STRUCTURE GEOTECHNICAL REPORT
STEARNS ROAD BRIDGE OVER FOX RIVER
KANE COUNTY, ILLINOIS
IDOT STRUCTURE NUMBER 045-3166
KANE COUNTY PROJECT P-91-051-07

For:

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March 10, 2008

Illinois Department of Transportation

Structure Geotechnical Report Responsibility Checklist

Structure Number: 045-3166 (prop.) None (exist.) Contract Number: ____ Date: 3/10/2008

Route: New Stearns Road Section: 98-00214-02BR County: Kane

TSL plans by: Baker Engineering, Inc. 801 W Adams Street, Chicago, IL 60607

Structure Geotechnical Report and Checklist by: Wang Engineering, Inc., 1145 N. Main St; Lombard, Illinois 60148

IDOT Structure Geotechnical Report Approval Responsibility : ☐ Qualified District Geotechnical Personnel ☒ BBS Central Geotechnical Unit

Geotechnical Data, Subsurface Exploration and Testing	Yes	No	N/A
All pertinent existing boring data, pile driving data, site inspection information included in the report?	☐	☒	☐
Are the preliminary substructure locations, foundation needs, and project scope discussions between Geotechnical Engineer and Structure Planner included in the report?	☒	☐	☐
All ground and surface water elevations shown on all soil borings and discussed in the report?	☒	☐	☐
Has all existing and new exploration and test data been presented on a subsurface data profile?	☒	☐	☐
Is the exploration and testing in accordance with the IDOT Geotechnical Manual policy?	☒	☐	☐
Are the number, locations, depths, sampling, testing, and subsurface data adequate for design?	☒	☐	☐
Geotechnical Evaluations			
Have structure or embankment settlement amounts and times been discussed in report?	☒	☐	☐
Does the report provide recommendations/treatments to address settlement concerns?	☒	☐	☐
Has the critical factor of safety against slope instability been identified and discussed in the report?	☒	☐	☐
Does the report provide recommendations/treatments to address stability concerns?	☒	☐	☐
Is the seismic design data (PGA, amplification, category, etc.) noted in the report?	☒	☐	☐
Have the vertical and horizontal limits of any liquefiable layers been identified and discussed?	☒	☐	☐
Has seismic stability been discussed and have any slope deformation estimates been provided?	☐	☐	☒
Has the report discussed the proximity of ISGS mapped mines or known subsidence events?	☒	☐	☐
Has scour been discussed, any Hydraulics Report depths reported & soil type reductions made?	☒	☐	☐
Do the Factors of Safety meet AASHTO and IDOT policy requirements?	☒	☐	☐
Geotechnical Analyses and Design Recommendations			
When spread footings are recommended, has a bearing capacity and footing elevation been provided for each substructure or footing region?	☐	☐	☒
Has footing sliding capacity been discussed?	☐	☐	☒
When piles are recommended, does the report include a table indicating estimated pile lengths vs. a range of feasible required bearings and design capacities for each pile type recommended?	☒	☐	☐
Have any downdrag, scour, and liquefaction reductions in pile capacity been addressed?	☒	☐	☐
Will piles have sufficient embedment to achieve fixity and lateral capacity?	☒	☐	☐
Have the diameters & elevations of any pile pre-coring been specified (when recommended)?	☒	☐	☐
Has the need for test piles been discussed and the locations specified (when recommended)?	☒	☐	☐
Has the need for metal shoes been discussed and specified (when recommended)?	☒	☐	☐
When drilled shafts are recommended, have side friction and/or end-bearing values been provided?	☒	☐	☐
Has the feasibility of using belled shafts been discussed when terminating above rock, or have estimated top of rock elevations been provided when extending into rock?	☐	☐	☒
Have shaft fixity, lateral capacity, and min. embedment been discussed?	☒	☐	☐
When retaining walls are required, has feasibility and relative costs for various wall types been discussed?	☐	☐	☒
Have lateral earth pressures and backfill drainage recommendations been discussed?	☒	☐	☐
Has ground modification been discussed as a way to use a less expensive foundation or address feasibility concerns?	☐	☐	☒
Have any deviations from IDOT Geotechnical Manual or Bridge Manual policy been recommended?	☐	☒	☐
Construction Considerations			
Has the need for cofferdams, seal coat, or underwater structure excavation protection been discussed?	☒	☐	☐
Has stability of temporary construction slopes vs. the need for temporary walls been discussed?	☐	☐	☒
Has the feasibility of cantilevered sheeting vs. a temporary soil retention system been discussed?	☐	☐	☒
Has the feasibility of using a geotextile wall vs. a temp. MSE for any temp fill retention been noted?	☐	☐	☒

"In order to aid in determining the level of departmental review, please attach additional documentation or reference specific portions of the SGR to clarify any checklist responses that reflect deviation from IDOT policy/practice."

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NEW STEARNS ROAD BRIDGE OVER FOX RIVER
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KANE COUNTY PROJECT NO. P-91-051-07
FOR
BAKER ENGINEERING, INC.

1.0 INTRODUCTION

This report presents the results of subsurface investigation, laboratory testing, and geotechnical evaluation for the proposed New Stearns Road Bridge over Fox River. The project site is located in Kane County, Illinois. The *Project and Site Location Maps* are presented as Exhibits 1 and 2.

2.0 PROJECT DESCRIPTION

The Stearns Road Corridor will include a new Fox River Bridge and a 4.6 mile new road alignment that extends from approximately the Kane/DuPage County line to Randall Road. The Contract 4 scope of work includes construction of the new Stearns Road from east of McLean Boulevard to Illinois Route 25 including new structure over Fox River.

The proposed typical cross section consists of two 12 foot lanes in each direction separated by an 8 to 32 foot median. Signalized intersection improvements will be provided at Randall Road/McDonald Road (the western terminus), McLean Boulevard, Illinois Route 25, Gilbert Street, and Dunham Road. The proposed roadway continues east of the intersection to join the four lane section of Stearns Road completed by DuPage County.

3.0 EXISTING AND PROPOSED STRCUTURES

This is a new bridge. There are no river crossings within the 5.5 miles from the Illinois Route 64 Bridge in the City of St. Charles to the State Street Bridge in the Village of South Elgin. The nearest existing crossing of the Fox River to the project is a railroad bridge. The proposed Stearns Road bridge crossing is located approximately 240 feet south of the Canadian National Illinois Central Railroad (CNICRR) Bridge. No information was available for this bridge structure foundation.

The proposed bridge structures will be a 5-span steel plate girder structure with cast-in-place concrete deck. The bridge will carry four 12-foot lanes in each direction with a 2-foot outside and inside shoulder as well as a 4-foot median. The structure will be 63'-2" wide out-to-out and 980'-11" long back-to-back abutments. The structure will require three spans to cross the Fox River. The span lengths measured along the Proposed Grade Line (PGL) are 180' for span 1, 210' for spans 2 and 4, and 163'-5" for span 5. Two piers will be located in the river. Both the abutments and piers 1, 3, and 4 are expansion type and pier 2 will be fixed. The abutments will be stubtype abutments. The substructure locations are shown in Exhibit 4, Boring Location Plan.

The preliminary estimated substructure LRFD factored loads have been provided by Baker Engineering, Inc. (Baker) at the sub-structures. They are as follow:

West Abutment	Vertical Load	2500 k
Pier 1	Vertical Load	7200 k
	Moment	5700 k-ft
Piers 2	Vertical Load	7500 k
	Moment	7500 k-ft
Piers 3	Vertical Load	7500 k
	Moment	7200 k-ft
Pier 4	Vertical Load	7000 k
	Moment	4650
East Abutment	Vertical Load	2500 k

A Mixed-use path ramp structure is proposed along the Fox River and under the proposed river bridge on the east side of the Fox River. A new retaining wall is proposed to be located parallel to the Interchange railroad track at northeast of the west abutment of the river bri8dge. A separate Structure Geotechnical Report will be prepared for these two structures.

4.0 PURPOSE AND SCOPE

The purpose of our geotechnical work was to investigate and evaluate the subsurface soil and groundwater conditions within this project area that would form a basis for foundation and earthwork design recommendations. Specifically, the scope of the work was as follows:

- To investigate by means of supplemental exploratory borings, the subsurface soils and ground water level conditions at the site to depths that will be influenced by the proposed construction;
- To evaluate the physical properties of the soils underlying the site that will influence foundation design and construction;
- To perform analyses and provide recommendations and data for the design and installation of foundations, including the suitable foundation type or types, bearing capacity, the elevation or elevations at which the foundations should be established, and the estimated foundation settlement;
- To provide recommendations relative to construction operations and special design precaution that may be required; and
- To provide a report summarizing the results of our studies, conclusions, and recommendations.

5.0 GEOLOGIC SETTING

The project is located in the eastern part of Kane County. On the USGS “Geneva” quadrangle map, the project spans mainly sections 2 and 3 of Tier 40 N Range 8 E. The proposed bridge over the Fox River is located in the center of Section 2 as shown in Exhibit 2.

The following review of published geologic data, with emphasis on factors that might influence the design and construction of the proposed engineering works, intends to place the project area within a geological framework and to confirm the dependability and consistency of our investigation results. Exhibit 3 illustrates the *Site and Regional Geology*.

5.1 Bedrock Geology

The uppermost bedrock unit in Kane County consists of Silurian-age dolostones that rest on top of Ordovician-age shale and dolostone of the Maquoketa Group. The bedrock strata dip gently toward southeast (Curry et al., 1999; Dey et al., 2007).

The bedrock crops out along the Fox River just south of the McLean Boulevard and IL-31 intersection. At the project site, the proglacial St. Charles Bedrock Valley shapes the bedrock topography: the valley is oriented NNE to SSW and has a relief of about 100 feet. The McLean Boulevard and IL 31 intersection is located above the western bank of the bedrock valley, whereas the proposed bridge over the Fox River lies above the valley's axis where the top of bedrock elevation measures 575 to 550 feet. The valley fill includes up to 100 feet of glacial outwash and till (Dey et al., 2007; Grimley and Curry, 2002).

5.2 Surficial Geology

Glacial and postglacial deposits overlie the bedrock surface. Near the project area, the glacial deposits include diamictons of the Yorkville Member of the Lemont Formation and sand and gravel of the Henry Formation (Hansel and Johnson, 1996). Postglacial deposits are made up of sand and silt alluvium deposited by the Fox River (Cahokia Formation) and peat and muck accumulated in marshy depressions (Grayslake Peat).

The Yorkville Member consists of low moisture content, high blow counts, low compressibility silty to silty clay loam diamicton (Bauer et al., 1991). It occurs at the east end of the project area and its thickness may range between 0 and 50 feet. The Yorkville Member rests over and it is overlain by medium dense to dense sand and gravel of the Henry Formation, which makes up most of the subgrade in the project area and may be as thick as 75 feet. Older diamictons may underline both the Yorkville Member and the Henry Formation (Grimley and Curry, 2002).

Less than 20-foot thick Cahokia alluvium (sand, silt, and clay) occurs in the project area, mostly east of the Fox River. A prominent deposit of peat, muck, organic silt and clay associated with the Grayslake Peat occur within a fen area just west of McLean Boulevard (Grimley and Curry, 2002).

Our and previous subsurface investigations result fit into the local geologic context. The investigation revealed the lithological profile includes mostly outwash sand and gravel and clayey to silty diamictons. None of the borings drilled near the proposed bridge location reached the top of the bedrock.

5.3 Mining Activity

Areas of disturbed ground with spoil piles or removed earth in gravel pits, dolostone quarries, and landfills are present within or near the project area. Fox River Quarry (crushed stone) is located at the west end of the project. Another area with disturbed ground, probably associated with the Elgin-Wayne Landfill, is located at the east end of the project area. There were no past coal mining activities at the proposed structure location. The Kane County is not identified as coal producing area by Illinois State Geological Survey (ISGS, 2000).

5.4 Seismic Activity

The 2002 US Geological Survey National Seismic Hazard Map (USGS, 2002) indicates for the Kane County area a peak ground acceleration of 2% of gravity, with a 10% probability of exceedance in 50 years. No active, major faults are present near the project area (Kolata, 2005).

6.0 METHODS OF INVESTIGATION

6.1 Subsurface Investigation

6.1.1. Existing Subsurface Data

During the Phase I, Testing Services Corporation (TSC) performed a total of 9 structure borings (STFX-1 to STFX-9) between stations 565+50 to 578+00 and spaced 150 feet interval. Three of these borings (STFX-4 to STFX-6) were located in the Fox River. The termination depths of these borings were between 70 to 100 feet below ground surface (bgs). Borings locations are shown in Exhibit 4. Boring logs are included in Appendix A.

6.1.2 Borings by WEI

The subsurface exploration performed by WEI for the Fox River Bridge consisted of two structure borings (P3B-1 and P4B-1) at the proposed piers 2 and 3 locations in the Fox River and one structure boring (S1B-1) at the west abutment location. Borings were drilled during the period of November 29 and December 13, 2007. The borings in the Fox River, the bridge west abutment, and Pier 1 were located and marked with metal posts by Christopher B. Burke Engineering Ltd. (CBBE). Boring S1B-1 was located in the field by WEI by measuring off the proposed distances from the marked Pier 1 and bridge west abutment locations. Boring S1B-1 was surveyed by CBBE after the drilling completion. As-drilled borings locations for the river borings were determined by measuring the offset from the surveyed boring locations. A Boring Locations Plan is included as Exhibit 4. The survey information (ground surface elevation, coordinates, stations and offset) provided by CBBE is included in the attached boring logs (Appendix A).

An all terrain vehicle (ATV) mounted drilling rig, equipped with hollow stem augers, was used to advance and maintain an open borehole. Because the water in the Fox River was shallow enough, the ATV rig was also used to drill the river borings. To minimize wandering off the borehole while drilling the river borings, a platform on wheels with a guide hole for the augers was used and placed perpendicular to the river current by the ATV drill rig. A second ATV with a cage was used to contain and transport the pressuremeter equipment, to transport the trailer containing the drilling equipment, and to obtain the results from the in field unconfined compressive strengths and pressure meter tests. Soil sampling was performed according to AASHTO T 206-87, "Penetration Test and Split Barrel Sampling of Soils."

The soil at Boring S1B-1 was sampled at 2.5-foot intervals to a depth of 30 feet and at 5-foot intervals below 30 feet to termination depths. The soil at borings P3B-1 and P4B-1 was sampled at 2.5-foot intervals to a depth of 30 feet and at 5-foot intervals below 30 feet until cohesive material was encountered. Once cohesive material was encountered, drilling continued using a mud rotary system, soil was sampled at 5-foot intervals, and each cohesive sample was immediately followed with a pressuremeter test. Borings were drilled few feet deeper than required in order to obtain necessary information for an adequate engineering analysis. Borings were drilled to depths ranging from 74 to 92 feet bgs.

A WEI field engineer monitored the drilling activities and maintained field boring logs. The field logs included results of Standard Penetration Test (SPT) recorded as blows per 6 inches of penetration. Theses values are shown on the boring logs as SPT values. The N value is the sum of the last two SPT numbers (blows per final 12 inches). The unconfined compressive strengths of cohesive soil samples were obtained in the field using Rimac Spring Tester on the split spoon samples. The soils were described and classified according to IDH classification system.

All soil samples collected in the field were placed in sealed glass jars and transported to WEI Geotechnical Laboratory in Lombard, Illinois for further laboratory testing and examination. The field logs were finalized by an experienced geologist after verifying the field visual classifications and laboratory test results.

The soil samples will be retained in our laboratory for 60 days following the final report submittal. The samples will be discarded unless a specific written request is received as to their disposition.

Groundwater observations were made during and at the end of drilling operations. Due to safety considerations, the land borehole was backfilled with bentonite chips mixed with soil cuttings immediately upon completion. The boreholes in the river were backfilled with the mud from the mud rotary drilling system and with granular cave-in material from the borehole's upper most layers.

6.1.3 Pressuremeter Testing

A Menard Pressuremeter, Model G-AM II manufactured by RocTest Ltd. was used to measure the in-situ strength and stress-strain soil properties. Pressuremeter testing was conducted in Borings P3B-1 and P4B-1 from depths of 43 feet to 68 feet bgs at intervals of 5 feet. The pressuremeter tests were performed during the period of November 29 through December 6, 2007. . Split spoon samples were obtained before performing in-situ pressuremeter testing for laboratory testing and to determine the interval at which the pressuremeter testing should be performed. Upon obtaining a split spoon sample of cohesive material, the borehole was redrilled at that same sample interval using a mud rotary drill bit to widen the borehole walls to a calculated diameter that is slightly larger than the pressuremeter probe. On the cohesive split spoon soil samples, unconfined compressive strengths were obtained in the field using a Rimac Spring Tester. These values were used as a guideline when calculating the pressure to be applied at each pressuremeter test interval. The results of pressuremeter tests are included in Appendix D.

6.2 Laboratory Testing

Laboratory testing program included moisture content (AASHTO T 265) on all the soil samples. Atterberg Limits tests (AASHTO T 89 & T 90) and particle-size analyses (AASHTO T 88) were performed on selected soil samples. The field visual descriptions of the samples were reviewed in the laboratory. The laboratory test results are presented on the boring logs (Appendix A) and included in Appendix B.

7.0 SITE AND SUBSURFACE CONDITIONS

7.1 Site Conditions

New Stearns Road Bridge is proposed approximately 240 feet south of CNIC (previously CC&P) Railroad Line Bridge. At approximately 0.5 miles south of the proposed New Stearns Road Bridge, the river quickly changes from a southward directional flow to a westward directional flow for approximately 1.0 miles. At which point, the river makes a hairpin turn and resumes its flow in a southward direction. The Fox River Valley generally is a broad flat-bottomed valley with steep bluffs that exhibit large relief. Where the New Stearns Road Bridge will cross the Fox River, the relief on the east side of the river gently increases towards the east up to Illinois Route 25 with a small and gentle valley at Brewster Creek. The west side of the river has a gradual but steeper incline towards the west up to Illinois Route 31. Currently vegetative islands are present within the area, as well as small sand bars. The Fox River is a navigable river used for recreational boating and is identified as a Class I stream.

The Fox River is bounded on the west side by Blackhawk County Forest Preserve and on the east side by the construction of New Stearns Road. Prior to the construction of New Stearns Road, the east side was occupied by numerous greenhouses and contained a few detention ponds. In the forest preserve, there are two elevated railroad tracks running perpendicular to the proposed New Stearns Road and are located between the proposed Pier 1 and the river bank. The tracks are elevated by steeply sloped, compacted soil mounds. The east river bank contains two manmade water inlets with one located at the proposed New Stearns Road westbound shoulder and the other located 225 feet south of the proposed New Stearns Road center line. These inlets run 150 to 190 feet inland and are between 20 to 45-foot wide.

Approximately 0.15 to 0.35 miles west of the river, Illinois Route 31 runs parallel to the Fox River. Illinois Route 25 runs parallel on east side of the Fox River and is located between 0.5 and 1.4 miles east of the river. The relief on both the east and west side of the Fox River increases gradually and continuously; however, slope is steeper over a smaller span on the west side of the river. Elevations vary on the east side of the river from 689 feet (NGVD) at the river bank to 726 feet (NGVD) at Illinois Route 25 over an approximate length of 3,450 feet. The west side of the river increases from 689 (NGVD) at the river bank to 763 (NGVD) at Illinois Route 31 over an approximate length of 835 feet. A site contour plan is included as Exhibit 5.

7.2 Subsurface Conditions

Detailed descriptions of the subsurface conditions encountered in the borings are presented on the attached boring logs (Appendix A) and Subsurface Data Profile (Exhibit 6). Please note that the strata contact lines shown on logs and profiles represent approximate boundaries between soil types. The actual transition between soil types in the field may be different in horizontal and vertical directions.

The subsurface investigation uncovered a vertical sequence of soil units laterally traceable throughout Borings STFX-1 through STFX-9, P3B-1 through P4B-1, and S1B-1. From top to bottom, the sequence consists of three lithological units: (1) brown and gray sand to sandy gravel; (2) brown and gray clay to clay loam; and (3) brown and gray sand to sandy gravel. Due to the higher ground elevations at STFX-1 to STFX-3, STFX-9 and S1B-1, these borings were terminated in the second lithological unit; therefore, the third unit was not able to be verified at these locations. The following presents in further detail the soil profile and groundwater conditions, as revealed through drilling at the bridge abutments and piers.

The top unit consists of alternating layers of medium dense to very dense, brown and gray, gravelly sand and fine to coarse sand. The thickness ranges from 23 to 42 feet in Borings STFX-5 to STFX-9, P3B-1 and P4B-1. The thickness of the layer increases in range from 47 to 76 feet in STFX-1 to STFX-4 and S1B-1. Within the sand and gravel, there are lenses and layers of cohesive material ranging from 1 to 12.5 feet thick and are comprised of stiff to hard clay, silty clay, sandy clay and clay loam. Additionally, there are lenses of medium dense to dense silt ranging from 1 to 2.5 feet thick in borings STFX-1, STFX-6, STFX-7, and STFX-9.

Underlying the sand and gravel unit is a unit of very stiff to very hard, brown and gray clay to clay loam. This unit contains lenses of medium dense to very dense, fine to medium sand ranging from 1 to 5 feet thick at borings P3B-1, STFX-5 and STFX-7. At STFX-8, there is a 5 foot thick layer of dense silt.

The thickness of the third unit has minimum thicknesses of 3 to 25 feet and has an undetermined maximum thickness. The soil encountered in this unit is dense to very dense, brown and gray, fine sand to gravelly sand, gravel, silt and occasional cobbles. There is a 1 to 2-foot thick lens of very stiff to hard, clay to silty clay encountered at borings STFX-4, P3B-1, and P4B-1. The summary of the boring data is shown in Table 1.

Bedrock was not encountered in any of the borings. The bedrock is estimated to be at a depth of 120 feet below the river bed and the borings were only extended to a maximum depth of 92 feet bgs. This would place the bedrock immediately below the silt that was encountered in STFX-4. Details on the type of bedrock expected to be encountered in this area is presented in Section 5.1 Bedrock Geology of this report.

7.3 Groundwater Levels

Water levels in the river borings (STFX-4 to STFX-6, P3B-1, and P4B-1) could not be recorded since they were drilled in the river. While drilling P3B-1 and P4B-1, the height of the surface river water was measured in reference to the river bed elevation and was approximately 1.5 feet above the ground surface at an estimated elevation of 688.5 (NGVD). Due to the erosion and deposition of material in the river and seasonal changes, we expect the Fox River water surface elevation will fluctuate.

While drilling, water levels were recorded in borings that were drilled outside the river. Water levels at various times after drilling completion were also observed in some of the borings. Water level observations are shown on the boring logs. In general, groundwater was encountered at elevations ranging between 685.5 and 689.2 feet while drilling. At the completion of drilling, groundwater levels were found at elevations ranging from 686.5 to 701.1 feet. We expect that the groundwater levels will fluctuate seasonally and with Fox River surface water level.

7.4 Seismic Considerations

7.4.1 Seismic Data

The following seismic data is recommended for the design which should be shown on the bridge plans.

Soil Profile Type: I

(According to AASHTO Standard Specifications for Highway Bridges)

Bedrock Acceleration Coefficient (A): 0.038g

(According to the AASHTO Seismic Acceleration Coefficient Map)

The Site Coefficient (S): 1.0

(Based on Soil Profile Type I)

Seismic Performance Zone (SPZ): 1

(Based on the Bedrock Acceleration coefficient and the Importance Classification according to the AASHTO Standard Specifications for Highway Bridges)

7.4.2 Liquefaction Potential

Liquefaction analysis at each bridge structure boring was performed using a Simplified Procedure originally developed by Seed and Idriss (1982) and revised in 1990. The minimum factors of safety range between 2.2 and 13.1 considering groundwater level at the existing grade. A design earthquake with a magnitude of 7.5 was used in the analyses. The minimum factor of safety required by IDOT is 1.0. The liquefaction of the soils at the site is unlikely to occur and therefore, there is no need for any remedial treatment of the soils or foundation.

8.0 ANALYSIS AND RECOMMENDATIONS

During the structure and foundation system studies conducted by Baker Engineering, Inc. (Baker), WEI evaluated possible foundation solution that can be considered for support of the proposed bridge structure. The following foundation options were considered in the preliminary foundation evaluation.

- All substructures on driven piles
- All substructures on drilled shafts
- Abutments on driven piles and the piers on drilled shafts
- River piers on drilled shafts and other substructures on driven piles

Based on the soil conditions encountered during our investigation, Baker and Wang concluded that the river piers could be supported on drilled shafts. The drilled shaft in a single row eliminates the need for cofferdams, seal coat and structure excavation. The other substructures are proposed to be supported by driven piles. Foundation design data and recommendations pertaining to construction are presented in subsequent sections of this report.

8.1 Foundation Recommendations

In the following discussions, the proposed Piers 1 and 4 are referred as land piers and Piers 2 and 3 are referred as river piers.

8.1.1 Abutments and Land Piers

The metal shell cast-in-place (MSCIP) pile driving through very dense/hard soils will be difficult and could damage the pile toe and cause deformation at the pile head. Therefore, we do not recommend MSCIP concrete piles for the abutments and land piers.

The top of the dolomitic limestone bedrock is estimated at approximate Elevation 570. The pile length from the bottom of the pile cap to top of the limestone bedrock would be 140 to 165 feet for the abutments and 115 to 135 feet for the piers. Based on the soil information from the borings, it appears that the driving of H-piles to top of bedrock, through very dense/very hard soils, will be very difficult and the refusal will be obtained before reaching top of the bedrock. Therefore, we do not recommend utilizing end bearing H-piles. The required driven capacity for steel H-piles installed as friction piles could be achieved with shorter lengths.

Several H-piles options for the foundations could be considered. Driven H-pile foundations could be designed for various capacities. The pile capacity will be developed in skin friction between the pile surface and the soils above the tip with some end bearing capacity at the tip.

The estimated pile lengths at each substructure location for various H-pile sizes and capacities are shown in Tables 2A through 2D. The most economical pile sizes should be selected. The sections of the pile through the precored holes in the newly placed embankment were not considered in providing vertical pile load carrying capacity. Precoring is recommended to avoid downdrag load on the piles and is discussed in the subsequent section of the report. The maximum structural design capacity of the steel pile and the spacing should be as per IDOT Bridge Manual (IDOT 2006). Hard pile driving during installation might be experienced in very dense sand and gravel deposits containing potentially cobbles. Therefore, we recommend that the piles be installed with metal shoes. It is our opinion that HP 12x53 or HP 14x73 piles be considered for the abutments and HP 12x74 or HP 14x89 for the piers. One test pile should be identified on the plans at each substructure which should be installed prior to production pile installation. There is no need for a full scale load test.

The soil immediately below the pile cap should not be considered as carrying any vertical load. The estimated lengths shown in the tables do not include any embedment into the pile cap footing. The estimated length to be shown on the bridge plans should include embedment in to the pile cap as per

IDOT Bridge Manual (IDOT 2006). The base of all pile footings should be established at a minimum depth of 4 feet below the finished grade for frost protection.

8.1.2 River Piers

We evaluated subsurface soil data obtained from the recently performed borings (Borings P3B-1 and P4B-1) along with borings performed previously by others (Borings STFX-4 through STFX-6). It is our opinion that a deep foundation scheme consisting of drilled shaft established in hard clay stratum can be utilized for the support of the pier substructures. The geotechnical recommendations for the design of drilled shafts are presented in Table 3A. All shafts should be sized in 6 inches increments with a minimum diameter of 36 inches. A permanent liner in the overburden soil should be provided.

