# Abbreviated Structure Geotechnical Report

F.A.U. Route 5147 (Mulford Road)
Section (201-3)K & (4-1, 5)R
Winnebago County
Job No. P-92-111-06
Contract No. 64C24
PTB No. 141-004
Mulford Road over I-39 & U.S. 20
Structure No. 101-0207
Existing Structure No. 101-0131

Submitted February 2016;
Revised August 2016; October 2016


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

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

**Prepared By:**
Hanson Professional Services Inc.
13801 Riverport Drive, Suite 300
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Exp 11/30/2017

10/21/2016

Illinois Department of Transportation

# Abbreviated Structure Geotechnical Report

**Original Report Date:** 02/12/16 **Proposed SN:** 101-0207 **Route:** F.A.U. 5147 (Mulford Rd)
**Revised Date:** 8/23/2016; 10/21/2016 **Existing SN:** 101-0131 **Section:** (201-3)K & (4-1,5)R
**Geotechnical Engineer:** Kipkoech Chepkoit **County:** Winnebago
**Structural Engineer:** Hanson Professional Services Inc. **Contract:** 64C24

**Indicate the proposed structure type, substructure types, and foundation locations (attach plan and elevation drawing):**

The new structure will be a two span plate girder bridge. The substructures will consist of pile-supported integral abutments and a multi-column pier with pile-supported footing. According to information provided by the structural designer, the estimated vertical factored substructure loads are 2,000 kips at south abutment, 6,000 kips at the pier and 2,600 kips at north abutment. The TSL general plan and elevation drawing is attached.

**Discuss the existing boring data, existing plans foundation information, new subsurface exploration and need for any additional exploration to be provided with SGR Technical Memo (attach all data and subsurface profile plot):**

Underground coal mine information available from ISGS indicates that the project area has not been undermined. Five boring logs were provided to Hanson Professional Services Inc. (Hanson) by IDOT for borings B-1g through B-4g. Borings B-1g through B-3g were drilled in July 2008. Borings B-4g SPT and B-4g Shelby tube (ST) were drilled in February and May 2016. Locations of the borings are as shown on the attached Boring Location Plan. The stations and offsets shown on the boring logs are relative to old and/or other alignments. Boring locations along the current alignment are shown on the attached Subsurface Data Profile and the following table.

| Boring | Old/Other Alignment | | Current Alignment | |
|---|---|---|---|---|
| | Station | Offset | Station | Offset |
| B-1g | 51+57 | 14’ LT | 51+59 | 65’ LT |
| B-2g | 50+10 | 34’ LT | 50+12 | 84’ LT |
| B-3g | 48+70 | 15’ RT | 48+73 | 34’ LT |
| B-4g | 2606+77 | 117’ RT | 48+86 | 60’ RT |
| B-4g Shelby | 2606+50 | 75’ RT | 48+27 | 32’ RT |

In general, the subsurface condition can be stratified into three layers. The top layer consisting of sandy loam, silty loam, silty clay loam, and clay loam, with occasional sand. The bottom of top layer is approximately El. 793, El. 791 and El. 797 at boring B-1g, B-2g and B-3g, respectively. Middle layer consist of sandy loam till with gravel with bottom at approximately El. 781, El. 781 and El. 775 at boring B-1g, B-2g and B-3g, respectively. All borings were terminated at third lower layer which consisted of very dense sand. The borings were terminated at El. 776.7, El. 774.7 and El. 762.7 at boring B-1g, B-2g and B-3g, respectively.

The subsurface conditions encountered at B-4g SPT boring match descriptions given above. The borings were terminated at El. 728 and El. 786.6 at SPT and ST borings, respectively.

Laboratory tests were performed on selected samples from Shelby tube boring B-4g (ST) and summary results are attached.

**Provide the location and maximum height of any new soil fill or magnitude of footing bearing pressure. Estimate the amount and time of the expected settlement. Indicate if further testing, analysis, and/or ground improvement/treatment is necessary:**

The height of the new embankment fill at the centerline of the south abutment will be approximately 14.5 feet with maximum of 21.0 feet at the side slope. The magnitude of immediate and long term settlement at the south abutment are estimated to be 0.5 and 3.5 inches, respectively. Immediate settlement is expected to be complete by end of embankment construction. Long term settlement is estimated to take 6 months to achieve 90% consolidation.

The height of the new embankment fill at the centerline of the north abutment will be approximately 11 feet with maximum of 16.0 feet at the side slope. The magnitude of long term settlement at the north abutment is estimated to be 1.5 inches. Long term settlement is estimated to take 6 months to achieve 90% consolidation.

The estimated magnitudes of long term settlement of 3.5 and 1.5 inches at south and north abutment, respectively are considered acceptable for approach abutments but is expected to cause down drag on the piles. Loss of pile capacities due to down drag has been considered in the pile capacities provided.

The centerline of the new bridge will be offset approximately 50 feet west of the existing bridge. Settlement estimated to occur at the existing structure due to additional stresses from new embankment is expected to be less than 0.4 inch. Down drag on existing piles is not expected.

**Identify any new cuts or fill slope angles and heights. Estimate the factor of safety against slope failure. Indicate if further testing, analysis or ground improvement/treatment is necessary:**

The height of the new embankment fill at the south abutment end slope will vary from approximately 6.0 to 20.5 feet with height of 14.5 feet at the centerline. The end slopes will be inclined at an angle of approximately 1 Vertical to 2 Horizontal. The global factor of safety against slope failure of the south abutment end slope is approximately 1.7 using soil parameters from Shelby tube soil boring. The side slopes at the south abutment will be inclined at approximately 1 Vertical to 4 Horizontal.

