September 8, 2010
L-68,482A

STRUCTURE GEOTECHNICAL REPORT

MORGAN STREET OVER ROCK RIVER
S.N. 101-6108 (NEW)
WINNEBAGO COUNTY
CITY OF ROCKFORD

PREPARED FOR:
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THREE FIRST NATIONAL PLAZA
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STRUCTURE GEOTECHNICAL REPORT
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1.0 INTRODUCTION

This report presents results of the geotechnical investigation performed for the proposed bridge replacement carrying Morgan Street over the Rock River. This work was performed in accordance with TSC Proposal No. 24,689 (revised) and the Subconsultant Services Agreement between CMT and TSC.

The bridge site is located north of the existing CC&P Railroad bridge and south of the Soo Line Railroad bridge that crosses the Rock River. The site falls within the northwest 1/4 of Section 26 of Rockford Township (T 44 N, R 1 E). A project location map is appended to this report.

The existing Morgan Street bridge has a total length of approximately 798 feet and is composed of eleven spans. The bridge extends several hundred feet west of the river where there are industrial buildings constructed immediately alongside and beneath the bridge deck. It is our understanding that the concrete abutments and piers are supported on timber piles.

The improvements are to include removal of the existing structure and replacement with a three span bridge having a total length of approximately 503 feet back to back and a width of 73'-2" feet out to out.

A significant portion of the existing bridge west of the river is to be replaced with an approach embankment (where the buildings will be removed). The new bridge will carry four lanes of traffic, with a Multi-Use Path on the south side and a sidewalk on the north side of the bridge. The proposed pavement grade will vary from about 20 to 32 feet over the 50 year high water elevation for the river, with the profile grade of the bridge deck generally rising from west to east.

2.0 SUMMARY OF WORK PERFORMED

A total of eleven (11) soil borings are included with this report. These include eight (8) structure borings (SB prefix) for the bridge foundation, with two (2) borings being performed for each abutment and pier. These structure borings extended 80 to 125 feet in depth. Two (2) borings were drilled for the west approach embankment (R-6 & R-7) extending about 15 feet below grade. The remaining boring (SC-1) was extended 33 feet below the river bed to help evaluate scour for the west pier. Please note that borings R-7, SB-1, SB-2, SB-6 and SC-1 were advanced through the bridge deck with casing extended to the ground or river bed. Some of the borings are offset from the pier and abutment locations due to obstructions or site conditions. Reference is made to the appended location plan showing general boring locations and the boring logs which identify the station, offset and elevation of each boring.

Drilling, sampling and testing procedures for these borings were in accordance with IDOT structure boring criteria. Soil samples were taken in accordance with the Standard Penetration Test, for which driving resistance to a 2" split-spoon sampler (in blows per 6" interval) provides an indication of the relative density of granular soils and consistency of cohesive soils. It should be noted that an automatic hammer was used to obtain the SPT samples in all borings, which has relatively high energy. Unconfined compressive strength values were determined while drilling using a modified Rimac spring tester.

Reference is made to the boring logs in the Appendix which indicate subsurface stratigraphy and soil descriptions, results of field and laboratory tests, as well as water level observations. Definitions of descriptive terminology are also included. While strata changes are shown as a definite line on the boring logs, the actual transition between soil layers will probably be more gradual.

3.0 DISCUSSION OF TEST DATA

3.1 West Embankment Borings (R-6 & R-7):

Boring R-6 was drilled on an existing asphalt pavement (alley) on the south side of the bridge, revealing approximately 4 inches asphalt over 5 inches crushed gravel and sand. Boring R-7 was drilled on the bridge deck revealing 6¾ inches of P.C. concrete. Approximately 14 feet of open space was encountered below the bridge deck in R-7, where the ground surface was about equal in elevation to boring R-6 (elev. 702).

Sandy Loam Fill was sampled below the pavement materials and below the deck to elevations on the order of 700. Sand Fill was also sampled below the Sandy Loam Fill at Boring R-7 to an approximate elevation of 698. Below the Fill at Boring R-6, very loose to loose native Sand and Sandy Loam deposits were encountered to an approximate elevation of 695. They exhibited Standard Penetration Test (SPT) values between 3 and 4 blows per foot (bpf). Soft to medium stiff Clay and Clay/Sandy Loam were encountered below the granular soils (native and fill) to approximate elevations between 692.5 and 693.5 at the borings.

Loose to medium dense Sand / Gravel and Sandy Loam were encountered below the cohesive soils extending to boring completion depths. They exhibited SPT blow counts between 9 and 16 bpf.

3.2 Riverbed Scour Boring (SC-1):

Boring SC-1 was performed through the bridge deck east of the proposed west pier where 6¾ inches of P.C. concrete was encountered. This boring encountered the river bed at a depth of 37 feet (elev. 690.6) below 3.8 feet of water. This boring encountered mostly native Sands and Gravels in a medium dense to dense condition (14 to 59 bpf) and in a saturated state.

A very stiff to hard Clay layer was found within the granular soils between elevation 673 and 682. The cohesive soils exhibited unconfined compressive strengths ranging from 3.5 to 6.5 tons per square foot (tsf) at moderate moisture contents (19-24%).

3.3 Structure Borings (SB-1 through SB-8):

Borings SB-1, SB-2 and SB-6 were drilled on the bridge deck revealing 7 to 8 inches of P.C. concrete. The ground surface was encountered approximately 20 to 22 feet below the bottom of the bridge deck at Borings SB-1 and SB-2 (approximate Elevation 701.5). At Boring SB-6 the surface of the water was encountered approximately 40 feet below the bridge deck (elev. 694.4), with the river bed encountered approximately 1 foot below the water (elev. 693.4). Boring SB-8 was located on the Morgan Street pavement where approximately 3½ inches of asphalt was found over 7½ inches of P.C. concrete. Boring SB-7 was located on the sidewalk adjacent to a residential building where approximately 5 inches of P.C. concrete was encountered.

Fill materials consisting of Sand / Gravel, Sandy Loam and Clay Loam were found to depths of 8 to 11 feet deep at Borings SB-1 and SB-2, and to depths of 3 to 5 feet in most of the remaining borings. Samples of the granular Fill exhibited SPT blow counts between 4 and 21 bpf, (indicative of loose to medium dense conditions). The cohesive Fill sampled at Boring SB-7 was found in a medium stiff condition (Qp=1.25 tsf) at a moisture content of 16 percent.

A layer of soft black Clay Loam was found buried beneath the fill soils in SB-1 at the proposed west abutment. This soil revealed a high moisture content (36%). Although a low hand penetrometer strength value was obtained (0.25 tsf), the SPT blow counts were indicative of a firmer condition. This week soil layer is located just below the water table and corresponds to generally soft or loose Sandy Loam soils in adjacent borings (R-6, R-7 & SB-2).

Each of the borings encountered thick interbedded layers of cohesive soil and Sand or Sand / Gravel, with the cohesive soil layers being more prevalent on the west side of the river. The cohesive soils were described mostly as Clay or Clay Loam having variable moisture contents (11-27%), with most being in the low range (below 14%). Unconfined compressive strength values typically ranged from about 1.7 to 6.0+ tons per square foot (tsf), with many samples being in a hard condition. Several borings encountered occasional layers of Sandy or Silty Loam which are typically marginally cohesive.

The Sand and Sand / Gravel soils encountered in each boring exhibited variable STP blow counts. They were typically in the range of 10 to 50 bpf which is indicative of a medium dense to dense condition. Each of the borings encountered very dense materials where the STP blow counts

exceeded 50 blows per foot. In most instances this occurred below a depth of 70 feet. Boring SB-5 was the only location to encounter very dense materials above 70 feet.

It should be noted that many zones of Sand / Gravel stratigraphy revealed evidence of large Cobbles or possible Boulders. Evidence of these materials is frequently indicated by high blow counts in excess of 50 blows per foot or rock fragments recovered within the split spoon sampler.

3.4 Groundwater Observations:

At the time of drilling, the water level within Rock River was recorded at about elevation 694.4. Each of the borings performed for this study east and west of the river encountered free groundwater that were within 3.0 feet of this elevation. The free groundwater in each boring was associated with water bearing layers of Sand / Gravel materials.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Seismic Considerations:

The project site is located at the north end of the state within south central Winnebago County and the City of Rockford. The following summarizes seismic design data and site classification.

Seismic Category: A
Soil Profile: Type II
Site Coefficient: 1.2
Horiz. Bedrock Acceleration Coefficient: 0.0325

It should be noted that applying a horizontal acceleration coefficient of 0.0325 to the soil stratigraphy had a relatively minor effect of reducing the factor of safety by about 0.2 for stability analysis. Although several borings did encounter occasional samples of loose Sand, their occurrence was limited in extent to relatively thin layers below the proposed footing elevations. Based on the site stratigraphy, the relatively low seismic design loads will not have a significant impact on geotechnical issues such as slope stability, liquefaction, settlement or bearing capacity.

4.2 Scour Potential:

Morgan Street Bridge is considered susceptible to scour from the Rock River. Crawford, Murphy & Tilly, Inc. (CMT) performed a sounding of the river bottom in September 2005. The results revealed that the existing bridge had bottom elevations about 10 to 20 feet lower than the stream bottom located 50 to 100 feet downstream. The lowest probe depth was at 28.8 feet below water surface which corresponds to elevation 661.06.

TSC has completed three borings for scour potential adjacent to the proposed location of the west pier. SB-3 and SB-4 were located on the bank of the stream, to the west of the proposed pier location. Boring SC-1 was drilled through the deck to the east of the proposed pier. All three of these borings have encountered a significant layer of relatively hard Clay which was initially encountered at elevation 678 - 682 and extended to elevation 670 - 673. Grain size analysis were performed on several representative samples from these borings for the purpose of assisting in a more detailed scour analysis. The following table summarizes the locations, elevations and D50 particle size from these samples.

Grain Size Analysis Results From Representative Scour Samples

Boring	Sample Location		D50 Particle Size	Soil Classification
	Depth	Elevation		
West Pier (Bottom of footing = 675.01)				
SC-1	38.5 - 42.5	687.0	8.5 mm	Gray & black Gravel / Sand A-1-a
	43.5 - 45.0	683.5	15 mm	Gray Gravel / Sand A-1-a
	46.0 - 47.5	681.0	0.002 mm	Hard gray Clay A-7-6 (27)
SB-3	6.0 - 7.5	690.7	0.95 mm	Brown Sand A-1-b
		Average Particle Size:	6.1 mm	
East Pier (Bottom of footing = 683.64)				
SB-6	46.0 - 47.5	688.1	1.9 mm	Brown Sand / Gravel A-1-b
	53.5 - 55.0	680.6	0.26 mm	Brown fine Sand A-3
	58.5 - 60.0	675.6	0.25 mm	Gray fine Sand A-3
		Average Particle Size:	0.80 mm	

4.3 Scour Analysis:

TSC has been provided with the most recent scour analysis results performed in June 2010 by CMT. Summarized in the following table are the scour elevations during a 100 and 500 year storm event.

Freq. Year	West Abutment	Pier 1 (west)	Pier 2 (east)	East Abutment
100	696.40	683.57	696.73	N/A
500	690.11	682.93	696.09	N/A

N/A - No potential scour at this location.

It is understood that the proposed bridge design is to include placement of large riprap adjacent to the new west abutment for scour protection. In addition, the proposed piers will be constructed close to the bank of the river, as opposed to the existing bridge which has two piers in the center area of the river. However, a large degree of conservatism is warranted given evidence that the river has a history of scour and given the catastrophic consequences of an event degrading the support for the pier footings. Therefore, it is our opinion that the driving criteria for the piles at the bridge piers should take into account the scour elevation for a 500 year storm event.

4.4 MSE Wall at West Bridge Abutment:

Current plans call for the construction of a mechanically stabilized earth (MSE) at the west bridge abutment. The MSE wall wraps around the abutment and extends approximately 80 feet west from the abutment along both the north and south sides of the bridge approach embankment. The MSE wall will have wall heights ranging from approximately 19 to 23 feet, with the embankment sloping down at a 1V:3.5H directly in front of the north and south sides of the walls. The leveling pad for the MSE walls is set at approximate Elevation 695.5. Borings SB-1 and SB-2 encountered unsuitable bearing materials at and below the base elevation, including soft black Clay Loam, loose Sand/Gravel and Sandy Loam fill materials. More suitable bearing materials, consisting of medium dense Sand and Gravel, were encountered at approximate Elevation 689.0 in the borings, i.e. approximately 10 feet below existing grade.

The existing Fill materials and underlying soft Clay soils on the west side of new bridge are unsuitable for support of gravity bearing retaining walls and new embankment fill. If left in-place, consolidation of them could lead to significant settlements, causing distress to the retaining wall and foundations constructed thereupon. Settlement problems in connection with the Morgan Street bridge approach slabs would also be expected. It is estimated that greater than 1" of total settlement could be expected from the placement of 20+ feet of new embankment fill in the area of SB-1 and SB-2. Therefore, remedial measures will need to be preformed in order to provided adequate bearing capacity for the retaining walls, minimize settlement and provide an adequate factor of safety for global stability.

4.4.1 Remove and Replace Option:

One option would be to completely remove and replace the unsuitable soil types at the base of the MSE walls as part of grading activities. Removal and replacement would have to extend from approximate Station 46+40 to 47+50 down to suitable bearing soils encountered at approximate Elevation 689.0. The limits of excavation behind the face of the wall would have to extend for the full length of MSE reinforcement zone, in order to minimize settlement and to provide an adequate factor of safety for global stability. The excavation in front of the retaining wall should extend at least 1.0 foot beyond the limits of the bottom edge of retaining wall leveling pad and then down at a 1V:1H slope until suitable bearing soils are encountered.

