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Structure Geotechnical Report

F.A.I. Route 74
Section 81-1HVB
Rock Island County
Job No. P-92-032-01
Contract No. 64C08
PTB No. N/A
Retaining Wall IL-RW3
Structure Number 081-6012

March 2011

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

Structure Designer:
Modjeski and Masters, Inc.

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

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1. Project Description

This report provides geotechnical data and recommendations for the proposed Retaining Wall IL-RW03, 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 6th-D roadway.

Nearby project features that have an impact on the design or construction of the proposed retaining wall include the Ramp 6th-D Bridge (S.N. 081-0187), the Ramp 6th-D roadway, and the 21st Street roadway. Geotechnical recommendations for the bridge are presented in a structure geotechnical report prepared by Jacobs Civil Inc. in June 2008. Geotechnical recommendations for the ramp and street will be contained in soil survey reports currently being prepared by Hanson Professional Services Inc. (Hanson).

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

2. Location

The proposed Retaining Wall IL-RW03 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 6th-D. The wall separates the ramp on the high side from 21st Street on the low side. The wall begins at Ramp 6th-D Sta. 422+75.00 and traverses northward to Sta. 426+00.75.

3. Proposed Structure

The proposed structure will be a mechanically stabilized earth (MSE) wall, as determined by a previous value engineering study. A wall using precast panels with the minimum reinforced soil mass width is preferred for cost and construction schedule. The wall will have a height, measured from the theoretical top of leveling pad to the finished grade line, between 3.5 and 27.8 feet. With this range of heights a typical MSE wall section would have an equivalent uniform bearing pressure varying from 500 to 5,200 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. This wall has an unusual configuration at the Ramp 6th-D Bridge. The wall continues in a straight line past the bridge abutment, terminating at the toe of the abutment spill slope. Piles for the bridge pass through the reinforced soil mass.

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 cuts through two city blocks that are currently occupied by several one-story and two-story homes, a parking lot, two alleys, and 5th Avenue. The existing parking lot and 5th

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Avenue are hot mix asphalt pavement with thickness ranging from 2 to 6 inches. The topography slopes gradually down toward the north (riverward direction) between 6th Avenue and 4th Avenue, with a change of elevation from 580 feet to 574 feet.

Six borings were drilled in the first two phases and three borings were drilled in the third phase. Locations of the borings were selected to avoid the numerous obstructions currently occupying the site. The maximum spacing between borings was approximately 100 feet. 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 25 ft. long core sample of the bedrock was collected in Boring PRMPD-05 and a 10 ft. long core sample was collected in Boring ILR0302. The boring depths ranged from 13.0 ft. to 42.5 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. The testing generally was limited to index testing of representative samples. One unconfined compression test of a rock core sample was 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. Six unconfined compression tests, one consolidated undrained triaxial test envelope, one unconsolidated undrained triaxial test envelope, and one consolidation test were performed on Shelby tube samples. Index testing was completed on two samples to help correlate the strength and consolidation testing data with the other borings drilled for the project.

The strength and consolidation properties of the soils were rather unusual. Although the cohesive soils had low shear strengths, they were highly overconsolidated. Samples collected for other portions of the I-74 project have had similar test results.

The locations of the index tests, triaxial tests, and consolidation tests are indicated on the subsurface data profile. All laboratory test data is 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 upper fill materials of varying depths overlying natural soil and bedrock strata. The fill consists of mostly cohesive and sometimes granular materials with variable thicknesses ranging from less than 1.0 ft to as much as 9.0 ft. The fill materials are underlain by natural cohesive soils that extend to depths of 8.5 to 13.5 ft below ground surface. Underlying the cohesive soils is a somewhat continuous stratum of water-bearing granular soils that extends to depths of 13 to 18 ft below the ground surface. Shale, siltstone, sandstone and limestone bedrock was encountered beginning at depths of 13.0 to 18.0 ft. below the ground surface. The bedrock stratigraphy is very erratic, with no apparent sequencing pattern.

The upper fill materials and cohesive natural soils exhibit decreasing unconfined compressive strengths with depth ranging from a high of 1.5 tsf in the upper profile to less than 0.5 tsf at the base of the natural cohesive

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stratum. The N-values exhibit a similar trend ranging from a high of 10 to less than 5 in the lower portions of the natural cohesive stratum. Some penetration values are recorded as the weight of hammer (WOH), indicating very soft materials. The N-values in the underlying natural granular stratum are higher, generally exceeding 8 and much higher. Penetration refusal was encountered in the bedrock strata and rock coring techniques were required to obtain samples.

Groundwater was encountered in most of the borings. The groundwater elevation measured at first encounter in the borings varied between Elevation 561.4 and Elevation 566.7 as shown in Table 6.1. Stabilized readings were not taken in any of the borings. The depths at which groundwater was encountered correlate fairly well with the depths at which the granular stratum is present For comparison, the water level in the Mississippi River, approximately 1,500 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
ILR0301	564.8	-	-
ILR0302	566.7	-	-
ILR0303	565.8	-	-
PRMPD02	-	-	-
PRMPD03	561.4	-	-
PRMPD-05	564.1	-	-
PRMP6thD-03	562.4	-	-
RW03-1	-	-	-
RW03-2	566.7	-	-

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

7. Design Recommendations

Considering the proposed maximum height of the wall and the existing ground configuration, the most feasible wall type will be 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 native cohesive soils found at this site are relatively weak and will not support the weight of a conventional MSE wall. This is not an insurmountable problem. Typically, the alternative solutions are to either reduce the wall's bearing pressure or to increase the foundation soils' strength.

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 for Road and Bridge Construction (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 native soils at the base of the wall have shear strengths of 650 to 1,500 psf under undrained loading or 0.60 times the effective vertical stress under drained loading. The native soils have an allowable bearing capacity between 900 and 1,850 psf when all soil layers within the zone of influence are considered. If a 0.70 length to

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height ratio is assumed for the reinforced soil mass, the equivalent uniform bearing pressure of the wall will vary between 500 and 5,200 psf. The equivalent uniform bearing pressure can be reduced to 4,500 psf, if a 0.90 length to height ration is specified. A shear strength of 100 to 1,550 psf would be needed to satisfy a 1.50 factor of safety for sliding. The proposed wall would not meet the Standard Specifications for Highway Bridges (AASHTO) requirements for bearing pressure and sliding stability.

Most of the native soils exhibit low compressibility. The estimated total settlement under the weight of the proposed wall ranges from 0.3 to 1 inch. Miscellaneous fill with high relative moisture content was encountered in Boring PRMP6THD-03. This material has the potential for much higher settlement, perhaps as much as 4.5 inches based on assumed parameters. The settlement is expected to occur quickly, with 90 percent complete within three weeks of completion. The magnitude of settlement is not of concern; however, differential settlement has the potential to cause distress to the concrete facing panels.

A slope stability analysis of the wall's highest point was completed to determine the overall stability of the wall. Results of that analysis are included in the Appendix. The 0.88 factor of safety is much lower than the minimum 1.50 value required by AASHTO.

Several potential treatment options were considered. Widening the reinforced soil mass, using lightweight fill, and raising the wall in stages are not feasible for this wall. Removal and replacement of the foundation soils and ground improvement with aggregate columns are viable solutions. Removal and replacement would require excavation below the water table, underwater placement of granular backfill, and shoring along the northeast corner of the excavation. These factors increase the complexity and cost. Aggregate column ground improvement is the recommended treatment option. The lump sum cost of the treatment is expected to be $100,000 to $200,000.

Our analyses indicate that stone column ground improvement of an area bounded by a line 4 ft. beyond the perimeter of the reinforced soil mass would satisfy the AASHTO requirements for bearing capacity, sliding resistance, and overall stability. The stone columns would also reduce the total settlement and shorten the settlement period. The stone columns would extend from the base of the reinforced soil mass to bedrock or dense granular material at approximately Elevation 561. An area replacement ratio between 21 and 31 percent would be required. Our analyses used a 2.0 factor of safety against bearing capacity failure, because the use of a 2.5 factor of safety requires very high replacement ratios. It should be noted that a factor of safety of 2.0 is commonly used with stone columns supporting other types of structures and is explicitly allowed by AASHTO when "justified by a geotechnical analysis".

Although ground improvement with tamper compacted aggregate columns was not expressly investigated, it is expected that the wall could be successfully constructed using that technology. Stone column (vibrator compacted aggregate columns) and tamper compacted aggregate columns may be collectively referred to as aggregate column ground improvement. With either type of construction, the results are highly dependent upon the equipment and techniques used to install the aggregate columns. The contractors that perform this type of work routinely design the improvement to specific geotechnical performance requirements.

We recommend that the approximate horizontal limits of the aggregate column ground improvement be defined as an area bounded by a line 4 ft. beyond the perimeter of the reinforced soil mass. The contractor should be required to satisfy the following performance requirements:

1. Minimum factor of safety of 1.5 against global slope stability failure.
2. Minimum factor of safety of 2.0 against equivalent uniform service bearing pressure failure if a load test is performed.

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3. Minimum factor of safety of 2.5 against equivalent uniform service bearing pressure failure if a load test is not performed.
4. Total settlement measured at the base of the wall not to exceed 4.0 inches.
5. Total settlement measured on the pavement not to exceed 1.0 inch.
6. Differential settlement measured along the base of the wall not to exceed 1/100.

With the ground improvement, 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). Any removals or other excavation below the reinforced soil mass should be backfilled with either the select backfill used in the reinforced soil mass or the granular material used as a drainage layer or working platform for the aggregate column ground improvement design. Other material outside the limits of the reinforced soil mass may be embankment fill in accordance with the IDOT Standard Specifications. The external stability design should be completed using a unit weight of 125 pcf and an active earth pressure coefficient of 0.36. The calculated bearing pressures should not be compared to allowable bearing pressures of the native soils. Instead, the calculated bearing pressures will be given as a performance requirement for the aggregate column ground improvement. We recommend limiting the equivalent uniform bearing pressure to approximately 4,500 psf in order to keep the area replacement ratio reasonable. To accomplish this, a 0.90 length to height ratio should be specified from Sta. 425+00.00 to 425+64.75. The minimum ratio specified by AASHTO (0.70) will be acceptable for the remainder of the wall.

8. Construction Considerations

The construction of MSE walls and aggregate column ground improvement are not covered by the IDOT Standard Specifications. Guide Bridge Special Provisions No. 38, Mechanically Stabilized Earth Retaining Walls (Revised: January 18, 2011), and No. 71, Aggregate Column Ground Improvement (Revised: October 4, 2010), should be included in the construction documents. These special provisions require that the contractor take responsibility for the final design of much of the structure.

The general contractor will hire a specialty contractor to design and install the aggregate column ground improvement. He will also hire an MSE wall supplier to complete the MSE wall design and furnish the materials. The interdependence of the ground improvement and MSE wall designs must be considered when developing the plans. The MSE wall supplier will typically design a wall with a horizontal base with vertical steps at convenient locations. This results in a wall that is slightly taller and wider than the theoretical size shown on the construction plans. The wall supplier may also use different assumptions for unit weight and lateral earth pressure on the reinforced soil mass. Because of these factors, the target bearing pressure for the ground improvement contractor should be 5% to 10% higher than the theoretical value calculated during preliminary design.

The ground improvement contractor will need to assign strength and consolidation properties to the native soils in order to design the aggregate columns. All of the soils laboratory data in the appendix to this report should be included in the contract documents. Usually, this is accomplished by adding a "Geotechnical Investigation Laboratory Data" section to the special provisions.

Obstructions, such as old foundations, pavements, utilities, etc., that are within the area to be treated with aggregate column ground improvement should be removed. Although it is possible to predrill the columns through large obstructions or space the columns around smaller obstructions, this increases the cost and reduces the effectiveness of the ground improvement.

The piles for the Ramp 6th-D Bridge (S.N. 081-0187), which are located within the reinforced soil mass for this wall, will interfere with the placement and compaction of the select backfill. The piles must either be driven prior to placing the select backfill or driven through sleeves after placing the select backfill.

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Appendix

Boring Location Plan
Subsurface Data Profile
Boring Logs
Soils Laboratory Test Results
Summary of Slope Stability Analysis

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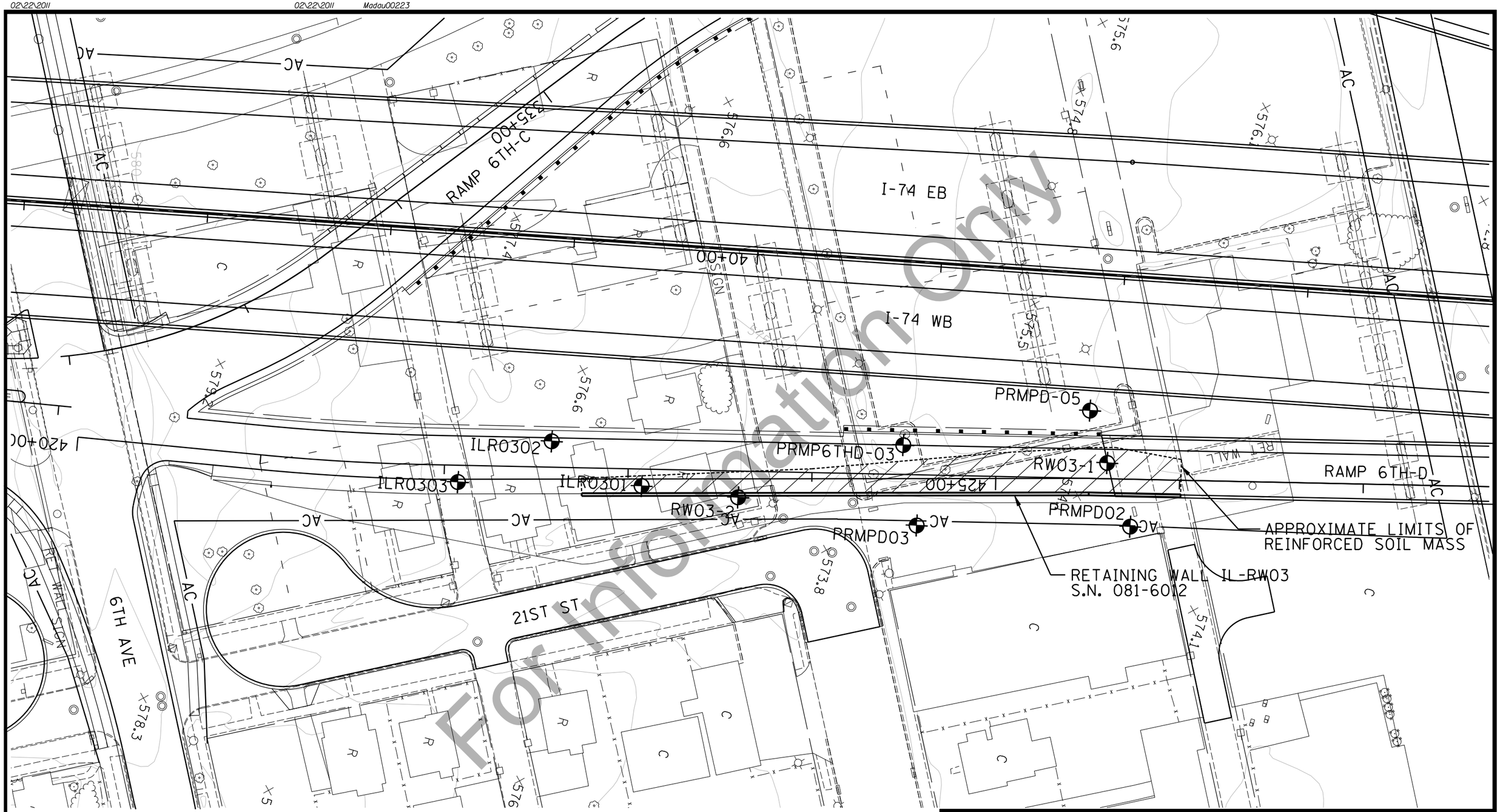

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LEGEND

RW600 BORING LOCATION

0 50 100
SCALE IN FEET

N

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BORING LOCATION PLAN

RAMP 6TH-D RETAINING WALL IL-RW03
S.N. 081-6012
ROCK ISLAND COUNTY, ILLINOIS

08H0120E 2/14/11

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ILR0303
Sta. 422+08, 9' RT

	N	Qu	w%	
576.78				Concrete
574.78	2	0.6		Silty Sand (SM) - grayish brown, slightly moist, very loose, fine to coarse grained, trace fines. Rimac: Pu = 30 lbs Sample 1: grain size analysis performed
572.78	2	1.0P		Lean Clay (CL) - brown to dark brown, moist, very loose Sample 2: Atterberg limit (LL=36, PI=21) test performed Rimac: Pu = 48 lbs
	2	0.9		
	5			Sample 3: Atterberg limit (LL=45, PI=24) test performed
566.78				
565.78 DD	23			Silty Sand (SM) - dark gray, moist to wet, medium dense, trace gravel
	50/4"			
563.78				Bottom of hole = 13.0 feet