The height of the new embankment fill at the north abutment end slope will vary from approximately 2.5 to 16.0 feet with height of 11.0 feet at the centerline. The end slopes will be inclined at an angle of approximately 1 Vertical to 2 Horizontal. The global factor of safety against slope failure of the end slope is approximately 1.8 using soil parameters from SPT soil boring. The side slopes at the south abutment will be inclined at approximately 1 Vertical to 4 Horizontal.

To check the worst-case global stability conditions of the side slopes at the abutments, a cross-section was drawn through the side slope at the south abutment. The global factor of safety against slope failure is approximately 2.4 using soil parameters from Shelby tube soil boring.

The global stability factors of safety meet IDOT and AASHTO requirements. Further testing, analysis, and/or ground improvement/treatment is not necessary. Plots of the global stability analysis results are attached.

**Indicate at each substructure, the 100-year and 200-year total scour depths in the Hydraulics report, the non-granular scour depth reduction, the proposed ground surface, and the recommended foundation design scour elevations:**

N/A

**Determine the seismic soil site class, the seismic performance zone, the 0.2 and 1.0 second design spectral accelerations and indicate if that the soils are liquefiable:**

The seismic Site Class is D, the SPZ is 1, $S_{DS}$ = 0.135g, and $S_{D1}$ = 0.080g. The soils are not considered to be liquefiable for the design earthquake.

**Confirm feasibility of the proposed foundation or wall type and provide design parameters. Attach a pile design table indicating feasible pile types, various nominal required bearings, factored resistances available and corresponding estimated lengths at locations where piles will be used. Provide factored bearing resistance and unit sliding resistance at various elevations and confirm no ground improvement/treatment is necessary where spread footings are proposed. Estimated top of rock elevations as well as preliminary factored unit side and tip resistance values shall be indicated when drilled shafts are proposed:**

A Pile Design Table including data for several pile types at each substructure is attached. In addition, draft Integral Abutment Pile Selection Chart which is part of new policy is attached as requested by IDOT BBS.

Metal shell piles that extend to hard till or very dense sand are preferred for the subsurface conditions encountered at the substructure locations. Steel H-piles are feasible, but would be significantly longer than similar capacity metal shell piles. H-piles driven to maximum nominal required bearing (MNRB) would be beyond the depth of the borings with the exception of the south abutment. Therefore, only the nominal required bearing within the limits of the borings are provided in the Pile Design Table for north abutment and pier.

As discussed in settlement section of this report, downdrag load and geotechnical loss are anticipated at the abutments. The structural engineer should evaluate the capacity of the piles to carry the bridge loads, downdrag load and geotechnical loss generated by the downdrag. If the capacity of the piles cannot accommodate above mentioned loads, we recommend pre-coring as described in the following paragraph.

In order to minimize downdrag forces on piles and factored geotechnical losses in pile capacities, it is recommended to perform 18-inch-diameter pre-coring through the embankment to Elevation 791.5 at the south abutment and Elevation 798 at the north abutment. After pre-coring, the piles should be placed in the hole and driven to achieve bearing. Pile lengths and capacities both with and without pre-coring are provided in the Pile Design Table.

Shoes are not required for H-piles, but are recommended for metal shell piles to protect against damage during driving. In addition using piles with thicker steel sections such as 14-inch metal shell pipes with 0.312 inch thick wall verses 0.25 inch thick wall, will improve driveability because it can endure high driving stresses.

One test pile should be specified at each abutment and at the center pier to determine the pile lengths for production piles.

If the lateral loads on the piles supporting the pier are larger than can be resisted with battered piles, the structure designer should evaluate lateral resistance considering both soil and structure properties. Soil parameters for generating P-y curves with the LPILE computer program are provided in the attached table.

**Calculate the estimated water surface elevation and determine the need for cofferdams (type 1 or 2), and seal coat:**

N/A

**Assess the need for sheeting or soil retention or temporary construction slope and provide recommendation for other construction concerns:**

The proposed structures will be staged to maintain traffic on I-39 during construction. A near-vertical cut with approximately 10 feet retained height will be required to construct the abutments near active traffic lanes. Temporary sheet piling, designed in accordance with IDOT Design Guide 3.13.1 – Temporary Sheet Piling Design, is feasible within the embankments at the abutments.

Temporary construction slopes should be excavated in accordance with current OSHA regulations.

