prepared By:
Hanson Professional Services Inc.
1525 South Sixth Street
Springfield, Illinois 62703
(217) 788-2450

Structure Designer:
Modjeski and Masters, Inc.
#4 Sunset Hills Professional Center
Edwardsville, Illinois 62088
(618) 659-9102

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1. Project Description

This report provides geotechnical data and recommendations for the proposed Retaining Wall IL-RW16, which is part of the Central Section of the I-74 over the Mississippi River Project. The project includes reconstruction of I-74 between 14th Avenue in Moline, Illinois and Lincoln Road in Bettendorf, Iowa. The retaining wall covered by this structure geotechnical report will be a new structure, constructed to retain fill for the proposed Eastbound I-74 roadway.

Nearby project features that have an impact on the design or construction of the proposed retaining wall include the I-74 Mississippi River Bridge, the Ramp RD-H retaining wall (IL-RW01, S.N. 081-6010), the Ramp RD-G retaining wall (IL-RW02, S.N. 081-6011) and the I-74 mainline and ramps. Geotechnical recommendations for the river bridge are presented in a soils design package prepared by Hanson Professional Services Inc. (Hanson) in January 2011. Geotechnical recommendations for Retaining Walls IL-RW01 and IL-RW02 are presented in separate structure geotechnical reports prepared by Hanson. Geotechnical recommendations for the roadways are contained in a soil survey report currently being prepared by Hanson.

This report supersedes the structure geotechnical report prepared by CH2M HILL in September 2009.

2. Location

The proposed Retaining Wall IL-RW16 is located in the north central portion of Rock Island County, within Section 32 of Township 18 North, Range 1 West. The wall is adjacent to and parallel to the right shoulder of Eastbound I-74 and Ramp 6th-C. The wall separates the interstate and Ramp 6th-C on the high side from Ramp RD-G on the low side. The wall begins at I-74 Sta. 25+75.00 and traverses 371 ft. southward to Ramp 6th-C Sta. 322+81.72.

3. Proposed Structure

Prior to the final planning for this structure, the Benesch Team completed a value engineering study for the portion of the project between the south abutment of the river bridge and the north abutment of the Illinois Viaduct. Estimated construction costs, maintenance requirements, local access, and aesthetics were compared for three alternatives. The study concluded that a plug fill, comprised of earth embankment and mechanically stabilized earth (MSE) retaining walls, was the preferred alternative. Meeting minutes summarizing the value engineering study are included in the Appendix.

After the value engineering study was completed, the grading for the plug fill was further refined and the foundation conditions were more thoroughly analyzed. Some of the retaining walls were replaced with earth slopes and the estimated foundation treatment quantities were reduced.

The proposed structure will be a mechanically stabilized earth (MSE) wall, as determined by a previous value engineering study. A wall using precast panels with the minimum reinforced soil mass width is preferred for cost and construction schedule. The wall will have a height, measured from the theoretical top of leveling pad to the finished grade line, between 3.7 and 15.1 ft. With this range of heights a typical MSE wall section would have an equivalent uniform bearing pressure varying from 700 to 3,100 psf along the length of the wall.

The wall is located within the 22 to 25 ft. high approach embankment to the Mississippi River Bridge. The base of the wall will be founded on the embankment, approximately 10 to 15 ft above existing grade. The north end of the wall will terminate in the embankment, while the south end terminates at the west wingwall of the Illinois Viaduct's south abutment. The MSE wall is approximately 15.1 ft. tall at the connection to the bridge wingwall.

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Construction of the wall will be governed by a performance specification. The MSE wall supplier will be responsible for the internal stability of the reinforced soil mass. This report provides geotechnical recommendations for external stability and global stability, which are the responsibility of the wall designer.

4. Site Investigation

The field exploration completed for this structure was completed in three phases. The first two phases were completed in November 2005 and September 2007 by another consultant. IDOT provided the data collected from those two phases. The third phase was completed in July 2010 by Hanson. The primary purpose of the third phase was to collect additional soil samples for strength and consolidation testing. A representative from Hanson logged the borings and performed a general site reconnaissance during the third phase.

The alignment for the proposed retaining wall passes through a former foundry site. The area is now mostly now vacant land. Remnants of floor slabs and other evidence of the past industrial use are visible throughout. At the time of the July 2010 site investigation, significant quantities of random material had been dumped in the area. The random material consists of fine to coarse grained soils, construction debris, dead branches, and metal scraps. The topography is generally flat, with the elevation of the natural ground between 566 ft. and 570 ft. Mounds of the random material up to 8 ft. above the surrounding grade were tightly spaced at the north end of the site.

Six borings were drilled in the first two phases and three borings were drilled in the third phase. Locations of the borings were selected to avoid the numerous obstructions currently occupying the site. The maximum spacing between borings was approximately 90 ft. Standard Penetration Test samples were collected at 2.5 ft. to 5.0 ft. intervals in all borings between the ground surface and bedrock. Several Shelby tube samples were collected at representative locations in cohesive strata. A 10 to 26.5 ft. long core sample of the bedrock was collected in Borings ILR0201-S, ILR1603, and VIAIL-104. The boring depths ranged from 13.7 to 40.5 ft.

The boring locations are shown on the Boring Location Plan included in the Appendix. Boring logs are included in the Appendix.

5. Laboratory Investigation

Soil samples from the first and second phase borings were tested by others. Most of the testing consisted of index testing of representative samples. Three organic content tests and a consolidated-undrained triaxial test were completed.

The soil samples obtained from the third phase borings were delivered to Hanson's soils laboratory and subjected to a testing program. Natural moisture content and visual classification tests were competed on all samples. Unconfined compressive strength tests, using a Rimac spring tester, were also completed when possible. Two consolidated undrained triaxial tests, one consolidation tests, and two organic content test were performed on Shelby tube samples. Index testing was completed on five representative samples to help correlate the strength and consolidation testing data with the other borings drilled for the project.

The locations of the index tests, triaxial tests, and consolidation tests are indicated on the subsurface data profile. The results of index tests are shown on the subsurface data profile. Test reports from triaxial and consolidation testing are included in the Appendix.

6. Subsurface Profile

A subsurface data profile has been developed from the boring logs. It is presented in the Appendix for use by the structure designer.

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The subsurface profile consists of fill materials overlying natural soil and bedrock strata. The fill was found over the entire wall alignment from the ground surface to depths of 3 to 17 ft. The depth of fill generally increases from the south to the north. Natural soils were encountered below the fill. These soils can be categorized into three distinct strata – weathered till (gumbotil), glacial till, and alluvium. Bedrock was encountered at depths of 7 to 21 ft.

The fill consists of a random mix of sands, gravels, silts, clays, and debris, including, but not limited to brick, dead branches, concrete, lumber, and metal scraps. Many of the samples recovered from the borings north of Sta. 25+75 had a large quantity of rotting wood matter with a consistency similar to mulch. The fill at the south end of the wall had more soil-like characteristics.

Strata of weathered till and glacial till were encountered in most of the borings. These strata were typically composed of medium stiff to stiff sandy clays.

A 1 to 7 ft. thick layer of granular alluvial soils was encountered under the glacial soils at the north and south ends of the site. The gradation and consistency of these soils varied considerably.

Cyclic deposits of sandstone, shale, limestone, and coal were found in the core borings. The shallow bedrock was generally towards the south end of the site.

Groundwater was encountered in all of the borings where measurements were taken. The groundwater elevation measured at first encounter and at the end of boring varied between Elevation 554.3 and Elevation 562.8 as shown in Table 6.1. For comparison, the water level in the Mississippi River, approximately 100 ft to the north of the site, is usually about Elevation 561.0.

Table 6.1 Groundwater Elevations

Boring No.	During Drilling	At End of Boring	24-hour Reading
ILR0201-S	562.4	-	-
ILR0203	-	-	-
ILR1603	562.3		
ILR0205	559.9	-	-
RW1503	554.3	-	-
RW1504	558.0	-	-
RW16-1	-	559.1	-
RW16-2	-	558.4	-
RW16-3	-	562.8	-

The Illinois State Geological Survey Directory of Coal Mines does not list any mines in the immediate vicinity of the site.

Although an environmental investigation was beyond the scope of this report, evidence of potential contamination was encountered during the geotechnical investigation. Petroleum odors and construction debris were encountered in the borings.

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7. Geotechnical Evaluations

Considering the proposed maximum height of the wall and the existing ground configuration, the most feasible wall type is an MSE wall. Although MSE wall systems are extremely flexible and can tolerate significant total and differential settlements without undue distress, they require good foundation soils to provide acceptable factors of safety against bearing capacity or global stability failures.

The miscellaneous fill, generally found north of Sta. 25+75, is not a suitable subgrade for the retaining wall or the roadway embankment. The poor compaction and heterogeneous nature of this material would result in localized instability and unpredictable settlement, if it used to support any significant load. Settlement could continue for many years after construction due to further decay within the large pockets of organic matter.

In-situ treatment of this material is not feasible. Many of the more common ground improvement techniques are not suited for the conditions found at this site. The construction debris would present a significant obstruction to any of the techniques where a probe or auger is inserted into the ground. Organics and groundwater can be problematic for vibratory and compaction techniques.

Removal and replacement of the unsuitable material is a feasible solution, if the support of the Mississippi River Bridge approach embankment and the three retaining walls are considered. The site has sufficient right-of-way to allow laid back excavation slopes and efficient large-scale earth-moving operations. It is estimated that up to 11,000 cubic yards of unsuitable material must be excavated, removed from the site, and replaced with suitable backfill. The approximately $500,000 cost to remove the unsuitable material and replace it with granular embankment material is very economical when compared to the substitution of additional bridge spans for the proposed embankment.

The external stability of the retaining wall will be greatly influenced by the strength of the embankment material that supports it. Compacted granular embankment material would provide sufficient support for the proposed wall. A cohesive fill material with an unconfined strength of at least 1.6 tsf would also provide suitable bearing. Soft, but otherwise suitable, native materials have little effect on the allowable bearing capacity of the compacted fill at the wall's footing level. The proposed wall would meet the Standard Specifications for Highway Bridges (AASHTO) requirements for bearing pressure and sliding stability, if it is constructed on a properly compacted structural fill. This will require somewhat more stringent material and compaction provisions than are typically used for highway embankments.

A slope stability analysis of the wall's critical section near Sta. 29+00 was completed to determine the overall stability of the wall. Results of this analysis are included in the Appendix. The computed factor of safety exceeds the minimum value of 1.3 required by AASHTO.

Once the objectionable fill material and excessively soft soils are removed, the remaining native soils are overconsolidated and exhibit fairly low compressibility. The estimated total settlement of the native soils under the weight of the proposed wall and embankment ranges from 0.5 to 5.0 inches. Some of this settlement will occur during embankment construction – prior to placement of the first lift of wall backfill. Settlement of the lower portion of the new roadway embankment is estimated at 0.5 to 1.5 inches under the weight of the proposed wall. The estimated net settlement to be experienced by the wall is 0.5 to 4.5 inches. Primary consolidation of the native soils is estimated to be 90 percent complete after 15 months. Less than 0.5 inches of primary consolidation would remain 9 months after completion of the retaining wall's backfill. This magnitude and duration of settlement is acceptable for construction of an MSE wall.

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8. Design Recommendations

Removal and replacement is the recommended treatment option for the unsuitable subgrade soils. Existing soils with significant woody material, large chunks of demolition debris, moisture contents greater than 50 percent, or organic contents greater than 5 percent should be excavated and removed from the area of retaining wall and embankment construction. The lateral limits of the unsuitable material removal should cover the area bounded by the Mississippi River Bridge south abutment, Ramp RD-H, the Illinois Viaduct north abutment, and Ramp RD-G. It is anticipated that the unsuitable material will extend to depths up to 20 feet below the ground surface. Due to the presence of granular layers and the close proximity to the river, dewatering of the excavation would be very difficult. The contractor should be allowed to excavate through groundwater. The excavation should be backfilled with porous granular embankment in accordance with the IDOT Standard Specifications for Road and Bridge Construction (IDOT Standard Specifications).

The miscellaneous fill material is not expected to extend under the footprint of this wall. If this material is encountered, it should be removed within the lateral limits shown in Figure 8.1. Backfill should be with porous granular embankment and embankment as shown in the figure.

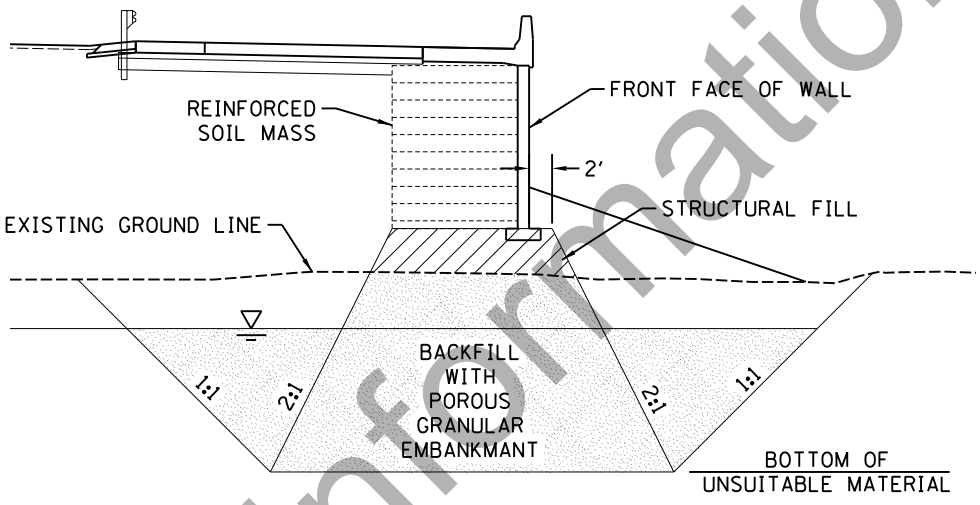

Figure 8.1 Lateral Limits of Unsuitable Material Removal and Replacement

The estimated vertical removal limits for the unsuitable material and soft cohesive soils are provided in Table 8.1. An estimated base of removal elevation is provided at each boring drilled in the vicinity. It is believed that the debris found in Borings RW16-1 and ILR0201 does not extend under the wall's footprint. For plan quantities, it may be assumed that no removal of unsuitable material is required for this wall. The actual limits of removal will be determined during construction based on the materials encountered.

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Table 8.1 Estimated Bottom of Unsuitable Material

Boring No.	Station	Base of Removal Elevation	Objectionable Material
RW16-1	25+10	553.10	debris
ILR0201-S	25+40	555.39	debris
ILR0203	26+30	-	-
RW16-2	26+33	-	-
RW1503	26+79	-	-
RW16-3	27+87	-	-
ILR1603	28+33	-	-
RW1504	28+83	-	-
VIAIL-104	29+66	-	-

It is recommended that the removal, disposal, and replacement of the large volume of miscellaneous fill, generally found north of Sta. 25+75, be treated as a roadway item per Section 202 of the IDOT Standard Specifications. The limits of the miscellaneous fill removal will extend under the I-74 embankment a considerable distance beyond the footprint of this retaining wall.

A conventional precast panel MSE wall is feasible. The theoretical top of leveling pad or base of reinforced soil mass may be located at the minimum embedment required by IDOT (3'-6" below finished grade). Compacted structural fill should be used to raise the grade. The minimum limits of the structural fill should be defined as shown in Figure 8.1. Other fill, outside the limits of the required structural fill and the reinforced soil mass, may be embankment fill in accordance with the IDOT Standard Specifications.

When designing for the external stability of the MSE wall, it should be assumed that the reinforced soil mass will be composed of a granular select backfill and the fill behind the reinforced soil mass will be embankment material as defined by the IDOT Standard Specifications. Both materials should be assumed to have a total unit weight of 125 pcf. The active earth pressure coefficient of the embankment fill could vary greatly depending on the actual material used, but should be assumed to be 0.36 for design.

The structural fill and the underlying soils, when prepared according to the recommendations herein, have an allowable bearing capacity of 3,500 psf. The structural fill, if composed of cohesive soils, has an undrained sliding resistance of 1,600 psf. The drained sliding resistance is 0.53 times the effective vertical stress for cohesive fill subgrade or 0.62 times the effective vertical stress for a compacted granular fill.

The MSE wall should be detailed to accommodate 0 to 5 inches of settlement after the first facing panel is placed. The parapet and anchorage slab details that are shown in the IDOT Bridge Manual will satisfy this requirement.

9. Construction Considerations

The construction of MSE walls are not covered by the IDOT Standard Specifications. Guide Bridge Special Provision No. 38, Mechanically Stabilized Earth Retaining Walls (Revised: April 19, 2012), should be included in the construction documents. This special provision requires that the contractor take responsibility for the final design of portions of the structure.

It should be anticipated that groundwater will influence the excavation of unsuitable material and the backfill with granular material. A dragline or long-reach excavator will be needed to complete the deeper portions of the

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excavation. The contractor must stage the work so that the excavated material can be inspected and sorted, as necessary. Compaction of porous granular embankment placed below the water will not be required; however, the material should be carefully placed in a manner to achieve the highest density practicable. Compaction should begin as soon as the backfill has reached a level where it can support compaction equipment.

Some of the excavated unsuitable material has the potential to be classified as special waste due to the presence of petroleum residue and other potentially hazardous substances. Material that is considered special waste must be handled and disposed of in accordance with applicable laws and regulations. Further environmental investigation will be required prior to or during construction.

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Appendix

Boring Location Plan
Subsurface Data Profile
Boring Logs
Soils Laboratory Test Results
Summary of Slope Stability Analysis
I-74 Illinois Retaining Walls and Bridges Value Engineering Study

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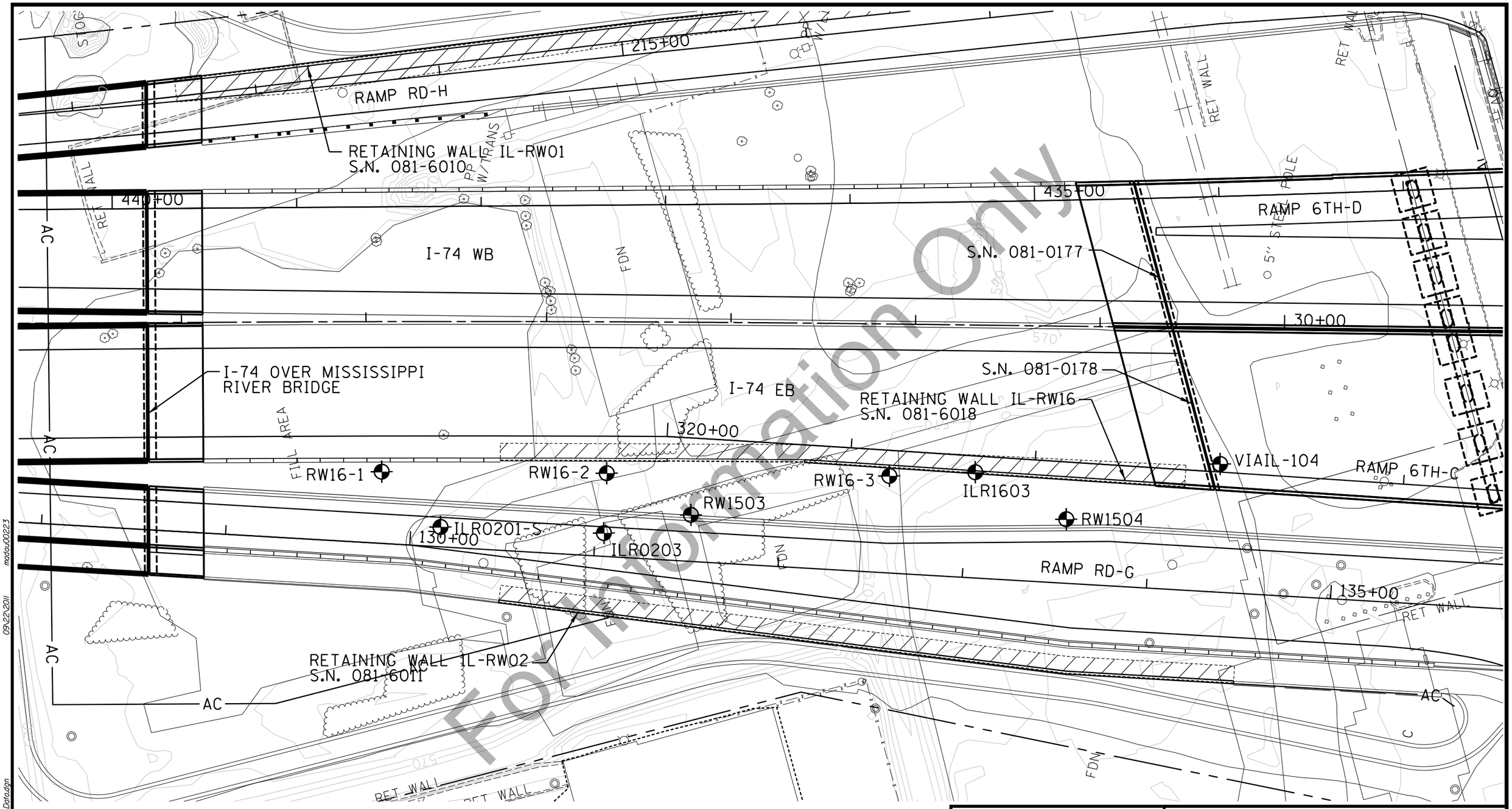