ILR0302
Sta. 422+58, 14' LT

	N	Qu	w%	
576.65				
575.65				Topsoil - dark brown
	8	4.5P		Silt (ML) - Dark brown to yellow orange, dry, loose, little medium to fine sand
	10	4.5P		trace coarse sand
570.65				
	7	1.5P		Lean Clay (ML-CL) - Little gravel, medium brown with yellowish orange streaks, dry to moist, very loose to loose
DD 566.65	4	1.5P		Sample 4 (8'-10'): Atterberg limit test performed (LL=35, PI=20)
565.65				Very Silty Fine to Coarse Sand (SM) - Gray with mingled brown, little gravel, wet, possible gumbo, tried to obtain ST from 11' to 13' but coarse grained soil at 12' prevented from push a full sample
562.65	18			Shelby tube recovery collected in bag sample, coarse gravels and fine cobbles from 12' to 13' (heavy grinding) Sample 5 (13'-15'): grain size analysis performed
560.45	50/4" 50/5"	0.8		Clayey Fine to Coarse Sand (SC) - little gravel, greenish gray with gray streaks, dry, trace fine sands, medium dense, possible weathered rock Sample 6 (16'-18'): grain size analysis and Atterberg limit (LL=30, PI=19) tests performed
555.75				Weathered Sandstone - Top 2" medium to fine gravel sized very angular light gray rock fragments, possible lightly weathered rock with silt and clay, wet, some fine to coarse sands; remainder: light gray with greenish gray streaks, dry, hard, impermeable, silt with fine sands, very strong cementation, possible completely weathered sandstone
	Rec. = 85% RQD = 50%			
				Limestone -
	Rec. = 82% RQD = 43%			
				MISSING ROCK CORE
545.75				Bottom of hole = 39.0 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
DD 558.10 ▽	Water Surface Elevation Encountered in Boring DD = during drilling 24h = 24 hours after completion

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SUBSURFACE DATA PROFILE
STRUCTURE NO. 081-6012

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JOB NO.	SHEET NO. 1	F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
08H0120E		74	81-1HVB	ROCK ISLAND	_	
DATE 2/14/11	4 SHEETS			CONTRACT NO. 64C08		
		FED. ROAD DIST. NO. _	ILLINOIS	FED. AID PROJECT		

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ILR0301
Sta. 423+08, 9' RT

	N	Qu	w%	
575.78				Fill: Brick And Silty Sand
	6			
	6			
569.78				
	4			Lean Clay (CL) - yellowish brown, moist to 11.0', wet deeper, loose, moderate plasticity, trace sand
DD	6			Sample 4: Atterberg limit test performed (LL=31, PI=11)
564.78 ▽				
563.78				Fine to Coarse Silty Sand (SM) - yellowish brown, little gravel, loose
	8			Sample 6 (12'-13.5'): grain size analysis performed
561.78	50/2"			Fine to Coarse Sand (SP) - light brown, wet, dense to very dense, trace silt
559.78				Bottom of hole = 16.0 feet

RW03-2
Sta. 423+60, 14' RT

	N	Qu	w%		
575.20					
574.95					TOPSOIL
	5		26		Very dark brown, moist, soft to medium stiff, silty, lean CLAY
571.70					
	5	1.50P	21		Dark gray, moist, soft to medium stiff, silty, lean CLAY with trace very-fine grained SAND
569.70		.89S	22		
			23	Q	Gray, wet, stiff, silty CLAY
DD		.90B	24		
566.70 ▽			24	R	
			25	C	
			26		(LL=26, PI=9)
563.70	18		9		Brown, wet, dense, silty, fine-to medium-grained SAND and gravel with limestone fragments
	41		13		
	47				
557.20					
555.70	50/5"	2.23S	17		Very dark gray, WEATHERED SHALE
					Bottom of hole = 19.5 feet

PRMP6THD-03
Sta. 424+49, 16' LT

	N	Qu	w%	
576.40				
	8	0.65B	39	FILL - Very dark brown, moist to wet, medium stiff to stiff, silty, lean CLAY
572.90				
	6		19	FILL - Brown, iron staining visible, moist, medium stiff, sandy, clayey SILT with trace gravel, and small metal scraps, debris
567.40	6		50	
				Brown, moist, medium stiff, silty CLAY
DD				
562.90 ▽				
562.40	23			Brown, wet, GRAVEL, limestone fragments
559.40				
558.30	50/1"			Gray, WEATHERED LIMESTONE, clayey shale filled voids
				Bottom of hole = 18.1 feet

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

SUBSURFACE DATA PROFILE
STRUCTURE NO. 081-6012

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JOB NO.	SHEET NO. 2	F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
08H0120E		74	81-1HVB	ROCK ISLAND	_	
DATE 2/14/11	4 SHEETS			CONTRACT NO. 64C08		
		FED. ROAD DIST. NO. _	ILLINOIS	FED. AID PROJECT		

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PRMPD03
Sta. 424+58, 28' RT

	N	Qu	w%	
573.45				
	10	1.5P		Fill Clay (CL) - trace gravel, sand, and brick, dark brown, dry to moist, homogeneous. 1' of concrete, pavement, and gravel on top of sediment.
	7	1.6P		Clay (CL) - trace to little silt, trace sand, dark brown, dry to moist, stiff
	6	1.0P		
566.45				Silty Clay (CL, CL-ML) gray brown, mottled orange brown and dark brown, dry to moist, soft to firm
564.45				
DD	5	0.6P		Sandy Clay to Sand (SC) - Sandy Clay to Sand, gray, moist to wet
561.45 ▽	5	0.4P		
560.45	23			
	46			Siltstone - Siltstone, little sand, gray, moist, homogeneous.
554.45				
	50/4"			Shale - Shale, gray, moist, homogeneous.
	50/0"			No Sample.
544.95				Auger refusal at 28.5'; end of borehole.
				Bottom of hole = 28.5 feet

PRMPD-05
Sta. 425+51, 37' LT

	N	Qu	w%	
575.10				
574.10				PAVEMENT - asphalt and base course
	11			SILT - black, with rubble (FILL)
571.60				
	3	0.5B	24.9	CLAY - medium gray to orange brown, slightly to medium plastic, medium stiff, moist
	3	0.7B	38.9	
566.60				[Attempted Shelby tube at 8.5'-10.5'; no recovery]
DD				SAND - red brown, fine grained, loose, wet
564.10 ▽	2			
				[Attempted Shelby tube at 11'-13'; no recovery; followed up with SPT]
561.10	16	1.4B	23.6	SHALE - green gray, clayey, severely weathered
558.40	50/1"	1.4B		
	Rec. = 82% ROD = 23%			SANDSTONE - medium gray, very fine grained, silt in matrix, abundant shale partings, conglomeratic at 17.5'-18.1' (TRANSITIONAL)
557.10				
	Rec. = 100% ROD = 95%			LIMESTONE - gray, fine grained, with occasional to some thin green shale partings and seams, locally stylolitic, hard, thin to medium bedded, predominantly horizontal to very low angle fractures, planar to slightly irregular, smooth to slightly rough, fresh
	Rec. = 97% ROD = 87%			
	Rec. = 100% ROD = 100%			-slightly rough fractures across stylolites at 28.3'-30.6' -thick bedded, occasional stylolites at 30.6'-35.6' -minor pitting with some "birdseye" texture from 32.1' to 35.6'
	Rec. = 100% ROD = 84%			-occasional soft rock-like green shale partings and clasts in limestone with fractures along shale, occasional pitting, at 38.9'-40.3' -green rock-like shale seam with 85° fracture at 40.3'-40.8' -medium gray, fine to medium grained, occasional shale partings
532.50				
				Bottom of hole = 42.6 feet

RW03-1
Sta. 425+60, 9' LT

	N	Qu	w%	
574.20				
573.70				ASPHALT
	12	7		FILL - Dark brown, SILT with fine-grained sand and gravel
570.70				
	6	3.50P	19	FILL - Brown and gray, moist, loose, very-fine to medium-grained SAND and SILT with gravel
		0.32S	19	
		0.60P	23	FILL - Gray, moist, loose, silty, medium-grained SAND with clay, wood debris
567.20		1.00P	22	
566.20		0.37S	27	Gray with brown mottles, silty, lean CLAY with fine-grained sand (LL=36, PI=17)
		0.29S	31	
		0.55S	33	
563.20				
	11		62	Gray, wet, very soft, clayey SILT
561.20	50/0"			INTACT ROCK
560.70				Bottom of hole = 13.5 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
DD ▽	Water Surface Elevation Encountered in Boring DD = during drilling 24h = 24 hours after completion
558.10	

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SUBSURFACE DATA PROFILE
STRUCTURE NO. 081-6012

PROFESSIONAL DESIGN FIRM LICENSE #184-001084

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JOB NO.	SHEET NO. 3	F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
08H0120E		74	81-1HVB	ROCK ISLAND	_	
DATE 2/14/11	4 SHEETS			CONTRACT NO. 64C08		
		FED. ROAD DIST. NO. _	ILLINOIS	FED. AID PROJECT		

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PRMPD02
Sta. 425+74, 26' RT

	N	Qu	w%	
574.20				Clay (CL) - Clay, few gravel, trace sand, dark brown, dry to moist, homogeneous.
	8	1.3P		Clay, few gravel and sand, dark brown, dry to moist, homogeneous.
	3	0.9P		Clay, trace sand and gravel, dark brown, dry to moist, homogeneous.
	3	0.6P	13.0	No Sample.
565.20	24			
	1	0.3P	37.0	Silty Clay (CL) - Silty Clay, trace sand and gravel, gray mottled orange brown and dark brown, moist, homogeneous. Shelby tube sample T-1 from 9'-11' from adjacent location having mc: 28%, dry density: 84.5pcf and UC: 920psf
	50/3"	0.8P		
560.70	50/2"			Silty Clay, trace sand and gravel, gray mottled orange brown and dark brown, moist, homogeneous.
	Rec. = 82% ROD = 13%			Limestone - Limestone, gray, fine to coarse grained, moderately weathered, weak rock, laminated to thin beds, vugs present. Auger refusal at 13.5'; begin rock core at 13.5' at 10:27, horizontal and vertical fractures, extremely fractured to slightly fractured, extremely close to close discontinuity, rough to smooth (undulating and planar) joints, tightly healed to sandy particles in joints with no rock wall separation, stylolites present. Coring rate smooth, slow beginning, but overall fast; no rod drops.
	Rec. = 100% ROD = 58%			Limestone, gray, fine to course grained, moderately weathered, strong to very strong rock, laminated to thin beds, vugs present. Horizontal fractures, extremely fractured to slightly fractured, extremely close to close discontinuity, rough to smooth (undulating and planar) joints, tightly healed to slightly altered with sandy particles in joints, stylolites present.
	Rec. = 100% ROD = 100%			Limestone, gray, fine to medium grained, slightly weathered, medium strength, thin to medium beds, vugs present. At 23.5' changed bit to one for limestone coring. Horizontal fractures, sound, moderate to wide discontinuity, rough to smooth (planar) joints, tightly healed to unaltered joints with hard dark mineral on joints walls, stylolites present.
	Rec. = 97% ROD = 97%			Limestone, gray, fine to medium grained, slightly weathered, medium strength, medium beds. Ran out of water; stopped at 18' of rock core. Horizontal fractures, sound, moderatel discontinuity, rough undulating joints, slightly altered joints with sandy particles and <1/4" thick rock wall separation, stylolites present.
542.70				Bottom of hole = 31.5 feet

For Information Only

LEGEND

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

SUBSURFACE DATA PROFILE
STRUCTURE NO. 081-6012

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HANSON
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JOB NO. 08H0120E
DATE 2/14/11

SHEET NO. 4
4 SHEETS

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

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 9/19/07

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

SECTION I-74 Bridge over Mississippi River LOCATION (N=563805.847, E=2459619.415), 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. ILR0301
Station _____
Offset _____
Ground Surface Elev. 575.78 ft

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

Groundwater Elev.:
First Encounter 564.8 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	5			**Fill: Brick And Silty Sand**
	3 3			
	2			
-5	3 3			
569.78				
	2			**Lean Clay (CL)** yellowish brown, moist to 11.0', wet deeper, loose, moderate plasticity, trace sand
	2 2			
	2			Sample 4: Atterberg limit test performed (LL=31, PI=11)
	3 3			
-10				
▼ 563.78				
	3			**Fine to Coarse Silty Sand (SM)** yellowish brown, little gravel, loose Sample 6 (12'13.5'): grain size analysis performed
	4 4			
561.78				
	30			**Fine to Coarse Sand (SP)** light brown, wet, dense to very dense, trace silt
-15	50/2"			
559.78				
				End of Boring
-20				

For Information Only

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

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 9/26/07

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=563752.136, E=2459609.413), 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. ILR0302
Station _____
Offset _____
Ground Surface Elev. 576.65 ft

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

Groundwater Elev.:
First Encounter 566.7 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
575.65				**Topsoil** dark brown
	3			**Silt (ML)**
	3	4.5		Dark brown to yellow orange, dry,
	4	P		loose, little medium to fine sand
	4			
	5			trace coarse sand
	4	4.5		
	5	P		
-5	5			
570.65				
	4			**Lean Clay<B>>** (ML-CL)
	4	1.5		**Little gravel, medium brown with**
	3	P		**yellowish orange streaks, dry to**
	4			**moist, very loose to loose**
	2			**Sample 4 (8'-10'): Atterberg limit**
	1	1.5		**test performed (LL=35, PI=20)**
	2	P		
▼-10	2			
565.65				
				Very Silty Fine to Coarse Sand (SM)
				Gray with mingled brown, little gravel, wet, possible gumbo, tried to obtain ST from 11' to 13' but coarse grained soil at 12' prevented from push a full sample
	5			
562.65	7			Shelby tube recovery collected in bag sample, coarse gravels and fine cobbles from 12' to 13' (heavy grinding)
	4			
-15	14			Sample 5 (13'-15'): grain size analysis performed
560.45				
	36			**Clayey Fine to Coarse Sand (SC)**
	45	0.8		little gravel, greenish gray with gray streaks, dry, trace fine sands, medium dense, possible weathered rock
	50/4			
	50/5			Sample 6 (16'-18'): grain size analysis and Atterberg limit (LL=30, PI=19) tests performed
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
555.75				**Weathered Sandstone** Top 2" medium to fine gravel sized very angular light gray rock fragments, possible lightly weathered rok with silt and clay, wet, some coarse to fine sands remainder: light gray with greenish gray streaks, dry, hard, impermeable, silt with fine sands, very strong cementation, possible completely weathered sandstone *(continued)*
-25				~~Borehole continued with rock coring.~~
-30				
-35				
-40				

For Information Only

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

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 9/19/07

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

SECTION I-74 Bridge over Mississippi River LOCATION (N=563709.105, E=2459644.732), SEC. 32, TWP. 18N, RNG. 1W, 4th PM

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

STRUCT. NO.
Station
BORING NO. ILR0303
Station
Offset
Ground Surface Elev. 576.78 ft

Surface Water Elev. ft
Stream Bed Elev. ft
Groundwater Elev.:
First Encounter 565.8 ft ▼
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
Concrete 574.78				
Silty Sand (SM) grayish brown, slightly moist, very loose, fine to coarse grained, trace fines□Rimac: Pu = 30 lbs Sample 1: grain size analysis performed 572.78	1 1 1 0	0.6		
-5 **Lean Clay (CL)** brown to dark brown, moist, very loose Sample 2: Atterberg limit (LL=36, PI=21) test performed Rimac: Pu = 48 lbs Sample 3: Atterberg limit (LL=45, PI=24) test performed 566.78 -10	0 2 0 1 1 0 2 3	1.0 P 0.9		
Silty Sand (SM) dark gray, moist to wet, medium dense, trace gravel ▼ 563.78	2 11 12 50/5"			
End of Boring -15 -20				

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

BBS, from 137 (Rev. 8-99)

For Information Only

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 11/1/05

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=564067.532, E=2459567.858), 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. PRMPD02
Station _____
Offset _____
Ground Surface Elev. 574.20 ft

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

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	6			**Clay (CL)** little gravel, trace sand, dark brown, dry to moist, firm to stiff
	4 4 4	1.3 P		
	WOH			
	1 1 2	0.9 P		
-5	1			
	1 1 2	0.6 P	13.0	
	WOH			
	WOH			
	8 16			
565.20				
	WOH			**Silty Clay (CL)** trace sand and gravel, gray mottled orange brown and dark brown, moist, soft to firm. Shelby tube sample T-1 from 9'-11' from adjacent location having mc: 28%, dry density: 84.5pcf and UC: 920psf
-10	WOH	0.3 P	37.0	
	WOH			
	1			
	WOH			
	50/3	0.8 P		
560.70	50/2			
				Borehole continued with rock coring.
-15				
-20				

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

BBS, from 137 (Rev. 8-99)

For Information Only

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 11/1/05

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=563955.586, E=2459599.114), 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. PRMPD03
Station _____
Offset _____
Ground Surface Elev. 573.45 ft

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

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Fill Clay (CL) trace gravel, sand, and brick, dark brown, dry to moist, homogeneous. 1' of concrete, pavement, and gravel on top of sediment.	5		
	6 6 4	1.5 P	
Clay (CL) trace to little silt, trace sand, dark brown, dry to moist, stiff	2		
	2 3 4	1.6 P	
-5	1		
	2 3 3	1.0 P	
566.45			
Silty Clay (CL, CL-ML) gray brown, mottled orange brown and dark brown, dry to moist, soft to firm	WOH 2 3	0.6 P	
564.45			
	1 1 2 3	0.4 P	
-10			
Sandy Clay to Sand (SC) Sandy Clay to Sand, gray, moist to wet ▼	1 2 13 10		
560.45			
Siltstone Siltstone, little sand, gray, moist, homogeneous.	7 9 16 30		
-15			
554.45			
Shale Shale, gray, moist, homogeneous.	50/4		
-20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Shale Shale, gray, moist, homogeneous. *(continued)*			
No Sample.	50/0		
-25			
547.45			
544.95			
Auger refusal at 28.5'; end of borehole. End of Boring			
-30			
-35			
-40			