**Structure No. 101-0207**
**Pile Design Parameters**

| Location | Cutoff Elevation (ft) | Pile Type | Without Precoring: Factored Resistance Available, $R_F$ (kips) | Without Precoring: Geotechnical Losses, $R_{Sdd}$ (kips) | Without Precoring: Nominal Required Bearing, $R_N$ (kips) | Without Precoring: Estimated Pile Length (ft) | With Precoring: Factored Resistance Available, $R_F$ (kips) | With Precoring: Geotechnical Losses, $R_{Sdd}$ (kips) | With Precoring: Nominal Required Bearing, $R_N$ (kips) | With Precoring: Estimated Pile Length (ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| South Abutment B-3g & B-4g | 819.0 | 12"Φ w/.25" walls | 64 | 130 | 353 | 45 | 194 | 0 | 353 | 53 |
| | | 14"Φ w/.25" walls | 75 | 152 | 413 | 43 | 227 | 0 | 413 | 50 |
| | | 14"Φ w/.312" walls | 130 | 152 | 513 | 50 | 282 | 0 | 513 | 54 |
| | | HP 10x42 | 100 | 84 | 335 | 67 | 95 | 0 | 172 | 63 |
| | | | | | | | 184 | 0 | 335 | 69 |
| | | HP 12x53 | 128 | 102 | 418 | 68 | 114 | 0 | 207 | 63 |
| | | | | | | | 230 | 0 | 418 | 70 |
| | | HP 12x63 | 171 | 102 | 497 | 69 | 117 | 0 | 212 | 63 |
| | | | | | | | 273 | 0 | 497 | 72 |
| | | HP 14x73 | 198 | 120 | 578 | 69 | 138 | 0 | 251 | 63 |
| | | | | | | | 318 | 0 | 578 | 72 |
| | | HP 14x89 | 266 | 122 | 705 | 72 | 142 | 0 | 258 | 63 |
| | | | | | | | 388 | 0 | 705 | 74 |
| Pier 1 B-2g | 800.0 | 12"Φ w/.25" walls | 194 | 0 | 353 | 11 | | | | |
| | | 14"Φ w/.25" walls | 227 | 0 | 413 | 10 | | | | |
| | | 14"Φ w/.312" walls | 282 | 0 | 513 | 12 | | | | |
| | | HP 10x42[1] | 30 | 0 | 55 | 13 | | | | |
| | | | 67 | 0 | 122 | 24 | | | | |
| | | HP 12x53[1] | 36 | 0 | 66 | 13 | | | | |
| | | | 80 | 0 | 146 | 24 | | | | |
| | | HP 12x63[1] | 38 | 0 | 70 | 13 | | | | |
| | | | 84 | 0 | 152 | 24 | | | | |
| | | HP 14x73[1] | 45 | 0 | 82 | 13 | | | | |
| | | | 99 | 0 | 180 | 24 | | | | |
| | | HP 14x89[1] | 48 | 0 | 88 | 13 | | | | |
| | | | 103 | 0 | 187 | 24 | | | | |
| | | HP 14x102[1] | 51 | 0 | 92 | 13 | | | | |
| | | | 106 | 0 | 193 | 24 | | | | |

**Structure No. 101-0207**
**Pile Design Parameters**

| Location | Cutoff Elevation (ft) | Pile Type | Without Precoring: Factored Resistance Available, $R_F$ (kips) | Without Precoring: Geotechnical Losses, $R_{Sdd}$ (kips) | Without Precoring: Nominal Required Bearing, $R_N$ (kips) | Without Precoring: Estimated Pile Length (ft) | With Precoring: Factored Resistance Available, $R_F$ (kips) | With Precoring: Geotechnical Losses, $R_{Sdd}$ (kips) | With Precoring: Nominal Required Bearing, $R_N$ (kips) | With Precoring: Estimated Pile Length (ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| North Abutment B-1g | 819.0 | 12"Φ w/.25" walls | 0 | 216 | 353 | 30 | 194 | 0 | 353 | 32 |
| | | 14"Φ w/.25" walls | 0 | 252 | 413 | 30 | 227 | 0 | 413 | 31 |
| | | 14"Φ w/.312" walls | 30 | 252 | 513 | 32 | 282 | 0 | 513 | 32 |
| | | HP 10x42[1] | 27 | 138 | 300 | 40 | 34 | 0 | 61 | 33 |
| | | | | | | | 97 | 0 | 177 | 40 |
| | | HP 12x53[1] | 32 | 166 | 359 | 40 | 41 | 0 | 74 | 33 |
| | | | | | | | 117 | 0 | 212 | 40 |
| | | HP 12x63[1] | 35 | 168 | 369 | 40 | 43 | 0 | 78 | 33 |
| | | | | | | | 121 | 0 | 220 | 40 |
| | | HP 14x73[1] | 44 | 196 | 437 | 40 | 51 | 0 | 92 | 33 |
| | | | | | | | 143 | 0 | 260 | 40 |
| | | HP 14x89[1] | 48 | 199 | 448 | 40 | 55 | 0 | 99 | 33 |
| | | | | | | | 149 | 0 | 270 | 40 |

