June 14, 2012
exp 11/2013

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-RW01
Structure Number 081-6010

September 2011 / Revised June 2012

Prepared for:
Illinois Department of
Transportation, District 2
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Table of Contents

Tables

Figures

1. Project Description

This report provides geotechnical data and recommendations for the proposed Retaining Wall IL-RW01, 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 Ramp RD-H 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 eastbound I-74 retaining wall (IL-RW16, S.N. 081-6018), 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-RW02 and IL-RW16 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-RW01 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 Ramp RD-H. The wall separates the ramp on the high side from a future bike path on the low side. The wall begins at Ramp RD-H Sta. 212+65.90 and traverses northward to Sta. 217+43.23, where it terminates at the south abutment of the proposed I-74 Mississippi River Bridge.

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 wall. 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 20.8 ft. With this range of heights a typical MSE wall section would have an equivalent uniform bearing pressure varying from 700 to 4,000 psf along the length of the wall.

The cross-section of the wall is typical for an Illinois Department of Transportation (IDOT) structure. A parapet and anchorage slab bears on the reinforced soil mass. The south end of the wall terminates in a low embankment for Ramp RD-H. The north end terminates at the east wingwall of the Mississippi River Bridge's south abutment. The MSE wall is approximately 13.7 ft. tall at the connection to the bridge wingwall.

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 traverses through a gravel parking lot and gravel-covered storage yard for adjacent businesses. The gravel surface is approximately 6 to 8 inches thick. The area immediately to the west of the proposed wall is a now vacant land. Remnants of floor slabs and other evidence of 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 565 ft. and 569 ft. Mounds of the random material up to 8 ft. above the surrounding grade were tightly spaced at the north end of the site.

Seven borings were drilled in the first two phases and six 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 75 ft.; however, most borings were spaced at 50 feet or less. 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 14 to 20 ft. long core sample of the bedrock was collected in Borings ILR0101, ILR0104, ILR0107, and RW1401. The boring depths ranged from 10.0 to 46.5 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, a consolidation test, 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. One consolidated undrained triaxial test envelope, a consolidation test, and three organic content tests were performed on Shelby tube samples. Index testing was completed on one representative sample 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.

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 23 ft. The depth of fill generally increases from the south to the north. Most of the borings drilled north of I-74 Sta. 25+75 encountered fill to the top of bedrock. Natural soils were encountered below the fill in the borings south of Sta. 25+75. These soils can be categorized into three distinct strata – weathered till (gumbotil), glacial till, and alluvium. Bedrock was encountered at depths of 13 to 26 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.

Weathered till and glacial till strata were encountered in the borings south of RW1403. These strata were typically stiff to very stiff sandy clays.

Granular alluvial soils were encountered under the glacial soils at the south end of the site. The gradation and consistency of these soils varied considerably.

Sandstone bedrock was encountered beginning at depths of 13.0 to 26.0 ft. below the ground surface. The bedrock surface is erratic; however, the deeper bedrock is generally closer to the river.

Groundwater was encountered in all of the borings. The groundwater elevation measured at first encounter and at the end of boring varied between Elevation 556.4 and Elevation 563.7 as shown in Table 6.1. A stabilized reading, measured 24 hours after completion of RW01-2, was at Elevation 564.5. 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
ILR0101	560.7	-	-
ILR0103	560.8	-	-
ILR0104	562.0	-	-
ILR0106	563.6	-	-
ILR0107	563.7	-	-
RDH01	-	562.7	-
RDH02	-	561.4	-
RDH03	-	563.1	-
RW01-1		562.3	-
RW01-2		563.0	564.5
RW01-3		563.4	-
RW1401	559.5	-	-
RW1403	556.4	-	-

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.

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.

If the unsuitable fill material and excessively soft soils are removed, the replacement fill and the remaining native soils will have allowable bearing capacities that exceed the applied bearing pressures. The proposed wall would meet the Standard Specifications for Highway Bridges (AASHTO) requirements for bearing pressure and sliding stability.

A slope stability analysis of the wall's critical section near Sta. 215+75 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 under the weight of the proposed wall and embankment ranges from 0.5 to 2.5 inches. The settlement is estimated to be 90 percent complete after 1 month. This magnitude and duration of settlement is acceptable for construction of an MSE wall.

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).

Removal and replacement is also recommended for any soft cohesive soils that are located directly beneath the wall. Cohesive soils with an unconfined compressive strength that is less than the applied bearing pressure of the wall should be removed within the lateral limits shown in Figure 8.1. It is anticipated that these soft soils will be encountered at shallow depths. Backfill should be with porous granular embankment and embankment as shown in Figure 8.1.

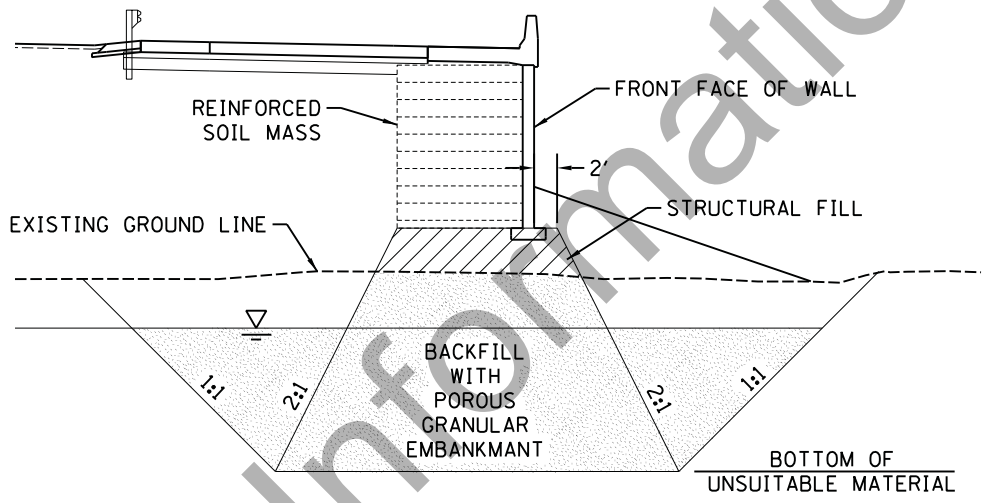


Figure 8.1 Lateral Limits of Unsuitable Material Removal and Replacement

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. For plan quantities, the base of the removal may be interpolated between the boring locations. The actual limits of removal will be determined during construction based on the materials encountered.

Table 8.1 Estimated Bottom of Unsuitable Material

Boring No.	Station	Base of Removal Elevation	Objectionable Material
RDH03	212+49	-	-
ILR0107	212+97	-	-
RW01-3	213+26	-	-
ILR0106	213+72	-	-
RDH02	214+39	561.90	soft, wet
RW01-2	214+44	562.00	soft, wet
ILR0104	214+97	563.49	debris
RW1403	215+47	560.39	soft
ILR0103	215+99	552.75	debris
RDH01	216+36	551.20	debris
RW01-1	216+48	549.30	debris
ILR0101	216+99	547.67	soft, wet
RW1401	217+49	-	-

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. Removal and disposal of the soft clays, which will only be required beneath the wall, should be in accordance with Section 502.

With the removal and replacement of the unsuitable soils, 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). If the base of the wall is above natural 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 replacement fill and the remaining native soils, when prepared according to the recommendations herein, have allowable bearing capacities of 2,200 psf at the south end of the wall and 4,600 psf at the north end. The allowable bearing capacity may be interpolated for locations in the middle of the wall. The native cohesive soils have an undrained sliding resistance of at least 1,200 psf. The drained sliding resistance is 0.53 times the effective vertical stress for the native subgrade or 0.62 times the effective vertical stress for a compacted granular fill subgrade.

The MSE wall should be detailed to accommodate 0 to 4 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 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.

References

American Association of State Highway and Transportation Officials (2002). *Standard Specifications for Highway Bridges, 17th Edition.*

CH2M HILL (2009, September). Structure Geotechnical Report Ramp RD-H Retaining Wall Structure Number 081-6010.

Illinois Department of Transportation (2009). *Bridge Manual*.

Illinois Department of Transportation (1999). *Geotechnical Manual*.

Illinois Department of Transportation (2012). *Standard Specifications for Road and Bridge Construction*.

Illinois State Geological Survey, Rock Island County coal data, Retrieved July 30, 2010 from http://www.isgs.illinois.edu/maps-data-pub/coal-maps/counties/rockisland.shtml.

U.S. Department of Transportation, Federal Highway Administration (1997, August). *Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines* (Publication No. FHWA-SA-96-071).

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

S.N. 081-0178

S.N. 081-0177

I-74 EB

FDN I-74 WB

RETAINING WALL IL-RW16
S.N. 081-6018

I-74 OVER MISSISSIPPI
RIVER BRIDGE

RAMP RD-G

RAMP RD-H

RETAINING WALL IL-RW01
S.N. 081-6010

RDH03 RW01-3 RDH02 RDH01

ILR0107 ILR0106 RW01-2 ILR0104 RW1403 ILR0103 RW01-1 ILR0101 RW-1401

130+00 320+00 435+00 215+00 420+00

5' STEEL POLE

RET WALL

STOCK PILES

22ND ST

AC

PP W/TRANS

PP W/LIGHT

HH

LEGEND

RW600 BORING LOCATION

0 50 100
SCALE IN FEET

N

HANSON

BORING LOCATION PLAN

I-74 MAINLINE RETAINING WALL IL-RW01
S.N. 081-6010
ROCK ISLAND COUNTY, ILLINOIS

08H0120E 8/24/11

madau00223
09\29\2011
ILRW01-A0432-001-Subsurface Data.dgn

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RDH03
Sta. 212+49, 5' LT

	N	Qu	w%	
569.10				
568.85				TOPSOIL
	11	1.55B	20	FILL - Brown and gray, moist, stiff, silty, sandy, lean CLAY with rock and brick fragments
566.10				
Oh	18	3.50P	17	Dark brown, moist, soft, SILT with fine-grained sand and rock fragments, tree roots
563.10 ▽		1.51S	33	
561.60			11	Grayish brown, wet, loose, well-graded, fine- to medium-grained SAND
560.60				Grayish brown, wet, medium dense, well-graded, medium- to coarse-grained SAND
559.10	11		14	

Bottom of hole = 10.0 feet

ILR0107
Sta. 212+97, 17' RT

	N	Qu	w%	
567.70				Fill: Gravel (GM)
566.70				Fill: Sandy Silt With Gravel (ML) - Very dark brown, dry, loose, with occasional wood matter
564.70	6			
563.70 ▽ DD				Sandy Silt With Clay (ML) - gray, moist, very stiff
	6	2.3P		
561.70				Silty and Clayey Sand (SC) - dark gray, loose to very loose Sample 3: grain size analysis performed (LL=28 PI=10)
	3		21.0	
559.70				Fine to Medium Sand With Silt (SP-SM, SM) - possible old alluvium
	3			
556.70				Silty Fine to Coarse Sand (SM) - Little gravel, brown with gray, wet, loose, possible old alluvium; Sample 5: grain size analysis performed
	9		16.0	
554.70				Silty Sand (SM) - brown with olive gray, wet, medium dense
	23			
551.45				
	Rec. = 77% RQD = 9%			Sandstone - Light brown with brown, fine to medium grained, rough texture, slightly weathered to unweathered, weak to medium strong rock 16.25' - Horizontal to 10° fractured, rough planar fracture surfaces, slightly altered joint walls, little or no infilling material, little or no brown and greenish gray surface stains, little greenish gray soft clay infilling material <1/8" thick at top 3" of sample, remainder no infilling, slightly to moderately fractured, very close to close discontinuities
	Rec. = 98% RQD = 6%			Light brown with brown, medium to fine grained, trace coarse grained, rough surface, slightly weathered to unweathered, weak to medium strong 20.67' - Horizontal to 20° fractures, rough fracture surfaces, varying undulated and planar throughout, no infilling material, no surface stains, slightly altered joint surfaces and stray crushed zones preventing back wall contact at bottom half of sample at some fractures, slightly to moderately fractured, very close to close discontinuities, most fractures at top 45° of sample, likely mechanical fractures Start 14:13-14:14; 14:18-14:20 Average 3/5 minutes per foot
537.03				

Bottom of hole = 30.67 feet

RW01-3
Sta. 213+26, ℄

	N	Qu	w%	
567.40				
566.70				GRAVEL
Oh	6	1.75P	17	FILL - Very dark brown, moist, stiff to very stiff, clayey SILT with sand and gravel, organic material
563.40 ▽		2.50S	61	[O]
562.40				
			24	[C]
			22	[R]
			22	[O]
559.40				Dark brown, moist, sandy CLAY with silt (LL=26 PI=11)
		0.34B	21	
		0.36B	19	Very dark brown, wet, medium dense, silty, fine-grained SAND
		0.40P	19	
556.40				
	22		15	Brown, wet, medium dense, well graded, SAND and GRAVEL
553.90				Brown, wet, medium dense, well graded, silty SAND and GRAVEL
	18		16	
551.90	50/2"		15	Gray, fine-grained, WEATHERED SANDSTONE
551.30				

Bottom of hole = 16.1 feet

LEGEND

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

SUBSURFACE DATA PROFILE
STRUCTURE NO. 081-6010

PROFESSIONAL DESIGN FIRM LICENSE #184-001084

HANSON
Hanson Professional Services Inc.

JOB NO. 08H0120E
DATE 8/24/11

SHEET NO. 1
5 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

ILR0106
Sta. 213+72, 17' RT

	N	Qu	w%	
567.60				Fill Gravel (GM) - Gravel followed by silty sand subbase
566.60				
566.40	21			Fill Silty Sand With Gravel (SM) - Reddish brick-like brittle dry clay, followed by yellowish orange mottled with brown sandy silt (ML)
564.60	DD			
563.60	2	1.0P		Sandy Silt (ML) - Stiff to very stiff, non plastic, dry. Remainder: Silty Sand with Gravel (SM), dark brown, dry coarse to fine sands with silt and few medium to fine subangular gravels
561.60		3.5P		Silty Clay (CL-ML) - Dark gray, moist to wet, stiff, little fine sand, gumbo (LL=47 PI=26)
559.60	5			Sandy Lean Clay With Gravel (CL) - Dark greenish gray, moist to dry, coarse to fine sand, coarse to fine gravel, very stiff, possible glacial till
556.60	17			Sand and Silt (SM, ML) - trace gravel, dark gray mottled with orange and greenish gray thereafter, moist, loose Sample 3: grain size analysis performed
554.35	50/3"			Very Sandy Lean Clay With Gravel (CL) - Dark gray with greenish gray, moist, coarse to fine sands, coarse to fine gravel, and seams throughout, wet, medium dense, possible completely weathered sandstone. Driller notes rough drilling and heavy chattering 14' bgs, possible weathered rock
				Bottom of hole = 13.25 feet

RDH02
Sta. 214+39, 6' LT

	N	Qu	w%	
566.90				GRAVEL
566.40	14		15	FILL - Very dark brown, dry to moist, stiff, SILT with sand and gravel
		1.13S	99	
	0h	0.44S	148	
561.90				
561.40		1.18S	25	Very dark brown, moist, medium, silty, lean CLAY
559.40				Bluish gray, moist, very stiff, silty CLAY with sand
	20	1.25B	26	
554.40				
553.20	50/3"			Brown, fine-grained WEATHERED SANDSTONE
				Bottom of hole = 13.7 feet

RW01-2
Sta. 214+44, 16' RT

	N	Qu	w%	
567.00				GRAVEL
566.50				
564.50	24h 10	1.00P	28	FILL - Very dark brown, wet, stiff, SILT with fine-grained sand with gravel
	0h	1.13P	26 [Q]	
563.00		1.13P	20	FILL - Very dark brown, wet, silty CLAY with fine-grained sand and gravel
562.00	10	1.60P	31	Grayish brown, moist, stiff, silty CLAY with trace sand and gravel
558.50				Brown, moist, stiff, silty CLAY with sand and gravel
558.00	18	2.00P	30	Brown, moist, medium dense, silty SAND
557.00				Gray, fine-grained, WEATHERED SANDSTONE
556.00	18		23	Brown and gray, poorly cemented, fine-grained, WEATHERED SANDSTONE with gravel and grayish green clay
553.50	50/3" 50/0"		19	Brown, wet, poorly cemented, fine-grained, WEATHERED SANDSTONE
551.00				Bottom of hole = 16.0 feet

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 ▽ 558.10	Water Surface Elevation Encountered in Boring DD = during drilling 24h = 24 hours after completion

SUBSURFACE DATA PROFILE
STRUCTURE NO. 081-6010

PROFESSIONAL DESIGN FIRM LICENSE #184-001084

HANSON
Hanson Professional Services Inc.