For Information Only

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

Illinois Department of Transportation
Division of Highways
CH2M HILL

SOIL BORING LOG

Date 9/7/07

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

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=564029.213, E=2459513.152), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

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

STRUCT. NO. _____
Station 437+80.7

BORING NO. PRMPD-05
Station _____
Offset _____
Ground Surface Elev. 575.10 ft

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

Groundwater Elev.:
First Encounter 564.1 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
PAVEMENT - asphalt and base course 574.10			
SILT - black, with rubble (FILL)	4		
	6		
	5		
571.60			
CLAY - medium gray to orange brown, slightly to medium plastic, medium stiff, moist	2		
	1	0.5	24.9
-5	2	B	
	1		
	2	0.7	38.9
	1	B	
[Attempted Shelby tube at 8.5'-10.5'; no recovery] 566.60			
SAND - red brown, fine grained, loose, wet			
-10			
▼	1		
[Attempted Shelby tube at 11'-13'; no recovery; followed up with SPT]	1		
	1		
	1		
561.10			
SHALE - green gray, clayey, severely weathered	3	1.4	23.6
-15	13	B	
	12		
558.40	41	1.4	
Borehole continued with rock coring.	50/1"	B	
-20			

For Information Only

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

Illinois Department of Transportation
Division of Highways
CH2M HILL

ROCK CORE LOG

Date 9/7/07

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

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=564029.213, E=2459513.152), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **CORING METHOD** NQ Core

STRUCT. NO. _____
Station 437+80.7

BORING NO. PRMPD-05
Station _____
Offset _____
Ground Surface Elev. 575.10 ft

CORING BARREL TYPE & SIZE NQ Wireline
Core Diameter 1.8 in
Top of Rock Elev. 561.60 ft
Begin Core Elev. 558.40 ft

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
SANDSTONE - medium gray, very fine grained, silt in matrix, abundant shale partings, conglomeratic at 17.5'-18.1' (TRANSITIONAL)	558.40	Run 1	82	23	1	
	557.10					
LIMESTONE - gray, fine grained, with occasional to some thin green shale partings and seams, locally stylolitic, hard, thin to medium bedded, predominantly horizontal to very low angle fractures, planar to slightly irregular, smooth to slightly rough, fresh	-20					
		Run 2	100	95	1.2	
	-25					
		Run 3	97	87	1	1081.2
-slightly rough fractures across stylolites at 28.3'-30.6'	-30					
		Run 4	100	100	2.6	
-thick bedded, occasional stylolites at 30.6'-35.6'						
-minor pitting with some "birdseye" texture from 32.1' to 35.6'	-35					
		Run 5	100	84	1.3	

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

For Information Only

Illinois Department of Transportation
Division of Highways
CH2M HILL

ROCK CORE LOG

Date 9/7/07

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

SECTION I-74 Bridge over Mississippi River **LOCATION** (N=564029.213, E=2459513.152), **SEC.** 32, **TWP.** 18N, **RNG.** 1W, 4th **PM**

COUNTY Rock Island **CORING METHOD** NQ Core

STRUCT. NO. _____
Station 437+80.7

BORING NO. PRMPD-05
Station _____
Offset _____
Ground Surface Elev. 575.10 ft

CORING BARREL TYPE & SIZE NQ Wireline
Core Diameter 1.8 in
Top of Rock Elev. 561.60 ft
Begin Core Elev. 558.40 ft

DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
LIMESTONE - gray, fine grained, with occasional to some thin green shale partings and seams, locally stylolitic, hard, thin to medium bedded, predominantly horizontal to very low angle fractures, planar to slightly irregular, smooth to slightly rough, fresh *(continued)*					
-occasional soft rock-like green shale partings and clasts in limestone with fractures along shale, occasional pitting, at 38.9'-40.3'					
-40					
-green rock-like shale seam with 85° fracture at 40.3'-40.8'					
-medium gray, fine to medium grained, occasional shale partings					
532.50					
End of Boring					
-45					
-50					
-55					

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

BBS, form 138 (Rev. 8-99)

For Information Only

HANSON

SOIL BORING LOG

Date 7/1/10

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

SECTION 81B / 81-HVB **LOCATION** NE 1/4, 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. PRMP 6th D-03
Station 424+49
Offset 16 Lt.
Ground Surface Elev. 576.4 ft

Surface Water Elev. _____
Stream Bed Elev. _____

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
FILL - Very dark brown, moist to wet, medium to stiff, silty, lean CLAY	3 4 4	0.65B	39	
572.90				
FILL - Brown, iron staining visible, moist, medium, sandy, clayey SILT with trace gravel, iron and metal debris	7 3 3		19	
567.40	3 3 3		50	
Brown, moist, medium, silty CLAY				
562.90				
Brown, wet, LIMESTONE fragments ▽	7 13 10			
559.40				
Gray, weathered LIMESTONE, clayey shale filled voids				
558.30	50/1"			
End of Boring				

For Information Only

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

HANSON

SOIL BORING LOG

Date 7/1/10

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. 081-6012
Station
BORING NO. RW 03-1
Station 425+60
Offset 9' Lt.
Ground Surface Elev. 574.2 ft

Surface Water Elev.
Stream Bed Elev.

Groundwater Elev.:
First Encounter NE ft
Upon Completion ft
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
ASPHALT 573.70				
FILL - Dark brown, SILT with fine-grained sand and gravel	2	11 6 6		7
570.70				
FILL - Brown and gray, moist, loose, very-fine to medium-grained SAND and SILT with gravel	4	4 4 2	3.50P	19
	6		0.32S	19
567.20			0.60P	23
FILL - Gray, moist, loose, silty, medium-grained SAND with clay, wood debris 566.20			1.00P	22
	8		0.37S	27
Gray with brown mottles, silty, lean CLAY with fine-grained sand			0.29S	31
			0.55S	33
	10			
563.20				
Gray, wet, very soft, clayey SILT	12	1 4 7		62
561.20				
INTACT ROCK 560.70				
End of Boring		50/0"		

For Information Only

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The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

HANSON

SOIL BORING LOG

Date 7/1/10

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. 081-6012
Station
BORING NO. RW 03-2
Station 423+60
Offset 14' Rt.
Ground Surface Elev. 575.2 ft

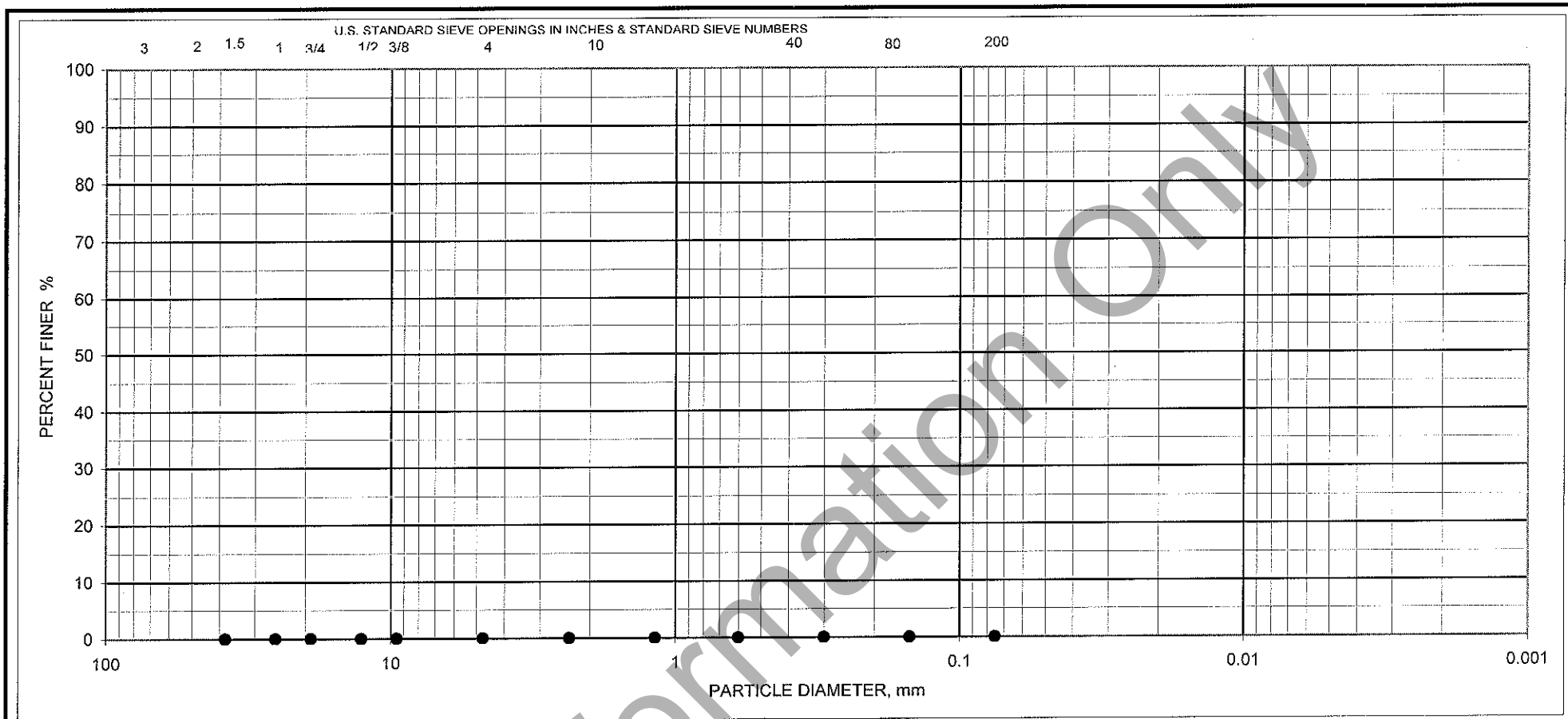
Surface Water Elev.
Stream Bed Elev.

Groundwater Elev.:
First Encounter ft
Upon Completion 566.7 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				TOPSOIL 574.95
	3		26	Very dark brown, moist, soft to medium stiff, silty, lean CLAY
2	2			
	3			
				571.70
	3	1.50P	21	Dark gray, moist, soft to medium stiff, silty, lean CLAY with trace very-fine grained SAND
4	2			
	3			
				569.70
				Gray, wet, stiff, silty CLAY
6		0.89S	22	
			23	
		0.90B	24	
8 ▽			24	
			25	
			26	
10				
	7		9	
	8			563.70
12	10			Brown, wet, dense, silty, fine- to medium-grained SAND and gravel with limestone fragments
	10		13	
14	18			
	23			
16				
	20			
	23			
	24			
				557.20
18				Very dark gray, WEATHERED SHALE
	25	2.23S	17	
	50/5"			555.70
				End of Boring

For Information Only

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



GRAVEL		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	SOIL DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
ILR0301	4	8	Silt	CL	25.5	31	20	11

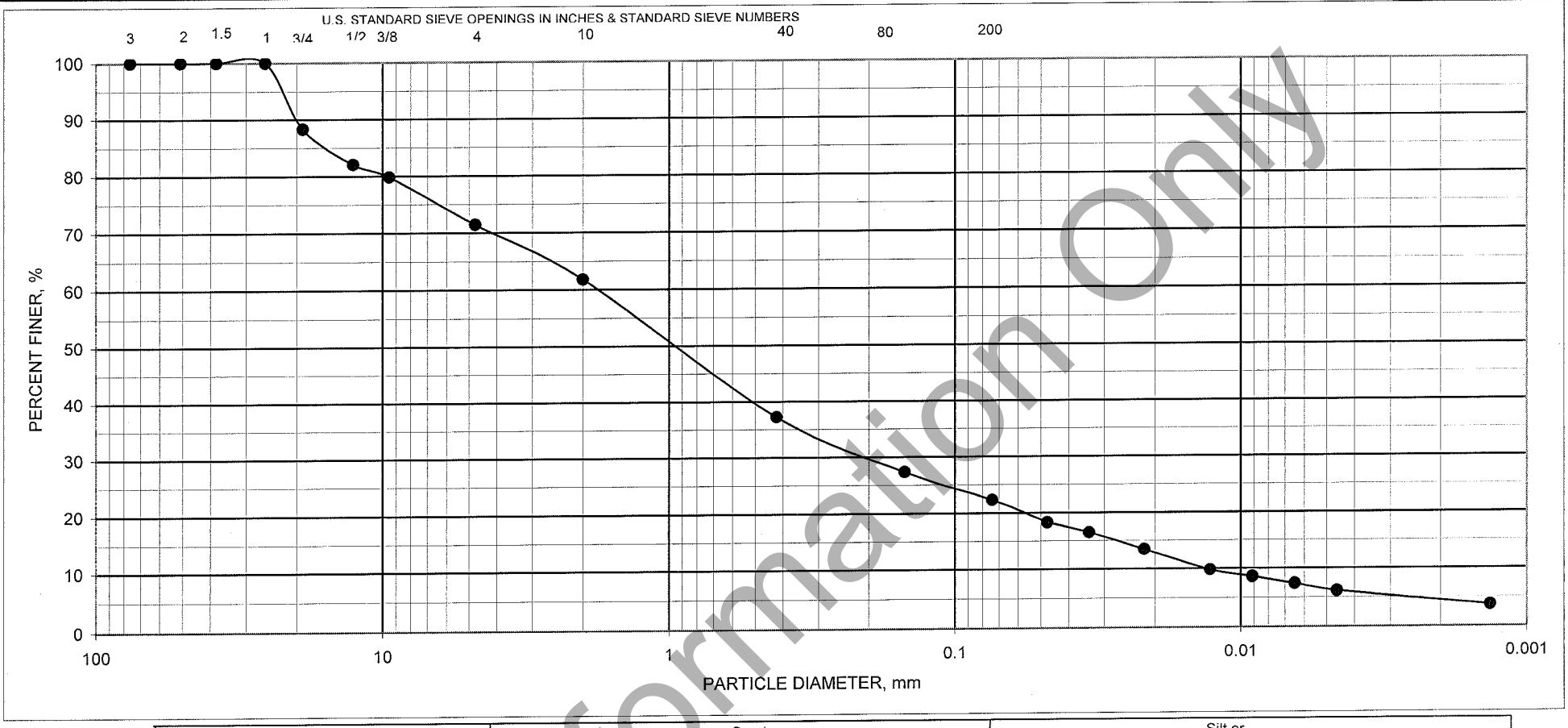
PROJECT I-74 Corridor

Moline, IL PROJECT NO. 07045052 DATE 2/13/2008

N:\Projects\2004\07045052\lab data\Grain Size Distribution\[ILR0301 S-4.xls]ACT DATA

Terracon

For Information Only



GRAVEL		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
ILR0301	6	12			13.4			

PROJECT I-74 Corridor

Moline, IL JOB NO. 07045052 DATE 2/15/2008

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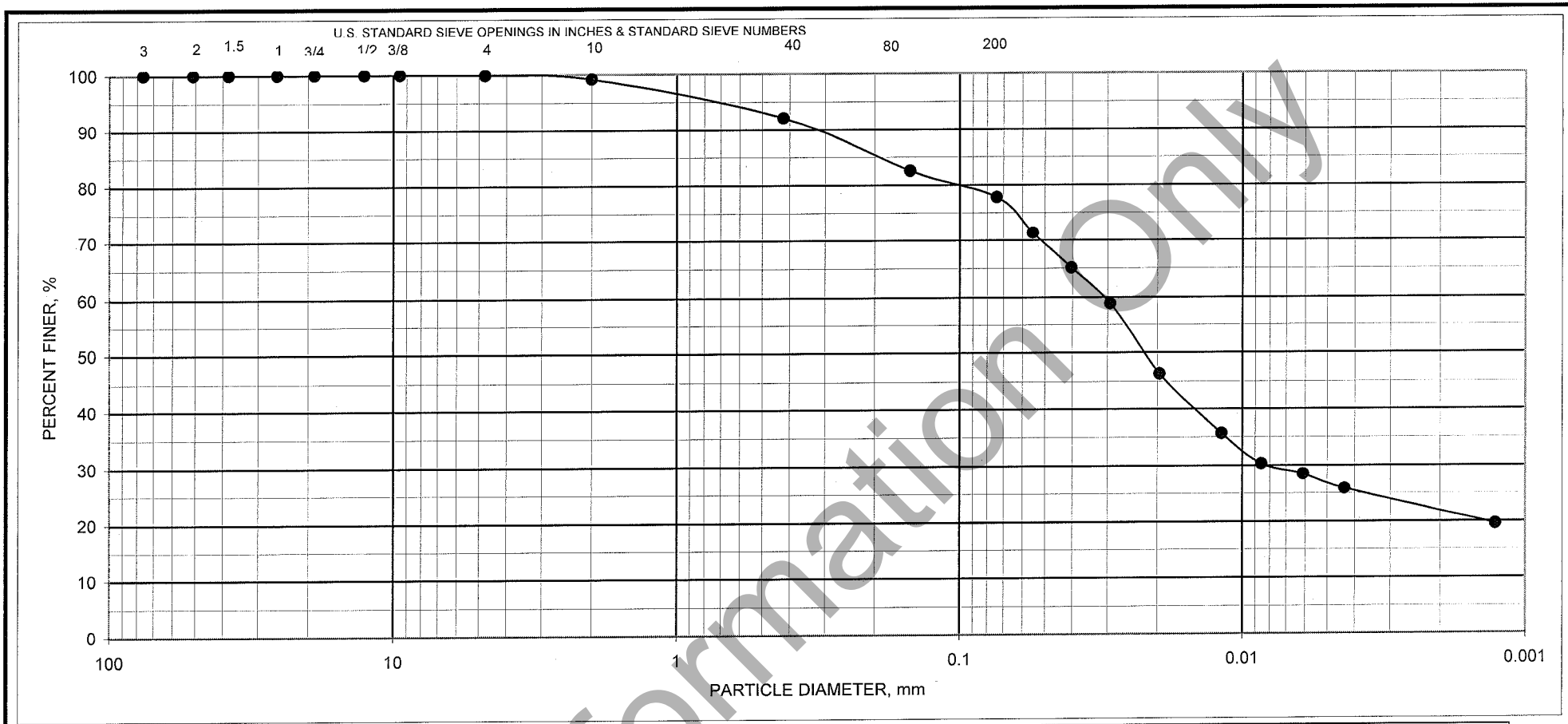
Terracon