The *Factored Resistance* R_R of drilled shafts in kips can be calculated as per equation 10.8.3.5-1, page 1-131 of AASHTO LRFD Bridge Design Specifications, 4th Edition 2007 (2007 AASHTO).

The portions of the drilled shaft which should not be taken in contributing to the development of resistance through skin friction should be as specified in 2007 AASHTO. The reduction in resistance from group effects should also be evaluated as per 2007 AASHTO. The scour depth should also be considered in the drilled shaft design.

For the drilled shafts closely spaced in a single row, a deep footing approach (an equivalent pier) can be considered. If this design approach is considered, we recommend the geotechnical design parameters for the end bearing design shown in Table 3B be used.

8.2 Downdrag Loads

Downdrag load due to the negative skin friction will occur on piles at the abutments when soil strata move downward relative to the piles due to compression of soils. It is understood that the embankment east of the east abutment is almost completed to the proposed grade level. If the west abutment piles are installed after substantial settlement of the new embankment is completed, there will not be any significant downdrag load. Therefore, we recommend that to avoid downdrag load, the pile installation should be delayed for at least 30 days after construction of the embankment to its full height. The piles should be installed in precored holes in the new embankment.

8.3 Lateral Design Pressures

For the design of abutments and wing walls, we recommend a linearly increasing lateral pressure at 40 and 72 pounds per square foot (psf) per foot of depth below finished grade for embankment slope of horizontal and 1V:2H respectively considering drainable backfill. Additional lateral load from traffic should include a surcharge of 2 feet of soil considering unit weight of 125 pounds per cubic foot. The backfill and the drainage behind the abutments should be in accordance with IDOT Bridge Manual (IDOT 2006).

8.4 Resistance to Lateral Loads

Batter piles can be considered to resist the lateral loads. For such pile caps, the horizontal component of the axial lad on battered piles can be taken at full value. The use of battered shaft is not recommended due to their difficulty of construction and high cost. The required lateral capacity can be obtained by increasing the number of shafts or the shaft diameter. No allowance should be made for the frictional resistance of the cap concrete on soil. Lateral resistance from the soils from the river bed to the design scour depth, as per IDOT Bridge Design Manual (IDOT 2006), should be ignored. The lateral load capacity analysis of the piles/drilled shafts can be performed using computer program such as COMP 624P and L-pile. The estimated soil parameters that may be used for the analysis of stresses and deflection under lateral loads are presented in the attached Table 4. The geotechnical resistance factor of 1.0 should be used. The group action should be considered in calculating total lateral load resistance of the substructures. The river piers foundation should be designed to resist debris loads occurring during the flood event and ice load in addition to the loads applied from the structure.

8.5 Scour Potential

The existing scour data is not available since there is no existing structure for the Fox River crossing at this location. The scour analysis was performed by CBBE. The flood elevations and the design scour elevations are shown in Tables 5 and 6 respectively. The grain size values of D_{50} and D_{90} determined from the Grain Size Analysis test on some selected boring samples are shown in Table 7. The scour depth to be used in the drilled shaft foundation design is shown in Table 6. The drilled shafts should be designed so that the shaft penetration after the design scour event satisfies the required axial and lateral resistance. The soil lost due to scour should not be considered in contributing the overburden stress in the soil below the scour zone.

8.6 Foundation Settlement

The driven H-pile foundations designed and constructed as recommended will undergo negligible settlement (less than 0.5 inch).

We performed settlement analyses considering pressuremeter modulus for a single drilled shaft. The settlement considering applied pressure of 32 kips per square foot is estimated to be on the order of 0.50 inch and 0.70 inch for a 4-foot and 7-foot diameter straight drilled shaft respectively. There would be an additional settlement due to elastic compression of the concrete shaft. For an equivalent footing size of 6’x70’ established at Elevations 626 and 628 feet. We estimated settlement on the order of 0.6 inch.

8.7 Embankment Slope Stability

Slope stability analyses were performed for the embankment end and side slopes at the west end of the bridge. The computer program, SLIDE Version 5.0, was used to calculate the factors of safety against global stability. The Simplified Bishop Method was used for slope stability analyses. The soil parameters for the proposed embankment fill were selected considering either granular soil or cohesive soil material will be used and are shown in Exhibits in Appendix C. Details of stability analysis with the critical failure surface and results are also shown in the Appendix C Exhibits.

The minimum factor of safety required by IDOT is 1.5 for static loading condition. Our stability analyses indicate the minimum factor of safety to be 1.57 for the end slope, 1.56 for the side slopes and 1.51 for the slope at the proposed MSE wall. Therefore, the minimum IDOT factors of safety will be achieved with the bridge cone and approach embankments constructed to the design grades of 1V:2H or flatter. The end slopes of 1V:2H are expected to be stable with additional resistance provided by the piles.

8.8 Embankment Settlement

The roadway approach embankments immediately behind the abutments will require approximately 40 and 25 feet of new fill above the existing grade at the west and east abutment respectively. The approach embankments will have 1:2 end slopes and 1:2 or flatter side slopes. It is understood that the embankment east of the east abutment is almost completed to the proposed grade level. Therefore, we performed settlement analysis for the west approach embankment only.

We considered that the roadway approach embankment near the west abutment will rise up to a height of 40 feet (Elevation 746 feet) above the existing grade and the width of the embankment at the top will be 120 feet. The approach west embankment will have 1V:2H end and side slopes. The placement of fill for the west embankment will result in settlements of the underlying natural soils. The elastic (immediate) settlement of the granular soils and consolidation (long-term) settlement of the cohesive soil layers are expected to occur. Most of the elastic settlement is expected to be occurring at the same rate as the construction of the embankment progresses.

For the settlement analysis we considered the general soil profile from the soil borings. We performed several stress and settlement analyses considering embankment widths and side slopes within the ranges described above.

A preliminary settlement analysis was performed using a computer interactive program FoSSA Version 2.0 (Foundation Stress and Settlement Analysis) for assessing stresses and settlements under embankment. Soil parameters required for elastic settlement evaluation and for consolidation settlement analysis were estimated from the borings and other published data.

We estimate potential elastic and consolidation settlements will be on the order of 4 inches and 2.4 inches, respectively for an embankment height of 40 feet. Assuming embankment height to be 30 feet below the bottom of the abutment footing, we estimate potential elastic and consolidation settlements on the order of 3 inches and 1.5 inches respectively. We estimate that it will take approximately 12 and 8 days to achieve 50% of the total settlement and 30 and 25 days to achieve 90% of the total consolidation settlement for an embankment height of 40 and 30 feet respectively.

Thus, we estimate that by the time the proposed embankment is built to the bottom of abutment footing, the soil would undergo about 3.0 inches of maximum elastic settlement in the areas of the proposed abutment. Therefore, if the rest of the embankment (from bottom of the abutment footing to the full design height) is constructed after the pile installation, the remaining elastic settlement could be up to 1.0 inch. We recommend that the embankment be constructed to full design height and deep foundation of the west abutment be installed at least 30 days after construction of the embankment to its full design height.

Settlement within new embankment fill would also occur. For granular soil embankment, the majority of the settlement is expected to be completed by the end of construction. For cohesive soil embankment, a significant portion of total settlement within the embankment can also be expected to occur by the end of construction; however complete consolidation may take some time. The total settlement within the new embankment of 40 feet in height and constructed of cohesive and granular fill material could be as much as 4.5 inches and 2.5 inches respectively. As discussed earlier in the report, the piles should be installed in precored holes though the new embankment fill to avoid the downdrag load.

9.0 CONSTRUCTION CONSIDERATIONS

9.1 Excavation

Due to the existing soil conditions and close proximity to the river it might not be possible to slope the excavation sidewalls for the pier footing construction near the river. If that's the case, bracing with groundwater level control might be required. Temporary excavations required for other pile footings should have a slope of 1V:2H or flatter, as required to provide a stable side slopes. Foundation excavations should be performed in accordance with local, state, and federal regulations.

9.2 Dewatering

Seepage water that does accumulate in open excavations at abutment and land pier substructure locations can be removed using the sump pump method.

9.3 Filling and Backfilling

Structural fill used to attain the final design subgrade elevations should be IDOT gradation CA-6 or equivalent. This fill material should be free of organic matter and debris. Fill should be placed in lifts not exceeding 8 inches loose thickness and compacted to minimum 95 percent maximum dry density, as determined in accordance with AASTHO T-99, Standard Proctor Method.

Any backfill should be pre-approved by the site engineer. The fill should be free of organic materials and debris. We recommend using a porous granular material, such as IDOT gradation FA-1/FA-2 or the equivalent, to backfill the proposed abutments. All backfill material should be compacted in lifts no greater than 8 inches loose thickness. Each layer should be compacted to minimum 95 percent maximum dry density, as determined by AASTHO T-99, Standard Proctor Method.

9.4 Cofferdam

Cofferdam and seal coat will not be necessary for construction of the river piers supported on the drilled shafts in a single row.

9.5 Drilled Shafts

We recommend that a permanent casing with teeth at the bottom be installed in order to provide a good seal at top of the clay layer. The excavation below the casing in the clay should be performed with a dry method. After drilled shaft is completed to the required elevation, the base should be cleaned and inspected, the reinforcing cage placed, and the concrete can be discharged at the base using a tremie pipe or concrete pump. The drilled shafts should be constructed in accordance with Section 516 Drilled Shafts of the IDOT 2007 Standard Specifications for Road and Bridge Construction (IDOT 2007).

9.6 Construction Monitoring

There is no need for a special construction monitoring for the foundations except normally required by the IDOT Standard Specifications, Special Provisions and Contract Plans.

9.7 Embankment Construction

Bridge abutment fill should be constructed as early as possible in the project construction period in order to allow the embankments to adjust or settle under its own weight as much as possible prior to piles installation for the abutments. As recommended in earlier section of this report, piles installation should be delayed for at least 30 days after completion of the embankments to their full design heights. The embankment construction should be performed in accordance with Section 205 of the IDOT Standard Specifications for Road and Bridge Construction (IDOT 2007).

10.0 QUALIFICATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the 3 soil borings drilled by WEI and 8 borings drilled by others. WEI does not assume any responsibility for the data presented on the boring logs prepared by others. In addition, this report does not reflect any variations that may occur between the borings or elsewhere on the site, variations whose nature and extent may not become evident until the course of construction. In the event that any changes in the design and/or location of the bridge or substructures are planned, we should be timely informed so that changes can be reviewed, modified, and approved in writing by the geotechnical engineer.

It has been a pleasure to assist Baker Engineering, Inc. and Kane County on this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

WANG ENGINEERING, INC.

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TABLES

New Stearns Road over Fox River
Kane County Division of Transportation
IDOT SN: 045-3166

Baker Engineering, Inc. Project No. 113005
Wang Engineering Project No. 707-11-01

Table 1
Boring Data

Proposed Sub-Structure	Substructure Location, Station	Applicable Boring(s)	Boring Location (Station / Offset)	Ground Surface Elevation at Boring Location at Time of Drilling-Feet	Top of Clay Layer Depth-feet, (Elevation)	Top of Hard Clay, Depth-feet (Elevation)	Bottom of Hard Clay Depth-feet (Elevation)	Boring termination Depth-feet (Elevation)
		STFX-1	565+68 / 20.0 LT	724.07	72 (652)	72 (652)	80 (644)	80 (644)
West Abutment	566+54.38	S1B-1	566+18 / 18.0 LT	715.83	77 (639)	77 (639)	80 (636)	80 (636)
		STFX-2	566+94 / 31.0 RT	706.06	77 (629)	77 (629)	80 (626)	80 (626)
Pier 1	568+36.25	STFX-3	568+53 / 26.0 LT	701.51	62 (639)	72 (629)	80 (621)	80 (621)
		STFX-4	569+83 / 40.0 RT	687.05	47 (640)	67 (620)	72 (615)	100 (587)
Pier 2	570+46.25	P3B-1	570+39 / 7.0 RT	686.84	39 (648)	58 (628)	72 (614)	92 (595)
		STFX-5	571+65 / 30.0 LT	686.30	23 (663)	57 (629)	67 (619)	70 (616)
Pier 3	572+56.25	P4B-1	572+50 / 5.0 RT	687.01	42 (645)`	56 (631)	67 (620)	74 (613)
		STFX-6	573+45 / 37.0 LT	686.30	31 (655)	57 (629)	67 (619)	75 (6110
Pier 4	574+66.25	STFX-7	575+13 / 7.0 RT	691.10	32 (659)	32 (659)	74 (617)	75 (616)
East Abutment	576+31.54	STFX-8	576+72 / 40.0 RT	693.14	28 (665)	58 (635)	87 (606)	100 (593)

New Stearns Road over Fox River
Kane County Division of Transportation
IDOT SN: 045-3166

Baker Engineering, Inc. Project No. 113005
Wang Engineering, Inc. Project No. 707-11-01

Table 2A
Pile Design Data for HP 12x53

Sub-Structure ID	Reference Boring Number	Bottom of Footing Elevation	Precoring To Elevation	Pile Capacity Calculated From Elevation	Estimated pile length below pile cap, ft				
					NRB: 270 kips	NRB: 300 kips	NRB: 330 kips	NRB: 360 kips	NRB: 390 kips
West Abutment	S1B-1	734.92	714.0	714.0	75	77	78	80	82
Pier 1	STFX-3	698.0	Not Required	698.0	37	40	42	44	46
Pier 4	STFX-7	685.0	Not Required	685.0	14	15	16	18	26
East Abutment	STFX-8	708.0	693.0	693.0	32	33	34	36	46

1. The estimated length does not include any embedment into the footing. For estimated length to be shown on the plans, add embedment in accordance with IDOT Bridge Manual.
2. NRB = Nominal Required Bearing, FRA = Factored Resistance Available, FRA=0.5 times NRB
3. Maximum NRB for HP 12x53 is 419 kips

New Stearns Road over Fox River
Kane County Division of Transportation
IDOT SN: 045-3166

Baker Engineering, Inc. Project No. 113005
Wang Engineering, Inc. Project No. 707-11-01

Table 2B (REVISED)
Pile Design Data for HP 12x74

Sub-Structure ID	Reference Boring Number	Bottom of Footing Elevation	Precoring To Elevation	Pile Capacity Calculated From Elevation	Estimated pile length below pile cap, ft
					NRB: 360 kips
West Abutment	S1B-1	734.9	714.0	714.0	82
Pier 1	STFX-3	695.0	Not Required	695.0	44
Pier 4	STFX-7	685.0	Not Required	685.0	19
East Abutment	STFX-8	708.0	693.0	693.0	40

1. The estimated length does not include any embedment into the footing. For estimated length to be shown on the plans, add embedment in accordance with IDOT Bridge Manual.
2. NRB = Nominal Required Bearing, FRA = Factored Resistance Available, FRA=0.5 times NRB
3. Maximum NRB for HP 12x74 is 589 kips

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New Stearns Road over Fox River
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IDOT SN: 045-3166

Baker Engineering, Inc. Project No. 113005
Wang Engineering, Inc. Project No. 707-11-01

Table 2C
Pile Design Data for HP 14x73

Sub-Structure ID	Reference Boring Number	Bottom of Footing Elevation	Precoring To Elevation	Pile Capacity Calculated From Elevation	Estimated pile length below pile cap, ft						
					NRB: 300 kips	NRB: 330 kips	NRB: 360 kips	NRB: 390 kips	NRB: 420 kips	NRB: 450 kips	NRB: 480 kips
West Abutment	S1B-1	734.92	714.0	714.0	75	76	77	78	79	80	82
Pier 1	STFX-3	698.0	Not Required	698.0	36	38	40	42	44	46	47
Pier 4	STFX-7	685.0	Not Required	685.0	13	14	15	16	17	24	30
East Abutment	STFX-8	708.0	693.0	693.0	31	32	33	34	36	42	49

1. The estimated length does not include any embedment into the footing. For estimated length to be shown on the plans, add embedment in accordance with IDOT Bridge Manual.
2. NRB = Nominal Required Bearing, FRA = Factored Resistance Available, FRA=0.5 times NRB
3. Maximum NRB for HP 14x73 is 578 kips

New Stearns Road over Fox River
Kane County Division of Transportation
IDOT SN: 045-3166

Baker Engineering, Inc. Project No. 113005
Wang Engineering, Inc. Project No. 707-11-01

Table 2D
Pile Design Data for HP 14x89

Sub-Structure ID	Reference Boring Number	Bottom of Footing Elevation	Precoring To Elevation	Pile Capacity Calculated From Elevation	Estimated pile length below pile cap, ft						
					NRB: 330 kips	NRB: 360 kips	NRB: 390 kips	NRB: 420 kips	NRB: 450 kips	NRB: 480 kips	NRB: 510 kips
West Abutment	S1B-1	734.92	714.0	714.0	76	77	78	79	80	82	86
Pier 1	STFX-3	698.0	Not Required	698.0	38	40	42	44	46	47	48
Pier 4	STFX-7	685.0	Not Required	685.0	14	15	16	17	23	29	34
East Abutment	STFX-8	708.0	693.0	693.0	32	33	34	36	40	48	53

1. The estimated length does not include any embedment into the footing. For estimated length to be shown on the plans, add embedment in accordance with IDOT Bridge Manual.
2. NRB = Nominal Required Bearing, FRA = Factored Resistance Available, FRA=0.5 times NRB
3. Maximum NRB for HP 14x89 is 705 kips

New Stearns Road over Fox River
Kane County Division of Transportation
IDOT SN: 045-3166

Baker Engineering, Inc. Project No. 113005
Wang Engineering, Inc. Project No. 707-11-01

Table 3A
Drilled Shaft Geotechnical Design Parameters

Geotechnical Design Parameters	Pier 3		Pier 4	
Applicable Soil Boring	P3B-1		P4B-1	
Existing River Bed Elevation at Boring	686.84		687.01	
Drilled Shaft Base Elevation	626		628	
Unit Tip Resistance $q_{p,}$ ksf	80		80	
Resistance factor for tip resistance, φ_{qp}	0.40		0.40	
Unit Side Resistance $q_{s,}$ ksf (See Note-1)	Elevation Range	Value	Elevation Range	Value
	680.5 to 680	0.03	680.5 to 676	0.20
	680 to 674	0.57	676 to 670	0.56
	674 to 668	1.03	670 to 666	0.90
	668 to 664	0.92	666 to 661	1.13
	664 to 658	0.77	661 to 643	0.96
	658 to 652	1.45	643 to 630	1.76
	652 to 646	0.78		
	646 to 643	2.38		
	643 to 629	1.90		
Resistance factor for shaft side resistance, φ_{qs}	0.45		0.45	
Bottom of Permanent Casing	Elevation 646		Elevation 643	

Note-1: It is assumed that the 100-year event scour depth at each pier is 6.5 feet (Elevation 680.5).

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Baker Engineering, Inc. Project No. 113005
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Table 3B
Drilled Shaft Geotechnical Design Parameters

Geotechnical Design Parameters	Pier 3	Pier 4
Applicable Soil Boring	P3B-1	P4B-1
Existing River Bed Elevation at Boring	686.84	687.01
Drilled Shaft Base Elevation	626	628
Unit Tip Resistance $q_{p,}$ ksf	65	65
Resistance factor for tip resistance, φ_{qp}	0.40	0.40
Bottom of Permanent Casing	Elevation 646	Elevation 643

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Baker Engineering, Inc. Project No. 113005
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Table 4
Recommended Soil Parameters for Lateral Load Analysis

Parameter / Subsurface Material	Loose Granular Soils	Medium Dense Granular Soils	Dense Granular Soils	Very Dense Granular Soils	Stiff Clays	Very Stiff Clays	Hard Clays
SPT Value(N, blows per foot) for Granular Soils OR Unconfined Compressive Strength (Qu, tsf) for Clays	Less than 10	10 to 30	31 to 50	Over 50	1.0 to 2.0	2.0 to 4.0	Over 4.0
Above Water Level							
Total Unit Weight, pci (gamma)	0.067	0.068	0.075	0.078	0.069	0.072	0.075
Angle of Internal Friction, degree (phi)	30	34	38	42	--	--	--
Cohesion, psi (c) (Undrained Shear Strength of soil)	---	--	--	--	10	20	30
Modulus of Subgrade Reaction, pci (k)	25	90	220	270	400	1030	1710
Strain at 50% stress, Percent (e50)	---	--	--	--	0.79	0.50	0.4
Below Water Level							
Submerged Unit Weight, pci (gamma)	0.029	0.032	0.039	0.042	0.033	0.036	0.039
Angle of Internal Friction (phi)	30	34	38	42	--	--	--
Cohesion, psi (c) (Undrained Shear Strength of soil)	---	--	--	--	10	20	30
Modulus of Subgrade Reaction, pci (k)	20	60	120	150	400	1030	1710
Strain at 50% stress, Percent (e50)	---	--	--	--	0.79	0.50	0.4

Boring logs show SPT Values number for three consecutive 6 inch penetration. N value is the total of second and the third numbers.

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TABLE-5
Waterway Information *

Flood Frequency (year)	Headwater Elevation (ft) (Proposed)
10	695.64
50 (Design)	697.22
100 (Base)	698.08
500 (Max. Calc.)	699.99

* Per Hydraulic Report & Baker Engineering

TABLE 6
Foundation Design Scour Data

Sub-structure	Boring Number	Design Scour Elevation*	Design Scour Elevation For Foundation Design
Pier 2	P3B-1	680.50	680.50
Pier 3	P4B-1	681.00	681.00

* Per Hydraulic Report & Baker Engineering

Structure Geotechnical Report
New Stearns Road over Fox River
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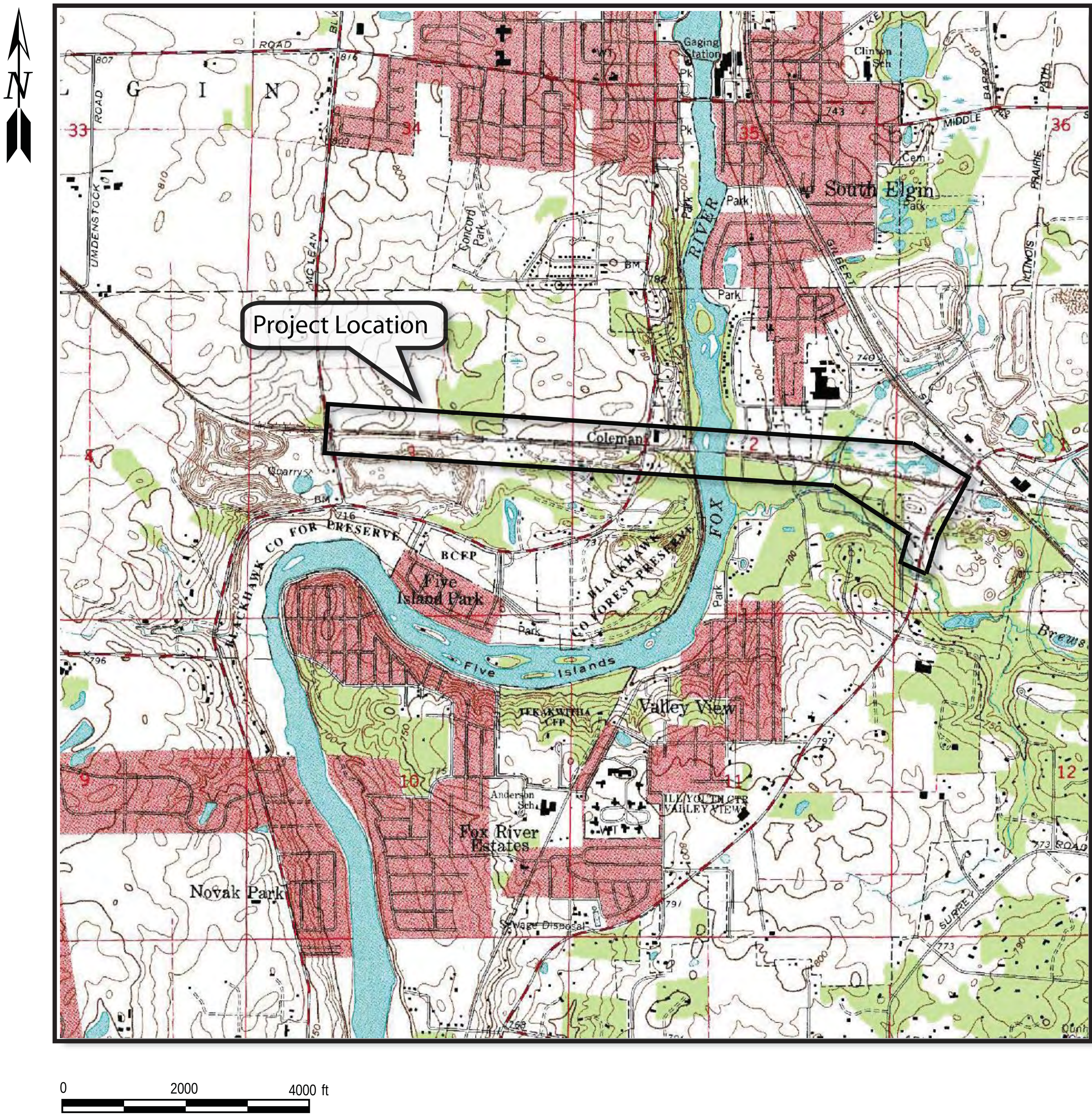
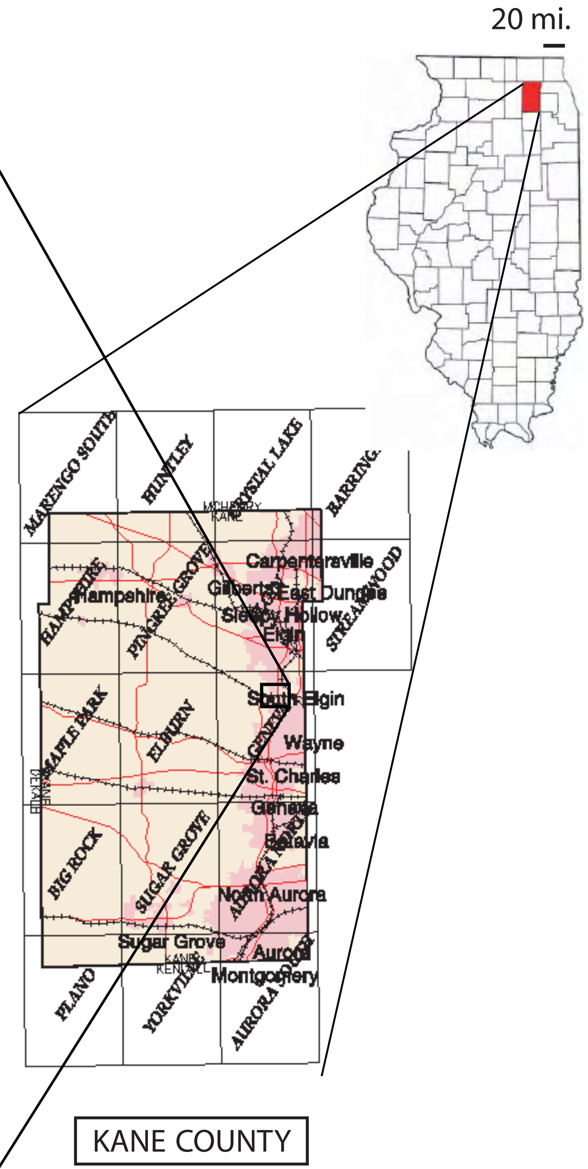
Baker Engineering, Inc. Project No. 113005