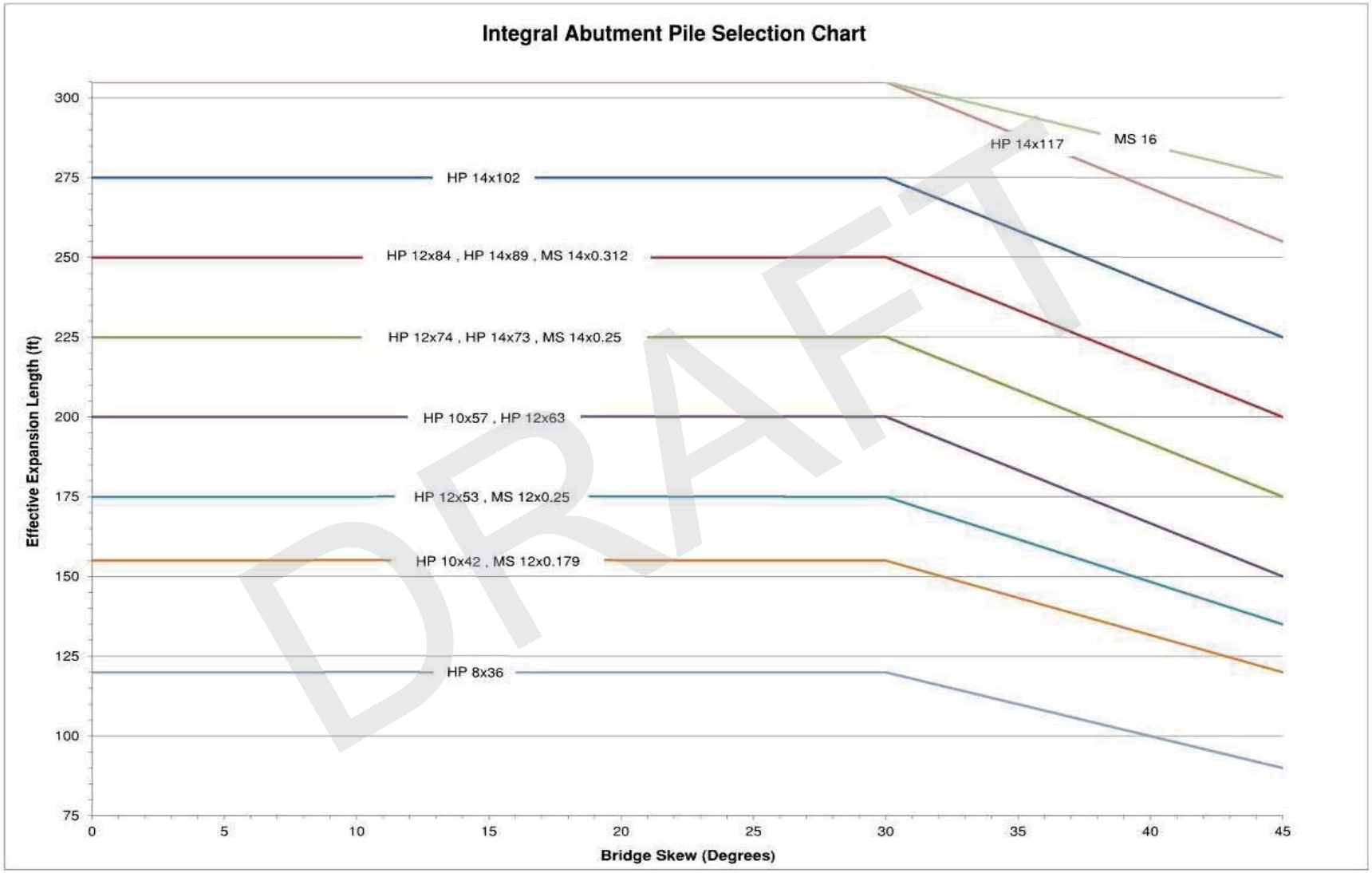
Note: Where a range of values is shown, pile lengths and capacities may be interpolated between the values given.

[1] Maximum Nominal Required Bearing (MNRB) was not achieved within the depth of the soil boring. MNRB will occur at a depth beyond available subsurface data. Precore to El. 791.5 at South Abutment and El. 798 at North Abutment

**Structure No. 101-0207**
**Pile Design Parameters**

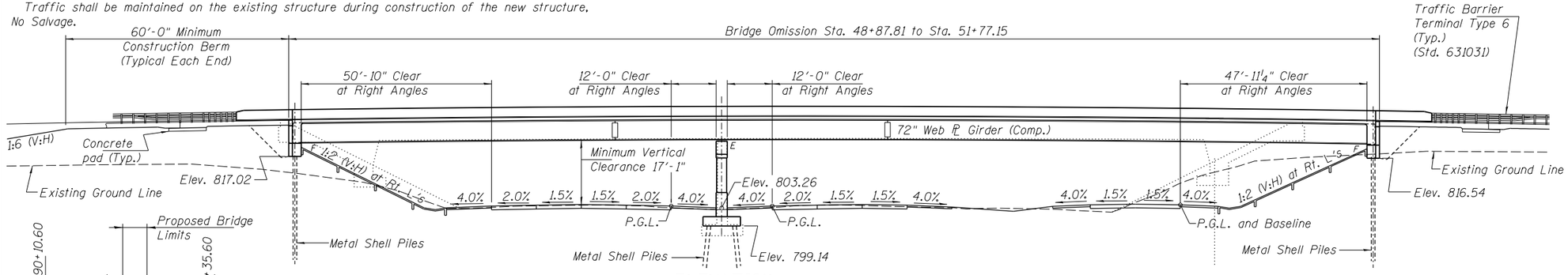
**Pier 1 (Boring B-2g)**

| Elevation | LPILE Soil Type | γ' (pcf) | c (psf) | φ | k (pci) | $\epsilon_{50}$ |
|---|---|---|---|---|---|---|
| 803.7 - 796.0 | Stiff Clay w/o Free Water | 118 | 800 | | 100 | 0.010 |
| 796.0 - 791.0 | Sand (Reese) | 121 | | 27 | 20 | |
| 791.0 - 779.0 | Sand (Reese) | 68 | | 36 | 125 | |
| 779.0 - 776.5 | Sand (Reese) | 68 | | 34 | 125 | |
| 776.5 - 774.5 | Sand (Reese) | 68 | | 36 | 125 | |

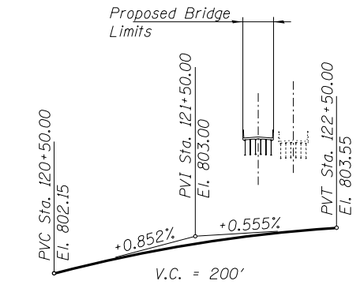

Integral Abutment Pile Selection Chart
Effective Expansion Length (ft)
300
275
250
225
200
175
150
125
100
75
0
5
10
15
20
25
30
35
40
45
Bridge Skew (Degrees)
HP 14x102
HP 12x84 , HP 14x89 , MS 14x0.312
HP 12x74 , HP 14x73 , MS 14x0.25
HP 10x57 , HP 12x63
HP 12x53 , MS 12x0.25
HP 10x42 , MS 12x0.179
HP 8x36
HP 14x117
MS 16
DRAFT