For Information Only



GRAVEL		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
ILR0302	4	8			25.3	35	15	20

PROJECT I-74 Corridor

Moline, IL JOB NO. 07045052 DATE 2/13/2008

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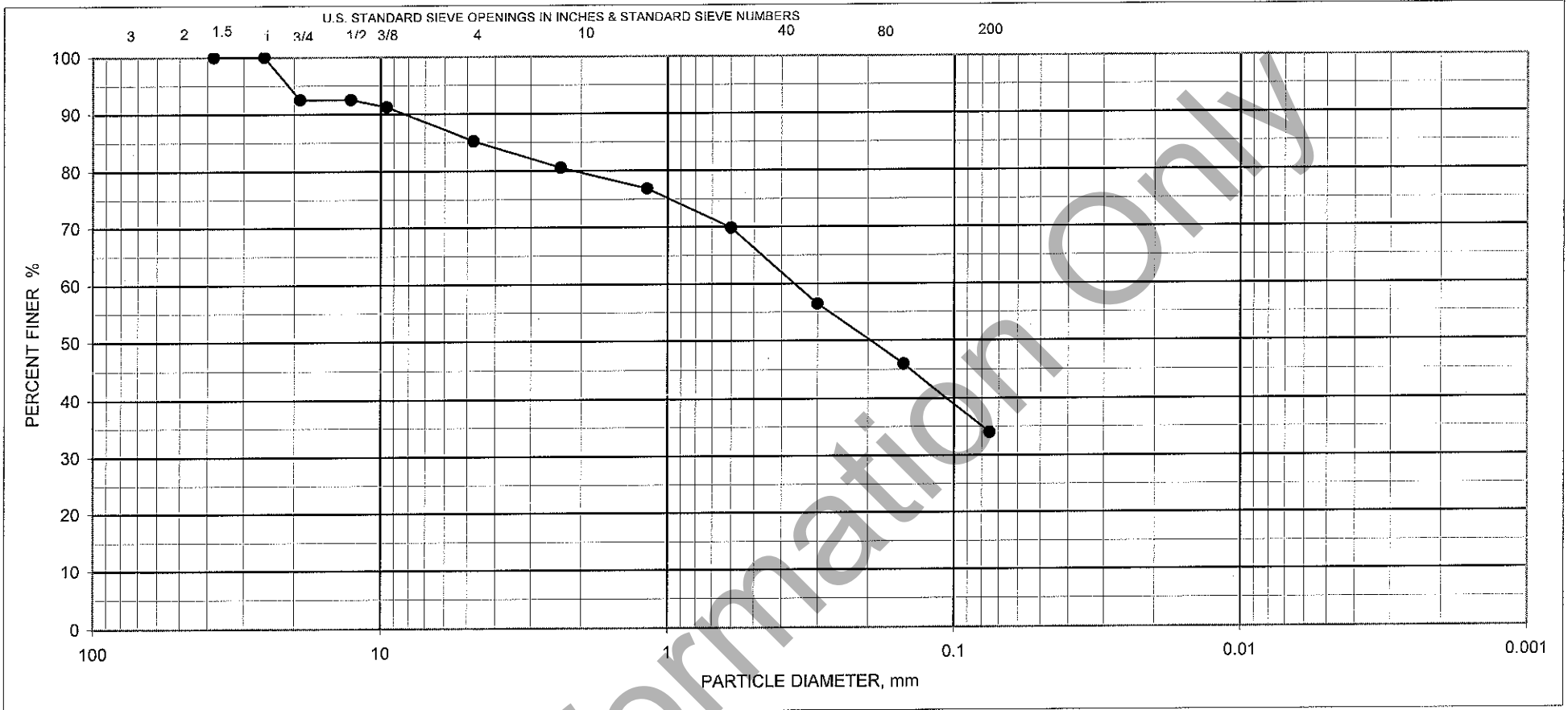
For Information Only



GRAVEL		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	SOIL DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
ILR0302	5	13-15	Well Graded Sand with Sith and Gravel	CL	13.9			

PROJECT I-74 Corridor

Moline, IL PROJECT NO. 07045052 DATE 2/13/2008

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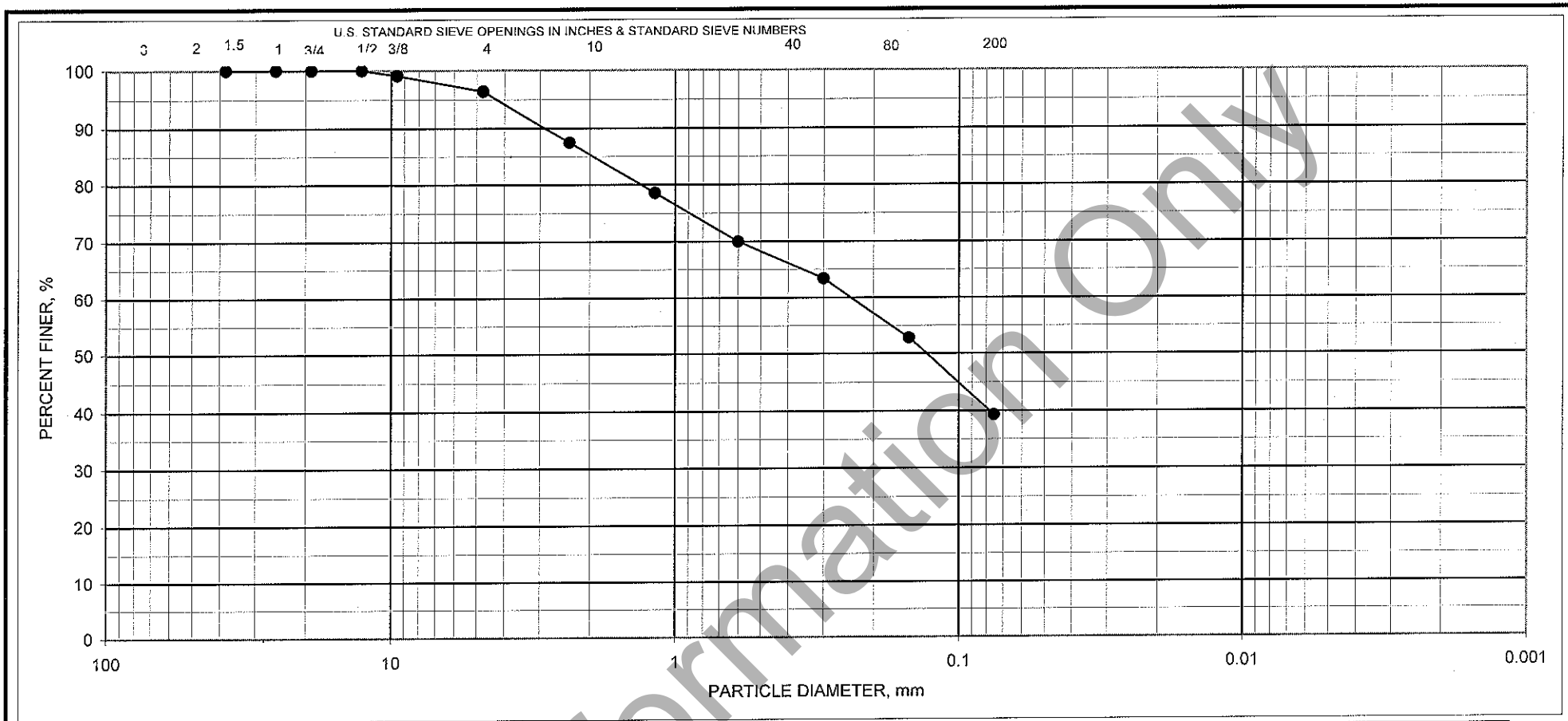
Terracon

For Information Only



GRAVEL		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	SOIL DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
ILR0302	6	16-18	Clayey Silt	CL		30	11	19

PROJECT I-74 Corridor

Moline, IL PROJECT NO. 07045052 DATE 2/14/2008

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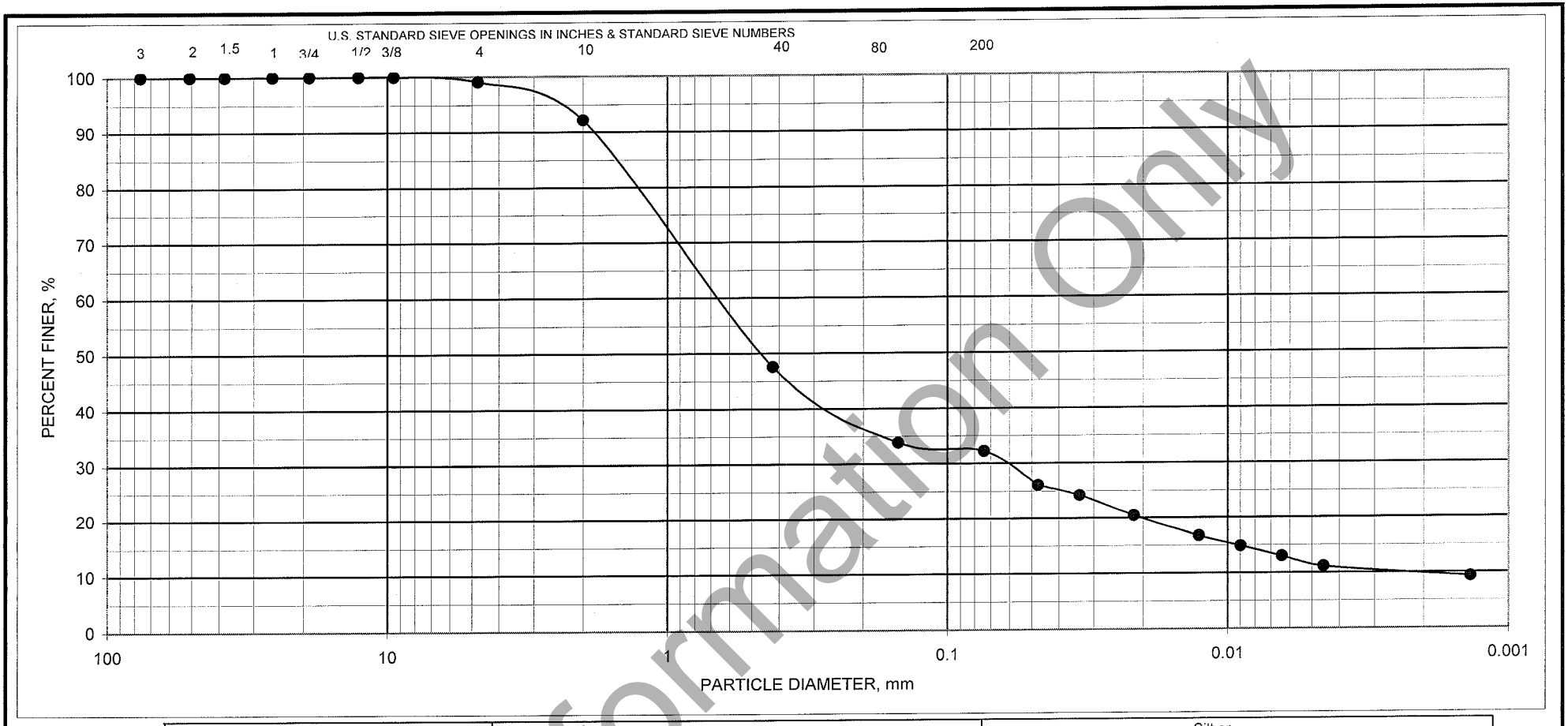
For Information Only



GRAVEL		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
ILR0303	1	2						

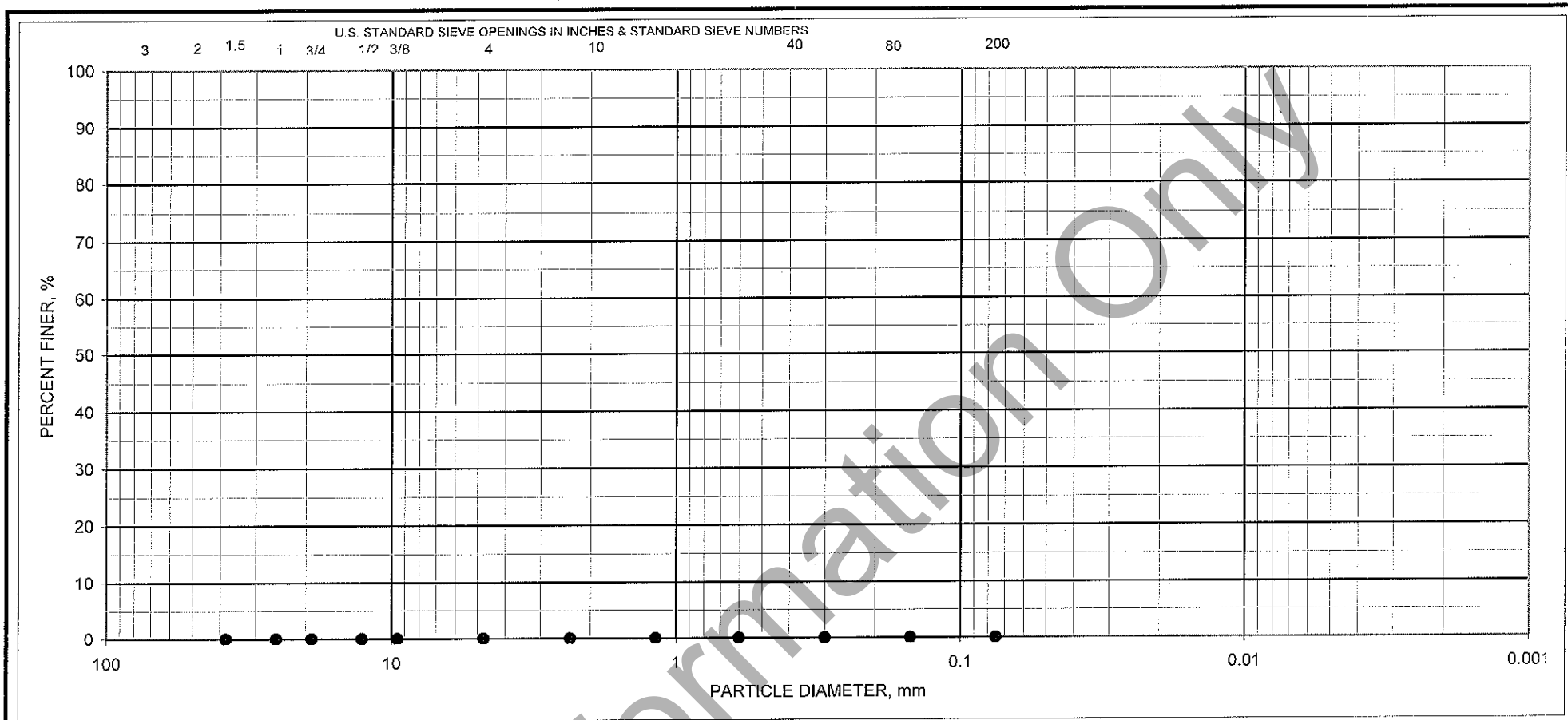
PROJECT I-74 Corridor

Moline, IL JOB NO. 07045052 DATE 2/14/2008

Terracon

N:\Projects\2004\07045052\lab data\Hydrometer\[ILR0303 S-1.xls]ACT DATA

For Information Only



GRAVEL		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	SOIL DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
ILR0303	2	4	Silt	CL		36	15	21