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LEGEND

RW600 BORING LOCATION

0 50 100
SCALE IN FEET

N

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BORING LOCATION PLAN

I-74 MAINLINE RETAINING WALL IL-RW16
S.N. 081-6018
ROCK ISLAND COUNTY, ILLINOIS

08H0120E 8/24/11

madau00223 09\22\2011 ILRW16-A0432-016-Subsurface Data.dgn

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RW16-1
Sta. 25+10, 81' RT

	N	Qu	w%	
570.10				FILL - Dark to very dark brown, moist to wet, soft and loose, silt, fine- to coarse-grained sand and gravel, with degrading plywood, particle board, timber, lumber, bituminous materials, metal scraps, cinder blocks, and brick fragments, petroleum odor
	16		10	
	27		8	
	50/1"		18	
Oh	12	1.75P	17	
559.10 ▽				
			[O]	
			[O]	
553.10	50/0"		6	
551.60	50/0"			Gray, fine-grained, LIMESTONE
				Bottom of hole = 18.5 feet

ILR0201-S
Sta. 130+16, 11' LT

	N	Qu	w%	
566.39				Concrete - 7" slab with rebar
565.39				Fill: Fine to Medium Sand With Silt (SP-SM) - Very dark brown, dry to moist, medium dense, little gravel, fine to medium sands, trace coarse sands
563.39	13			
562.4 ▽	DD		30.0	[O] Fill: Sandy Lean Clay (CL) - Very dark gray mottled with greenish gray, moist to wet, stiff, faint petroleum odor, trace medium to fine gravel, with sand seams (LL=28 PI=5)
	7	1.8P		[O] Fill: wood matter with fine to coarse sand, strong petroleum odor, saturated, possible old railroad ties
558.39	3		40.3	Fill: Silty Sand Trace Gravel (SM) - Top 5": Brown, wet, root matter with petroleum odor and root matter throughout Remainder: Silty Sand trace gravel, dark to medium gray, wet, non plastic, medium to fine sands, trace subrounded fine gravels, loose, faint petroleum odor, Encountered WT at 10' bgs
555.39	3			
553.39	3		11.0	Silty Fine to Coarse Sand (SM) - trace gravel, brown, wet, very loose to medium dense, faint petroleum odor, occasional root, possible native soil, non odorous
	50/2"			Sandy Silt With Clay And Gravel (CL) - Top 2": Dark brown followed by yellowish orange and then light gray at bottom 2", wet, non plastic, very angular flat coarse to fine gravels (possible rock fragments), some medium to fine sands with silt and few clay, possible gumbo/residual soil. Driller began set up for rock coring at 0950
550.56				
	Rec. = 78% ROD = 41% 381.7 tsf			Sandstone - with Limestone and bands of coal towards bottom of sample, light brown with light gray, rough texture at top 32", remainder has smooth texture, medium to fine grained with little coarse grains, slightly weathered to unweathered, medium to strong, top 32": sandstone, remainder Limestone with coal bands 15.83' - Horizontal to 15° fractures, rough planar fractures at top 32" of sample, remainder fractures are irregular and undulated, little hard greenish gray impermeable clay infilling throughout top 13" of sample, remainder: no infilling, surface stains only, surfaces stained greenish gray at top 16", 16" to 30" no stains, 30" to bottom dark gray and brown coal stains, top 30": no rock wall contact due to crushed rock, remainder tightly healed with coal strands, sound to moderate fractures, very close to moderate discontinuities 23'-86" = top of run, 1/2-1/2-1/4-3/4-3/4 light gray milky water, brown water 2.5' down and 7'-4' dark brown to dark green 23'-31.5" = end run
	Rec. = 95% ROD = 67%			Medium to fine grained, smooth texture, slightly weathered to unweathered, medium strong 21.42' - 15° to 45° degree fractures, irregular, undulating, slickensided at 11", 15" 51", 67" and 88" from top, hard impermeable clay infilling 1/8" to 1/2" thick that has tightly healed at most fractures except from 45" to 51" from top, dark gray surface stains, no infilling and surface stains from 45" to 51", from 57" to bottom thinly bedded throughout, stiff to very stiff gray clay infilling that is 1/2" to 1/4" thick at fracture, sound to moderate fractures, close to wide discontinuities, Average 1-1/4 minute per foot for top 5 feet, 10-20-30 (3/4-3/4")
534.97				
				Bottom of hole = 31.42 feet

ILR0203
Sta. 131+05, 13' LT

	N	Qu	w%	
567.93				
567.43				Concrete - Surface: 3" of concrete
	4			Silty Sand (SM) - dark brown and black, slightly moist, very loose, fine to medium grained, low plasticity
	4	1.5P	27.0	
561.93				
	5			Sand Silt and Clay (ML) - Black, moist; NOTE: Sample 3 grain size analysis performed
559.93				
	6	1.8P	25.0	Clay (CH) - black, slightly moist, firm to stiff, trace fine sand, moderate plasticity; Rimac: Pu = 94 lbs
	8	1.0P	23.0	NOTE: Sample 4 Atterberg limits: (LL=63, PI=46)
	5	0.5P		Rimac: Pu = 28 lbs
				brown, very dense, fine to medium grained, Same as above, sandy gravel in tip, brown, very dense, fine to medium angular gravel <1" diameter
	37			
551.93	50/3"			Sandy Gravel (GP) - light gray, wet, very dense, fine to medium angular gravel, fine to coarse sand
549.93				Bottom of hole = 18.0 feet

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N	Standard Penetration Test N (blows/ft)
Qu	Unconfined Strength (tsf)
w%	Natural Moisture Content (%)
[Q]	Unconsolidated Undrained Triaxial Test
[R]	Consolidated Undrained Triaxial Test
[C]	Consolidation Test
[O]	Organic Content Test
DD ▽ 558.10	Water Surface Elevation Encountered in Boring DD = during drilling 24h = 24 hours after completion

SUBSURFACE DATA PROFILE
STRUCTURE NO. 081-6018

PROFESSIONAL DESIGN FIRM LICENSE #184-001084

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Hanson Professional Services Inc.

JOB NO. 08H0120E
DATE 8/24/11
SHEET NO. 1
3 SHEETS

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
74	81-1HVB	ROCK ISLAND	_	
		CONTRACT NO. 64C08		
FED. ROAD DIST. NO. _	ILLINOIS	FED. AID PROJECT		

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RW16-2
Sta. 26+33, 82' RT

	N	Qu	w%		
567.40					
567.15					TOPSOIL
	8	2.25P	19		FILL - Very dark brown, wet, stiff to very stiff, sandy SILT with trace gravel, brick fragments
	5	1.25P	22		
561.90					
			16	R	Dark brown, moist, lean CLAY with silt
			27	R	(LL=43 PI=24)
559.40					
558.40 ▽	Oh	1.10B	27	C	Gray, moist, stiff, CLAY with silt
			24		(LL=50 PI=30)
556.90					
					Gray, moist, medium stiff, CLAY with very fine-grained sand
	16	0.92B	28		
553.90					Brown, wet, very dense, silty, coarse-grained SAND and GRAVEL
552.90	50/5"		30		
551.30	50/1"		23		Brown, WEATHERED LIMESTONE
					Bottom of hole = 16.1 feet

RW1503
Sta. 26+79, 104' RT

	N	Qu	w%	
567.80				
	18			Fill (GC) - Clayey gravel to clayey sand, trace brick, dark brown, dry to moist, stratified
	6	2.3P		Sandy to Silty Clay (CL, CL-ML) - trace to little gravel and silt, trace organics, dark brown to brown, dry to moist,
	7	2.5P		very stiff
561.80				
	4	0.5P	30.0	Sandy Clay (CL) trace to little gravel, dark brown to gray brown, dry to moist, soft to firm, encountered hard material
559.80				at 6', moved borehole 3' west and started sampling again
	7	1.5P		at 6' (LL=46 PI=21)
DD				
	8	1.8P		Silty Clay (CL-ML) - Silty clay, trace gravel, gray brown, dry to moist to wet, homogeneous, stiff
554.3 ▽				
553.80	24	0.5P		
	42			Poorly Graded Sand with Silt (SP-SM) little gravel, light gray and brown, wet, homogeneous, dense
	50/5"			
546.80				
				Bottom of hole = 21.0 feet

RW16-3
Sta. 27+87, 82' RT

	N	Qu	w%	
569.80				
568.30	50/0"	1.76B	12	FILL - Dark brown, moist, medium, sandy SILT
567.80				CONCRETE
			24	FILL - Dark brown, moist, silty SAND and GRAVEL
	30	1.50P	23	(LL=26 PI=10)
563.80				
562.80 ▽	Oh		23	FILL - Very dark brown, moist, soft, SILT with metal
562.30		1.55B	29	scraps, brick and concrete fragments (LL=44 PI=20)
			26	Gray, moist, stiff, CLAY with trace silt (LL=59 PI=28)
			23	(LL=25 PI=7)
	17	1.36B	26	Gray, moist, very stiff, CLAY with trace silt, sand and gravel
557.60				
556.30	50/2"	1.25P	27	Gray, WEATHERED LIMESTONE
556.10				Bottom of hole = 13.7 feet

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N	Standard Penetration Test N (blows/ft)
Qu	Unconfined Strength (tsf)
w%	Natural Moisture Content (%)
Q	Unconsolidated Undrained Triaxial Test
R	Consolidated Undrained Triaxial Test
C	Consolidation Test
O	Organic Content Test
DD ▽	Water Surface Elevation Encountered in Boring
558.10 ▽	DD = during drilling 24h = 24 hours after completion

SUBSURFACE DATA PROFILE
STRUCTURE NO. 081-6018

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JOB NO. 08H0120E
DATE 8/24/11
SHEET NO. 2
3 SHEETS

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
74	81-1HVB	ROCK ISLAND	_	
		CONTRACT NO. 64C08		
FED. ROAD DIST. NO. _	ILLINOIS	FED. AID PROJECT		

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ILR1603
Sta. 28+33, 80' RT

	N	Qu	w%	
568.27				
568.02				Fill Concrete - underlain with 3" concrete, silt and gravel, dark gray to black, dry, hole offset 3 feet west of proposed boring location
565.27	8			Fill Silty Fine to Coarse Sand With gravel (SM) - Very dark gray, dry, loose, occasional reddish brick fragments
DD				
562.27	2	1.0P	24.0	Silty to Clayey Fine Sand (SM, SC) - Dark brown with dark gray, moist, stiff, possible fill, weak cementation, Sample 2: grain size analysis and Atterberg limits (LL=26, PI=10) test performed
	1.5		23.0	Possible Fill Sandy Fat Clay (CH) - dark gray to greenish gray, wet, stiff to very stiff, trace gravel, Sample 3: (8'-10'): Atterberg limits (LL=59, PI=28) test performed
	6	2.5P	26.0	Weathered Sandstone - Brown with gray, wet, coarse to fine sands with, coarse to fine gravels, some silt and clay, dense to very dense, Bottom 2": Sandy Silt, uniform gray, dry, nonplastic, silt with fine sands, possible complete weathered sandstone, Driller reports rough drilling and chatter 12.0' bgs, possible weathered rock Completely weathered sandstone, dry, uniform gray, medium to fine sands with silt Possible top of rock at 13'6" bgs, Sample 4 (11'-13'): grain size analysis and Atterberg limits (LL=25, PI=7) tests performed
557.27	49		26.0	
	50/4"			
552.60				
	Rec. = 92%			Sandstone - Light brown and light gray, medium to fine grained, trace coarse grains at top 16" of sample, smooth to rough texture, slightly vuggy at top 24" of sample indicates little water action, slightly weathered, weak to medium to strong, light gray with greenish gray blotches at bottom 15" of sample 15.67' - Slightly to moderately fractured, very close to close discontinuities, horizontal to 30° fractures, varying rough and irregular fracture surfaces, undulated, greenish gray, stiff to very stiff clay infilling that is 1/8" to 1" thick at 80% of fractures surfaces, stained green and gray, possibly due to clay infilling, zones containing clay seam thick enough to prevent back wall contact at 80" and 86", other fractures tightly healed with impermeable infilling and varying discontinuous joints and slightly altered joint walls, Started coring at 11:00 AM.
	RQD = 51%			
542.60				Bottom of hole = 25.67 feet

RW1504
Sta. 28+83, 105' RT

	N	Qu	w%	
567.96				
566.96				Concrete - 1' of concrete and crushed rock.
				Clayey Sand (SC) - Clayey Sand, few gravel, dark brown and brown, dry to moist, homogeneous.
564.96	10			
	5	0.7P		Sandy Clay (CL) Sandy Clay, some silt, few gravel, dark brown, dry to moist, homogeneous.
				Sandy Clay, some silt, trace gravel, black, dry to moist, homogeneous.
	4	0.2P		
560.96				Clayey Silt to Silty Clay (MH-CL) - Clayey Silt to Silty Clay, trace gravel, gray brown, dry to moist, stratified.
558.96	7	1.1P		
558.0	DD			Sand to Shale (SC) - Sand to Shale, gray, wet, stratified. Water at 10' while drilling
556.96	50/0"			
	50/0"			Shale - Poss. shale
				Auger refusal at 14'; end of borehole.
553.96				Bottom of hole = 14.0 feet

VIAIL-104
Sta. 29+66, 74' RT

	N	Qu	w%	
568.20				
567.70				ASPHALT + BASE COURSE - (3" to 6" thick)
	23			SILT - black, sandy, and gravel, moist (FILL)
565.20				
	6	1.0P	17.0	CLAY - reddish brown to greenish brown, silty, medium plastic, medium stiff to soft, moist.
561.10	7	0.3B	18.9	
559.70	DD			SHALE - medium gray, with sand partings, friable, stiff.
	4		17.0	SAND - medium brown, fine to medium, some silt, loose, saturated.
557.20				- moderately well consolidated in 2" seam at 10'
	50/4"		18.9	SANDSTONE - moderate to severely weathered.
554.20				- augered through 11.3' to 14' (LL=31 PI=19)
	Rec. = 100%			
	RQD = 51%			SANDSTONE - light to medium gray, with numerous shale partings with fracture at partings, soft to very soft, moderately well cemented, non-distinct bedding at thin to occasionally medium bedded spacing, fractures at partings are horizontal to 10° planar and smooth, fractures in sandstone are planar to slightly irregular and sandy rough. localized high angle to vertical fractures, fresh to slightly weathered.
	Rec. = 85%			
	RQD = 21%			
	Rec. = 73%			
	RQD = 40%			- near-vertical fracture in sandstone at 19.7', sandy rough
				- thin beds of medium to dark gray shale with numerous sand partings at 20.3'-21.5'
	Rec. = 98%			
	RQD = 38%			
	Rec. = 98%			- medium to dark gray shale with numerous sand partings at 30.5'-32.5'
	RQD = 87%			
				- occasional shale partings from 32.5' to 35.5'
	Rec. = 98%			
	RQD = 62%			- brownish gray with occasional shale clasts, increasing to numerous clast at 40.0'-40.3', rough horizontal fractures with localized 70° rough fracture at 39.9'
527.90				SHALE - medium to dark gray.
527.70				Bottom of hole = 40.5 feet

For Information Only

LEGEND

N	Standard Penetration Test N (blows/ft)
Qu	Unconfined Strength (tsf)
w%	Natural Moisture Content (%)
Q	Unconsolidated Undrained Triaxial Test
R	Consolidated Undrained Triaxial Test
C	Consolidation Test
O	Organic Content Test
DD	Water Surface Elevation Encountered in Boring
558.10 ▽	DD = during drilling 24h = 24 hours after completion

SUBSURFACE DATA PROFILE
STRUCTURE NO. 081-6018

PROFESSIONAL DESIGN FIRM LICENSE #184-001084

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JOB NO. 08H0120E
DATE 8/24/11

SHEET NO. 3
3 SHEETS

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
74	81-1HVB	ROCK ISLAND	_	
		CONTRACT NO. 64C08		
FED. ROAD DIST. NO. _	ILLINOIS	FED. AID PROJECT		

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 9/19/07

ROUTE I-74 **DESCRIPTION** New I-74 Bridge Over Mississippi River - Illinois Approach **LOGGED BY** F. Abreu

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=565232.456, E=2459065.732), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **DRILLING METHOD** HSA, CME 55 **HAMMER TYPE** CME AUTOMATIC

STRUCT. NO. _____
Station _____

BORING NO. ILR0201-S
Station _____
Offset _____
Ground Surface Elev. 566.39 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 562.4 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Concrete 7" slab with rebar	565.39			
Fill: Fine to Medium Sand With Silt (SP-SM) Very dark brown, dry to moist, medium dense, little gravel, fine to medium sands, trace coarse sands	563.39	4 8 5 4 2		
Fill: Sandy Lean Clay(CL) ▼ Very dark gray mottled with greenish gray, moist to wet, stiff, faint petroleum odor, trace medium to fine gravel, with sand seams	-5	4 3 2	1.8 P	30.0
Fill: wood matter with fine to coarse sand, strong petroleum odor, saturated, possible old railroad ties	558.39	2 1 2 2		
Fill: Silty Sand Trace Gravel(SM) Top 5": Brown, wet, root matter with petroleum odor and root matter throughout Remainder: Silty Sand trace gravel, dark to medium gray, wet, non plastic, medium to fine sands, trace subrounded fine gravels, loose, faint petroleum odor Encountered WT at 10' bgs	-10 555.39	2 1 2 1 2		40.0 11.0
Silty Fine to Coarse Sand(SM) trace gravel, brown, wet, very loose to medium dense, faint petroleum odor, occasional root, possible native soil, non odorous	553.39	1 2 15 30 50/2		
Sandy Silt With Clay And Gravel (CL) Top 2": Dark brown followed by yellowish orange and then light gray at bottom 2", wet, non plastic, very angular flat coarse to fine gravels (possible rock fragments), some medium to fine sands with silt and few clay, possible gumbo/residual soil Driller began to set up for rock coring at 0950	-15 550.56 -20			

End of Boring

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	-25			
	-30			
	-35			
	-40			

For Information Only

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways
CH2M HILL

ROCK CORE LOG

Date 9/19/07

ROUTE I-74 **DESCRIPTION** New I-74 Bridge Over Mississippi River - Illinois Approach **LOGGED BY** F. Abreu

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=565232.456, E=2459065.732), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **CORING METHOD** Double tube, 10 ft core barrel, NQ wireline, diamond bit

STRUCT. NO. _____
Station _____

BORING NO. ILR0201-R
Station _____
Offset _____
Ground Surface Elev. 566.39 **ft**

CORING BARREL TYPE & SIZE _____
Core Diameter _____ **in**
Top of Rock Elev. 550.56 **ft**
Begin Core Elev. 550.56 **ft**

DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
	NQ-R1	78	41		
Sandstone with Limestone and bands of coal towards bottom of sample, light brown with light gray, rough texture at top 32", remainder has smooth texture, medium to fine grained with little coarse grains, slightly weathered to unweathered, medium to strong, top 32": Sandstone, remainder Limestone with coal bands 15.83' - Horizontal to 15° fractures, rough planar fractures at top 32" of sample, remainder fractures are irregular and undulated, little hard greenish gray impermeable clay infilling throughout top 13" of sample, remainder: no infilling, surface stains only, surfaces stained greenish gray at top 16", 16" to 30" no stains, 30" to bottom dark gray and brown coal stains, top 30": no rock wall contact due to crushed rock, remainder tightly healed with coal strands, sound to moderate fractures, very close to moderate discontinuities 23'-86" = top of run 1/2-1/2-1/4-3/4-3/4 light gray milky water, brown water 2.5' down and 7'-4' dark brown to dark green 23'-31.5" = end of run Medium to fine grained, smooth texture, slightly weathered to unweathered, medium strong 21.42' - 15° to 45° degree fractures, irregular, undulating, slickensided at 11", 15", 51", 67" and 88" from top, hard impermeable clay infilling 1/8" to 1/2" thick that has tightly healed at most fractures except from 45" to 51" from top, dark gray surface stains, no infilling and surface stains from 45" to 51", from 57" to bottom thinly bedded throughout, stiff to very stiff gray clay infilling that is 1/2" to 1/4" thick at fracture, sound to moderate fractures, close to wide discontinuities Average 1-1/4 minute per foot for top 5 feet, 10-20-30 (3/4-3/4')	NQ-R2	95	67		
534.97					
End of Boring					

Color pictures of the cores _____
Cores will be stored for examination until _____
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

For Information Only

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 9/18/07

ROUTE I-74 **DESCRIPTION** New I-74 Bridge Over Mississippi River - Illinois Approach **LOGGED BY** KB

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=565145.331, E=2459082.04), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **DRILLING METHOD** HSA, CME 55 **HAMMER TYPE** CME AUTOMATIC

STRUCT. NO. _____
Station _____

BORING NO. ILR0203
Station _____
Offset _____
Ground Surface Elev. 567.93 **ft**

Surface Water Elev. _____ **ft**
Stream Bed Elev. _____ **ft**

Groundwater Elev.:
First Encounter _____ **ft**
Upon Completion _____ **ft**
After _____ **Hrs.** _____ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Concrete 567.43 Surface: 3" of concrete				
Silty Sand (SM) dark brown and black, slightly moist, very loose, fine to medium grained, low plasticity		2		
		2 2		
		4		
	-5	2 2	1.5 P	
561.93				
Sand Silt and Clay (ML) Black, moist NOTE: Sample 3 grain size analysis performed		0 2 3		27.0
559.93				
Clay (CH) black, slightly moist, firm to stiff, trace fine sand, moderate plasticity Rimac: Pu = 94 lbs NOTE: Sample 4 Atterberg limits: LL=63, PI=46		2 3 3	1.8 P	25.0
	-10	2 3 5	1.0 P	23.0
Rimac: Pu = 28 lbs		1 2 3	0.5 P	
brown, very dense, fine to medium grained, Same as above, sandy gravel in tip, brown, very dense, fine to medium angular gravel <1" diameter	-15	5 15 22		
551.93				
Sandy Gravel (GP) light gray, wet, very dense, fine to medium angular gravel, fine to coarse sand		50/3"		
549.93				
End of Boring	-20			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, from 137 (Rev. 8-99)