BM: # 316 2" Aluminum Disk on Approx. C/L of U.S. 20 - on pier base under Mulford Rd. - Elevation 805.75

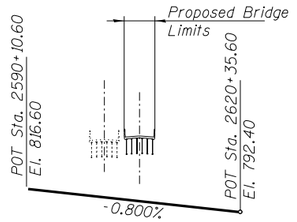
Existing Structure (No. 101-0131)
Originally constructed in 1963 under FA 194, Section 4-HB-2, the structure was a 4 span, concrete deck on steel beam superstructure with concrete piers and pile bent abutments.
The structure was reconstructed in 1976 under FA 194, Section 201-3HB-3 as a 2 span concrete deck on continuous steel girder superstructure with concrete piers and closed sand filled pile bent abutments. The structure has a Bk. to Bk. = 274'-0" with an out-out of deck of 42'-0". The structure was repainted in 1999.
Traffic shall be maintained on the existing structure during construction of the new structure.
No Salvage.



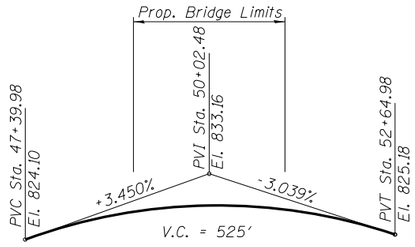

## ELEVATION



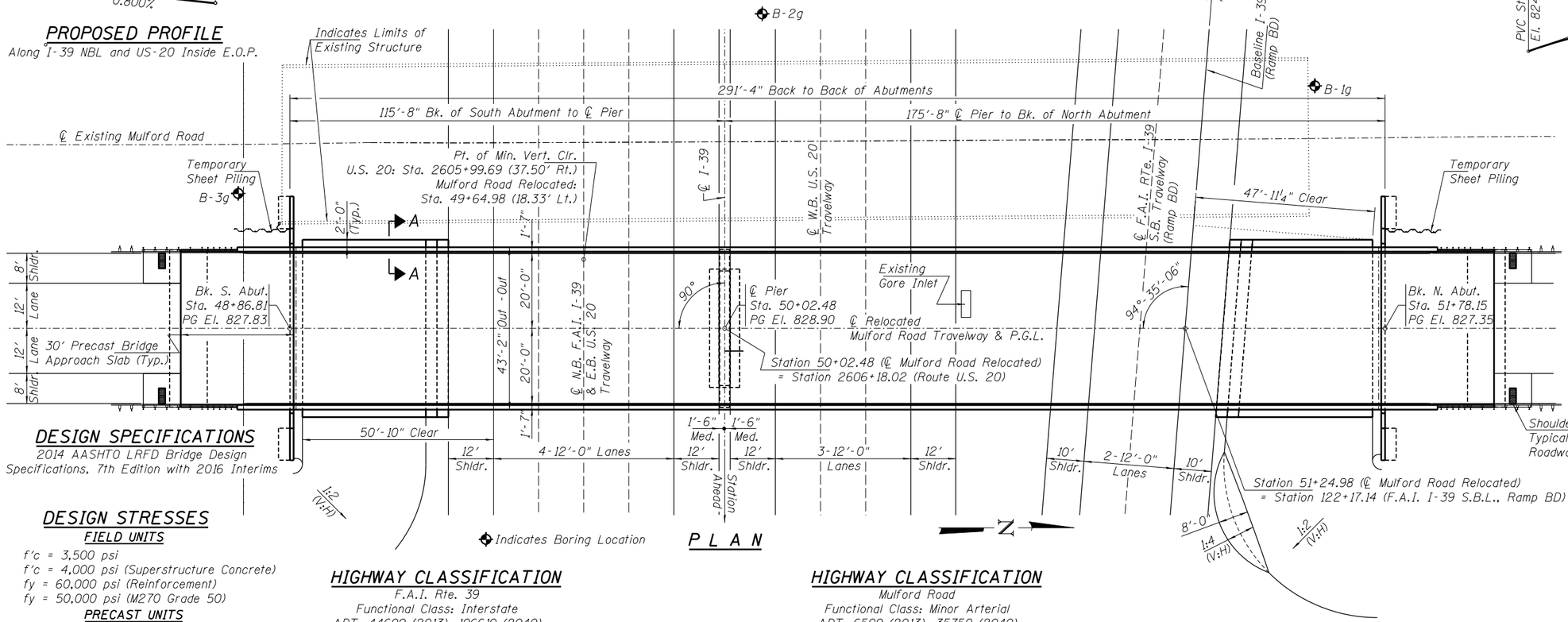

## PROPOSED PROFILE
Along I-39 S.B.L. (Ramp BD) Outside E.O.P.



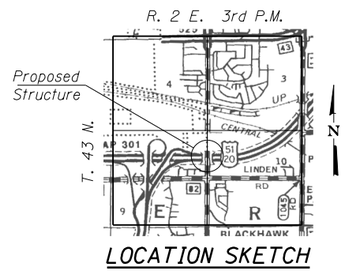

## PROPOSED PROFILE
Along I-39 NBL and US-20 Inside E.O.P.




## PROPOSED PROFILE
Along ℄ Mulford Road Relocated




## PLAN




## LOCATION SKETCH

## DESIGN SPECIFICATIONS
2014 AASHTO LRFD Bridge Design Specifications, 7th Edition with 2016 Interims

## DESIGN STRESSES
### FIELD UNITS
f'c = 3,500 psi
f'c = 4,000 psi (Superstructure Concrete)
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50)
### PRECAST UNITS
f'c = 6,000 psi (Precast Bridge Approach Slab)