TABLE 7
Soil Parameters from Grain Size Analysis Tests

Sub-Structure	Boring No. (Existing River Bed Elevation)	Sample Depth Range, Feet Below Grade	Grain Size D_{50} mm	Grain Size D_{90} mm
Pier-2	P3B-1 (686.8)	1.0-5.0	8.0	32.0
		8.5-10.0	0.012	0.053
		16.0-17.5	2.2	15.0
		56.0-57.5	0.022	1.0
		71.0-72.5	0.06	3.4
Pier-3	P4B-1 (687.0)	3.5-5.0	5.0	22.0
		9.0-10.5	1.5	28.0
		14.0-15.5	0.8	9.0
		21.5-23.0	0.8	21.0
		33.5-35.0	0.16	0.4
		43.5-45.0	0.013	0.45
		58.5-60.0	0.02	0.4

EXHIBITS

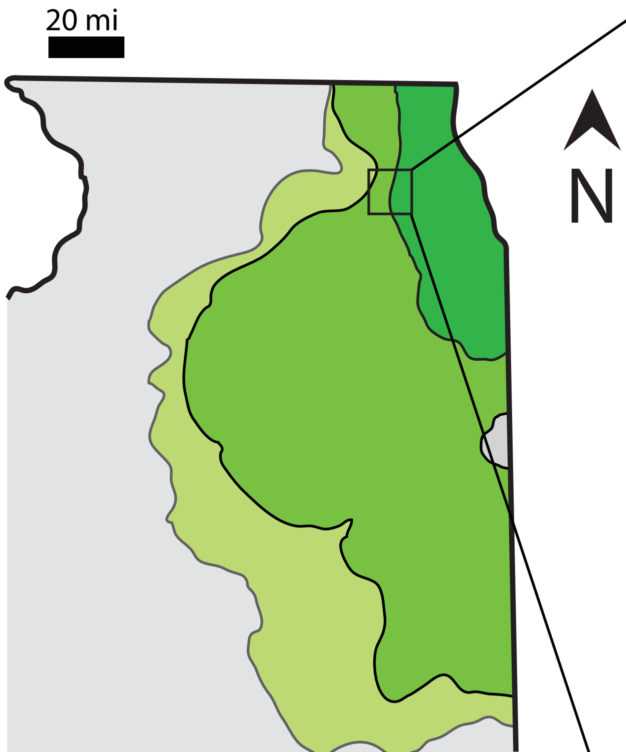




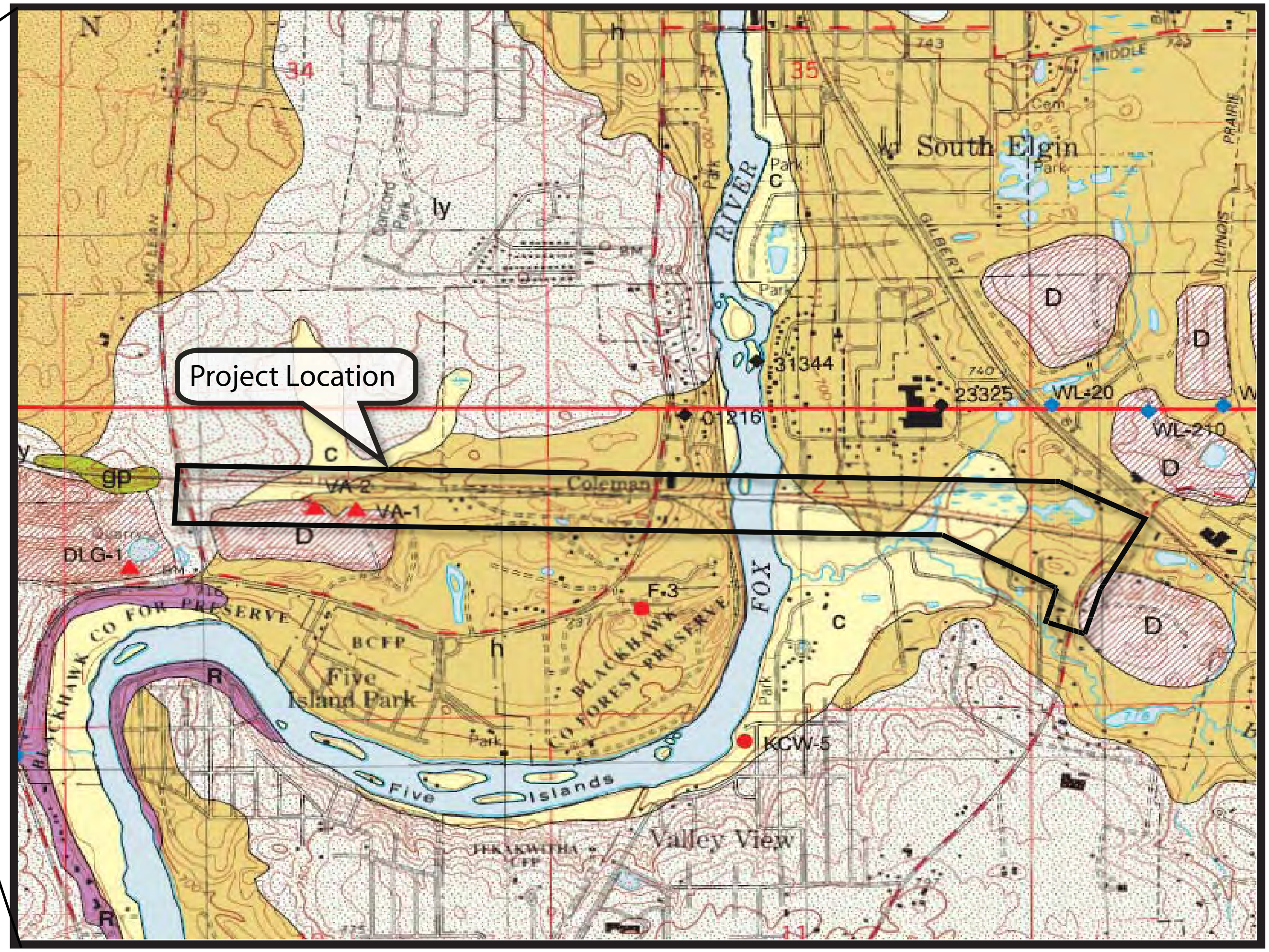
SITE LOCATION MAP: NEW STEARNS ROAD, KANE COUNTY, IL		
Scale: See Scale Bar	EXHIBIT 1	Drawn by: Yvette Shiu
Wang Engineering, Inc. Geo-Environmental Engineers		1145 N Main Street Lombard, IL 60148 630 953-9928
FOR BAKER ENGINEERING, INC.		707-11-01

0 250 FT 500 FT

SITE LOCATION MAP: NEW STEARNS ROAD OVER FOX RIVER, KANE COUNTY, IL		
Scale: See Scale Bar	EXHIBIT 2	Drawn by: Wei H. Wang
	Wang Engineering, INC. Geo-Environmental Engineers	1145 N Main Street Lombard, IL 60148 630 953-9928
FOR BAKER ENGINEERING, INC.		707-11-01



Modified after Hansel and Johnson (1996)



After Grimley and Curry (2002)

2 mi

Wedron Group Formations in Illinois

- Wadsworth Formation
- Lemont Formation
- Tiskilwa Formation

Postglacial Deposits

- c / gp — Cahokia Fm. (c) and Grayslake Peat (gp)

Mason Group

- h — Henry Formation

Wedron Group

- ly — Yorkville Member: Lemont Formation

Bedrock

- R — Bedrock exposures or near surface exposures
- D — Disturbed Ground (spoil piles, gravel pits, quarries and landfills)

SITE AND REGIONAL GEOLOGY: NEW STEARNS ROAD, SOUTH ELGIN, KANE COUNTY, IL.		
SCALE: SEE SCALE BAR	EXHIBIT 3	DRAWN BY: Y. SHIU CHECKED BY:
Wang Engineering		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR BAKER ENGINEERING, INC.		707-11-01

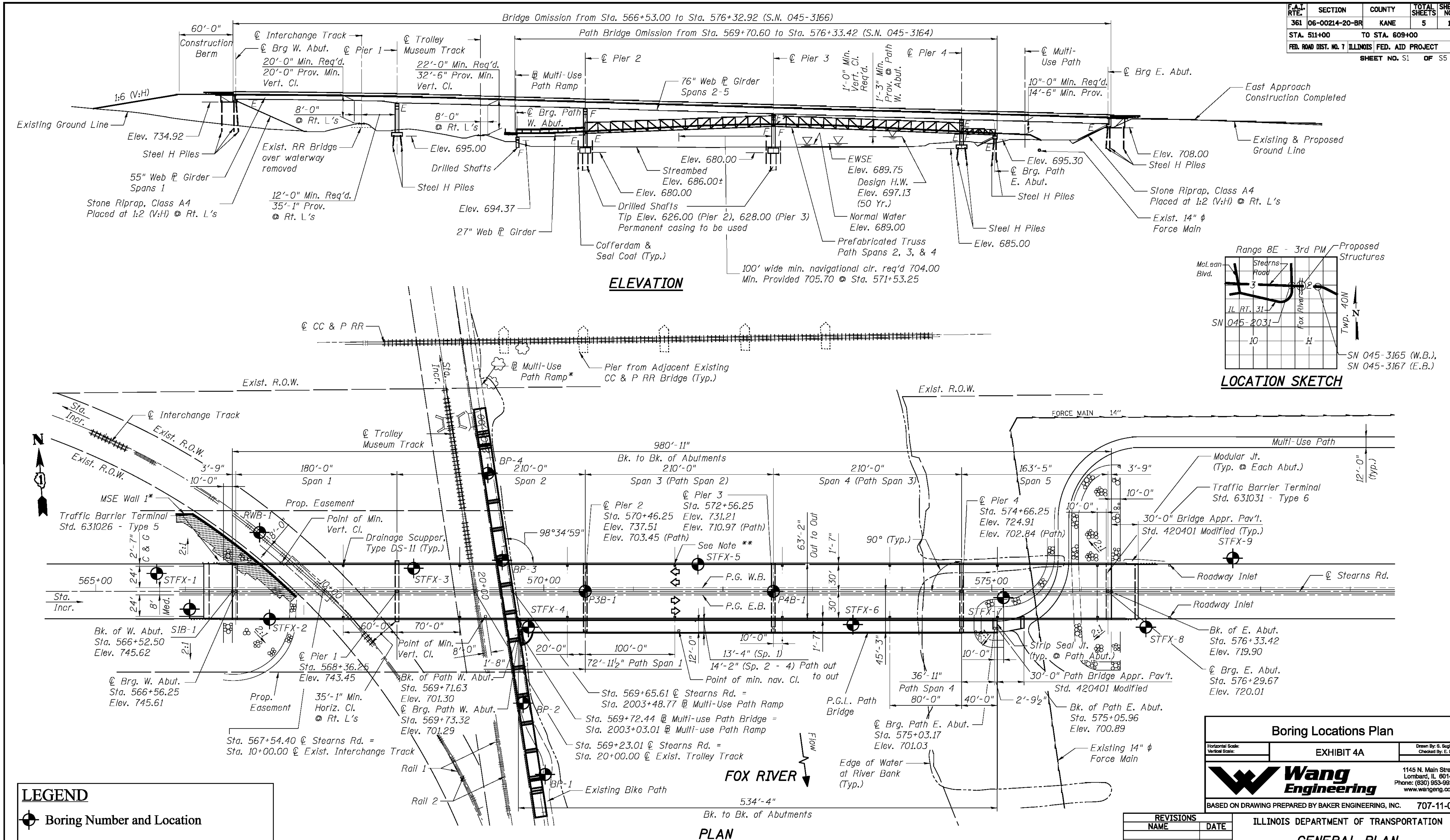
CONTRACT NO. 63075

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
361	06-00214-20-BR	KANE	5	1

STA. 511+00 TO STA. 609+00

FED. ROAD DIST. NO. 7 ILLINOIS FED. AID PROJECT

SHEET NO. S1 OF S5



LEGEND

Boring Number and Location

NOTE

See contract plans for proposed improvement.
This sheet is for Boring Locations only.

Boring Locations Plan

EXHIBIT 4A

Drawn By: S. Sugiarto
Checked By: E. Dahl

Wang Engineering

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Lombard, IL 60148
Phone: (630) 953-9928
www.wangeng.com

BASED ON DRAWING PREPARED BY BAKER ENGINEERING, INC. 707-11-01

REVISIONS	
NAME	DATE

Baker

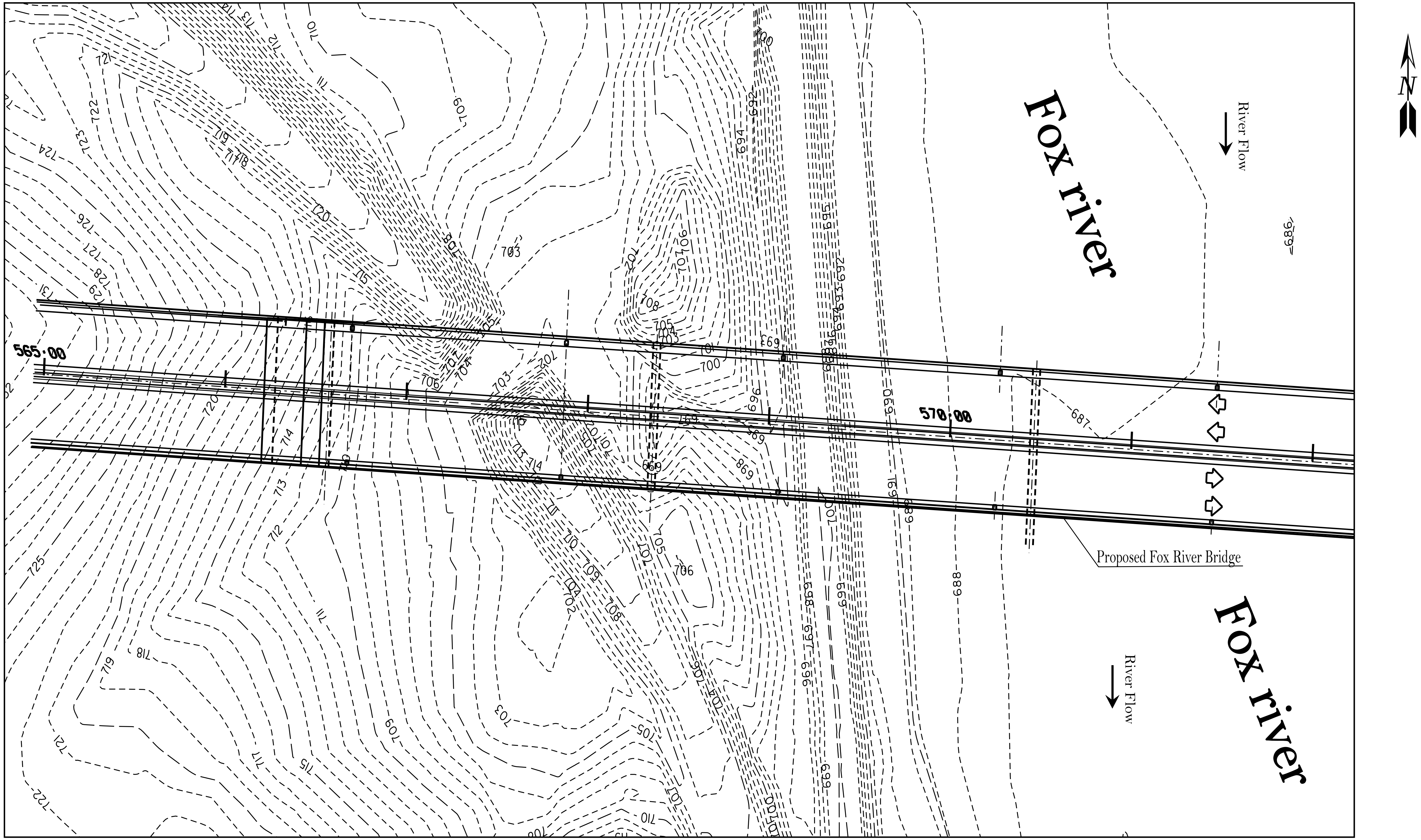
Baker Engineering, Inc.

ILLINOIS DEPARTMENT OF TRANSPORTATION

GENERAL PLAN

STEARNS ROAD BRIDGE OVER THE FOX RIVER
STRUCTURE NUMBER 045-3166
MILTI-USE PATH BRIDGE OVER THE FOX RIVER
STRUCTURE NUMBER 045-3164

KANE COUNTY FAP 361 SECTION 06-00214-20-BR
STATION 571+42.96 DESIGNED: KPZ DRAWN: DFM
DATE: MARCH 2008 CHECKED: GG CHECKED: KPZ



0 ft 50 ft 100 ft 200 ft

Site Contour Map; New Stearns Road Over Fox River (West Side); Kane County, IDOT Structure No. 045-3166

Scale: See Scale Bar	EXHIBIT 5A	Drawn By: Jean Kasnick

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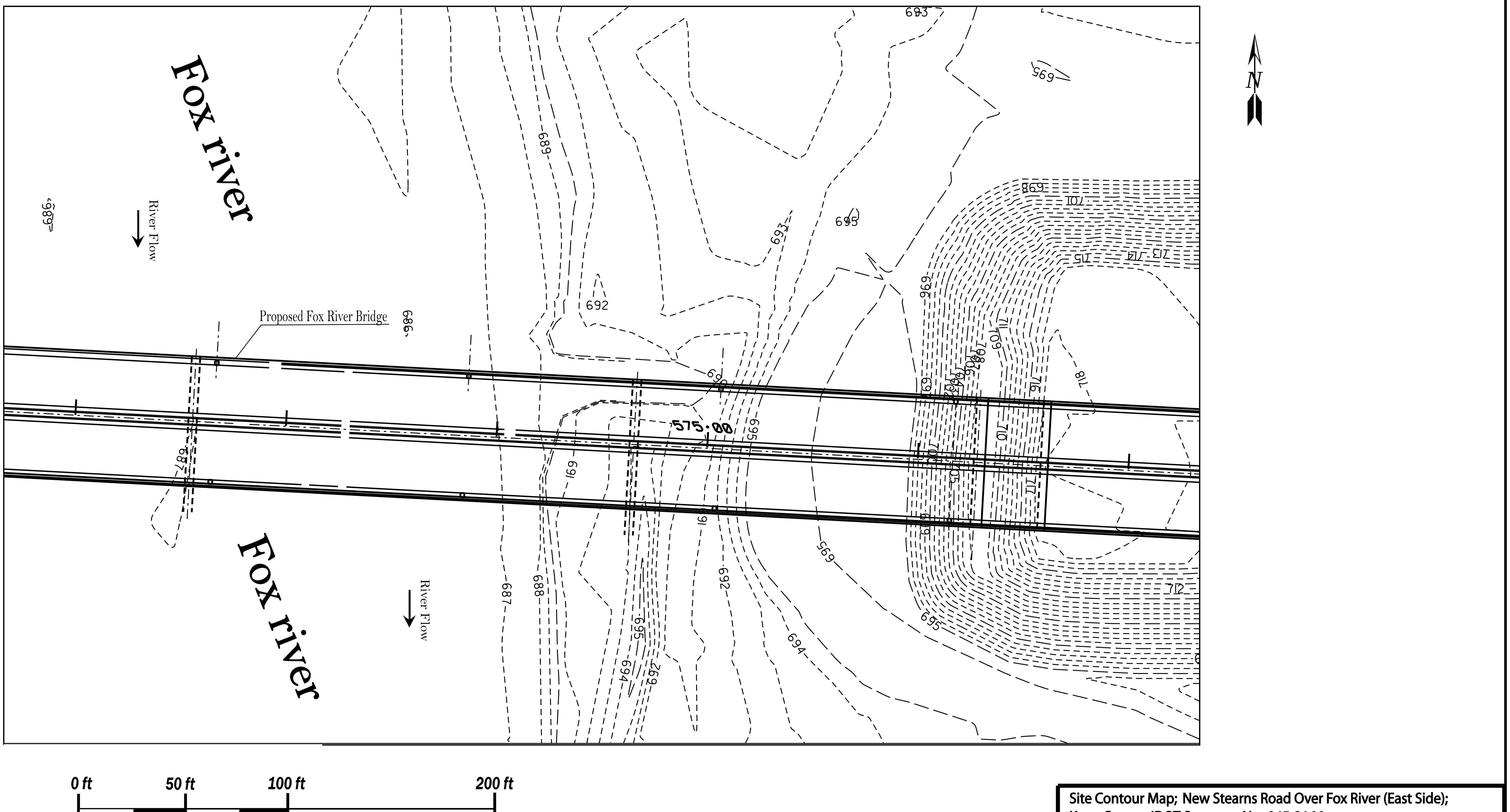
For Baker Engineering, Inc. 707-11-01



Site Contour Map; New Stearns Road Over Fox River (East Side);
Kane County, IDOT Structure No. 045-3166

Scale: See Scale Bar

EXHIBIT 5B

Drawn By: Jean Kasnick

Wang Engineering

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Lombard, IL 60148
Phone: (630) 953-9928
www.wangeng.com

For Baker Engineering, Inc.

707-11-01

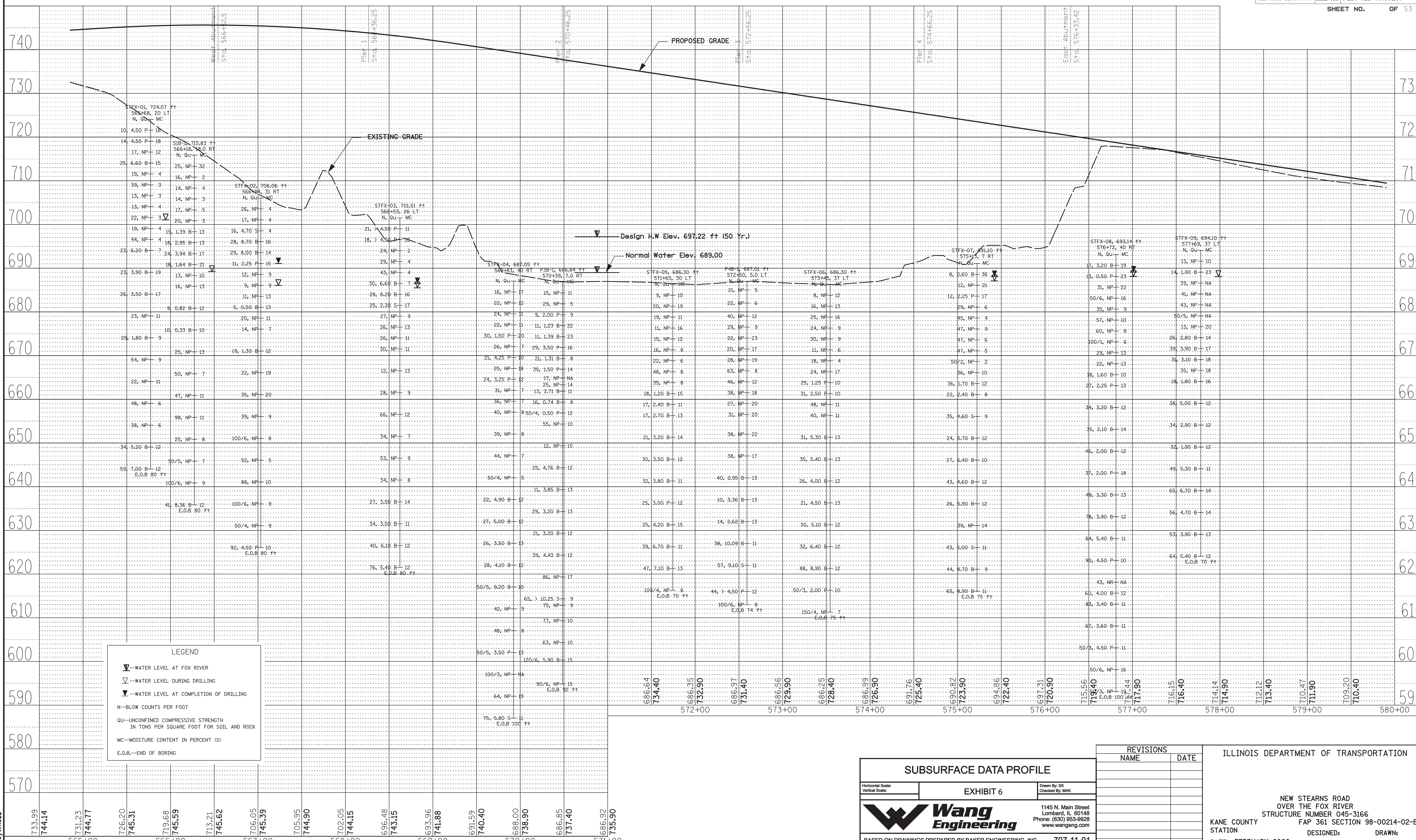
CONTRACT NO. XXXXX

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
361	98-00214-02-BR	KANE	$$TOT$$	

STA. XXX+XX TO STA. XXX+XX

FED. ROAD DIST. NO. 7 ILLINOIS FED. AID PROJECT

SHEET NO. OF S3



SUBSURFACE DATA PROFILE

EXHIBIT 6

Drawn By: SS
Checked By: MAK

Wang Engineering

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Lombard, IL 60148
Phone: (630) 953-9928
www.wangeng.com

BASED ON DRAWINGS PREPARED BY BAKER ENGINEERING, INC. 707-11-01

REVISIONS	
NAME	DATE

ILLINOIS DEPARTMENT OF TRANSPORTATION

NEW STEARNS ROAD
OVER THE FOX RIVER
STRUCTURE NUMBER 045-3166
FAP 361 SECTION 98-00214-02-BR

KANE COUNTY
STATION
DATE: FEBRUARY 2008

DESIGNED: DRAWN:
CHECKED: CHECKED:

$$dgn$$
$$time$$

APPENDIX A

Wang Engineering, INC.
Consulting Geotechnical and Environmental Engineers
wangeng3@wangeng.com
1145 Main Street
Lombard, IL 60148
Telephone: 630 953-9928
Fax: 630 953-9938

BORING LOG P3B-1

WEI Job No.: 707-11-01

Client: **Baker Engineering, Inc.**
Project: **New Stearns Road**
Location: **Elgin, Illinois**

Datum: NGVD
Elevation: 686.84 ft
North: 1934477.50 ft
East: 994925.75 ft
Station: 570+39
Offset: 7.0 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	Loose to medium dense, brown and gray SANDY GRAVEL to GRAVELLY SAND --Water Level = 1.5ft Above River Bed--		1	7 7 8	NP	11
		5	2	13 22 7	NP	5
679.8	Stiff to very stiff, brown to gray CLAY with occassional sand and silt interbeds		3	4 5 4	2.00 P	9
		10	4	4 4 7	1.23 B	22
			5	2 5 6	1.39 B	23
673.8	Stiff to very stiff, gray, gravelly SANDY CLAY LOAM	15	6	9 14 15	3.50 P	16
			7	10 11 10	1.31 B	8
668.2	Medium dense to dense, gray GRAVELLY SAND	20	8	9 14 21	1.50 P	14
			9A	7 10	NP	
664.8	Medium dense, brown and gray, fine to coarse SAND		9B	9 12 13	NP	14
663.5	Stiff to very stiff, gray CLAY LOAM to SANDY CLAY	25	10	5 6 7	2.71 B	11
661.3	Medium stiff, gray CLAY LOAM		11	8 4 12	0.74 B	8
658.1	Very dense, brown and gray, GRAVELLY SAND to SANDY GRAVEL	30	12	25 50/4"	0.50 P	12
			13	25 28 27	NP	10
652.1	Medium dense, brown, coarse SAND with gravel	35	14	11 6 6	NP	10
647.8	Very stiff to hard, gray gravelly CLAY LOAM	40	15	11 12 13	4.76 B	12
	PressuremeterTest@43.0'-44.0'	45				
	--PressuremeterTest@47.0'-48.0'		16	3 5 6	3.85 B	13
		50				