Replacement materials should consist of crushed stone or crushed gravel between ¼ to 3 inches in size and containing no fines; IDOT gradations CA-1 and CA-7 meet these criteria. This “structural” fill should be spread in 12-inch layers loose thickness, each lift to be densified using vibratory compaction equipment. The MSE wall constructed on the crushed stone or crushed gravel backfill may be proportioned for 3000 psf bearing. The 3000 psf bearing value is generally satisfactory for retaining wall construction, with a maximum settlement of about 1 inch estimated.

It should be noted that the undercut for the MSE wall extends about 8 feet below the Estimated Water Surface Elevation (EWSE = 697.30). Therefore, a cofferdam will be required for undercutting and would likely require continuous pumping from wells or a well point system during construction. It is understood that the cofferdam may be left in place in order to protect the MSE wall against a 500 year storm event. The placement of large riprap adjacent to the walls would otherwise be required for scour protection.

4.4.2 Aggregate Columns Option:

Consideration may also be given to the use of aggregate columns to improve the existing granular and soft clay fill at the west bridge abutment, i.e. from approximate Station 46+50 to 47+45. The aggregate column specialty contractor will provide their own specific design spacing for the aggregate columns as well as installation procedures. The following minimum design requirements should be met by the aggregate column ground improvement.

The aggregate column ground improvement area behind the face of the wall should extend for the full length of MSE reinforcement zone. This would provide adequate bearing for retaining walls (i.e. about 4 feet below existing grade/frost depth) as well as the reinforced zone. The aggregate columns should also be engineered to provide an adequate factor of safety for global stability as well as minimize settlement at the bridge approach slabs. The aggregate columns should be extended through the existing granular and soft clay fill layers, to typically penetrate the medium dense Sand and Gravel found at approximate Elevation 689.0. Shallow footings constructed on aggregate columns improved ground should be able to be designed for a net allowable bearing pressure in the range of 3000 to 5000 psf with a maximum settlement of 1 inch (0.6 inch differential settlement).

It should be noted that a cofferdam will not be required during the installation of the aggregate columns. However, the placement of large riprap adjacent to the walls would be required for scour protection against a 500 year storm event.

4.4.3 *Steel Piles:*

Steel Piles are not considered to be a viable ground improvement option for the MSE wall. While the piles may provide suitable bearing for the face of the retaining wall, they do not take care of the ground improvement needed to provide adequate bearing within the MSE reinforcement zone. Therefore, the potential would exist for excessive differential settlement between the face of the wall and the reinforcement zone. Also, settlement problems in connection with the Morgan Street bridge approach slabs would still be expected.

4.5 Pile Foundations for Piers and Abutments:

It is our understanding that a previous bridge was located at this site which included piers supported on timber piles. The exact locations of these old timber piles is currently unknown. However, the new pier locations are situated so as to avoid possibly encountering the old pilings during driving of new piles.

The installation of new piles must be able to penetrate occasional layers of dense stratigraphy and occasional cobbles or boulders which may also be encountered. It is our opinion that steel H-piles are best suited to deal with these conditions.

Summarized in the following table are the estimated tip elevations and pile lengths for steel H-piles having an HP 12x53 and HP 14x73 section. IDOT criteria stipulates that steel H-piles at the bridge piers must be driven to lengths which are suitable for foundation support after a deep scour event, i.e. a 500 year storm event. The pile lengths and associated allowable resistance available given below at the piers take into account the geotechnical losses due to scour. As for the west abutment, the current design includes placement of large riprap adjacent to the new west abutment for scour protection, with no potential scour expected at the east abutment. Therefore, no reduction was taken into account for the pile design at the abutments.

Estimated Pile Lengths* and Tip Elevations
Factor of Safety = 3.0

Boring and Location	Bottom of Concrete Elevation	Pile Section	Nominal Req. Bearing 270 kips		Nominal Req. Bearing 360 kips		Nominal Req. Bearing 420 kips	
			Depth / Elevation	Allowable Resistance Available**	Depth / Elevation	Allowable Resistance Available**	Depth / Elevation	Allowable Resistance Available**
SB-1 W Abutment	712.97	HP12x53	81 ft (633)	90 kips	94 ft (620)	120 kips	99 ft (615)	140 kips
		HP14x73	64 ft (650)		79 ft (635)		84 ft (630)	
SB-2 W Abutment		HP12x53	66 ft (648)		89 ft (625)		99 ft (615)	
		HP14x73	48 ft (658)		74 ft (640)		84 ft (630)	
SB-3 Pier 1 (west)	688.22	HP12x53	56 ft (634)	88 kips	64 ft (626)	118 kips	64 ft (626)	138 kips
		HP14x73	46 ft (644)	87 kips	64 ft (626)	117 kips	64 ft (626)	137 kips
SB-4 Pier 1 (west)		HP12x53	75 ft (615)	89 kips	92 ft (598)	119 kips	99 ft (590)	139 kips
		HP14x73	64 ft (626)	89 kips	79 ft (611)	119 kips	89 ft (601)	139 kips

SB-5 Pier 2 (east)	700.54	HP12x53	65 ft (637)	89 kips	76 ft (626)	118 kips	84 ft (618)	138 kips
		HP14x73	58 ft (644)	89 kips	67 ft (635)	119 kips	73 ft (629)	139 kips
SB-6 Pier 2 (east)		HP12x53	71 ft (631)	89 kips	93 ft (609)	119 kips	N/A	
		HP14x73	61 ft (641)	89 kips	73 ft (629)	119 kips	84 ft (618)	139 kips
SB-7 E. Abutment	726.71	HP12x53	39 ft (689)	90 kips	46 ft (681)	120 kips	51 ft (677)	140 kips
		HP14x73	33 ft (695)		40 ft (688)		45 ft (683)	
SB-8 E. Abutment		HP12x53	44 ft (684)		55 ft (673)		66 ft (662)	
		HP14x73	33 ft (694)		44 ft (684)		50 ft (678)	

* Pile lengths include 1.0 foot embedment into pile cap.

** The variability in the allowable resistance available is due to the pile section and the depth of scour which was taken into account at the piers.

The above estimated pile lengths are being provided for contract estimates. The actual pile lengths should be determined during installation based on resistance to driving criteria. It is recommended that at least one test pile be driven at each abutment and pier prior to ordering piles for production driving. The test piles are normally driven to 110 percent of the Nominal Required Bearing shown on the plans. It is recommended that the steel H-piles be provided with metal pile shoes (pile points) due to the possible presence of cobbles, boulders or existing timber piles which may be encountered during pile driving. The driving equipment should be selected so that the piles can be driven to the required allowable resistance available at an adequate final penetration resistance and without inducing pile stresses that exceed allowable values.

4.6 Groundwater Management and Cofferdams:

The two bridge piers will be located along each side of the River. The borings performed adjacent to the west pier show the excavation for proposed footings will extend through loose Sand and silty Sand in a saturated condition. It is understood that the Estimated Water Surface Elevation (EWSE) to be used is 697.30. The proposed bottom of the concrete footing at the west pier (688.22) will be about 9 feet below the EWSE. Therefore, a cofferdam will be required for construction of the west pier footing which must be designed for hydrostatic pressures. As for the east pier, the bottom of the concrete footing (700.54) will be about 3 feet above the EWSE, therefore a cofferdam will not be required.

4.7 West Approach Embankment:

The approach embankment area west of the bridge is being considered for an area of pedestrian traffic and congregation. The footprint for the west approach embankment covers a large area which includes about five spans of the existing bridge and various industrial and warehouse type buildings, some of which actually cross under the existing bridge deck. The preliminary designs for the embankment include side slopes of 1V:3.1H to 1V:3.5H, with north side of the embankment being graded with several steps/benches along sloped embankment.

Initial work will include demolition and removal of the bridge and building structures. It will not be required to remove below grade foundation walls and footings. However, all walls, bridge piers and other structural elements which extend above grade should be removed since they will interfere with placement of new earth embankment. Existing slab on grade floors should be broken into pieces or otherwise removed to prevent a drainage barrier at the base of new embankment. It may be required to use granular fill or controlled flowable fill to fill in voids and cavities, prior to placement of earth embankment. The construction procedures and details of demolition and removal should be sufficient to prevent any voids or drainage barriers from being buried within the embankment.

Borings R-6 and R-7 were performed within the area of the west approach embankment, with Borings SB-1 and SB-2 performed within the MSE reinforcement zone portion of the approach embankment. As previously stated above, remedial measures will need to be preformed in the area reinforcement zone for the MSE wall and west bridge abutment. Borings R6 and R7 encountered loose Sand, silty Sand and Sandy Loam materials having moderate moisture contents. Approximately 8 and 18 feet of new fill will be placed for the new embankment at Borings R6 and R7, respectively. It is estimated that an inch or less of total settlement would be expected from the placement of the new embankment fill in the area of Borings R6 and R7.

4.8 East Cut Slope:

It is understood that a railroad relocation project has been incorporated into this project, which eliminates the existing tracks below the eastern bridge span. Therefore, a minimum vertical railroad clearance constraint is no longer required, resulting in a lower roadway profile and abutment on the

east side. The east pier (Pier 2) was also moved further east away from the river avoiding the need for cofferdam during construction as well as minimizing scour at the pier.

There are two major slopes on the east side of the river. The upper slope extends between the multi-use path (approx. Elev. 719) and the bottom of the east abutment (Elev. 726). The lower slope extends from the east bank of the river (approx. Elev. 684) up to the multi-use path (approx. Elev. 719). The new pile supported footing for the east pier will be constructed mid slope. The improvements will also include a concrete slope wall along the slope from the toe of the multi-use path toe to the abutment. It should be noted that the geotechnical investigation has included Borings SB-6 at the river, SB-5 adjacent to the existing railroad and SB-7 & SB-8 at the top of slope adjacent to the abutment. The soil stratigraphy has consisted of Sand or Sand / Gravel in each boring.

4.9 Global Stability:

Global stability analyses were performed at the east bridge/abutment embankment. The stability analyses were run using SLIDE 5.0 computer program by Rocscience Inc. The Bishop method (i.e. circular failures) was utilized for the proposed embankment slope. Since the borings revealed no cohesive soils in the stratigraphy, there is no discrepancy between short term and long term strength conditions (C = 0). The slope stabilities were created using draws provided by Crawford, Murphy & Tilly, Inc dated August 2010. Results are summarized in the following table.

East Bridge/Abutment Emankment		
General Location	**Figure**	**Factor of Safety**
Multi-Use Path to Morgan Street	1	1.9
River bottom to Multi-Use Path	2	2.0

The results of the global stability analyses can also be seen on the computer-generated figures included in the Appendix. These figures show the geometry of the slope, soil stratigraphy, material properties and the one hundred (100) most critical slip surfaces and associated factors of safety.

Factors of safety determined by the stability analyses for the embankment ranged from 1.9 to 2.0. The global stability analyses performed for the embankment meet the minimum requirements set by the IDOT Geotechnical Manual of 1.5

4.10 Lateral Earth Pressures

Lateral earth pressures for permanent underground structures will be dependent on the type of backfill used, whether it is in a drained or undrained state, as well as loading conditions. Equivalent fluid pressures (EFP) given below for cohesive and granular backfills assuming active (Ka) and passive (Kp) earth pressures. The values shown represent the increase in lateral pressure over a 1.0 foot distance measured in pounds per square foot (psf/ft).

BACKFILL TYPE	EQUIVALENT FLUID PRESSURE (PSF/FT)			
	ACTIVE CONDITION		**PASSIVE STATE**	
	DRAINED	UNDRAINED	DRAINED	UNDRAINED
GRANULAR	35	80	400	250
COHESIVE	50	85	350	250

The active condition applies to retaining walls which are free to rotate at their top. The passive state is induced in soil which is resisting lateral movement or displacement.

The values shown above are nominal, i.e. are based on average soil conditions. They also assume a level backfill height behind the walls; sloping backfill will increase lateral earth pressures and should be analyzed on an individual basis. It should be noted that for the EFP values given for granular soils be valid, the wedge of granular materials should extend a minimum distance at the top of the wall (or ground surface) equal to the height of the wall.

An appropriate surcharge load should be applied at the top of below grade walls in computing lateral earth pressures; 100 to 200 psf is normally used for sidewalks and/or bike paths. Finally, the height of free-standing retaining walls with clay backfill should be limited to approximately 6 feet, to avoid excessive deflections.

Backfill placed against retaining walls should be compacted to between 90 and 95 percent of Modified Proctor density. Compaction in excess of 95 percent is not desirable, since it can result in higher lateral earth pressures than recommended for design. Also, heavy compaction equipment should not be used on the high side of the wall within a horizontal distance equal to the height of backfilling, as this may result in over-stressing of the wall and excessive deflection.

5.0 CLOSURE

It is recommended that full-time technician services be provided by Testing Service Corporation personnel to observe and monitor undercuts and placement of new fill materials. In addition, adequacy of building materials, stripping and undercutting, as well as fill placement and compaction should be monitored for compliance with the recommended procedures and specifications.

The analysis and recommendations submitted in this report are based upon the data obtained from the eleven (11) soil borings performed at the locations indicated on the appended plan. This report does not reflect any variations which may occur between these borings, the nature and extent of which may not become evident until during the course of construction. If variations are then identified, recommendations contained in this report should be re-evaluated after performing on-site observations.

We are available to review this report with you at your convenience.