JOB NO. 08H0120E
DATE 8/24/11

SHEET NO. 2
5 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

ILR0104
Sta. 214+97, 17' RT

	N	Qu	w%	
566.99				Gravel (GM)
565.99	7			gray to dark gray mottled with yellowish orange, moist to dry, medium stiff, few coarse to fine subangular to subrounded gravel, little coarse to fine sands, loose with cinder block fragments, Rough drilling and chattering 3.0' bgs
563.99 ▽ DD	8			Fine to Coarse Sand and Gravel (GP-GM) - With possible limestone rock and silty sand seams/ layers, light gray, wet to loose to medium dense; Sample 2: grain size analysis performed
560.99	16			Fine to Coarse Silty Sand (SM) - little gravel, with silty clay layers, light gray, wet, medium dense; Sample 3: grain size analysis performed
558.99	7	2.0P		Clay (CH) - Greenish gray, dry, non plastic, moderate to strong cementation, medium stiff to stiff, orange brown stains, oxidized, possible native soil, trace fine sands, possible glacial till, weathered; Sample 4: Atterberg limit test performed (LL=51 PI=29)
555.99	50/4"			Silty Sand (SM) - Uniform light gray, wet, loose to medium dense, fine sands with silt, trace medium to fine subangular gravels, little medium sands, possible completely weathered sandstone
552.82				Silty Sand - Top 24": Light gray, uniform, fine sands with silts, wet, Remainder: Sandstone, light grain, rough to smooth texture, slightly weathered to moderately weathered, weak to medium strong, crush rock zone from 29" to 32" from top of clayey sand infilling 14.17' - Bottom 13": Vertical fractures from 29" to 32", remainder has horizontal fractures, rough to undulating fracture surfaces, little soft clayey sand infilling materials at first from 24" to 34", surface stained greenish gray, no rock wall contact due to silty sand seams at fractures, moderately to extremely fractured, extremely close to close discontinuities; Started rock coring at 09:11 @ 13.5 bgs
550.82				
	Rec. = 92% RQD = 45%			Sandstone - Light gray, fine grained, slightly rough texture, weak to medium strong
	Rec. = 99% RQD = 85%			Light brown to gray, medium to fine grained, slightly weathered to unweathered, medium to strong rock 31.25' - Horizontal to 15° fractures, rough fracture surface, varying planar and undulating fracture surfaces, little hard clay infilling material <1/8" at 64" from top that has tightly healed and created an irregular surface at the fracture with greenish gray stains, remainder of sample has no infilling material and no surface stain, sound to slightly fractured with close to wide discontinuities; 100% fluid loss, 45 second per foot
525.74				Bottom of hole = 41.25 feet

RW1403
Sta. 215+47, 15' RT

	N	Qu	w%	
566.39				Silty Clay (CL-ML) - Gravel and silty clay, light gray and brown, dry to moist, stratified, hard
564.39	13	6.8P		Sandy Clay (CL) - Sandy clay, some gravel, dark brown and black, moist, homogeneous (LL=23 PI=4)
562.39	11		24.4	Silty Clay (CL-ML) - Silty clay, some fine sand, dark brown, moist to wet, homogeneous. Shelby sample from 4'-6' obtained in adjacent hole on 11/10/05. See lab results for consolidation data
	Push	0.8P	24.0 C R	
DD	5	2.7P		
556.39 ▽	11			
554.39	50/3"	0.7P		Sandstone
	50/0"			
	50/1"			
546.39				Bottom of borehole at 20'. No auger refusal, but hit sandstone and couldn't sample with the split spoon End of Boring

ILR0103
Sta. 215+99, 14' RT

	N	Qu	w%	
565.75				Silty Sand and Gravel (GM) - Hole offset 5 feet southwest of proposed boring location
564.75	30			Silty Medium to Coarse Sand With Gravel (SM) - Very dark gray with brown, dry, dense, faint petroleum odor
562.75				
560.75 ▽ DD	5			Fill: Silty Fine to Medium Sand (SM) - Very dark brown to black, loose, wet, faint petroleum odor, loose
559.75	3		106.0 O	Fill: Clayey Silt (CH) - Very dark brown to black, moist, loose to very loose, wood matter possible old railroad tie, no odor; Sample 4: Atterberg limits performed (LL=53 PI=5)
557.75	2		50.0 O	
552.75	50/3"		28.0	Very Silty Fine to Coarse Sand (SM) - Little gravel, very dark brown to black, moist to wet, loose, with brick fragments; Tried to obtain ST from 11 to 13 feet but encountered coarse material, Bag sample at 12 ft; Sample 4: grain size analysis performed (LL=34 PI=8)
552.50				Silty Fine Sand (SM) - Light gray, wet, very dense, trace medium sand, possibly highly weathered sandstone
				Bottom of hole = 13.25 feet

LEGEND

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

SUBSURFACE DATA PROFILE
STRUCTURE NO. 081-6010

PROFESSIONAL DESIGN FIRM LICENSE #184-001084

HANSON
Hanson Professional Services Inc.

JOB NO.	SHEET NO. 3	F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
08H0120E		74	81-1HVB	ROCK ISLAND	_	
DATE 8/24/11	5 SHEETS				CONTRACT NO. 64C08	
		FED. ROAD DIST. NO. _	ILLINOIS	FED. AID PROJECT		

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RDH01
Sta. 216+36, 13' LT

	N	Qu	w%	
565.70				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 fragements, petroleum odor
Oh ▽ 562.70	10		16	
		1.50P	16	
	7		18	
			35	
		0.30P	68	
	3		44	
551.20	29	0.80P	17	Gray, fine- to medium-grained WEATHERED SANDSTONE
549.70	50/1"			Gray, fine-grained SANDSTONE
549.60				Bottom of hole = 16.1 feet

RW01-1
Sta. 216+48, 13' RT

	N	Qu	w%	
565.30				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, bitumious materials, metal scraps, cinder blocks, and brick fragments, petroleum odor
Oh ▽ 562.30	14	0.75P	36	
	6	0.10P	16	
	2		85	
	4		26	
	7		131	
	7		108	
549.30	50/1/2"			Gray, fine-grained, WEATHERED SANDSTONE
548.80				Bottom of hole = 16.5 feet

ILR0101
Sta. 216+99, 12' RT

	N	Qu	w%	
568.67				Topsoil - with gravel, brick and root
567.67	20			Fill: Silty Sand With Gravel (SM) - Dark gray, coarse to fine sand with silt and some coarse to fine subangular gravel with brick fragments, dry
565.67	37		17.0	Fill: Silty Sand (SM) - trace to little gravel, light gray, transitions to very dark brown to black, dense, very loose to dense, dry to wet, faint petroleum odor
				few gravel-sized brick fragments
DD ▽ 560.67	6			Samples 2, 3: grain size analyses performed
	2		50.0	occasional wood matter
557.67	2		43.0	Silty Fine to Coarse Sand (SM) - Trace gravel, very dark gray to black, wet, very loose
553.67	2		90.0	Sample 5: grain size analysis performed
	1		67.0	Clayey Silt (ML, CL-ML) - little sand, trace gravel, dark gray to black, soft, wet
	2			Sample 6: grain size analysis performed
547.67		4.5P		Silty Clay With Gravel (CL-ML) - dark gray, wet, trace sand, little gravel, hard thin wire strand embedded in tube
545.67	50/4"			Silty Sand (SM) - Light gray, moist, very dense, fine sands with silt, trace medium and coarse sand, trace fine gravel, possible completely weathered sandstone
542.50	Rec. = 95% RQD = 53%			Sandstone - Top 27": medium to fine grained, light brown, slightly weathered, weak to moderately strong 26.17' - Horizontal 10° fractures, rough and slightly irregular fracture surfaces, undulating, little hard impermeable gray clay infilling 1/4" thick at 24" from top, surface stained greenish gray from 0-24" and dark gray from 24" to bottom, fractures at 0-20", slightly altered joint walls with little clay infilling at fractures, hard clay infilling at 20" to bottom, tightly healed at joint walls and slightly altered joint walls
540.22				Started preparing for rock coring at 1500
537.50	Rec. = 96% RQD = 69%			Limestone - fine grained, light gray, slightly weathered to unweathered, moderately strong rock
				Sandstone - Gray to light gray, medium to fine grained, smooth to rough texture, slight weathered to moderately weathered from 5" to 18" and 33" to 45", unweathered sandstone fragments that consolidated with infilling over time R2= CR=3/4 minute per foot average
527.50				Bottom of hole = 41.17 feet

LEGEND

N	Standard Penetration Test N (blows/ft)
Qu	Unconfined Strength (tsf)
w%	Natural Moisture Content (%)
[U]	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. 081-6010

PROFESSIONAL DESIGN FIRM LICENSE #184-001084

HANSON
Hanson Professional Services Inc.

JOB NO. 08H0120E
DATE 8/24/11
SHEET NO. 4
5 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

RW-1401
Sta. 217+49, 12' RT

	N	Qu	w%	
568.53				
	22			Fill Gravel (GM) - Gravel, sand, and silt, trace clay, gray brown, dry to moist, medium dense to dense
	36			
	22			
562.53				
DD	3			Sand (SP) - Sand, little to some gravel, trace clay, brown, moist to 9.0', wet deeper, loose, contamination at 6 ft
559.53 ▽				
558.53	6			
				Clayey Sand (SC) - Clayey sand, little gravel, dark brown and white, wet, loose
556.53	9			
				Sandy Clay (CL) - Sandy clay and silt, dark brown, wet
554.53	4		21.4	
	4			Poorly Graded Sand (SP) - Sand and gravel, trace organics, dark brown to black, wet, loose
548.53				
	0		0.0P	Clay (CL) - Clay, dark brown to black, moist to wet, stratified, sand at top 4" of sample, limestone and sand for bottom 4"-5" of sample.
	50/3"			
542.53				
	Rec. = 100% RQD = 37%			Sandstone and Shale - Interbedded Sandstone and Shale, gray, fine grained, weathering: barely consolidated, seems highly weathered, no discoloration; extremely weak strength, interbedded, hummocky bedding; Shale - laminated beds; Sandstone, no apparent bedding (thick to massive), well sorted, well rounded. Auger refusal at 26' at 12:35. Begin rock core at 13:41. Horizontal fractures, extremely fractured to slightly fractured continuity, extremely close to close discontinuity, rough to smooth joints, joints do not seem altered, but shale is softened in joints, these could also be bedding planes. Drilling water was black then dark gray for about 20 seconds at the start of rock coring. Drilling water loss due to formation absorption.
540.03				
	Rec. = 100% RQD = 12%			
535.03				
	Rec. = 92% RQD = 42%			Sandstone and Shale, gray, fine grained, see weathering above, extremely weak rock, interbedded, laminated to very thin beds, well sorted, well rounded. Horizontal fractures, extremely fractured to slightly fractured continuity, extremely close to close discontinuity, rough to smooth joints, joints not altered, softened shale at contact points. First 2.5' of coring R-1 occurred more rapidly than other rock coring with same rig (2.5' in 10-15 minutes).
532.03				
	Rec. = 92% RQD = 17%			
530.03				
	Rec. = 100% RQD = 50%			Sandstone and Shale, gray, fine grained, see weathering above, interbedded, laminated to very thin beds, well sorted, well rounded; shale-extremely weak rock; sandstone-very weak rock; 33.5' to 35.66' highly shaley; Drilling water turned black from shale at 33.5' for just a few seconds. Horizontal fractures, extremely fractured to sound continuity, extremely close to moderate discontinuity, rough to smooth joints, unaltered joint walls, but softened shale at contact points.
525.03				
	Rec. = 100% RQD = 100%			Sandstone and Shale, black to dark gray, fine to medium grained, fine grained sandstone, fair amount of silt sized particles in shale, see above weathering, interbedded, laminated to very thin bedding, shale-extremely weak rock, sandstone-weak rock. Replaced drill bit at 3pm. Horizontal fractures, extremely fractured to slightly fractured continuity, extremely close to close discontinuity, rough to smooth joints, some altering of joint walls (could be due to coring processes and strength of shale).
522.03				
				Sandstone, Shale, and Limestone, dark gray to light gray; sandstone, fine grained see above weathering, medium strength, laminated to thin bedding, well sorted, well rounded; shale, see above weathering, laminated beds, extremely weak rock; limestone (at 42.83'), fine to medium grained, slightly to moderately weathered, no apparent bedding (thin to massive). Horizontal fractures, extremely fractured to slightly fractured continuity, extremely close to close discontinuity, rough to smooth joints, some altering of joint walls (could be due to coring processes and strength of shale). Limestone, firm clay mineral coatings and sandy/gravelly material in fractures with rock wall separation <1/4" thick.
				Limestone - Limestone, gray, fine to medium grained, unweathered to slightly weathered, strong rock, no apparent bedding (thin to massive), Horizontal fractures, sound continuity, wide discontinuity, rough to smooth joints, tightly healed joints with hard clay mineral in joints with no rock wall separation.
				Bottom of hole = 46.5 feet

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 ▽ 558.10	Water Surface Elevation Encountered in Boring DD = during drilling 24h = 24 hours after completion

SUBSURFACE DATA PROFILE
STRUCTURE NO. 081-6010

PROFESSIONAL DESIGN FIRM LICENSE #184-001084

HANSON
Hanson Professional Services Inc.

JOB NO.	SHEET NO. 5	F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
08H0120E		74	81-1HVB	ROCK ISLAND	-	
DATE 8/24/11	5 SHEETS			CONTRACT NO. 64C08		
		FED. ROAD DIST. NO. -	ILLINOIS	FED. AID PROJECT		

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 9/20/07

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=565384.43, E=2459285.013), **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. ILR0101
Station _____
Offset _____
Ground Surface Elev. 568.67 ft

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

Groundwater Elev.:
First Encounter 560.7 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Topsoil with gravel, brick and root	567.67			
Fill: Silty Sand With Gravel(SM) Dark gray, coarse to fine sand with silt and some coarse to fine subangular gravel with brick fragments, dry	565.67	5 6 14 18		
Fill: Silty Sand(SM) trace to little gravel, light gray, transitions to very dark brown to black, dense, very loose to dense, dry to wet, faint petroleum odor	-5	14 23 14 15		17.0
few gravel-sized brick fragments		4		
Samples 2, 3: grain size analses performed		4 2		
▼ occasional wood matter		2 1		
		1 1		50.0
	-10	1		
Silty Fine to Coarse Sand(SM) Trace gravel, very dark gray to black, wet, very loose	557.67	0 1 1 1		43.0
Sample 5: grain size analysis performed		1 1 1		90.0
	553.67 -15	0		
Clayey Silt(ML, CL-ML) little sand, trace gravel, dark gray to black, soft wet		2		
		0 1 1		67.0
Sample 6: grain size analysis performed		1 1 1		
	-20	1		

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	547.67			
Silty Clay With Gravel(CL-ML) dark gray, wet, trace sand, little gravel, hard thin wire strand embedded in tube	545.67		4.5 P	
Silty Sand(SM) Light gray, moist, very dense, fine sands with silt, trace medium and coarse sand, trace fine gravel, possible completely weathered sandstone	-25	50/4		
	542.50			
Borehole continued with rock coring.	-30			
	-35			
	-40			

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 9/20/07

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=565384.43, E=2459285.013), **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. ILR0101
Station _____
Offset _____
Ground Surface Elev. 568.67 **ft**

CORING BARREL TYPE & SIZE _____
Core Diameter _____ **in**
Top of Rock Elev. 542.50 **ft**
Begin Core Elev. 542.50 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Sandstone Top 27": medium to fine grained, light brown, slightly weathered, weak to moderately strong 26.17' - Horizontal 10° fractures, rough and slightly irregular fracture surfaces, undulating, little hard impermeable gray clay infilling 1/4" thick at 24" from top, surface stained greenish gray from 0-24" and dark gray from 24" to bottom, fractures at 0-20", slightly altered joint walls with little clay infilling at fractures, hard clay infilling at 20" to bottom, tightly healed at joint walls and slightly altered joint walls Started preparing for rock coring at 1500	542.50	NQ-R1	95	53		1411.0
Limestone fine grained, light gray, slightly weathered to unweathered, moderately strong rock	540.22					
Sandstone Gray to light gray, medium to fine grained, smooth to rough texture, slight weathered to moderately weathered from 5" to 18" and 33" to 45", unweathered sandstone fragments that consolidated with infilling over time R2= CR=3/4 minute per foot average	537.50	NQ-R2	96	69		215.0
End of Boring	527.50					

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)

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 9/20/07

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=565290.255, E=2459318.646), **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. ILR0103
Station _____
Offset _____
Ground Surface Elev. 565.75 ft

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

Groundwater Elev.:
First Encounter 560.8 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Silty Sand and Gravel(GM) Hole offset 5 feet southwest of proposed boring location		12		
564.75				
Silty Medium to Coarse Sand With Gravel(SM) Very dark gray with brown, dry, dense, faint petroleum odor		14 16 42		
562.75				
Fill: Silty Fine to Medium Sand (SM) Very dark brown to black, loose, wet, faint petroleum odor, loose		3 3 2		
▼	-5	2		
559.75				
Fill: Clayey Silt(CH) Very dark brown to black, moist, loose to very loose wood matter possible old railroad tie, no odor		0 1 2 1		106.0
557.75				
Sample 3: Atterberg limits performed		1 1		50.0
Very Silty Fine to Coarse Sand (SM) Little gravel, very dark brown to black, moist to wet, loose	-10	1 1 4		
with brick fragments Tried to obtain ST from 11 to 13 feet but encountered coarse material. Bag sample at 12 ft				28.0
Sample 4: grain size analysis performed				
552.75				
552.50		50/3		
Silty Fine Sand(SM) Light gray, wet, very dense, trace medium sand, possibly highly weathered sandstone	-15			
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)

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 9/20/07

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=565194.129, E=2459353.658), **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. ILR0104
Station _____
Offset _____
Ground Surface Elev. 566.99 ft

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

Groundwater Elev.:
First Encounter 562.0 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Gravel (GM)				
565.99				
gray to dark gray mottled with yellowish orange, moist to dry, medium stiff, few coarse to fine subangular to subrounded gravel, little coarse to fine sands, loose with cinder block fragments, Rough drilling and chattering 3.0' bgs		3 2 5 6		
563.99		1		
		3 5		
Fine to Coarse Sand and Gravel (GP-GM)	-5 ▼	20		
With possible limestone rock and silty sand seams/layers, light gray, wet to loose to medium dense Sample 2: grain size analysis performed		6 6 10		
560.99				
Fine to Coarse Silty Sand(SM) little gravel, with silty clay layers, light gray, wet, medium dense Sample 3: grain size analysis performed		3 4 3 4	2.0 P	
558.99				
Clay (CH) Greenish gray, dry, non plastic, moderate to strong cementation, medium stiff to stiff, orange brown stains, oxidized, possible native soil, trace fine sands, possible glacial till, weathered Sample 4: Atterberg limit test performed	-10	4		
555.99		50/4		
Silty Sand (SM) Uniform light gray, wet, loose to medium dense, fine sands with silt, trace medium to fine subangular gravels, little medium sands, possible completely weathered sandstone				
552.82	-15			
Borehole continued with rock coring.	-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)

Illinois Department of Transportation
Division of Highways
CH2M HILL

ROCK CORE LOG

Date 9/20/07

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=565194.129, E=2459353.658), **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. ILR0104
Station _____
Offset _____
Ground Surface Elev. 566.99 **ft**

CORING BARREL TYPE & SIZE _____
Core Diameter _____ **in**
Top of Rock Elev. 552.82 **ft**
Begin Core Elev. 545.74 **ft**

DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
552.82					
Silty Sand Top 24": Light gray, uniform, fine sands with silts, wet, Remainder: Sandstone, light grain, rough to smooth texture, slightly weathered to moderately weathered, weak to medium strong, crush rock zone from 29" to 32" from top of clayey sandy infilling 14.17' - Bottom 13": Vertical fractures from 29" to 32", remainder has horizontal fractures, rough to undulating fracture surfaces, little soft clayey sand infilling materials at first from 24" to 34", surface stained greenish gray, no rock wall contact due to silty sand seams at fractures, moderately to extremely fractured, extremely close to close discontinuities Started rock coring at 09:11 @ 13.5 bgs					
550.82					
Sandstone Light gray, fine grained, slightly rough texture, weak to medium strong	NQ-R2	92	45		203.0
Light brown to light gray, medium to fine grained, slightly weathered to unweathered, medium to strong rock 31.25' - Horizontal to 15° fractures, rough fracture surface, varying planar and undulating fracture surfaces, little hard clay infilling material <1/8" at 64" from top that has tightly healed and created an irregular surface at the fracture with greenish gray stains, remainder of sample has no infilling material and no surface stain, sound to slightly fractured with close to wide discontinuities 100% fluid loss 45 second per foot	NQ-R3	99	85		168.0

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)

Illinois Department of Transportation
Division of Highways
CH2M HILL

ROCK CORE LOG

Date 9/20/07

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=565194.129, E=2459353.658), **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. ILR0104
Station _____
Offset _____
Ground Surface Elev. 566.99 **ft**

CORING BARREL TYPE & SIZE _____
Core Diameter _____ **in**
Top of Rock Elev. 552.82 **ft**
Begin Core Elev. 545.74 **ft**

DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Sandstone Light gray, fine grained, slightly rough texture, weak to medium strong *(continued)*					
-35					
-40					
525.74					
End of Boring					
-45					
-50					

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)

BBS, form 138 (Rev. 8-99)

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=565075.678, E=2459393.588), **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. ILR0106
Station _____
Offset _____
Ground Surface Elev. 567.60 ft

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

Groundwater Elev.:
First Encounter 563.6 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

Description	Elev. (ft)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Fill Gravel (GM) Gravel followed by silty sand subbase	566.60				
	566.40		7		
Fill Silty Sand With Gravel (SM) Reddish brick-like brittle dry clay, followed by yellowish orange mottled with brown sandy silt (ML)			12 9 2		
	564.60		1		
Sandy Silt (ML) Stiff to very stiff, non plastic, dry, Remainder: Silty Sand with Gravel (SM), dark brown, dry coarse to fine sands with silt and few medium to fine subangular gravels		▼	1 1 2	1.0 P	
		-5			
	561.60				
Silty Clay (CL-ML) Dark gray, moist to wet, stiff, little fine sand, gumbo				3.5 P	
Sandy Lean Clay With Gravel (CL) Dark greenish gray, moist to dry, coarse to fine sand, coarse to fine gravel, very stiff, possible glacial till	559.60		1 3 2 3		
		-10			
Sand and Silt (SM, ML) trace gravel, dark gray mottled with orange and greenish gray thereafter, moist, loose Sample 3: grain size analysis performed	556.60		3 4 13 22		
Very Sandy Lean Clay With Gravel (CL) Dark gray with greenish gray, moist, coarse to fine sands, coarse to fine gravel, and seams throughout, wet, medium dense, possible completely weathered sandstone, Driller notes rough drilling and heavy chattering 14' bgs, possible weathered rock	554.35		50/3		
		-15			
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)

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=565004.631, E=2459417.617), **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. ILR0107
Station _____
Offset _____
Ground Surface Elev. 567.70 ft

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

Groundwater Elev.:
First Encounter 563.7 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Fill: Gravel (GM)
566.70				
	5			**Fill: Sandy Silt With Gravel(ML)**
	4			Very dark brown, dry, loose, with occasional wood matter
	2			
564.70	3			
	1			**Sandy Silt With Clay(ML)**
▼	3	2.3		gray, moist, very stiff
	3	P		
-5	4			
561.70				
	1			**Silty and Clayey Sand(SC)**
	1		21.0	dark gray, moist, loose to very loose
	2			Sample 3: grain size analysis performed
559.70	2			
	1			**Fine to Medium Sand With Silt (SP-SM, SM)**
	1			possible old alluvium
	2			
-10	2			
556.70				
	1			**Silty Fine to Coarse Sand(SM)**
	2		16.0	Little gravel, brown with gray, wet, loose, possible old alluvium
	7			Sample 5: grain size analysis performed
554.70	10			
	6			**Silty Sand (SM)**
	11			brown with olive gray, wet, medium dense
	12			
-15	50/5			
551.45				
				Borehole continued with rock coring.
-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)

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=565004.631, E=2459417.617), **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. ILR0107
Station _____
Offset _____
Ground Surface Elev. 567.70 **ft**

CORING BARREL TYPE & SIZE _____
Core Diameter _____ **in**
Top of Rock Elev. 551.45 **ft**
Begin Core Elev. 551.45 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Sandstone Light brown with brown, fine to medium grained, rough texture, slightly weathered to unweathered, weak to medium strong rock 16.25' - Horizontal to 10° fractured, rough planar fracture surfaces, slightly altered joint walls, little or no infilling material, little or no brown and greenish gray surface stains, little greenish gray soft clay infilling material <1/8" thick at top 3" of sample, remainder no infilling, slightly to moderately fractured, very close to close discontinuities	551.45	NQ-R1	77	9		
Light brown with brown, medium to fine grained, trace coarse grained, rough surface, slightly weathered to unweathered, weak to medium strong 20.67' - Horizontal to 20° fractures, rough fracture surfaces, varying undulated and planar throughout, no infilling material, no surface stains, slightly altered joint surfaces and stray crushed zones preventing back wall contact at bottom half of sample at some fractures, slightly to moderately fractured, very close to close discontinuities, most fractures at top 45" of sample, likely mechanical fractures Start: 14:13-14:14 14:18-14:20 Average 3/5 minutes per foot	-20 -25 -30	NQ-R2	98	6		228.0
End of Boring	537.03 -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)

HANSON

SOIL BORING LOG

Date 6/30/10

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

SECTION 81B **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. _____
Station _____
BORING NO. RDH 01
Station 216+36
Offset 13' Lt.
Ground Surface Elev. 565.7 ft

Surface Water Elev. _____
Stream Bed Elev. _____

Groundwater Elev.:
First Encounter _____ ft
Upon Completion 562.7 ft ▽
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	4		16
2	5		
	5		
▽			
		1.50P	16
4	18		18
	5		
	2		
6			35
		0.30P	68
8			
	3		44
	2		
10	1		
12			
	4	0.80P	17
14	13		
	16		
16	50/1"		

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

551.20
Gray, fine- to medium-grained WEATHERED SANDSTONE

549.70
549.60
Gray, fine-grained SANDSTONE

End of Boring

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 6/28/10

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

SECTION 81B **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. _____
Station _____
BORING NO. RDH 02
Station 214+39
Offset 6' Lt.
Ground Surface Elev. 566.9 ft

Surface Water Elev. _____
Stream Bed Elev. _____

Groundwater Elev.:
First Encounter _____ ft
Upon Completion 561.4 ft ▽
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				GRAVEL 566.40
				FILL - Very dark brown, dry to moist, stiff, SILT with sand and gravel
	10		15	
2	8			
	6			
4		1.13S	99	
		0.44S	148	
				561.90
▽		1.18S	25	Very dark brown, moist, medium, silty, lean CLAY
6				
				559.40
8				Bluish gray, moist, very stiff, silty CLAY with sand
	6	1.25B	26	
	9			
10	11			
12				
				554.40
				Brown, fine-grained WEATHERED SANDSTONE
				553.20
	50/3"			End of Boring

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 6/28/10

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

SECTION 81B **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. _____
Station _____
BORING NO. RDH 03
Station 212+49
Offset 5' Lt.
Ground Surface Elev. 569.1 ft

Surface Water Elev. _____
Stream Bed Elev. _____

Groundwater Elev.:
First Encounter _____ ft
Upon Completion 563.1 ft ▽
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
TOPSOIL 568.85				
FILL - Brown and gray, moist, stiff, silty, sandy, lean CLAY with rock and brick fragments	2	10 6 5	1.55B	20
566.10				
Dark brown, moist, soft, SILT with fine-grained sand and rock fragments, tree roots	4	5 10 8	3.50P	17
	6 ▽		1.51S	33
				11
561.60				
Grayish brown, wet, loose, well-graded, fine- to medium-grained SAND 560.60	8			
Grayish brown, wet, medium dense, well-graded, medium- to coarse-grained SAND 559.10		5 6 5		14
End of Boring	10			

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 6/30/10

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. 081-6010
Station
BORING NO. RW 01-1
Station 216+48
Offset 13' Rt.
Ground Surface Elev. 565.3 ft

Surface Water Elev.
Stream Bed Elev.

Groundwater Elev.:
First Encounter ft
Upon Completion 562.3 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	6 6 8	0.75P	36
2			
▽			
	7 3 3	0.10P	16
4			
6	1 1 1		85
8			
	3 2 2		26
10			
	2 2 5		131
12			
	6 3 4		108
14			
549.30 16	24 50/1/2"		
548.80			

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

Gray, fine-grained, WEATHERED SANDSTONE

End of Boring

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 6/28/10

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. 081-6010
Station
BORING NO. RW 01-2
Station 214+44
Offset 16' Rt.
Ground Surface Elev. 567.0 ft

Surface Water Elev.
Stream Bed Elev.

Groundwater Elev.:
First Encounter ft
Upon Completion 563.0 ft ▽
After 24 **Hrs.** 564.5 ft ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
GRAVEL 566.50				
FILL - Very dark brown, wet, stiff, SILT with fine-grained sand with gravel	2 ▽	7 5 5	1.00P	28
564.00				
FILL - Very dark brown, wet, silty CLAY with fine-grained sand and gravel	4 ▽		1.13P 1.13P	26 20
562.00				
Grayish brown, moist, stiff, silty CLAY with trace sand and gravel	6	4 5 5	1.60P	31
558.50	8			
Brown, moist, stiff, silty CLAY with sand and gravel 558.00		5 8 10	2.00P	30
Brown, moist, medium dense, silty SAND 557.00	10			
Gray, fine-grained, WEATHERED SANDSTONE 556.00		5 8 10		23
Brown and gray, poorly cemented, fine-grained, WEATHERED SANDSTONE with gravel and grayish green clay	12			
553.50				
Brown, wet, poorly cemented, fine-grained, WEATHERED SANDSTONE	14	50/3"		19
551.00	16			
End of Boring		50/0"		

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 6/28/10

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. 081-6010
Station
BORING NO. RW 01-3
Station 213+26
Offset CL
Ground Surface Elev. 567.4 ft

Surface Water Elev.
Stream Bed Elev.

Groundwater Elev.:
First Encounter ft
Upon Completion 563.4 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
GRAVEL 566.70			
FILL - Very dark brown, moist, stiff to very stiff, clayey SILT with sand and gravel, organic material	2 2 4	1.75P	17
2		2.50S	61
▽ 4			
562.40			
Dark brown, moist, sandy CLAY with silt			24
6			22
			22
559.40			
Very dark brown, wet, medium dense, silty, fine-grained SAND		0.34B	21
8		0.36B	19
		0.40P	19
10			
556.40			
Brown, wet, medium dense, well graded, SAND and GRAVEL	8 10 12		15
12			
553.90			
Brown, wet, medium dense, well graded, silty SAND and GRAVEL	6 9 9		16
14			
551.90			
Gray, fine-grained, WEATHERED SANDSTONE 551.30			
16			
End of Boring	50/2"		15

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 10/25/05

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=565431.726, E=2459268.813), **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. RW1401
Station _____
Offset _____
Ground Surface Elev. 568.53 ft

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

Groundwater Elev.:
First Encounter 559.5 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	14			**Fill Gravel (GM)** Gravel, sand, and silt, trace clay, gray brown, dry to moist, medium dense to dense
	12			
	10			
	9			
	10			
	14			
	22			
	45			
	26			
-5	10			
	12			
562.53	8			
	1			**Sand (SP)** Sand, little to some gravel, trace clay, brown, moist to 9.0', wet deeper, loose, contamination at 6 ft
	1			
	2			
	4			
	1			
▼	3			
	3			
558.53 -10	3			
	2			**Clayey Sand (SC)** Clayey sand, little gravel, dark brown and white, wet, loose
	3			
	6			
556.53	5			
	2		21.4	**Sandy Clay (CL)** Sandy clay and silt, dark brown, wet
	2			
	2			
554.53	2			
-15	1			**Poorly Graded Sand (SP)** Sand and gravel, trace organics, dark brown to black, wet, loose
	2			
	2			
	3			
548.53 -20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	WOH			**Clay (CL)** Clay, dark brown to black, moist to wet, stratified, sand at top 4" of sample, limestone and sand for bottom 4"-5" of sample
	WOH	0.0		WOH = Weight of Hammer.
	50	P		
-25	50/3			
542.53				Borehole continued with rock coring.
-30				
-35				
-40				

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 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=565431.726, E=2459268.813), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **CORING METHOD** NQ DOUBLE BARREL DIAMOND TIP

STRUCT. NO. _____
Station _____

BORING NO. RW1401
Station _____
Offset _____
Ground Surface Elev. 568.53 **ft**

CORING BARREL TYPE & SIZE _____
Core Diameter _____ **in**
Top of Rock Elev. 542.53 **ft**
Begin Core Elev. 542.53 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Sandstone and Shale Interbedded Sandstone and Shale, gray, fine grained, weathering: barely consolidated, seems highly weathered, no discoloration; extremely weak strength, interbedded, hummocky bedding; Shale - laminated beds; Sandstone, no apparent bedding (thick to massive), well sorted, well rounded. Auger refusal at 26' at 12:35, Begin rock core at 13:41. Horizontal fractures, extremely fractured to slightly fractured continuity, extremely close to close discontinuity, rough to smooth joints, joints do not seem altered, but shale is softened in joints, these could also be bedding planes. Drilling water was black then dark gray for about 20 seconds at the start of rock coring. Drilling water loss due to formation absorption.	542.53	R1	100	37		
Sandstone and Shale, gray, fine grained, see weathering above, extremely weak rock, interbedded, laminated to very thin beds, well sorted, well rounded. Horizontal fractures, extremely fractured to slightly fractured continuity, extremely close to close discontinuity, rough to smooth joints, joints not altered, softened shale at contact points. First 2.5' of coring R-1 occurred more rapidly than other rock coring with same rig(2.5' in 10-15 minutes).	540.03	R2	100	12		
Sandstone and Shale, gray, fine grained, see weathering above, interbedded, laminated to very thin beds, well sorted, well rounded; shale-extremely weak rock; sandstone-very weak rock; 33.5' to 35.66' highly shaley Drilling water turned black from shale at 33.5' for just a few seconds. Horizontal fractures, extremely fractured to sound continuity, extremely close to moderate discontinuity, rough to smooth joints, unaltered joint walls, but softened shale at contact points.	535.03	R3	92	42		
Sandstone and Shale, black to dark gray, fine to medium grained, fine grained sandstone, fair amount of silt sized particles in shale, see above weathering, interbedded, laminated to very thin bedding, shale-extremely weak rock, sandstone-weak rock. Replaced drill bit at 3pm. Horizontal fractures, extremely fractured to slightly fractured continuity, extremely close to close discontinuity, rough to smooth joints, some altering of joint walls (could be due to coring processes and strength of shale).	532.03	R4	92	17		
Sandstone, Shale, and Limestone, dark gray to light gray; sandstone, fine grained, see above weathering, medium strength, laminated to thin bedding, well sorted, well rounded; shale, see above weathering, laminated beds, extremely weak rock; limestone (at 42.83'), fine to medium grained, slightly to moderately weathered, no apparent bedding (thin to massive). Horizontal fractures, extremely fractured to slightly fractured continuity, extremely close to close discontinuity, rough to smooth joints, some altering of joint walls (could be due to coring processes and strength of shale), Limestone, firm clay mineral coatings and sandy/gravelly material in fractures with rock wall separation <1/4" thick.	530.03	R5	100	50		198.0
Limestone Limestone, gray, fine to medium grained, unweathered to slightly weathered, strong rock, no apparent bedding (thin to massive). Horizontal fractures, sound continuity, wide discontinuity, rough to smooth joints, tightly healed joints with hard clay mineral in joints with no rock wall separation.	525.03	R6	100	100		294.0

-30
-35
-40
-45

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)

Illinois Department of Transportation
Division of Highways
CH2M HILL

ROCK CORE 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=565431.726, E=2459268.813), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **CORING METHOD** NQ DOUBLE BARREL DIAMOND TIP

STRUCT. NO. _____
Station _____

BORING NO. RW1401
Station _____
Offset _____
Ground Surface Elev. 568.53 **ft**

CORING BARREL TYPE & SIZE _____
Core Diameter _____ **in**
Top of Rock Elev. 542.53 **ft**
Begin Core Elev. 542.53 **ft**

DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
522.03					
End of Rock Core. 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)

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=565240.796, E=2459335.667), **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. RW1403
Station _____
Offset _____
Ground Surface Elev. 566.39 ft

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

Groundwater Elev.:
First Encounter 556.4 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	16		
	7	6.8	
	6	P	
564.39	3		
	2		
	6		
	5		
562.39	3		
	1		
-5	WOH	0.8	24.0
	WOH	P	
	WOH	0.8	
	Push	P	
	WOH	2.7	
	2	P	
	3		
	4		
	3		
	5		
▼-10	6		
	7		
	6	0.7	
	50/3	P	
554.39			
	50/0		
	50/1		
-15			
546.39			
-20			

Silty Clay (CL-ML) Gravel and silty clay, light gray and brown, dry to moist, stratified, hard

Sandy Clay (CL) Sandy clay, some gravel, dark brown and black, moist, homogeneous.