## LOADING HL-93
Allow 50#/sq. ft. for future wearing surface.

## HIGHWAY CLASSIFICATION
F.A.I. Rte. 39
Functional Class: Interstate
ADT: 44600 (2013); 106610 (2040)
ADTT: 12950 (2013); 32000 (2040)
DHV: 10600 (2040)
Design Speed: 70 m.p.h.
Posted Speed: 65 m.p.h.
2 -Way Traffic
Directional Distribution: 50/50

## HIGHWAY CLASSIFICATION
Mulford Road
Functional Class: Minor Arterial
ADT: 6500 (2013); 35750 (2040)
ADTT: 520 (2013); 2860 (2040)
DHV: 3575 (2040)
Design Speed: 45 m.p.h.
Posted Speed: 45 m.p.h.
2 -Way Traffic
Directional Distribution: 50/50

## SEISMIC DATA
Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. ($S_{D1}$) = 0.080
Design Spectral Acceleration at 0.2 sec. ($S_{DS}$) = 0.135
Soil Site Class = D

# GENERAL PLAN
# MULFORD ROAD over
# I-39 & U.S.20
# F.A.U. 5147 - SECTION (201-3)K & (4-1,5)R
# WINNEBAGO COUNTY
# STA. 50+02.48
# STRUCTURE NUMBER -101-0207

| | | |
|---|---|---|
| DESIGNED | MNM | 02/14/08 |
| DRAWN | RAH | 02/14/08 |
| REVIEWED | MNM | 12/05/15 |

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HANSON
PROFESSIONAL DESIGN FIRM LICENSE #184-001084

| | | | |
|---|---|---|---|
| USER NAME = madau.00223 | DESIGNED - MNM | REVISED | |
| | CHECKED - TEH | REVISED | |
| PLOT SCALE = 0.166667 ' / in. | DRAWN - RAH/RSJ | REVISED | |
| PLOT DATE = 9/6/2016 | CHECKED - MNM | REVISED | |

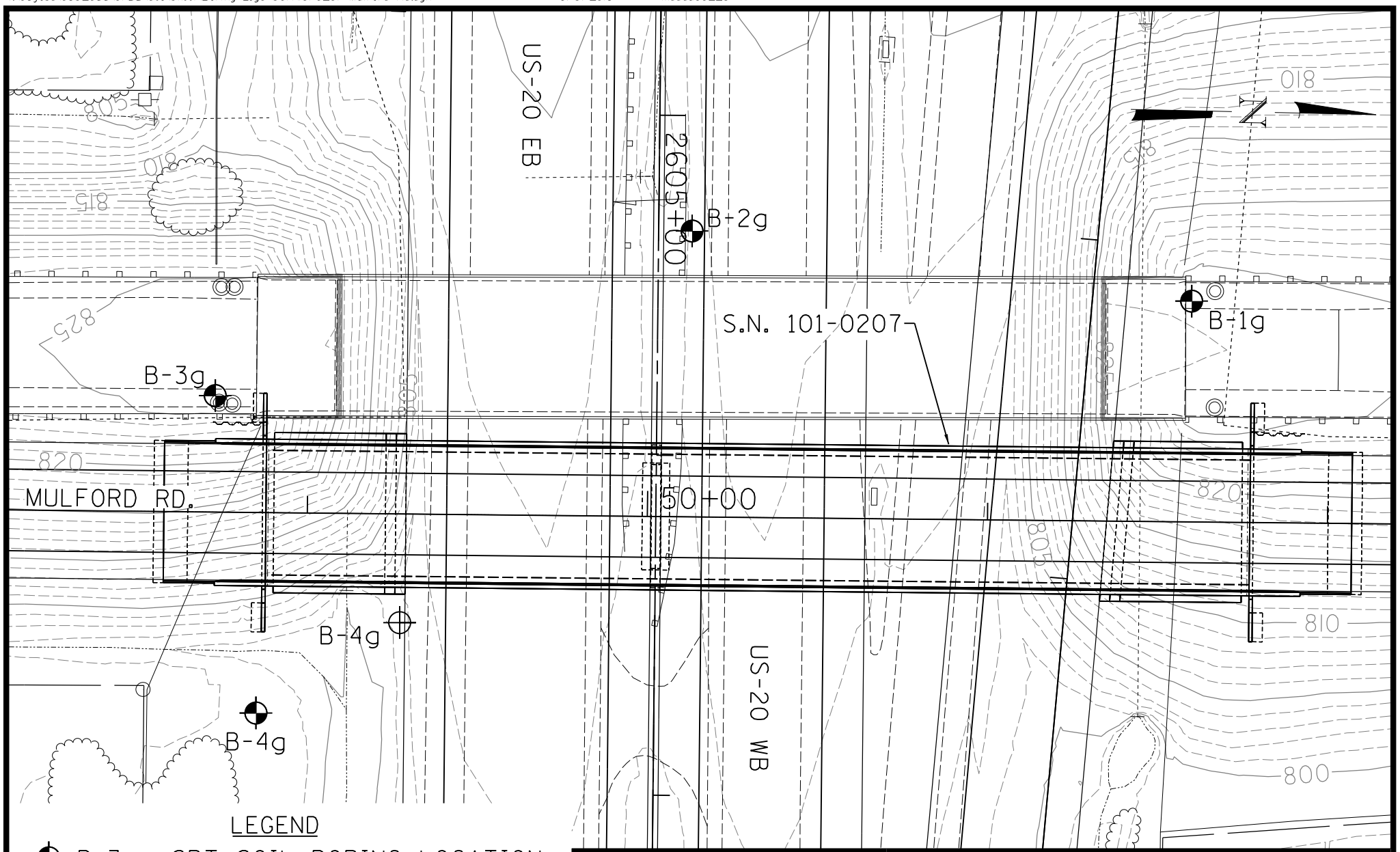
**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**STRUCTURE NUMBER 101-0207**