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Vice President

APPENDIX

PROJECT LOCATION MAPS (2)

RESULTS OF STABILITY ANALYSIS (2)

SOIL TEST DATA SHEETS (3)

BORING LOGS (11)

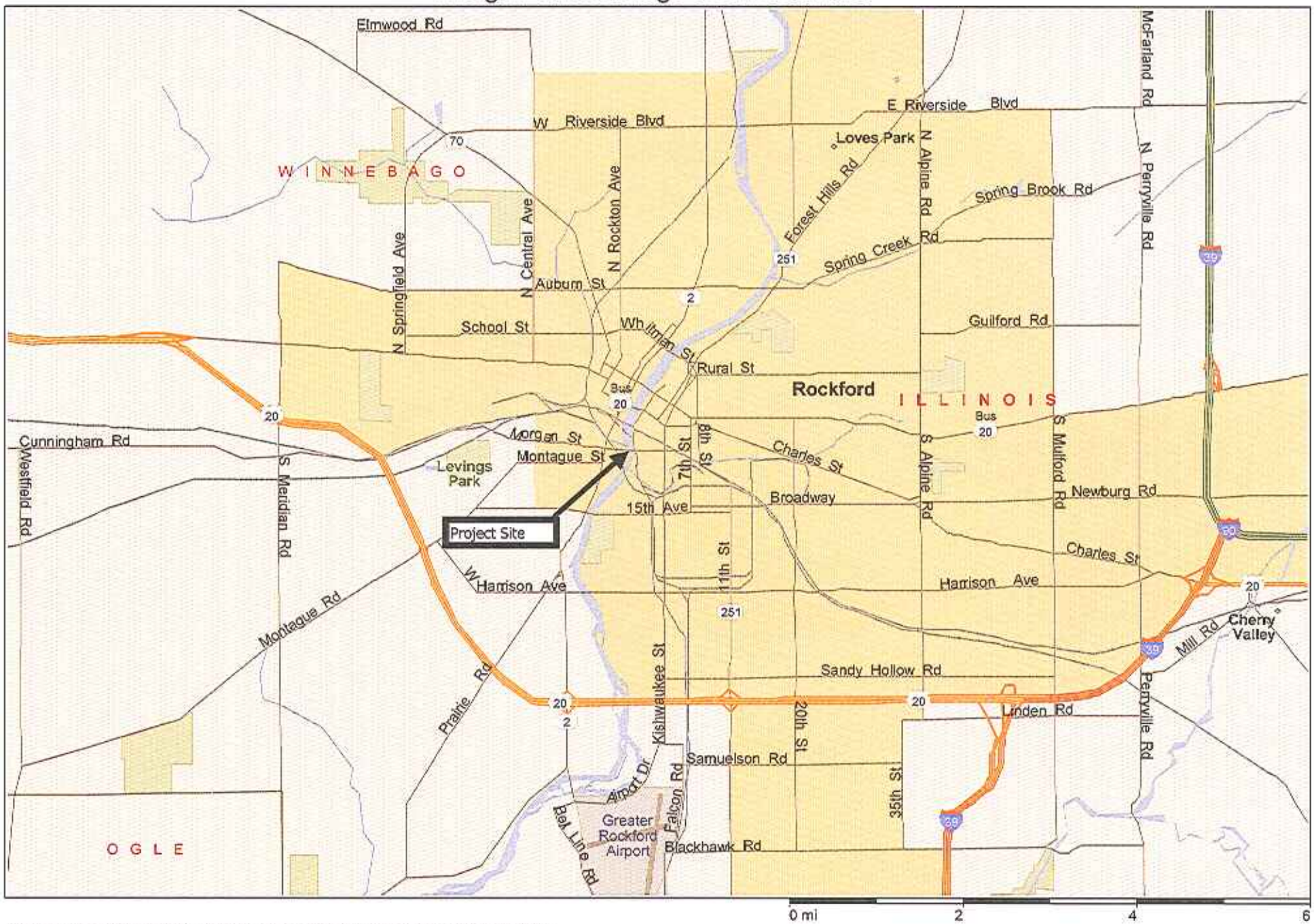
LEGEND FOR BORING LOGS

SOIL TEXTURAL CLASSIFICATION SYSTEM

AASHTO SOIL CLASSIFICATION SYSTEM

BORING LOCATION PLAN

Morgan Street Bridge over Rock River



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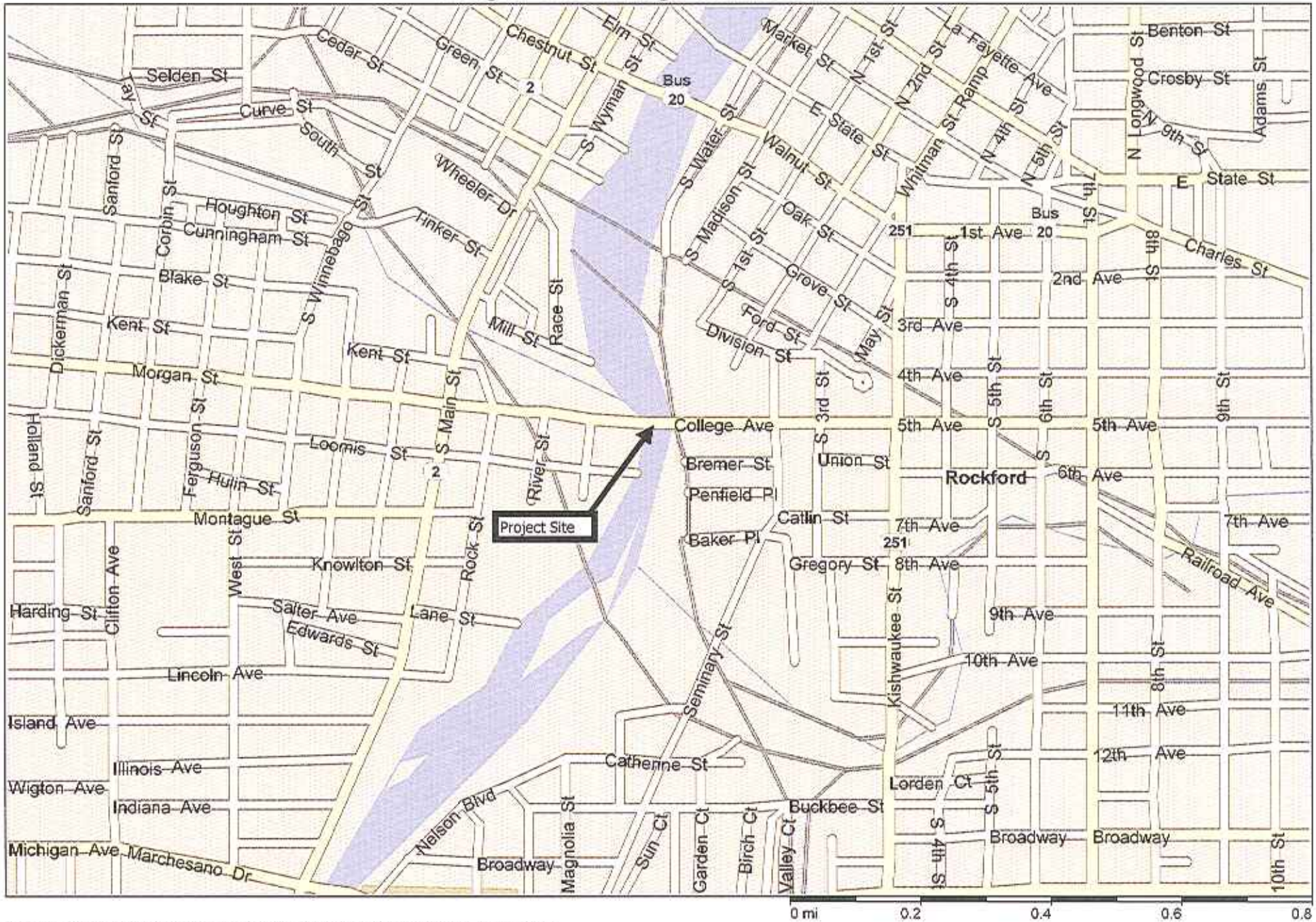
Morgan Street Bridge over Rock River



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Testing Service Corporation
457 E. Gundersen Dr.
Carol Stream, IL 60188

September 3, 2010

TSC Job No. L-68,482A
Morgan St. over Rock River
S.N. 101-6108 (New)
Rockford, Illinois

Global Stability Analysis
Method: Bishop
Circular

FIGURE 1
East Abutment Slope

Soil #	Soil Type	Total Unit Weight	Friction Angle
1	Loose Sand	112 pcf	28
2	Med Dense Sand, Gravel	115 pcf	33
3	Med Dense to Dense Sand, Gravel	125 pcf	35
4	Med Dense Sand	115 pcf	32
5	Loose Sand, Gravel	113 pcf	30
6	Med Dense to Dense Sand	125 pcf	35