Silty Clay (CL-ML) Silty clay, some fine sand, dark brown, moist to wet, homogeneous. WOH = Weight of Hammer, Shelby sample from 4'-6' obtained in adjacent hole on 11/10/05, See lab results for consolidation data

Sandstone

Bottom of Borehole at 20'. No auger refusal, but hit sandstone and couldn't sample with the split spoon
End of Boring

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

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)

Summary of Laboratory Test Results, I-74 Corridor, 081-6010

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
ILR0101	Silty Sand with Gravel	3-5	2	SM		SAND	32	53	12	3					68	35	15	17												
	Silty Sand with Gravel	8-10	3	SM		SA.LO.	12	53	29	6					88	60	35	50												
	Silty Clay with Sand	11-13	4															43												
	Silty Sand with Gravel	13-15	5	SM			14	66	20						86	49	20	90												
	Silty Sand with Gravel	16	6			SI.CL.LO.	6	13	57	24					94	89	81	67												
	LImestone	29	1															0.0	165	1411										
	Sandstone	35	1															1.8	129	215										
ILR0103	Org. Clayey Silt with Sand	6-8	3	OH							31.3	53	48	5				106												
	Silty Clay with Sand and Gravel	8-10	4	ML	A-4(0)		13	53	34		12.8	34	31	8	87	69	34	50												
	Silty Sand	11-13	T1	SM							5.97							28												
ILR0104	Poorly Graded Sand with Silt	3-5	2	SP-SM			65	29	6						35	17	6													
	Poorly Graded Gravel	6-8	3	GM			40	37	23						60	40	23													
	Silty Clay	8-10	4	CH								51	22	29																
	Sandstone	24	1															0	121	203										
	Sandstone	32	1															0	122	168										
ILR0106	Clay with Trace Sand and Grave	8-10	3	SM			7	49	44						93	77	44													
	Sandy Lean Clay with Gravel	6	T-1	CL								47	21	26																
ILR0107	Silty Sand	6-8	3	SM	A-4(1)	SA.LO.	0	57	28	15		28	18	10	100	94	43	21												
	Silty Sand	11-13	5	SM		SAND	25	59	10	6					75	43	16	16												
	Sandstone	22	1															0	117	228										
RW1401	Clayey Sand	12	B-7	SC								NP	NP	NP				21												
	Shale/Sandstone	38.5	R-5															2	130	198										L/D =1.6 <2.0
	Shale/Sandstone	39	R-5															7	122	294										L/D =1.6 <2.0
RW1403	Silty Clay	4.0	T-1	CL								23	19	4				24.4	105.9			13	173	32.2	0	0.16	0.005	0.74	0.8	

HANSON

ORGANIC CONTENT

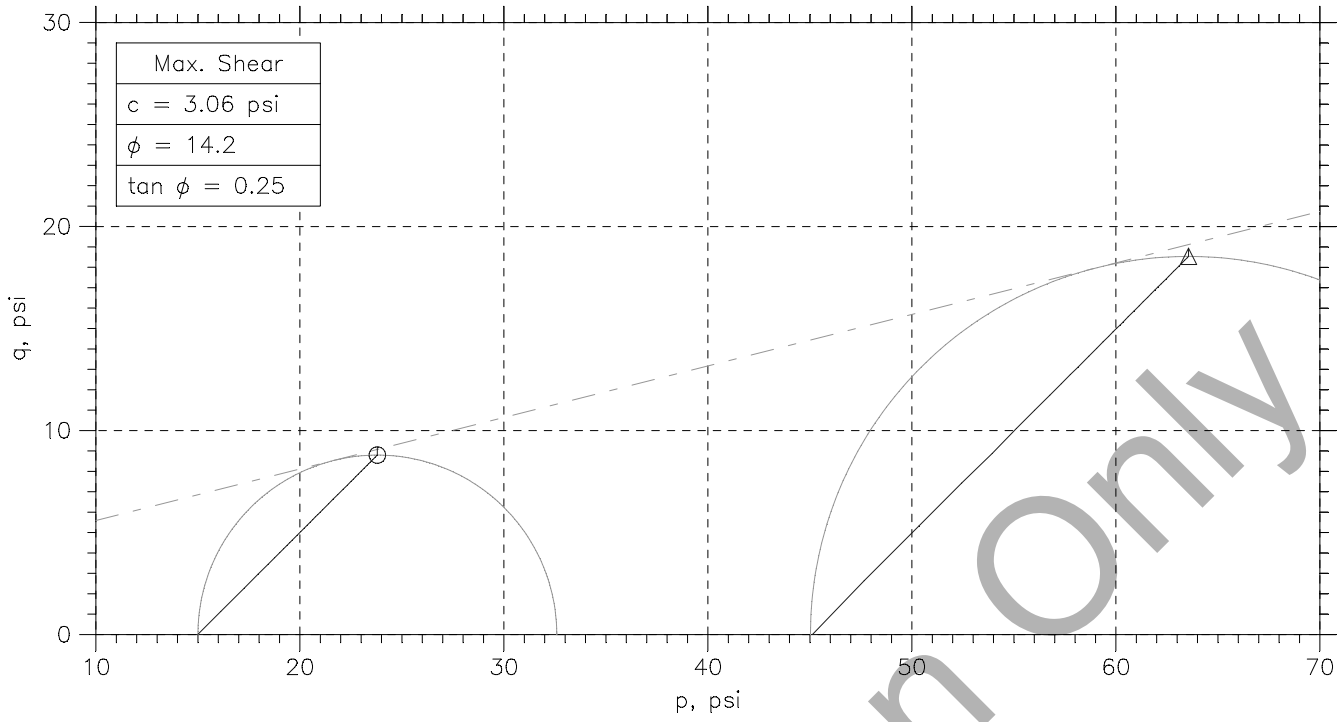
Project: I-74 Over Mississippi River Job Number: 08H0120E

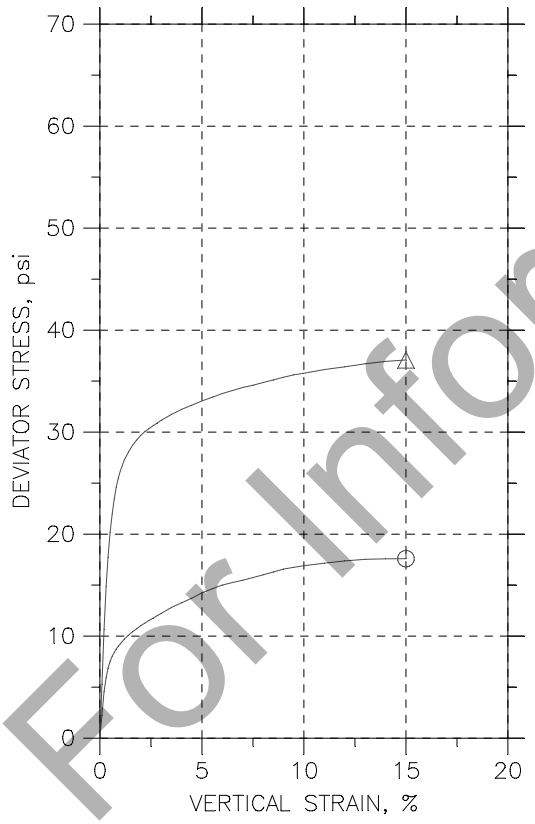
Client: Iowa DOT Date: 8/23/2010

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

CONSOLIDATED UNDRAINED TRIAXIAL TEST





Symbol		⏲	△		
Sample No.		3-2	3-3		
Test No.		1 of 2	2 of 2		
Depth		6.5-7.0	7.0-7.5		
Initial	Diameter, in	2.884	2.84		
	Height, in	5.325	5.101		
	Water Content, %	22.3	21.6		
	Dry Density, pcf	104.4	106.3		
	Saturation, %	101.2	103.0		
	Void Ratio	0.584	0.556		
Before Shear	Water Content, %	21.2	18.6		
	Dry Density, pcf	105.9	110.8		
	Saturation*, %	100.0	100.0		
	Void Ratio	0.563	0.493		
	Back Press., psi	62.	42.01		
Ver. Eff. Cons. Stress, psi		14.99	44.98		
Shear Strength, psi		8.795	18.53		
Strain at Failure, %		15	15		
Strain Rate, %/min		0.0625	0.0625		
B-Value		0.96	0.96		
Estimated Specific Gravity		2.65	2.65		
Liquid Limit		0	0		
Plastic Limit		0	0		

HANSON

Project: I-74 Mississippi River Br

Location: Quad Cities

Project No.: 08H0120E

Boring No.: RW01-3

Sample Type: Tube

Description: Black vf.-f. sandy silt / so. clay - organic.

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

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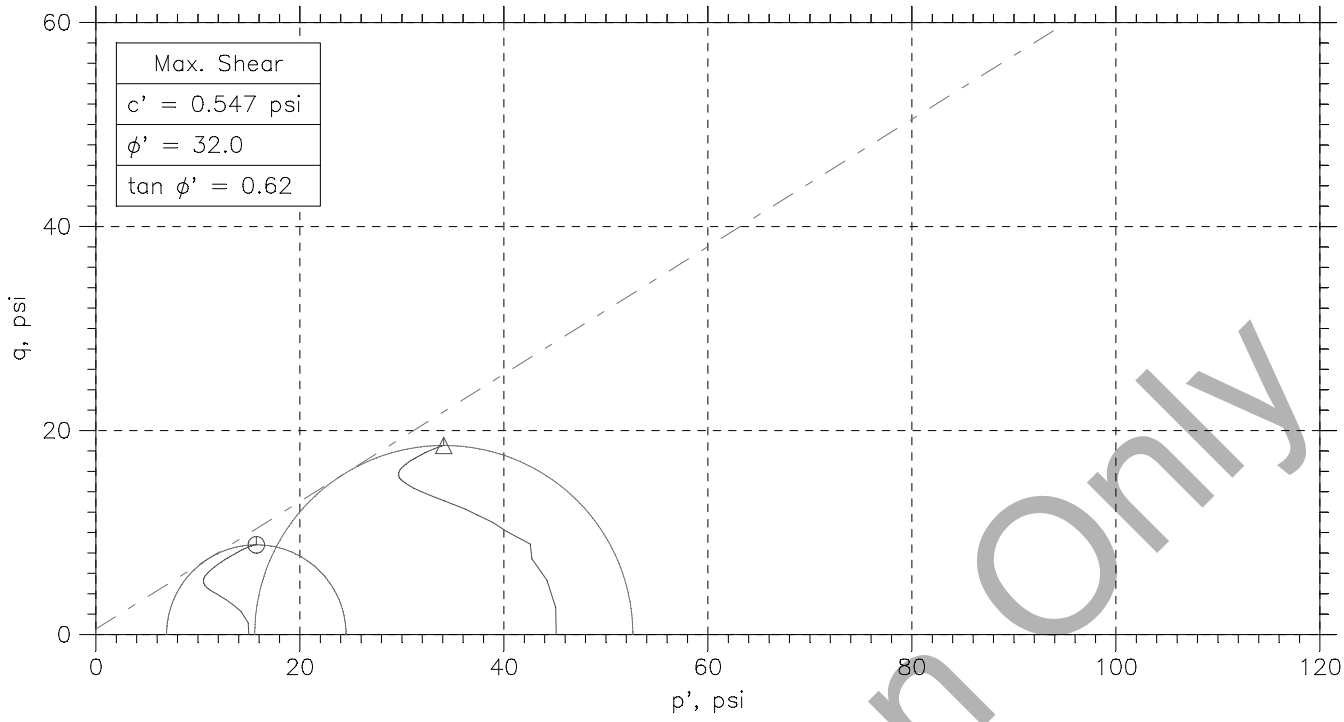
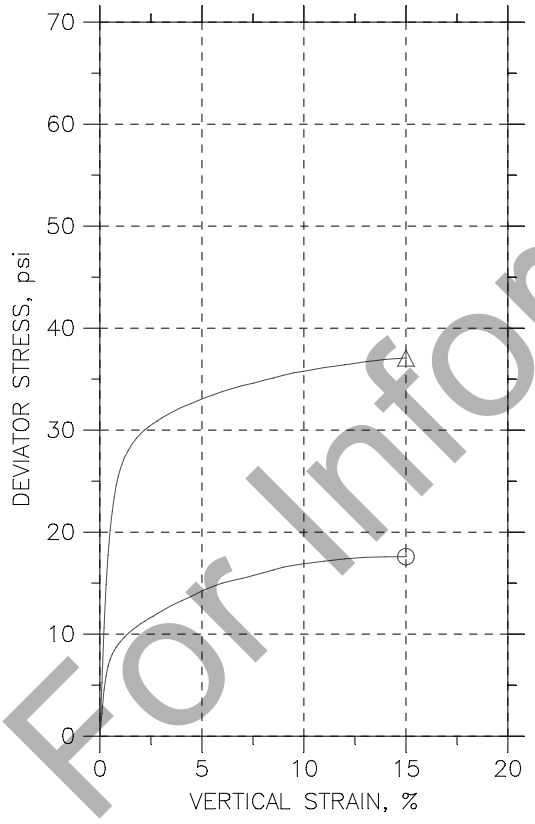
CONSOLIDATED UNDRAINED TRIAXIAL TEST





Symbol		⏲	△		
Sample No.		3-2	3-3		
Test No.		1 of 2	2 of 2		
Depth		6.5-7.0	7.0-7.5		
Initial	Diameter, in	2.884	2.84		
	Height, in	5.325	5.101		
	Water Content, %	22.3	21.6		
	Dry Density, pcf	104.4	106.3		
	Saturation, %	101.2	103.0		
	Void Ratio	0.584	0.556		
Before Shear	Water Content, %	21.2	18.6		
	Dry Density, pcf	105.9	110.8		
	Saturation*, %	100.0	100.0		
	Void Ratio	0.563	0.493		
	Back Press., psi	62.	42.01		
Ver. Eff. Cons. Stress, psi		14.99	44.98		
Shear Strength, psi		8.795	18.53		
Strain at Failure, %		15	15		
Strain Rate, %/min		0.0625	0.0625		
B-Value		0.96	0.96		
Estimated Specific Gravity		2.65	2.65		
Liquid Limit		0	0		
Plastic Limit		0	0		

HANSON

Project: I-74 Mississippi River Br

Location: Quad Cities

Project No.: 08H0120E

Boring No.: RW01-3

Sample Type: Tube

Description: Black vf.-f. sandy silt / so. clay - organic.

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.

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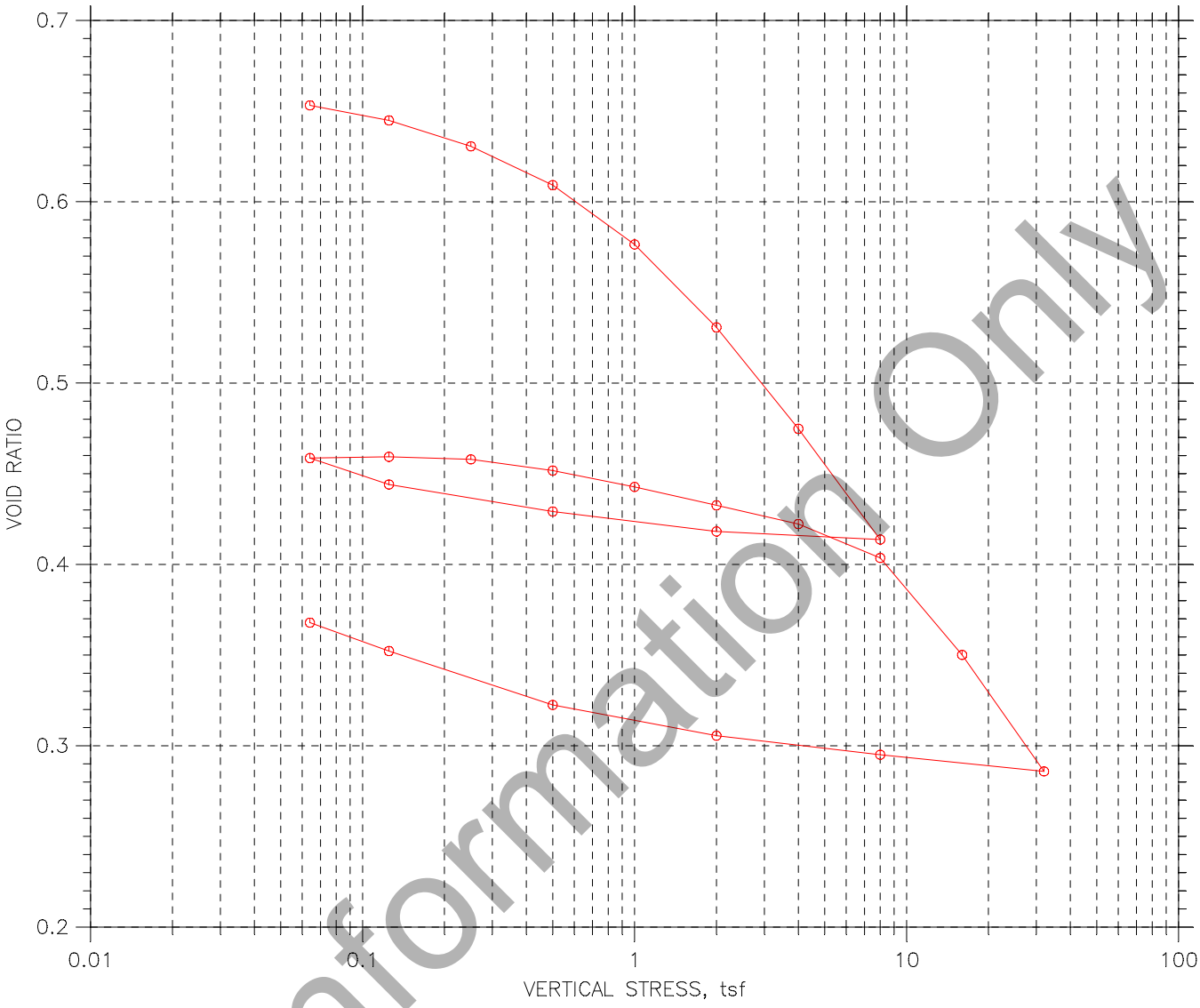
CONSOLIDATION TEST DATA

SUMMARY REPORT



				Before Test	After Test
Overburden Pressure: 0 tsf			Water Content, %	23.86	15.86
Preconsolidation Pressure: 0 tsf			Dry Unit Weight, pcf	99.67	120.9
Compression Index: 0			Saturation, %	95.84	114.28
Diameter: 2.5 in		Height: 0.992 in	Void Ratio	0.66	0.37
LL: 0	PL: 0	PI: 0	GS: 2.65		

HANSON	Project: I74	Location: Quad Cities	Project No.: 08H0120E
	Boring No.: RW01-3	Tested By: RIN	Checked By: JCC
	Sample No.: 3-1	Test Date: 7/13/10	Depth: 6.3-6.5
	Test No.: 1	Sample Type: Tube	Elevation:
	Description: Black vf.-f. sandy silt / so. clay - organic.		
	Remarks:		

CONSOLIDATION TEST DATA

Project: I74
Boring No.: RW01-3
Sample No.: 3-1
Test No.: 1

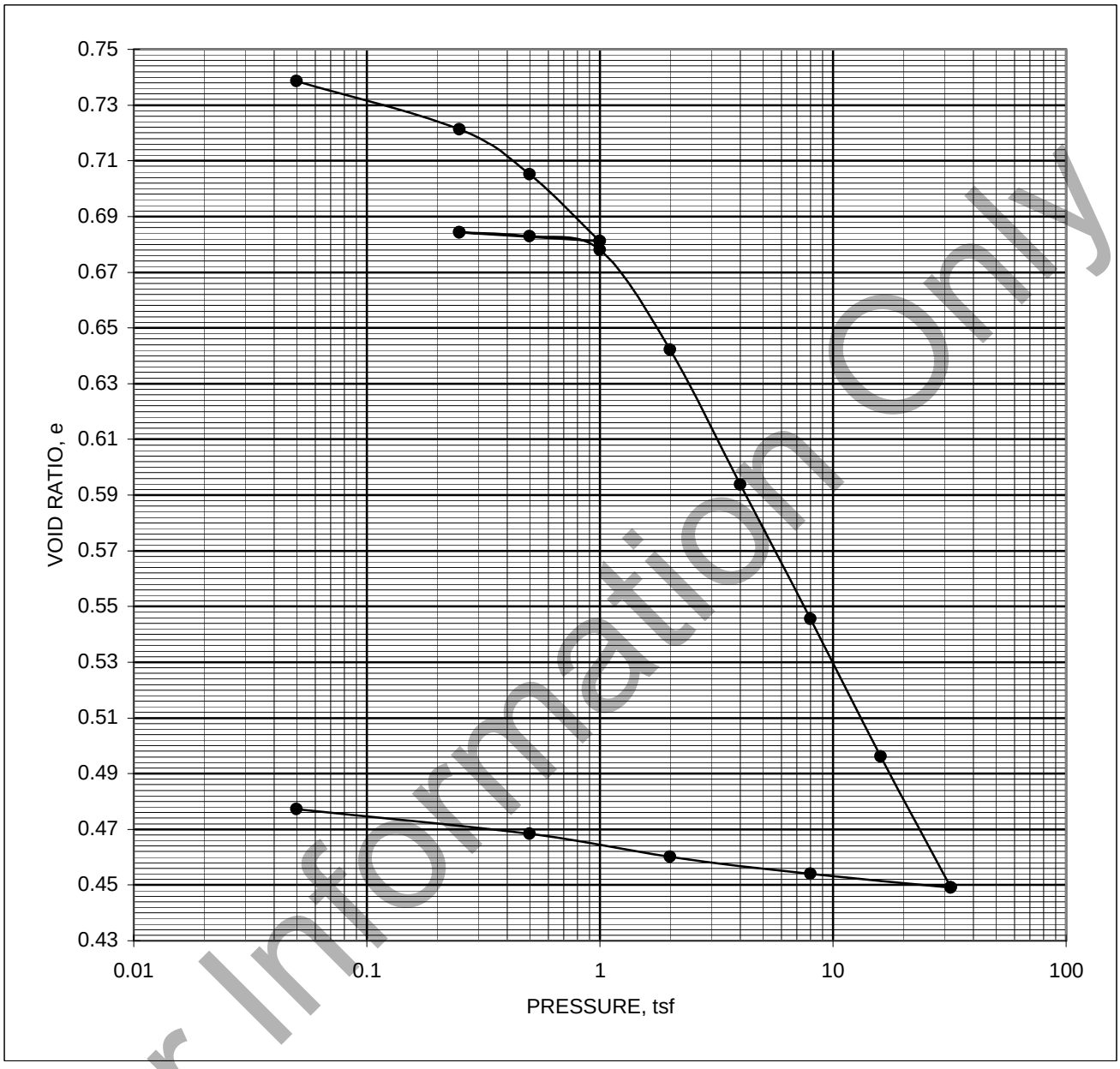
Location: Quad Cities
Tested By: RIN
Test Date: 7/13/10
Sample Type: Tube