For Information Only

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 9/24/07

ROUTE I-74 **DESCRIPTION** New I-74 Bridge Over Mississippi River - Illinois Approach **LOGGED BY** F. Abreu

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=564956.216, E=2459158.48), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **DRILLING METHOD** HSA, CME 55 **HAMMER TYPE** CME AUTOMATIC

STRUCT. NO. _____
Station _____

BORING NO. ILR1603
Station _____
Offset _____
Ground Surface Elev. 568.27 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 562.3 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Fill Concrete underlain with 3" concrete, silt and gravel, dark gray to black, dry, hole offset 3 feet west of proposed boring location	568.02	13		
Fill Silty Fine to Coarse Sand With Gravel (SM) Very dark gray, dry, loose, occasional reddish brick fragments	565.27	5 3 3 2		
Silty to Clayey Fine Sand (SM, SC) Dark brown with dark gray, moist, stiff, possible fill, weak cementation	-5	1 1 2	1.0 P	24.0
Sample 2: grain size analysis and Atterberg limits (LL=26, PI=10) test performed	562.27 ▼			
Possible Fill Sandy Fat Clay (CH) dark gray to greenish gray, wet, stiff to very stiff, trace gravel		2	1.5	23.0
Sample 3 (8'-10'): Atterberg limits (LL=59, PI=28) test performed	-10	3 3 3	2.5 P	26.0
Weathered Sandstone Brown with gray, wet, coarse to fine sands with, coarse to fine gravels, some silt and clay, dense to very dense, Bottom 2": Sandy Silt, uniform gray, dry, nonplastic, silt with fine sands, possible complete weathered sandstone, Driller reports rough drilling and chatter 12.0' bgs, possible weathered rock	557.27	25 33 16 50/5 50/4		26.0
Completely weathered sandstone, dry, uniform gray, medium to fine sands with silt Possible top of rock at 13'6" bgs Sample 4 (11'-13'): grain size analysis and Atterberg limits (LL=25, PI=7) tests performed	-15 552.60			
Borehole continued with rock coring.	-20			

For Information Only

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways
CH2M HILL

ROCK CORE LOG

Date 9/24/07

ROUTE I-74 **DESCRIPTION** New I-74 Bridge Over Mississippi River - Illinois Approach **LOGGED BY** F. Abreu

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=564956.216, E=2459158.48), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **CORING METHOD** Double tube, 10 ft core barrel, NQ wireline, diamond bit

STRUCT. NO. _____
Station _____

BORING NO. ILR1603
Station _____
Offset _____
Ground Surface Elev. 568.27 **ft**

CORING BARREL TYPE & SIZE _____
Core Diameter _____ **in**
Top of Rock Elev. 552.60 **ft**
Begin Core Elev. 552.60 **ft**

DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
552.60	NQ-R1	92	51		472.0
Sandstone Light brown and light gray, medium to fine grained, trace coarse grains at top 16" of sample, smooth to rough texture, slightly vuggy at top 24" of sample indicates little water action, slightly weathered, weak to medium to strong, light gray with greenish gray blotches at bottom 15" of sample 15.67' - Slightly to moderately fractured, very close to close discontinuities, horizontal to 30° fractures, varying rough and irregular fracture surfaces, undulated, greenish gray, stiff to very stiff clay infilling that is 1/8" to 1" thick at 80% of fractures surfaces, stained green and gray, possibly du to clay infilling, zones containing clay seam thick enough to prevent back wall contact at 80" and 86", other fractures tightly healed with impermeable infilling and varying discontinuous joints and slightly altered joint walls Started coring 11:00 AM.					
-20					
-25					
542.60					
End of Boring					
-30					
-35					

Color pictures of the cores _____
Cores will be stored for examination until _____
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

For Information Only

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 10/25/05

ROUTE I-74 **DESCRIPTION** New I-74 Bridge Over Mississippi River - Illinois Approach **LOGGED BY** L. Hunt

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=565101.511, E=2459102.047), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **DRILLING METHOD** HSA, CME 55 **HAMMER TYPE** CME AUTOMATIC

STRUCT. NO. _____
Station _____

BORING NO. RW1503
Station _____
Offset _____
Ground Surface Elev. 567.80 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 554.3 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	3			**Fill (GC)** Clayey gravel to clayey sand, trace brick, dark brown, dry to moist, stratified.
	9			
	9			
	3			
	3			**Sandy to Silty Clay (CL, CL-ML)** trace to little gravel and silt, trace organics, dark brown to brown, dry to moist, very stiff
	3	2.3 P		
	3			
	4			
	3			
-5	3	2.5 P		
	4			
561.80	4			
	1			**Sandy Clay (CL)** trace gravel, dark brown to gray brown, dry to moist, soft to firm, encountered hard material at 6', moved borehole 3' west and started sampling again at 6'
	2	0.5 P	30.0	
	2			
559.80	2			
	2			**Silty Clay (CL-ML)** Silty clay, trace gravel, gray brown, dry to moist to wet, homogeneous, stiff
	3	1.5 P		
	4			
-10	5			
	3			
	4	1.8 P		
	4			
	6			
	6			
	9	0.5 P		
▼	15			
553.80	16			
	10			**Poorly Graded Sand with Silt (SP-SM)** little gravel, light gray and brown, wet, homogeneous, dense
-15	9			
	33			
	36			
	3			
-20	50/5			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Auger refusal at 20'
546.80				End of Boring
-25				
-30				
-35				
-40				

For Information Only

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 10/27/05

ROUTE I-74 **DESCRIPTION** New I-74 Bridge Over Mississippi River - Illinois Approach **LOGGED BY** L. Hunt

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=564902.45, E=2459144.517), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **DRILLING METHOD** HSA, CME 55 **HAMMER TYPE** CME AUTOMATIC

STRUCT. NO. _____
Station _____

BORING NO. RW1504
Station _____
Offset _____
Ground Surface Elev. 567.96 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 558.0 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Concrete 1' of concrete and crushed rock. 566.96
	5			**Clayey Sand (SC)** Clayey Sand, few gravel, dark brown and brown, dry to moist, homogeneous.
	5			
	5			
	5			564.96
	4			**Sandy Clay (CL)** Sandy Clay, some silt, few gravel, dark brown, dry to moist, homogeneous.
	3	0.7 P		
	2			
-5	2			
	2			Sandy Clay, some silt, trace gravel, black, dry to moist, homogeneous.
	2	0.2 P		
	2			
	2			560.96
	2			**Clayey Silt to Silty Clay (MH - CL)** Clayey Silt to Silty Clay, trace gravel, gray brown, dry to moist, stratified.
	3	1.1 P		
	4			
	4			558.96
	2			**Sand to Shale (SC)** Sand to Shale, gray, wet, stratified.
▼-10	21			Water at 10' while drilling
	50/0			556.96
	50/0			**Shale** Poss. shale
				Auger refusal at 14'; end of borehole. 553.96
				End of Boring
-15				
-20				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, from 137 (Rev. 8-99)

For Information Only

HANSON

SOIL BORING LOG

Date 6/29/10

ROUTE F.A.I. 74 **DESCRIPTION** I-74 Over Mississippi River **LOGGED BY** JMB

SECTION 81-1HVB **LOCATION** NE¼ of SEC. 32, TWP. 18N, RNG. 1W, 4th P.M.

COUNTY Rock Island **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** Auto

STRUCT. NO. 081-6018
Station
BORING NO. RW 16-1
Station 25+10
Offset 81' Rt.
Ground Surface Elev. 570.1 ft

Surface Water Elev.
Stream Bed Elev.

Groundwater Elev.:
First Encounter ft
Upon Completion 559.1 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	6 8 8		10
2			
	12 12 15		8
4			
	woh woh 50/1"		18
6			
8			
	4 5 7	1.75P	17
10			
▽			
12			
14			
16	8 16 50/0"		6
553.10			
Gray, fine-grained, LIMESTONE			
18			
551.60			
End of Boring	50/0"		

For Information Only

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

HANSON

SOIL BORING LOG

Date 6/29/10

ROUTE F.A.I. 74 **DESCRIPTION** I-74 Over Mississippi River **LOGGED BY** JMB

SECTION 81-1HVB **LOCATION** NE¼ of SEC. 32, TWP. 18N, RNG. 1W, 4th P.M.

COUNTY Rock Island **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** Auto

STRUCT. NO. 081-6018
Station
BORING NO. RW 16-2
Station 26+33
Offset 82' Rt.
Ground Surface Elev. 567.4 ft

Surface Water Elev.
Stream Bed Elev.

Groundwater Elev.:
First Encounter ft
Upon Completion 558.4 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
TOPSOIL 567.15			
FILL - Very dark brown, wet, stiff to very stiff, sandy SILT with trace gravel, brick fragments	8 5 3	2.25P	19
2			
	2 2 3	1.25P	22
4			
561.90			
Dark brown, moist, lean CLAY with silt			16
6			27
559.40			
Gray, moist, stiff, CLAY with silt		2.22B	27
▽			24
10			
556.90			
Gray, moist, medium stiff, CLAY with very fine-grained sand	5 7 9	0.92B	28
12			
553.90			
Brown, wet, very dense, silty, coarse-grained SAND and GRAVEL	50/5"		30
14 552.90			
Brown, WEATHERED LIMESTONE			
551.30 16			
End of Boring	50/1"		23

For Information Only

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

HANSON

SOIL BORING LOG

Date 6/29/10

ROUTE F.A.I. 74 **DESCRIPTION** I-74 Over Mississippi River **LOGGED BY** JMB

SECTION 81-1HVB **LOCATION** NE¼ of SEC. 32, TWP. 18N, RNG. 1W, 4th P.M.

COUNTY Rock Island **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** Auto

STRUCT. NO. 081-6018
Station
BORING NO. RW 16-3
Station 27+87
Offset 82' Rt.
Ground Surface Elev. 569.8 ft

Surface Water Elev.
Stream Bed Elev.

Groundwater Elev.:
First Encounter ft
Upon Completion 562.8 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
FILL - Dark brown, moist, medium, sandy SILT			
568.30	5	1.76B	12
CONCRETE 567.80	50/0"		
2 FILL - Dark brown, moist, silty SAND and GRAVEL			
4	6 12 18	1.50P	23
563.80			
6 FILL - Very dark brown, moist, soft, SILT with metal scraps, brick and concrete fragments ▽			
562.30			
Gray, moist, stiff, CLAY with trace silt 8		1.55B	29
10			
	5 7 10	1.36B	23
557.60 12			
Gray, moist, very stiff, CLAY with trace silt, sand and gravel			
556.30			
Gray, WEATHERED LIMESTONE 556.10	50/2"	1.25P	27
End of Boring			

For Information Only

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 8/28/07

ROUTE I-74 **DESCRIPTION** New I-74 Bridge Over Mississippi River - Illinois Approach **LOGGED BY** SL

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=564827.741, E=2459192.07), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **DRILLING METHOD** HSA, CME 55 **HAMMER TYPE** CME AUTOMATIC

STRUCT. NO. _____
Station 29+40
BORING NO. VIAIL-104
Station _____
Offset _____
Ground Surface Elev. 568.20 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft
Groundwater Elev.:
First Encounter 559.7 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
ASPHALT + BASE COURSE - (3" to 6" thick) 567.70				
SILT - black, sandy, and gravel, moist (FILL)		3		
		11 12		
565.20				
CLAY - reddish brown to greenish brown, silty, medium plastic, medium stiff to soft, moist.		3		
		3	1.0	17.0
	-5	3	P	
		3		
561.10		3 4	0.3 B	18.9
SHALE - medium gray, with sand partings, friable, stiff.				
559.70 ▼				
SAND - medium brown, fine to medium, some silt, loose, saturated.		3		
		2		
	-10	2		
- moderately well consolidated in 2" seam at 10'				
557.20				
SANDSTONE - moderate to severely weathered.		50/4"		
- augered through 11.3' to 14'				
554.20				
Borehole continued with rock coring.	-15			
	-20			

For Information Only

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways
CH2M HILL

ROCK CORE LOG

Date 8/28/07

ROUTE I-74 **DESCRIPTION** New I-74 Bridge Over Mississippi River - Illinois Approach **LOGGED BY** SL

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=564827.741, E=2459192.07), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **CORING METHOD** NQ Core

STRUCT. NO. _____
Station 29+40

BORING NO. VIAIL-104
Station _____
Offset _____
Ground Surface Elev. 568.20 **ft**

CORING BARREL TYPE & SIZE NQ Wireline
Core Diameter 1.8 **in**
Top of Rock Elev. 557.20 **ft**
Begin Core Elev. 554.20 **ft**

DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
SANDSTONE - light to medium gray, with numerous shale partings with fracture at partings, soft to very soft, moderately well cemented, non-distinct bedding at thin to occasionally medium bedded spacing, fractures at partings are horizontal to 10° planar and smooth, fractures in sandstone are planar to slightly irregular and sandy rough, localized high angle to vertical fractures, fresh to slightly weathered. 554.20	Run 1	100	51	2.7	
-15					
	Run 2	85	21	1.2	305.0
- near-vertical fracture in sandstone at 19.7', sandy rough					
-20					
- thin beds of medium to dark gray shale with numerous sand partings at 20.3'-21.5'	Run 3	73	40	1.6	
-25					
	Run 4	98	38	1.2	
-30					
- medium to dark gray shale with numerous sand partings at 30.5'-32.5'	Run 5	98	87	1	
- occasional shale partings from 32.5' to 35.5'					

For Information Only

Color pictures of the cores Yes
Cores will be stored for examination until _____
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
CH2M HILL

ROCK CORE LOG

Date 8/28/07

ROUTE I-74 **DESCRIPTION** New I-74 Bridge Over Mississippi River - Illinois Approach **LOGGED BY** SL

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=564827.741, E=2459192.07), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **CORING METHOD** NQ Core

STRUCT. NO. _____
Station 29+40

BORING NO. VIAIL-104
Station _____
Offset _____
Ground Surface Elev. 568.20 **ft**

CORING BARREL TYPE & SIZE NQ Wireline
Core Diameter 1.8 **in**
Top of Rock Elev. 557.20 **ft**
Begin Core Elev. 554.20 **ft**

DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
SANDSTONE - light to medium gray, with numerous shale partings with fracture at partings, soft to very soft, moderately well cemented, non-distinct bedding at thin to occasionally medium bedded spacing, fractures at partings are horizontal to 10° planar and smooth, fractures in sandstone are planar to slightly irregular and sandy rough, localized high angle to vertical fractures, fresh to slightly weathered. *(continued)*					
-35					
	Run 6	98	62	0.6	
- brownish gray with occasional shale clasts, increasing to numerous clast at 40.0' - 40.3', rough horizontal fractures with localized 70° rough fracture at 39.9'					
-40					
527.90 / ~~527.70~~ SHALE - medium to dark gray.					
End of Boring					
-45					
-50					

Color pictures of the cores Yes
Cores will be stored for examination until _____
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

For Information Only

Summary of Laboratory Test Results, I-74 Corridor, Wall 081-6018

Boring	Soil	Depth to Top of Sample (ft)	Sample #	Unified Classification	AASHTO Classification	IDH Classification	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Organic Content (%)	LL	PL	PI	#10 (%)	#40 (%)	#200 (%)	In-Situ WC (%)	Dry Density (pcf)	Compressive Strength (tsf)	Undrained Shear Strength Su (psf)	Total Stress Friction Angle (deg.)	Total Stress Cohesion (psf)	Effective Stress Friction Angle (deg.)	Effective Stress Cohesion (psf)	Cc	Cr	eo	Preconsol. Press. (tsf)	Remarks
ILR0201	Sandy Lean Clay	3-5	2	SM-SC	A-4(0)		10	48	42		9.49	28	23	5	90	75	42	30												
	Silty Sand Tr. Gravel	8	4	SM			11	68	21		9.59				89	72	21	40												
	Silty Sand	11-13	5															11												
ILR0203	Sand,Silt&Clay	6	3	SM		SA.CL.LO.	1	56	18	25					99	95	43	27												
	Clay	8	4	CH								63	17	46				25												
	Clay	10	5	CH		SI.CL.	1	4	64	31					99	98	95	23												
ILR1603	Clayey Silt with Sand	3-5	2	SC	A-4(0)		1	64	35			26	17	10	99	85	35	24												
	Clay	6-8	T1	CL								44	24	20				23	102.1	1.5	1540							0.65		
	Clay	8-10	3	MH								59	31	28				26												
	H.Wthd. sandstone	11-13	4	SM-SC	A-4(0)	SA.LO.	27	46	19	8		25	18	7	73	48	27	26												
	Limestone	16																2	157.6	472										
RW1501	Silty Sand	6.0	4	SM			14	58	28						86.0	79.0	28.0	18.6												
	Clay	8.0	S-1	CL								50	27	23				55.6	62.1			14	14	26.4	0					
	Clayey Sand	12.0	7	SC			16	42	42						84.0	74.0	42.0	48.4												
RW1503	Sandy Clay	6.0	4	CL								46	25	21				30.1												

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ORGANIC CONTENT

Project: I-74 Over Mississippi River Job Number: 08H0120E

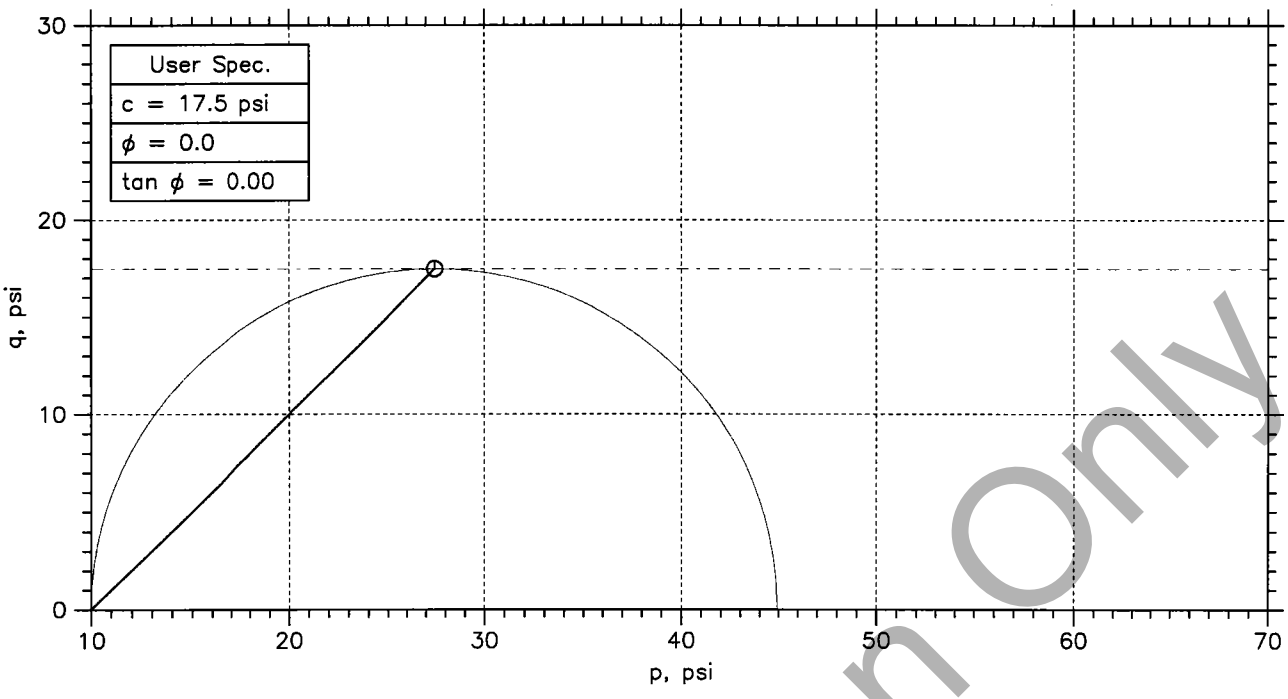
Client: Iowa DOT Date: 8/23/2010

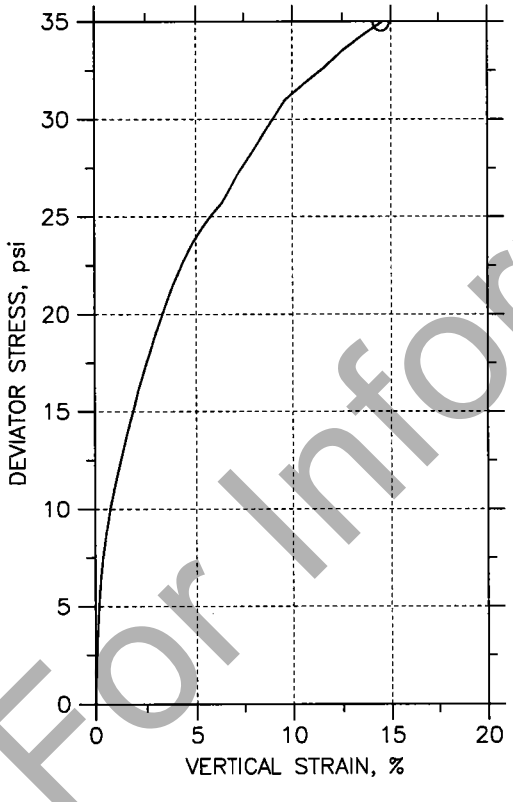
Checked by: SLS Date: 8/23/2010

Boring/ Sample Number	Oven Dry Weight of Soil+Tare (grams)	Fired Weight of Soil+Tare (grams)	Weight of Tare (grams)	Loss On Ignition (%)	Furnace Temperature (C)
I-74 01 ST4-2 8.5'-9.0'	121.34	120.03	81.55	3.3	440.0
RW01-2 ST2-1 3.0'-3.5'	93.11	92.54	79.37	4.1	440.0
RW01-3 ST2-1 3.0'-3.5'	136.56	135.47	79.37	1.9	440.0
RW01-3 ST3-2 6.5'-7.0'	118.23	116.79	81.55	3.9	440.0
RW02-4 ST2-1 6.0'-6.5'	142.60	140.28	79.37	3.7	440.0
RW16-1 ST5-1 11.0'-11.5'	104.58	95.74	79.38	35.1	440.0
RW16-1 ST6-1 13.0'-13.5'	99.40	91.88	81.56	42.2	440.0
RW135-04 SPT-5 7.0'-7.5'	87.08	85.49	81.56	28.8	440.0

For Information Only

CONSOLIDATED UNDRAINED TRIAXIAL TEST





Symbol		⊙			
Sample No.		3-1			
Test No.		1 of 1			
Depth		6.3-6.8			
Initial	Diameter, in	2.835			
	Height, in	6.003			
	Water Content, %	15.9			
	Dry Density, pcf	112.			
	Saturation, %	88.0			
	Void Ratio	0.478			
Before Shear	Water Content, %	13.5			
	Dry Density, pcf	121.8			
	Saturation*, %	100.0			
	Void Ratio	0.358			
	Back Press., psi	62.			
Ver. Eff. Cons. Stress, psi		9.988			
Shear Strength, psi		17.46			
Strain at Failure, %		14.5			
Strain Rate, %/min		0.0625			
B-Value		0.97			
Estimated Specific Gravity		2.65			
Liquid Limit		0			
Plastic Limit		0			

HANSON

Project: I-74 Mississippi River Br

Location: Quad Cities

Project No.: 08H0120E

Boring No.: RW16-2

Sample Type: Tube

Description: Brn. & blk. f. sandy silt / so. clay & organics.