GENERAL NOTES

Begin Drilling **12-04-2007** Complete Drilling **12-06-2007**
Drilling Contractor **TSC** Drill Rig **CME 55 ATV**
Driller **D,F & C** Logger **J. Kasnick** Checked by **E. Datz**
Drilling Method **3.25"ID HSA; Mud Rotary at 41ft**

WATER LEVEL DATA

While Drilling **0.00 ft**
At Completion of Drilling **0.00 ft**
Time After Drilling **NA**
Depth to Water **NA**

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

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BORING LOG P3B-1

WEI Job No.: 707-11-01

Client: **Baker Engineering, Inc.**
Project: **New Stearns Road**
Location: **Elgin, Illinois**

Datum: NGVD
Elevation: 686.84 ft
North: 1934477.50 ft
East: 994925.75 ft
Station: 570+39
Offset: 7.0 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	--PressuremeterTest@52.0'-53.0'			17	10 11 18	3.20 B	13
		55					
	--PressuremeterTest@57.0-58.0'			18	8 9 12	3.20 B	12
	--Boulder at 59.0' - 60.5'--	60					
	--PressuremeterTest@62.0'-63.0'			19	13 17 22	4.43 B	12
		65					
620.7	Very dense, gray SANDY LOAM			20	28 44 42	NP	17
619.6	Hard, gray gravelly CLAY LOAM --PressuremeterTest@67.0'-68.0'						
		70					
				21	18 23 42	> 10.25 S	9
614.5	Very dense, brown and gray SANDY GRAVEL --Boulders at 73.5' - 76.25'--			22	31 28 47	NP	9
		75					
				23	20 36 41	NP	10
	--Boulder at 79.5' - 80.5'--	80					
				24	20 28 35	NP	10
601.8	Hard, gray gravelly CLAY	85					
600.5	Very dense, brown GRAVEL with sand			25	120/6"	5.90 B	15
		90					
595.4	Very dense, brown, fine SAND			26	54 90/6"	NP	15
594.8	--Spoon refusal at 92.0'-- Boring terminated at 92.00 ft						
		95					
		100					

GENERAL NOTES

Begin Drilling **12-04-2007** Complete Drilling **12-06-2007**
Drilling Contractor **TSC** Drill Rig **CME 55 ATV**
Driller **D,F & C** Logger **J. Kasnick** Checked by **E. Datz**
Drilling Method **3.25"ID HSA; Mud Rotary at 41ft**

WATER LEVEL DATA

While Drilling **0.00 ft**
At Completion of Drilling **0.00 ft**
Time After Drilling **NA**
Depth to Water **NA**

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

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BORING LOG P4B-1

WEI Job No.: 707-11-01

Client: **Baker Engineering, Inc.**
Project: **New Stearns Road**
Location: **Elgin, Illinois**

Datum: NGVD
Elevation: 687.01 ft
North: 1934477.82 ft
East: 995137.63 ft
Station: 575+50
Offset: 5.0 LT

SOIL AND ROCK DESCRIPTION

Elevation (ft)	Soil and Rock Description
	Medium dense, brown and gray SANDY GRAVEL to GRAVELLY SAND --Water Level = 1.6ft Above River Bed--
676.0	Medium dense to dense, brown, medium to coarse SAND with gravel
669.8	Medium dense to very dense, gray, GRAVELLY SAND
666.0	Dense, gray, medium to coarse SAND with trace to some gravel
661.0	Dense, fine to medium SAND to SANDY LOAM
645.3	Very stiff to hard, brownish gray CLAY LOAM with little gravel --PressuremeterTest@44.5'-45.5' --PressuremeterTest@49.0'-50.0'

Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
1	9, 12	NP	5
2	12, 15, 7	NP	6
3	9, 25, 15	NP	12
4	9, 13, 16	NP	9
5	5, 15, 7	NP	23
6	5, 12, 8	NP	17
7	5, 8, 20	NP	19
8	5, 25, 38	NP	8
9	5, 25, 21	NP	12
10	7, 17, 21	NP	18
11	5, 6, 21	NP	20
12	10, 12, 19	NP	20
13	13, 16, 22	NP	22
14	10, 17, 21	NP	17
15	8, 20, 20	2.95 B	13
16	3, 5, 5	3.36 B	13

Depth (ft): 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

GENERAL NOTES

Begin Drilling: **11-29-2007** Complete Drilling: **11-30-2007**
Drilling Contractor: **TSC** Drill Rig: **Mobil B-57 ATV**
Driller: **D,F & C** Logger: **J. Kasnick** Checked by: **E. Datz**
Drilling Method: **3.25"ID HSA; Mud Rotary at 43.5ft**

WATER LEVEL DATA

While Drilling: **0.00 ft**
At Completion of Drilling: **0.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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

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BORING LOG P4B-1

WEI Job No.: 707-11-01

Client **Baker Engineering, Inc.**
Project **New Stearns Road**
Location **Elgin, Illinois**

Datum: NGVD
Elevation: 687.01 ft
North: 1934477.82 ft
East: 995137.63 ft
Station: 575+50
Offset: 5.0 LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	--PressuremeterTest@54.0'-55.0'	55	17	4 7 7	2.62 B	13
	--PressuremeterTest@59.0'-60.0'	60	18	7 14 24	10.09 B	11
	--PressuremeterTest@64.0'-65.0'	65	19	10 24 33	9.10 S	11
620.3	Dense, brown and gray, medium to coarse SAND					
616.8	Hard, gray CLAY LOAM	70	20	18 20 24	> 4.50 P	12
615.0	Very dense, gray GRAVELLY SAND		21	100/6"	NP	8
613.0	Boring terminated at 74.00 ft	75				

GENERAL NOTES

Begin Drilling **11-29-2007** Complete Drilling **11-30-2007**
Drilling Contractor **TSC** Drill Rig **Mobil B-57 ATV**
Driller **D,F & C** Logger **J. Kasnick** Checked by **E. Datz**
Drilling Method **3.25"ID HSA; Mud Rotary at 43.5ft**

WATER LEVEL DATA

While Drilling **0.00 ft**
At Completion of Drilling **0.00 ft**
Time After Drilling **NA**
Depth to Water **NA**

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

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BORING LOG S1B-1

WEI Job No.: 707-11-01

Client: **Baker Engineering, Inc.**
Project: **New Stearns Road**
Location: **Elgin, Illinois**

Datum: NGVD
Elevation: 715.83 ft
North: 1934488.61 ft
East: 994504.83 ft
Station: 566+18
Offset: 18.0 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	14-inch thick black SILTY LOAM					
714.7	--TOPSOIL--					
714.3	Hard, brown SANDY CLAY		1	7 13 12	NP	32
	Medium dense, brown GRAVELLY SAND to SANDY GRAVEL		2	6 6 10	NP	2
		5	3	3 6 8	NP	4
		10	4	4 6 8	NP	3
			5	4 6 11	NP	5
		15	6	6 9 11	NP	3
699.6	Stiff to very stiff, gray CLAY, with gravel		7	5 7 12	1.39 B	13
		20	8	5 8 10	2.95 B	13
			9	7 11 13	3.94 B	17
690.9		25	10	5 7 11	1.64 B	21
	Medium dense, brown to gray, fine SAND, little gravel		11	5 6 7	NP	10
		30	12	7 9 7	NP B	13
683.6	Soft to medium stiff, brown CLAY LOAM					
		35	13	3 4 5	0.82 B	12
		40	14	3 5 5	0.33 B	10
673.3	Medium dense to dense, gray GRAVELLY SAND					
		45	15	10 12 13	NP	13
		50	16	15 22 28	NP	7

GENERAL NOTES

Begin Drilling **12-13-2007** Complete Drilling **12-13-2007**
Drilling Contractor **TSC** Drill Rig **CME-55 ATV**
Driller **F & C** Logger **J. Kasnick** Checked by **E. Datz**
Drilling Method **3.25"ID HSA**

WATER LEVEL DATA

While Drilling ▽ **26.66 ft**
At Completion of Drilling ▼ **N/A**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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

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Fax: 630 953-9938

BORING LOG S1B-1

WEI Job No.: 707-11-01

Client **Baker Engineering, Inc.**
Project **New Stearns Road**
Location **Elgin, Illinois**

Datum: NGVD
Elevation: 715.83 ft
North: 1934488.61 ft
East: 994504.83 ft
Station: 566+18
Offset: 18.0 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
663.8	Dense to very dense, gray coarse SAND					
		55	17	36 26 21	NP	11
		60	18	36 73 25	NP	11
653.3	Medium dense to very dense, GRAVELLY SAND					
		65	19	11 8 17	NP	8
		70	20	42 50/5	NP	7
		75	21	100/6	NP	9
638.8	Hard, brown CLAY LOAM					
635.8		80	22	10 16 25	8.36 B	12
	Boring terminated at 80.00 ft					
		85				
		90				
		95				
		100				

GENERAL NOTES

Begin Drilling **12-13-2007** Complete Drilling **12-13-2007**
Drilling Contractor **TSC** Drill Rig **CME-55 ATV**
Driller **F & C** Logger **J. Kasnick** Checked by **E. Datz**
Drilling Method **3.25"ID HSA**

WATER LEVEL DATA

While Drilling ▽ **26.66 ft**
At Completion of Drilling ▼ **N/A**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 8/16/04
Date Completed 8/16/04

ROUTE F.A.U. 361 DESCRIPTION New Stearns Road over the Fox River

SECT. 98-00214-02-BR STRUCT. NO. 045-3166 DRILLED BY TSC L-60,393

COUNTY Kane LOCATION North End West Abutment S. 2 - SW 1/4 , TWP. 40 N , RNG. 8 E

Boring No. STFX-1
Station 565+68
Offset 20.00ft LT
Surface Elev. 724.07 ft

Surface Water Elev.
Groundwater Elev.:
when drilling 671.1
at Completion Cave at 42.0'
after Hrs.

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Black clayey Topsoil	723.77				
			3 4 6	P 4.5	17.9
Hard brown CLAY, damp to moist A-6					
		-5	4 7 7	P 4.5	17.8
	718.57				
Medium dense brown SILTY LOAM, damp A-4			4 7 10		12.4
	716.07				
Hard brown CLAY, moist A-6	714.57				
		-10	12 16 9	B 6.6 15%	14.5 3.6
			5 9 10		4.1
Medium dense to dense brown SAND and GRAVEL, occasional Cobbles, damp A-1-a		-15	20 26 13		3.3
			4 7 6		3.4
	706.07				
Medium dense brown SAND, trace gravel, damp A-1-b		-20	9 7 6		3.8
	703.57				
			5 9 13		3.4
Medium dense brown SAND and GRAVEL, damp A-1					
	699.07	-25	7 9 10		4.3

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Dense brown SAND and GRAVEL, occasional Cobbles, damp A-1-a			12 20 24		3.8
	694.57	-30	22 19 4	B 6.2 15%	6.5 13.9
Hard brownish-gray CLAY, moist A-6	692.07				
		-35	8 8 15	B 3.9 15%	18.7
Very stiff gray CLAY, trace gravel, moist A-6					
		-40	9 12 14	B 3.5 15%	16.6
	682.07				
Medium dense gray sandy SILT, damp A-4		-45	8 10 13		11.3
	677.07				
Stiff gray CLAY LOAM, trace gravel, moist A-4/A-6		-50	10 9 20	B 1.8 15%	9.0

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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 8/16/04
Date Completed 8/16/04

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

Boring No. STFX-1
Station 565+68
Offset 20.00ft LT
Elevation 674.07 ft

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Stiff gray CLAY LOAM, trace gravel, moist A-4/A-6	672.07				
		-55	30 37 17		8.8
Medium dense to dense gray SAND and GRAVEL, saturated A-1-a		-60	20 10 12		10.7
		-65	9 19 29		5.7
	652.07	-70	12 19 19		6.0
Hard gray CLAY, trace gravel, moist A-6		-75	4 15 19	B 5.2 15%	12.1

Elevation 649.07 ft

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Hard gray CLAY, trace gravel, moist A-6	644.07	-80	18 26 33	B 7.0 15%	11.9
End of Boring at 80.0' CME 850 Track ATV Drill Rig (#127) CME Automatic Hammer 3.25" (83 mm) ID HSA		-85			
		-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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 8/13/04
Date Completed 8/13/04

ROUTE F.A.U. 361 DESCRIPTION New Stearns Road over the Fox River

SECT. 98-00214-02-BR STRUCT. NO. 045-3166 DRILLED BY TSC L-60,393

COUNTY Kane LOCATION South End Pier 1 S. 2 - SW 1/4, TWP. 40 N, RNG. 8 E

Boring No.	STFX-2
Station	566+94
Offset	31.00ft RT
Surface Elev.	706.06 ft
Surface Water Elev.	
Groundwater Elev.: when drilling	685.1
at Completion	690.1
after ___ Hrs.	

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Black clayey Topsoil	705.56				
			4 10 16		3.9
Medium dense brown SAND and GRAVEL, damp A-1-a			6 7 10		3.8
		-5			
(possible fill)			8 8 8	S 4.7 10%	4.4 14.1
	699.06				
Hard brown and gray CLAY, trace gravel, moist A-6			17 11 17	B 8.7 15%	16.4
		-10			
			12 14 15	B 8.0 15%	13.6
	692.56				
Very stiff gray SANDY LOAM, trace gravel, moist A-4/A-6			6 4 7	P 2.25	15.2
		-15			
	690.56				
Medium dense gray SAND, some gravel, moist A-1-b	689.56		5 6 6		9.3 9.6
Loose to medium dense gray fine to medium SAND, little gravel, saturated A-1-b			4 5 4		8.7
		-20			
			6 6 5		12.5
	683.56				
Loose brownish-gray SANDY LOAM, trace gravel, very moist A-2-4			2 2 3	B 0.5 15%	12.8
	681.06	-25			

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Medium dense brown SAND, some gravel, saturated A-1-b			7 9 11		10.8
	678.06				
Medium dense gray SAND and GRAVEL, saturated A-1-a			5 6 8		6.8
		-30			
	674.06				
Stiff brown and gray CLAY LOAM, trace gravel, moist A-4			6 9 10	B 1.3 15%	12.0
		-35			
	669.06				
			8 10 12		19.4
		-40			
Medium dense to dense gray fine to medium SAND, saturated A-3			9 15 20		20.2
		-45			
	659.06				
Dense gray SAND and GRAVEL, occasional Cobbles, (rock fragments recovered), saturated A-1-a			10 19 20		9.0
	656.06	-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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 8/12/04
Date Completed 8/12/04

ROUTE F.A.U. 361 DESCRIPTION New Stearns Road over the Fox River

SECT. 98-00214-02-BR STRUCT. NO. 045-3166 DRILLED BY TSC L-60,939

COUNTY Kane LOCATION North End Pier 2 S. 2 - SW 1/4 , TWP. 40 N , RNG. 8 E

Boring No. STFX-3
Station 568+53
Offset 26.00ft LT
Surface Elev. 701.51 ft

Surface Water Elev. ______
Groundwater Elev.:
when drilling 685.5
at Completion 686.0
after ______ Hrs. ______

		DEPTH	BLOWS	Qu tsf	W %
FILL - Black clayey TopsoiL	701.21				
FILL - Brown CLAY, trace gravel, damp A-6			4 8 13	P 4.5+	10.9
			5 8 10	P 4.5+	9.9
	696.01	-5			
Medium dense brown SAND, some gravel, damp A-1-b			5 10 14		2.3
			8 11 18		3.7
	691.01	-10			
Dense brown SAND and GRAVEL, damp A-1-a			9 16 27		3.7
	687.01	-15	43 16 14	B 6.6 15%	6.9 13.7
Hard brownish-gray CLAY, trace gravel, moist A-6			7 12 16	B 8.2 15%	15.5
	682.01	-20	9 12 13	S 2.3 10%	17.0 11.3
Medium dense brown SAND and GRAVEL, occasional Cobbles, (rock fragments recovered), saturated A-1-a			11 12 15		9.1
	678.51				
Medium dense gray silty fine SAND, saturated A-2-4/A-4			7 11 15		12.6
	676.51	-25			

		DEPTH	BLOWS	Qu tsf	W %
Medium dense to dense brownish-gray silty fine SAND, trace gravel, saturated A-1-b			8 11 15		10.8
		-30	10 14 16		11.0
	669.51				
Medium dense brownish-gray silty SAND and GRAVEL, saturated A-1-b		-35	10 6 6		13.4
	664.51				
Medium dense gray SAND and GRAVEL, occasional silt seams, saturated A-1-a		-40	11 13 15		9.2
	659.51				
Very dense gray SAND, trace to little gravel, saturated A-1-b		-45	20 30 36		12.0
	654.51				
Dense gray SAND and GRAVEL, saturated A-1-a		-50	15 17 17		7.4

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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 8/12/04

Date Completed 8/12/04

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

Boring No. STFX-3
Station 568+53
Offset 26.00ft LT

Elevation 651.51 ft

Description	DEPTH	BLOWS	Qu tsf	W %
		19 24 29		9.1
Dense gray SAND and GRAVEL, saturated A-1-a	-55			
		11 17 17		7.7
	-60			
639.51				
		4 10 17	B 3.5 15%	14.0
	-65			
Very stiff brown and gray CLAY, trace gravel, moist A-6				
		7 14 20	B 3.5 15%	11.2
	-70			
629.51				
Hard brown and gray CLAY, trace gravel, moist A-6		12 12 28	B 6.1 15%	12.4
	-75			

Elevation 626.51 ft

Description	DEPTH	BLOWS	Qu tsf	W %
Hard brown and gray CLAY, trace gravel, moist A-6				
		19 27 49	B 5.4 15%	12.0
621.51	-80			
End of Boring at 80.0' CME 850 Track ATV Drill Rig (#127) CME Automatic Hammer 3.25" (83 mm) ID HSA				
	-85			
	-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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 8/27/04
Date Completed 8/30/04

ROUTE F.A.U. 361 DESCRIPTION New Stearns Road over the Fox River

SECT. 98-00214-02-BR STRUCT. NO. 045-3166 DRILLED BY TSC L-60,939

COUNTY Kane LOCATION South End Pier 3 S. 2 - SW 1/4 , TWP. 40 N , RNG. 8 E

Boring No. STFX-4
Station 569+83
Offset 40.00ft RT
Surface Elev. 687.05 ft

Surface Water Elev. +1.3
Groundwater Elev.:
when drilling River
at Completion River
after ______ Hrs. ______

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Cobbles and Boulders	686.25				
Medium dense gray SAND, some gravel, saturated A-1	684.05		5 7 9		17.3
Medium dense gray GRAVEL, some sand, saturated A-1-a	681.55	-5	9 11 11		11.8
Medium dense brown fine to medium SAND, trace gravel, saturated A-1-b	679.05		8 11 13		11.2
Medium dense brown SAND and GRAVEL, trace clay, saturated A-1	676.55	-10	8 10 12		10.7
Stiff gray CLAY, occasional silt seams, moist A-6	675.05		12 14 16	P 1.5	20.0 6.9
Medium dense gray SAND and GRAVEL, saturated A-1-a		-15	10 12 14		7.0
	670.05		7 9 12	P 4.25	10.2 14.3
Hard gray CLAY, little gravel, moist A-6	669.05				
Medium dense gray fine to medium SAND, trace gravel, occasional silt seams, saturated A-1-b	666.55	-20	8 12 13		17.5
Very stiff gray CLAY, trace gravel, moist A-6	664.05		10 12 12	P 3.25	12.4
Dense gray SAND and GRAVEL, saturated A-1-a	662.05	-25	8 14 17		7.3
			10 15 21		7.2
* Boulder Zone 27.5'-28.5'		-30	17 18 22		7.7
Dense gray SAND and GRAVEL, occasional Cobbles and Boulders, saturated A-1-a		-35	13 17 22		7.6
	645.05	-40	17 24 20		7.1
Very dense gray SAND and GRAVEL, occasional Cobbles and Boulders, saturated A-1-a	640.05	-45	53 50/4"		5.1
Hard gray CLAY, trace gravel, moist A-6	637.05	-50	10 11 11	B 4.9 15%	12.2

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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 8/27/04
Date Completed 8/30/04

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

Boring No. STFX-4
Station 569+83
Offset 40.00ft RT
Elevation 637.05 ft

Description	DEPTH	BLOWS	Qu tsf	W %
Hard to very stiff gray CLAY, trace gravel, moist A-6		12 13 14	B 5.0 15%	12.3
	-55			
		8 12 14	B 3.5 15%	12.7
	-60			
		9 12 16	B 4.1 15%	12.1
	-65			
620.05				
Very hard brownish-gray CLAY, little to some gravel, moist A-6		18 35 50/5"	B 9.2 15%	10.4
	-70			
615.05				
Dense gray SAND and GRAVEL, occasional Cobbles, (rock fragments recovered), saturated A-1-a		5 14 28		9.0
	-75			

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

Elevation 612.05 ft

Description	DEPTH	BLOWS	Qu tsf	W %
Dense gray SAND and GRAVEL, occasional Cobbles, (rock fragments recovered), saturated A-1-a		18 24 24		7.5
	-80			
605.05				
Very stiff gray CLAY, trace gravel, moist A-6				
603.05		21 50/5"	P 3.5	13.0 13.7
Very dense GRAVEL, occasional Cobbles, trace clay, saturated A-1-a	-85			
600.05				
Very dense Cobbles and Boulders, little sand and gravel, saturated A-1-a		100/3"		
	-90			
595.05				
Very dense brownish-gray fine SAND, trace silt, saturated A-3		19 24 40		19.1
	-95			
590.05				
Very dense gray SILTY LOAM, trace gravel, moist A-4		5 25 50	S 5.8 15%	11.3
587.05	-100			

End of Boring at 100.0'

CME-75 Truck Rig (#256)
CME Automatic Hammer

3.25" (83 mm) ID HSA

Depth of River = 1.3'

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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 8/23/04

Date Completed 8/25/04

ROUTE F.A.U. 361 DESCRIPTION New Stearns Road over the Fox River

SECT. 98-00214-02-BR STRUCT. NO. 045-3166 DRILLED BY TSC L-60,393

COUNTY Kane LOCATION North End Piers 4 & 5 S. 2 - SW 1/4, TWP. 40 N, RNG. 8 E

Boring No. STFX-5
Station 571+65
Offset 30.00ft LT

Surface Elev. 686.30 ft

Surface Water Elev. +2.0
Groundwater Elev.:
when drilling River
at Completion River
after ______ Hrs. ______

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Cobbles and Boulders,	685.80				
Loose brown SAND and GRAVEL, saturated A-1-a			4 4 5		10.4
	683.30				
Medium dense gray SAND, trace to little gravel, saturated A-1-b		-5	9 9 11		18.8
			10 9 10		10.6
		-10	3 5 6		16.2
			4 8 7		11.9
	673.30				
Medium dense gray SAND, little to some gravel, saturated A-1		-15	7 8 8		7.8
	670.80				
Medium dense to dense gray SAND and GRAVEL, occasional Cobbles, (rock fragments recovered), saturated A-1-a			9 10 12		6.2
		-20	13 20 28		8.1
			15 16 19		7.8
	663.30				
Stiff gray SILTY CLAY LOAM, moist A-6			7 8 10	B 1.2 15%	15.0
	661.30	-25			

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Very stiff gray SILTY CLAY LOAM, trace gravel, moist A-6			7 9 8	B 2.4 15%	10.8
	658.30				
Very stiff gray CLAY, trace gravel, moist A-6		-30	7 9 8	B 2.7 15%	13.2
		-35	8 10 11	B 3.2 15%	13.7
	649.30				
Very stiff brownish-gray CLAY and CLAY LOAM, trace to little gravel, moist A-6		-40	12 14 16	B 3.5 15%	11.8
		-45	12 15 17	B 3.8 15%	11.4
	637.30		7 12 13	P 3.0	12.3
Gray fine SAND	636.30	-50			19.0

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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 8/23/04
Date Completed 8/25/04

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

Boring No. STFX-5
Station 571+65
Offset 30.00ft LT
Elevation 636.30 ft

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Medium dense gray fine SAND, saturated A-3	632.30		10 12 13	B 4.2 15%	15.4 12.5
		-55			
Hard brownish-gray trace gravel, moist A-6			18 19 20	B 6.7 15%	10.6
		-60			
			15 24 23	B 7.1 15%	12.8
		-65			
	619.30				
Very dense gray SAND and GRAVEL, occasional Cobbles and Boulders, (rock fragments recovered), saturated A-1-a			75 100/4"		8.4
	616.30	-70			
End of Boring at 70.0' Mobile B-57 Ardco ATV Rig (#159) CME Automatic Hammer 3.25" (83 mm) ID HSA Depth of River = 2.0'					
		-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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 8/16/04
Date Completed 8/16/04

ROUTE F.A.U. 361 DESCRIPTION New Stearns Road over the Fox River

SECT. 98-00214-02-BR STRUCT. NO. 045-3166 DRILLED BY TSC L-60,393

COUNTY Kane LOCATION South End Pier 6 S. 2 - SW 1/4, TWP. 40 N, RNG. 8 E

Boring No. STFX-6
Station 573+45
Offset 37.00ft RT
Surface Elev. 686.30 ft

Surface Water Elev. +2.0
Groundwater Elev.:
when drilling River
at Completion River
after ___ Hrs. ___

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Loose brown and gray SAND and GRAVEL, saturated A-1-a	683.30		3 4 4		12.0
Medium dense gray SAND and GRAVEL, saturated A-1-a	680.80	-5	6 6 10		12.6
Medium dense gray SAND, little to some gravel, saturated A-1-b	678.30		9 12 13		16.4
Medium dense to dense gray SAND and GRAVEL, saturated A-1-a	673.30	-10	9 10 14		9.2
			9 13 17		8.7
Medium dense gray SAND and GRAVEL, saturated A-1-a	668.30	-15	9 6 5		6.0
			6 9 9		4.2
Medium dense gray fine to medium SAND, trace gravel, saturated A-3	665.80	-20	10 12 12		17.0
Medium dense gray sandy CLAY with sand layers, trace gravel, moist A-4	663.30		9 11 14	P 1.25	9.7
Dense gray SILTY LOAM, occasional sand seams, damp A-4	661.30	-25	5 11 20	P 2.5	9.6

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Dense gray fine to medium SAND, trace to little gravel, saturated A-1-b			25 23 25		10.8
	656.80	-30	10 13 27		10.9 8.1
Dense gray Cobbles and Boulders A-1-a	655.30				
Hard brownish-gray CLAY and CLAY LOAM, trace gravel, moist A-6		-35	10 17 14	B 5.3 15%	12.5
		-40	8 16 19	B 5.4 15%	12.6
		-45	8 14 12	B 4.0 15%	12.4
	636.30	-50	7 10 11	B 4.5 15%	13.0

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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 8/16/04

Date Completed 8/16/04

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

Boring No. STFX-6
Station 573+45
Offset 37.00ft RT

Elevation 636.30 ft

Description	Elevation	DEPTH	BLOWS	Qu tsf	W %
		-55	10 16 14	B 5.1 15%	11.6
Hard brownish-gray CLAY, trace gravel, moist A-6		-60	10 15 17	B 6.4 15%	12.3
	624.30				
Very hard brownish-gray CLAY, little to some gravel, moist A-6		-65	26 38 50	B 8.9 15%	11.8
	619.30				
Very dense gray clayey SAND and GRAVEL, occasional Cobbles, moist A-1		-70	71 50/3"	P 2.0	9.5
	613.30				
Very dense SAND and GRAVEL, occasional Cobbles, saturated A-1-a	611.30	-75	150/6"		6.6