Project No.: 08H0120E
Checked By: JCC
Depth: 6.3-6.5
Elevation:

Soil Description: Black vf.-f. sandy silt / so. clay - organic.
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	0.004009	0.653	0.40	6.7	0.0	1.20e-004	0.00e+000	1.20e-004
2	0.125	0.008966	0.645	0.90	7.4	0.0	1.08e-004	0.00e+000	1.08e-004
3	0.25	0.01747	0.631	1.76	3.5	0.0	2.24e-004	0.00e+000	2.24e-004
4	0.5	0.03028	0.609	3.05	3.5	0.0	2.20e-004	0.00e+000	2.20e-004
5	1	0.04982	0.576	5.02	3.5	0.0	2.12e-004	0.00e+000	2.12e-004
6	2	0.07715	0.531	7.78	3.7	0.0	1.92e-004	0.00e+000	1.92e-004
7	4	0.1106	0.475	11.15	3.5	0.0	1.89e-004	0.00e+000	1.89e-004
8	8	0.1471	0.414	14.83	2.0	0.0	3.08e-004	0.00e+000	3.08e-004
9	2	0.1444	0.418	14.56	0.0	0.0	1.64e-002	2.75e+001	3.28e-002
10	0.5	0.1378	0.429	13.90	1.9	0.0	3.09e-004	0.00e+000	3.09e-004
11	0.125	0.1289	0.444	13.00	8.2	12.6	7.43e-005	4.82e-005	5.84e-005
12	0.064	0.1202	0.459	12.12	89.6	0.0	6.91e-006	0.00e+000	6.91e-006
13	0.125	0.1198	0.459	12.08	0.5	0.1	1.26e-003	6.39e-003	2.11e-003
14	0.25	0.1207	0.458	12.17	3.5	0.0	1.78e-004	0.00e+000	1.78e-004
15	0.5	0.1243	0.452	12.54	3.7	0.0	1.69e-004	0.00e+000	1.69e-004
16	1	0.1298	0.443	13.08	3.6	0.0	1.69e-004	0.00e+000	1.69e-004
17	2	0.1358	0.433	13.69	1.9	0.0	3.23e-004	0.00e+000	3.23e-004
18	4	0.142	0.422	14.31	0.9	0.0	6.57e-004	0.00e+000	6.57e-004
19	8	0.1532	0.404	15.44	1.8	0.0	3.23e-004	0.00e+000	3.23e-004
20	16	0.1851	0.350	18.66	1.9	2.3	2.93e-004	2.42e-004	2.65e-004
21	32	0.2235	0.286	22.53	2.0	0.0	2.52e-004	0.00e+000	2.52e-004
22	8	0.218	0.295	21.98	0.0	0.0	5.08e-002	0.00e+000	5.08e-002
23	2	0.2117	0.306	21.34	0.9	0.0	5.26e-004	0.00e+000	5.26e-004
24	0.5	0.2016	0.322	20.32	14.8	10.7	3.42e-005	4.72e-005	3.97e-005
25	0.125	0.1838	0.352	18.53	53.8	0.0	9.76e-006	0.00e+000	9.76e-006
26	0.064	0.1745	0.368	17.59	267.9	245.2	2.03e-006	2.22e-006	2.12e-006

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF COHESIVE SOILS
ASTM D2435



DIAMETER, mm	63.42	HEIGHT, mm	25.40	PROPERTY	BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, tsf	0.30			MOISTURE, %	25.3	17.2
PRECONSOL. PRESSURE, tsf	0.81			DRY DENSITY, pcf	96.9	112.2
OVER CONSOLIDATION RATIO	2.7			SATURATION, %	92	96
COMPRESSION INDEX	0.16			VOID RATIO	0.740	0.477
REBOUND INDEX	0.005			SAMPLE TYPE	3" SHELBY TUBE	

LIQUID LIMIT	23	PLASTIC LIMIT	19	PLASTICITY INDEX	4	SPECIFIC GRAVITY	2.70 ASSUMED

SAMPLE DESCRIPTION SILTY CLAY, VERY DARK BROWN

BORING NO.	RW1403	SAMPLE NO.	T-1	DEPTH, feet	4.0 TO 6.0

I-74 CENTER SECTION
QUAD CITIES, IA/IL
07045052
1/10/2006

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Terracon

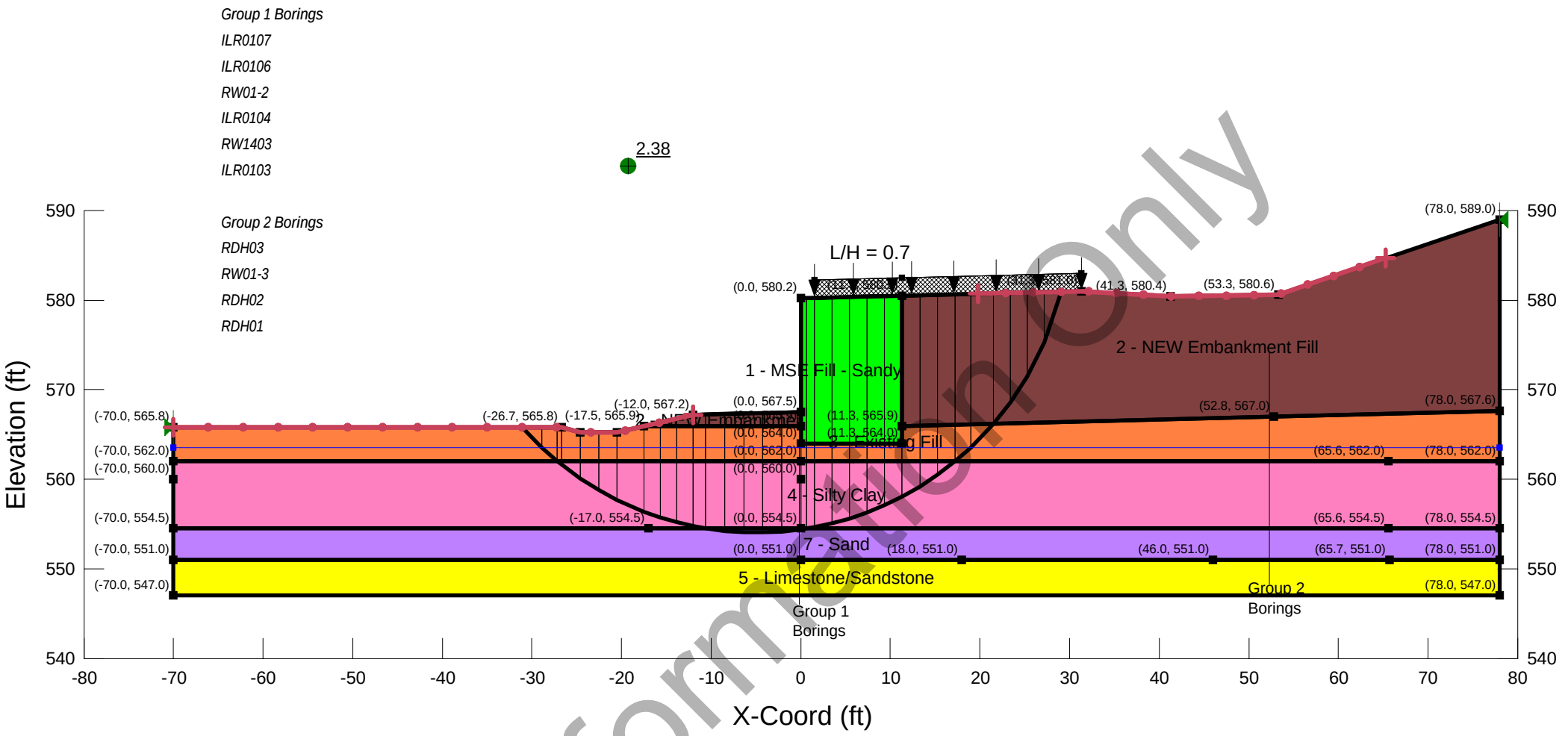
I-74 CENTER SECTION
QUAD CITIES, IA/IL
07045052
1/10/2006

ADDITIONAL CONSOLIDATION DATA

RW1403
T-1
4.0 TO 6.0

PRESSURE, tsf	Cv50, cm2/sec	Cv90, cm2/sec	Av, cm2/g	Mv, cm2/g	k, cm/sec
0					
0.05			2.13E-05	1.23E-05	
0.25	3.88E-03	3.91E-03	8.89E-05	5.11E-05	1.98E-07
0.5	2.18E-04	2.20E-04	6.54E-05	3.80E-05	8.30E-09
1	5.11E-03	5.16E-03	4.94E-05	2.90E-05	1.48E-07
0.25			4.50E-06	2.68E-06	
0.5			5.69E-06	3.38E-06	
1	3.31E-03	3.33E-03	1.03E-05	6.13E-06	2.03E-08
2	1.17E-02	1.17E-02	3.64E-05	2.17E-05	2.55E-07
4	1.52E-02	1.54E-02	2.48E-05	1.51E-05	2.30E-07
8	1.19E-02	1.18E-02	1.23E-05	7.72E-06	9.20E-08
16			6.31E-06	4.08E-06	
32	1.64E-02	1.64E-02	3.00E-06	2.00E-06	3.28E-08
AVERAGE	1.01E-02	1.01E-02	2.79E-05	1.64E-05	1.28E-07

Terracon



Material Properties

Name: 1 - MSE Fill - Sandy Gravel 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: 118 pcf Cohesion: 785 psf Phi: 0 °
Name: 4 - Silty Clay Model: Mohr-Coulomb Unit Weight: 118 pcf Cohesion: 950 psf Phi: 0 °
Name: 5 - Limestone/Sandstone Model: Bedrock (Impenetrable)
Name: 7 - Sand Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 0 psf Phi: 32 °

SN 081-6010 IL-RW01
Case 1 - Sta 215+75 (E/E)
File Name: I-74 RW01 MSE Wall.gsz
Last Edited By: Robert Chantome
Date: 10/20/2011 5:20:12 PM

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

HANSON

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	

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

- 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.

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.

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

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
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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)