PROJECT I-74 Corridor

Moline, IL PROJECT NO. 07045052 DATE 2/21/2008

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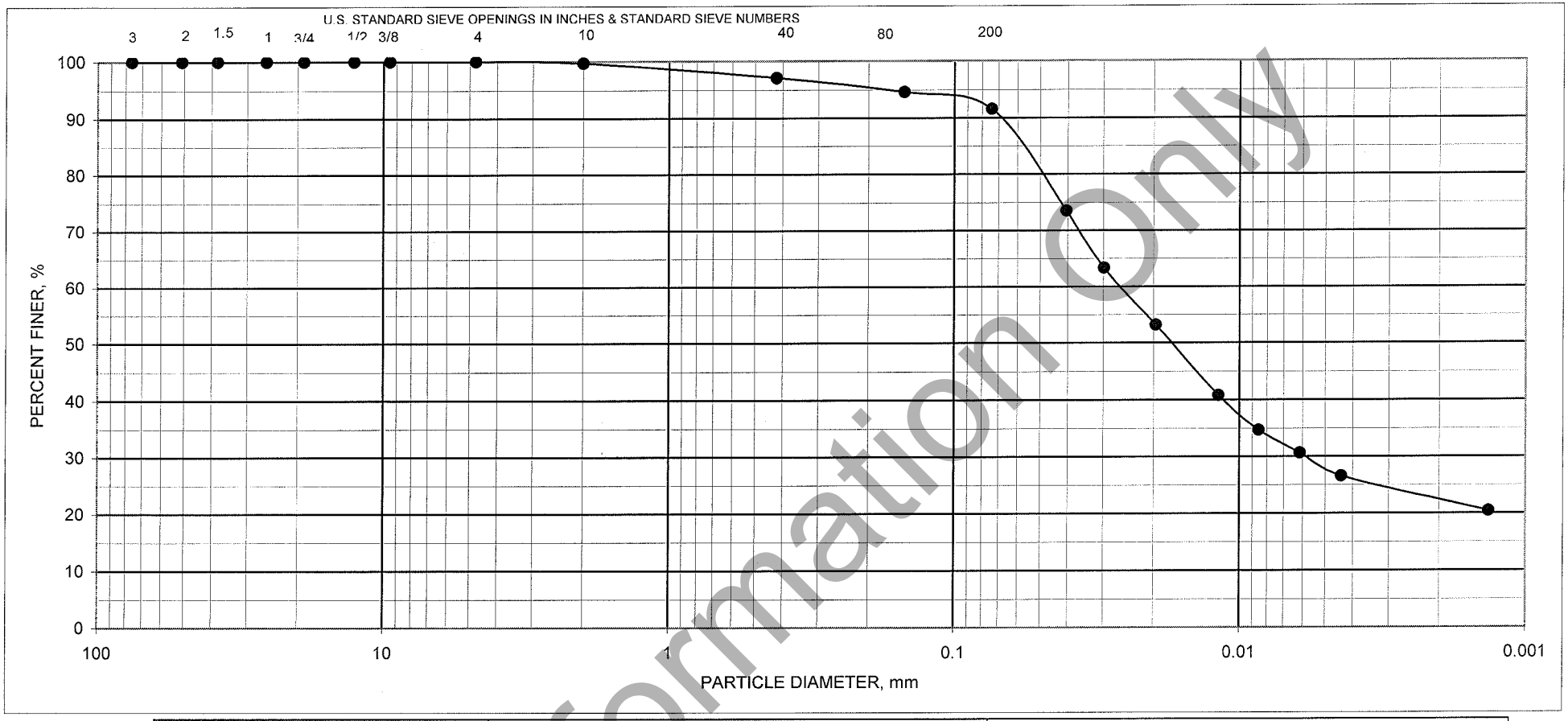
Terracon

For Information Only



GRAVEL		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
ILR0303	3	6			19.7	45	21	24

PROJECT I-74 Corridor

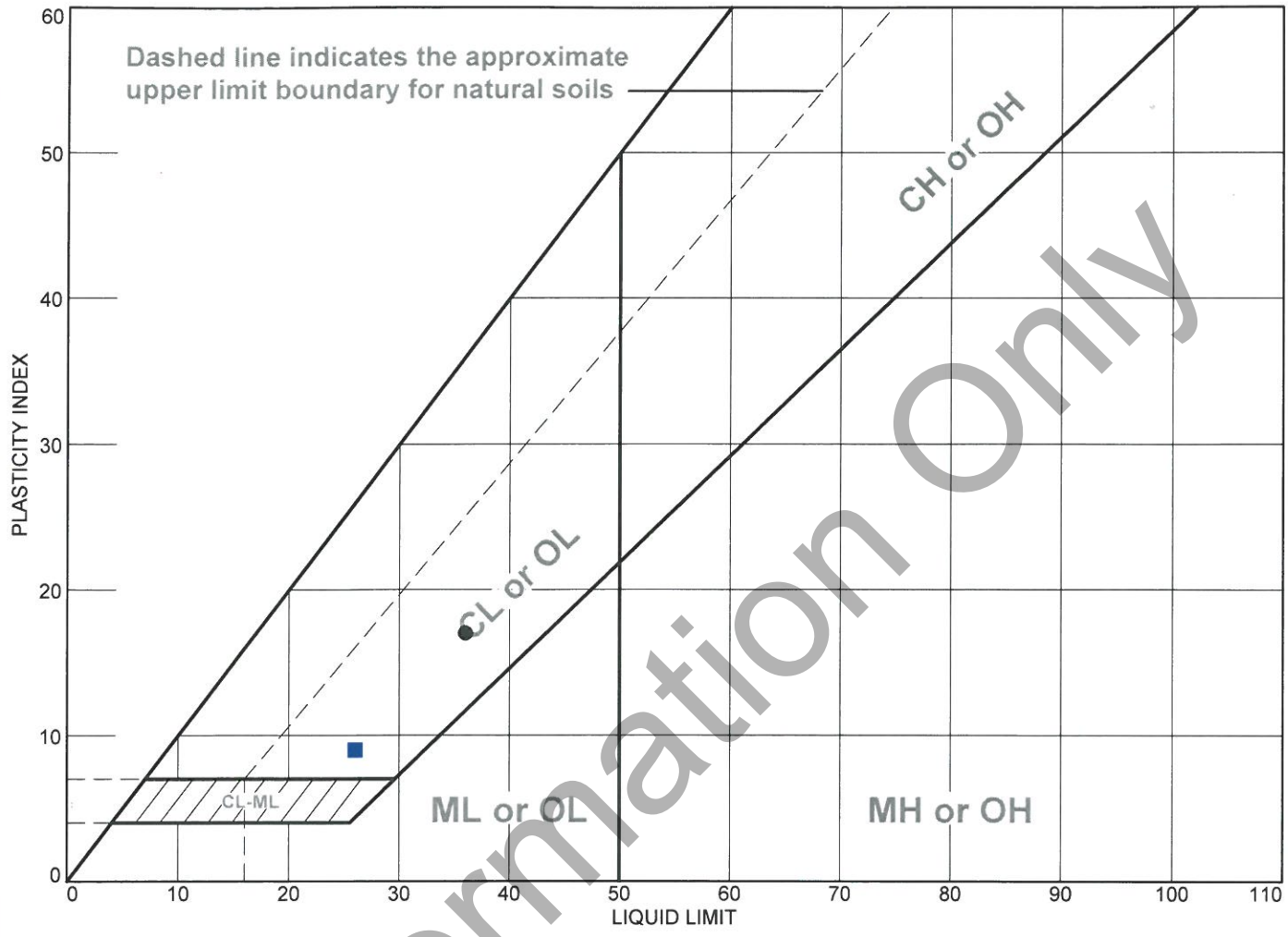
Moline, IL JOB NO. 07045052 DATE 2/21/2008

N:\Projects\2004\07045052\lab data\Hydrometer\[ILR0303 S-3.xls]ACT DATA

Terracon

For Information Only

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dk. gray vf.-f. sandy silty clay.	36	19	17		54	CL
■	Brn. & gray vf. sandy silt w/so clay.	26	17	9		97	CL

Project No. 08H0120E **Client:** IDOT

Project: I-74 Bridge over Mississippi River

● **Location:** RW03-1 **Depth:** ST3-1 6.5-7.0 **Sample Number:** RW03-1

■ **Location:** RW03-2 **Depth:** ST4-4 9.5-10.0 **Sample Number:** RW03-2

Remarks:

HANSON

Figure

Tested By: JCC **Checked By:** RIN

For Information Only

UNCONFINED COMPRESSIVE STRENGTH OF INTACT ROCK CORE

CLIENT: **CH2M HILL** **JOB NO.:** **07045052**

PROJECT: **INTERSTATE I-74 IMPROVEMENTS BETTENDORF, IOWA** **DATE:** **2/22/06**

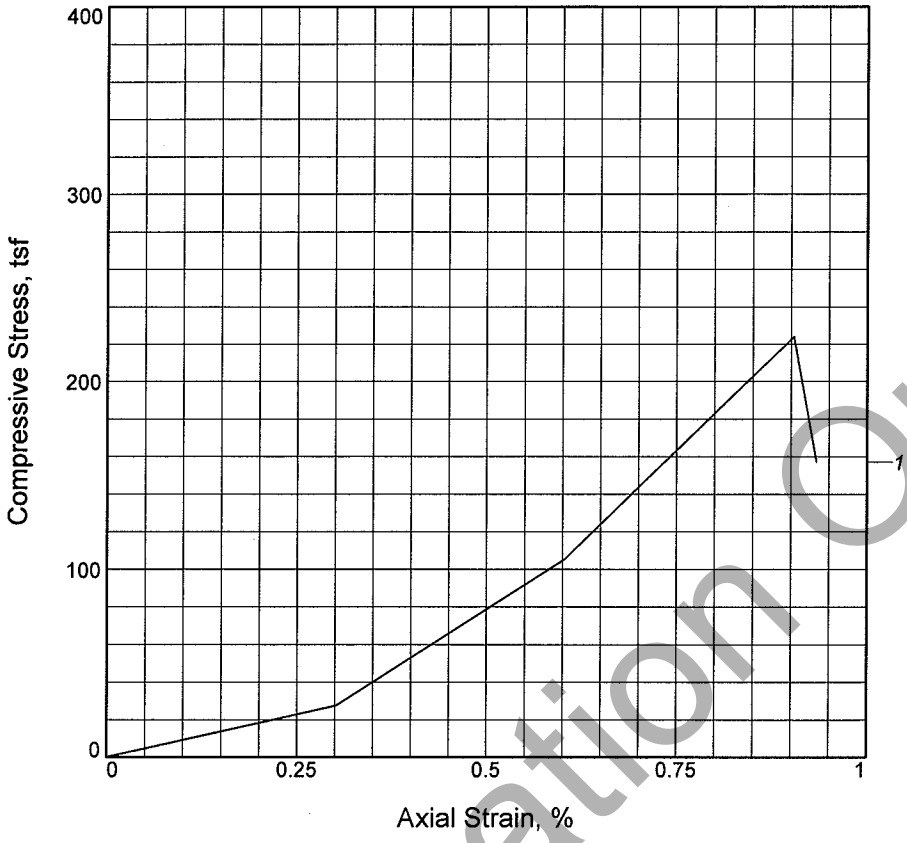
TEST NO.	5	6	7	8
BORING NO,	PRMPD2	PRMPA1	RW1401	RW1401
RUN NO.	1	2	5	5
DEPTH (FT.)	171/2 –18	25 – 25 1/2	38 1/2 – 39	39 – 39 ½
PREPARED CORE (IN.)	4.50	4.52	3.06	3.07
ROCK DESCRIPITION (Note 1)	LIMESTONE	LIMESTONE	SHALE SANDSTONE	SHALE SANDSTONE
MOISTURE CONTENT %	0.2	0.1	2.2	7.0
COMPRESSIVE STRENGTH TESTS				
DIAMETER (IN.)	1.87	1.86	1.87	1.88
AREA (SQ.IN.)	2.74	2.72	2.74	2.77
L/D RATIO	2.4	2.4	1.6	1.6
TOTAL LOAD (LBS.)	18,420	25,830	7,540	11,300
COMPRESSIVE STRENGTH (PSI) (Note 2)	6,720	9,500	2,750	4,080
TYPE FRACTURE	VERTICAL FRACTURE	VERTICAL FRACTURE	VERTICAL FRACTURE	VERTICAL FRACTURE
DATE TESTED	2/21/06	2/21/06	2/21/06	2/21/06
DENSITY (PCF)	157	162	130	122

Note 1: Rock type based on visual and tactile observation of core.

Note 2: Tests No. 7 and 8 are below the L/D ratio of 2.0 to 2.5 stated in the ASTM 4543 Standard, compressive strength values may not be representative.

For Information Only

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	223.8938			
Undrained shear strength, tsf	111.9469			
Failure strain,	0.9			
Strain rate, in./min.	0.500			
Water content, %	0.3			
Wet density, pcf	161.5			
Dry density, pcf	161.1			
Saturation, %	N/A			
Void ratio	N/A			
Specimen diameter, in.	1.850			
Specimen height, in.	3.320			
Height/diameter ratio	1.79			

Description: LIMESTONE

LL =	**PL =**	**PI =**	**GS=**	**Type:** Limestone

Project No.: 19636.040
Date: 4-7-08
Remarks:
Lab No. 3192

Figure _____

Client: TERRACON (#07045052)

Project: I-74 CROSSING-BETTENDORF-MOLINE

Source of Sample: ILR0302 **Depth:** 20'11"
Sample Number: R-1

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

Tested By: DR **Checked By:** GS

For Information Only

Hanson Professional Services Inc.

Unconfined Compression Test Report (ASTM D2166)

Date 8/30/10

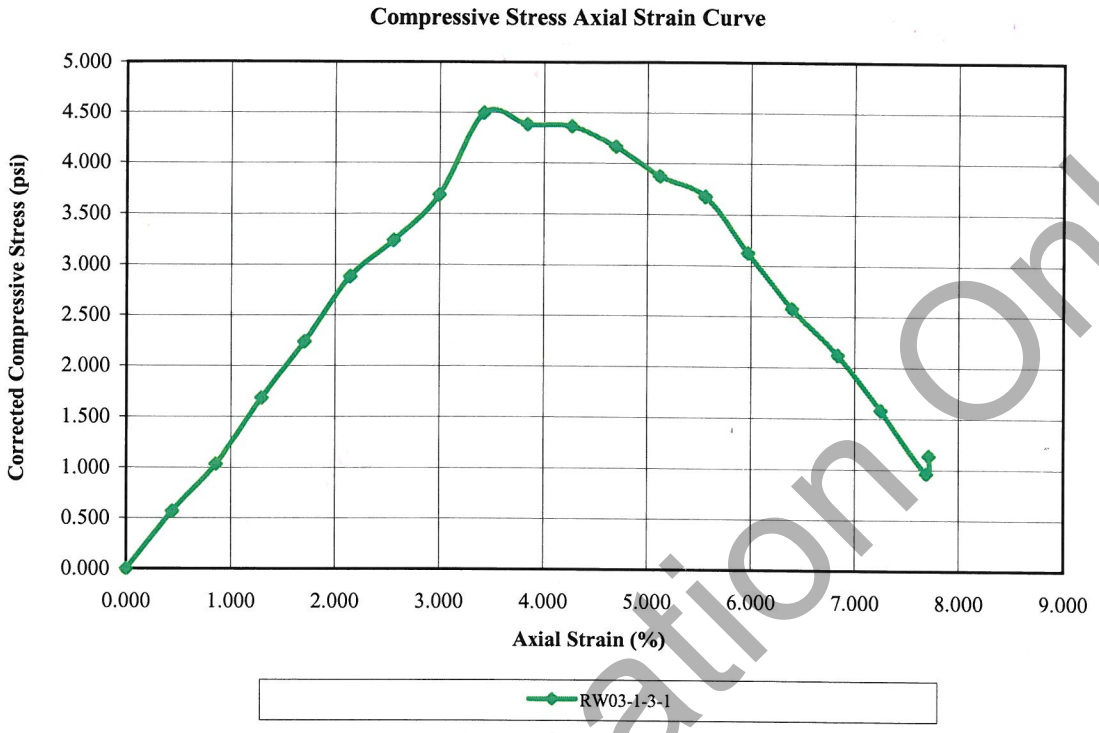
Checked By JCC

Date

Computed By

Date 8/6/10

Tested By Rin



Before Test	Specimen RW03-1-3-1	B	C	D
Water Content (%)	18.95			
Dry Density (pcf)	106.800			
Saturation (%)	91.50			
Void Ratio	0.55			
Diameter (in)	2.859			
Height (in)	4.822			
Test Data	**RW03-1-3-1**	**B**	**C**	**D**
Unconfined Strength (psi)	4.500			
Undrained Shear Strength (tsf)	0.162			
Undrained Shear Strength (psi)	2.250			
Rate of Strain (in/min)	0.100000			
Strain at Failure (%)	3.42			
Description				

Project Information		Specimen Description	
Project Num	08H0120E	RW03-1-3-1	Dk. gray vf.-f. sandy silty clay.
Project	I-74 Mississippi River Bridge		
Depth	6.0-6.5		
Sample #	3-1		
Client			
		Specific Gravity	2.65
		Liquid Limit:	
		Plastic Limit:	

Remarks

For Information Only

Hanson Professional Services Inc.