Elevation 611.30 ft

Description	DEPTH	BLOWS	Qu tsf	W %
	-80			
	-85			
	-90			
End of Boring at 75.0' Mobile B-57 Ardco ATV Rig (#159) CME Automatic Hammer 3.25" (83 mm) ID HSA Depth of River = 2.0'	-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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 3/12/04
Date Completed 3/12/04

ROUTE F.A.U. 361 DESCRIPTION New Stearns Road Bridge over the Fox River

SECT. 98-00214-02-BR STRUCT. NO. 045-3166 DRILLED BY TSC/L-59,965

COUNTY Kane LOCATION Pier No. 7 S. 2-SW 1/4 , TWP. 40 N , RNG. 8 E

Boring No.	STFX-7
Station	575+13
Offset	7.00ft RT
Surface Elev.	691.10 ft
Surface Water Elev.	
Groundwater Elev.: when drilling	687.6
at Completion	688.1
after 24 Hrs.	688.6

Description	DEPTH	BLOWS	Qu tsf	W %
Black and dark gray ORGANIC CLAY, very moist A-7-6		3 4 4	B 0.6 15%	36.2 30.6
689.10				
Medium stiff brown and gray CLAY, very moist A-7-6				
688.10				
Medium dense brown and gray SAND and GRAVEL, saturated A-1	-5	5 6 6		20.8
685.60				
Medium dense gray SILTY LOAM, occasional silt seams, moist A-4		4 6 6	P 2.25	16.7
683.10				
Medium dense to dense gray GRAVEL, little sand, saturated A-1-a	-10	8 13 16		6.0
680.60				
Dense gray GRAVEL, little sand, occasional Cobbles, saturated A-1-a		18 20 25		4.4
	-15	17 22 25		8.8
		15 25 22		6.4
	-20	18 21 26		4.7
670.60				
Very dense gray GRAVEL and COBBLES, saturated A-1-a		23 50/2"		2.2
668.10				
Dense gray fine to medium SAND, trace gravel, saturated A-1-b		15 17 19		10.4
666.10	-25			

Description	DEPTH	BLOWS	Qu tsf	W %
Stiff gray CLAY LOAM, trace gravel, moist A-4/A-6		16 19 17	B 1.7 15%	12.0
663.10				
Very stiff gray SANDY LOAM, trace gravel, moist A-2-4/A-4	-30	9 9 13	B 2.4 15%	8.4
659.10				
Very hard brownish-gray CLAY LOAM and SANDY LOAM, trace gravel, damp A-4/A-6	-35	11 16 19	S 4.6 10%	9.4
654.10				
Sample 14: LL/PL/PI=24/13/11	-40	8 12 12	B 5.7 15%	12.4
Hard to very hard brownish-gray CLAY LOAM, trace gravel, damp to moist A-6(5)	-45	10 12 15	B 6.4 15%	9.8
642.10				
Dark brown and gray silty fine SAND, wet A-1-b	-50	12 18 25	B 4.6 15%	12.4 10.3

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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 3/12/04
Date Completed 3/12/04

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

Boring No. STFX-7
Station 575+13
Offset 7.00ft RT
Elevation 641.10 ft

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Dark brown and gray silty fine SAND, wet A-1-b	639.10				
Hard gray CLAY, trace gravel, damp A-6		-55	11 13 13	B 5.9 15%	11.6
	634.10				
Dark brown and gray fine to medium SAND, trace silt, saturated A-1-b		-60	13 18 21		14.3
	629.10				
		-65	18 20 23	S 5.0 10%	10.9
Hard to very hard brownish-gray CLAY LOAM and SANDY LOAM, trace gravel, damp to moist A-4/A-6		-70	13 19 25	B 8.7 15%	9.1
	616.60		26 30 35	B 8.9 15%	11.4 9.2
***	616.10	-75			

Elevation 616.10 ft

Description	DEPTH	BLOWS	Qu tsf	W %
	-80			
	-85			
***74.5' - 75.0' Very dense gray silty SAND and GRAVEL, saturated A-1-a				
	-90			
	-95			
Mobile B-57 Ardco ATV Rig (#159) CME Automatic Hammer				
3.25" (83 mm) ID HSA				
End of Boring at 75.0'				
	-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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 3/10/04
Date Completed 3/11/04

ROUTE F.A.U. 361 DESCRIPTION New Stearns Road Bridge over the Fox River

SECT. 98-00214-02-BR STRUCT. NO. 045-3166 DRILLED BY TSC/L-59,965

COUNTY Kane LOCATION South End East Abutment S. 2-SW 1/4 , TWP. 40 N , RNG. 8 E

Boring No. STFX-8
Station 576+72
Offset 40.00ft RT
Surface Elev. 693.14 ft

Surface Water Elev.
Groundwater Elev.:
when drilling 687.6
at Completion
after 24 Hrs. 688.1

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Very stiff black CLAY, moist A-7-6			6 9 8	B 3.2 15%	19.4
	690.14				
Soft black and gray SANDY LOAM, little gravel, very moist A-2-4		-5	5 4 9	P 0.5	23.0
	687.64				
Medium dense brown fine SAND, saturated A-3	686.14		8 11 20		21.5
Dense brown SAND and GRAVEL, saturated A-1-a	685.14				10.4
Very dense dark gray and brown SAND and GRAVEL, occasional Cobbles, saturated A-1-a		-10	29 50/6"		16.3
	682.64				
Dense to very dense gray SAND and GRAVEL, saturated A-1-a			14 17 18		8.6
		-15	27 26 31		10.2
			21 24 36		7.5
	675.14				
Very dense GRAVEL and COBBLES, saturated A-1-a		-20	100/1"		6.2
	672.64				
Medium dense gray fine to medium SAND, trace silt, saturated A-1-b			14 13 16		12.6
	668.14	-25	16 10 12		12.8
Medium dense gray SANDY LOAM, trace gravel, moist A-2-4/A-4			10 7 11	B 1.6 15%	10.2
	665.14				
Very stiff brownish-gray CLAY LOAM and SANDY LOAM, trace gravel, moist A-4		-30	9 13 14	P 2.25	13.2
	661.14				
Sample 13: LL/PL/PI=27/11/16		-35	11 14 20	B 3.2 15%	12.4
Very stiff reddish-brown CLAY LOAM, trace gravel, A-6(8)		-40	8 14 21	B 2.1 15%	13.5
		-45	19 16 30	B 2.0 15%	12.4
	646.14				
Dense gray SILTY LOAM, moist A-4/A-6		-50	11 15 22	P 2.0	18.0

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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 3/10/04
Date Completed 3/11/04

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

Boring No. STFX-8
Station 576+72
Offset 40.00ft RT
Elevation 643.14 ft

Description	DEPTH	BLOWS	Qu tsf	W %
Dense gray SILTY LOAM, moist A-4/A-6				
641.14				
	-55	16 24 25	B 3.3 15%	12.7
Sample 18: LL/PL/PI=24/12/12	-60	20 28 50	B 3.9 15%	12.2
Very stiff to hard brownish-gray CLAY LOAM, trace gravel, damp to moist A-6(5)	-65	22 28 36	B 5.4 15%	11.2
Gus Pech GP-750 Truck Rig (#217) Rope and Cathead Hammer 3.25" (83 mm) ID HSA	-70	29 40 50	P 4.5	10.2
(No Recovery)	-75	20 19 24		

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

Elevation 618.14 ft

Description	DEPTH	BLOWS	Qu tsf	W %
(Qp=4.5+ tsf)		19 26 34	B 4.0 15%	11.8
Very stiff to hard brownish-gray CLAY LOAM, trace gravel, damp to moist A-6	-80	15 33 50	B 3.4 15%	11.4
(Qp=4.5+ tsf)				
(Qp=4.5+ tsf)	-85	22 33 34	B 3.6 15%	11.0
606.14				
Very dense brownish-gray CLAY LOAM and SANDY LOAM, little to some gravel, damp to moist A-2-4/A-4	-90	53 50/3"	P 4.5	11.4
601.14				
Very dense gray fine to medium SAND, trace to little gravel, saturated A-1-b	-95	36 50/6"		15.6
End of Boring at 100.0'				
593.14	-100	39 50/3"		19.0

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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 3/10/04

Date Completed 3/11/04

ROUTE F.A.U. 361 DESCRIPTION New Stearns Road Bridge over the Fox River

SECT. 98-00214-02-BR STRUCT. NO. 045-3166 DRILLED BY TSC/L-59,965

COUNTY Kane LOCATION East of East Abutment S. 2-SW 1/4, TWP. 40 N, RNG. 8 E

Boring No. STFX-9
Station 577+69
Offset 37.00ft LT
Surface Elev. 694.10 ft

Surface Water Elev. ______
Groundwater Elev.:
when drilling 688.6
at Completion ______
after ______ Hrs. ______

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
FILL - Brown SAND and GRAVEL with some layers of clay, moist A-1 & A-6			4 6 7		10.4
	691.10				
Stiff dark gray and brown CLAY LOAM, trace gravel, very moist A-6		-5	5 7 7	B 1.9 15%	22.5
	688.60				
Dense brown and gray SAND and GRAVEL, occasional Cobbles (rock fragments recovered), saturated A-1-a			16 19 20		
		-10	17 19 22		
	683.60				
Dense to very dense gray SAND and GRAVEL, occasional Cobbles (rock fragments recovered), saturated A-1-a			20 22 21		
		-15	19 30 50/5"		
	678.60				
(Poor recovery - disturbed sample)			4 7 6		19.8
Very stiff brownish-gray CLAY and SILTY CLAY LOAM, occasional silt and sand seams, trace gravel, moist A-6(11)		-20	8 11 15	B 2.8 15%	13.8
			8 17 22	B 3.9 15%	16.5
Sample 9: LL/PL/PI=25/10/15		-25	9 15 16	B 3.1 15%	17.5
	669.10				

Description	Elev.	DEPTH	BLOWS	Qu tsf	W %
Dense brown SAND, trace gravel, saturated A-1-b			10 15 20		18.2
	667.10				
Dense brownish-gray SILT, moist A-4	666.10				
Stiff reddish-brown CLAY LOAM with sand lenses, trace gravel, moist to very moist A-4/A-6		-30	6 8 10	B 1.8 15%	16.1
	662.10				
		-35	8 16 22	B 5.0 15%	12.2
Hard to very stiff reddish-brown CLAY LOAM, trace gravel, moist A-6(7)		-40	11 14 20	B 2.9 15%	12.4
Sample 14: LL/PL/PI=26/10/16					
(Qp = 4.0 tsf)		-45	13 14 18	B 1.9 15%	12.4
	647.10				
Hard reddish-brown CLAY LOAM, trace gravel, moist A-6		-50	14 22 27	B 5.3 15%	11.3
	644.10				

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

ILLINOIS DEPARTMENT OF TRANSPORTATION
Testing Service Corporation
STRUCTURE BORING LOG

Date Started 3/10/04
Date Completed 3/11/04

STRUCTURE NO. 045-3166
ROUTE F.A.U. 361
SECTION 98-00214-02-BR
COUNTY Kane

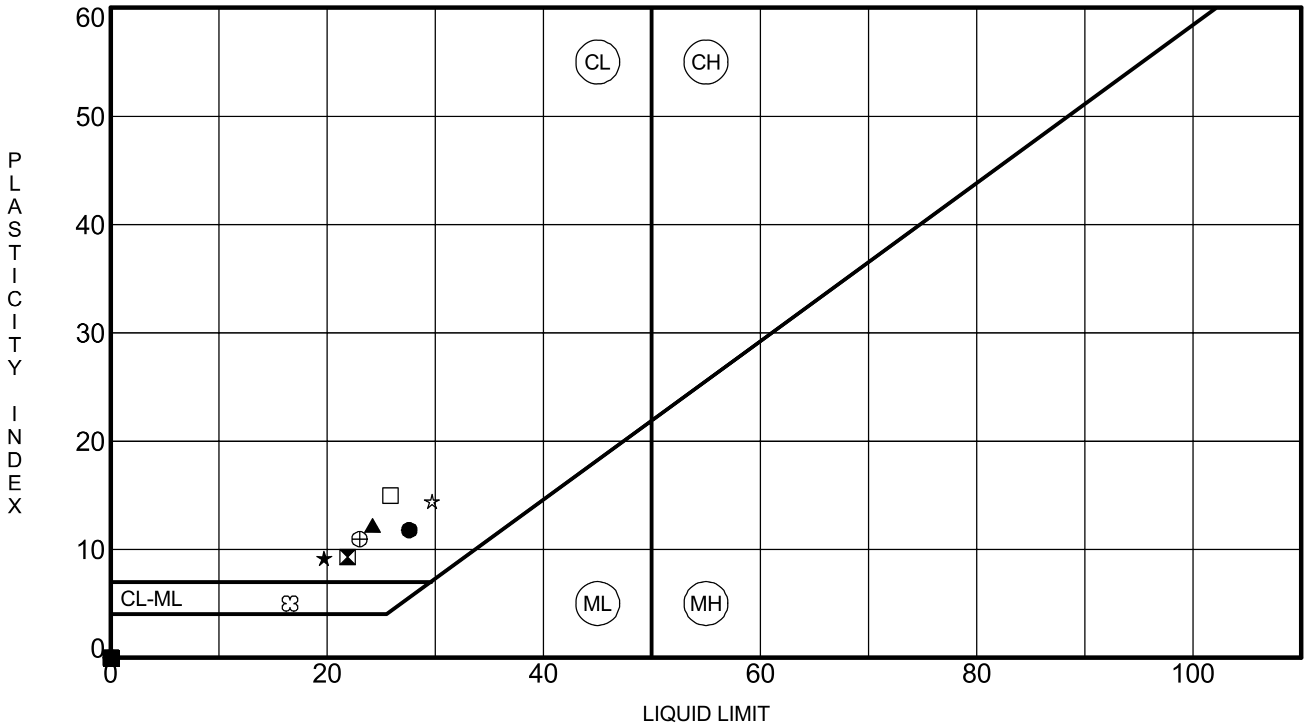
Boring No. STFX-9
Station 577+69
Offset 37.00ft LT

Elevation 644.10 ft

Description	DEPTH	BLOWS	Qu tsf	W %
	-55	17 26 39	B 6.7 15%	13.5
Hard reddish-brown CLAY and CLAY LOAM, trace gravel, damp to moist A-6	-60	14 22 34	B 4.7 15%	14.1
(Qp = 4.5+ tsf)	-65	15 26 27	B 3.9 15%	12.6
624.10	-70	19 30 34	B 5.4 15%	11.6
End of Boring at 70.0' Gus Pech GP-750 Truck Rig (#217) Rope and Cathead Hammer Rotary Wash Drill below 20 feet	-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

APPENDIX B



	Specimen Identification		LL	PL	PI	Fines	Classification
●	P3B-1	8.5	28	16	12	95	LEAN CLAY(CL)
⧗	P3B-1	16.0	22	13	9	25	CLAYEY SAND with GRAVEL(SC)
▲	P3B-1	56.0	24	12	12	67	SANDY LEAN CLAY(CL)
★	P3B-1	71.0	20	11	9	65	SANDY LEAN CLAY(CL)
⊙	P4B-1	3.5	NP	NP	NP	6	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)
✿	P4B-1	9.0	NP	NP	NP	6	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)
○	P4B-1	14.0	NP	NP	NP	11	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)
△	P4B-1	21.5	NP	NP	NP	8	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)
⊗	P4B-1	33.5	NP	NP	NP	30	SILTY SAND(SM)
⊕	P4B-1	43.5	23	12	11	70	SANDY LEAN CLAY(CL)
□	P4B-1	58.5	26	11	15	72	LEAN CLAY with SAND(CL)
◉	S1B-1	6.0	NP	NP	NP	7	POORLY GRADED SAND with SILT(SP-SM)
◕	S1B-1	13.5	NP	NP	NP	4	WELL-GRADED GRAVEL with SAND(GW)
☆	S1B-1	21.0	30	15	15	83	LEAN CLAY with SAND(CL)
✣	S1B-1	33.5	17	12	5	55	SANDY SILTY CLAY(CL-ML)
■	S1B-1	48.5	NP	NP	NP	12	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)
◆	S1B-1	58.5	NP	NP	NP	7	POORLY GRADED SAND with SILT(SP-SM)

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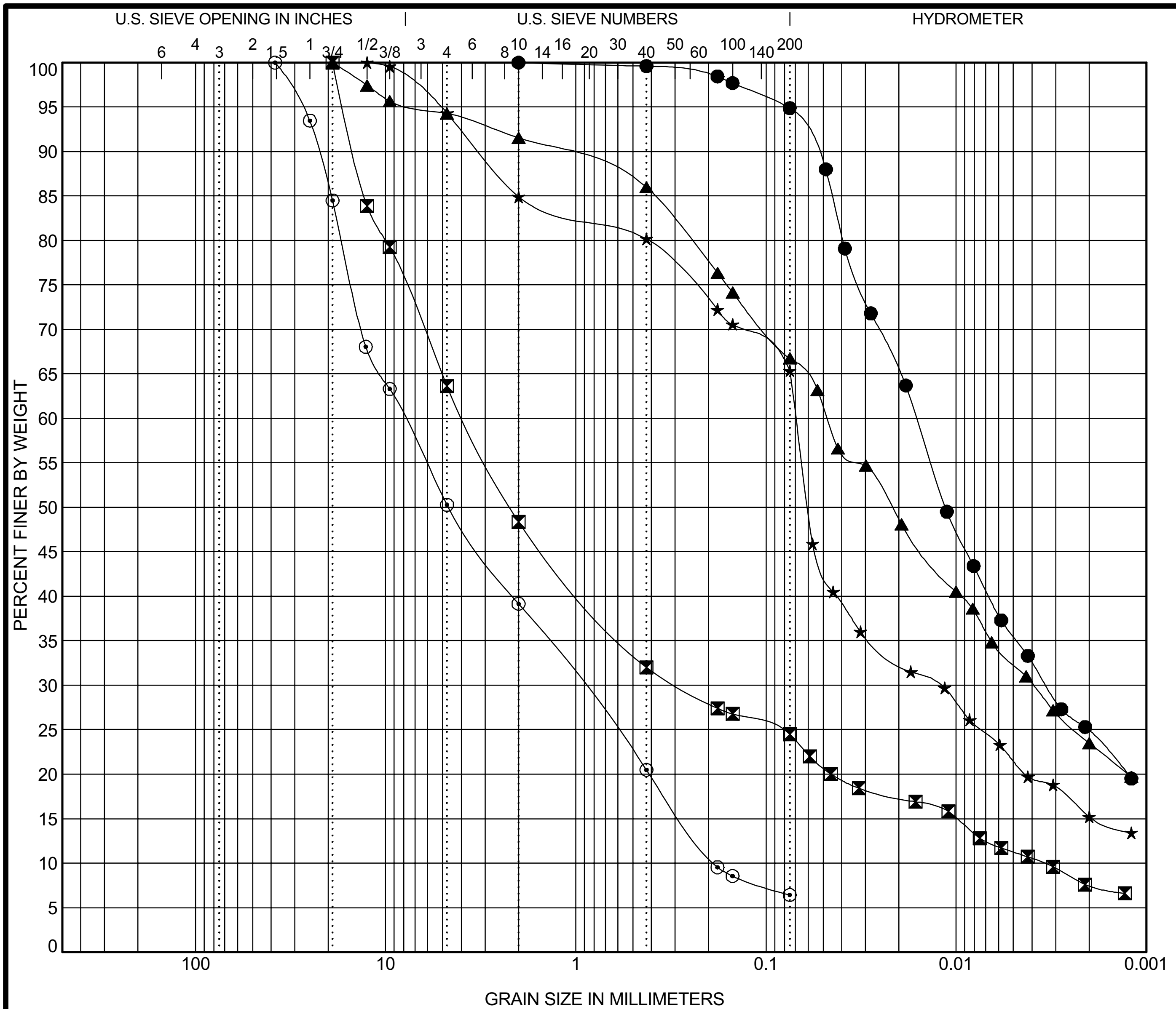
ATTERBERG LIMITS' RESULTS

Project: New Stearns Road over Fox River

Location: Sec. 2 and 3, T 40 N, R 8 E of Geneva Quadrangle

Number: 707-11-01



COBBLES	GRAVEL	SAND coarse	SAND fine	SILT AND CLAY

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	P3B-1	8.5	**Silty Clay Loam**	28	16	12		
⧗	P3B-1	16.0	**Gravelly Loam**	22	13	9	6.40	1116.35
▲	P3B-1	56.0	**Clay Loam**	24	12	12		
★	P3B-1	71.0	**Gravelly Silty Loam**	20	11	9		
⊙	P4B-1	3.5	**Gravelly Loam**	NP	NP	NP	0.59	42.66

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	P3B-1	8.5	2	0.016	0.003		0.0	5.3	69.9	24.8
⧗	P3B-1	16.0	19	3.865	0.293	0.003	51.6	24.0	16.9	7.5
▲	P3B-1	56.0	19	0.048	0.004		8.5	24.9	43.1	23.5
★	P3B-1	71.0	12.5	0.07	0.012		15.1	20.5	49.2	15.2
⊙	P4B-1	3.5	38.1	7.966	0.936	0.187	60.8		6.4	

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Wang Engineering

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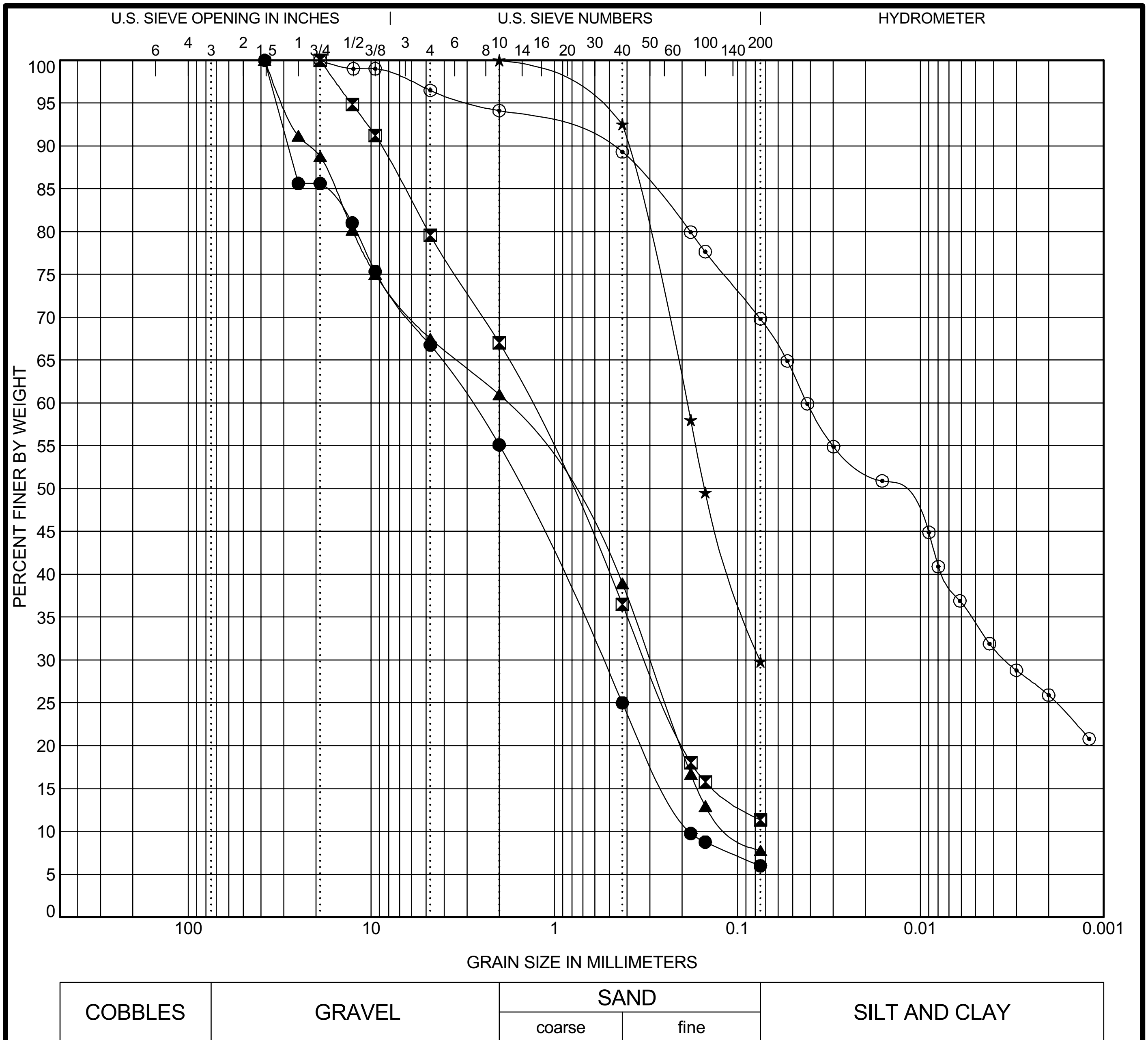
GRAIN SIZE DISTRIBUTION

Project: New Stearns Road over Fox River

Location: Sec. 2 and 3, T 40 N, R 8 E of Geneva Quadrangle

Number: 707-11-01

WEI GRAIN SIZE IDH 7071101.GPJ US LAB.GDT 10/23/08



	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	**P4B-1**	**9.0**	**Gravelly Loam**	**NP**	**NP**	**NP**	**0.58**	**15.75**
⊠	**P4B-1**	**14.0**	**Gravelly Loam**	**NP**	**NP**	**NP**	**1.16**	**23.01**
▲	**P4B-1**	**21.5**	**Gravelly Loam**	**NP**	**NP**	**NP**	**0.48**	**18.41**
★	**P4B-1**	**33.5**	**Loam**	**NP**	**NP**	**NP**		
⊙	**P4B-1**	**43.5**	**Clay Loam**	**23**	**12**	**11**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**P4B-1**	**9.0**	**38.1**	**2.875**	**0.55**	**0.183**	**44.9**		**6.0**	
⊠	**P4B-1**	**14.0**	**19**	**1.4**	**0.314**		**33.0**		**11.3**	
▲	**P4B-1**	**21.5**	**38.1**	**1.866**	**0.301**	**0.101**	**39.0**		**7.8**	
★	**P4B-1**	**33.5**	**2**	**0.189**	**0.075**		**0.0**		**29.8**	
⊙	**P4B-1**	**43.5**	**19**	**0.042**	**0.003**		**5.9**	**24.5**	**43.7**	**25.9**