I-74 Final Design
Plug Fill VE Study Results

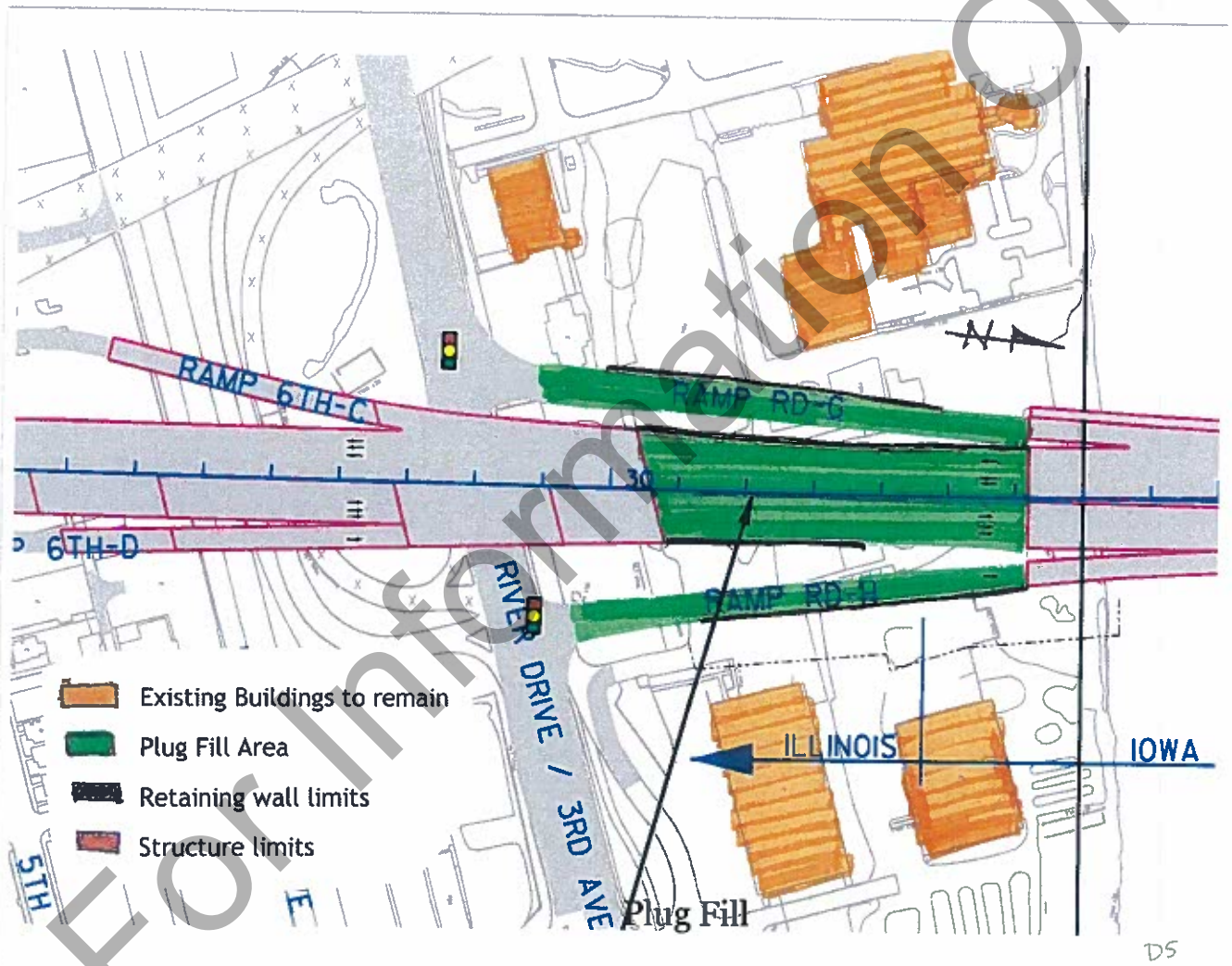
November 16, 2010

I-74/Mississippi River

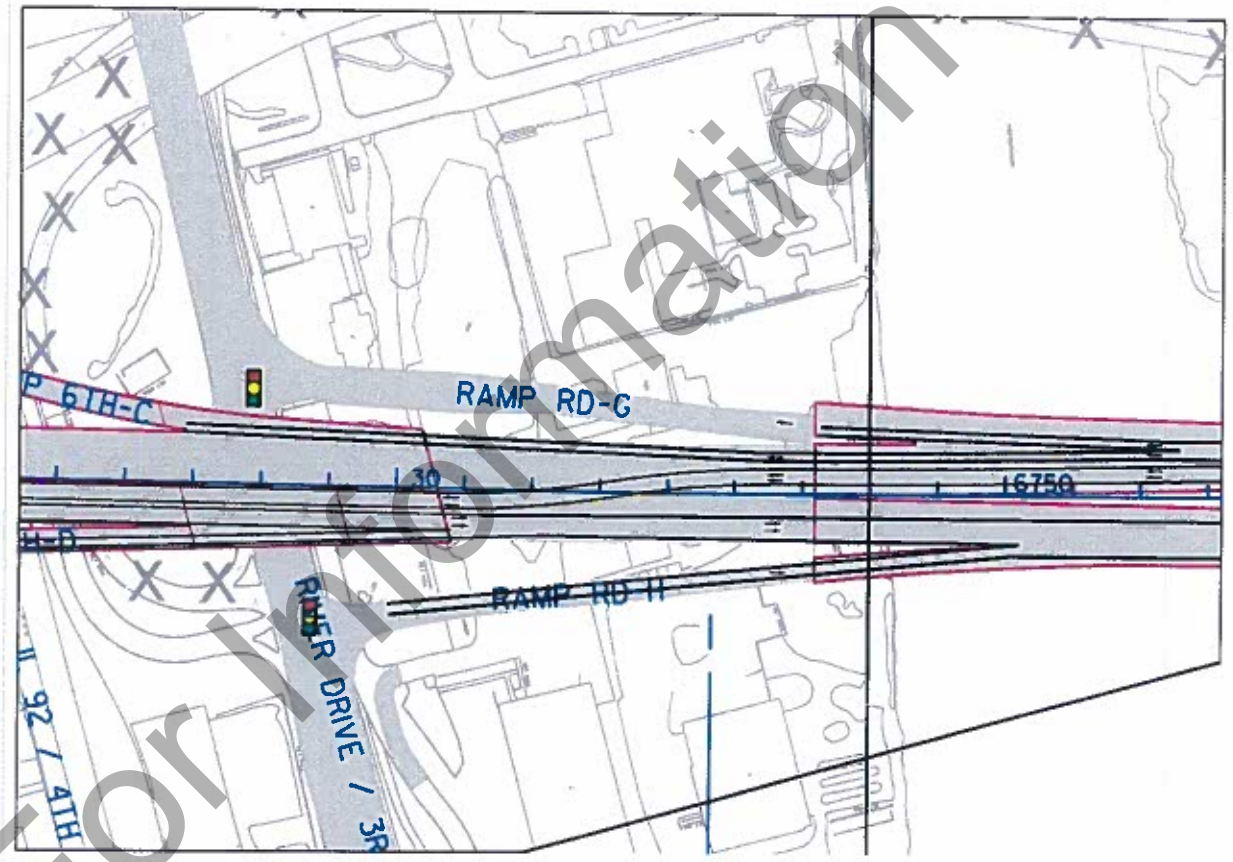
Agenda

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

Preliminary Engineering (Phase I) Design - Plug Fill



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



MOT crossover

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

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

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

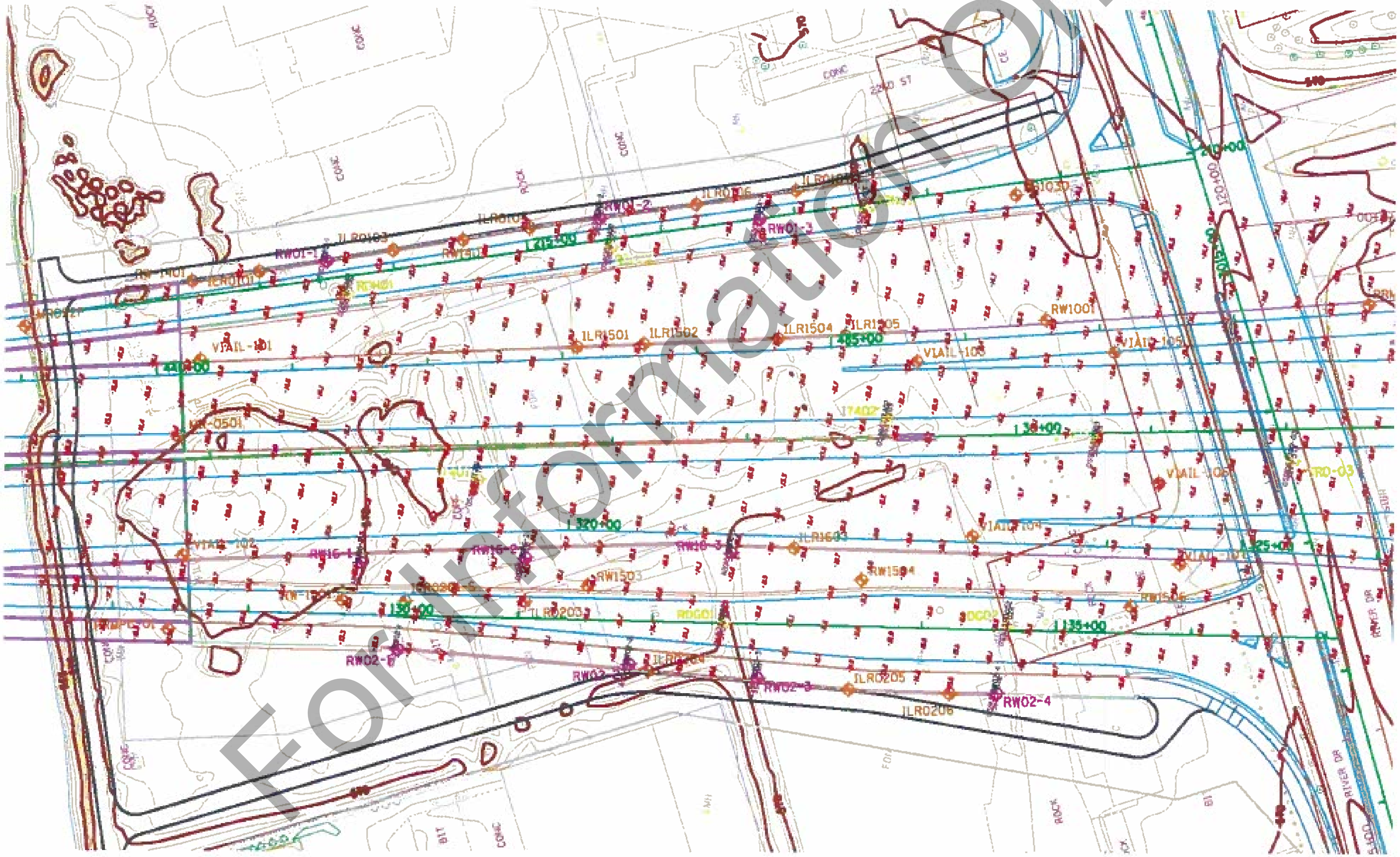
@ South End

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

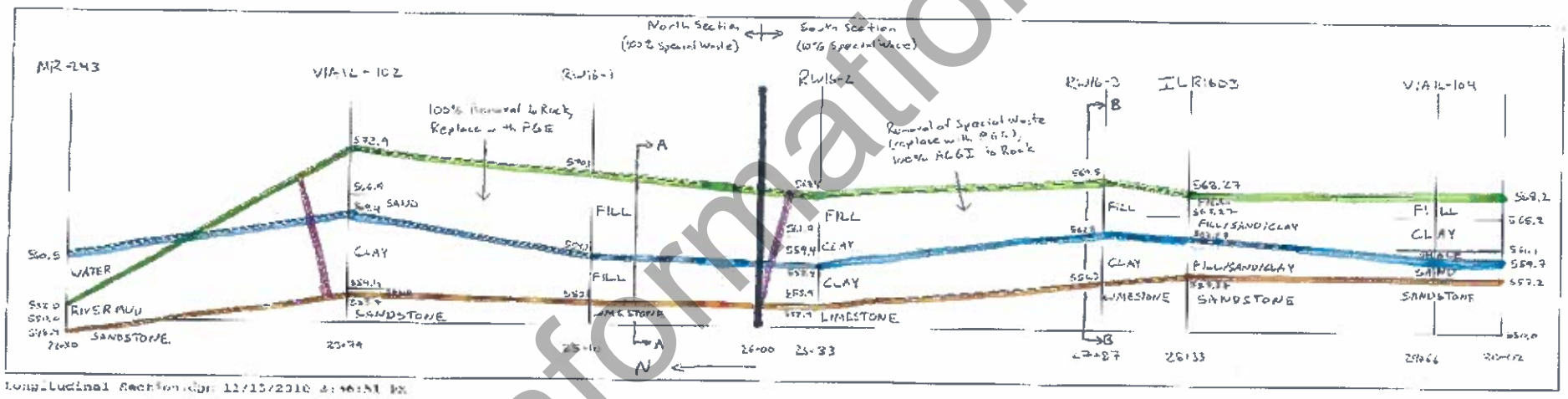
Plug Fill Final Condition

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

Plug Fill: Depths of Required Soil Removal

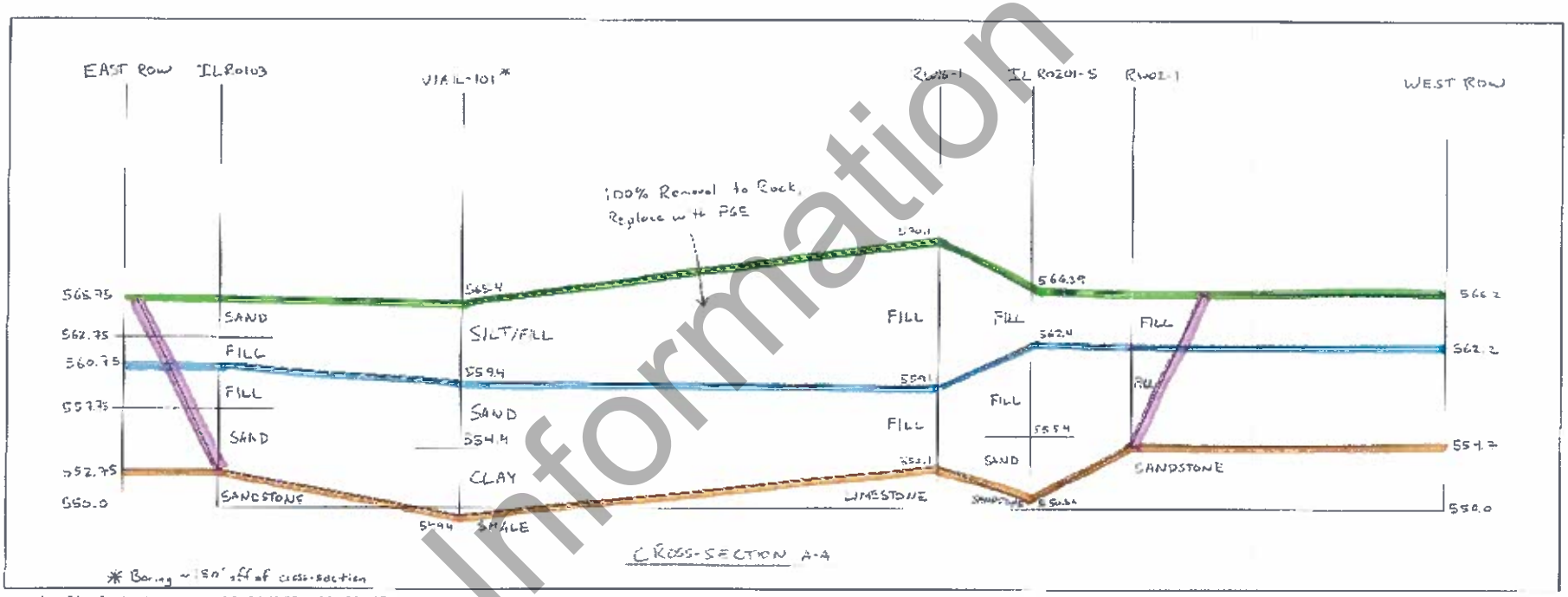


Plug Fill: Limits of Soil Removal/Treatment



Longitudinal Section Along I-74

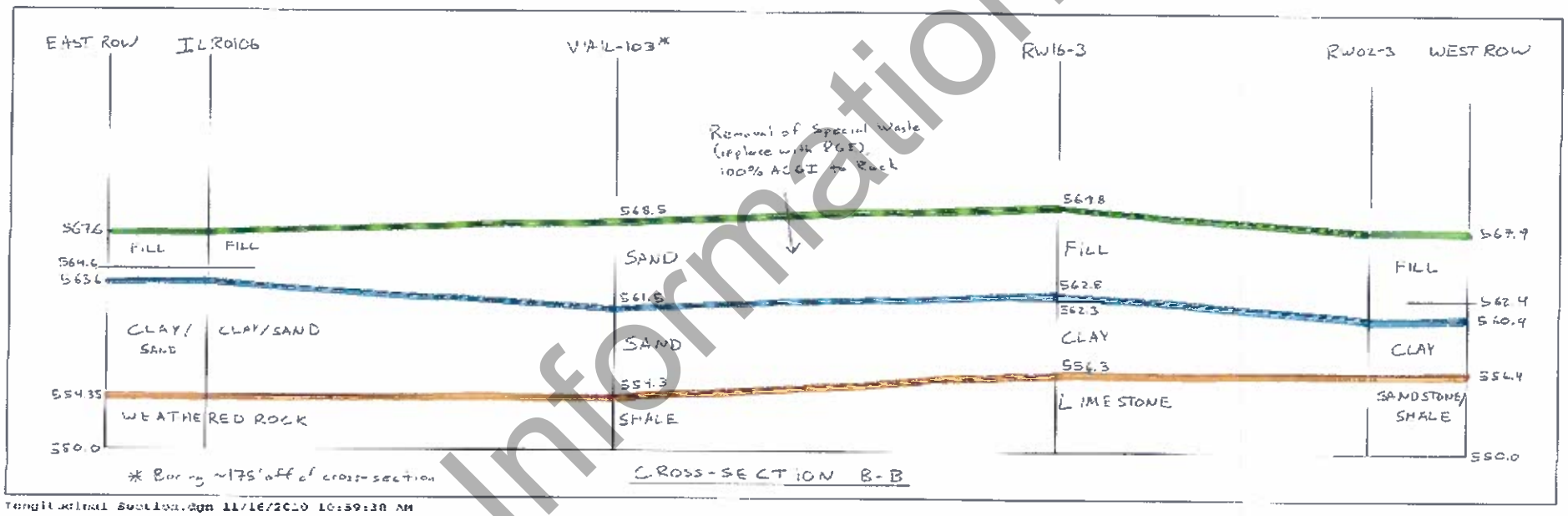
Plug Fill: Limits of Soil Removal



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

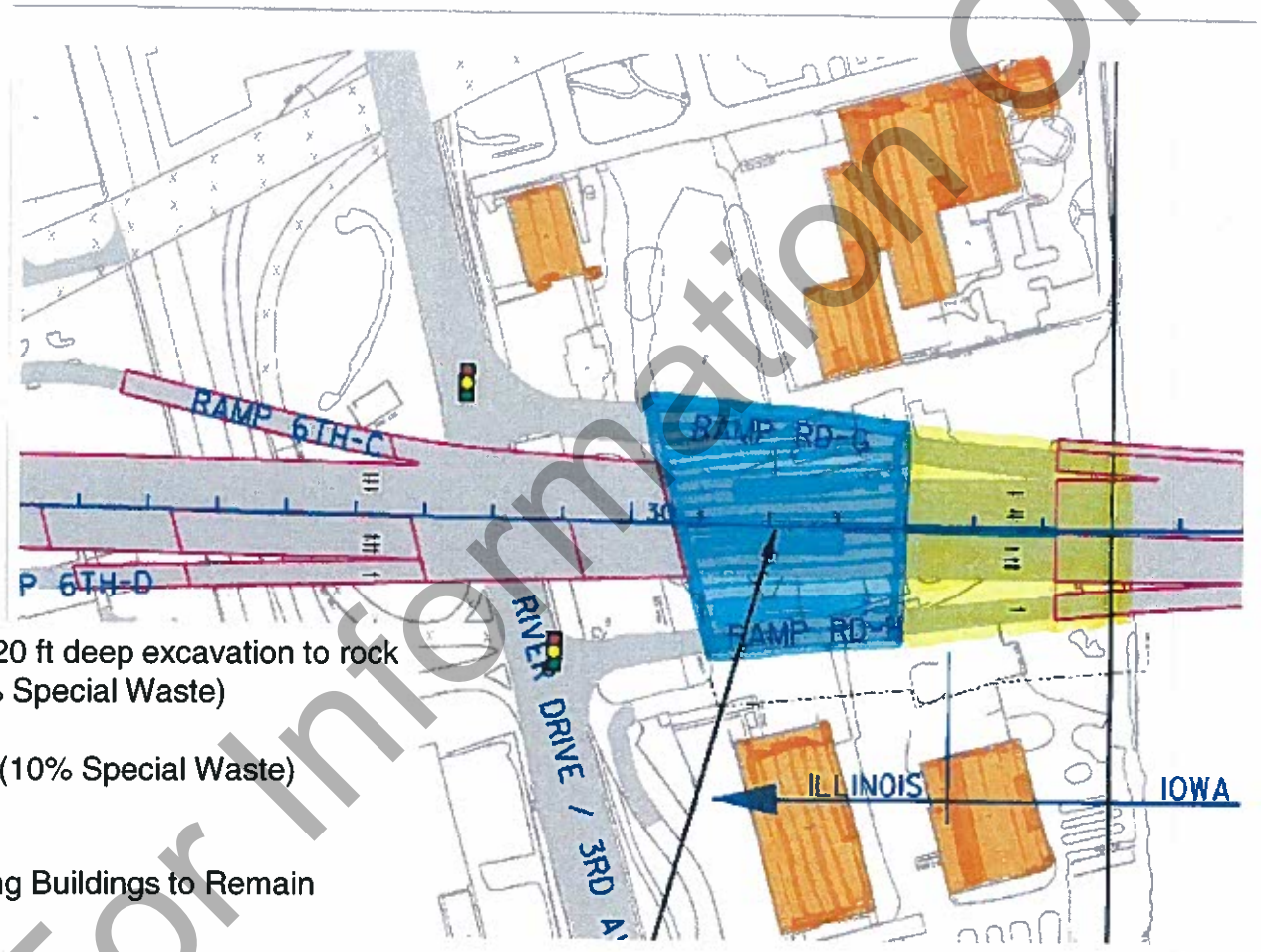
North Zone

Plug Fill: Limits of Soil Treatment



South Zone

Plug Fill: Limits of Soil Removal/Treatment

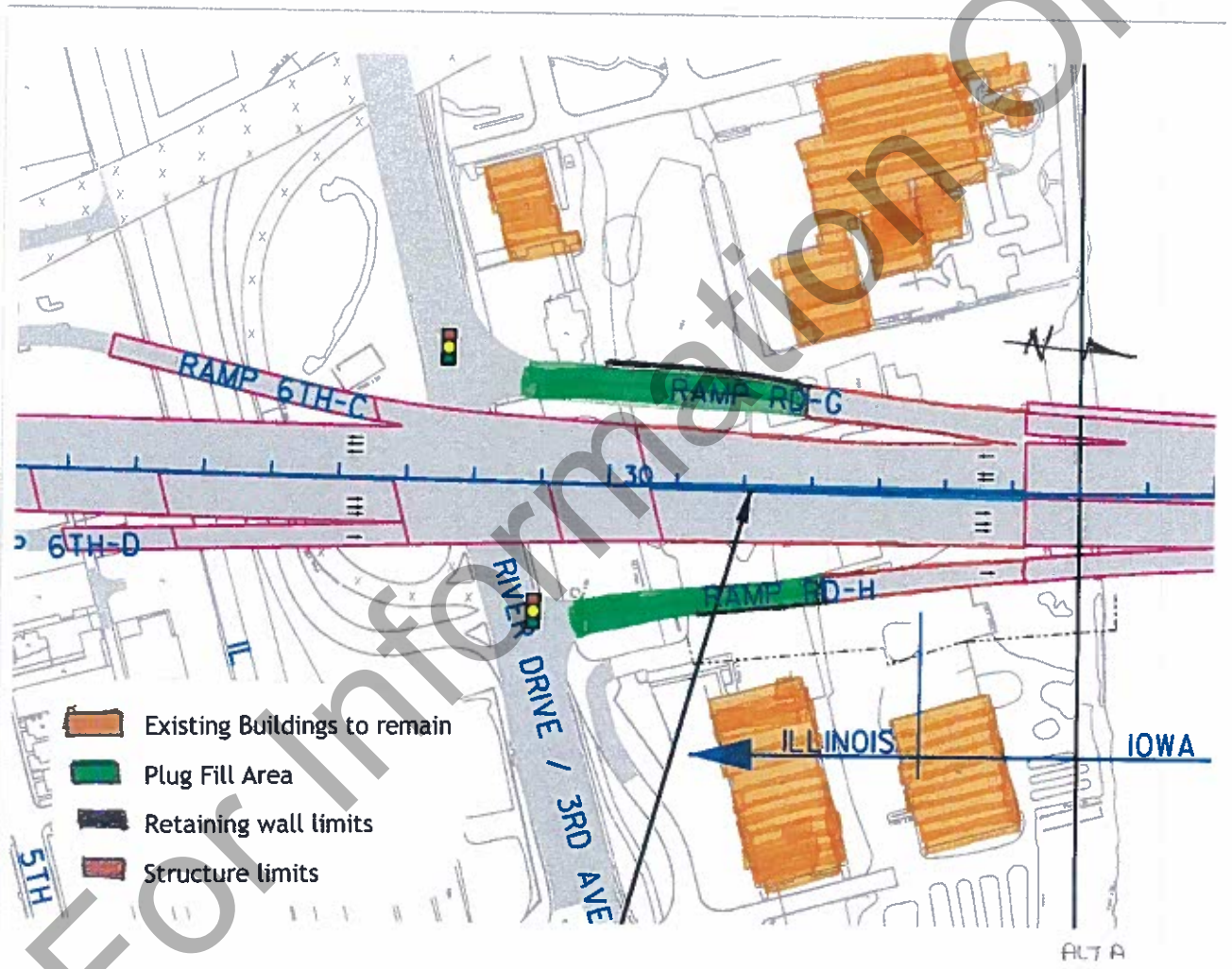


15 to 20 ft deep excavation to rock (100% Special Waste)