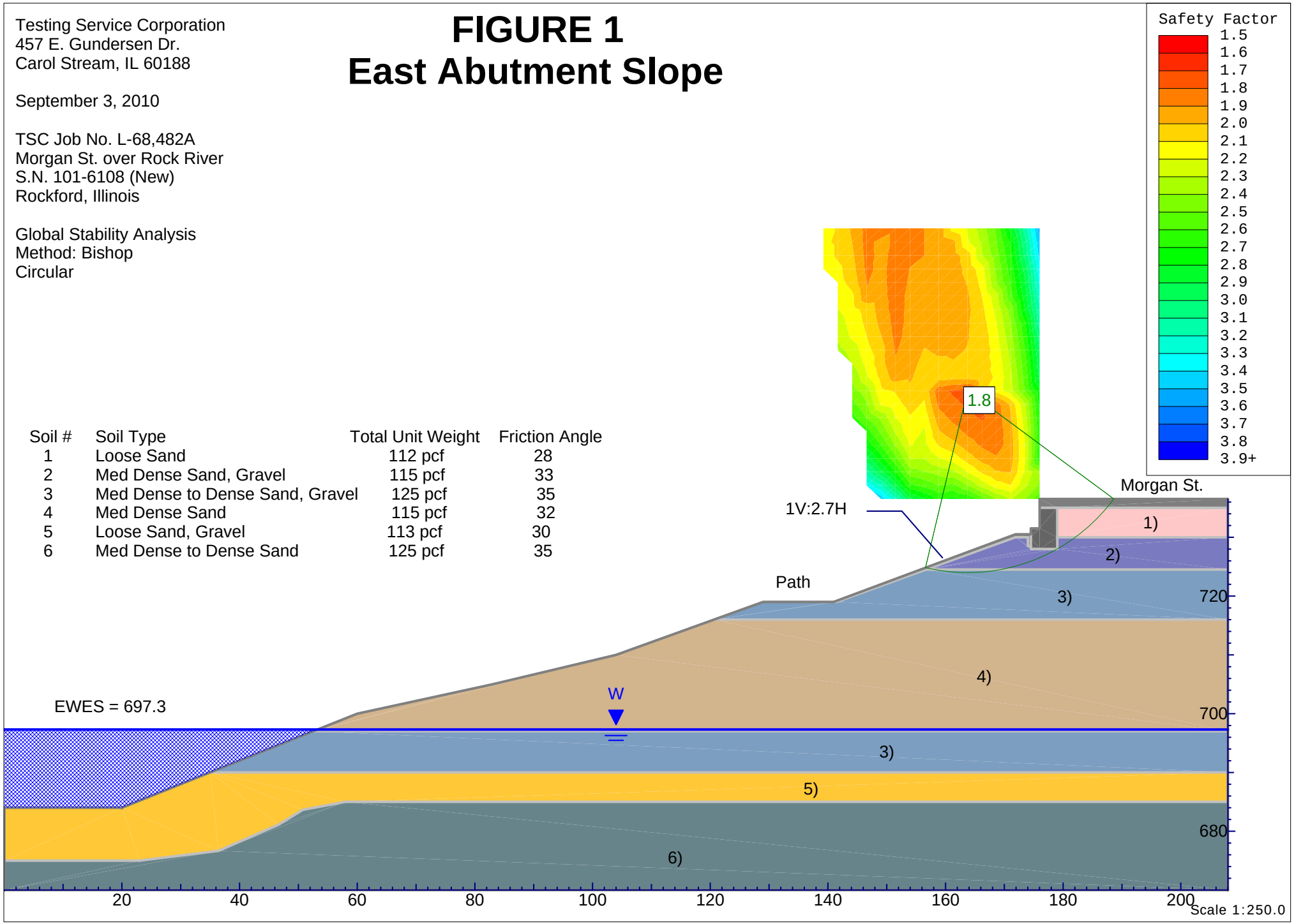


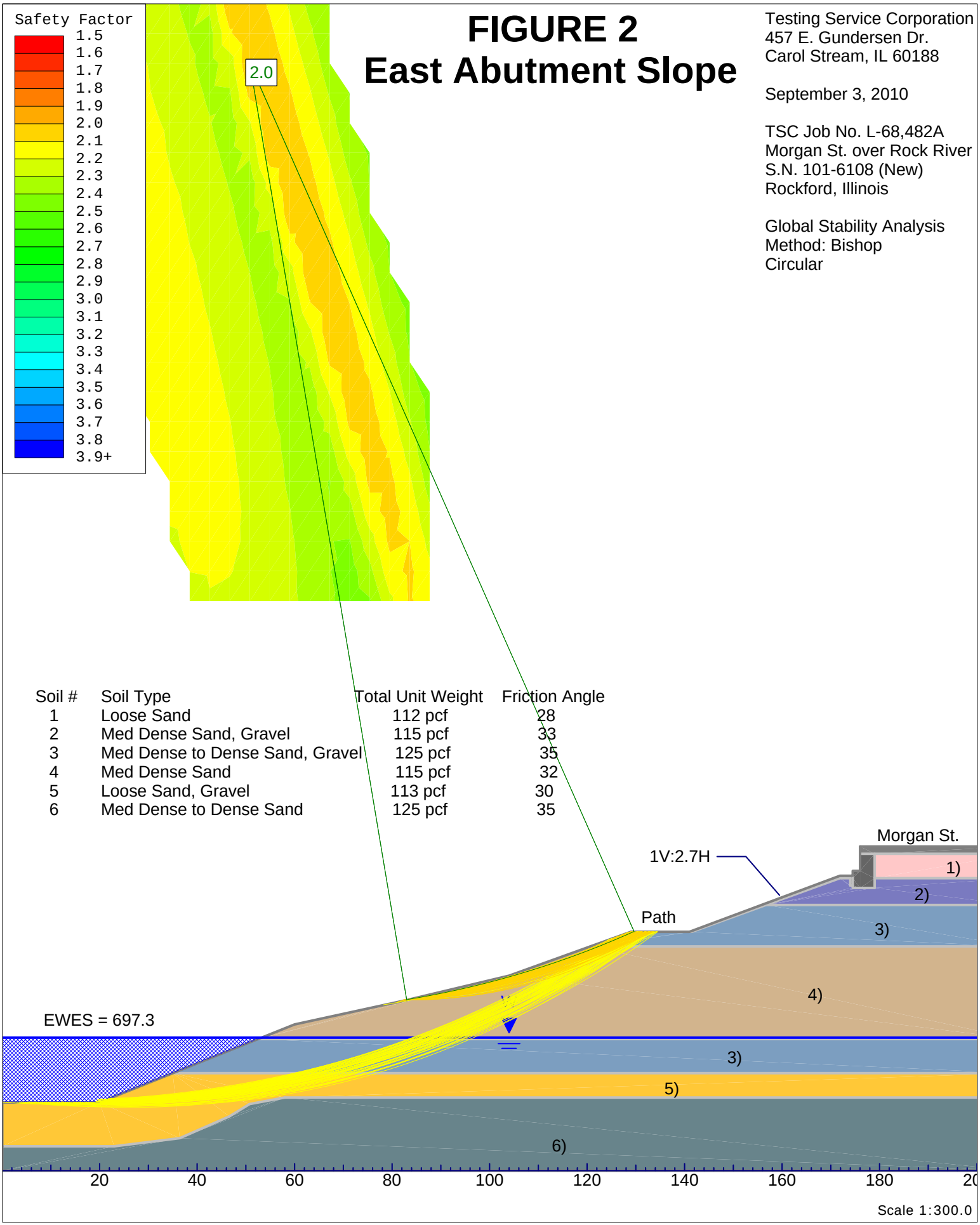
FIGURE 2
East Abutment Slope

Testing Service Corporation
457 E. Gundersen Dr.
Carol Stream, IL 60188

September 3, 2010

TSC Job No. L-68,482A
Morgan St. over Rock River
S.N. 101-6108 (New)
Rockford, Illinois

Global Stability Analysis
Method: Bishop
Circular



Soil #	Soil Type	Total Unit Weight	Friction Angle
1	Loose Sand	112 pcf	28
2	Med Dense Sand, Gravel	115 pcf	33
3	Med Dense to Dense Sand, Gravel	125 pcf	35
4	Med Dense Sand	115 pcf	32
5	Loose Sand, Gravel	113 pcf	30
6	Med Dense to Dense Sand	125 pcf	35

TESTING SERVICE CORPORATION
457 East Gundersen Drive
Carol Stream, Illinois

CLIENT: Crawford, Murphy & Tilly, Inc.
2750 W. Washington St.
Springfield, IL 62702-3497

TSC Job No. L - 68,482
July 12, 2007

PROJECT: Morgan St. Over Rock River
Village of Plainfield

SOIL TEST DATA

LOCATION	Sta. 43+29 33' RT	Sta. 45+88 15' LT			
BORING NUMBER	R-6	R-7			
SAMPLE NUMBER	2	3			
DEPTH IN FEET	2.0 - 3.5	19.0 - 20.5			
HRB CLASSIFICATION & GROUP INDEX	A-2-4	A-6 (3)			
UNIFIED CLASSIFICATION	SM	SC			
GRAIN SIZE CLASSIFICATION	Brown fine SANDY LOAM	Brown SANDY LOAM			
GRADATION - PASSING 1" SIEVE %					
GRADATION - PASSING 3/4" SIEVE %					
GRADATION - PASSING 3/8" SIEVE %					
GRADATION - PASSING # 4 SIEVE %					
GRADATION - PASSING # 10 SIEVE %	100	100			
GRADATION - PASSING # 40 SIEVE %	98	97			
GRADATION - PASSING # 100 SIEVE %	33	58			
GRADATION - PASSING # 200 SIEVE %	24	47			
GRAVEL %	0	0			
SAND %	76	53			
SILT %	24% Fines	38			
CLAY % (<0.002 MM)		9			
LIQUID LIMIT %		25			
PLASTIC LIMIT %		10			
PLASTICITY INDEX %		15			
NATURAL MOISTURE CONTENT %	12.3	22.0			
LIQUIDITY INDEX		0.8			
BEARING RATIO % (SOAKED IBR)					
STANDARD DRY DENSITY AASHTO T-99 PCF					
OPTIMUM MOISTURE %					
ORGANIC CONTENT — L-O-I %					
ORGANIC CONTENT — WET COMBUSTION %					

TESTING SERVICE CORPORATION
457 East Gundersen Drive
Carol Stream, Illinois

CLIENT: Crawford, Murphy & Tilly, Inc.
2750 W. Washington St.
Springfield, IL 62702-3497

TSC Job No. L - 68,482
July 12, 2007

PROJECT: Morgan St. Over Rock River
Village of Plainfield

SOIL TEST DATA

LOCATION		Sta. 48+72 6" LT	Sta. 48+72 6' LT	Sta. 48+72 6' LT	Sta. 46+83 0' RT	Sta. 48=21 50' RT
BORING NUMBER		SC-1	SC-1	SC-1	SB-1	SB-3
SAMPLE NUMBER		2 and 3	4	5	4	3
DEPTH IN FEET		38.5 - 42.5	43.5 - 45.0	46.0 - 47.5	28.5 - 30.0	6.0 - 7.5
HRB CLASSIFICATION & GROUP INDEX		A-1-a	A-1-a	A-7-6 (27)	A-6 (10)	A-1-b
UNIFIED CLASSIFICATION		GW - GM	GW - GM	CL	OL	SP
GRAIN SIZE CLASSIFICATION		Gray & Black GRAVEL / SAND	Gray GRAVEL / SAND	Gray CLAY	Black CLAY LOAM	Brown SAND
GRADATION - PASSING 1" SIEVE %		100	79			
GRADATION - PASSING 3/4" SIEVE %		72	56		100	100
GRADATION - PASSING 3/8" SIEVE %		52	43		98	94
GRADATION - PASSING # 4 SIEVE %		40	33		97	87
GRADATION - PASSING # 10 SIEVE %		30	25		95	74
GRADATION - PASSING # 40 SIEVE %		17	14	100	85	21
GRADATION - PASSING # 100 SIEVE %		8	7	99	67	3
GRADATION - PASSING # 200 SIEVE %		6	6	99	61	2
GRAVEL %		70	75	0	5	26
SAND %		24	19	1	34	72
SILT %		6% Fines	6% Fines	44	39	2% Fines
CLAY % (<0.002 MM)				55	22	
LIQUID LIMIT %				41	38	
PLASTIC LIMIT %				15	16	
PLASTICITY INDEX %				26	22	
NATURAL MOISTURE CONTENT %				20.5	36.0	28.8
LIQUIDITY INDEX				0.21	0.91	
BEARING RATIO % (SOAKED IBR)						
STANDARD DRY DENSITY AASHTO T-99 PCF						
OPTIMUM MOISTURE %						
ORGANIC CONTENT	L-O-I %					
	WET COMBUSTION %					

TESTING SERVICE CORPORATION
457 East Gundersen Drive
Carol Stream, Illinois

CLIENT: Crawford, Murphy & Tilly, Inc.
2750 W. Washington St.
Springfield, IL 62702-3497

TSC Job No. L - 68,482
July 12, 2007

PROJECT: Morgan St. Over Rock River
Village of Plainfield

SOIL TEST DATA

LOCATION		Sta. 51+22 22' LT	Sta. 51+22 22' LT	Sta. 51+22 22' LT	Sta. 51+22 22' LT	
BORING NUMBER		SB-6	SB-6	SB-6	SB-6	
SAMPLE NUMBER		3	6	8	17	
DEPTH IN FEET		46.0 - 47.5	53.5 - 55.0	58.5 - 60.0	83.5 -85.0	
HRB CLASSIFICATION & GROUP INDEX		A-1-b	A-3	A-3	A-6 (2)	
UNIFIED CLASSIFICATIONSP-GP			SP	SP - SM	CL	
GRAIN SIZE CLASSIFICATION		Brown SAND and GRAVEL	Brown fine SAND	Gray fine SAND	Gray CLAY LOAM	
GRADATION - PASSING 1" SIEVE %		100				
GRADATION - PASSING 3/4" SIEVE %		97			100	
GRADATION - PASSING 3/8" SIEVE %		78			96	
GRADATION - PASSING # 4 SIEVE %		63			94	
GRADATION - PASSING # 10 SIEVE %		51	100	100	93	
GRADATION - PASSING # 40 SIEVE %		26	99	96	85	
GRADATION - PASSING # 100 SIEVE %		6	7	16	57	
GRADATION - PASSING # 200 SIEVE %		4	2	8	49	
GRAVEL %		49	0	0	7	
SAND %		47	98	92	44	
SILT %		4% Fines	2% Fines	8% Fines	31	
CLAY % (<0.002 MM)					18	
LIQUID LIMIT %					20	
PLASTIC LIMIT %					9	
PLASTICITY INDEX %					11	
NATURAL MOISTURE CONTENT %		13.2	24.8	23.6	11.4	
LIQUIDITY INDEX					0.22	
BEARING RATIO % (SOAKED IBR)						
STANDARD DRY DENSITY AASHTO T-99 PCF						
OPTIMUM MOISTURE %						
ORGANIC CONTENT	L-O-I %					
	WET COMBUSTION %					

PROJECT **Bridge Replacement - Phase 1, Morgan St. Over Rock River, Rockford, Illinois**

CLIENT **Crawford, Murphy & Tilly, Inc., Springfield, Illinois**

BORING **R6** DATE STARTED **5-10-07** DATE COMPLETED **5-10-07** JOB **L-68,482**

ELEVATIONS

GROUND SURFACE **702.1**

END OF BORING **687.1**

WATER LEVEL OBSERVATIONS

WHILE DRILLING **6.0 '**

AT END OF BORING **8.0 '**

24 HOURS

Sta. 43+29; 33' RT

SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
						0.3	701.8	4" Asphalt Pavement
						0.8	701.3	5" Crushed Gravel and Sand
1	SS	2-3-4	10.9	1.25*				FILL - Dark brown and brown SANDY LOAM with Sand layers, trace cinders and slag, moist A-2-4
						2.0	700.1	
2	SS	2-2-2	12.3					Loose to very loose brown fine SANDY LOAM, moist A-2-4
3	SS	1-2-2	13.1					
						5.5	696.6	
A			19.2					Very loose brown fine to medium SAND, saturated A-3
4	SS	1-2-1						
B			24.7	0.5*		7.0	695.1	Soft gray and brown CLAY, occasional sand seams, very moist A-6
						8.0	694.1	
A			17.0	1.0*				Medium stiff to stiff brownish-gray CLAY LOAM, very moist A-4/A-6
5	SS	3-5-6						
B			10.9			9.7	692.4	
6	SS	4-5-5	12.0					Med. dense brown SAND and GRAVEL, saturated A-1
7	SS	6-8-8	19.8					
								End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20

DRILL RIG NO. **256**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Bridge Replacement - Phase 1, Morgan St. Over Rock River, Rockford, Illinois**

CLIENT **Crawford, Murphy & Tilly, Inc., Springfield, Illinois**

BORING **R7** DATE STARTED **5-10-07** DATE COMPLETED **5-10-07** JOB **L-68,482**

ELEVATIONS

GROUND SURFACE **717.2**

END OF BORING **686.7**

WATER LEVEL OBSERVATIONS

WHILE DRILLING **24.5 '**

AT END OF BORING **22.5 '**

24 HOURS

Sta. 45+88; 15' LT

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.6	716.6	6.75" Concrete Bridge Deck
									Air below bridge deck. Casing extended into soil below.
							14.8	702.4	FILL - Dark brown and brown SANDY LOAM, some gravel, moist
	A			8.7			16.5	700.7	
	1	SS	3-3-5						FILL - Black and dark brown silty SAND, trace cinders, trace clay, damp A-2-4
	B			14.2			17.5	699.7	
	2	SS	2-3-5	11.3					FILL - Dark brown and brown silty SAND, trace cinders, trace clay, damp A-2-4
							19.0	698.2	
	3	SS	3-3-3	22.0	0.5*				Sample 3: LL/PL/PI=25/10/15
									Soft brown SANDY LOAM, very moist A-6(3)
	4	SS	2-3-2	20.8	0.5*				
							23.5	693.7	
	A			18.2	<0.25*				Med. dense brown SANDY LOAM, very moist A-1/A-2
	5	SS	5-7-5				25.0	692.2	
	B			10.0					
	6	SS	3-4-5	7.8					Loose to med. dense brown SAND and GRAVEL, saturated A-1
	7	SS	4-4-5	11.7					
									End of Boring at 30.5'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0, 5, 10, 15, 20, 25, 30, 35