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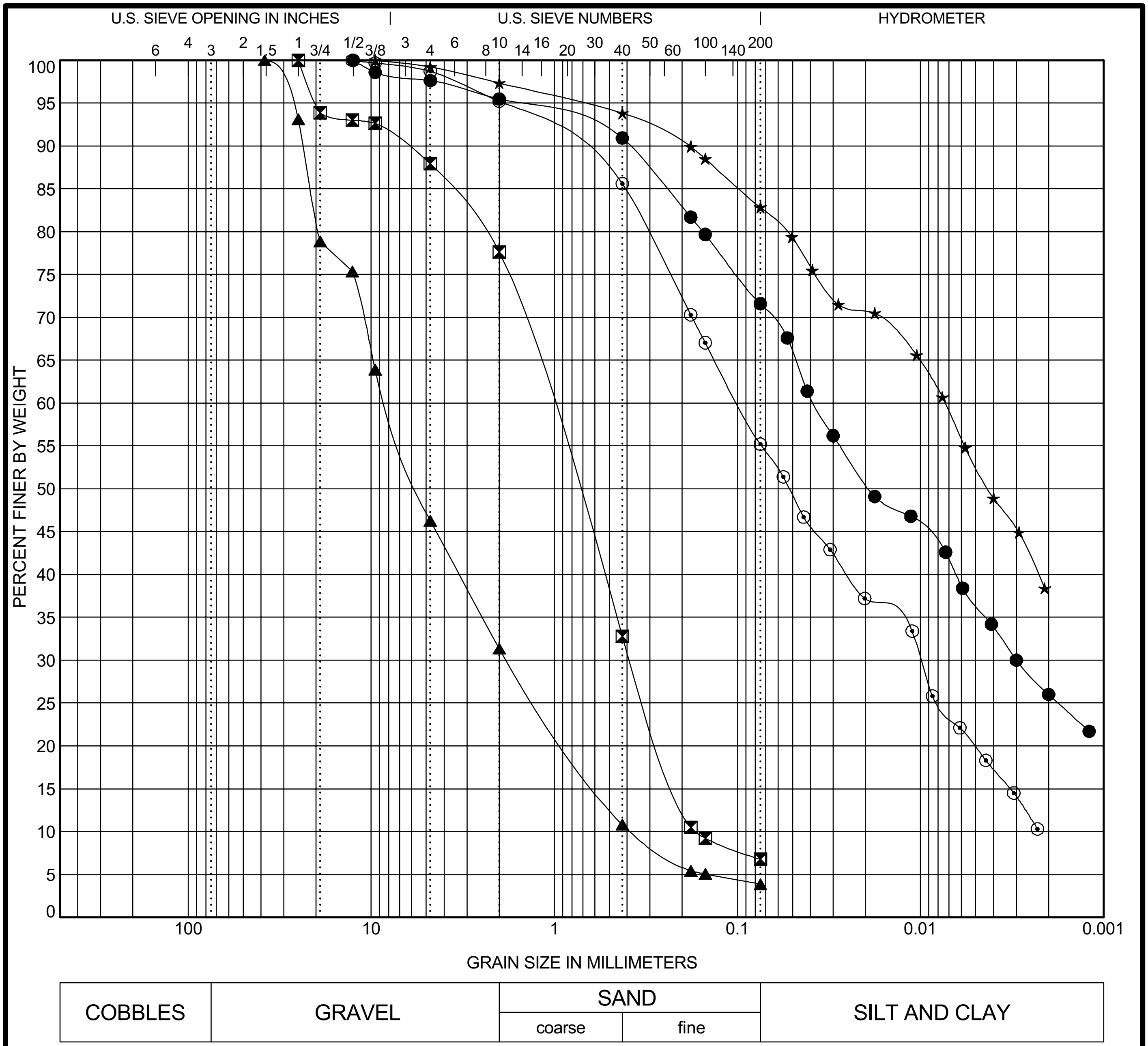
GRAIN SIZE DISTRIBUTION

Project: New Stearns Road over Fox River

Location: Sec. 2 and 3, T 40 N, R 8 E of Geneva Quadrangle

Number: 707-11-01



	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	**P4B-1**	**58.5**	**Clay Loam**	**26**	**11**	**15**		
⧗	**S1B-1**	**6.0**	**Gravelly Loam**	**NP**	**NP**	**NP**	**0.80**	**6.49**
▲	**S1B-1**	**13.5**	**Gravelly Loam**	**NP**	**NP**	**NP**	**1.07**	**21.83**
★	**S1B-1**	**21.0**	**Loam**	**30**	**15**	**15**		
⊙	**S1B-1**	**33.5**	**Loam**	**17**	**12**	**5**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**P4B-1**	**58.5**	**12.5**	**0.038**	**0.003**		**4.5**	**24.0**	**45.4**	**26.0**
⧗	**S1B-1**	**6.0**	**25**	**1.088**	**0.382**	**0.167**	**22.4**		**6.8**	
▲	**S1B-1**	**13.5**	**38.1**	**8.15**	**1.808**	**0.373**	**68.7**		**3.9**	
★	**S1B-1**	**21.0**	**9.5**	**0.007**			**2.6**	**14.6**		
⊙	**S1B-1**	**33.5**	**12.7**	**0.099**	**0.01**		**4.8**	**40.2**		

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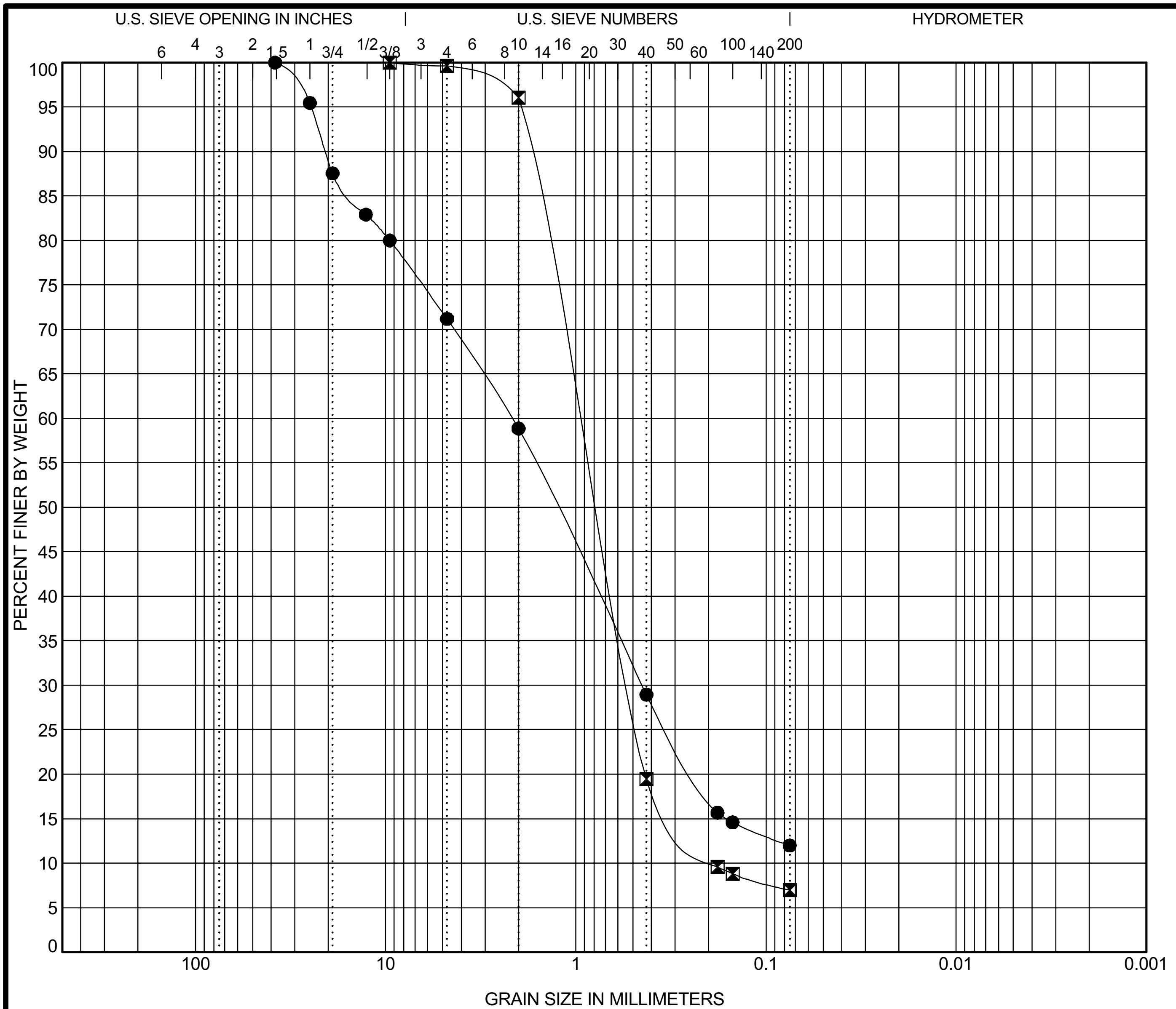
GRAIN SIZE DISTRIBUTION

Project: New Stearns Road over Fox River

Location: Sec. 2 and 3, T 40 N, R 8 E of Geneva Quadrangle

Number: 707-11-01



COBBLES	GRAVEL	SAND coarse	SAND fine	SILT AND CLAY

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	**S1B-1**	**48.5**	**Gravelly Loam**	**NP**	**NP**	**NP**	**2.10**	**48.91**
⊠	**S1B-1**	**58.5**	**Loam**	**NP**	**NP**	**NP**	**1.53**	**5.15**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**S1B-1**	**48.5**	**38.1**	**2.166**	**0.449**		**41.1**		**12.0**	
⊠	**S1B-1**	**58.5**	**9.5**	**0.965**	**0.526**	**0.187**	**4.0**		**7.0**	

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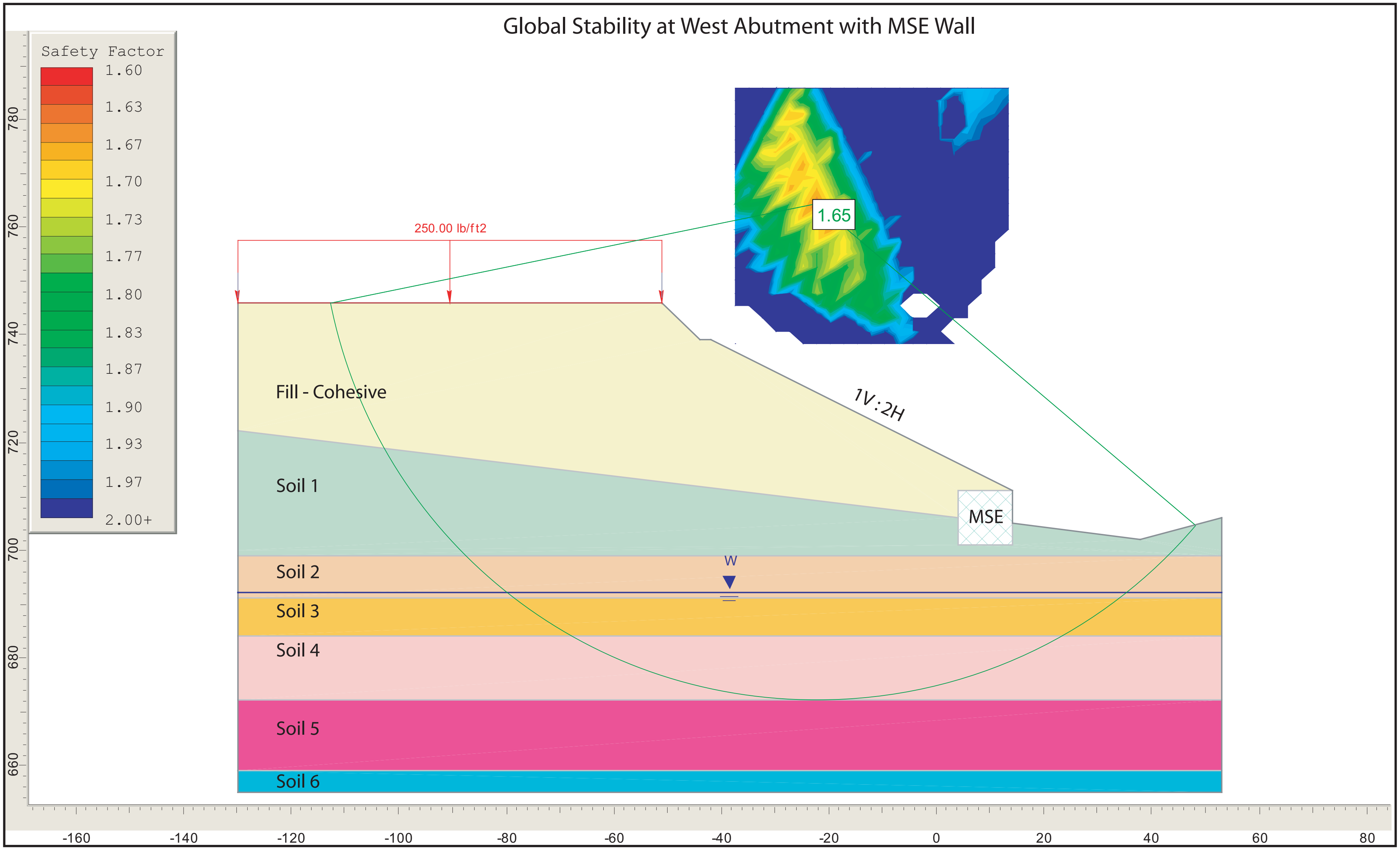
GRAIN SIZE DISTRIBUTION

Project: New Stearns Road over Fox River

Location: Sec. 2 and 3, T 40 N, R 8 E of Geneva Quadrangle

Number: 707-11-01

APPENDIX C



Soil ID	Soil Type	Unit Weight [pcf]	Cohesion [psf]	Friction Angle [deg.]
Fill	Cohesive	125	1500	0
Soil 1	Granular	120	0	33
Soil 2	Cohesive	120	2500	0
Soil 3	Granular	120	0	33
Soil 4	Cohesive	115	900	0
Soil 5	Granular	125	0	35
Soil 6	Granular	130	0	38

GLOBAL STABILITY: NEW STEARNS ROAD
KANE COUNTY, IL

scale: see graphic scale

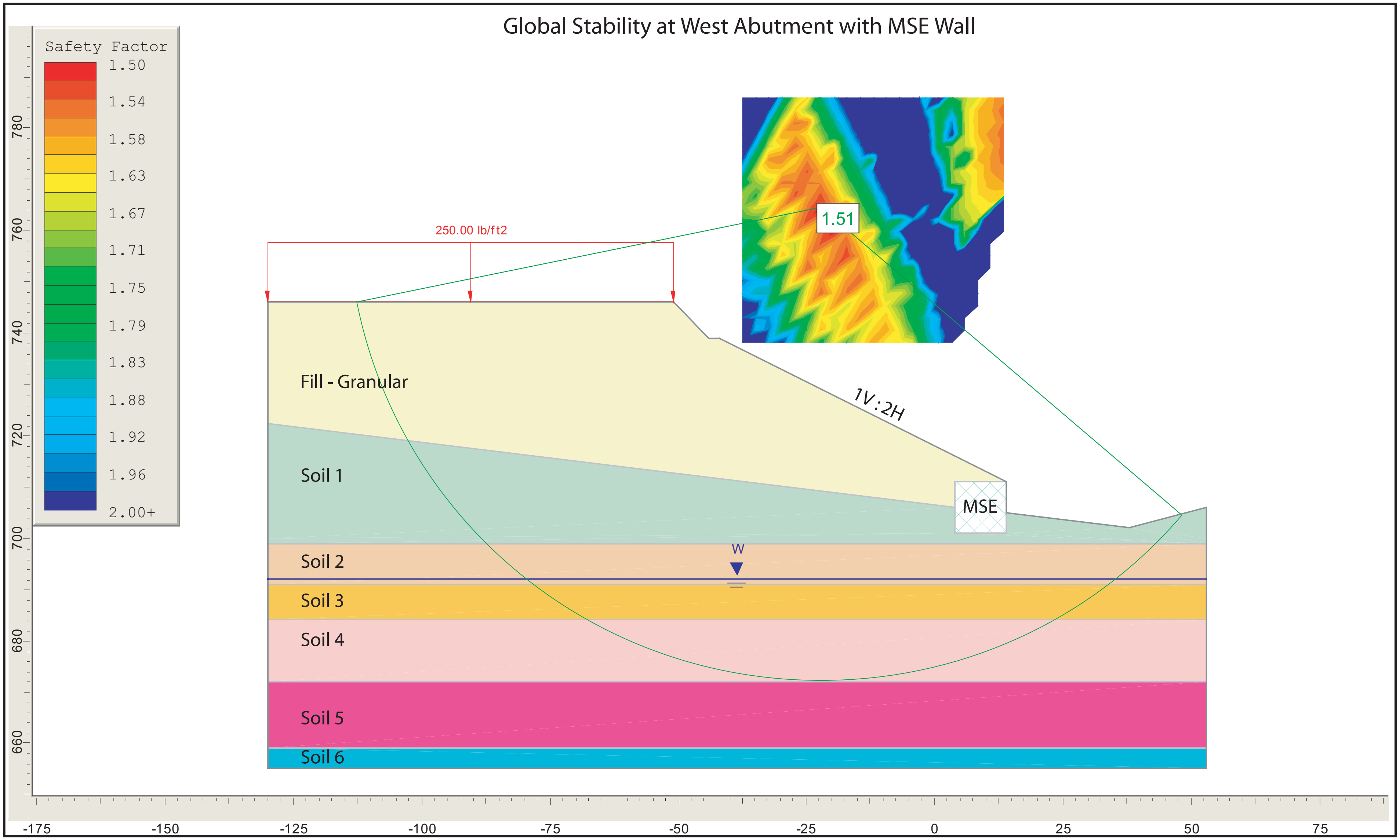
EXHIBIT

Drawn by: SS
Checked by: MAK

Wang Engineering, Inc.
Geo-Environmental Engineers
1145 N Main Street
Lombard, IL 60101
630 953-9928

For Baker Engineering, Inc.

707-11-01



Soil ID	Soil Type	Unit Weight [pcf]	Cohesion [psf]	Friction Angle [deg.]
Fill	Granular	125	0	34
Soil 1	Granular	120	0	33
Soil 2	Cohesive	120	2500	0
Soil 3	Granular	120	0	33
Soil 4	Cohesive	115	900	0
Soil 5	Granular	125	0	35
Soil 6	Granular	130	0	38

GLOBAL STABILITY: NEW STEARNS ROAD
KANE COUNTY, IL

scale: see graphic scale

EXHIBIT

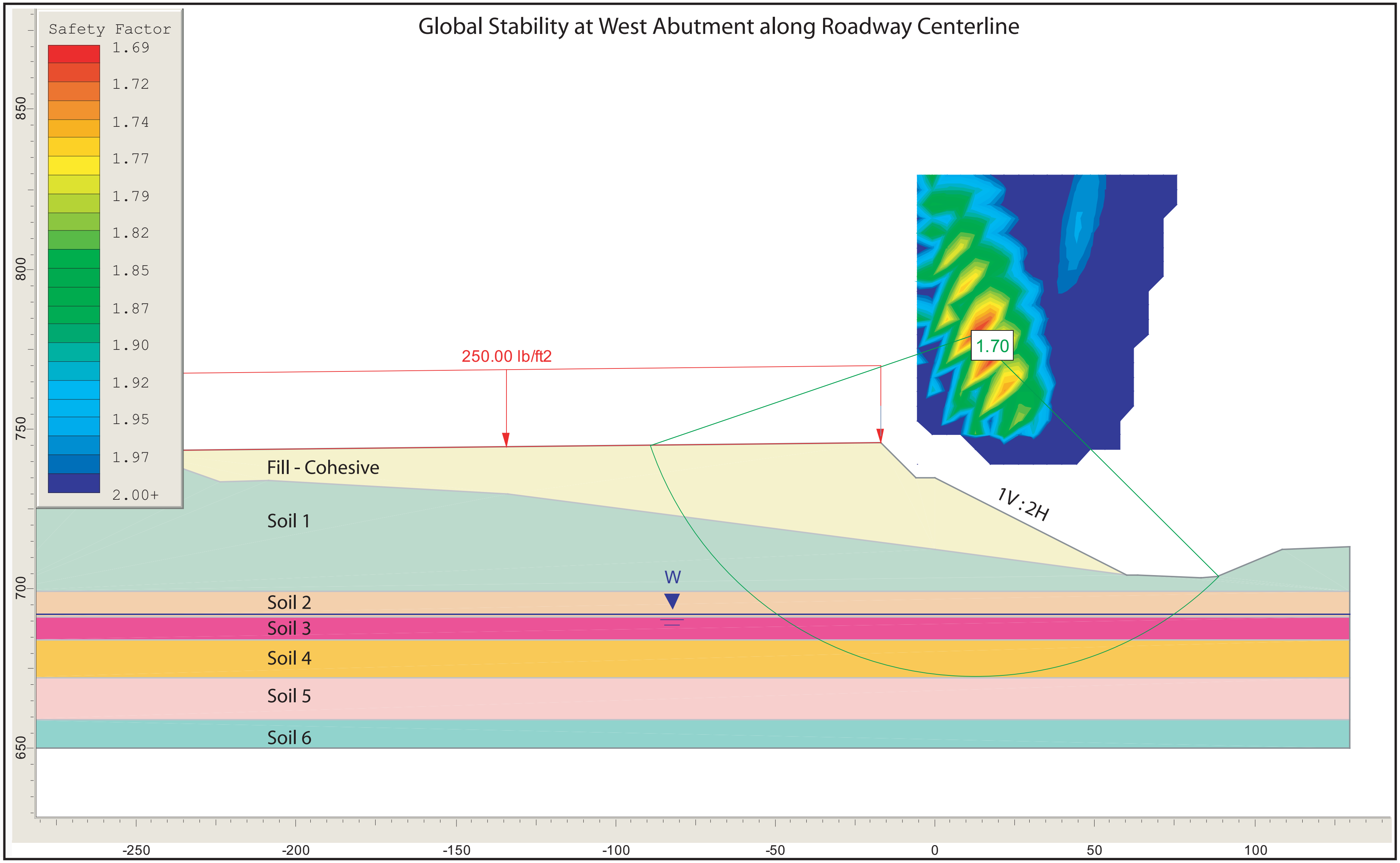
Drawn by: SS

Checked by: MAK

Wang Engineering, Inc.
Geo-Environmental Engineers
1145 N Main Street
Lombard, IL 60101
630 953-9928

For Baker Engineering, Inc.

707-11-01



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Fill	Cohesive	125	1500	0
Soil 1	Granular	120	0	33
Soil 2	Cohesive	120	2500	0
Soil 3	Granular	120	0	33
Soil 4	Cohesive	115	900	0
Soil 5	Granular	125	0	35
Soil 6	Granular	130	0	38

GLOBAL STABILITY: NEW STEARNS ROAD
KANE COUNTY, IL

scale: see graphic scale

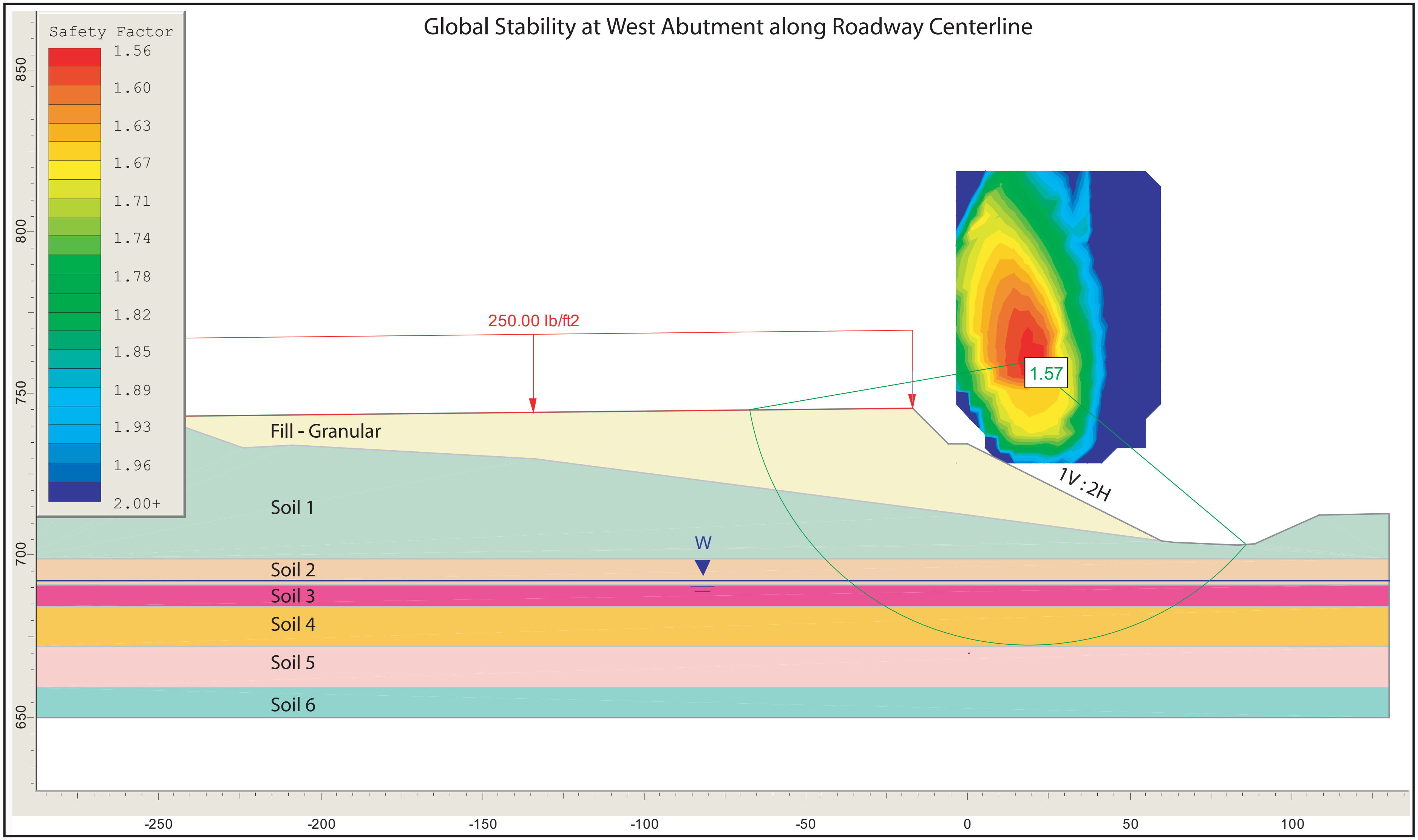
EXHIBIT

Drawn by: SS
Checked by: MAK

Wang Engineering, Inc.
Geo-Environmental Engineers
1145 N Main Street
Lombard, IL 60101
630 953-9928

For Baker Engineering, Inc.