Remarks: 2500 # Load Cell Loadtrac II # 258112 FlowTrac II 13610 & 13610B & LVDT55306

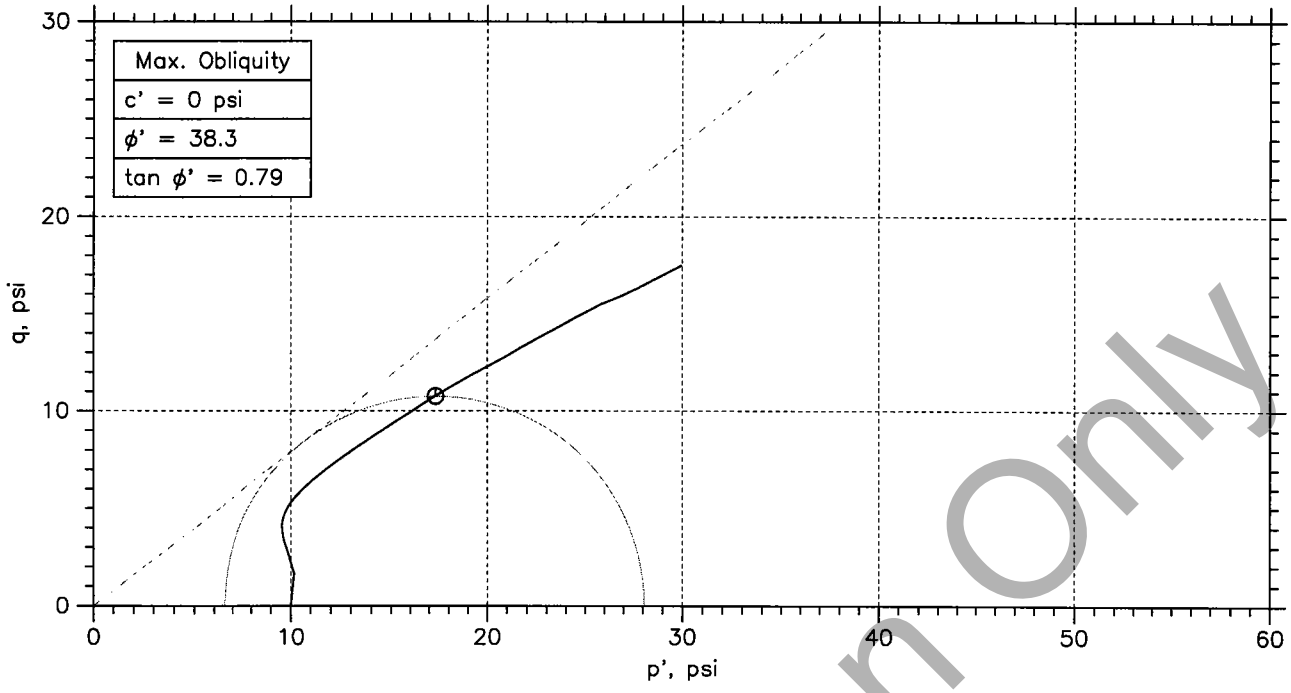
Phase calculations based on start of test.

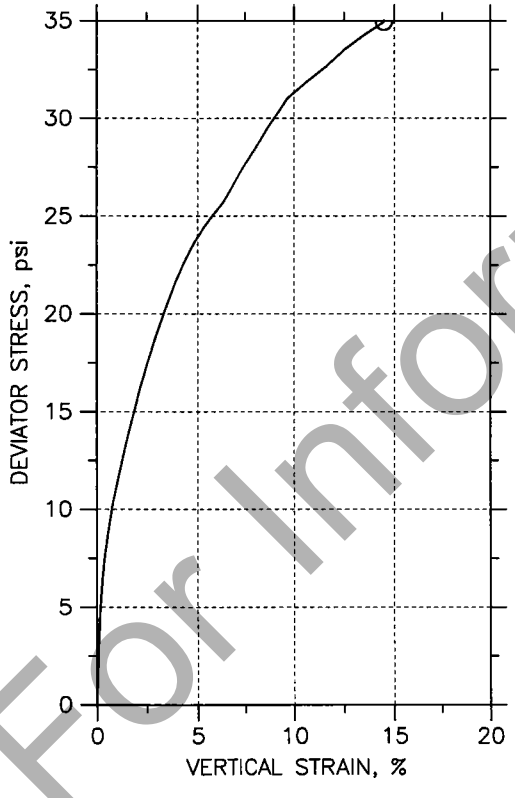
* Saturation is set to 100% for phase calculations.

Thu, 16-SEP-2010 13:49:44

For Information Only

CONSOLIDATED UNDRAINED TRIAXIAL TEST





Symbol		⊙			
Sample No.		3-1			
Test No.		1 of 1			
Depth		6.3-6.8			
Initial	Diameter, in	2.835			
	Height, in	6.003			
	Water Content, %	15.9			
	Dry Density, pcf	112.			
	Saturation, %	88.0			
	Void Ratio	0.478			
Before Shear	Water Content, %	13.5			
	Dry Density, pcf	121.8			
	Saturation*, %	100.0			
	Void Ratio	0.358			
	Back Press., psi	62.			
Ver. Eff. Cons. Stress, psi		9.988			
Shear Strength, psi		17.46			
Strain at Failure, %		14.5			
Strain Rate, %/min		0.0625			
B-Value		0.97			
Estimated Specific Gravity		2.65			
Liquid Limit		0			
Plastic Limit		0			

HANSON

Project: I-74 Mississippi River Br

Location: Quad Cities

Project No.: 08H0120E

Boring No.: RW16-2

Sample Type: Tube

Description: Brn. & blk. f. sandy silt / so. clay & organics.

Remarks: 2500 # Load Cell Loadtrac II # 258112 FlowTrac II 13610 & 13610B & LVDT55306

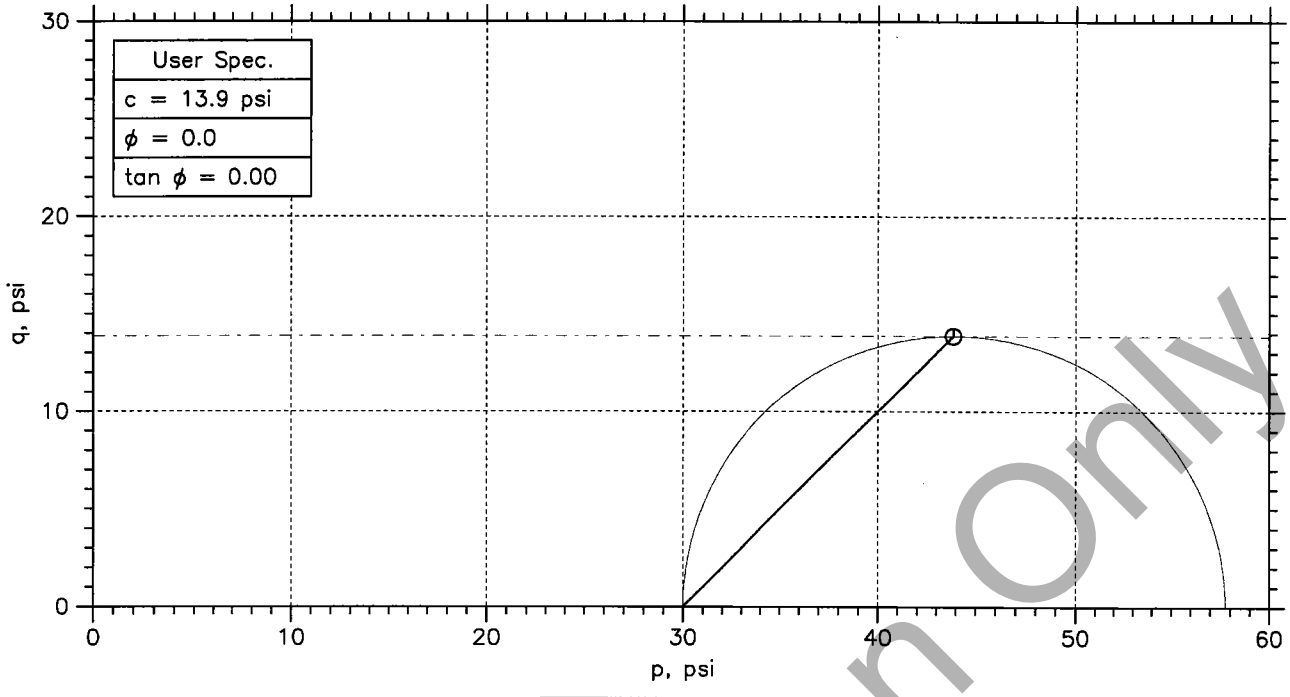
Phase calculations based on start of test.

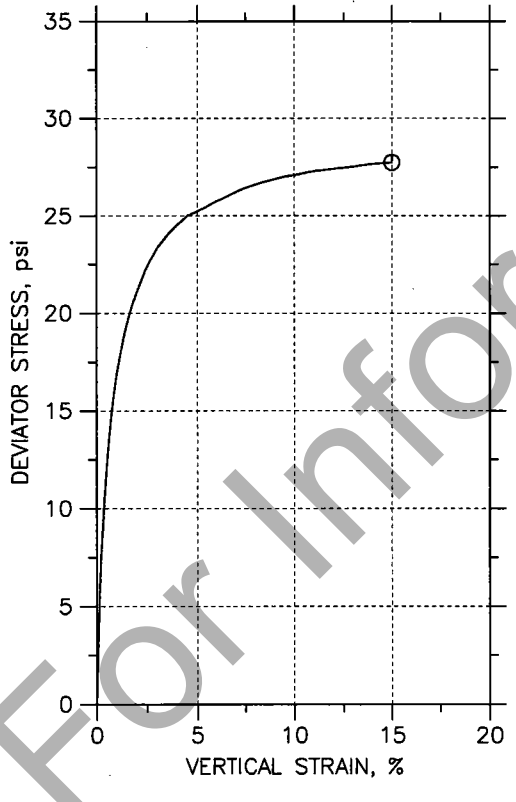
* Saturation is set to 100% for phase calculations.

Thu, 16-SEP-2010 13:46:52

For Information Only

CONSOLIDATED UNDRAINED TRIAXIAL TEST





Symbol		⊙			
Sample No.		3-2			
Test No.		1 of 1			
Depth		6.8-7.3			
Initial	Diameter, in	2.873			
	Height, in	5.721			
	Water Content, %	27.3			
	Dry Density, pcf	93.86			
	Saturation, %	94.8			
	Void Ratio	0.763			
Before Shear	Water Content, %	23.3			
	Dry Density, pcf	102.2			
	Saturation*, %	100.0			
	Void Ratio	0.618			
	Back Press., psi	42.01			
Ver. Eff. Cons. Stress, psi		30.02			
Shear Strength, psi		13.87			
Strain at Failure, %		15			
Strain Rate, %/min		0.0625			
B-Value		0.95			
Estimated Specific Gravity		2.65			
Liquid Limit		0			
Plastic Limit		0			

HANSON

Project: I-74 Mississippi River Br

Location: Quad Cities

Project No.: 08H0120E

Boring No.: RW16-2

Sample Type: Tube

Description: Dk. gray silty clay / dk. brn. f. sandy silt.

Remarks: 2500 # Load Cell Loadtrac II # 258112 FlowTrac II 13610 & 13610B & LVDT55306

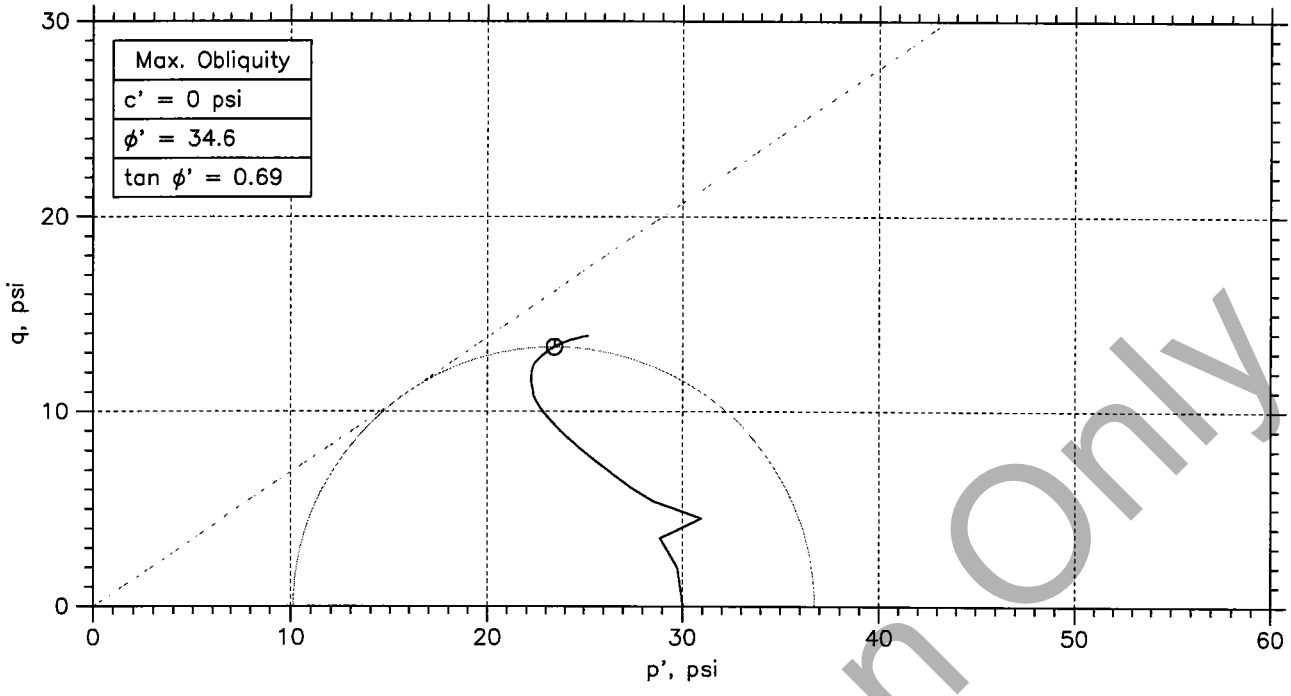
Phase calculations based on start of test.

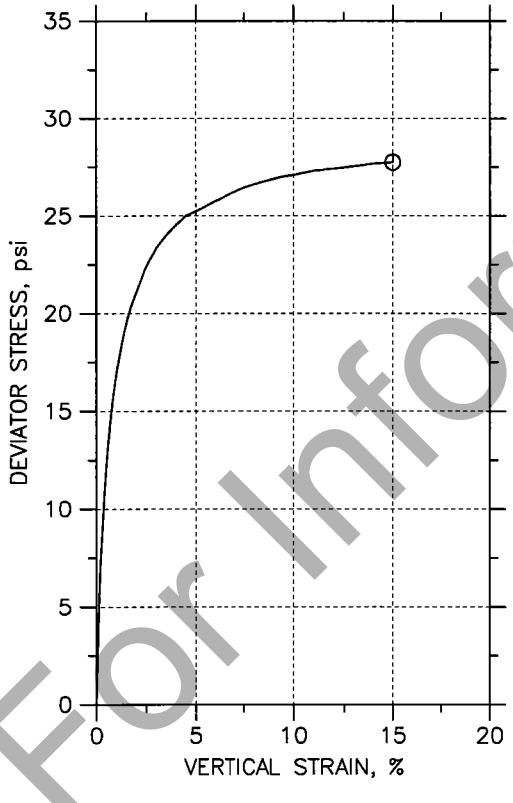
* Saturation is set to 100% for phase calculations.

Wed, 15-SEP-2010 10:25:36

For Information Only

CONSOLIDATED UNDRAINED TRIAXIAL TEST





Symbol		⊙			
Sample No.		3-2			
Test No.		1 of 1			
Depth		6.8-7.3			
Initial	Diameter, in	2.873			
	Height, in	5.721			
	Water Content, %	27.3			
	Dry Density, pcf	93.86			
	Saturation, %	94.8			
	Void Ratio	0.763			
Before Shear	Water Content, %	23.3			
	Dry Density, pcf	102.2			
	Saturation*, %	100.0			
	Void Ratio	0.618			
	Back Press., psi	42.01			
Ver. Eff. Cons. Stress, psi		30.02			
Shear Strength, psi		13.87			
Strain at Failure, %		15			
Strain Rate, %/min		0.0625			
B-Value		0.95			
Estimated Specific Gravity		2.65			
Liquid Limit		0			
Plastic Limit		0			

HANSON

Project: I-74 Mississippi River Br

Location: Quad Cities

Project No.: 08H0120E

Boring No.: RW16-2

Sample Type: Tube

Description: Dk. gray silty clay / dk. brn. f. sandy silt.

Remarks: 2500 # Load Cell Loadtrac II # 258112 FlowTrac II 13610 & 13610B & LVDT55306

Phase calculations based on start of test.

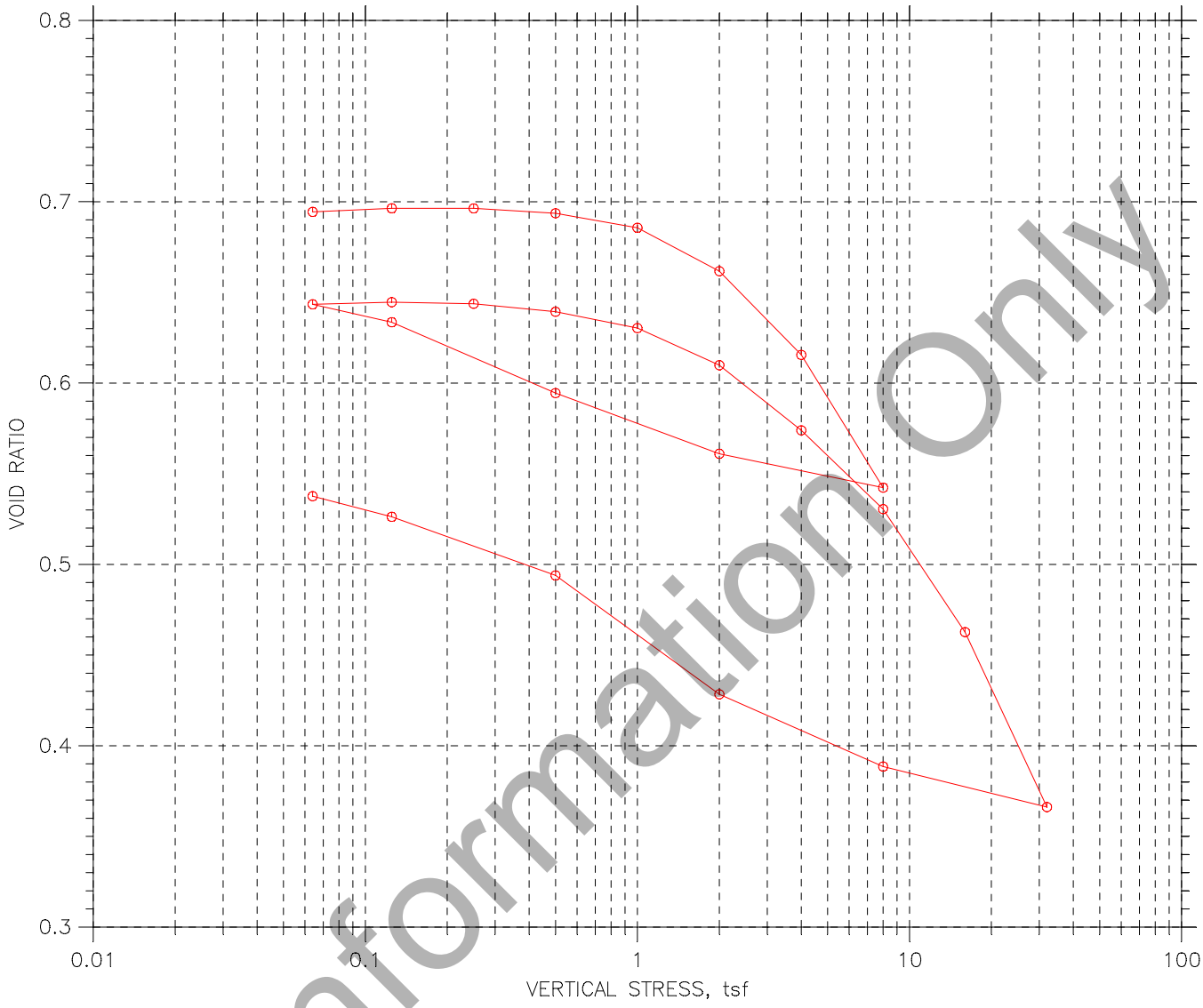
Wed, 15-SEP-2010 10:06:55

* Saturation is set to 100% for phase calculations.