DRILL RIG NO. **256**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/8/07

Date Completed 5/9/07

ROUTE FAU 5077 DESCRIPTION Morgan Street Bridge, Rockford

SECT. 99-00493-00-BR STRUCT. NO. 101-6132 DRILLED BY TSC/L-68,482

COUNTY Winnebago LOCATION East of West Pier S. 26NW 1/4 , TWP. 44N , RNG. 1E

Boring No. SC-1
Station 48+72
Offset 6.00ft LT
Surface Elev. 727.60 ft

Surface Water Elev. 33.2'
Groundwater Elev.:
when drilling Wash Drill
at Completion Wash Drill
after ____ Hrs. ____

Description	Elev.	Depth	Blows	Qu tsf	W %
6.75" PC Bridge Deck	727.10				
Air below bridge deck. Casing installed in streambed.		-5			
		-10			
Air below bridge deck. Casing installed in streambed.					
Diedrich D-120 Truck Rig (#315) CME Automatic Hammer Rotary Wash Drill		-15			
		-20			
		-25			
Air below bridge deck. Casing installed in streambed.		-30			
	694.40				
Water in River		-35			
	690.60				
Dense brown and black SAND and GRAVEL with Cobbles and Boulders, saturated A-1-a	689.10		15 25 20		23.6
			10 10 7		13.1
		-40			
Med. dense gray and black Gravel with Sand, trace concrete and cinders, saturated A-1-a			11 8 10		9.7
	684.60				
Med. dense gray Gravel with Sand, saturated A-1-a			6 6 9		9.5
		-45			
	682.10				
LL/ PL/ PI = 41/15/26			8 10 12	B 4.1 15%	20.5
Hard gray CLAY, occasional silt seams, moist A-7-6 (27)					
			11 14 16	B 5.3 15%	23.5
	677.60	-50			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/8/07

Date Completed 5/9/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SC-1
Station 48+72
Offset 6.00ft LT
Elevation 677.60 ft

	DEPTH	BLOWS	Qu tsf	W %
Hard to very stiff gray CLAY, trace gravel, moist A-6		9 11 20	B 6.5 15%	19.2
673.10	-55	5 10 15	B 3.8 15%	23.3 22.7
Dense brown fine to medium SAND, saturated A-1-b		13 19 21		14.3 9.0
670.60				
Dense to very dense gray SAND and GRAVEL, occasional Cobbles, saturated A-1-a	-60	20 26 33		9.3
667.10				
Dense gray SAND, some gravel, saturated A-1-b		15 17 17		9.0
664.60				
Dense gray SAND and GRAVEL, occasional Cobbles, saturated A-1-a	-65	15 17 19		6.3
662.10				
Med. dense gray fine to medium SAND, occasional silt seams, trace to little gravel, saturated A-1-b		12 12 12		11.8
657.60	-70	7 7 7		18.9
End of Boring at 70'				
Diedrich D-120 Truck Rig (#315) CME Automatic Hammer Rotary Wash Drill	-75			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/16/07

Date Completed 5/17/07

ROUTE FAU 5077 DESCRIPTION Morgan Street Bridge, Rockford

SECT. 99-00493-00-BR STRUCT. NO. 101-6132 DRILLED BY TSC/L-68,482

COUNTY Winnebago LOCATION West Abutment (center) S. 26NW 1/4 , TWP. 44N , RNG. 1E

Boring No. SB-1
Station 46+83
Offset 0.00ft RT
Surface Elev. 721.90 ft

Surface Water Elev. _____
Groundwater Elev.:
when drilling 693.9
at Completion Wash Drill
after _____ Hrs. _____

Description	Elev.	Depth	Blows	Qu tsf	W %
7.25" PC Bridge Deck	721.20				
FILL - Black & brown SAND & GRAVEL, occasional Cobbles, trace organic, moist A-1-a	693.90		7 7 5		10.7
Black CLAY LOAM, trace organic, very moist A-6 (10) LL/ PL/ PI = 38/16/22	691.40	-30	6 4 5	P 0.25	36.0
Loose brown and gray SAND and GRAVEL, saturated A-1	688.90		4 3 3		12.5
Air below bridge deck. Casing extended into soil below.		-35	8 7 8		8.1
Diedrich D-120 Truck Rig (#315) CME Automatic Hammer Rotary Wash Drill					
Med. dense brown and gray SAND and GRAVEL, occasional Cobbles, saturated A-1-a		-40	18 16 13		8.8
			10 5 6		9.5
Med. dense brown fine to medium SAND, trace silt, saturated A-3	681.40		14 12 15		17.4
Med. dense brown silty SAND, saturated A-1-b	678.90	-45	8 11 12		16.8
FILL - Black SANDY LOAM with some cinders, moist A-2-4	701.60	-20	2 2 3 3		12.2
Med. dense brown and gray SAND and GRAVEL, saturated A-1-a	676.40		9 9 11		13.1
FILL - Brn & blk SAND & GRAVEL, occasional Cobbles, tr. organic, moist A-1-a	698.90	-25	4 4 12		8.8
Dense brown fine to medium SAND, little gravel, saturated A-1-b	673.90	-50	10 14 20		15.9
	671.90				

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/16/07
Date Completed 5/17/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-1
Station 46+83
Offset 0.00ft RT
Elevation 671.90 ft

Description	Elev.	Depth	Blows	Qu tsf	W %
Med. dense brown fine to medium SAND, trace gravel, saturated A-1-b			8 10 15		23.0
	668.90				
Med. dense gray fine to medium SAND, trace gravel, saturated A-1-b		-55	7 10 11		18.4
	664.90				
Very stiff gray CLAY LOAM, little gravel, moist A-4/A-6		-60	3 4 6	B 2.1 15%	11.4
	659.90				
Stiff gray CLAY LOAM, trace to little gravel, moist A-4/A-6		-65	5 6 6	B 1.3 15%	14.1
		-70	6 6 9	B 1.7 15%	20.6
	646.90	-75	5 6 9	B 1.3 15%	12.1

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Elevation 646.90 ft

Description	Elev.	Depth	Blows	Qu tsf	W %
Stiff to very stiff gray CLAY LOAM, little gravel, moist A-6					
(disturbed sample - pound on large gravel)		-80	6 9 12		20.4
	639.90				
Very stiff gray CLAY LOAM, trace gravel, moist A-6		-85	5 6 8	B 2.0 15%	13.7
	634.90				
Very stiff gray CLAY and CLAY LOAM, occasional sand seams, trace gravel, moist A-6		-90	6 8 10	B 2.0 15%	14.9
	629.90				
Very stiff gray CLAY, trace gravel, moist A-6		-95	9 11 16	B 3.5 15%	22.4
	624.90				
Stiff to very stiff gray CLAY LOAM, trace gravel, moist A-6 (Qp = 3.0 tsf)		-100	5 7 11	B 1.7 15%	13.5

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/16/07

Date Completed 5/17/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-1
Station 46+83
Offset 0.00ft RT
Elevation 621.90 ft

Elevation 596.90 ft

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Stiff to very stiff gray CLAY and CLAY LOAM, trace gravel, moist A-6 (Qp = 3.0 tsf)		-105	4 6 8	B 1.7 15%	23.8
	614.90				
Med. dense gray fine to medium SAND, trace gravel, saturated A-1-b		-110	11 11 12		15.7
	611.90				
Dense brown and gray clayey SAND and GRAVEL, occasional Cobbles, saturated A-1-a		-115	23 24 23		11.2
	603.90				
Very dense brown silty SAND and GRAVEL with cobbles, wet A-1-a		-120	100/2"		12.3
	599.90				
Very dense yellow-brown SILTY LOAM with gravel & cobbles, moist A-4/A-6		-125	100/2"	P 4.5	12.6
	596.90				

Diedrich D-120 Truck Rig (#315)
CME Automatic Hammer
Rotary Wash Drill

End of Boring at 125'

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/10/07

Date Completed 5/11/07

ROUTE FAU 5077 DESCRIPTION Morgan Street Bridge, Rockford

SECT. 99-00493-00-BR STRUCT. NO. 101-6132 DRILLED BY TSC/L-68,482

COUNTY Winnebago LOCATION North End West Abutment S. 26NW 1/4 , TWP. 44N , RNG. 1E

Boring No. SB-2
Station 47+22
Offset 25.00ft LT
Surface Elev. 722.90 ft

Surface Water Elev. _____
Groundwater Elev.:
when drilling 694.4
at Completion Wash Drill
after _____ Hrs. _____

Description	Elev.	Depth	Blows	Qu tsf	W %
8" PC Bridge Deck	722.20				
Air below bridge deck. Casing extended into soil below.		-5, -10			
Diedrich D-120 Truck Rig (#315) CME Automatic Hammer Rotary Wash Drill		-15, -20			
FILL - Brn SAND, lt gravel, tr cinders, damp	701.40		4 4		6.9
FILL - Blk & gr cl Sand, Cinders & Gravel, very moist	700.40		5 4		27.9
FILL - Brn fine SAND, damp	699.40		3 3 4		7.1
FILL - Brown SAND and GRAVEL, occasional Cobbles, trace glass, damp A-1	697.90	-25	3 4 3		8.4
FILL - Gray SAND and GRAVEL, occasional Cobbles, trace organic, saturated A-1	694.40	-30	3 3 5		13.7
FILL - Brown SANDY LOAM, trace organic, trace cinders, very moist A-2-4	692.40		3 3 2	P <0.25	23.3
Med. dense brown and gray SAND and GRAVEL, saturated A-1-a	689.90	-35	5 10 12		8.9
			8 8 7		9.8
Very stiff reddish-gray CLAY, moist A-6/A-7-6	684.90	-40	5 9 11	B 3.3 15%	24.6
Hard gray CLAY, trace gravel, moist A-6/A-7-6	682.40	-45	5 11 13	B 4.2 15%	22.7
			6 11 15	B 5.1 15%	21.9
Very stiff brown CLAY, moist A-6/A-7-6	677.40		9 10 15	B 2.7 15%	25.3
Dense brown fine to medium SAND, trace gravel, saturated A-3	674.90	-50	12 16 22		18.3
	672.90				

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/10/07

Date Completed 5/11/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-2
Station 47+22
Offset 25.00ft LT
Elevation 672.90 ft

	DEPTH	BLOWS	Qu tsf	W %
Med. dense to dense brownish-gray fine to medium SAND, trace gravel, saturated A-3		12 13 16		18.5
		14 15 16		20.7
	-55			
665.90				
Med. dense gray fine to medium SAND, trace silt, saturated A-1-b		4 5 6		17.7
	-60			
660.90				
Med. dense gray fine to medium SAND, trace gravel, saturated A-3		10 11 11		19.6
	-65			
		10 13 15		19.7
	-70			
650.90				
Stiff gray CLAY LOAM, moist A-6		5 7 9	B 1.7 15%	13.3
	-75			

Elevation 647.90 ft

	DEPTH	BLOWS	Qu tsf	W %
Stiff gray CLAY LOAM, moist A-6				
645.90				
Very stiff gray CLAY, trace gravel, moist A-6		6 7 9	B 2.2 15%	13.7
	-80			
640.90				
Stiff to very stiff gray CLAY, trace to little gravel, moist A-6		8 8 13	B 1.9 15%	14.1
	-85			
(disturbed sample, pound on large gravel)		9 12 15	P 0.25	25.2
	-90			
630.90				
Very stiff gray CLAY, trace gravel, moist A-6 (Qp = 3.5 tsf)		9 11 14	B 2.5 15%	16.3
	-95			
625.90				
Stiff to very stiff gray CLAY, little gravel, moist A-6 (Qp = 3.5 tsf)		10 15 20	B 1.4 15%	18.9
622.90	-100			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/10/07

Date Completed 5/11/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-2
Station 47+22
Offset 25.00ft LT
Elevation 622.90 ft

	DEPTH	BLOWS	Qu tsf	W %
Very stiff gray CLAY, trace gravel, moist A-6		7 8 14	B 2.1 15%	15.6
	-105			
615.90				
Stiff gray SILTY LOAM, very moist A-4/A-6		3 4 8	B 1.2 15%	24.0
612.90	-110			
End of Boring at 110'				
Diedrich D-120 Truck Rig (#315) CME Automatic Hammer Rotary Wash Drill				
	-115			
	-120			
	-125			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/16/07

Date Completed 5/17/07

ROUTE FAU 5077 DESCRIPTION Morgan Street Bridge, Rockford

SECT. 99-00493-00-BR STRUCT. NO. 101-6132 DRILLED BY TSC/L-68,482

COUNTY Winnebago LOCATION South End West Pier S. 26NW 1/4 , TWP. 44N , RNG. 1E

Boring No. SB-3
Station 48+21
Offset 50.00ft RT
Surface Elev. 697.47 ft

Surface Water Elev. _____
Groundwater Elev.:
when drilling 693.5
at Completion Wash Drill
after _____ Hrs. _____