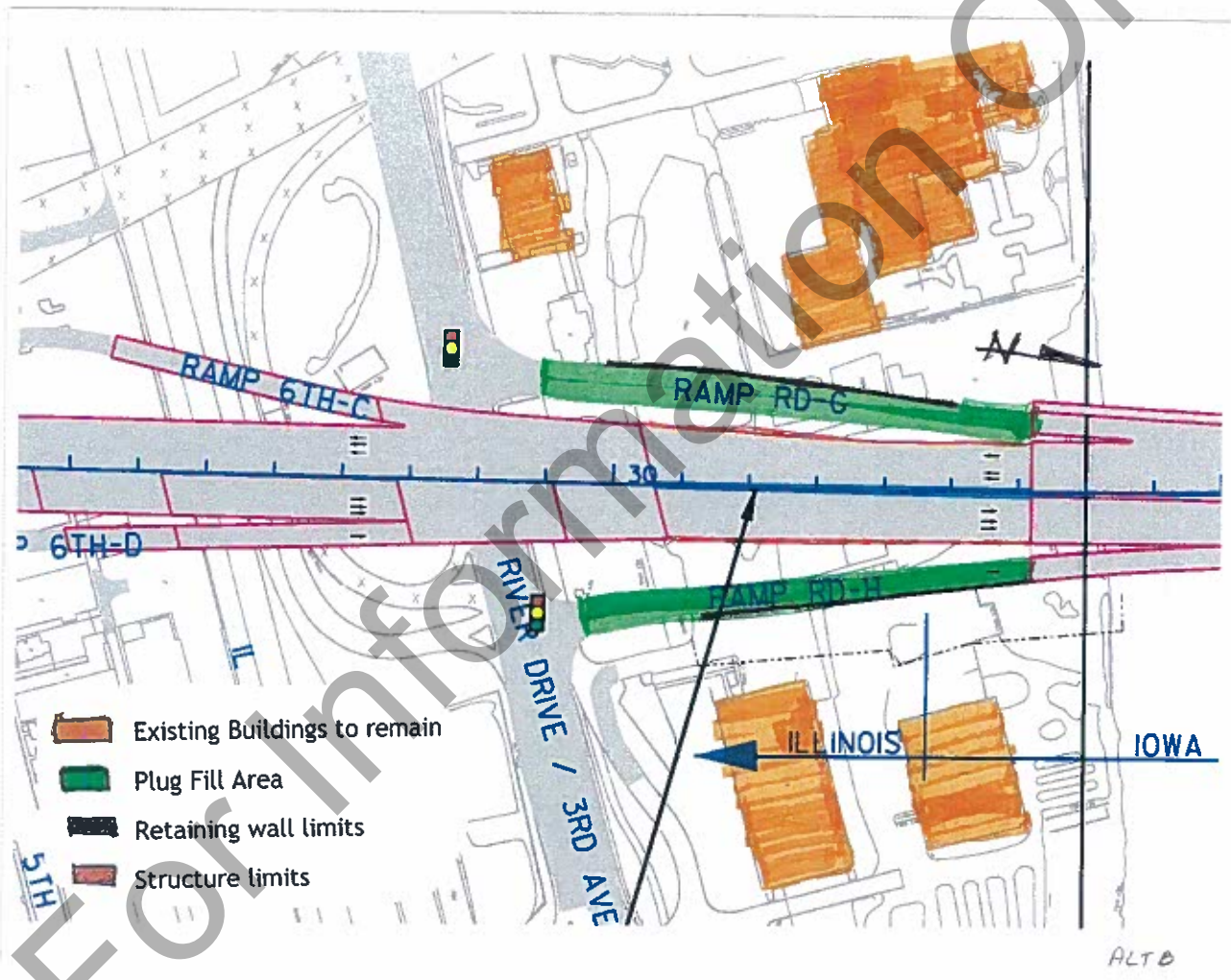
ACGI (10% Special Waste)

Existing Buildings to Remain

Alternative A: Structure (mainline and ramp)



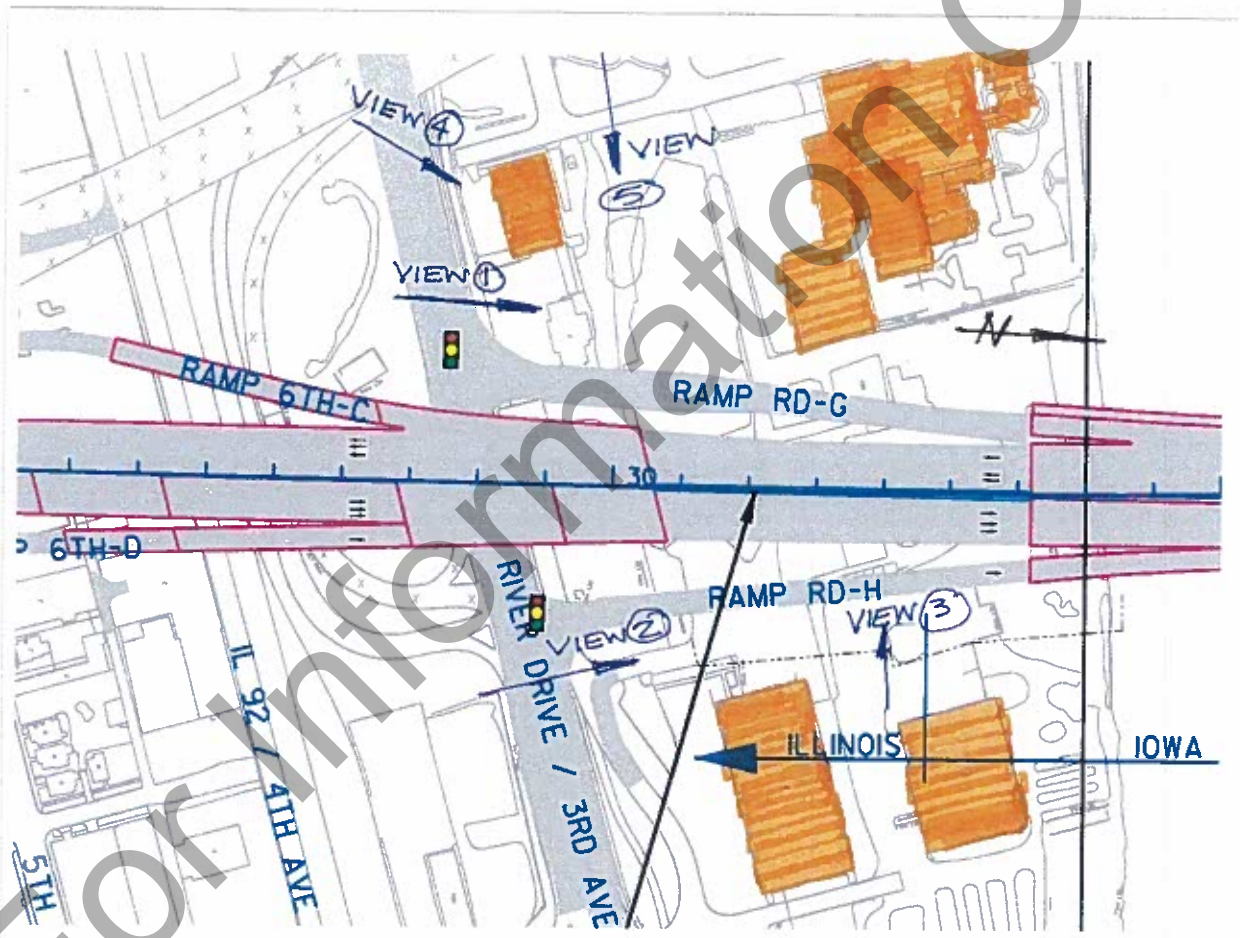
Alternative B: Structure (mainline only)



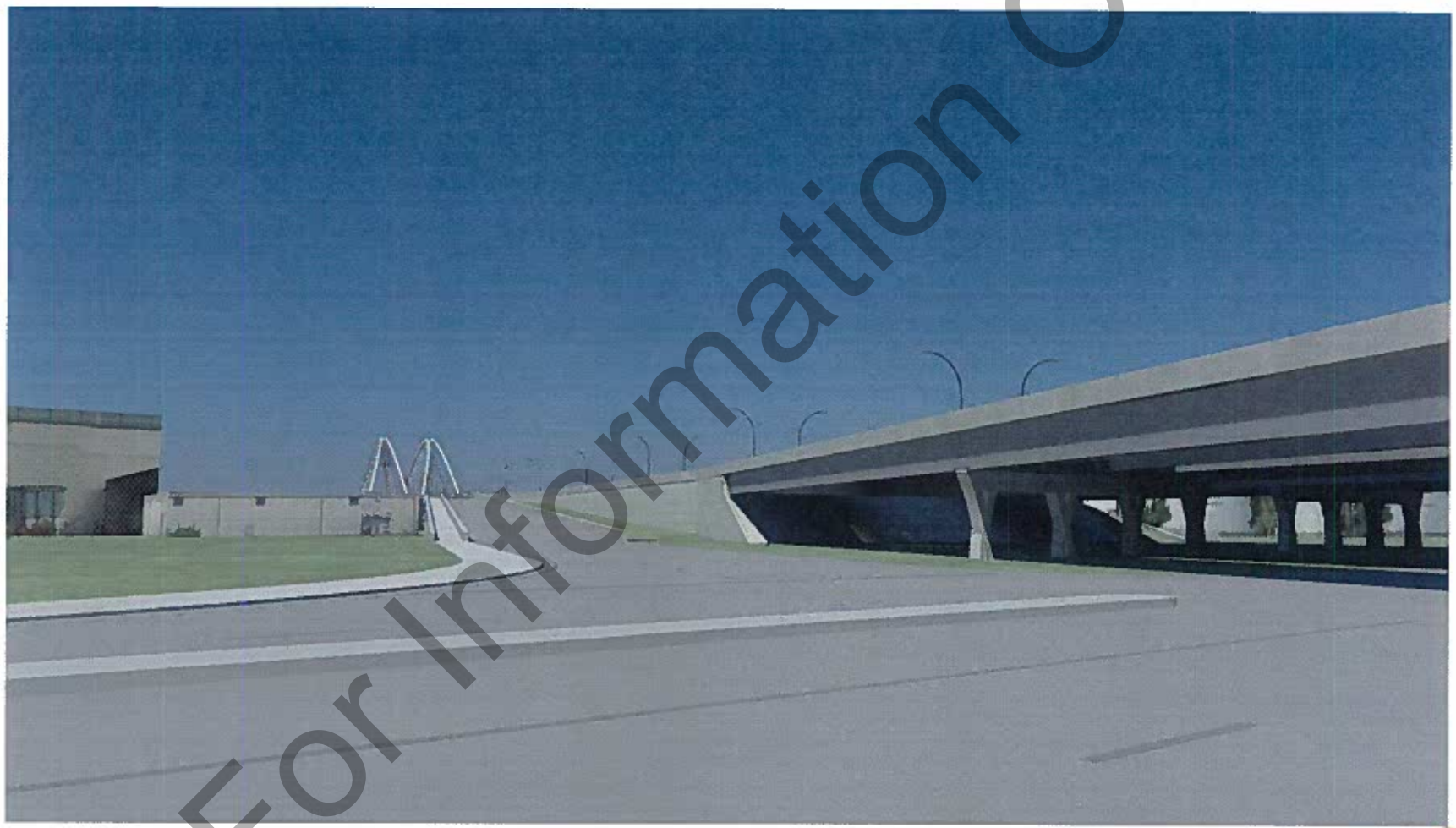
Cost Summary

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

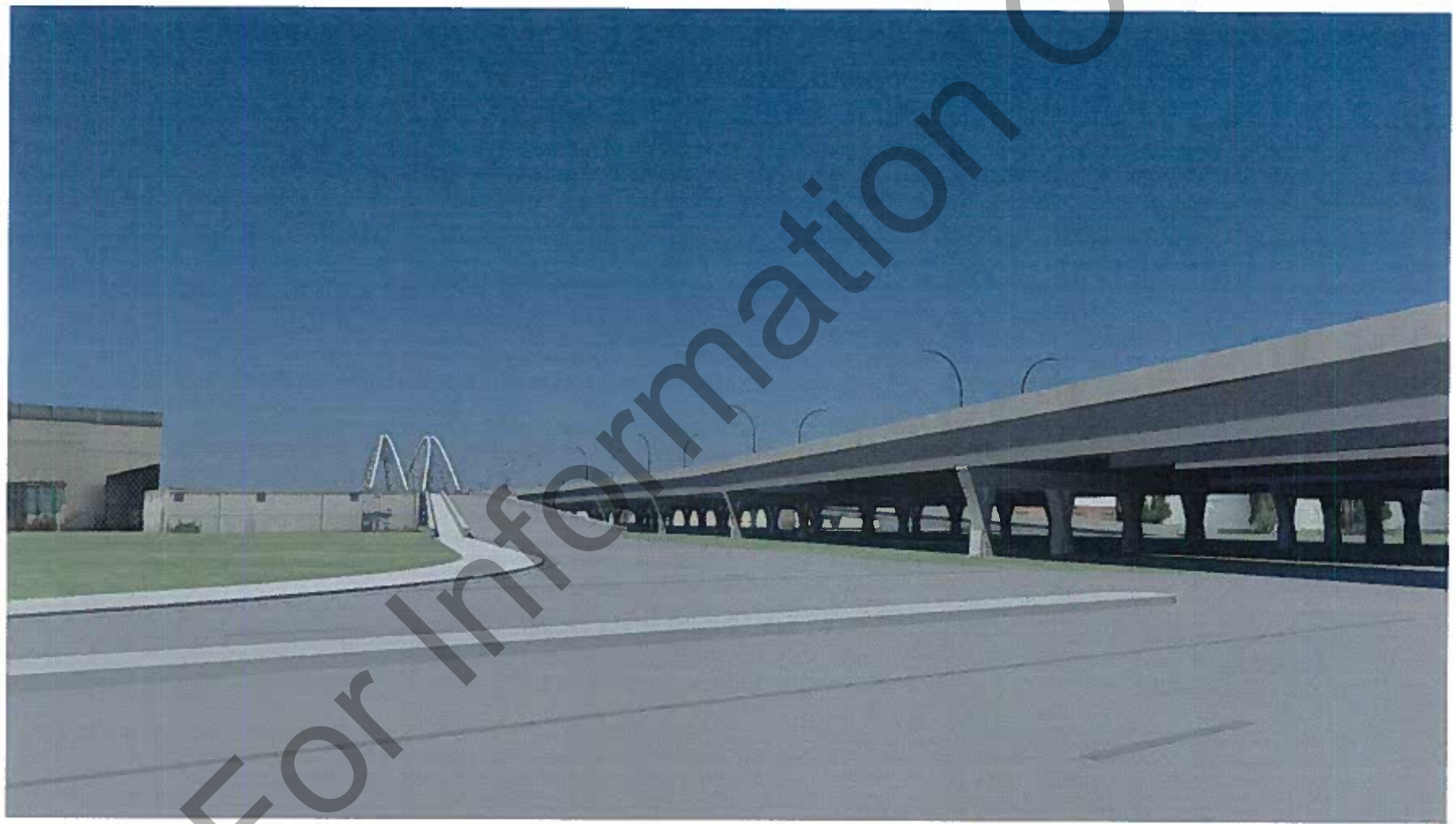
Renderings



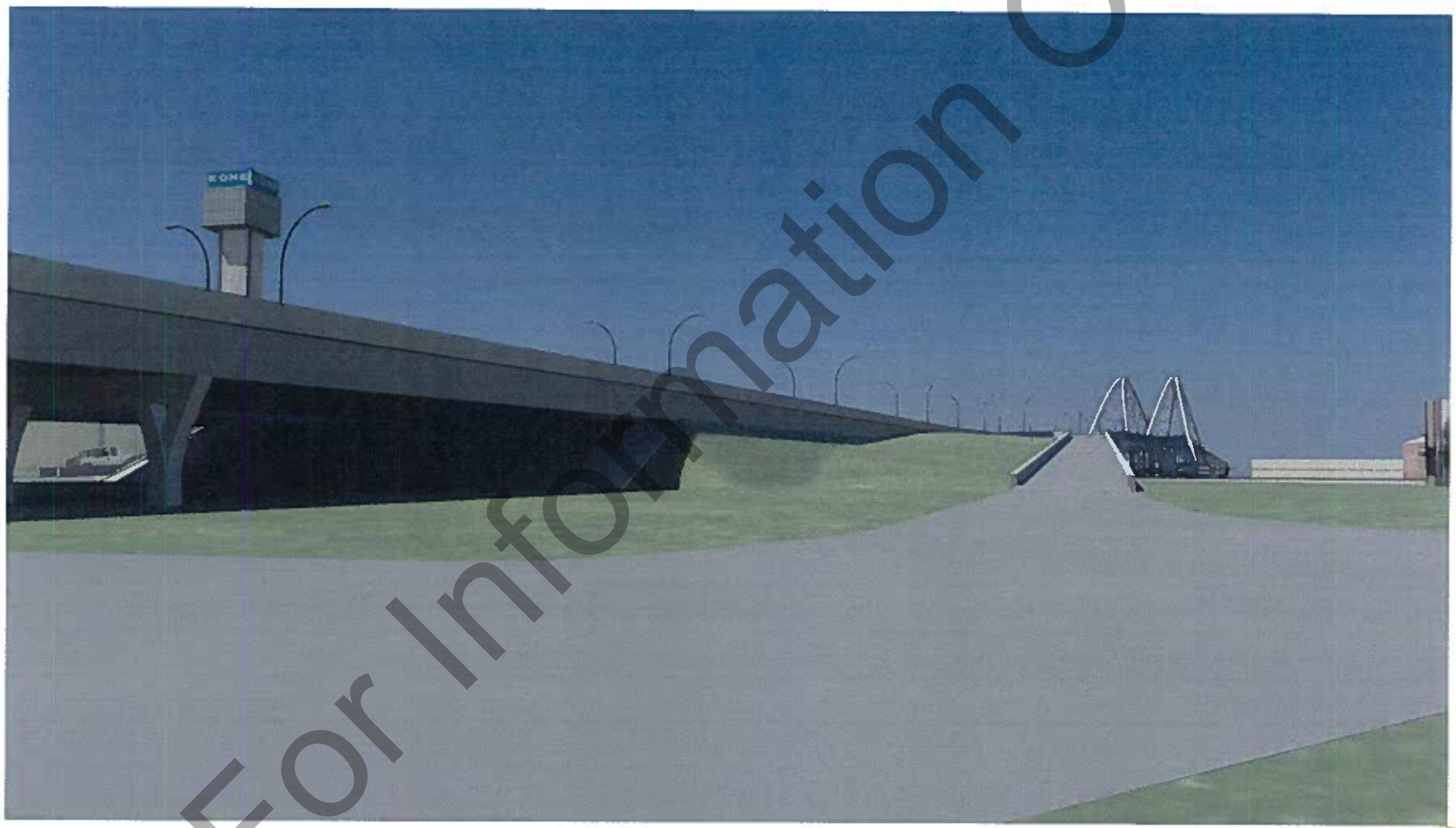
View 1 - Plug Fill
From River Drive: West of Ramp RD-G