For Information Only

CONSOLIDATION TEST DATA

SUMMARY REPORT



For Information Only

				Before Test	After Test
Overburden Pressure: 0 tsf			Water Content, %	26.48	22.97
Preconsolidation Pressure: 0 tsf			Dry Unit Weight, pcf	97.88	107.6
Compression Index: 0			Saturation, %	101.68	113.25
Diameter: 2.5 in		Height: 0.994 in	Void Ratio	0.69	0.54
LL: 0	PL: 0	PI: 0	GS: 2.65		

HANSON	Project: I74	Location: Quad Cities	Project No.: 08H0120E
	Boring No.: RW16-2	Tested By: RIN	Checked By: JCC
	Sample No.: 4-1	Test Date: 7/16/10	Depth: 8.2-8.5
	Test No.: 1	Sample Type: Tube	Elevation:
	Description: Gray silty clay.		
	Remarks:		

CONSOLIDATION TEST DATA

Project: I74
Boring No.: RW16-2
Sample No.: 4-1
Test No.: 1

Location: Quad Cities
Tested By: RIN
Test Date: 7/16/10
Sample Type: Tube

Project No.: 08H0120E
Checked By: JCC
Depth: 8.2-8.5
Elevation:

Soil Description: Gray silty clay.
Remarks:

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting Sq.Rt. min	T50 Fitting Log min	Coefficient of Consolidation Sq.Rt. in^2/sec	Coefficient of Consolidation Log in^2/sec	Coefficient of Consolidation Ave. in^2/sec
1	0.064	-0.002461	0.694	-0.25	0.0	0.0	0.00e+000	0.00e+000	0.00e+000
2	0.125	-0.003623	0.696	-0.36	0.0	0.0	0.00e+000	0.00e+000	0.00e+000
3	0.25	-0.003582	0.696	-0.36	0.1	0.0	6.66e-003	2.12e-002	1.01e-002
4	0.5	-0.002012	0.694	-0.20	0.9	0.0	9.04e-004	0.00e+000	9.04e-004
5	1	0.002695	0.686	0.27	3.4	0.0	2.42e-004	0.00e+000	2.42e-004
6	2	0.01677	0.662	1.69	7.7	0.0	1.04e-004	0.00e+000	1.04e-004
7	4	0.04393	0.616	4.42	16.0	12.5	4.77e-005	6.09e-005	5.35e-005
8	8	0.08699	0.542	8.75	27.9	0.0	2.54e-005	0.00e+000	2.54e-005
9	2	0.07601	0.561	7.65	7.5	0.0	9.15e-005	0.00e+000	9.15e-005
10	0.5	0.05633	0.594	5.67	44.7	0.0	1.58e-005	0.00e+000	1.58e-005
11	0.125	0.03336	0.634	3.36	120.4	0.0	6.15e-006	0.00e+000	6.15e-006
12	0.064	0.02754	0.643	2.77	194.8	0.0	3.92e-006	0.00e+000	3.92e-006
13	0.125	0.02682	0.645	2.70	0.4	0.0	2.06e-003	0.00e+000	2.06e-003
14	0.25	0.02735	0.644	2.75	3.9	0.0	1.95e-004	0.00e+000	1.95e-004
15	0.5	0.02995	0.639	3.01	7.3	0.0	1.05e-004	0.00e+000	1.05e-004
16	1	0.03525	0.630	3.55	15.8	11.8	4.81e-005	6.45e-005	5.51e-005
17	2	0.04727	0.610	4.76	16.2	0.0	4.62e-005	0.00e+000	4.62e-005
18	4	0.06839	0.574	6.88	27.9	0.0	2.58e-005	0.00e+000	2.58e-005
19	8	0.09394	0.530	9.45	28.0	25.6	2.45e-005	2.68e-005	2.56e-005
20	16	0.1338	0.463	13.46	36.0	26.7	1.77e-005	2.39e-005	2.03e-005
21	32	0.1906	0.366	19.17	68.3	0.0	8.33e-006	0.00e+000	8.33e-006
22	8	0.1774	0.389	17.85	15.2	0.0	3.54e-005	0.00e+000	3.54e-005
23	2	0.154	0.428	15.49	62.4	0.0	9.04e-006	0.00e+000	9.04e-006
24	0.5	0.1155	0.494	11.62	232.5	0.0	2.61e-006	0.00e+000	2.61e-006
25	0.125	0.09645	0.526	9.70	363.6	0.0	1.78e-006	0.00e+000	1.78e-006
26	0.064	0.08977	0.538	9.03	393.7	0.0	1.69e-006	0.00e+000	1.69e-006

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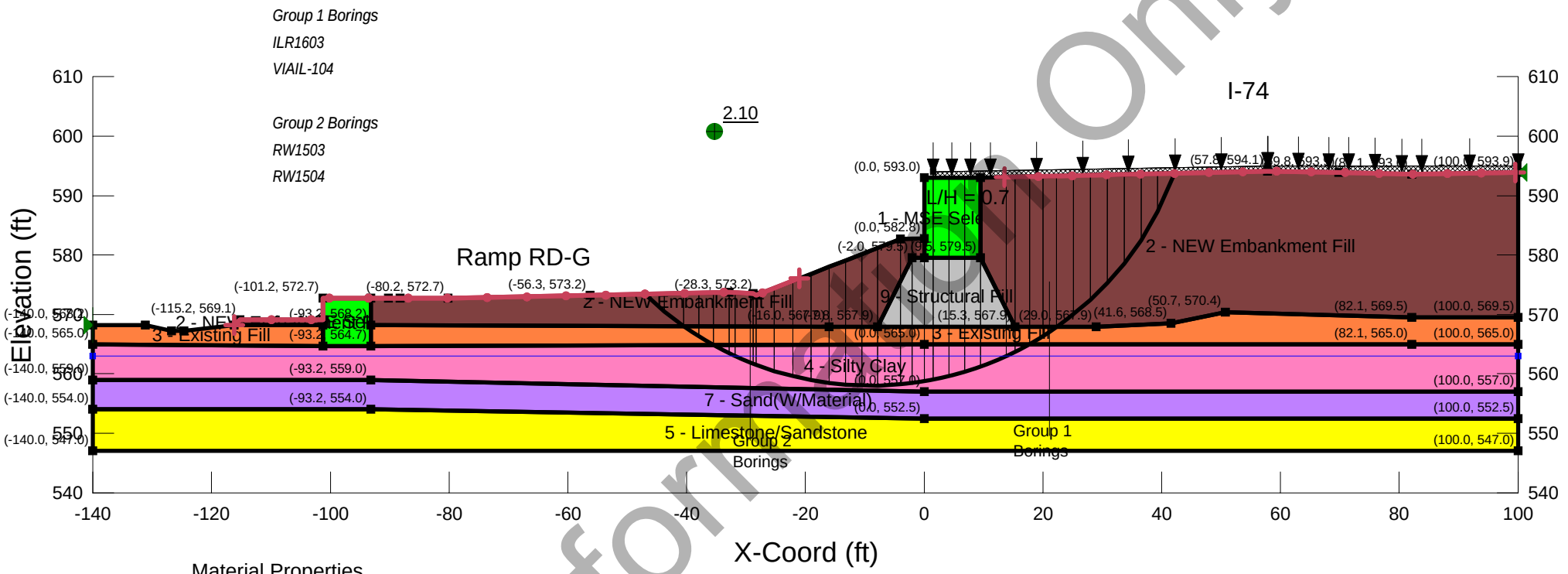

Material Properties

Name: 1 - MSE Select Fill Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion: 0 psf Phi: 34 °

Name: 2 - NEW Embankment Fill Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion: 1000 psf Phi: 0 °

Name: 3 - Existing Fill Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 1000 psf Phi: 0 °

Name: 4 - Silty Clay Model: Mohr-Coulomb Unit Weight: 118 pcf Cohesion: 1000 psf Phi: 0 °

Name: 5 - Limestone/Sandstone Model: Bedrock (Impenetrable)

Name: 7 - Sand(W/Material) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion: 0 psf Phi: 32 °

Name: 9 - Structural Fill Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion: 1600 psf Phi: 0 °

SN 081-6018 IL-RW16
Case 1 - Sta 29+00 (E/E)
File Name: I-74 RW16 MSE Wall_2.gsz
Last Edited By: Robert Chantome
Date: 10/20/2011 4:30:15 PM

I-74 OVER THE MISSISSIPPI RIVER
CENTRAL SECTION FINAL DESIGN
ILLINOIS DEPARTMENT OF TRANSPORTATION
ROCK ISLAND COUNTY, ILLINOIS

HANSON

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benesch
engineers · scientists · planners

Meeting Minutes

Project Name:	I-74 over the Mississippi
Project Number:	IM-74-1(185)5--13-82
Current Date:	March 15, 2011
Date of Meeting:	November 16, 2010
Time of Meeting:	1:00 p.m.- 2:30 p.m.
Meeting Location:	Conference Call and WebEx
Regarding:	I-74 FHWA VE Illinois Retaining Walls and Bridges – Status Update

Participant's Name	Title and Company Name
See Attached Sign in Sheet	

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1. Purpose of Meeting:

The purpose of the meeting was to discuss the Benesch Team's findings regarding the evaluation of the FHWA's VE Recommendations for the Plug Fill and several retaining walls on the Illinois side. These minutes reflect discussions pertaining to the following:

- Plug Fill which includes retaining walls RW01 (SN 081-6010), RW02 (SN 081-6011), RW16 (SN 081-6018) and RW15
- Retaining wall RW03 (SN 081-6012), which retains Proposed Ramp 6th–D
- Retaining wall RW04 (SN 081-6013), which is east of 19th Street
- Retaining wall RW14 ,which is east of proposed Ramp 7th-A

David Morrill opened the meeting at 1 p.m. The attendees were identified and added to the attached Attendance Roster.

David noted that Benesch presented our initial findings regarding the plug fill to District 2 on October 25, 2010. The preliminary conclusion from that meeting was to adopt the Structure option. This was based on the Illinois DOT's understanding of the City of Moline's concerns with the Plug Fill option. Subsequent to the October meeting, Benesch refined the cost analysis; specifically the special waste costs. The results remain the same, namely the Plug Fill option is less expensive than the Structure option. The analysis and results are summarized in a PowerPoint presentation (see Attachment A) that was presented during the conference call via WebEx.

With respect to the Plug Fill retaining walls, Benesch's intent was to present the initial findings and recommendations to make sure everyone is on the same page before the Benesch Team proceeds with completing the TSLs and SGRs. The walls presented included retaining wall RW03, an MSE wallwith temporary wire facing and retaining walls RW04 and RW14, soldier pile and lagging walls with permanent CIP concrete facing.

As noted in Tim's previous comments on the unapproved retaining wall TS&Ls, the D5 preliminary studies did not fully address the soils issues. Therefore those TSLs with soil issues were not approved. Hanson reviewed the D5 SGRs along with additional soil borings and/or analysis to verify these soil concerns. They concluded that some type of soil remediation is required for the Plug Fill area and for RW03 which validates Tim's concerns.

2. Plug Fill Alternatives:

David walked the group through the PowerPoint presentation (see Attachment A) which included the following discussion items:

- Review Preliminary Engineering (Phase I) Design
- Review Existing Soil Conditions
- Review Alternatives
- Review Costs
- Present Renderings
- Advantages and Limitations
- Recommendations
- Next Steps

The existing soils conditions have a wide range of variability with no consistent section. There are significant settlement issues requiring a long time period (over 400 days) for consolidation.

Three alternatives were explored in detailed:

- Plug Fill – included the removal and replacement and strengthening of existing soils
- Structure for mainline and ramps
- Structure for mainline only

The City of Moline/Renew Moline expressed concerns with the Plug Fill alternative, a large mass of earth framed by concrete walls that would block views and access.

To assist in the evaluation of the alternatives, visual renderings were created with views looking to the east, the northeast, the north and the northwest.

The advantages of the Plug Fill alternative are:

- Easily accommodates the I-74 MOT crossover and sag;
- Less maintenance;
- Lessens the industrial feeling; and
- Provides opportunity for incorporating aesthetics on the walls.

The limitations of the Plug Fill alternative are:

- Less open vista; and
- Limits east-west access

The advantages of the Structure alternatives are:

- More open vista; and

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- Accommodates east-west access,

The limitations of the Plug Fill alternative are:

- Crossover on Structure adds complications;
- Sags on bridges are not generally favored by the Bridge Office;
- More structure to maintain;
- Openness is more of an industrial feel; and
- Does not permit clear view of the river

The cost for the Plug Fill alternative is approximately $19.0 million while the Mainline and Ramp Structure alternative is approximately $3.1 million more, i.e. $22.1 million. The cost for the Mainline only Structure alternative is approximately $23.5 million which is more than the structure only alternative due to an inefficient combination of bridge and wall. Therefore this alternative was removed from further consideration. If the City of Moline requests that the DOTs build the Mainline and Ramp Structure alternative, then the additional $3 million cost would be attributed to aesthetics.

The next step is for the Illinois DOT to present these findings to the City of Moline and Renew Moline. Until a decision is made, the Benesch Team is on hold with Phase I tasks such as the completion of TS&L's and SGR's for the Plug Fill alternative or the development of new TS&Ls and SGR's for the Structure alternative. Repercussions affecting the adjacent Illinois Viaduct and the Mississippi River South Approach Structures are unknown and therefore work on these structures is also on hold.

3. Retaining Wall RW03 (SN 081-6012):

Retaining wall RW03 is a mechanically stabilized earth (MSE) wall with precast concrete panels which retains the fill for the proposed Ramp 6th– D roadway. The wall continues in a straight line past the Ramp 6th– D Bridge (SN 081-0187) abutment, terminating at the toe of slope of the abutment spill slope. Piles for the bridge pass through the reinforced soil mass. The unapproved D5 RW03 SGR identified insufficient bearing capacity at the higher segment of the wall.

As the result of these issues, the TSL and SGR for RW03 were not approved. Hanson's preliminary results support the bearing capacity issue and also identified global slope stability issues. Their recommendation is to incorporate soil remediation to the D5 solution as a means to minimize and/or eliminate these concerns.

Benesch considered the following alternatives:

- Alternative A: D5 solution + Strengthen the existing soils
  –
- Alternative B: Reduce the length of wall

Alternative A with modifications to the soils, such as aggregate column ground improvement would increase the D5 cost by at least $100,000. Alternative B incorporates an embankment with 3:1 slopes resulting in the reduction of the wall by 167 ft and a reduction of the D5 costs by approximately $250,000. This alternative would still require modifications to the soils. Thus the overall cost savings is expected to be $150,000 ($150,000 - $250,000).
It was agreed to pursue alternative B. Refer to Attachment B for exhibits.

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4. Retaining wall RW04 (SN 081-6013):

Retaining wall RW04 is a hybrid wall retaining both cut and fill soil. The wall is located on the east side of 19th Street. The D5 recommended a soldier pile and lagging wall with permanent cast in place facing. Both the SGR and TS&L were approved for RW04. However, the FHWA VE study identified potential cost savings through reduction and/or elimination of the wall.

Benesch considered the following alternatives:

- Alternative A: D5 solution
- Alternative B: Reduce length of wall by removing the extra 7 ft shoulder.

Alternative B would reduce the length of wall by 100 ft and reduce the height of wall by an average of 3 ft reducing the D5 solution by $230,000. It was agreed to pursue Alternative B. Refer to Attachment C for exhibits.

5. Retaining Wall RW14

Retaining wall RW14 is a hybrid wall retaining both cut and fill soil. The wall is east of proposed Ramp 7th–A. The D5 recommended an anchored soldier pile and lagging wall with permanent cast in place facing. Both the SGR and TS&L were approved for RW14. However, the FHWA VE study identified potential cost savings through reduction and/or elimination of the wall.

Benesch considered the following alternatives:

- Alternative A: D5 solution
- Alternative B: Replace wall with a concrete barrier adjacent to 19th Street (w/sidewalk behind the concrete barrier)
- Alternative C: Keep the wall but reduce the buffer from 5 ft to 2 ft

Alternative B would replace wall with concrete barrier adjacent to 19th Street (sidewalk behind concrete barrier). However, this alternative would result in potential sight issue with barrier adjacent to the roadway. A sight analysis would be required to determine if the concrete barrier is an obstruction. In addition, Alternative B would require drainage structures on both side of the concrete barrier. On the sidewalk side, the structure cannot be within the walking surface. Finally, this alternative would have a concrete barrier blunt end near the intersection of 19th Street and 11th Avenue that would require guardrail to protect the motorists. Ideally the guardrail would wrap around the curb return, but due to the pedestrian movement across 11th Avenue, this cannot happen. A Terminal Type 1 would need to be used.

Alternative C would reduce the buffer from 5 ft to 2 ft giving a total width from face of wall to back of curb of 7 ft. Potential cost savings would be approximately $65,000; however the Benesch Team would need to revise and resubmit the already approved TS&L. It was agreed to keep the D5 design. Refer to Attachment D for exhibits.

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6. Conclusions and next steps:

The Benesch Team will proceed with the following actions:

- Complete the unapproved SGR and TS&L for retaining wall RW03 based on Alternative B.
- Revised the approved TS&L for retaining wall RW04 based on Alternative B.
- Keep the D5 solution for retaining wall RW14.

The Illinois DOT will present the Plug Fill and Structure Alternatives to the City of Moline.

The Meeting adjourned at 2:30 p.m.

Closure:

The above constitutes our understanding of the issues discussed and the conclusions reached. If there are any misunderstandings or omissions, please forward comments/corrections within five business days to the undersigned.

Respectfully submitted,

David J. Morrill, S.E., P.E.
Vice President
Project Manager

Diane M. Campione, S.E., P.E.
Deputy Project Manager

DJM/DMC:qmf

cc: All Attendees
Benesch Team Members

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Iowa Department of Transportation

Illinois Department of Transportation

ATTENDANCE ROSTER

I-74 Final Design-FHWA VE Recommendation Review Meeting

MEETING LOCATION: WebEx and Star Conference Call

DATE: November 16, 2010

LAST	FIRST	POSITION/OFFICE	TELEPHONE	CELL PHONE	E-MAIL ADDRESS
THE ILLINOIS DOT					
Craven	Tim	Illinois DOT BBS			Tim.Craven@illinois.gov
Marruffo	Rebecca	Project Engineer Illinois DOT – District 2	815-284-5902		Rebecca.Marruffo@illinois.gov
BENESCH					
Campione	Diane	Deputy Project Manager	312-565-0450	312-925-0997	dcampione@benesch.com
Morrill	David	Project Manager	312-565-0450	312-560-7947	dmorrill@benesch.com

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ATTACHMENT A

PLUG FILL POWERPOINT PRESENTATION
(includes retaining walls RW01 (SN 081-6010), RW02 (SN 081-6011), RW16 (SN 081-6018) and RW15)

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I-74 Final Design
Plug Fill VE Study Results

November 16, 2010

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I-74/Mississippi River

Agenda

- Review Preliminary Engineering (Phase I) Design
- Review Existing Soil Conditions
- Review Alternatives
- Review Costs
- Present Renderings
- Advantages and Limitations
- Recommendations
- Next Steps