Description	Elev.	Depth	Blows	Qu tsf	W %
FILL - Dark brown SANDY LOAM (topsoil)	696.77				
FILL - Black silty SAND with cinders, trace organic, trace asphalt, moist A-1-b	694.47		4 5 7		13.6
Loose brown fine to medium SAND, trace gravel, saturated A-1-b	691.97	-5	2 3 2		18.4
Very loose brown SAND, little gravel, saturated A-1-b	689.47		2 2 1		28.8
Loose gray fine SAND, trace organic, saturated A-3	686.97	-10	1 2 2		26.8
Loose gray SAND, some gravel, saturated A-1-b	684.47		1 2 3		21.2
Loose gray SAND and GRAVEL, saturated A-1-a	681.97	-15	2 2 3		11.0
Med. dense gray SAND and GRAVEL, occasional Cobbles, saturated A-1-a	677.97		4 5 10		12.7
Hard brown CLAY, moist	676.97	-20	3 15 12	B 4.9 15%	8.9 20.1
Hard brownish-gray CLAY, trace gravel, moist A-6/A-7-6	674.47		5 10 15	B 5.3 15%	21.9
Hard gray layers of SILTY LOAM & CLAY, moist A-4/A-6	672.47	-25	23 23 13	P 4.25	17.6
Very stiff brownish-gray CLAY, occasional silt seams, moist A-6 (pound on gravel)	669.47		11 14 21	B 2.2 15%	21.9
Med. dense gray clayey SAND, wet A-1-b	668.47		9 10 15	B 4.8 15%	23.8 23.3
Hard gray CLAY, occasional sand seams, moist A-6	666.97	-30			
Medium stiff layers of CLAY and SILT, very moist A-4/A-6	665.97		3 12 15	B 0.6 15%	26.7 14.5
Med. dense to dense gray fine to medium SAND, trace to little gravel, saturated A-1-b	661.97	-35	8 15 19		14.8
Med. dense gray SAND and GRAVEL with clay seams, saturated A-1-b	659.47		9 11 17		13.1
Med. dense gray SAND and GRAVEL, occasional Cobbles, saturated A-1-a	656.97	-40	4 13 11		13.2
Med. dense gray fine to medium SAND, saturated A-1-b	651.97	-45	10 13 15 / 6 10 13		18.6 / 17.9
Dense gray fine to medium SAND, saturated A-1-b	649.47		11 20 24		18.2
Med. dense brown SAND, saturated A-1-b	647.97		5 8 7	B 1.7 15%	18.1 13.6
Stiff gray CLAY LOAM		-50			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/16/07
Date Completed 5/17/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-3
Station 48+21
Offset 50.00ft RT
Elevation 647.47 ft

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Stiff gray CLAY LOAM, moist A-6	645.47				
Stiff to very stiff gray CLAY with sand seams, moist to very moist A-6		-55	5 9 10	B 2.1 15%	18.8
	640.47				
Very stiff gray CLAY, trace gravel, moist A-6		-60	5 7 9	B 2.6 15%	13.9
	635.47				
(Qp = 2.5 tsf)		-65	4 7 8	B 1.9 15%	13.0
Stiff to very stiff gray CLAY LOAM, trace gravel, moist A-6		-70	4 6 9	B 1.9 15%	14.6
	625.47				
Dense gray fine to medium SAND, trace gravel, saturated A-1-b		-75	15 24 26		11.1

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Elevation 622.47 ft

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Dense gray fine to medium SAND, trace gravel, saturated A-1-b	620.47				
Very stiff gray CLAY LOAM, trace gravel, moist A-6		-80	5 8 9	B 3.1 15%	14.6
CME-75 Truck Rig (#256) CME Automatic Hammer Rotary Wash Drill	610.47	-85	6 8 10	B 3.1 15%	14.9
Hard gray CLAY, trace gravel, moist A-6/A-7-6	605.47	-90	6 12 13	B 4.7 15%	24.3
Med. dense gray clayey SILT, very moist A-4	602.97	-95	4 8 10	S 2.3 15%	23.4 21.5
Med. dense gray sandy SILT, very moist A-4	600.47				
Med. dense gray fine to medium SAND, trace silt, saturated A-1-b		-100	2 9 15		20.6

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/16/07

Date Completed 5/17/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-3
Station 48+21
Offset 50.00ft RT
Elevation 597.47 ft

		DEPTH	BLOWS	Qu tsf	W %
Med. dense gray fine to medium SAND, trace silt, saturated A-1-b	595.47				
Very dense gray silty SAND, wet A-1-b	592.47	-105	18 26 36		19.8
End of Boring at 105.0'					
CME-75 Truck Rig (#256) CME Automatic Hammer Rotary Wash Drill		-110			
		-115			
		-120			
		-125			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/7/07
Date Completed 5/8/07

ROUTE FAU 5077 DESCRIPTION Morgan Street Bridge, Rockford

SECT. 99-00493-00-BR STRUCT. NO. 101-6132 DRILLED BY TSC/L-68,482

COUNTY Winnebago LOCATION North End West Pier S. 26NW 1/4 , TWP. 44N , RNG. 1E

Boring No. SB-4
Station 48+30
Offset 46.00ft LT
Surface Elev. 695.30 ft

Surface Water Elev. _____
Groundwater Elev.:
when drilling 694.3
at Completion Wash Drill
after _____ Hrs. _____

Description	Elev.	Depth	Blows	Qu tsf	W %
FILL - Dark brown clayey SAND and GRAVEL, trace brick, wet	692.30		6 12 9		18.7
FILL - Brown and dark brown clayey SAND, saturated A-1-b	690.80	-5	WOH		29.6
					23.7
Very loose dark brown and black silty SAND, trace gravel, saturated A-1-b	687.30		1 2 1		23.6
Med. dense dark brown and black silty SAND, trace gravel, saturated A-1-b	685.80	-10	7 7 4		24.1
					9.2
Med. dense brown and gray SAND and GRAVEL, saturated A-1-a	679.80	-15	4 9 7		8.5
			10 5 7		10.4
Hard brownish-gray silty CLAY, numerous silt and sand seams, moist A-6 (Qp = 4.5+ tsf)	672.30	-20	12 7 10	B 4.1 15%	19.6
			12 16 10	B 3.7 15%	19.8
Med. dense brown layers of CLAY LOAM and SAND, moist A-6 and A-1-b	670.30	-25	8 10 13	B 4.5 15%	24.4
			8 11 12	P 2.0	18.1
Very loose gray and brown clayey SILT, very moist A-4	668.80		1 1 1		28.5
Very loose brown fine to medium SAND, saturated A-1-b	667.30				19.6
Loose brown SAND and GRAVEL, saturated A-1	662.30	-30	2 3 4		11.7
			4 3 3		14.5
Loose brown GRAVEL, little sand, saturated A-1-a	657.30	-35	3 3 5		13.5
			5 3 5		19.5
Med. dense brown SAND, little to some gravel, saturated A-1	649.80	-40	4 5 7		16.0
		-45	6 5 7		18.1
			7 5 6		17.8
Med. dense brown SAND, some gravel, occasional clay seams, saturated A-1-b	647.30		7 11 12		20.1
Med. dense brown SAND, trace gravel, saturated A-1-b		-50	7 11 11		16.4

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/7/07

Date Completed 5/8/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-4
Station 48+30
Offset 46.00ft LT
Elevation 645.30 ft

	DEPTH	BLOWS	Qu tsf	W %
Med. dense to dense brown SAND, trace gravel, saturated A-1-b				
		10 15 19		
	-55			
638.30				
Stiff brownish-gray CLAY LOAM, trace gravel, moist A-6		5 7 9	B 1.8 15%	14.5
	-60			
633.30				
Very stiff brownish-gray CLAY LOAM, trace gravel, moist A-6		5 7 10	B 2.2 15%	17.4
	-65			
		6 8 13	B 2.8 15%	13.9
	-70			
		7 9 13	B 2.3 15%	14.5
620.30	-75			

Elevation 620.30 ft

	DEPTH	BLOWS	Qu tsf	W %
		7 9 12	B 1.9 15%	15.6
	-80			
Very stiff to stiff brownish-gray CLAY LOAM, trace gravel, moist A-6				
		5 8 10	B 1.9 15%	15.7
	-85			
608.30				
Medium stiff brownish-gray CLAY, very moist A-6/A-7-6 (disturbed sample)				
606.30		12 13 12	P 0.75	34.5 28.6
	-90			
Med. dense brownish-gray silty fine SAND, saturated A-2-4				
603.30				
Very stiff brown and gray silty CLAY, occasional silt seams, moist A-6		5 7 10	B 2.7 15%	25.6
	-95			
598.30				
Med. dense brownish-gray SILT, very moist A-4				
		7 9 12		23.8
	-100			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/7/07

Date Completed 5/8/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-4
Station 48+30
Offset 46.00ft LT
Elevation 595.30 ft

		DEPTH	BLOWS	Qu tsf	W %
Med. dense brownish-gray SILT, very moist A-4	593.30				
			7 9 13	B 3.4 15%	23.6
		-105			
Very stiff gray silty CLAY, occasional silt seams, moist A-6					
			9 11 14	B 2.3 15%	21.8 26.7
	585.80	-110			
Very stiff dark brown CLAY, moist A-6	582.30				
			21 15 34		15.9
		-115			
Dense to very dense yellow-brown silty SAND and GRAVEL, trace clay, wet A-1					
			100/2"		
	575.30	-120			
End of Boring at 120.0'					
Diedrich D-120 Truck Rig (#315) CME Automatic Hammer Rotary Wash Drill					
WOH = Weight of Hammer					
		-125			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 7/6/07

Date Completed 7/6/07

ROUTE FAU 5077 DESCRIPTION Morgan Street Bridge, Rockford

SECT. 99-00493-00-BR STRUCT. NO. 101-6132 DRILLED BY TSC/L-68,482

COUNTY Winnebago LOCATION South End East Pier S. 26NW 1/4 , TWP. 44N , RNG. 1E

Boring No. SB-5
Station 51+85
Offset 39.00ft RT
Surface Elev. 710.40 ft

Surface Water Elev. _____
Groundwater Elev.:
when drilling 691.4
at Completion Wash Drill
after _____ Hrs. _____

Description	Elev.	Depth	Blows	Qu tsf	W %
FILL - Black SANDY LOAM, some gravel, moist A-2-4	708.90		2 9 7		15.4
FILL - Gray Crushed Stone with some sand, damp A-1-a	707.40				7.9
Med. dense brown SAND, trace gravel, damp A-1-b	704.90	-5	5 8 9		2.4
Med. dense brown SAND, little to some gravel, damp A-1-b	697.40	-10	4 5 6		3.1
			3 5 8		2.9
			4 7 8		3.7
Med. dense brown with little black SAND, some gravel, occasional Cobbles, trace clay, damp A-1-b	694.90	-15	6 10 15		5.0
Very dense brown SAND and GRAVEL, occasional Cobbles, damp to moist A-1	692.40		7 33 50/5"		3.2
Very dense gray SAND, little gravel, trace clay, saturated A-1-b	689.90	-20	19 28 31		10.7
Loose to med. dense brown and gray SAND, trace to little gravel, saturated A-1-b	685.40	-25	2 4 5		13.5
			4 5 6		15.7
Med. dense brown fine to medium SAND, trace to little gravel, saturated A-1-b	682.40		7 12 14		12.2
Med. dense gray SAND and GRAVEL, saturated A-1	679.90	-30	9 8 8		13.8
Med. dense gray and brown silty SAND, some gravel, saturated A-1	677.40		13 13 14		12.4
Loose gray and brown SAND, trace to little gravel, saturated A-1-b	674.90	-35	3 4 4		21.5
Med. dense gray fine to medium SAND, trace gravel, saturated A-1-b			3 7 9		21.0
		-40	3 6 9		19.5
			5 11 12		15.5
		-45	6 12 13		16.9
Stiff to very stiff gray sandy CLAY, trace gravel, moist A-4/A-6	664.90		5 9 12	B 1.7 15%	11.2
		-50	5 8 12	B 2.8 15%	12.2
	660.40				

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 7/6/07

Date Completed 7/6/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-5
Station 51+85
Offset 39.00ft RT
Elevation 660.40 ft

	DEPTH	BLOWS	Qu tsf	W %
	-55	7 10 12	B 3.9 15%	12.0
Very stiff to hard gray CLAY LOAM, trace gravel, moist A-6	-60	7 10 16	B 3.7 15%	11.2
	-65	7 13 24	B 4.4 15%	12.1
643.40				
Very stiff to hard gray CLAY LOAM and SILTY LOAM, occasional sand seams, trace gravel, trace organic, moist A-6 (Qp = 2.0 tsf)	-70	6 11 17	B 4.0 15%	19.8
638.40				
Med. dense gray silty SAND, occasional silt seams, wet A-1/A-2	-75	9 14 14		16.8

Elevation 635.40 ft

	DEPTH	BLOWS	Qu tsf	W %
Med. dense gray silty SAND, occasional silt seams, wet A-1/A-2				
633.40				
Med. dense gray SILTY LOAM, occasional sand seams, trace gravel, trace wood, moist A-4	-80	8 8 10	P 2.75	18.9
628.40				
Dense gray thin layers of SAND and SILT, wet A-3 & A-4	-85	16 21 27		20.0
623.40				
Very stiff to hard gray CLAY LOAM, occasional sand seams, trace gravel, moist A-6 (Qp = 2.5 tsf)	-90	11 15 32	B 6.7 15%	13.7
618.40				
Dense gray sandy SILT, trace organic, very moist A-4	-95	15 23 24		20.1
613.40				
Very stiff brownish-gray CLAY, occasional silt and sand seams, moist A-6/A-7-6		6 18 17	P 2.5	28.1 24.4
610.90				
Dense gray SAND	-100			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 7/6/07

Date Completed 7/6/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-5
Station 51+85
Offset 39.00ft RT
Elevation 610.40 ft