Unconfined Compression Test Report (ASTM D2166)

Date 8/31/10

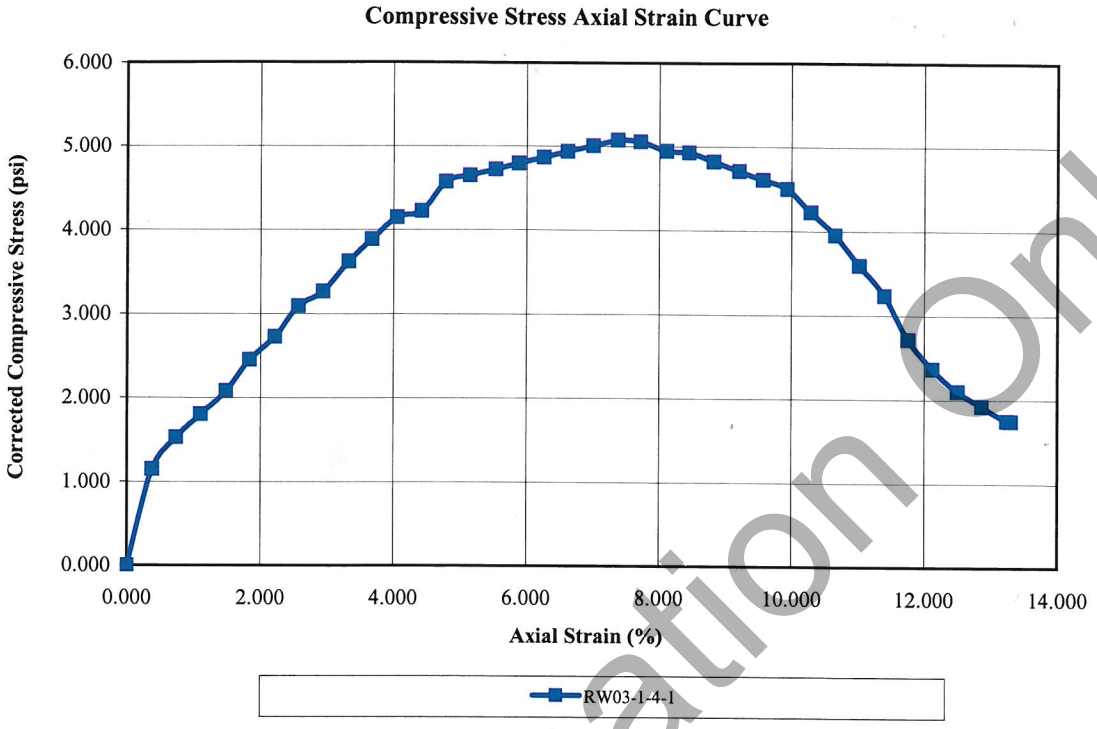
Checked By JCC

Date

Computed By

Date 8/6/2010

Tested By Rin



Before Test	Specimen A	B	C	D
Water Content (%)		27.17		
Dry Density (pcf)		94.600		
Saturation (%)		96.16		
Void Ratio		0.75		
Diameter (in)		2.843		
Height (in)		5.595		
Test Data	**A**	**B**	**C**	**D**
Unconfined Strength (psi)		5.078		
Undrained Shear Strength (tsf)		0.183		
Undrained Shear Strength (psi)		2.539		
Rate of Strain (in/min)		0.200000		
Strain at Failure (%)		7.37		
Description				

Project Information		Specimen Description	
Project Num	08H0120E		
Project	I-74 Mississippi River Bridge	RW03-1-4-1	Dk. gray vf. sandy silty clay.
Depth	8.0-8.5		
Sample #	4-1		
Client		**Test Variables**	
		Specific Gravity	2.65
		Liquid Limit:	
		Plastic Limit:	

Remarks

For Information Only

Hanson Professional Services Inc.

Unconfined Compression Test Report (ASTM D2166)

Date 8/31/10

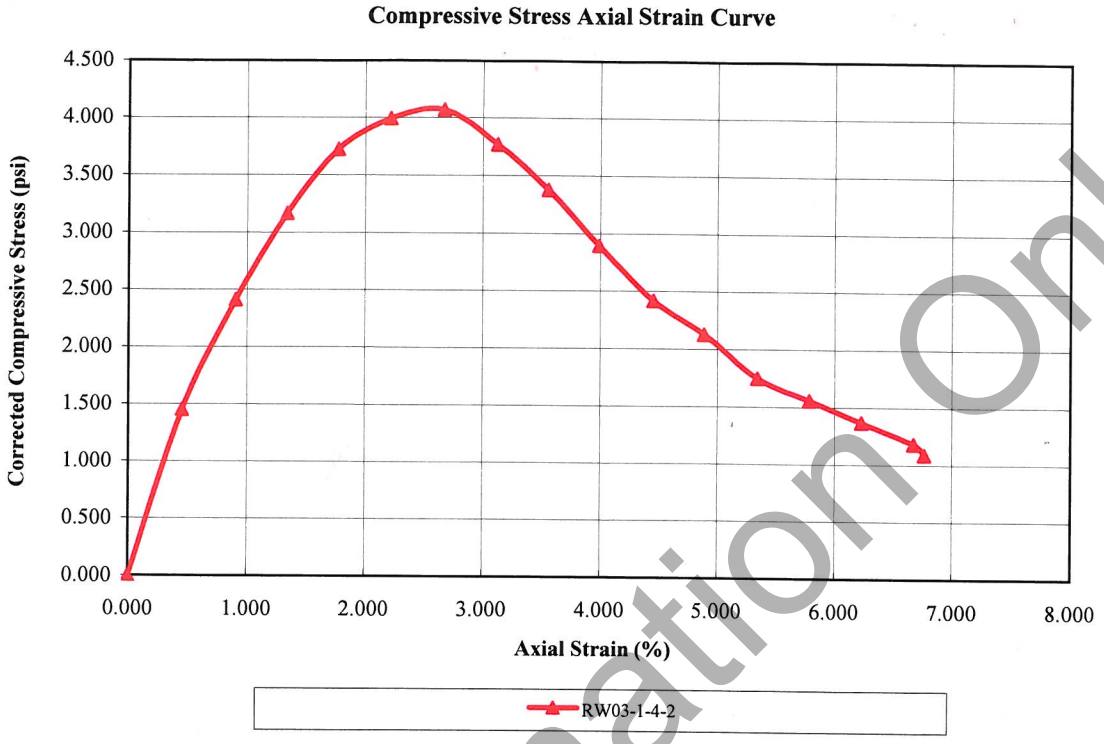
Checked By JCC

Date

Computed By

Date 8/6/10

Tested By Rin



Before Test	Specimen A	B	C	D
Water Content (%)			30.86	
Dry Density (pcf)			92.200	
Saturation (%)			103.06	
Void Ratio			0.79	
Diameter (in)			2.828	
Height (in)			5.663	
Test Data	**A**	**B**	**C**	**D**
Unconfined Strength (psi)			4.068	
Undrained Shear Strength (tsf)			0.146	
Undrained Shear Strength (psi)			2.034	
Rate of Strain (in/min)			0.200000	
Strain at Failure (%)			2.67	
Description				

Project Information		Specimen Description	
Project Num	08H0120E		
Project	I-74 Mississippi River Bridge		
Depth	8.5-9.0	RW03-1-4-2	Gray & brn. vf. sandy clayey silt.
Sample #	4-2		
Client		**Test Variables**	
		Specific Gravity	2.65
		Liquid Limit:	
		Plastic Limit:	

Remarks

For Information Only

Hanson Professional Services Inc.

Unconfined Compression Test Report (ASTM D2166)

Date 8/31/10

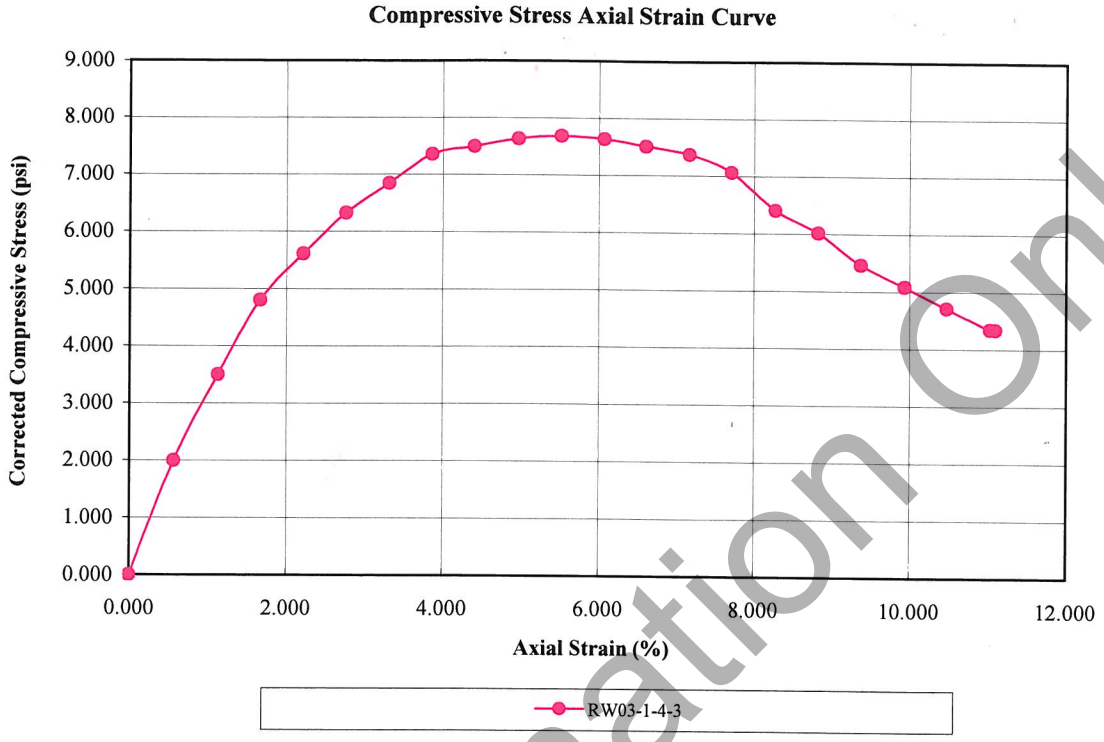
Checked By JCC

Date

Computed By

Date 8/6/10

Tested By Rin



Before Test	Specimen A	B	C	D
Water Content (%)				33.17
Dry Density (pcf)				88.900
Saturation (%)				102.18
Void Ratio				0.86
Diameter (in)				2.852
Height (in)				4.563
Test Data	**A**	**B**	**C**	**D**
Unconfined Strength (psi)				7.675
Undrained Shear Strength (tsf)				0.276
Undrained Shear Strength (psi)				3.838
Rate of Strain (in/min)				0.200000
Strain at Failure (%)				5.52
Description				

Project Information		Specimen Description	
Project Num	08H0120E		
Project	I-74 Mississippi River Bridge		
Depth	9.0-9.5		
Sample #	4-3	RW03-1-4-3	Dk. gray vf. sandy clayey silt.
Client		**Test Variables**	
		Specific Gravity	2.65
		Liquid Limit:	
		Plastic Limit:	

Remarks

For Information Only

Hanson Professional Services Inc.

Unconfined Compression Test Report (ASTM D2166)

Date 08/31/10

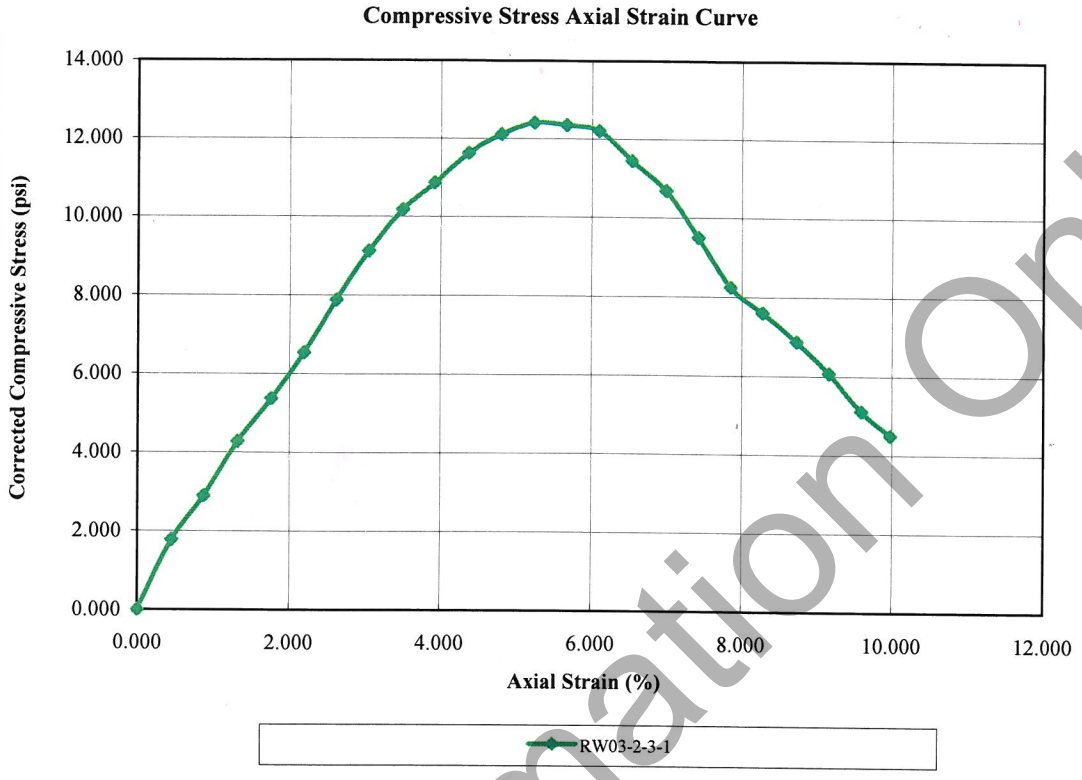
Checked By JCC

Date

Computed By

Date 8/6/10

Tested By Rin



Before Test	Specimen A	B	C	D
Water Content (%)	22.31			
Dry Density (pcf)	102.555			
Saturation (%)	96.43			
Void Ratio	0.61			
Diameter (in)	2.872			
Height (in)	5.769			
Test Data	**A**	**B**	**C**	**D**
Unconfined Strength (psi)	12.414			
Undrained Shear Strength (tsf)	0.447			
Undrained Shear Strength (psi)	6.207			
Rate of Strain (in/min)	0.200000			
Strain at Failure (%)	5.24			
Description				

Project Information		Specimen Description	
Project Num	08H0120E	RW03-2-3-1	Gray & brn. vf. sandy clayey silt.
Project	I-74 Mississippi River Bridge		
Depth	6.0-6.5		
Sample #	3-1		
Client		Test Variables	
		Specific Gravity	2.65
		Liquid Limit:	
		Plastic Limit:	

Remarks

For Information Only

Hanson Professional Services Inc.

Unconfined Compression Test Report (ASTM D2166)