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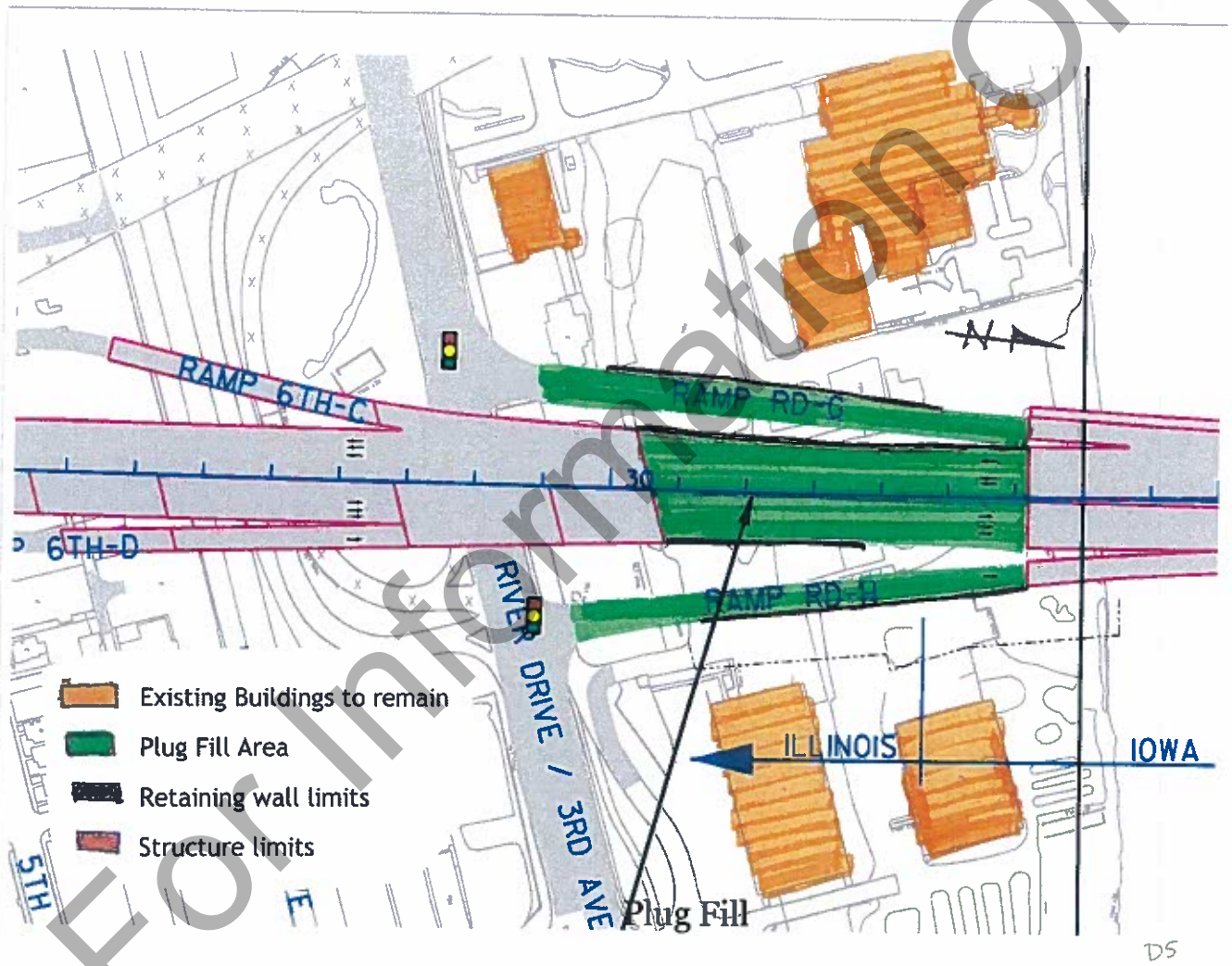
Preliminary Engineering (Phase I) Design - Plug Fill



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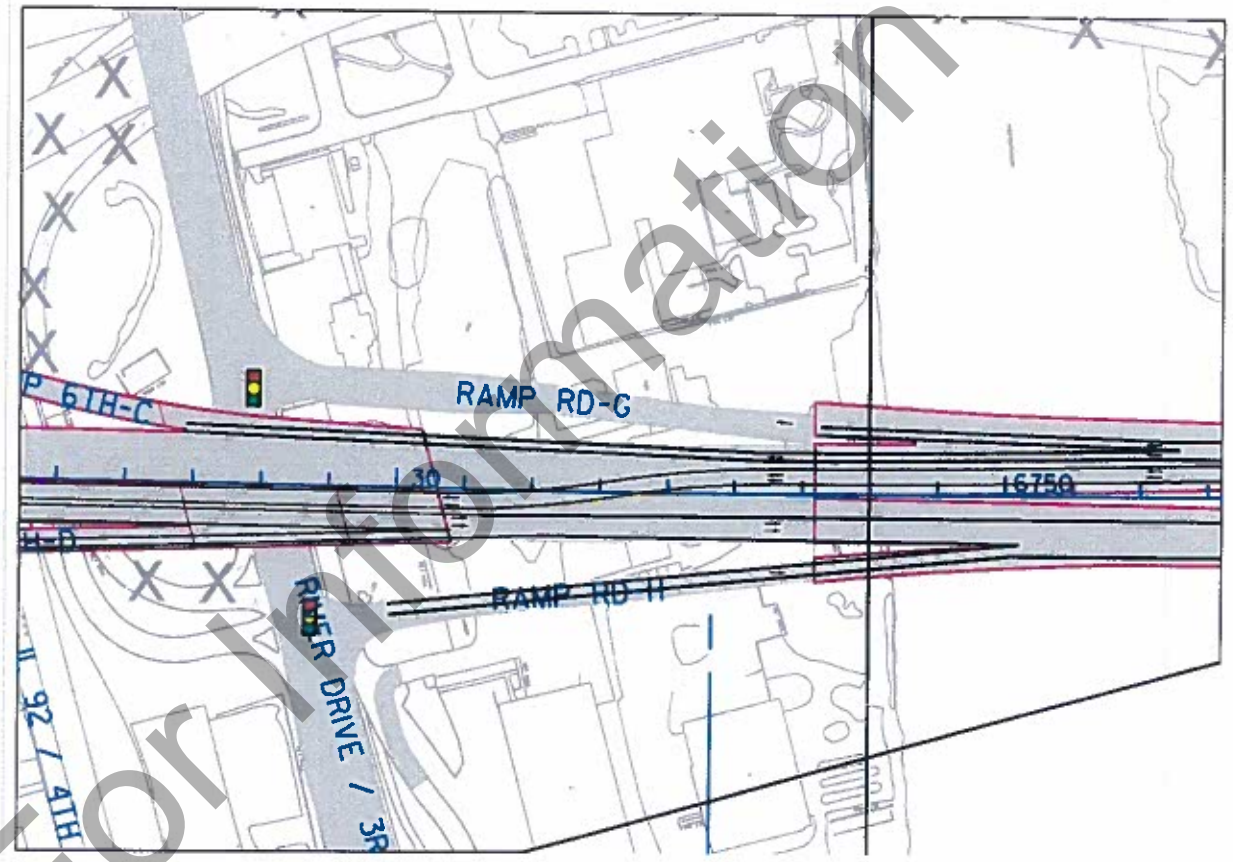
Preliminary Engineering (Phase I) - Plug Fill MOT Crossover (Year 5 Stage 2)



MOT crossover

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Existing Soil Conditions in Plug Fill Area

Subsurface Profile (top to bottom)

- Random fill (varies 6 - 12 ft)
- Loose sand filled with debris (varies 2 - 6 ft; one location 20 ft)
- Soft to very soft clay with organic (4 - 10 ft)
- Weathered sandstone, shale or weathered shale bedrock

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Existing Soil Conditions in Plug Fill Area

Soil Analysis Results

- Stability Analysis of abutment end slope
  - Low Factor of Safety
- Settlement Analysis (primary)
  - differential settlement
  - 90% consolidation within 60 days near abutment
  - 90% consolidation within 420 days elsewhere
- Settlement Analysis (secondary/creep)
  - 1.8 inches after 5 years
  - 2.4 inches after 25 years

  after construction of embankment

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Plug Fill Alternative

Recommendations

@ North End (north of Sta. 26+00)

- Remove soft clay, organic materials and random fill down to bedrock
- Replace with PGE

@ South End

- Remove Special Waste (estimated at 10%) and replace with PGE
- Use Aggregate Column Ground Improvement (AGCI) to strengthen the existing soil

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Plug Fill Final Condition

- Acceptable factor of safety for abutment slope
- Primary consolidation concerns addressed
- Secondary consolidation concerns addressed
- Eliminate down drag on piles

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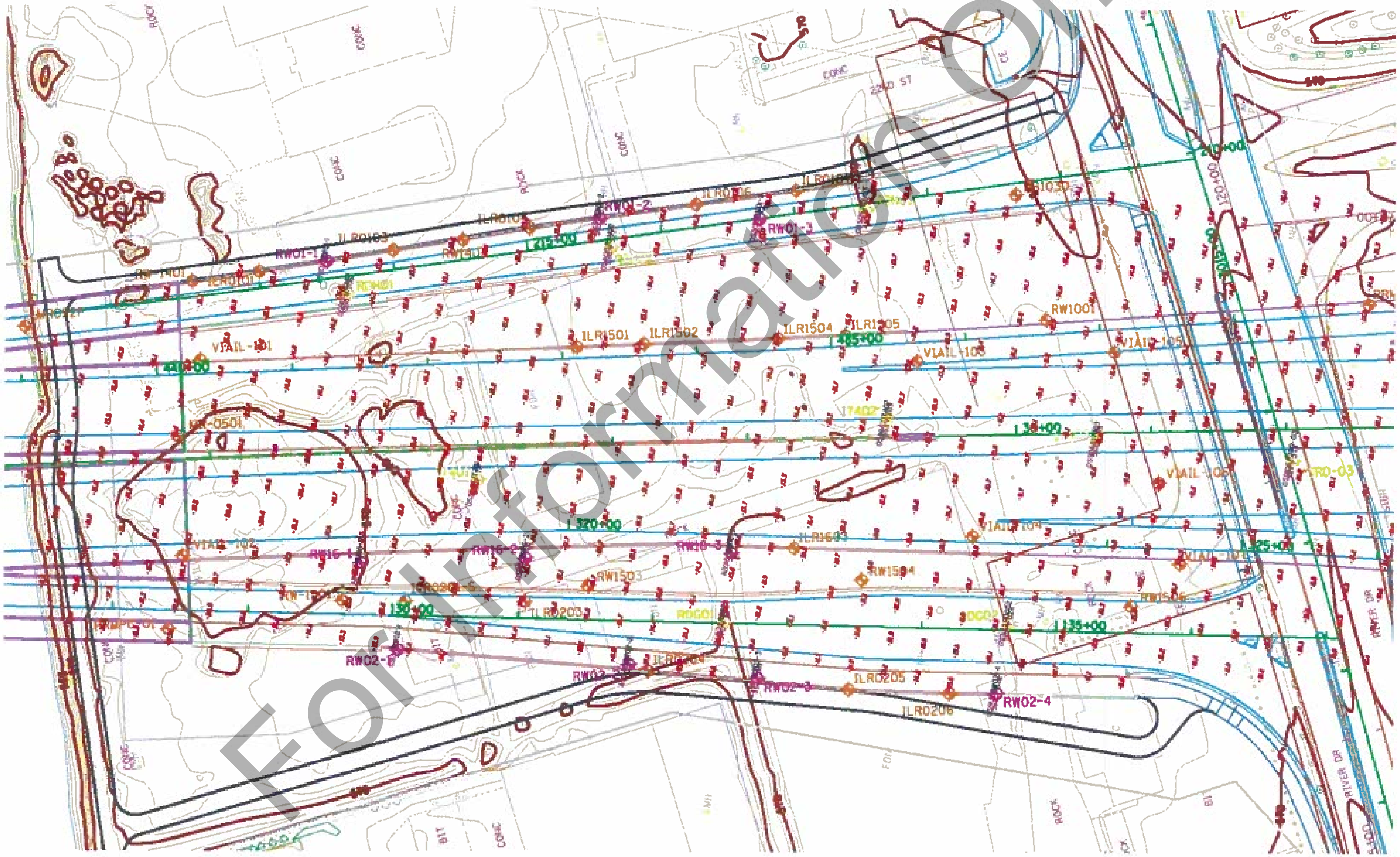
Plug Fill: Depths of Required Soil Removal



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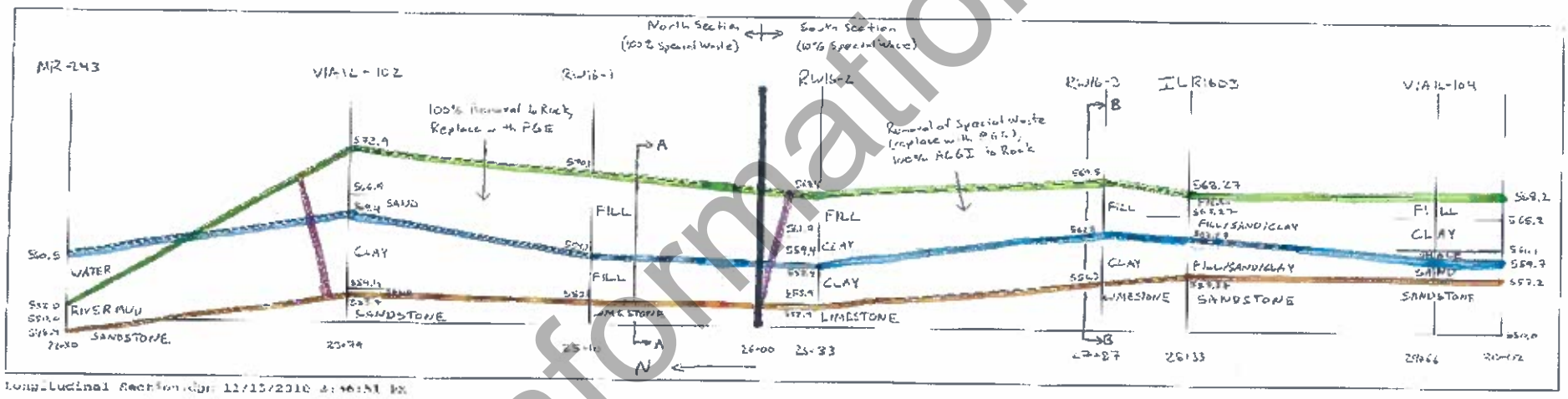
Plug Fill: Limits of Soil Removal/Treatment



Longitudinal Section Along I-74

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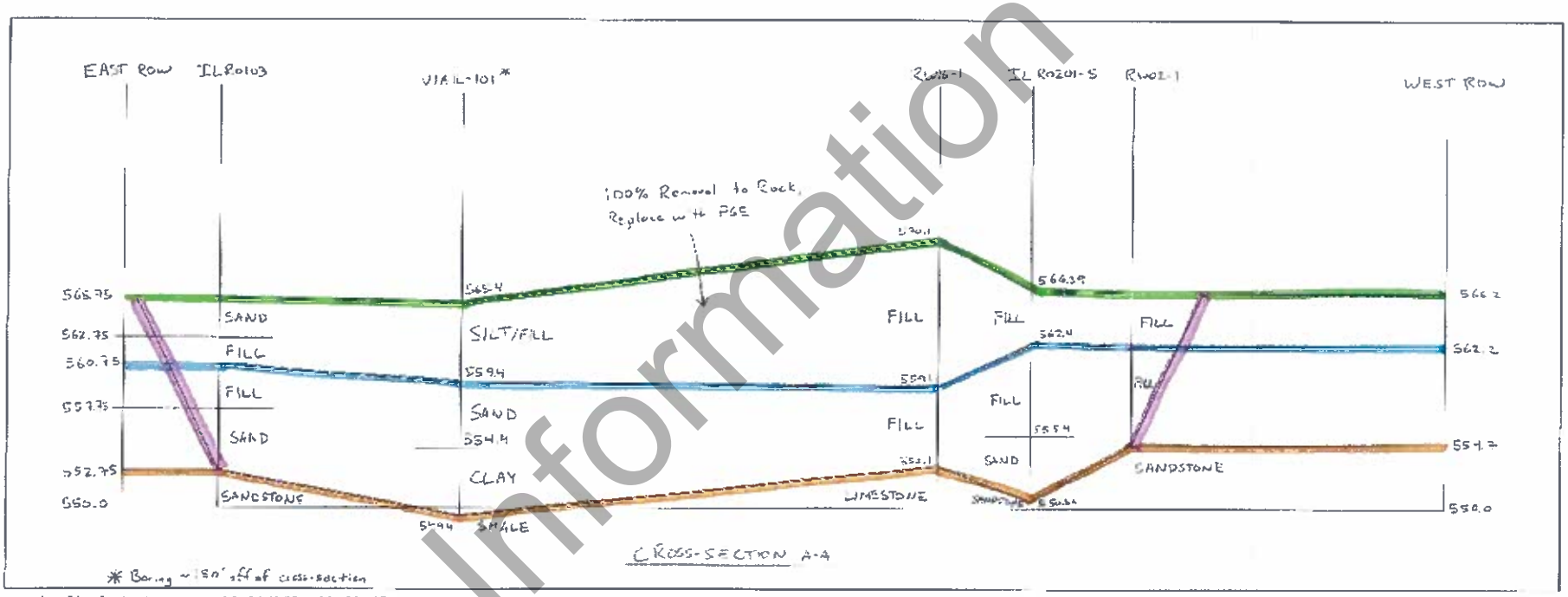
Plug Fill: Limits of Soil Removal



Longitudinal Section.cgn 11/16/2010 11:02:47 AM

North Zone

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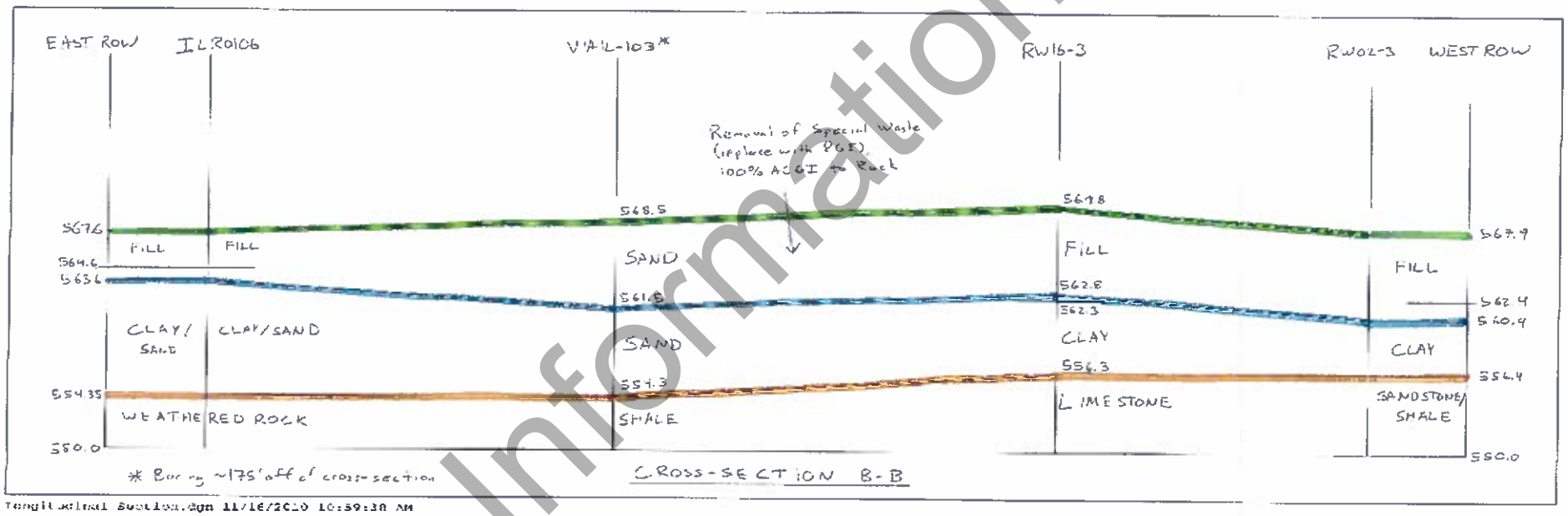
Plug Fill: Limits of Soil Treatment



South Zone

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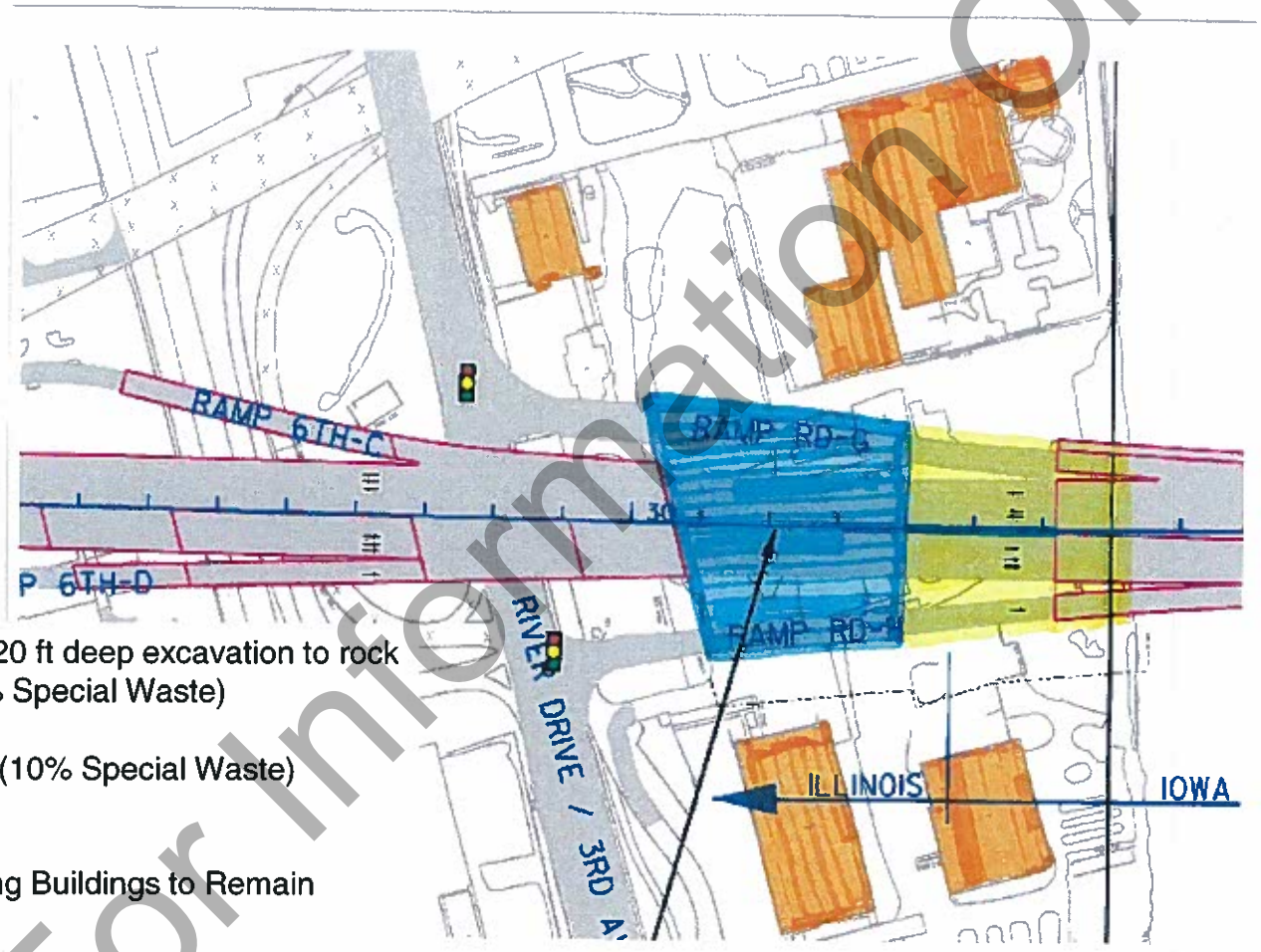
Plug Fill: Limits of Soil Removal/Treatment