	DEPTH	BLOWS	Qu tsf	W %
Dense to med. dense gray silty SAND, occasional clay seams, saturated A-1-b		12 10 8		21.2
	-105			
603.40				
Very stiff to hard brownish-gray CLAY, trace gravel, moist A-7-6		5 7 10	B 2.9 15%	26.8
	-110			
(Qp = 4.25 tsf)				
598.40				
Dense gray SILT, moist to very moist A-4		8 11 20		24.1
595.40	-115			
End of Boring at 115.0'				
CME-75 Truck Rig (#256) CME Automatic Hammer				
3.25" ID HSA to 43.0'				
Rotary Wash Drill below 43.0'				
	-120			
	-125			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/14/07

Date Completed 5/14/07

ROUTE FAU 5077 DESCRIPTION Morgan Street Bridge, Rockford

SECT. 99-00493-00-BR STRUCT. NO. 101-6132 DRILLED BY TSC/L-68,482

COUNTY Winnebago LOCATION North End East Pier S. 26NW 1/4 , TWP. 44N , RNG. 1E

Boring No. SB-6
Station 51+22
Offset 22.00ft LT
Surface Elev. 734.90 ft

Surface Water Elev. 40.5'
Groundwater Elev.:
when drilling Wash Drill
at Completion Wash Drill
after ____ Hrs. ____

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
7.5" Bridge Deck	734.20				
		-5			
Air below bridge deck. Casing extended into soil below.		-10			
Diedrich D-120 Truck Rig (#315) CME Automatic Hammer Rotary Wash Drill		-15			
		-20			
		-25			
		-30			
Air below bridge deck. Casing extended into soil below.		-35			
		-40			
	694.40				
Water in River	693.40				
Loose gray and black SAND and GRAVEL, saturated A-1	691.40	-45	5 5 3 6		13.3
			7 9 3		15.3
Med. dense to loose brown SAND and GRAVEL, saturated A-1		-50	2 2 3		13.2
	686.90				
Very dense brown SAND and GRAVEL, occasional Cobbles and Boulders, saturated A-1-a	684.90		100/2"		12.7

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/14/07

Date Completed 5/14/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-6
Station 51+22
Offset 22.00ft LT
Elevation 684.90 ft

Description	Elevation	DEPTH	BLOWS	Qu tsf	W %
Loose brown SAND and GRAVEL, saturated A-1-a	681.90		7 4 4		9.6
Loose brown fine SAND, saturated A-3	679.40	-55	3 3 3		24.8
Loose to medium dense brownish gray fine SAND, saturated A-3	674.40	-60	3 4 5		27.8
			9 12 12		23.6
Med. dense grayish-brown fine to medium SAND, trace gravel, saturated A-1-b and A-3	666.90	-65	8 9 10		23.5
			9 12 15		19.7
			12 12 15		24.3
Medium dense gray layers of CLAY and clayey SAND, wet A-1/A-2	664.40	-70	10 10 12	P 0.5*	18.7
Med. dense gray clayey SAND, saturated A-1/A-2	661.90		10 13 16		21.1
Dense gray SILTY LOAM, trace gravel, moist A-4	659.90	-75	10 16 23	S 0.9 9%	15.5

Elevation 659.90 ft

Description	Elevation	DEPTH	BLOWS	Qu tsf	W %
Very dense gray clayey SAND, trace gravel, saturated A-2-4	656.90		18 31 33		18.8
Very stiff gray CLAY LOAM, trace gravel, moist A-6	652.90	-80	10 11 17	S 3.4 13%	13.7
Very stiff to hard gray CLAY LOAM, occasional sand seams, trace gravel, moist A-6	642.90	-85	18 17 15	B 4.2 15%	11.4
		-90	7 10 13	B 3.9 15%	11.3
Hard gray CLAY LOAM, numerous silt and sand seams, trace gravel, moist A-4/A-6	637.90	-95	10 14 17	B 4.0 15%	15.8
Very stiff gray CLAY LOAM, trace gravel, moist A-6		-100	8 11 14	B 2.3 15%	12.5

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/14/07

Date Completed 5/14/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-6
Station 51+22
Offset 22.00ft LT
Elevation 634.90 ft

Elevation 609.90 ft

	DEPTH	BLOWS	Qu tsf	W %
		7 10 13	B 2.9 15%	14.0
Very stiff gray CLAY LOAM, trace gravel, moist A-6	-105			
		8 12 17	B 3.5 15%	15.1
622.90	-110			
Loose gray SANDY LOAM, occasional silt seams, very moist A-4		3 3 5	B 0.5 15%	16.6
617.90	-115			
Very stiff gray CLAY LOAM, trace gravel, moist A-6		7 9 14	B 3.4 15%	16.1
612.90	-120			
Very stiff gray CLAY, moist A-6/A-7-6		7 9 15	B 2.4 15%	24.7
609.90	-125			
	-130			
	-135			
	-140			
	-145			
	-150			

End of Boring at 125'

Diedrich D-120 Truck Rig (#315)
CME Automatic Hammer
Rotary Wash Drill

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/15/07

Date Completed 5/15/07

ROUTE FAU 5077 DESCRIPTION Morgan Street Bridge, Rockford

SECT. 99-00493-00-BR STRUCT. NO. 101-6132 DRILLED BY TSC/L-68,482

COUNTY Winnebago LOCATION South End East Abutment S. 26NW 1/4 , TWP. 44N , RNG. 1E

Boring No. SB-7
Station 52+69
Offset 12.00ft RT
Surface Elev. 739.70 ft

Surface Water Elev. _____
Groundwater Elev.:
when drilling 693.7
at Completion 689.7
after _____ Hrs. _____

Description	Elev.	Depth	Blows	Qu tsf	W %
5" Concrete Sidewalk	739.20				
FILL - Brown CLAY LOAM, trace organic, moist A-6	737.70		1 2 2	P 1.25	15.8 20.1
FILL - Black SAND and CINDERS, moist A-1-b	736.70				
Medium stiff brown and black SANDY LOAM, trace organic, moist to very moist A-4/A-6	734.20	-5	2 1 2	P 1.0	16.8
Very loose brown clayey SAND, trace gravel, moist A-1/A-2	731.70		2 2 1		15.3
Loose brown fine to medium SAND, trace gravel, damp A-1-b	729.20	-10	2 3 3		7.6
Med. dense brown SAND and GRAVEL, damp A-1	726.70		4 6 7		7.9
Med. dense brown SAND, trace gravel, damp A-1-b	724.20	-15	3 9 14		3.7
Dense brownish-gray SAND and GRAVEL, occasional Cobbles and Boulders, damp A-1-a	721.70		12 19 15		2.7
Med. dense brown fine to medium SAND, trace gravel, damp A-1-b	719.20	-20	8 9 10		3.0
Very dense brown SAND and GRAVEL, occasional Cobbles, damp A-1-a	716.70		28 42 19		2.4
Med. dense brown fine to medium SAND, some gravel, damp A-1-b	714.70	-25	11 14 11		4.4
Med. dense brown fine to medium SAND, little gravel, occasional Cobbles, damp A-1-b	707.70	-30	12 12 12		2.8
Dense brown fine to medium SAND, damp A-3	702.70	-35	12 11 10		3.4
Med. dense brown fine to medium SAND, trace gravel, damp A-1-b	697.70	-40	7 10 22		3.2
Med. dense brown and gray SAND and GRAVEL, wet A-1-a	692.70	-45	9 10 11		2.8
Very dense brown SAND and GRAVEL, saturated A-1-a	689.70	-50	9 11 17		10.1
			16 22 32		7.1

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/15/07

Date Completed 5/15/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-7
Station 52+69
Offset 12.00ft RT
Elevation 689.70 ft

	DEPTH	BLOWS	Qu tsf	W %
Very dense brown SAND and GRAVEL, saturated A-1-a	687.70			
Very dense gray SAND and GRAVEL with Cobbles and Boulders, saturated A-1-a	-55	55 38 25		6.3
	682.70			
Med. dense brown SAND and GRAVEL, occasional Cobbles, saturated A-1-a	-60	20 11 9		8.9
	677.70			
Dense reddish-gray fine to medium SAND, trace gravel, saturated A-1-b	-65	51 19 15		18.4
	672.70			
Loose reddish-brown fine SAND, saturated A-3	-70	8 2 3		19.5
	667.70			
Med. dense brown and gray fine to medium SAND, trace silt, saturated A-1-b	-75	3 4 9		16.4
	664.70			

Elevation 664.70 ft

	DEPTH	BLOWS	Qu tsf	W %
Med. dense brown and gray SAND, trace silt, saturated A-1-b	662.70			
Dense reddish-gray and black SAND, occasional silt seams, saturated A-1-b	-80	8 18 23		14.5
	659.70			
End of Boring at 80'	-85			
CME-75 Truck Rig (#256) CME Automatic Hammer Rotary Wash Drill	-90			
	-95			
	-100			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/10/07

Date Completed 5/14/07

ROUTE FAU 5077 DESCRIPTION Morgan Street Bridge, Rockford

SECT. 99-00493-00-BR STRUCT. NO. 101-6132 DRILLED BY TSC/L-68,482

COUNTY Winnebago LOCATION North End East Abutment S. 26NW 1/4 , TWP. 44N , RNG. 1E

Boring No. SB-8
Station 52+89
Offset 40.00ft LT
Surface Elev. 738.90 ft

Surface Water Elev. _____
Groundwater Elev.:
when drilling 694.9
at Completion 690.9
after _____ Hrs. _____

Description	Elev.	Depth	Blows	Qu tsf	W %
3.5" Asphalt Pavement	738.65				
7.5" P.C. Concrete	738.00				
FILL - Black and brown SAND, GRAVEL and CINDERS, damp A-1	735.90		7 5 5		13.0
Loose brown fine to medium SAND, trace gravel, damp A-1-b	730.90	-5	2 3 5		8.0
			2 3 3		3.5
Med. dense brown SAND and GRAVEL, damp A-1	728.40	-10	4 8 11		3.3
Med. dense brown SAND, some gravel, damp A-1-b	725.90		2 6 10		4.1
Med. dense to dense brown SAND and GRAVEL, occasional Cobbles, damp A-1-a	718.40	-15	5 10 11		3.1
			4 8 16		3.1
		-20	10 18 26		2.3
Med. dense brown SAND, some gravel, damp A-1-b	715.90		9 10 13		4.3
Med. dense brown fine to medium SAND, little gravel, damp A-1-b	713.90	-25	4 6 10		8.5
Med. dense brown and gray fine to medium SAND, damp A-1-b	710.90		5 6 8		3.0
Med. dense brown fine to medium SAND, trace silt, damp A-3	706.90	-30	3 6 9		2.9
Med. dense brown SAND and GRAVEL, damp A-1	701.90	-35	6 10 11		3.0
Med. dense brown fine to medium SAND, trace gravel, damp A-1-b	696.90	-40	5 10 14		2.7
Med. dense brown SAND, trace to little gravel, saturated A-1-b	692.40	-45	9 11 12		12.6
Dense brown SAND, some gravel, trace clay, saturated A-1-b		-50	10 17 20		14.7

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

Testing Service Corporation

STRUCTURE BORING LOG

Date Started 5/10/07

Date Completed 5/14/07

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

STRUCTURE NO. 101-6132
ROUTE FAU 5077
SECTION 99-00493-00-BR
COUNTY Winnebago

Boring No. SB-8
Station 52+89
Offset 40.00ft LT
Elevation 688.90 ft

	DEPTH	BLOWS	Qu tsf	W %
Dense brown SAND, some gravel, trace clay, saturated A-1-b (686.90)				
Med. dense brown SAND, little to some gravel, saturated A-1-b (681.90)	-55	4 8 18		17.4
Med. dense brown fine to medium SAND, saturated A-3 (676.90)	-60	9 6 7		21.6
Dense brown fine to medium SAND, trace silt, saturated A-1-b (671.90)	-65	5 12 36		16.2
Med. dense brown fine to medium SAND, trace clay, saturated A-1-b (666.90)	-70	6 8 9		22.7
Med. dense gray silty fine SAND, trace clay, saturated A-1-b	-75	7 8 13		18.1

Elevation 663.90 ft

	DEPTH	BLOWS	Qu tsf	W %
Med. dense gray silty fine SAND, trace clay, saturated A-1-b (661.90)				
Very stiff gray CLAY LOAM with silt seams, moist A-4 (658.90)	-80	2 8 22	P 3.25	12.7
End of Boring at 80'	-85			
CME-75 Truck Rig (#256) CME Automatic Hammer Rotary Wash Drill	-90			
	-95			
	-100			

SPT. (N) = Sum of last two blow values in sample. (Qu) B=Bulge S=Shear P=Penetration Test
Stations, Depths, Offset, and Elevations are in Feet

ILDOT_BORING 68482 IDOT.GPJ IDOT.GDT 8/12/10

TESTING SERVICE CORPORATION

LEGEND FOR BORING LOGS

(FPS Units)

SAMPLE TYPE:

SS	=	Split Spoon
ST	=	Thin-Walled Tube
A	=	Auger

FIELD AND LABORATORY TEST DATA:

BLOWS	=	Standard Penetration Resistance in Blows per 6 inches
W%	=	In-Situ Water Content in percent
Qu	=	Unconfined Compressive Strength in tons per square foot (tsf)
*	=	Hand Penetrometer Measurement; Max. Reading = 4.5+ tsf

SOIL DESCRIPTION:

MATERIAL	PARTICLE SIZE RANGE
BOULDER	Over 12 inch
COBBLE	12 - 3 inch
Coarse GRAVEL	3 - ¾ inch
Small GRAVEL	¾ inch to No. 10 Sieve
Coarse SAND	No. 10 Sieve to No. 40 Sieve
Fine SAND	No. 40 Sieve to No. 200 Sieve
SILT and CLAY	Passing No. 200 Sieve