Date 8/31/10

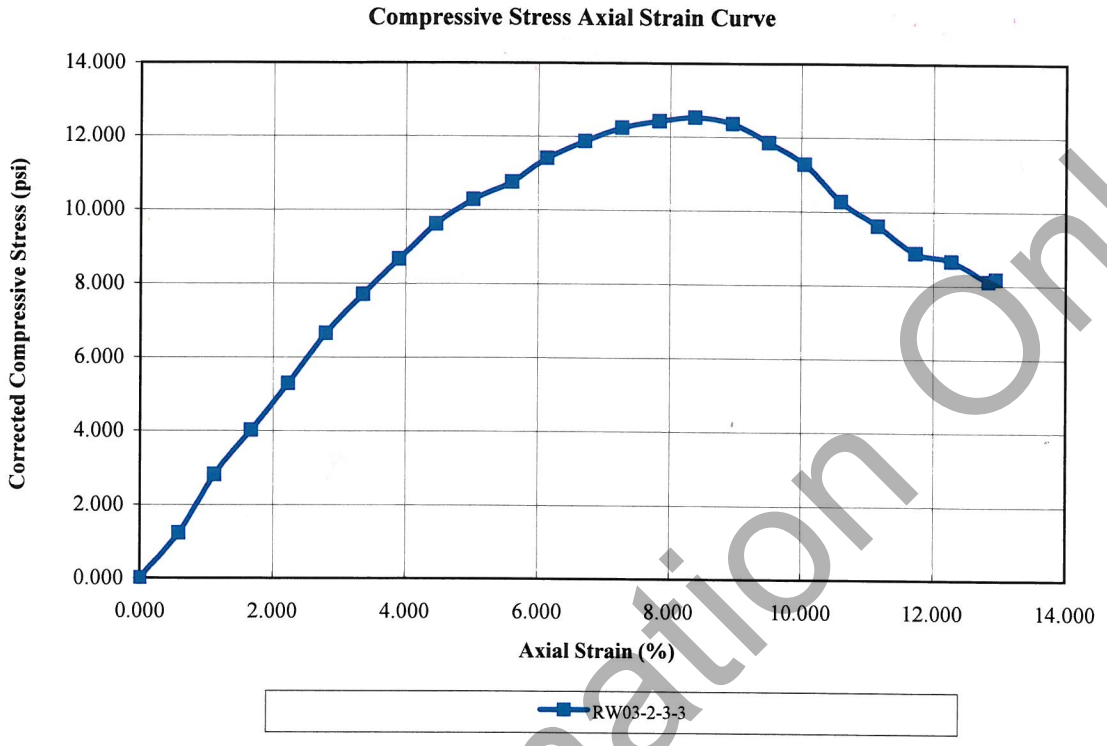
Checked By JCC

Date

Computed By

Date 8/6/10

Tested By Rin



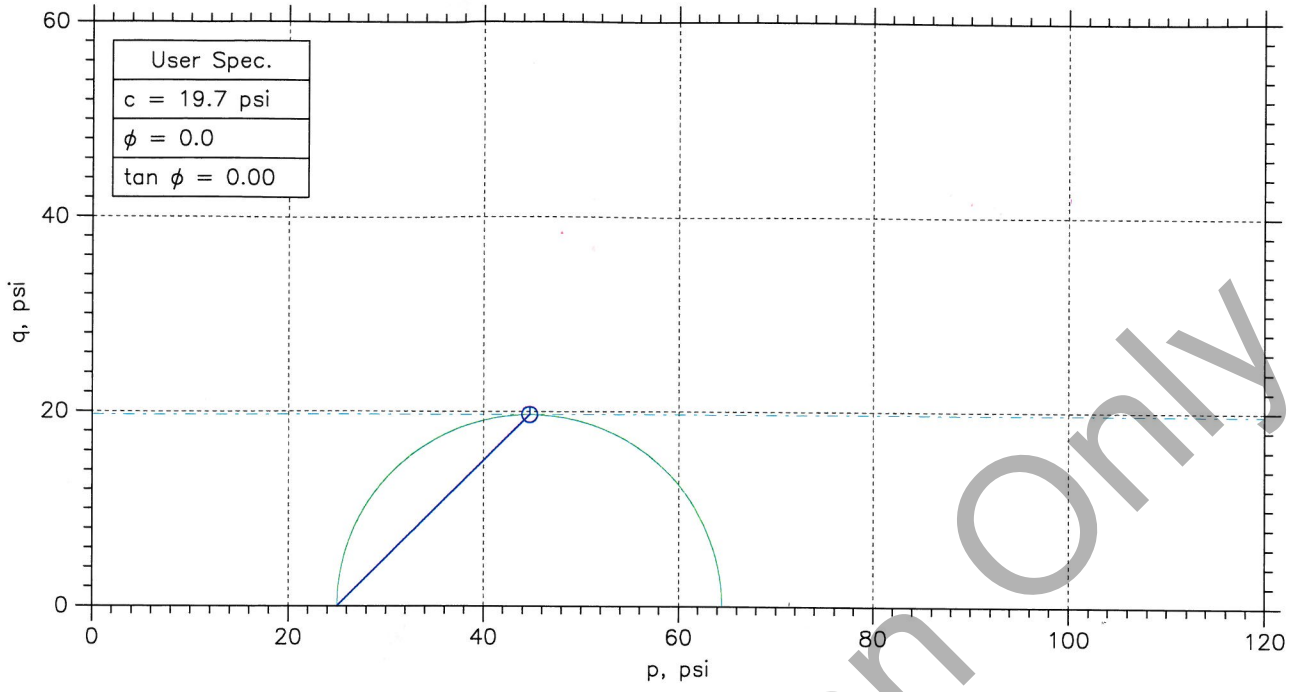
Before Test	Specimen A	B	C	D
Water Content (%)		24.49		
Dry Density (pcf)		100.000		
Saturation (%)		99.17		
Void Ratio		0.65		
Diameter (in)		2.861		
Height (in)		4.502		
Test Data	**A**	**B**	**C**	**D**
Unconfined Strength (psi)		12.529		
Undrained Shear Strength (tsf)		0.451		
Undrained Shear Strength (psi)		6.265		
Rate of Strain (in/min)		0.200000		
Strain at Failure (%)		8.38		
Description				

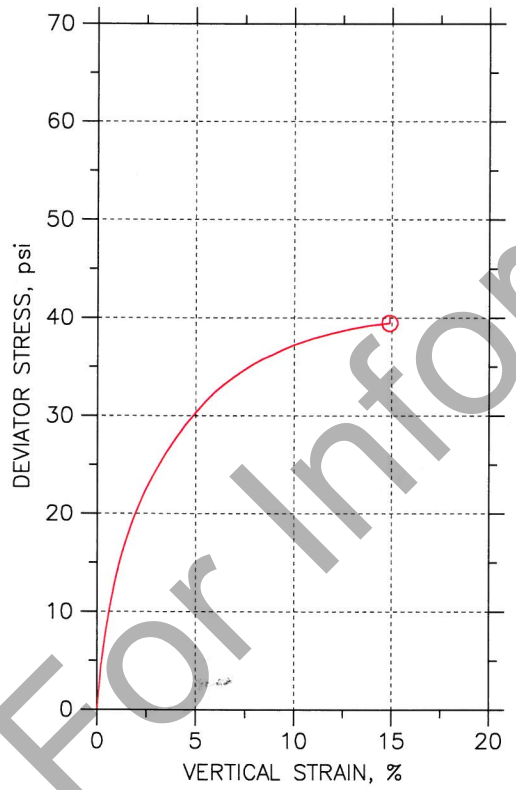
Project Information		Specimen Description	
Project Num	08H0120E		
Project	I-74 Mississippi River Bridge	RW03-2-3-3	Brn. & gray vf. sandy silt / so. clay.
Depth	7.0-7.5		
Sample #	3-3		
Client		**Test Variables**	
		Specific Gravity	2.65
		Liquid Limit:	
		Plastic Limit:	

Remarks

For Information Only

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850





Symbol	⊙			
Sample No.	3-2			
Test No.	1			
Depth	6.5-7.0			
Tested by	RIN			
Test Date	8/6/10			
Checked by	JCC			
Check Date				
Diameter, in	2.87			
Height, in	5.534			
Water Content, %	22.5			
Dry Density, pcf	103.5			
Saturation, %	99.7			
Void Ratio	0.598			
Confining Stress, psi	25			
Undrained Strength, psi	19.73			
Max. Dev. Stress, psi	39.46			
Strain at Failure, %	14.9			
Strain Rate, %/min	1			
Estimated Specific Gravity	2.65			
Liquid Limit	0			
Plastic Limit	0			
Plasticity Index	0			

HANSON

Project: I-74 Mississippi River

Location: Quad Cities

Project No.: 08H0120E

Boring No.: RW03-2

Sample Type: Tube

Description: Gray vf. sandy silt / so. clay.

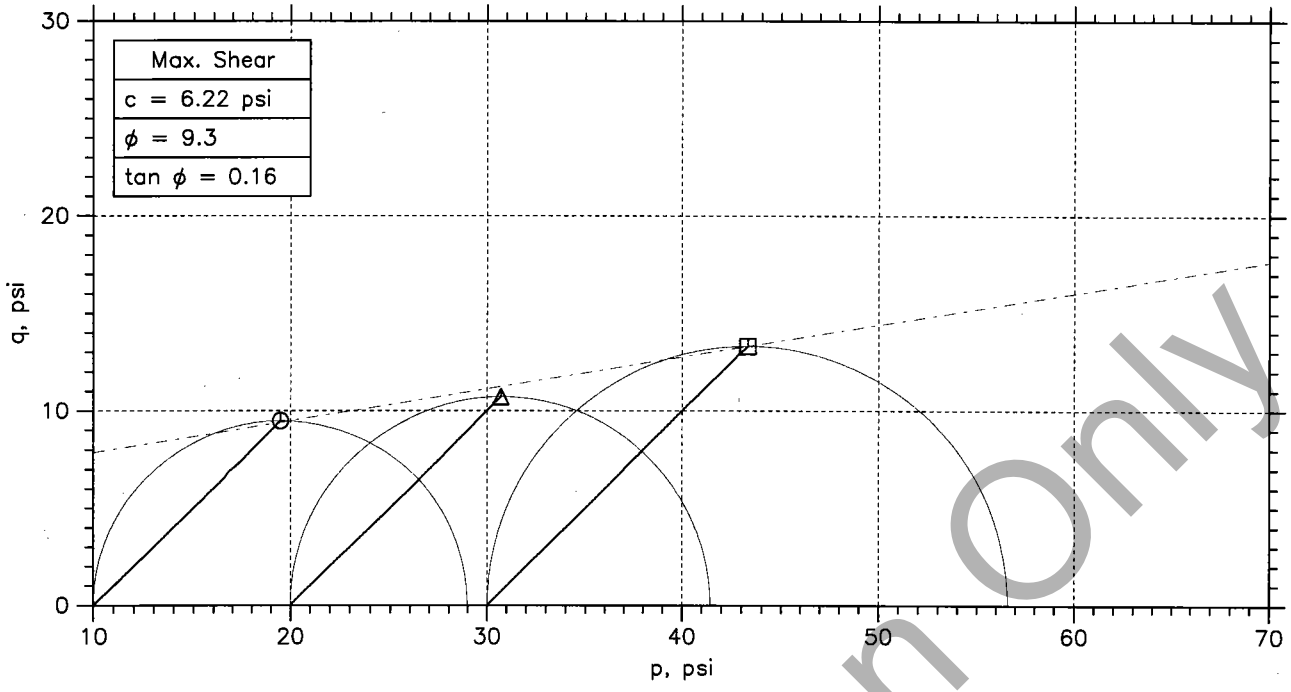
Remarks: 2500 # Load Cell Loadtrac II # 258112 LVDT55306

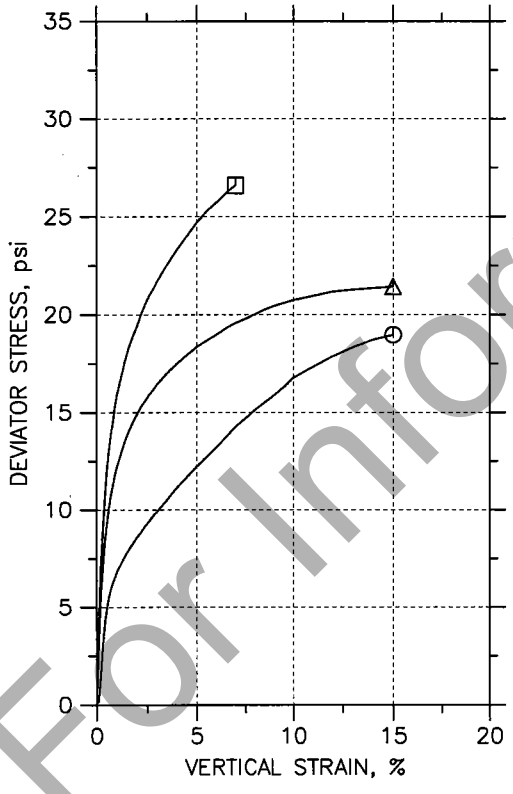
Phase calculations based on start of test.

Wed, 25-AUG-2010 15:54:34

For Information Only

CONSOLIDATED UNDRAINED TRIAXIAL TEST





Symbol		⏲	△	◫	
Sample No.		4-1	4-2	4-4	
Test No.		1 of 3	2 of 3	3 of 3	
Depth		8.0-8.5	8.5-9.0	9.2-9.7	
Initial	Diameter, in	2.835	2.86	2.841	
	Height, in	5.823	5.839	5.825	
	Water Content, %	24.4	25.4	26.1	
	Dry Density, pcf	102.4	97.62	98.84	
	Saturation, %	105.3	96.8	102.8	
	Void Ratio	0.615	0.695	0.674	
Before Shear	Water Content, %	23.5	22.9	23.3	
	Dry Density, pcf	101.9	103.	102.4	
	Saturation*, %	100.0	100.0	100.0	
	Void Ratio	0.623	0.607	0.616	
	Back Press., psi	22.01	21.97	22.01	
Ver. Eff. Cons. Stress, psi		9.981	20.03	29.98	
Shear Strength, psi		9.482	10.72	13.3	
Strain at Failure, %		15	15	7	
Strain Rate, %/min		0.0625	0.0625	0.0625	
B-Value		0.95	0.98	0.96	
Estimated Specific Gravity		2.65	2.65	2.65	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	

HANSON

Project: I-74 Mississippi River Br
Location: Quad Cities
Project No.: 08H0120E
Boring No.: RW03-2
Sample Type: Tube
Description: Brn. & gray vf. sandy silty clay
Remarks: 2500 # Load Cell Loadtrac II # 258112 FlowTrac II 13610 & 13610B & LVDT55306

Thu, 16-DEC-2010 14:53:35

Phase calculations based on start of test.
* Saturation is set to 100% for phase calculations.

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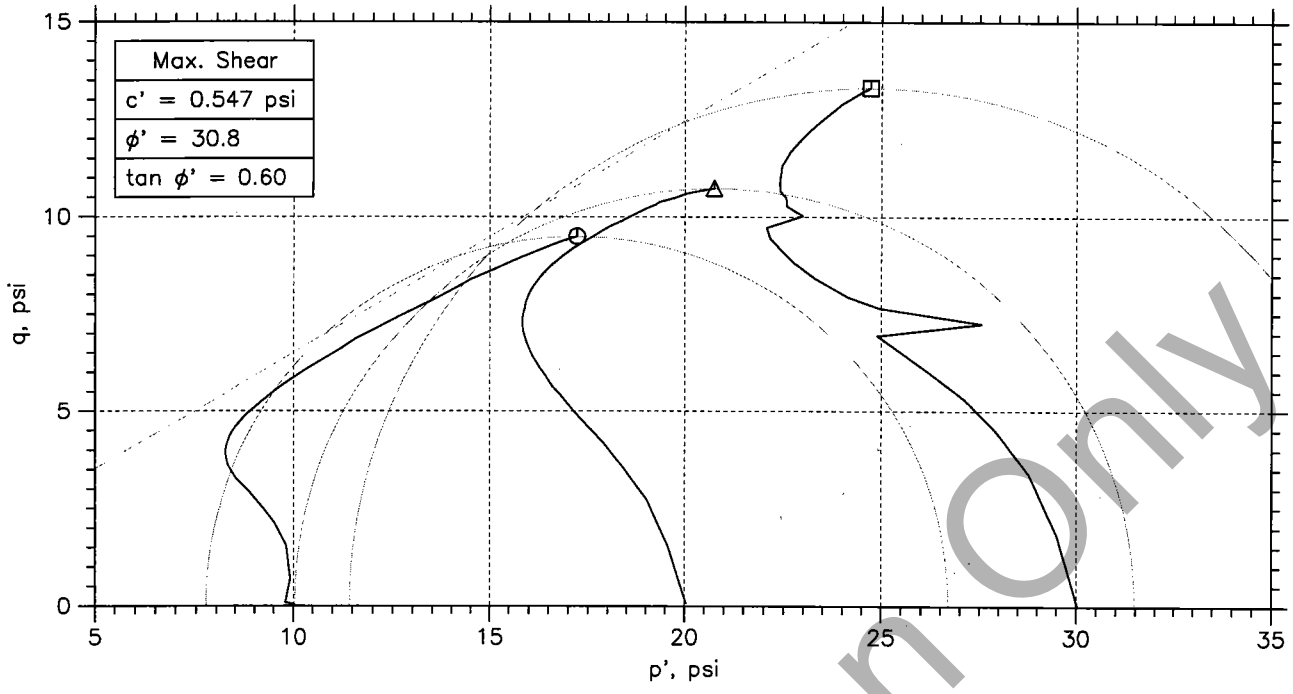
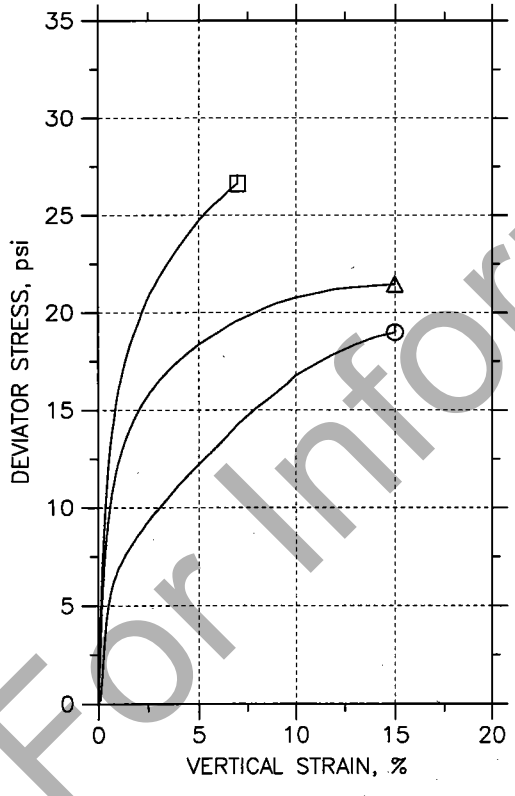
CONSOLIDATED UNDRAINED TRIAXIAL TEST





Symbol		⊙	△	⊡	
Sample No.		4-1	4-2	4-4	
Test No.		1 of 3	2 of 3	3 of 3	
Depth		8.0-8.5	8.5-9.0	9.2-9.7	
Initial	Diameter, in	2.835	2.86	2.841	
	Height, in	5.823	5.839	5.825	
	Water Content, %	24.4	25.4	26.1	
	Dry Density, pcf	102.4	97.62	98.84	
	Saturation, %	105.3	96.8	102.8	
	Void Ratio	0.615	0.695	0.674	
Before Shear	Water Content, %	23.5	22.9	23.3	
	Dry Density, pcf	101.9	103.	102.4	
	Saturation*, %	100.0	100.0	100.0	
	Void Ratio	0.623	0.607	0.616	
	Back Press., psi	22.01	21.97	22.01	
Ver. Eff. Cons. Stress, psi		9.981	20.03	29.98	
Shear Strength, psi		9.482	10.72	13.3	
Strain at Failure, %		15	15	7	
Strain Rate, %/min		0.0625	0.0625	0.0625	
B-Value		0.95	0.98	0.96	
Estimated Specific Gravity		2.65	2.65	2.65	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	

HANSON

Project: I-74 Mississippi River Br

Location: Quad Cities

Project No.: 08H0120E

Boring No.: RW03-2

Sample Type: Tube

Description: Brn. & gray vf. sandy silty clay

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

Phase calculations based on start of test.

* Saturation is set to 100% for phase calculations.