15 to 20 ft deep excavation to rock (100% Special Waste)

ACGI (10% Special Waste)

Existing Buildings to Remain

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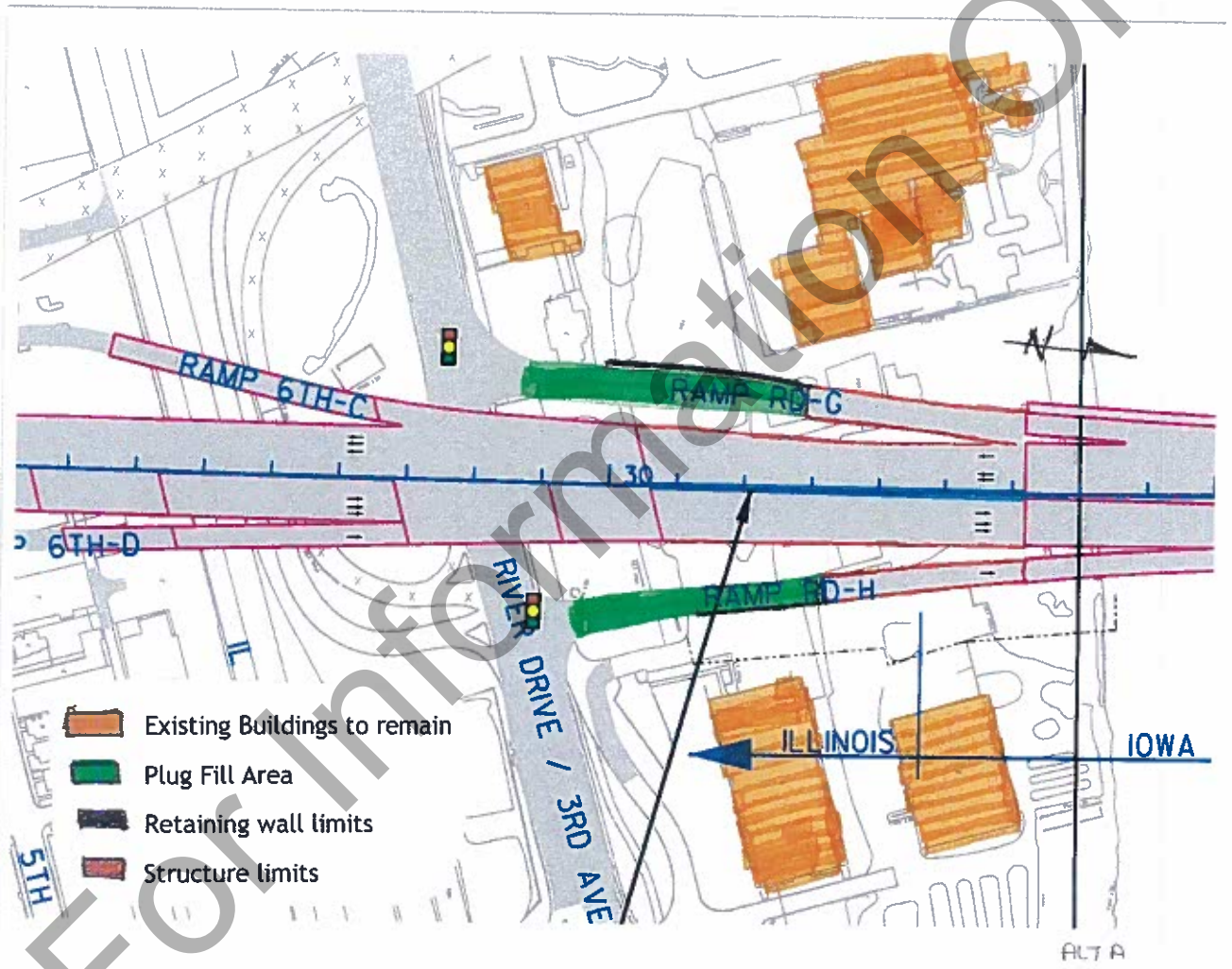
Alternative A: Structure (mainline and ramp)



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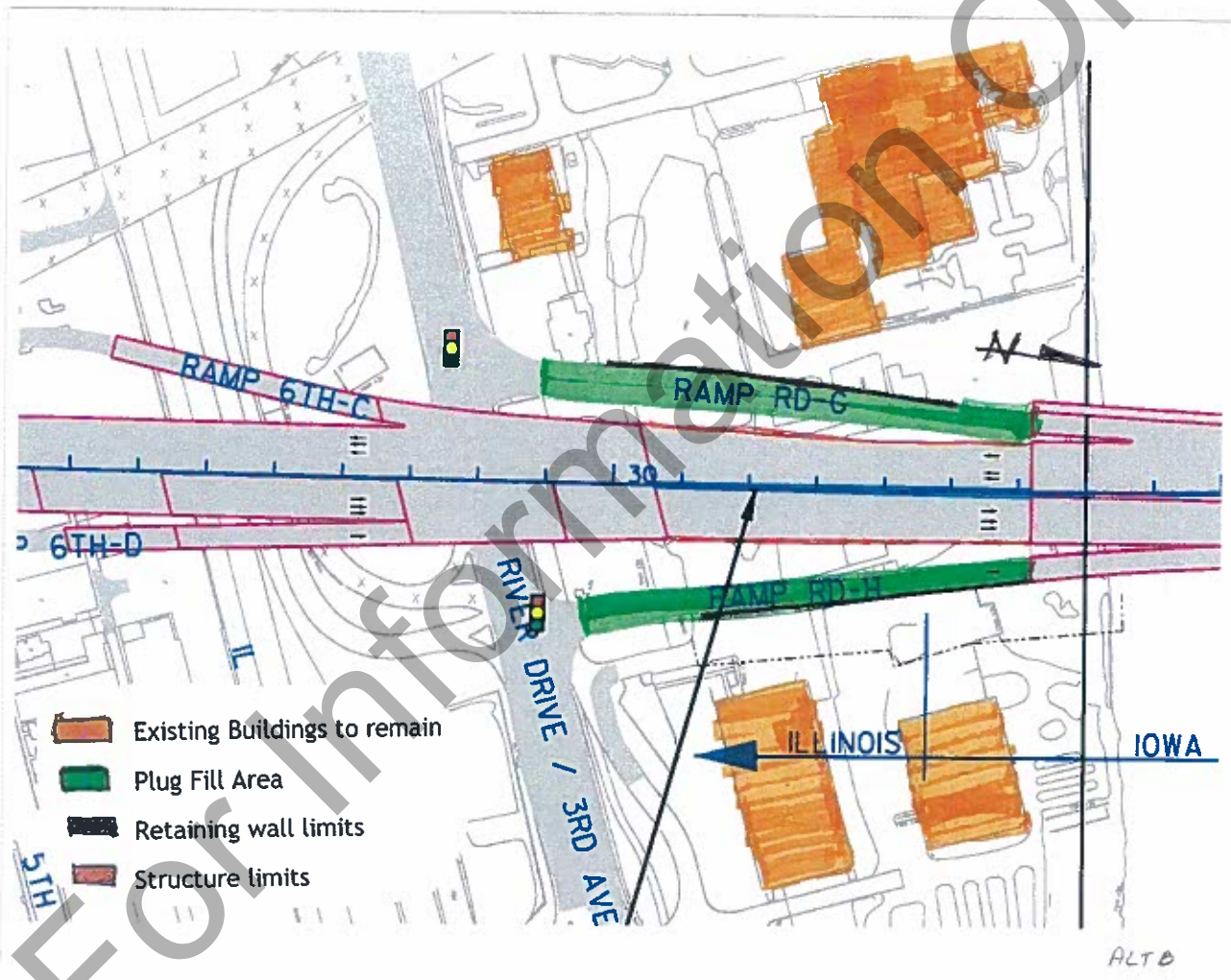
Alternative B: Structure (mainline only)



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Cost Summary

- Plug Fill
  - $19.0 Million
- Alternative A – Structure: Mainline and Ramp
  - $22.1 Million
- Alternative B – Structure: Mainline only
  - $23.5 Million

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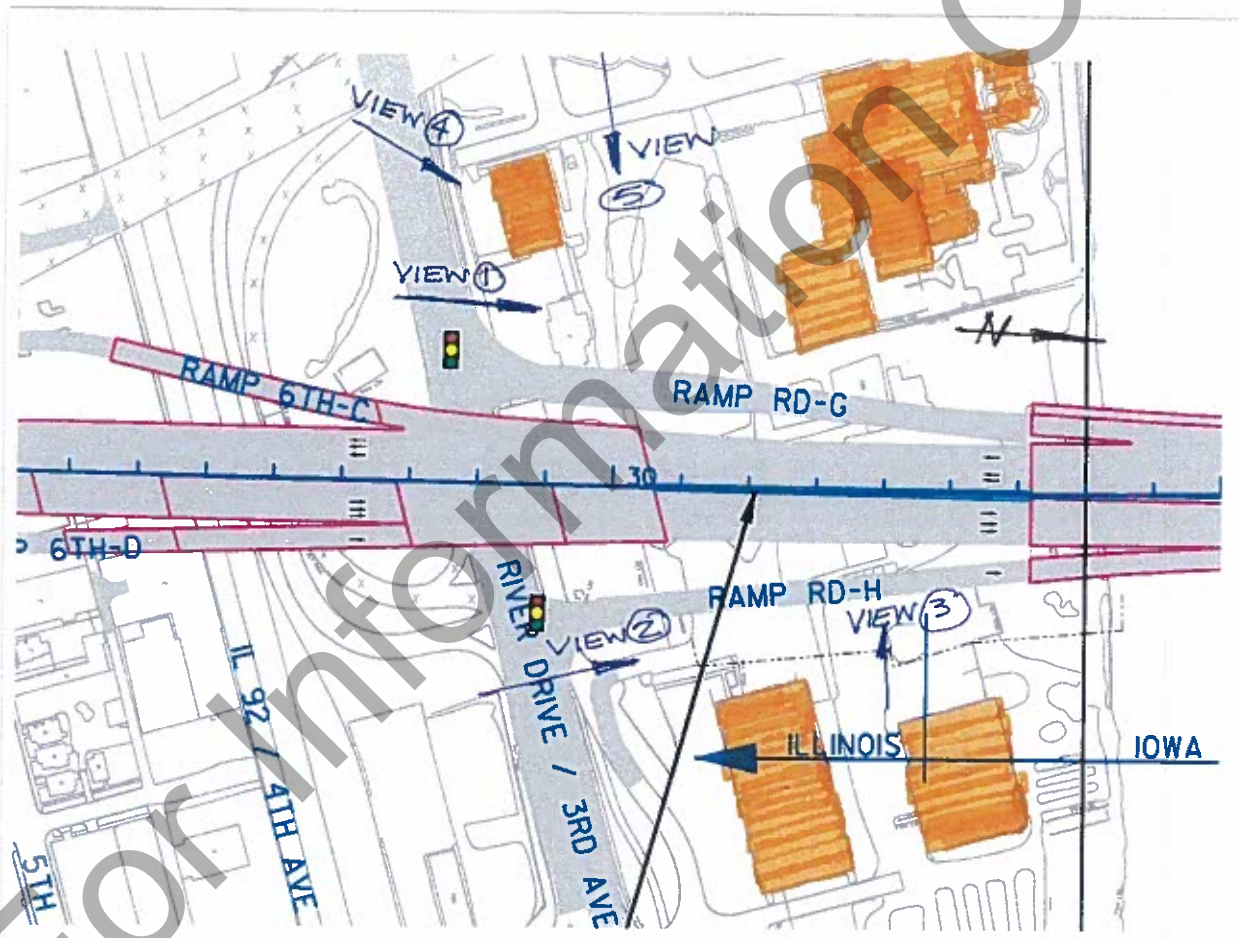
Renderings



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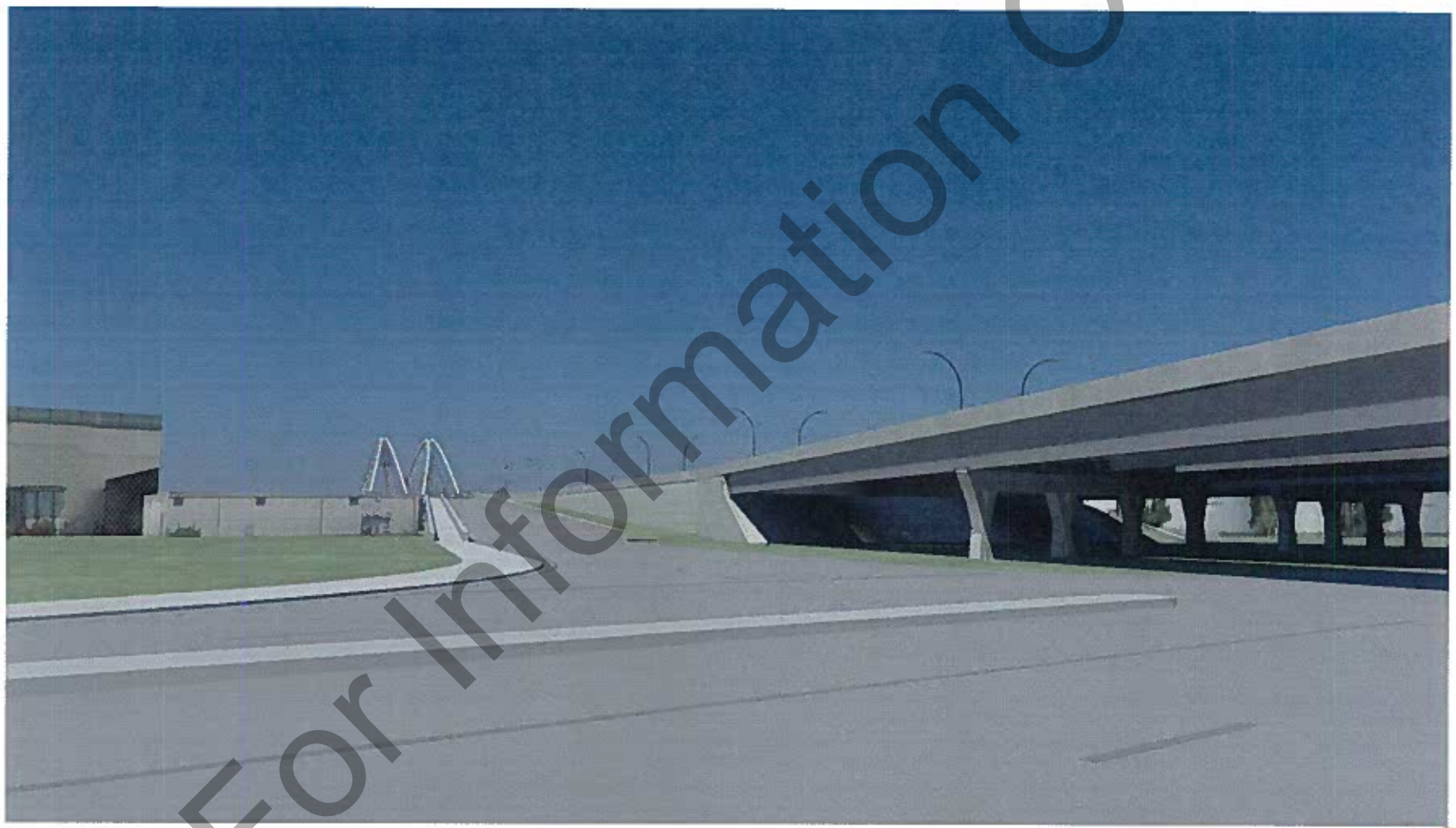
View 1 - Plug Fill
From River Drive: West of Ramp RD-G



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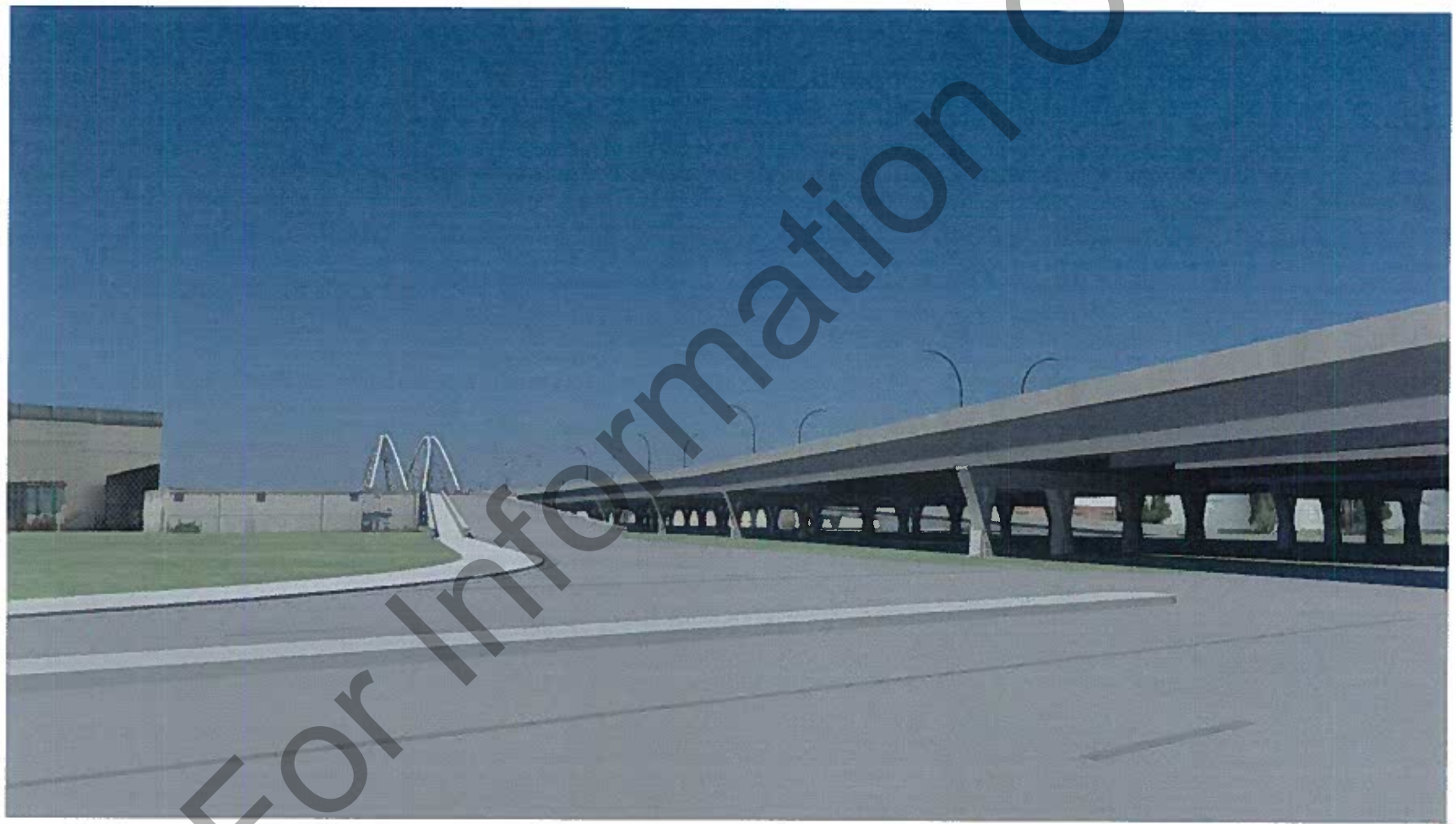
View 1 - Alternative A (Structure)
From River Drive: West of Ramp RD-G