707-11-01



Soil ID	Soil Type	Unit Weight [pcf]	Cohesion [psf]	Friction Angle [deg.]
Fill	Granular	125	0	34
Soil 1	Granular	120	0	33
Soil 2	Cohesive	120	2500	0
Soil 3	Granular	120	0	33
Soil 4	Cohesive	115	900	0
Soil 5	Granular	125	0	35
Soil 6	Granular	130	0	38

GLOBAL STABILITY: NEW STEARNS ROAD
KANE COUNTY, IL

scale: see graphic scale

EXHIBIT

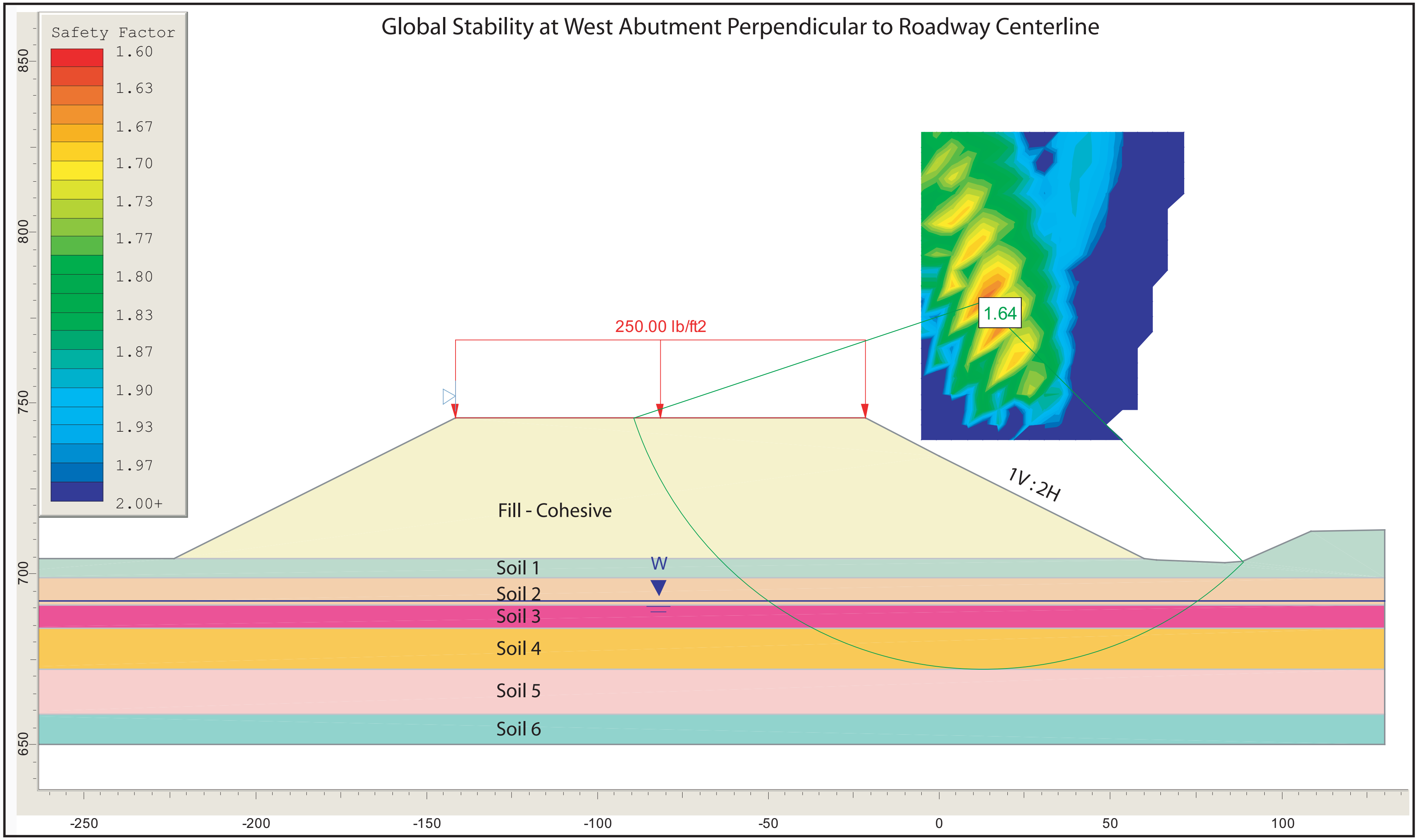
Drawn by: SS

Checked by: MAK

Wang Engineering, Inc.
Geo-Environmental Engineers
1145 N Main Street
Lombard, IL 60101
630 953-9928

For Baker Engineering, Inc.

707-11-01



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Fill	Cohesive	125	1500	0
Soil 1	Granular	120	0	33
Soil 2	Cohesive	120	2500	0
Soil 3	Granular	120	0	33
Soil 4	Cohesive	115	900	0
Soil 5	Granular	125	0	35
Soil 6	Granular	130	0	38

GLOBAL STABILITY: NEW STEARNS ROAD
KANE COUNTY, IL

scale: see graphic scale

EXHIBIT

Drawn by: SS

Checked by: MAK

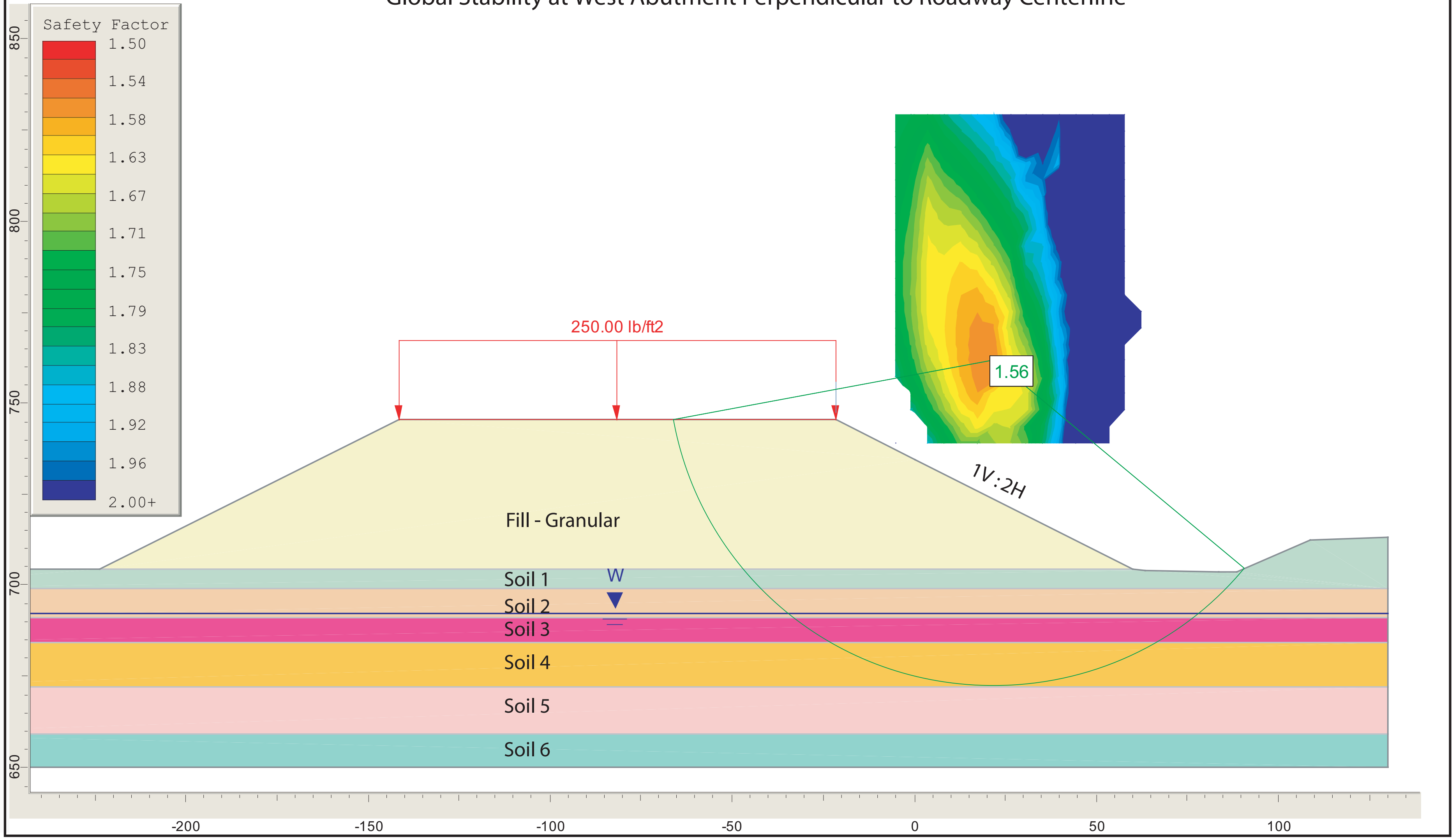
Wang Engineering, Inc.
Geo-Environmental Engineers

1145 N Main Street
Lombard, IL 60101
630 953-9928

For Baker Engineering, Inc.

707-11-01

Global Stability at West Abutment Perpendicular to Roadway Centerline



Soil ID	Soil Type	Unit Weight [pcf]	Cohesion [psf]	Friction Angle [deg.]
Fill	Granular	125	0	34
Soil 1	Granular	120	0	33
Soil 2	Cohesive	120	2500	0
Soil 3	Granular	120	0	33
Soil 4	Cohesive	115	900	0
Soil 5	Granular	125	0	35
Soil 6	Granular	130	0	38

GLOBAL STABILITY: NEW STEARNS ROAD
KANE COUNTY, IL

scale: see graphic scale

EXHIBIT

Drawn by: SS
Checked by: MAK

Wang Engineering, Inc.
Geo-Environmental Engineers
1145 N Main Street
Lombard, IL 60101
630 953-9928

For Baker Engineering, Inc.

707-11-01

APPENDIX D

TSC
TESTING SERVICE CORPORATION

Corporate Office:
360 S. Main Place, Carol Stream, IL 60188-2404
630.462.2600 • Fax 630.653.2988

Local Office:
457 E. Gundersen Drive, Carol Stream, IL 60188-2492
630.653.3920 • Fax 630.653.2726

Local Office
February 14, 2008

Mr. Mike Kothawal
Wang Engineering, Inc.
1145 North Main St.
Lombard, IL 60148

RE: L-70,503
Pressuremeter Testing
New Stearns Rd.
South Elgin, IL

Dear Mr. Kothawala;

Enclosed are the results of the pressuremeter testing performed in connection with the referenced project. The PMT testing was performed at two (2) boring locations in the Fox river at the depths requested by Wang Engineering, Ltd.

A summary of "Pressuremeter Investigation" which covers the field procedures and engineering analysis is attached for your review. Also attached are the data reductions for the individual tests performed as well as a summary of the pressuremeter test results obtained from the pressure versus relative increase in probe radius curves developed.

We are appreciative of the opportunity to assist you with this project. Please call if you have any questions or we may be of further service.

Respectfully Submitted,

TESTING SERVICE CORPORATION

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Enc. 18 pages

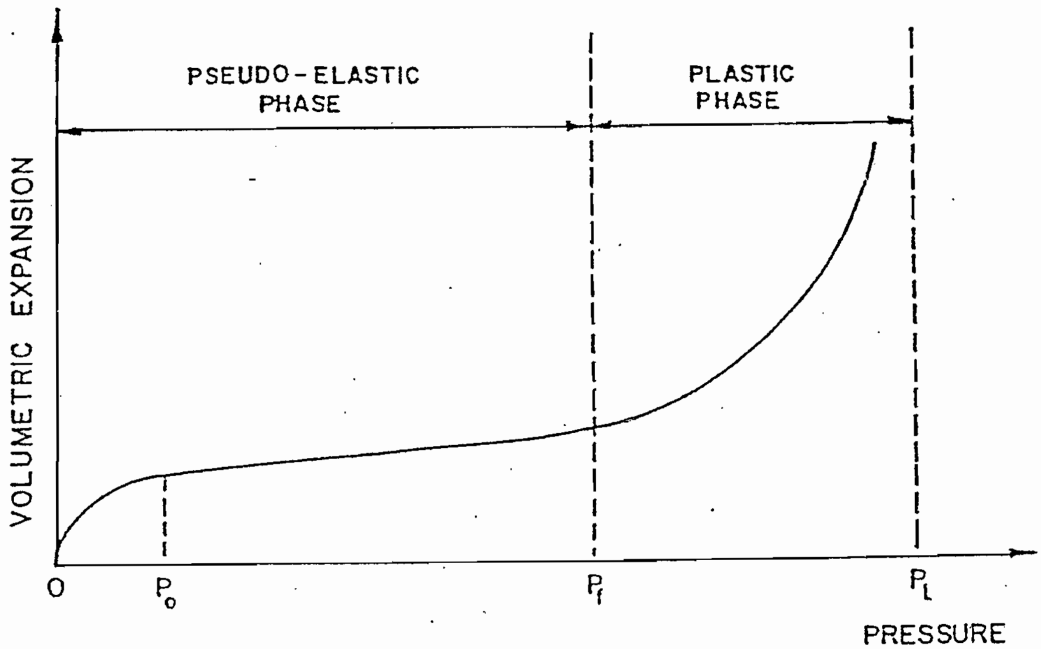
PRESSUREMETER INVESTIGATION

The pressuremeter is essentially used to perform an in-situ load test. It allows for the determination of the stress-strain characteristics of soil or rock with depth. Its results are most commonly used in the determination of bearing capacity for foundations and also in the evaluation of settlement.

Testing Service Corporation uses a Menard Pressuremeter, Model G-Am manufactured by Roctest. The downhole probe fits in NX size casing, measuring approximately 2.75 inches in diameter. Its overall length is approximately 2.25 feet.

To perform a pressuremeter test, the cylindrical probe is lowered into a bore hole to the desired test depth. A flexible cell contained in the probe is then expanded against the sides of the hole by applying internal gas pressure. The deformation of the surrounding soil or rock is measured by means of volume changes in the test cell. Pressure is increased incrementally, with volume readings typically taken at 30 and 60 seconds.

The results of the pressuremeter test are generally interpreted by plotting pressure versus volume change for each loading increment. A typical curve is shown below. It can typically be divided into three parts in conformance with Menard's theories.



The elastic zone in which soil strengths are completely recoverable is generally not noticed due to drilling disturbance. The lower limit of this elastic zone is defined as p_0. It corresponds to seating of the probe against the sides of the bore hole.

At pressures above p_o, the soil behaves as a pseudo-elastic material which is indicated as a straight line on the curve. Strains occurring within this zone are not completely recoverable. The linearity of this portion of the curve helps define the modulus of deformation for the soil, which in turn can be used for settlement evaluation. The upper limit of the pseudo-elastic zone is defined as p_f.

Creep deformation of the soil occurs at pressures above p_f. The pressure at which failure eventually occurs is defined as the limit pressure or P_L. It is normally related to the ultimate bearing capacity of the soil.

The following values are those usually obtained from the pressure versus volume curves and used in the foundation analysis:

Limit Pressure (PL) - Pressure at which failure occurs in tons per square foot

Modulus of Deformation (E) - Slope of stress-strain curve for the pseudo-elastic zone in tons per square foot.

Bearing capacity can be derived from the pressuremeter data using the following general equation:

$$q = P_v + k\,(P_L - P_o)$$

where q = Ultimate bearing capacity

P_o = Lateral at-rest pressure of the soil at the elevation of the foundation element

P_L = Limit pressure of the soil

k = A coefficient which depends upon soil type, geometric shape of the foundation, and depth of embedment

P_v = Overburden pressure at foundation level

Settlement calculations are based on the following computation:

$$S = \frac{1.33}{3E} P\, Ro \left(\lambda 2 \frac{R}{Ro}\right)^{\alpha} + \frac{\alpha}{4.5E} P \lambda 3R$$

where E = Pressuremeter modulus

P = Contact stress at base of foundation

R = Radius of foundation

Ro = Reference length of 30 cm

α = Rheologic coefficient based on type of soil

λ 2/3 = Shape coefficients

The above is intended to be a summary of pressuremeter testing, i.e. field procedures, data reduction and analysis. The List of References which follows may be referred to for more detailed information.

REFERENCES

1. The Menard Pressuremeter - Interpretation and Application of Pressuremeter Test Results - Sols Soils No. 26-1975

2. Baguelin F., Jezequel J.f., Shields D.H, The Pressuremeter and Foundation Engineering, Trans Tech Publications, 1978

3. Gambin M., Computation of the Settlement of a Slender Deep Foundation in Terms of Pressuremeter Test Results - Sols Soils No. 7

4. Higgins C.M., "Pressuremeter Correlation Study", Highway Research Record No. 284, Highway Research Board, 1969

5. Lukas R.G., de Bussy, B.L., "Pressuremeter and Laboratory Test Correlations for Clays", ASCE Journal of the Geotechnical Engineering Division Vol 102, No. GT9, September 1976

6. Briaud J-L, Lytton R.L., Hung J-T, "Obtaining Moduli from Cyclic Pressuremeter Tests", ASCE Journal of Geotechnical Engineering Vol. 109, No. 5, May 1983

7. Orpwood T.G., Ahmad S.A., Peaker K.R., "Pressuremeter Evaluation of Glacial Till Bearing Capacity in Toronto, Canada", Proceedings of the 1989 Foundation Engineering Congress, Foundation Engineering: Current Principles and Practices Vol.1, 1989

8. Lutenegger A.J., "Use of In-Situ Tests to Determine Design Parameters for Drilled Shaft Foundations"

9. Haberfield C.M., Johnston I.W., "Model Studies of Pressuremeter Testing in Soft Rock", Geotechnical Testing Journal, Vol. 12, No. 2, June 1989

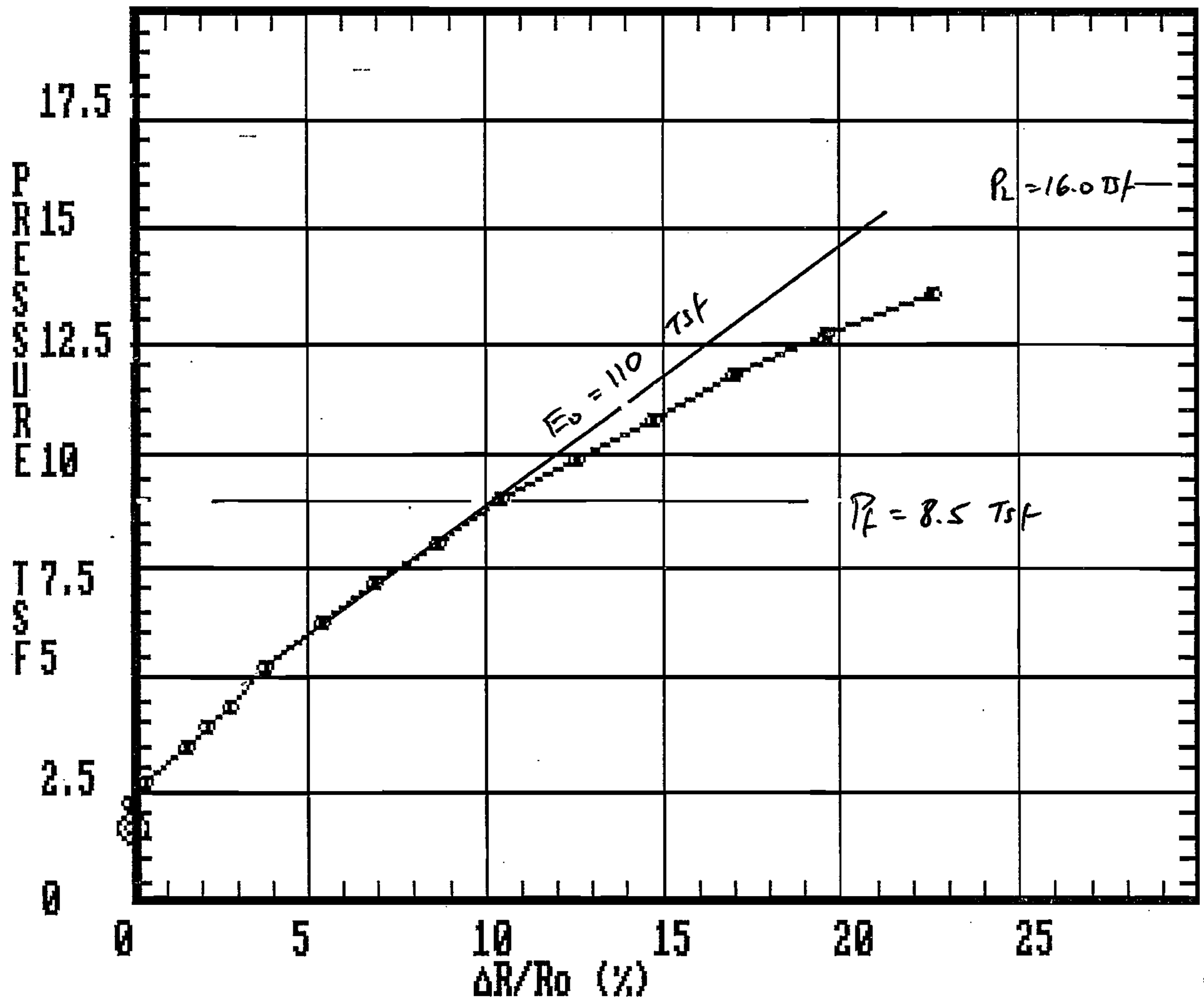
TSC Job No. L-70,503 Project : New Stearns Road, South Elgin, IL

SUMMARY OF PRESSUREMETER TEST RESULTS

Boring No.	Depth in feet	Po in tsf	Pf in tsf	Pl in tsf	Pl* in tsf	Eo in tsf	Eo/Pl	Eo/Pl*	Pl/Pf	Remarks
P3 B1	47.0	**	8.5	16.0		110	6.9		1.88	**Po couldn't be determined (hole too small)
P3 B1	52.0	4.5	11.0	23.5	19.0	268	11.4	14.1	2.14	
P3 B1	57.0	4.5	10.5	22.5	18.0	160	7.1	8.9	2.14	
P3 B1	62.0	6.0	18.0	38.0	32.0	682	17.9	21.3	2.11	
P3 B1	67.0	7.0	21.5	**		618				**Pl couldn't be determined (probe burst)
P4 B1	59.0	4.5	15.0	29.0	24.5	319	11.0	13.0	1.93	
P4 B1	64.0	7.0	19.0	48.0	41.0	803	16.7	19.6	2.53	

Po = at-rest pressure
Pf = creep pressure
Pl = limit pressure
Pl* = net limit pressure
Eo = pressuremeter modulus

PRESSUREMETER DATA REDUCTION
TSC JOB NO. L-70,503
BORING P3B1 DEPTH 47.0 FT.



RELATIVE INCREASE IN PROBE RADIUS

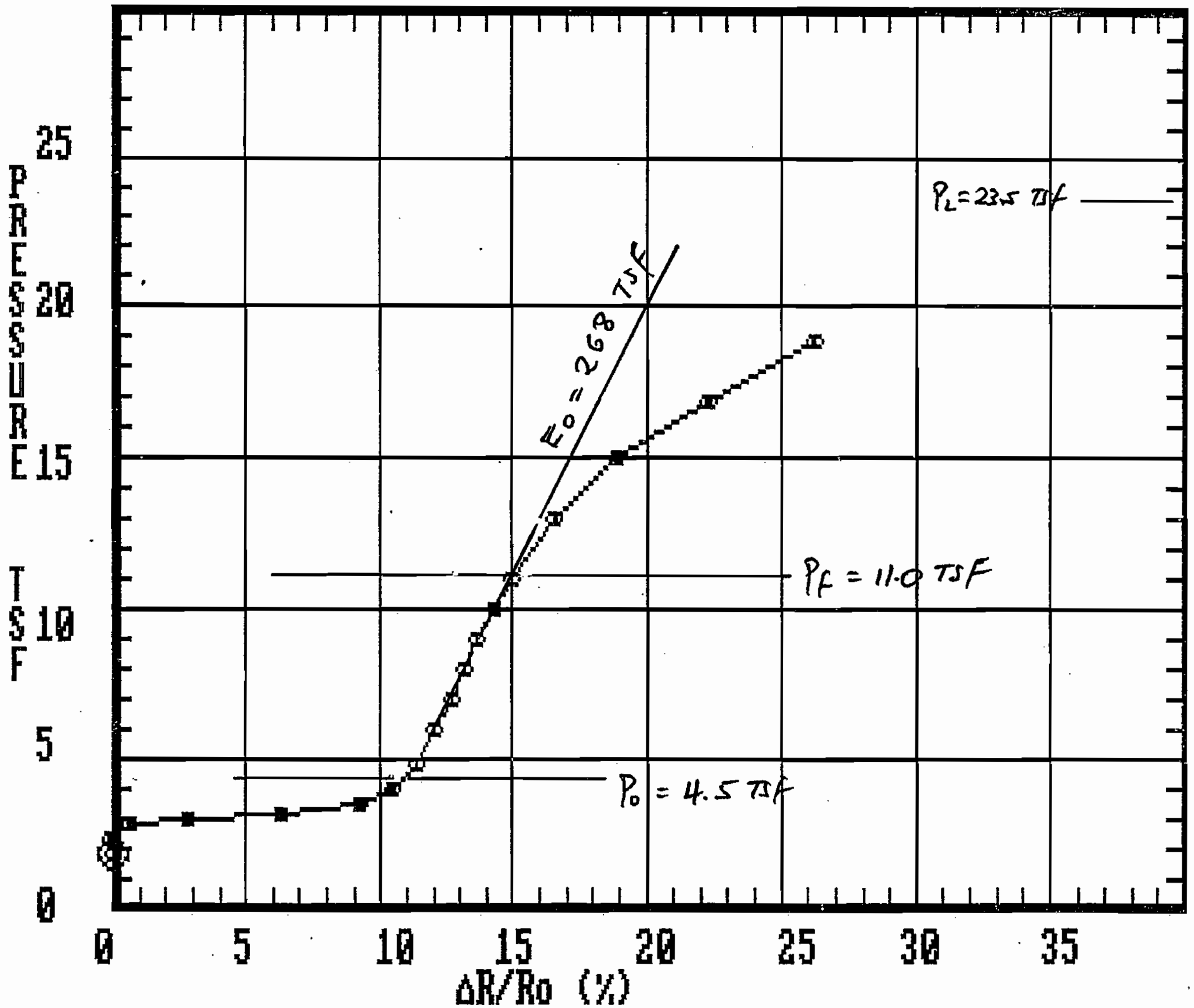
L-70,503 / BORING P3 B-1 AT 47 FT

POINT NUMBER	VOLUME MEASUREMENT	PRESSURE MEASUREMENT	CORR. VOL. INCREASE (FT^3)	dR/Ro (%)	CORRECTED PRESSURE (TSF)
1	-20.00	0.000	0.000	0.00	1.685
2	-20.00	0.500	-0.000	-0.05	2.207
3	-13.00	1.000	0.000	0.35	2.653
4	8.00	2.000	0.001	1.57	3.478
5	17.00	2.500	0.001	2.08	3.924
6	30.00	3.000	0.002	2.84	4.337
7	47.00	4.000	0.002	3.79	5.276
8	76.00	5.000	0.003	5.45	6.169
9	101.00	6.000	0.004	6.90	7.107
10	132.00	7.000	0.005	8.67	8.037
11	164.00	8.000	0.006	10.47	8.969
12	202.00	9.000	0.007	12.59	9.902
13	242.00	10.000	0.009	14.77	10.829
14	283.00	11.000	0.010	17.00	11.762
15	332.00	12.000	0.012	19.61	12.674
16	389.00	13.000	0.014	22.58	13.556

Po = Pl = 16.00 TSF Pl* =

Eo = 110 TSF Er = Eo/Pl* =

PRESSUREMETER DATA REDUCTION
TSC JOB NO. L-70,503
BORING P3B1 DEPTH 52.0 FT.