COHESIVE SOILS

CONSISTENCY	Qu (tsf)
Very Soft	Less than 0.3
Soft	0.3 to 0.6
Medium Stiff	0.6 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	4.0 and over

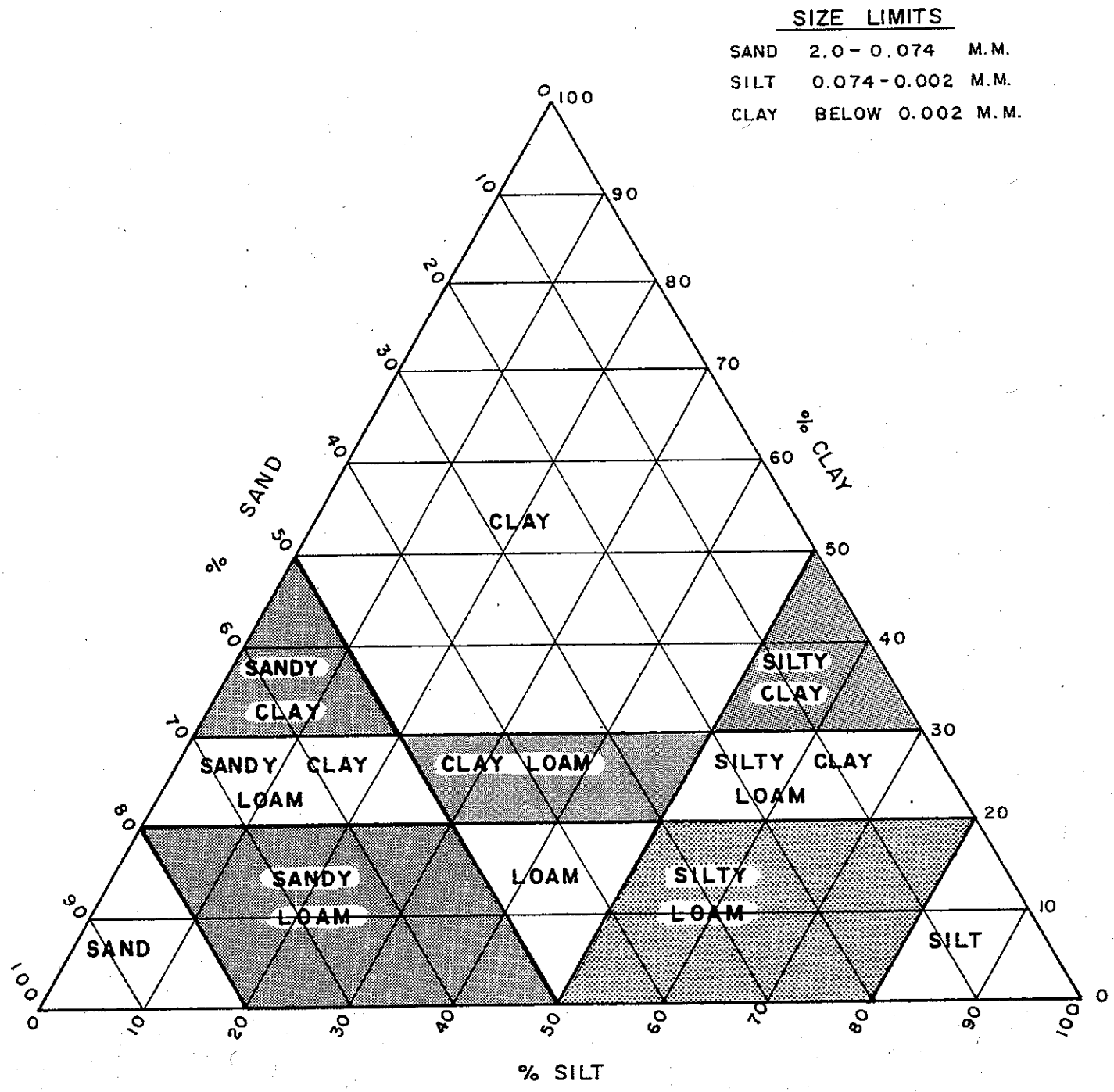
COHESIONLESS SOILS

RELATIVE DENSITY	N
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50 and over

MODIFYING TERM	PERCENT BY WEIGHT
Trace	1 - 10
Little	10 - 20
Some	20 - 35

TESTING SERVICE CORPORATION

IDH TEXTURAL CLASSIFICATION CHART

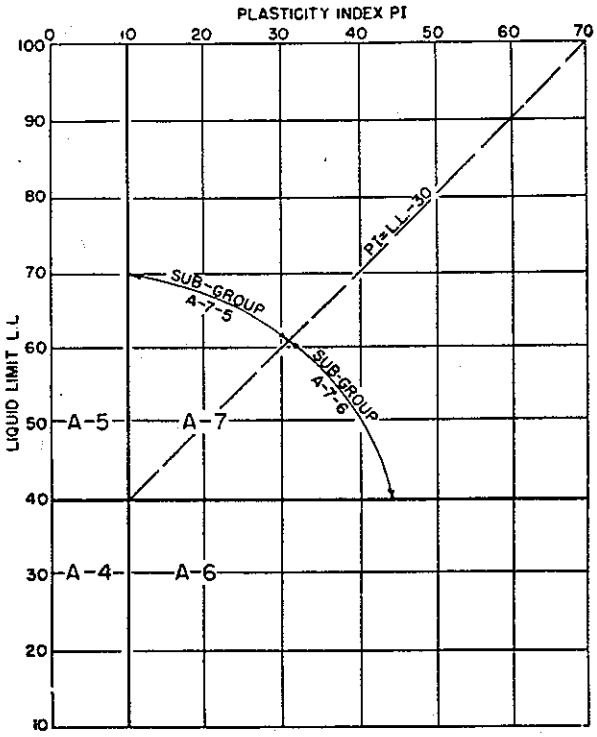


TESTING SERVICE CORPORATION
AASHTO CLASSIFICATION CHART

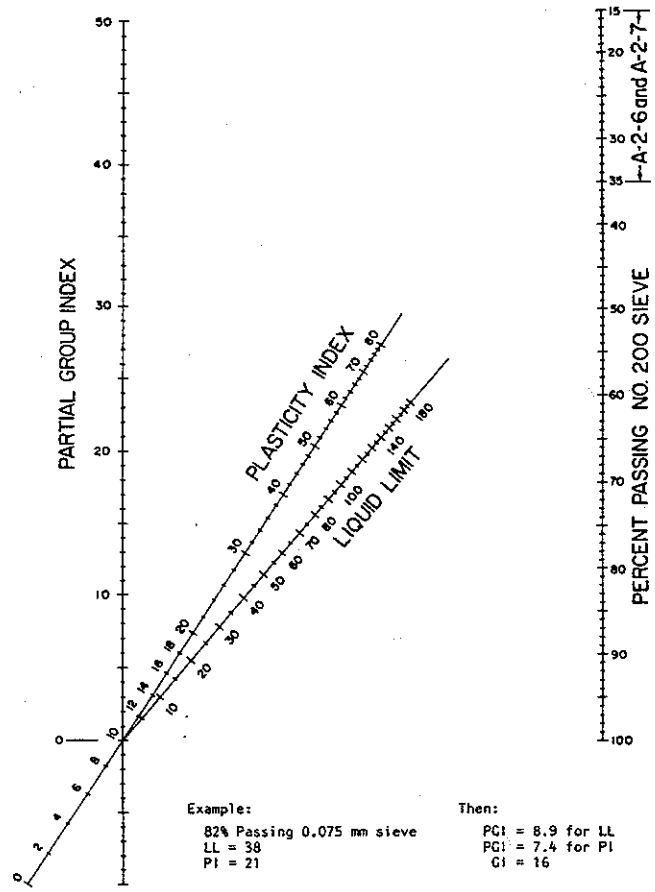
Group Index (GI) = (F-35)[0.2+0.005 (LL-40)]+0.01(F-15)(PI-10)
where F = % Passing 0.075 mm sieve, LL = Liquid Limit,
and PI = Plasticity Index

When working with A-2-6 and A-2-7 subgroups the Partial Group Index (PGI) is determined from the PI only.

When the combined Partial Group Indices are negative, the Group Index should be reported as zero.



Liquid Limit and Plasticity Index Ranges for the A-4, A-5, A-6 and A-7 Subgrade Groups



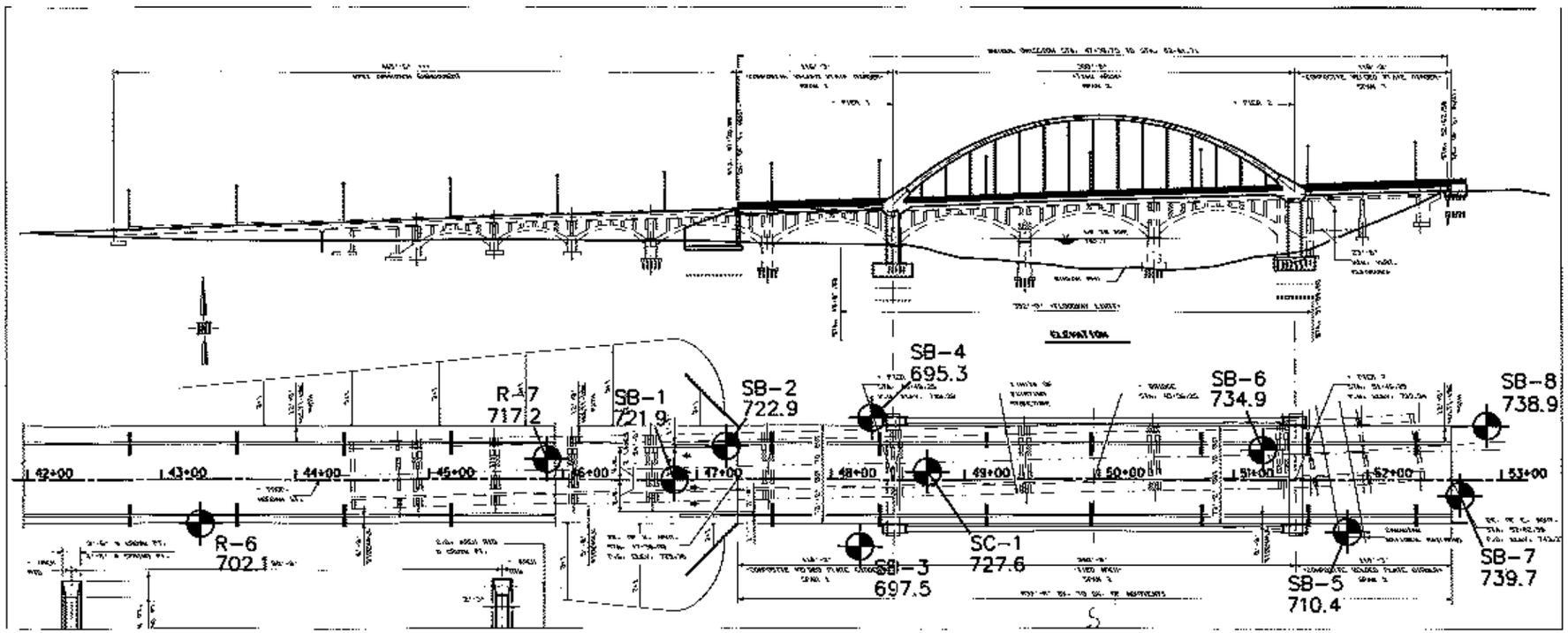
Example:
82% Passing 0.075 mm sieve
LL = 38
PI = 21

Then:
PGI = 8.9 for LL
PGI = 7.4 for PI
GI = 16

AASHTO SOIL CLASSIFICATION SYSTEM

General Classification	*Granular Materials (35% or less passing No. 200)*							*Silt-Clay Materials (more than 35% passing No. 200)*			
	A-1			*A-2*							*A-7*
Group Classification	*A-1-a*	*A-1-b*	*A-3*	*A-2-4*	*A-2-5*	*A-2-6*	*A-2-7*	*A-4*	*A-5*	*A-6*	*A-7-5, A-7-6*
Sieve analysis, % passing:											
No. 10	50 max	.....	.....	.....	.....	.....	.....	.....	.....	.....	
No. 40	30 max	50 max	51 min	.....	.....	.....	.....	.....	.....	.....	
No. 200	15 max	25 max	10 max	35 max	35 max	35 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction passing No. 40:											
Liquid limit	.....		.....	40 max	41 min	40 max	41 min	40 max	41 min	40 max	41 min
Plasticity index	6 max		N.P.	10 max	10 max	11 min	11 min	10 max	10 max	11 min	11 min†
Usual types of significant constituent materials	Stone fragments, gravel and sand		Fine sand	Silty or clayey gravel and sand				Silty soils		Clayey soils	
General rating as subgrade	Excellent to good						Fair to poor				

† Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30.



SCALE 1" = 100'

BORING LOCATION PLAN
MORGAN STREET OVER ROCK RIVER
BRIDGE REPLACEMENT–PHASE 1
SEC 99–00493–00–BR
ROCKFORD, ILLINOIS

TSC	TESTING SERVICE CORPORATION 457 EAST GUNDERSEN DRIVE CAROL STREAM, ILLINOIS 60188	DRAWN BY: WFA	PAGE NO.
		CHECKED BY:	
		JOB NO. : L–68,482	1 OF 1
		DATE: 9/20/07	