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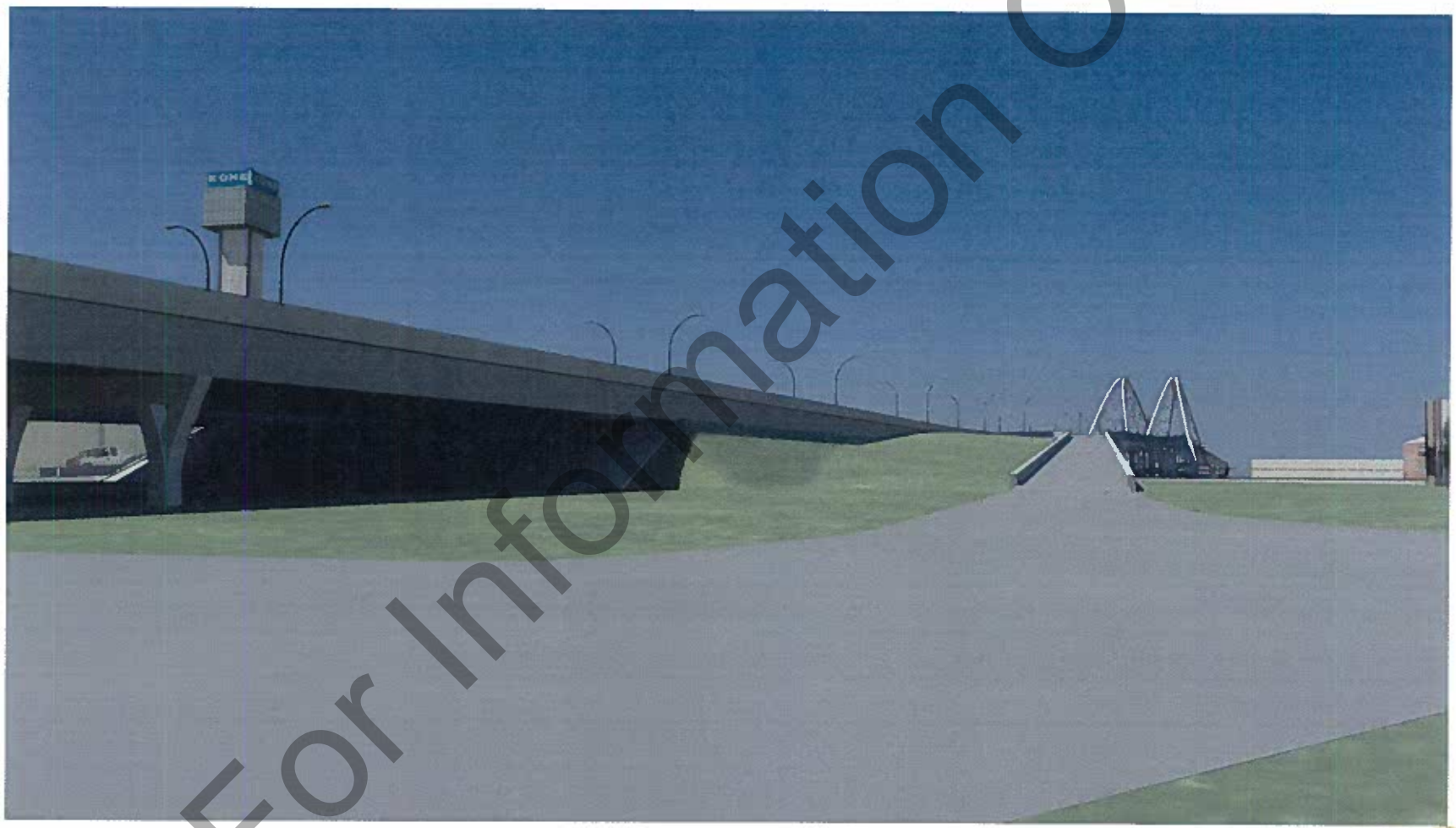
View 2 - Plug Fill
From River Drive: East of Ramp RD-H



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View 2 - Alternative A (Structure)
From River Drive: East of Ramp RD-H

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View 3 - Plug Fill (looking west)

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View 3 - Alternative A (Structure) (looking west)

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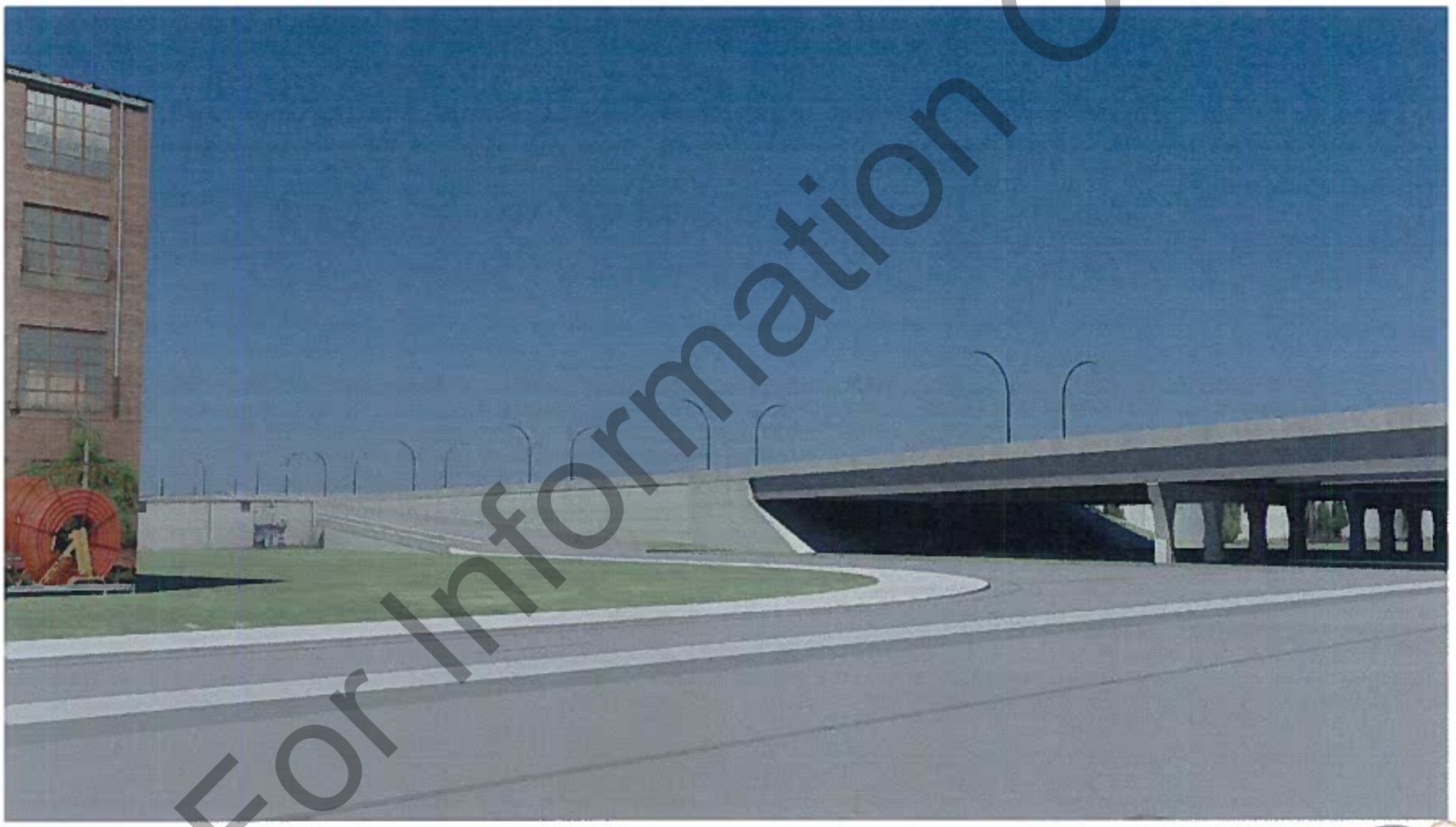
View 4 - Plug Fill
(looking NE from River Drive)



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View 4 - Alternative A (Structure) (looking NE from River Drive)

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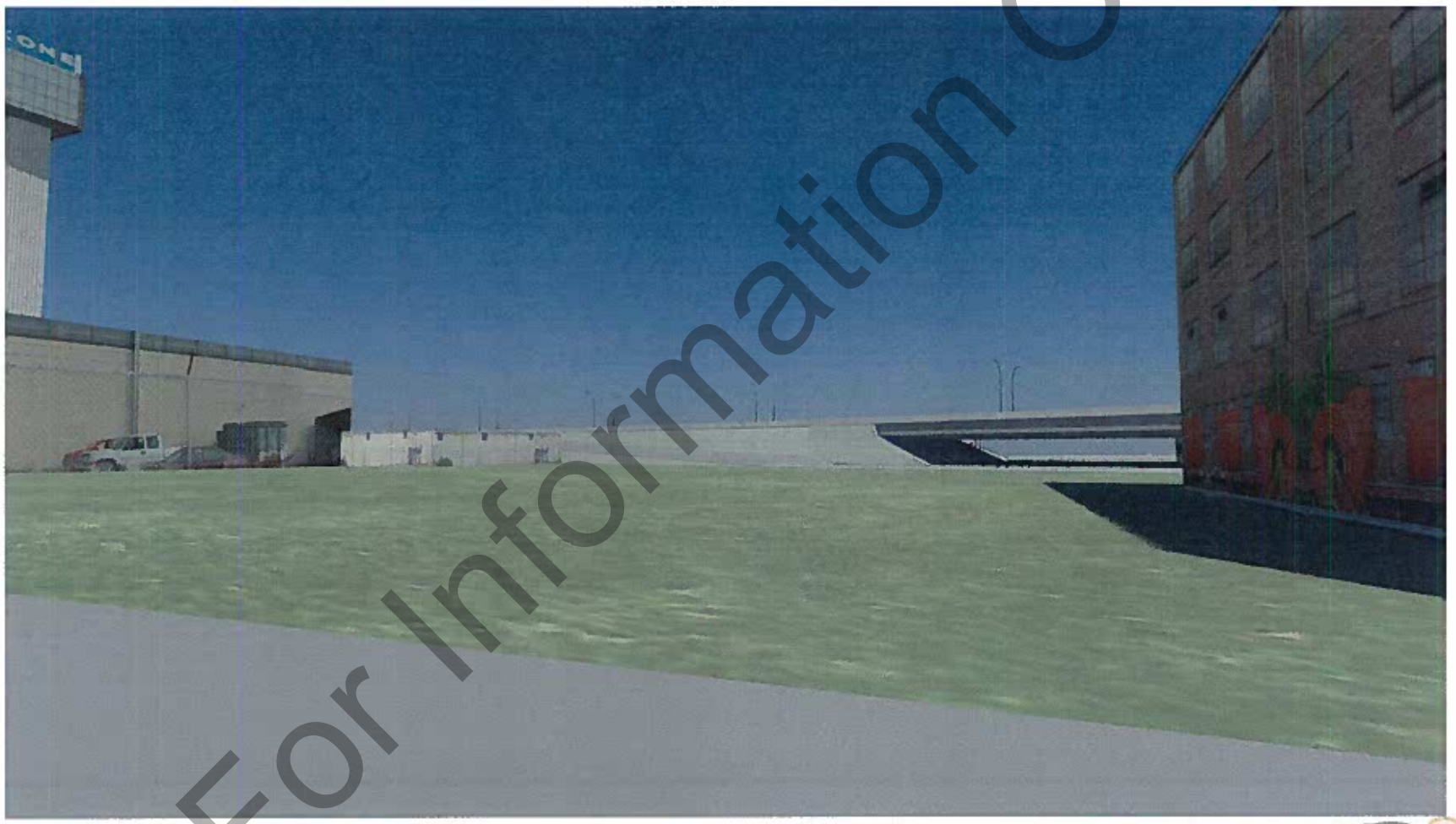
View 5 - Plug Fill (looking East)



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View 5 - Alternative A (Structure) (looking East)

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Plug Fill - Advantages

- Accommodates (MOT) crossover
- Accommodates sag
- Less maintenance
- Lessens the industrial "feeling"
- Opportunity for creative aesthetics (on wall segments)
- Opportunity to achieve required consolidations (work offline in early stages)

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Plug Fill - Limitations

- Less open vista
- Limits east-west access

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Structure - Advantages

- More open vista
- Accommodates east-west access

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Structure - Limitations

- Crossover on structure – adds complications
- Sag on Bridge – not favored by Bridge Office
- More structure to maintain
- Openness is more of industrial feel
- Not clear view of river

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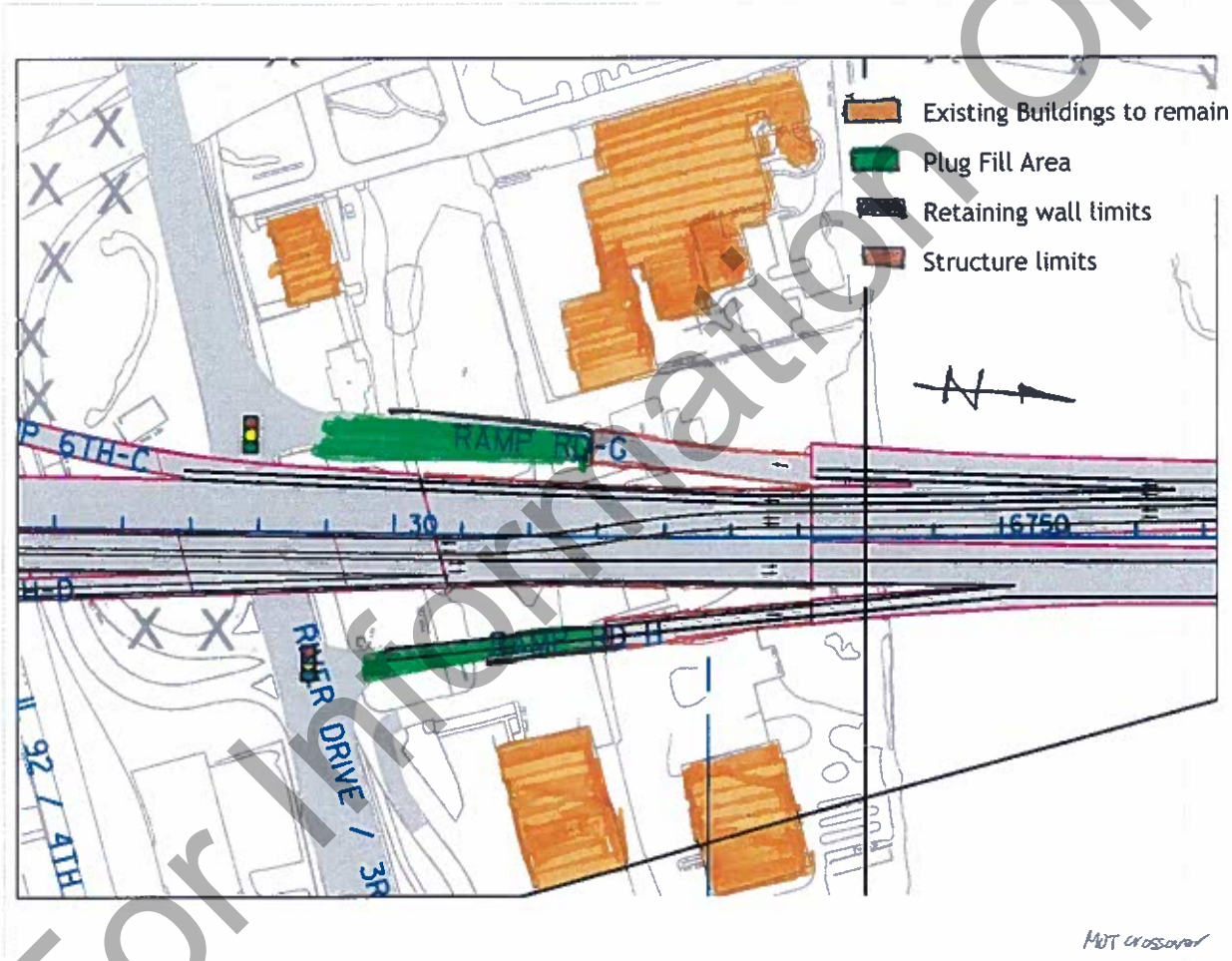
MOT: Crossover (Year 5 Stage 2)



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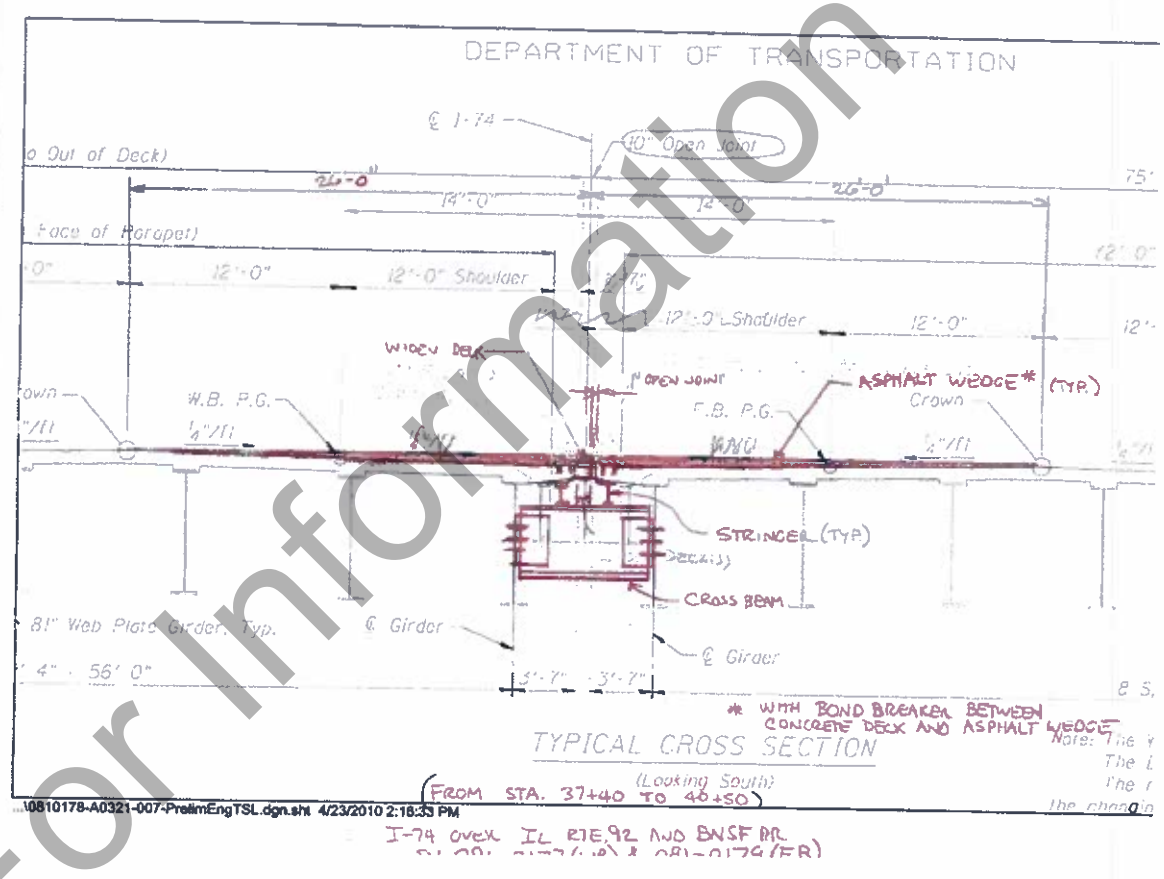
MOT Crossover (Year 5 Stage 2)



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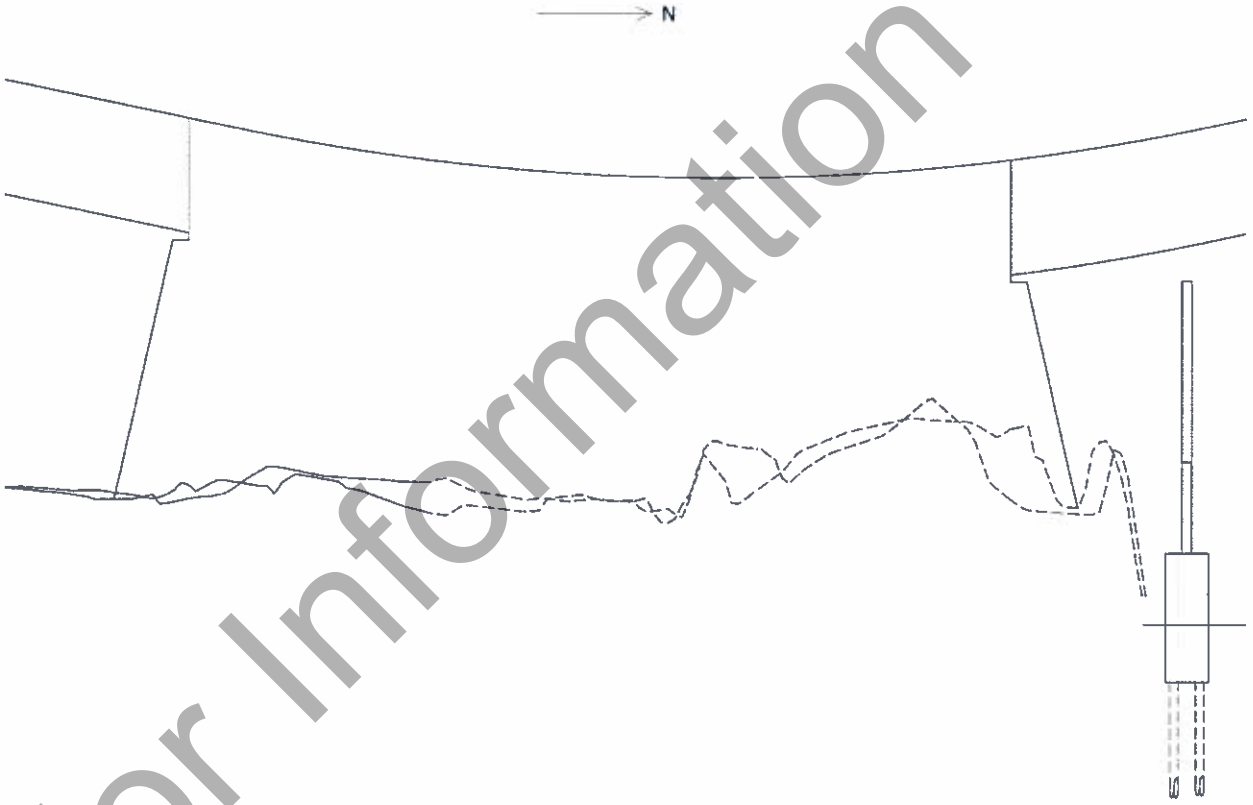
Sag on Structure



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Recommendations

- Build Structure for Mainline and Ramps??
  - Extra $3 million cost attributed to aesthetics

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