SHEET NO. 1 OF 2 SHEETS

| F.A.U. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| 5147 | (201-3)K & (4-1, 5)R | WINNEBAGO | 2 | 1 |
| | | CONTRACT NO. | | |
| | ILLINOIS FED. AID PROJECT | | | |

I:\06jobs\06S2055\CADD\Geo\Sheet\Boring Logs SGR\01-0207 Mulford Rd.dgn 8/3/2016 madau00223




LEGEND

B-3g SPT SOIL BORING LOCATION

B-4g ST SOIL BORING LOCATION

0 40 80 120

SCALE IN FEET

HANSON



# BORING LOCATION PLAN

MULFORD RD. OVER US-20 BYPASS
S.N. 101-0207
WINNEBAGO COUNTY, ILLINOIS

06S2055 08/03/16

B-4g
Sta. 48+86, 60' RT
02/17/2016

| | N | Qu | w% | |
|---|---|---|---|---|
| 802.0 | | 0.7P | 23.0 | MEDIUM brown SILTY CLAY LOAM |
| | 6 | 1.5B | 28.0 | STIFF tan SILTY CLAY LOAM |
| | 5 | 0.4P | 25.0 | SOFT tan LOAM with SAND, medium GRAVEL lens |
| 796.0 | | | | |
| | 4 | | | LOOSE tan dirty SANDY GRAVEL |
| 793.5 ▽ | | | | |
| 793.0 DD | 7 | 0.5B | 11.0 | MEDIUM tan SANDY LOAM TILL |
| | 10 | 2.0P | 10.0 | STIFF tan SANDY LOAM TILL |
| | 39 | | | DENSE. No recovery, assume as above. |
| | 34 | | | DENSE. No recovery, assume as above. |
| | 34 | 2.8P | | DENSE. VERY STIFF tan SANDY LOAM TILL |
| 781.0 | | | | |
| | 47 | | | DENSE tan fine SAND |
| | 84 | | | VERY DENSE tan fine SAND |
| | 30 | | | MEDIUM/DENSE tan very fine SAND |
| | 35 | | | DENSE tan fine SAND with CLAY lens |
| 771.0 | | | | |
| 0h ▽ | 35 | 3.7S | 9.0 | VERY STIFF gray SANDY LOAM TILL with SAND lens |
| 768.0 | 40 | 6.0S | 12.0 | HARD gray LOAM TILL |
| | 37 | 5.9S | 12.0 | HARD gray LOAM TILL with ORGANICS |
| | 68 | 4.8S | 10 | HARD gray LOAM TILL |
| | 86 | | | VERY DENSE gray SANDY LOAM TILL |
| | 100/8" | | | VERY DENSE light gray SANDY LOAM TILL |
| 756.0 | | | | |
| | 61 | | | VERY DENSE light gray weathered LIMESTONE |
| | 94 | | | VERY DENSE light gray weathered LIMESTONE |
| 748.0 | | | | |
| 743.0 | | | | |
| 738.0 | | | | |
| 733.0 | | | | No Refusal to 74.0' |
| 728.0 | | | | |

Bottom of Hole = 74.0 feet

B-4g Shelby
Sta. 49+27, 32' RT
05/19/2016

| | N | Qu | w% | |
|---|---|---|---|---|
| 801.6 | | | | SILTY CLAY LOAM |
| | | 3.54 | 21 | SILTY CLAY |
| | | | 8 | GRAVELLY SAND |
| | | | 20 [C] | SILTY CLAY (LL=49 PI=30) |
| | | 1.18 | 25 [C] | SILTY CLAY (LL=40 PI=21) |
| | | | 11 | |
| | | 0.61 | 31 | SILTY CLAY |
| | | | | SILTY CLAY LOAM |
| | | 0.25 | 20 | SANDY LOAM |
| | | | | SANDY LOAM |
| | | 0.15 | 15 | SANDY LOAM |
| | | | | Lifted Truck @ 14', Pushed 20". |
| 786.6 | | | | |

Bottom of Hole = 15.0 feet

LEGEND

| | |
|---|---|
| N | Standard Penetration Test N (blows/ft) |
| Qu | Unconfined Strength (tsf) |
| w% | Natural Moisture Content (%) |
| [C] | Consolidation Test |
| DD ▽ 507.20 | Water Surface Elevation Encountered in Boring<br>DD = during drilling<br>0h = at completion<br>24h = 24 hours after completion |
| | Approximate Finish Grade |
| | Bottom of Footing |

FILE NAME =
HANSON


| | | |
|---|---|---|
| USER NAME = | DESIGNED - RGC | REVISED |
| | CHECKED - JLD | REVISED |
| PLOT SCALE = | DRAWN - EJM | REVISED |
| PLOT DATE = 08/11/16 | CHECKED - KKC | REVISED |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**SUBSURFACE DATA PROFILE**
**STRUCTURE NO. 101-0207**
SHEET NO. 1 OF 2 SHEETS

| F.A.U. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| 5147 | (201-3)K & (4-1,5)R | WINNEBAGO | | |
| | | CONTRACT NO. | | |
| | ILLINOIS FED. AID PROJECT | | | |