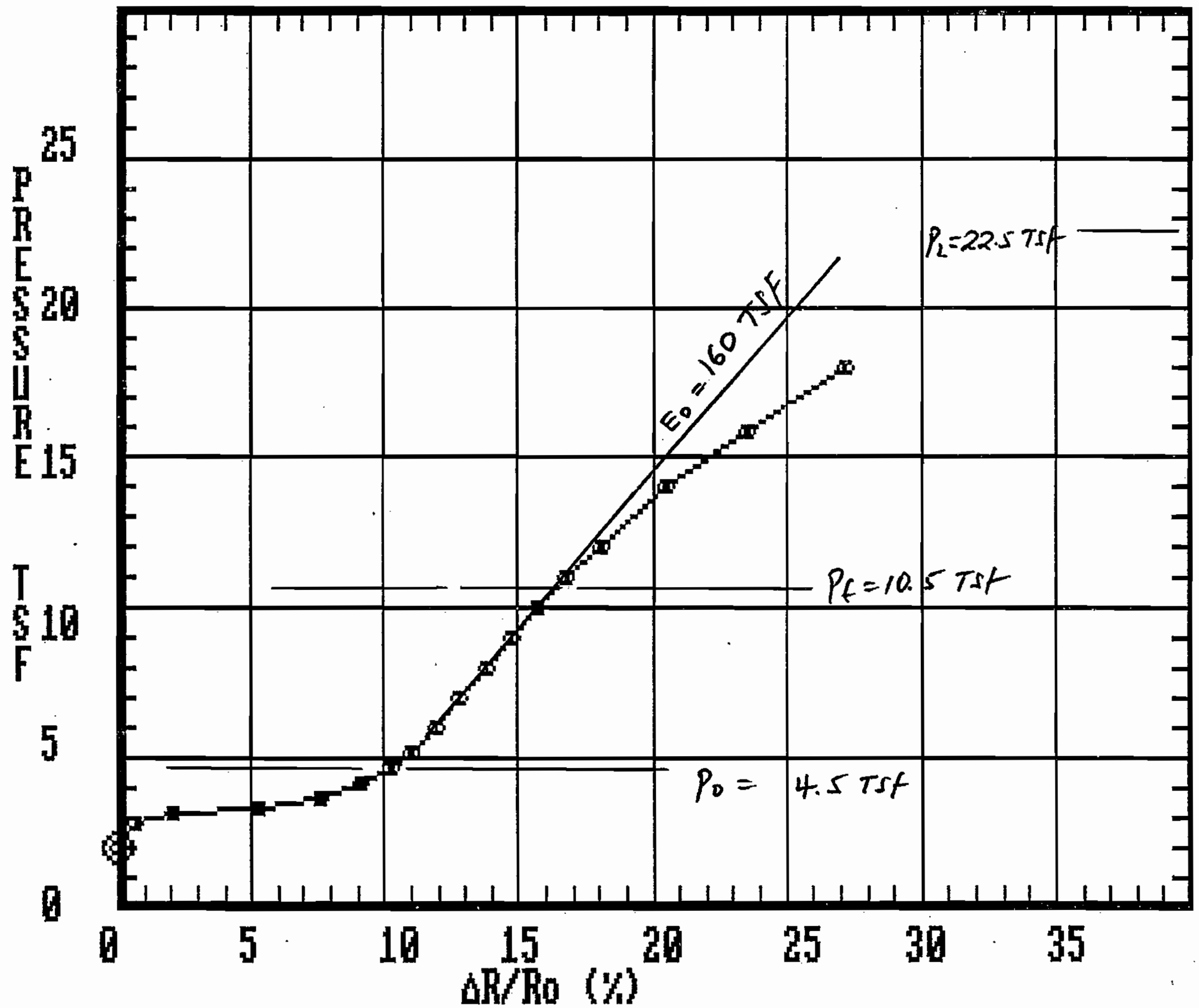
RELATIVE INCREASE IN PROBE RADIUS

L-70,503 / BORING P3 B-1 AT 52 FT

POINT NUMBER	VOLUME MEASUREMENT	PRESSURE MEASUREMENT	CORR. VOL. INCREASE (FT^3)	dR/Ro (%)	CORRECTED PRESSURE (TSF)
1	-10.00	0.000	0.000	0.00	1.841
2	-10.00	0.500	-0.000	-0.05	2.363
3	2.00	1.000	0.000	0.66	2.754
4	38.00	1.500	0.002	2.86	2.944
5	95.00	2.000	0.004	6.26	3.146
6	146.00	2.500	0.005	9.22	3.480
7	168.00	3.000	0.006	10.44	3.923
8	186.00	4.000	0.007	11.38	4.914
9	200.00	5.000	0.007	12.09	5.917
10	211.00	6.000	0.008	12.67	6.929
11	221.00	7.000	0.008	13.18	7.944
12	230.00	8.000	0.008	13.64	8.961
13	242.00	9.000	0.009	14.26	9.970
14	255.00	10.000	0.009	14.94	10.976
15	286.00	12.000	0.010	16.61	12.980
16	330.00	14.000	0.012	18.95	14.950
17	394.00	16.000	0.014	22.29	16.858
18	472.00	18.000	0.017	26.24	18.806

Po =	4.50 TSF	Pl =	23.50 TSF	Pl* =	19.00 TSF
Eo =	268 TSF	Er =		Eo/Pl* =	14.1

PRESSUREMETER DATA REDUCTION
TSC JOB NO. L-70,503
BORING P3B1 DEPTH 57.0 FT.



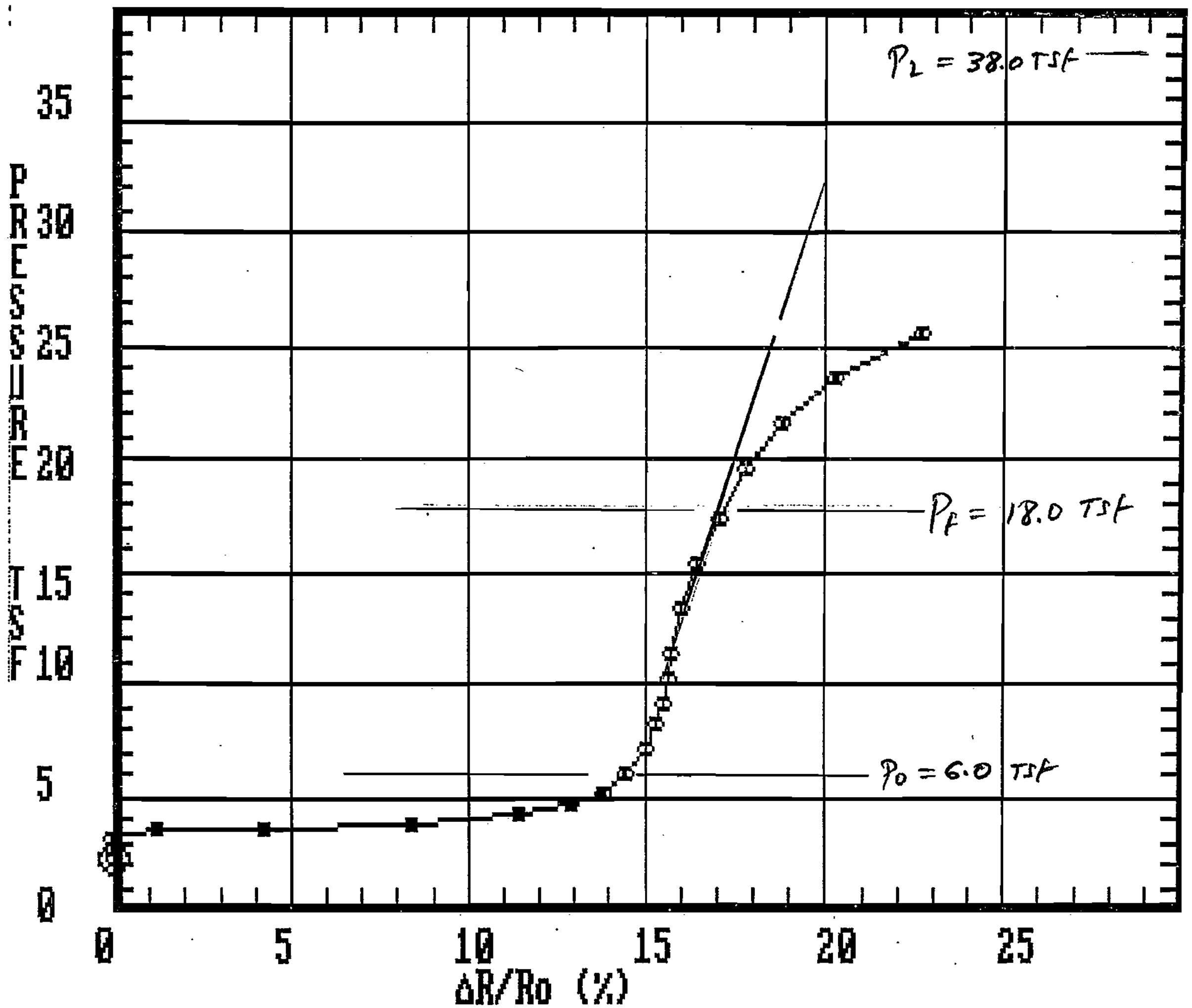
RELATIVE INCREASE IN PROBE RADIUS

L-70,503 / BORING P3 B-1 AT 57 FT

POINT NUMBER	VOLUME MEASUREMENT	PRESSURE MEASUREMENT	CORR. VOL. INCREASE (FT^3)	dR/Ro (%)	CORRECTED PRESSURE (TSF)
1	-38.00	0.000	0.000	0.00	1.997
2	-26.00	1.000	0.000	0.66	2.910
3	-2.00	1.500	0.001	2.11	3.201
4	50.00	2.000	0.003	5.24	3.391
5	90.00	2.500	0.004	7.58	3.739
6	117.00	3.000	0.005	9.11	4.162
7	137.00	3.500	0.006	10.22	4.610
8	152.00	4.000	0.006	11.04	5.088
9	169.00	5.000	0.007	11.92	6.082
10	186.00	6.000	0.008	12.83	7.076
11	204.00	7.000	0.008	13.79	8.067
12	222.00	8.000	0.009	14.75	9.058
13	240.00	9.000	0.009	15.69	10.053
14	261.00	10.000	0.010	16.79	11.040
15	285.00	11.000	0.011	18.08	12.020
16	332.00	13.000	0.013	20.55	13.980
17	390.00	15.000	0.015	23.54	15.902
18	462.00	17.000	0.017	27.15	17.918

Po = 4.50 TSF   Pl = 22.50 TSF   Pl* = 18.00 TSF
Eo = 160 TSF   Er =   Eo/Pl* = 8.9

PRESSUREMETER DATA REDUCTION
TSC JOB NO. L-70,503
BORING P3B1 DEPTH 62.0 FT.



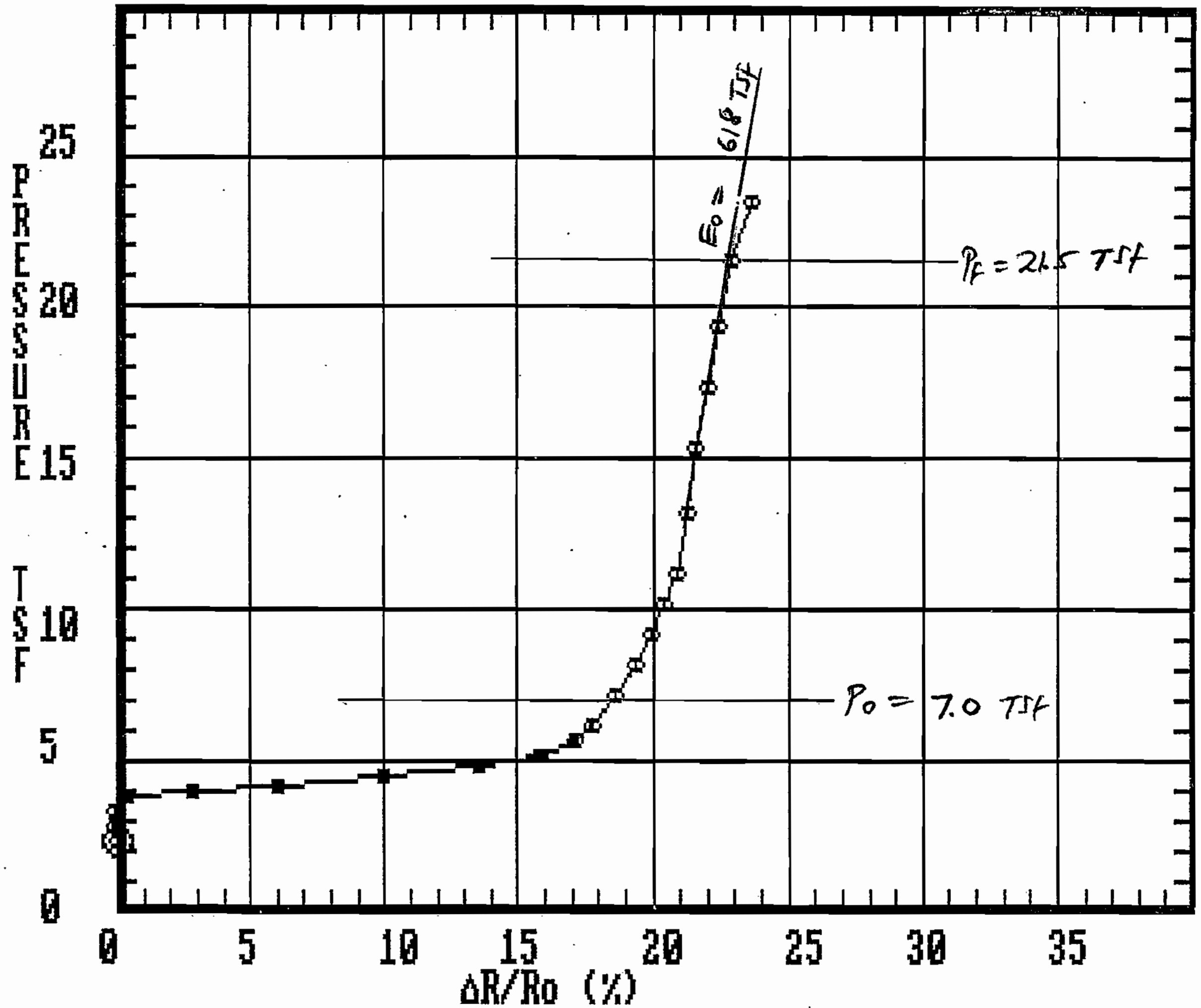
RELATIVE INCREASE IN PROBE RADIUS

L-70,503 / BORING P3 B-1 AT 62 FT

POINT NUMBER	VOLUME MEASUREMENT	PRESSURE MEASUREMENT	CORR. VOL. INCREASE (FT^3)	dR/Ro (%)	CORRECTED PRESSURE (TSF)
1	-17.00	0.000	0.000	0.00	2.153
2	-17.00	0.500	-0.000	-0.05	2.675
3	-17.00	1.000	-0.000	-0.10	3.197
4	4.00	1.500	0.001	1.18	3.490
5	54.00	2.000	0.002	4.22	3.635
6	125.00	2.500	0.005	8.40	3.844
7	178.00	3.000	0.007	11.41	4.185
8	205.00	3.500	0.008	12.89	4.628
9	222.00	4.000	0.008	13.80	5.100
10	236.00	5.000	0.009	14.49	6.103
11	246.00	6.000	0.009	15.00	7.118
12	253.00	7.000	0.009	15.34	8.142
13	257.00	8.000	0.009	15.52	9.176
14	260.00	9.000	0.009	15.64	10.212
15	263.00	10.000	0.009	15.76	11.247
16	268.00	12.000	0.010	16.01	13.322
17	276.00	14.000	0.010	16.42	15.388
18	288.00	16.000	0.010	17.05	17.444
19	302.00	18.000	0.011	17.79	19.495
20	321.00	20.000	0.011	18.78	21.531
21	349.00	22.000	0.012	20.24	23.543
22	396.00	24.000	0.014	22.67	25.497

Po = 6.00 TSF   Pl = 38.00 TSF   Pl* = 32.00 TSF
Eo = 682 TSF   Er =   Eo/Pl* = 21.3

PRESSUREMETER DATA REDUCTION
TSC JOB NO. L-70,503
BORING P3B1 DEPTH 67.0 FT.



RELATIVE INCREASE IN PROBE RADIUS

L-70,503 / BORING P3 B-1 AT 67 FT

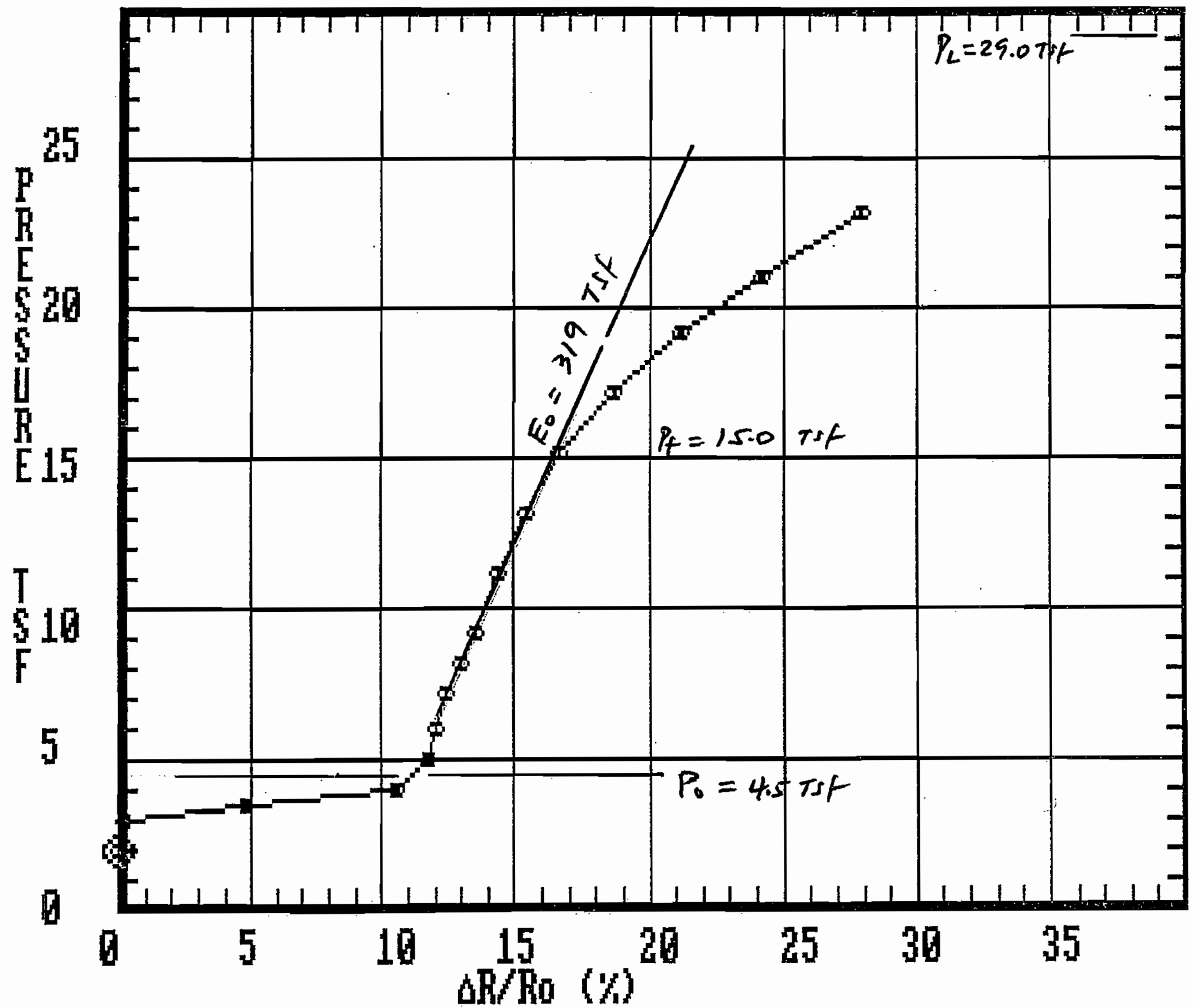
POINT NUMBER	VOLUME MEASUREMENT	PRESSURE MEASUREMENT	CORR. VOL. INCREASE (FT^3)	dR/Ro (%)	CORRECTED PRESSURE (TSF)
1	-18.00	0.000	0.000	0.00	2.309
2	-18.00	0.500	-0.000	-0.05	2.831
3	-18.00	1.000	-0.000	-0.10	3.353
4	-10.00	1.500	0.000	0.36	3.788
5	30.00	2.000	0.002	2.81	3.934
6	83.00	2.500	0.003	5.98	4.157
7	152.00	3.000	0.006	9.98	4.419
8	215.00	3.500	0.008	13.51	4.752
9	258.00	4.000	0.010	15.84	5.150
10	282.00	4.500	0.010	17.10	5.608
11	296.00	5.000	0.011	17.82	6.092
12	312.00	6.000	0.011	18.63	7.093
13	327.00	7.000	0.012	19.39	8.097
14	338.00	8.000	0.012	19.93	9.111
15	348.00	9.000	0.013	20.41	10.127
16	358.00	10.000	0.013	20.90	11.143
17	365.00	12.000	0.013	21.24	13.211
18	372.00	14.000	0.013	21.58	15.278
19	381.00	16.000	0.014	22.03	17.341
20	388.00	18.000	0.014	22.37	19.409
21	398.00	20.000	0.014	22.87	21.468
22	413.00	22.000	0.015	23.62	23.513

Po = 7.00 TSF   Pl =   Pl* =

Eo = 618 TSF   Er =   Eo/Pl* =

PRESSUREMETER DATA REDUCTION

TSC JOB NO. L-70,503
BORING P4B1 DEPTH 59.0 FT.



RELATIVE INCREASE IN PROBE RADIUS

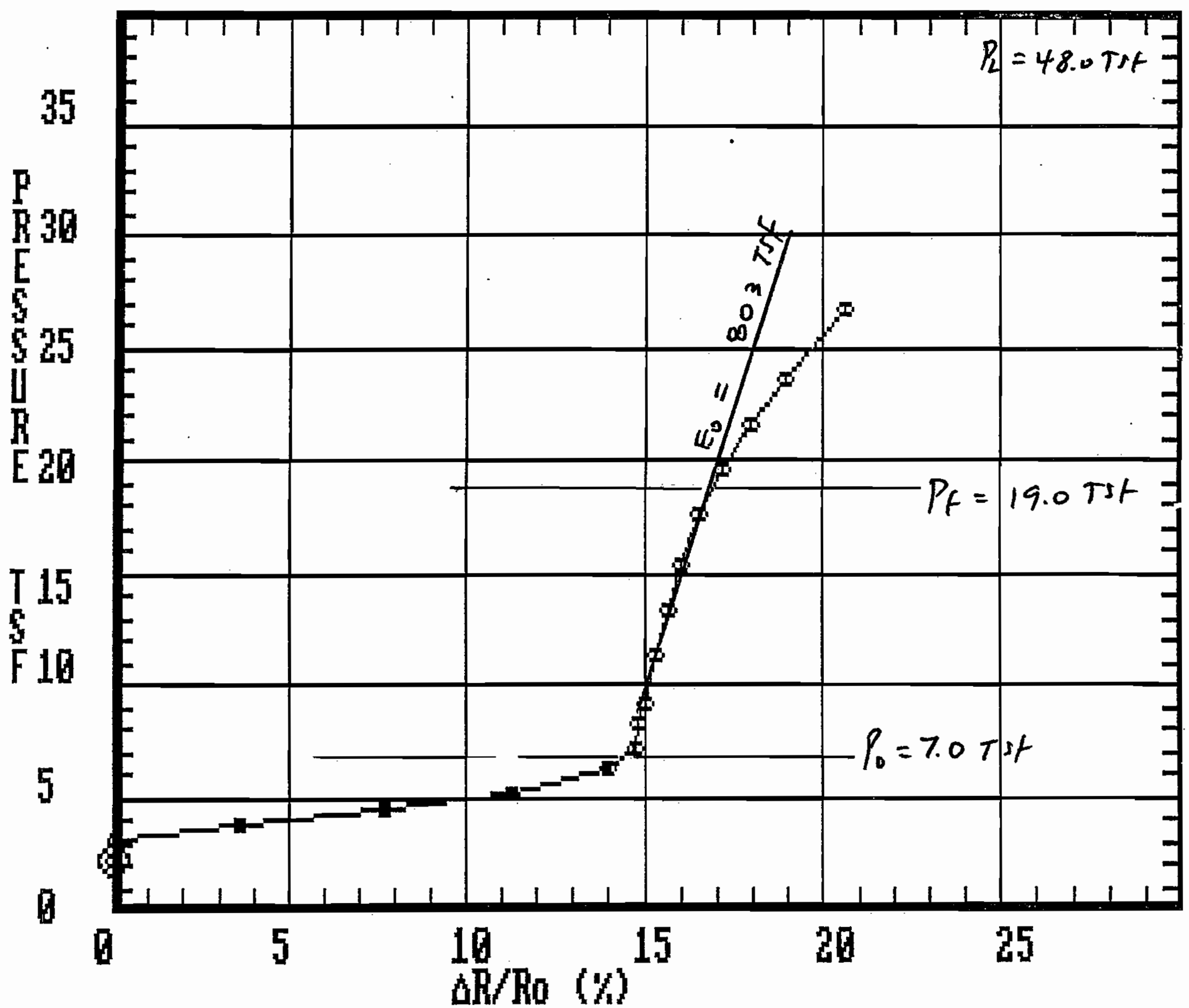
L-70,503 / BORING P4 B-1 AT 59 FT

POINT NUMBER	VOLUME MEASUREMENT	PRESSURE MEASUREMENT	CORR. VOL. INCREASE (FT^3)	dR/Ro (%)	CORRECTED PRESSURE (TSF)
1	0.00	0.000	0.000	0.00	1.987
2	4.00	1.000	0.000	0.16	2.988
3	80.00	2.000	0.003	4.76	3.423
4	179.00	3.000	0.006	10.50	4.067
5	203.00	4.000	0.007	11.78	5.040
6	210.00	5.000	0.007	12.09	6.064
7	217.00	6.000	0.007	12.44	7.087
8	228.00	7.000	0.008	13.01	8.099
9	238.00	8.000	0.008	13.53	9.114
10	255.00	10.000	0.009	14.38	11.152
11	275.00	12.000	0.009	15.46	13.184
12	298.00	14.000	0.010	16.70	15.210
13	335.00	16.000	0.011	18.66	17.198
14	383.00	18.000	0.013	21.18	19.153
15	442.00	20.000	0.015	24.20	21.072
16	518.00	22.000	0.018	28.00	23.128

Po = 4.50 TSF   Pl = 29.00 TSF   Pl* = 24.50 TSF

Eo = 319 TSF   Er =   Eo/Pl* = 13.0

PRESSUREMETER DATA REDUCTION
TSC JOB NO. L-70,503
BORING P4B1 DEPTH 64.0 FT.



RELATIVE INCREASE IN PROBE RADIUS

L-70,503 / BORING P4 B-1 AT 64 FT

POINT NUMBER	VOLUME MEASUREMENT	PRESSURE MEASUREMENT	CORR. VOL. INCREASE (FT^3)	dR/Ro (%)	CORRECTED PRESSURE (TSF)
1	0.00	0.000	0.000	0.00	2.143
2	3.00	1.000	0.000	0.09	3.155
3	61.00	2.000	0.002	3.61	3.678
4	131.00	3.000	0.004	7.71	4.397
5	195.00	4.000	0.007	11.33	5.220
6	244.00	5.000	0.008	13.99	6.120
7	258.00	6.000	0.009	14.73	7.123
8	261.00	7.000	0.009	14.85	8.158
9	265.00	8.000	0.009	15.02	9.190
10	272.00	10.000	0.009	15.32	11.260
11	279.00	12.000	0.009	15.68	13.329
12	286.00	14.000	0.010	16.04	15.398
13	295.00	16.000	0.010	16.51	17.462
14	307.00	18.000	0.010	17.14	19.517
15	322.00	20.000	0.011	17.93	21.565
16	341.00	22.000	0.012	18.92	23.602
17	374.00	25.000	0.013	20.63	26.643

Po = 7.00 TSF Pl = 48.00 TSF Pl* = 41.00 TSF

Eo = 803 TSF Er = Eo/Pl* = 19.6