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



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

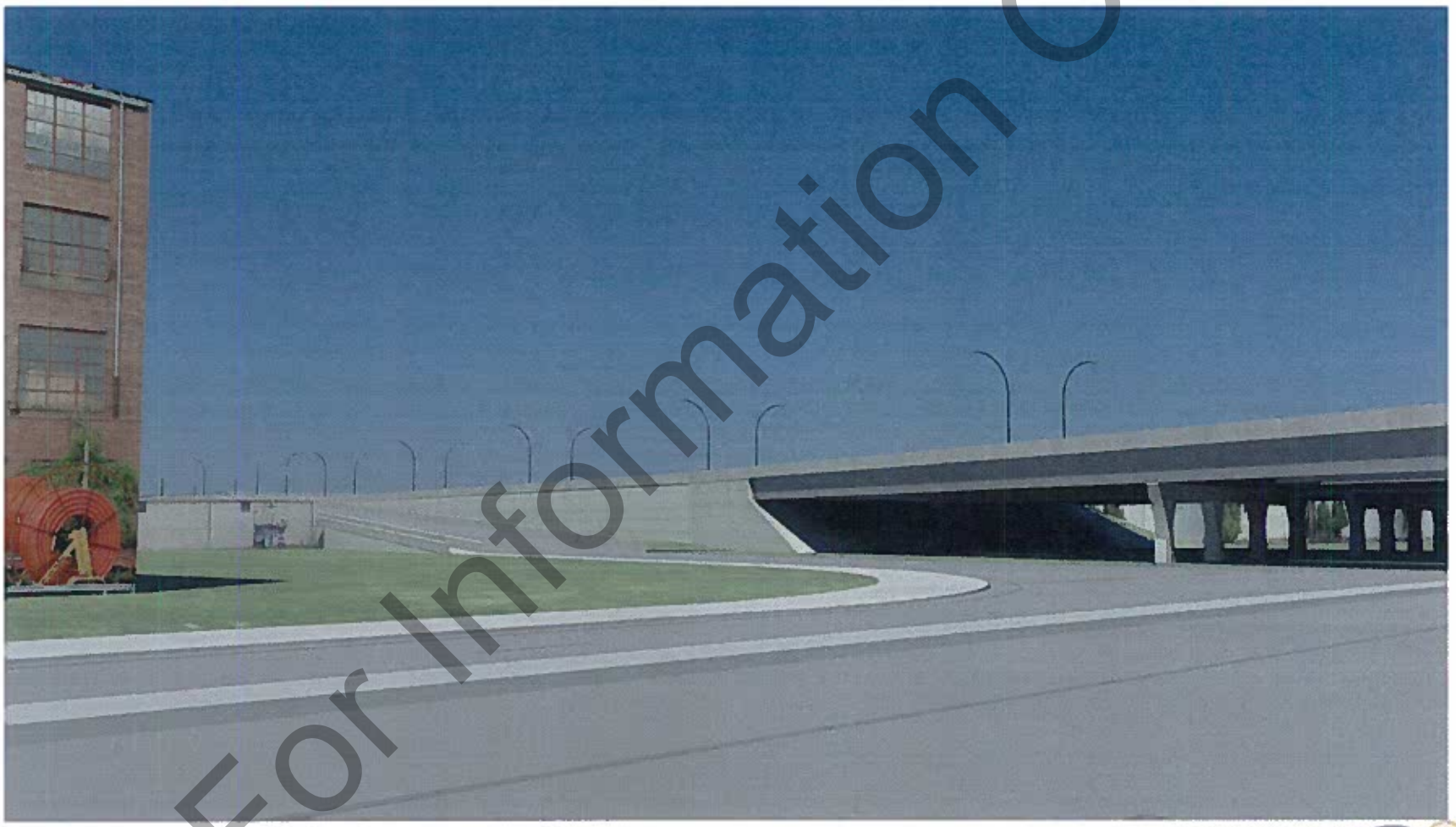


View 2 - Alternative A (Structure)
From River Drive: East of Ramp RD-H

View 3 - Plug Fill (looking west)

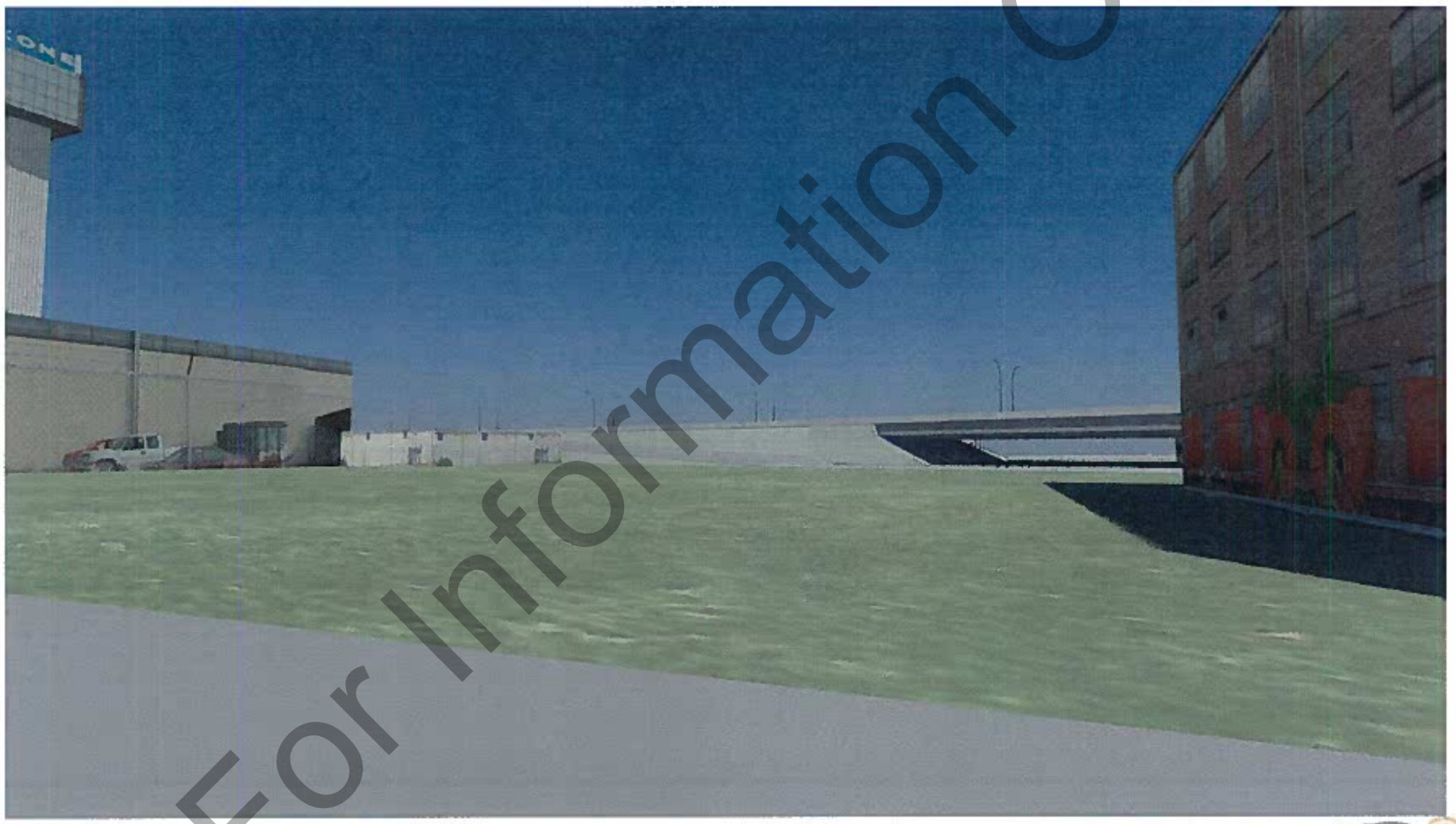
View 3 - Alternative A (Structure) (looking west)

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



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

View 5 - Plug Fill (looking East)



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

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)

Plug Fill - Limitations

- Less open vista
- Limits east-west access

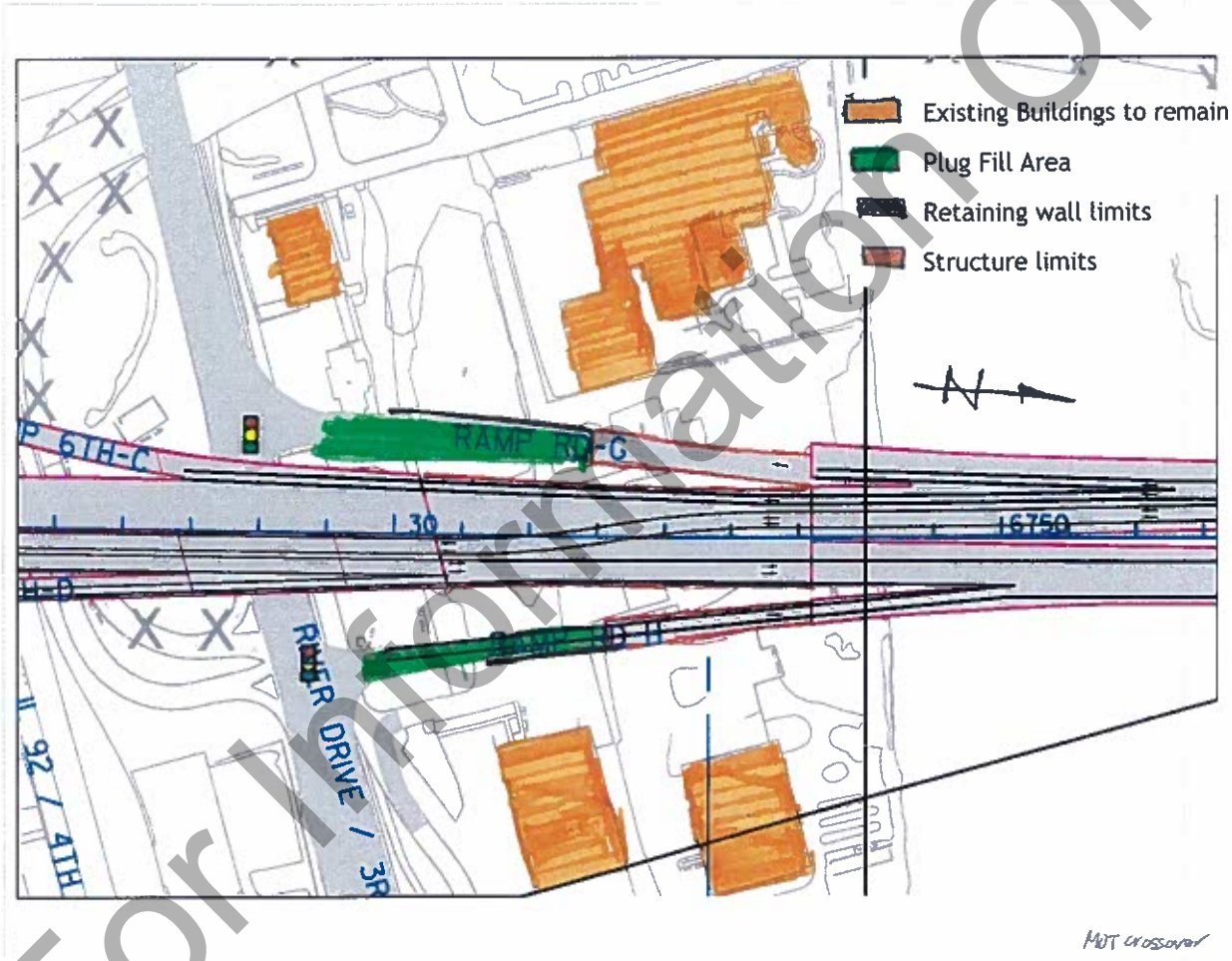
Structure - Advantages

- More open vista
- Accommodates east-west access

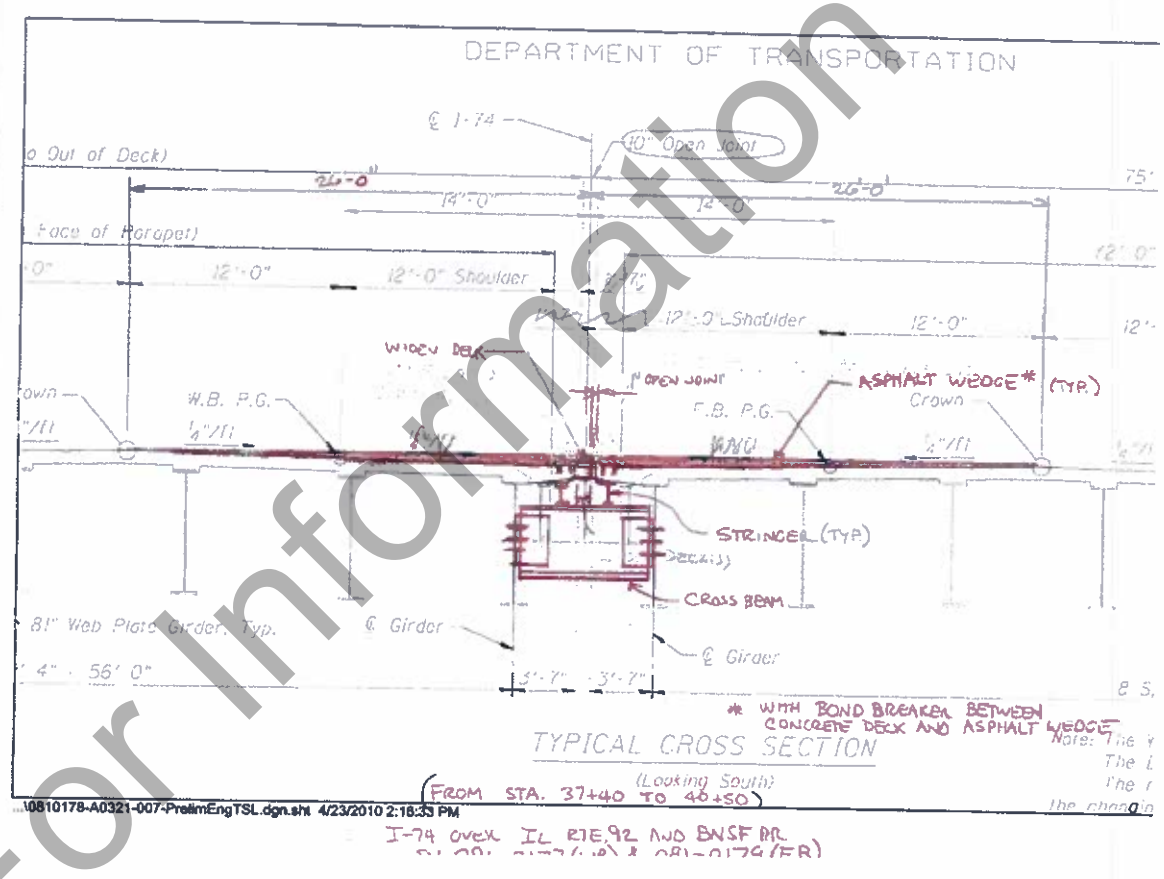
Structure - Limitations

- 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

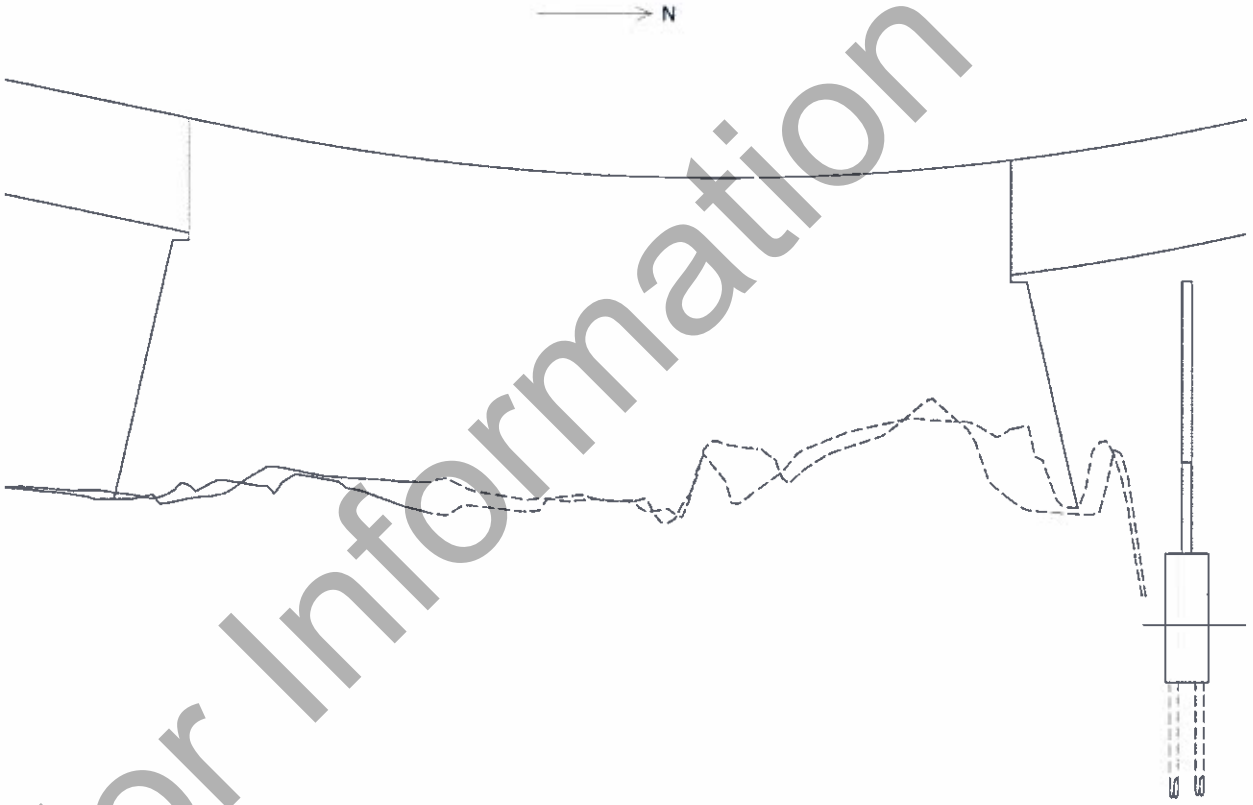
MOT: Crossover (Year 5 Stage 2)



MOT Crossover (Year 5 Stage 2)



Sag on Structure



Recommendations

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