Thu, 16-DEC-2010 14:51:20

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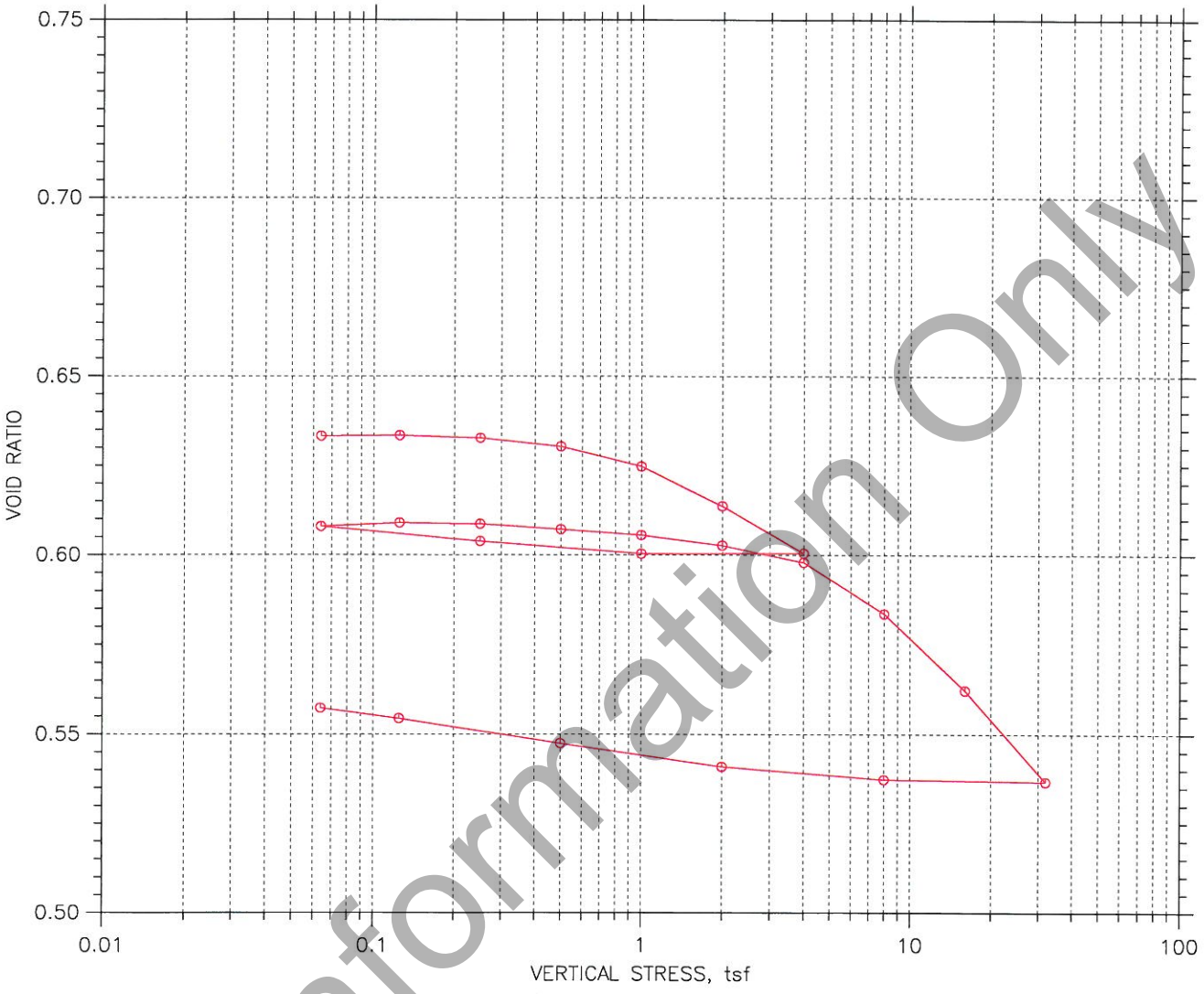
CONSOLIDATION TEST DATA

SUMMARY REPORT



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					Before Test	After Test
Overburden Pressure: 0 tsf				Water Content, %	24.59	21.82
Preconsolidation Pressure: 0 tsf				Dry Unit Weight, pcf	101.3	106.2
Compression Index: 2.54639e-313				Saturation, %	103.06	103.78
Diameter: 2.499 in		Height: 0.996 in		Void Ratio	0.63	0.56
LL: 0	PL: 0	PI: 0	GS: 2.65			

HANSON	Project: I74	Location: Quad Cities	Project No.: 08H0120E
	Boring No.: RW03-2	Tested By: Rin	Checked By: JCC
	Sample No.: 4-3	Test Date: 8/3/10	Depth: 9.0-9.2
	Test No.: 1	Sample Type: Tube	Elevation:
	Description: Red. & gray vf. sandy silty clay.		
	Remarks:		

Wed, 19-JAN-2011 14:32:00

CONSOLIDATION TEST DATA

Project: I74
Boring No.: RW03-2
Sample No.: 4-3
Test No.: 1

Location: Quad Cities
Tested By: Rin
Test Date: 8/3/10
Sample Type: Tube

Project No.: 08H0120E
Checked By: JCC
Depth: 9.0-9.2
Elevation:

Soil Description: Red. & gray vf. sandy silty clay.
Remarks:

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting Sq.Rt. min	T50 Fitting Log min	Coefficient of Consolidation Sq.Rt. in^2/sec	Coefficient of Consolidation Log in^2/sec	Coefficient of Consolidation Ave. in^2/sec
1	0.064	-0.0004536	0.633	-0.05	0.0	1.4	0.00e+000	5.83e-004	5.83e-004
2	0.125	-0.0005591	0.633	-0.06	14.4	0.0	5.67e-005	0.00e+000	5.67e-005
3	0.25	-0.0001238	0.633	-0.01	1.9	0.0	4.25e-004	0.00e+000	4.25e-004
4	0.5	0.001302	0.630	0.13	1.8	1.3	4.53e-004	6.38e-004	5.30e-004
5	1	0.004732	0.625	0.48	0.9	0.5	8.87e-004	1.61e-003	1.14e-003
6	2	0.01146	0.614	1.15	0.5	0.5	1.76e-003	1.66e-003	1.71e-003
7	4	0.01949	0.600	1.96	0.4	0.3	2.15e-003	2.46e-003	2.30e-003
8	1	0.01957	0.600	1.97	0.1	0.1	6.76e-003	1.50e-002	9.32e-003
9	0.25	0.01744	0.604	1.75	1.8	0.5	4.46e-004	1.70e-003	7.07e-004
10	0.064	0.01493	0.608	1.50	3.5	3.2	2.23e-004	2.46e-004	2.34e-004
11	0.125	0.01432	0.609	1.44	0.2	0.0	4.84e-003	0.00e+000	4.84e-003
12	0.25	0.01451	0.609	1.46	0.4	0.0	2.21e-003	0.00e+000	2.21e-003
13	0.5	0.01543	0.607	1.55	0.3	0.5	2.31e-003	1.64e-003	1.92e-003
14	1	0.01642	0.605	1.65	0.5	0.3	1.58e-003	2.55e-003	1.95e-003
15	2	0.01816	0.603	1.82	0.3	0.0	2.43e-003	0.00e+000	2.43e-003
16	4	0.02103	0.598	2.11	0.3	0.1	2.30e-003	8.23e-003	3.59e-003
17	8	0.02978	0.584	2.99	0.5	0.3	1.70e-003	2.39e-003	1.99e-003
18	16	0.04281	0.562	4.30	0.3	0.3	2.19e-003	2.82e-003	2.47e-003
19	32	0.05842	0.537	5.87	0.2	0.2	3.17e-003	4.02e-003	3.55e-003
20	8	0.05805	0.537	5.83	0.0	0.0	3.65e-002	8.64e-002	5.13e-002
21	2	0.05587	0.541	5.61	0.2	0.2	3.19e-003	4.48e-003	3.73e-003
22	0.5	0.05185	0.547	5.21	1.8	1.4	4.01e-004	5.31e-004	4.57e-004
23	0.125	0.04762	0.554	4.78	6.5	0.0	1.14e-004	0.00e+000	1.14e-004
24	0.064	0.04585	0.557	4.60	36.4	28.1	2.04e-005	2.64e-005	2.30e-005

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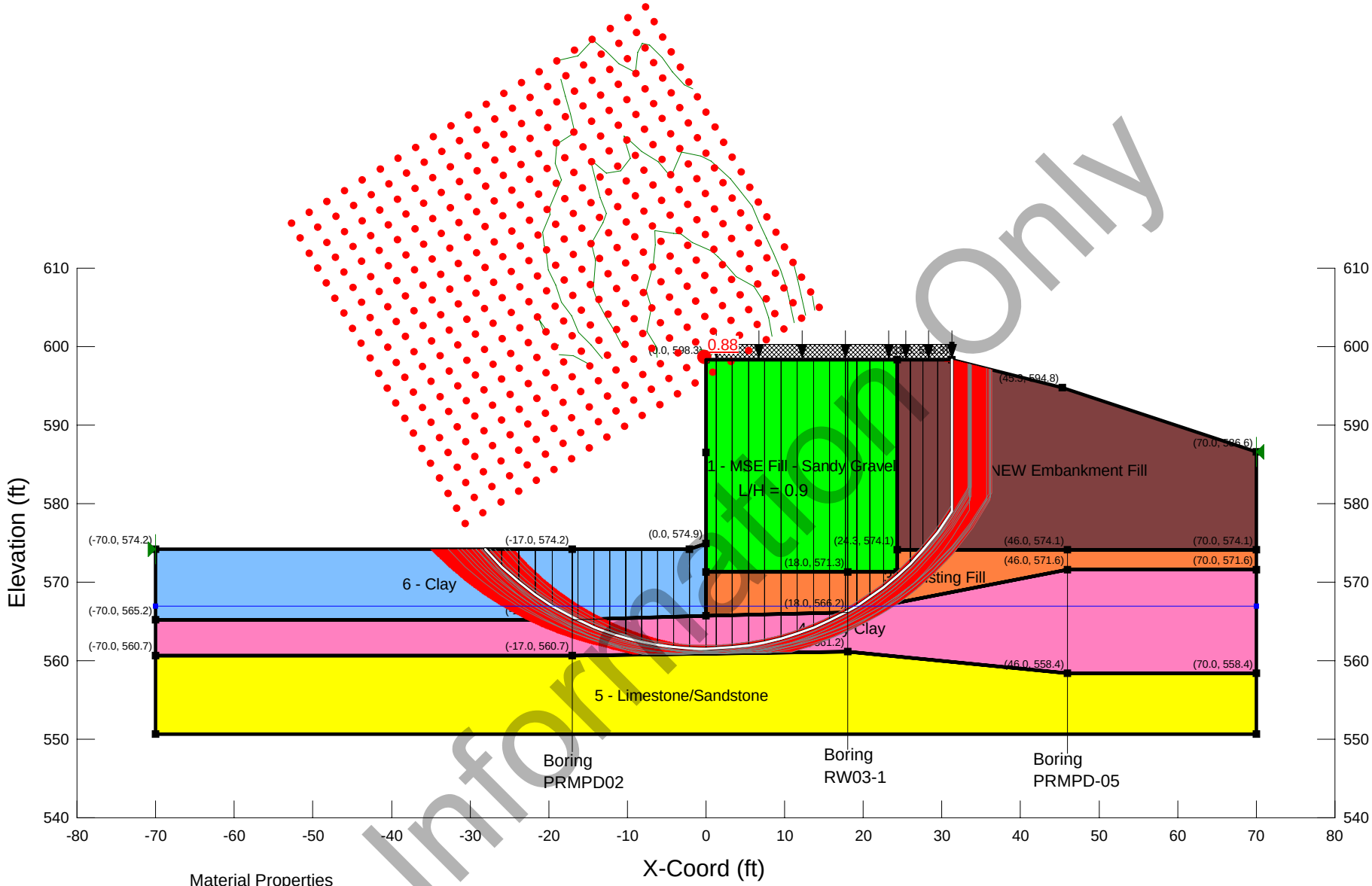

Material Properties

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: 125 pcf Cohesion: 600 psf Phi: 0 °
Name: 4 - Silty Clay Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion: 400 psf Phi: 0 °
Name: 5 - Limestone/Sandstone Model: Bedrock (Impenetrable)
Name: 6 - Clay Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion: 900 psf Phi: 0 °

SN 081-6012 IL-RW3
Case 1 - Sta 425+50.75 (Grid)
File Name: I-74_081-6012-Sta425+50-75_LH09.gsz
Last Edited By: Ryan English
Date: 2/11/2011 11:44:02 AM

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

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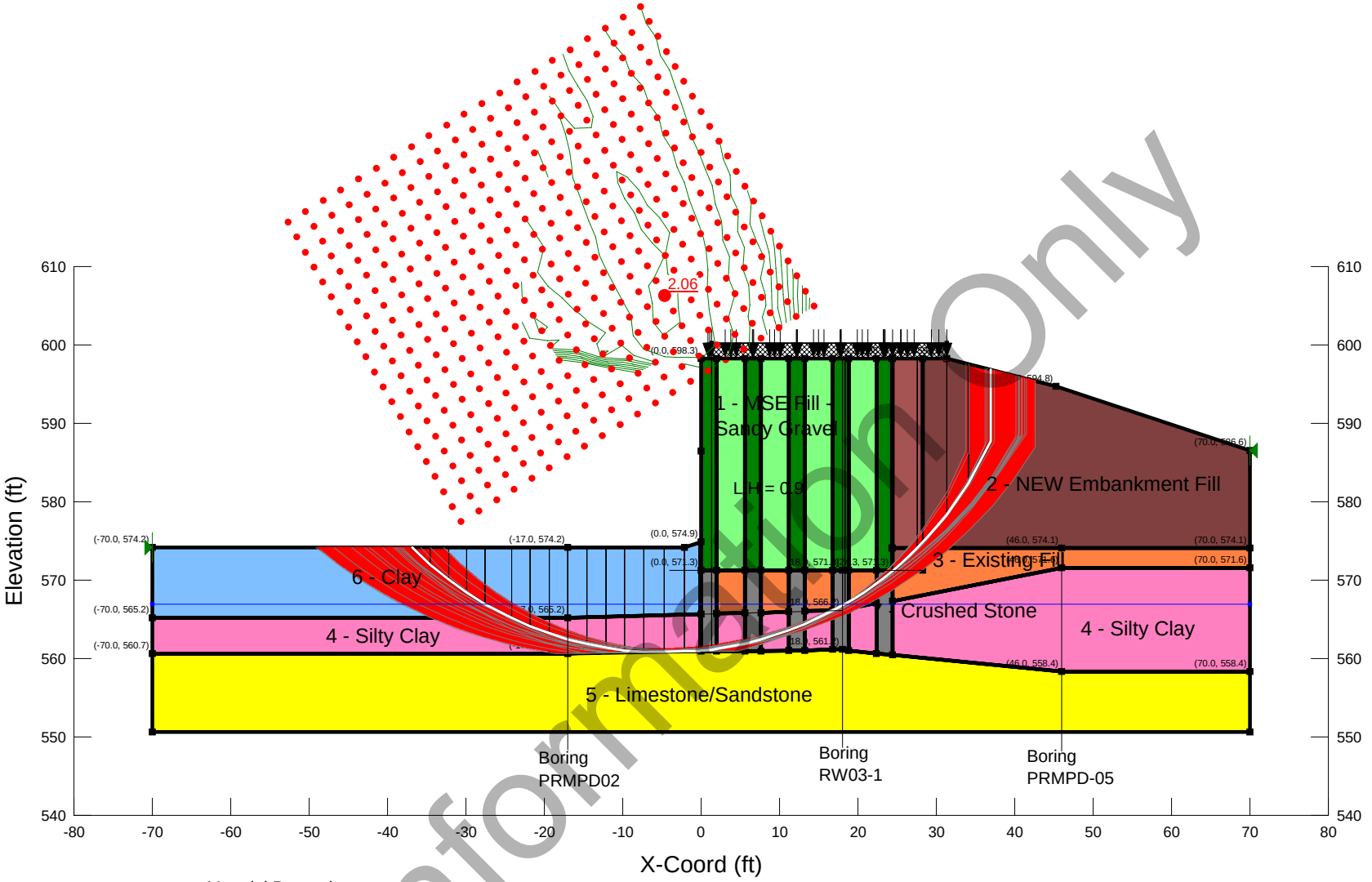

Material Properties

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: 125 pcf Cohesion: 600 psf Phi: 0 °
Name: 4 - Silty Clay Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion: 400 psf Phi: 0 °
Name: 5 - Limestone/Sandstone Model: Bedrock (Impenetrable)
Name: 6 - Clay Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion: 900 psf Phi: 0 °
Name: 7 - Crushed Stone Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion: 0 psf Phi: 42 °
Name: 1 - MSE Fill - Sandy Gravel (S) Model: Mohr-Coulomb Unit Weight: 220 pcf Cohesion: 0 psf Phi: 34 °
Name: 1 - MSE Fill - Sandy Gravel (C) Model: Mohr-Coulomb Unit Weight: 73.5 pcf Cohesion: 0 psf Phi: 34 °
Name: 2 - NEW Embankment Fill (S) Model: Mohr-Coulomb Unit Weight: 220 pcf Cohesion: 1000 psf Phi: 0 °
Name: 2 - NEW Embankment Fill (C) Model: Mohr-Coulomb Unit Weight: 73.5 pcf Cohesion: 1000 psf Phi: 0 °

SN 081-6012 IL-RW3
Case 1 - Sta 425+50.75 (Grid)
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Date: 2/11/2011 1:37:08 PM

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