## B-3g
Sta. 48+73, 34' LT
07/28/2008

| | N | Qu | w% | |
|---|---|---|---|---|
| 824.2 | | | | Shoulder |
| | 20 | 4.0P | 11.0 | HARD brown SANDY LOAM |
| | 11 | 0.8P | 10.0 | MEDIUM tan SANDY LOAM |
| | 21 | 1.0P | 13.0 | STIFF tan SANDY LOAM with GRAVEL |
| | 12 | 2.5B | 23.0 | VERY STIFF brown SILTY CLAY LOAM |
| | 18 | 2.9B | 21.0 | VERY STIFF brown SILTY CLAY LOAM |
| | 19 | 3.5B | 18.0 | VERY STIFF gray SILTY CLAY |
| Oh 805.2 | 16 | 2.5P | 22.0 | VERY STIFF gray SILTY CLAY LOAM |
| DD 801.7 | 8 | 1.5B | 25.0 | STIFF gray SILTY CLAY LOAM |
| 799.7 | 4 | 0.3B | 29.0 | SOFT gray SILTY CLAY LOAM |
| 797.2 | 5 | | | LOOSE tan dirty moist SAND |
| | 7 | 0.6P | 10.0 | MEDIUM tan SANDY LOAM TILL |
| | 14 | 0.8P | 9.0 | MEDIUM tan SANDY LOAM TILL with SAND lens |
| | 37 | | 9.0 | DENSE tan SANDY LOAM TILL with GRAVEL |
| | 59 | | | VERY DENSE tan SANDY LOAM TILL with GRAVEL |
| | 100/2" | | | VERY DENSE tan GRAVEL<br>Hard Drilling |
| | 30 | | | DENSE tan SANDY LOAM TILL |
| | 26 | 1.6B | 8.0 | STIFF gray SANDY LOAM TILL |
| | 21 | 2.5S | 8.0 | VERY STIFF gray SANDY LOAM TILL with GRAVEL |
| 774.7 | 19 | 1.5B | 10.0 | STIFF gray SANDY LOAM TILL |
| | 29 | | | MEDIUM gray fine SAND with medium GRAVEL |
| | 36 | | | DENSE gray fine SAND |
| | 100/7" | | | VERY DENSE tan SAND with GRAVEL |
| | 100/9" | | | VERY DENSE tan SANDY LOAM TILL with SANDY GRAVEL lens |
| | 100/11" | | | VERY DENSE tan fine SAND |
| 762.7 | | | | Bottom of Hole = 61.5 feet |

## B-2g
Sta. 50+12, 84' LT
07/27/2008

| | N | Qu | w% | |
|---|---|---|---|---|
| 803.7 | | 0.5P | 18.0 | MEDIUM brown SILTY CLAY LOAM |
| | 11 | 1.5B | 26.0 | STIFF tan SILTY CLAY LOAM |
| | 8 | 0.8P | 17.0 | MEDIUM brown SANDY LOAM |
| DD 793.7 | 11 | | 14.0 | MEDIUM tan dirty SAND |
| | 7 | | 11.0 | LOOSE tan dirty SAND |
| Oh 790.7 | 56 | | 9.0 | VERY DENSE tan SANDY LOAM TILL with GRAVEL |
| | 58 | | | VERY DENSE tan SANDY LOAM TILL with GRAVEL |
| | 60 | | | VERY DENSE tan SANDY LOAM TILL with GRAVEL |
| | 50 | | | VERY DENSE tan SANDY LOAM TILL with GRAVEL |
| | 51 | | | VERY DENSE light brown fine SAND |
| 779.2 | 67 | | 13.0 | VERY DENSE gray CLAY LOAM |
| 776.7 | 79 | | | VERY DENSE gray clean medium SAND |
| 774.7 | | | | Bottom of Hole = 29.0 feet |

## B-1g
Sta. 51+59, 65' LT
07/25/2008

| | N | Qu | w% | |
|---|---|---|---|---|
| 825.7 | | 0.3P | 14.0 | SOFT brown SANDY LOAM |
| | 3 | 0.3P | 15.0 | SOFT tan/brown SANDY LOAM |
| | 18 | 4.5P | 8.0 | HARD tan SANDY LOAM TILL |
| | 18 | 2.4B | 21.0 | VERY STIFF brown/gray CLAY LOAM |
| | 16 | 4.5P | 9.0 | HARD tan SANDY LOAM TILL |
| | 14 | | 11.0 | tan SANDY LOAM with large piece of GRAVEL in nose |
| | 15 | 2.4B | 20.0 | VERY STIFF brown/gray CLAY LOAM |
| | 11 | 3.1B | 22.0 | VERY STIFF brown/gray CLAY LOAM |
| | 18 | 3.5B | 19.0 | VERY STIFF brown/gray CLAY LOAM with ORGANICS |
| | 16 | 3.3B | 21.0 | VERY STIFF dark gray SILTY CLAY LOAM |
| | 10 | 1.3B | 28.0 | STIFF dark gray SILTY LOAM |
| | 7 | 1.2B | 25.0 | STIFF gray CLAY LOAM |
| DD 793.2 | 9 | 1.0P | 21.0 | MEDIUM gray/brown CLAY LOAM with SAND lens |
| | 13 | 0.6S | 9.0 | MEDIUM tan SANDY LOAM TILL |
| | 27 | 2.3P | 9.0 | VERY STIFF tan SANDY LOAM TILL |
| | 45 | | 8.0 | |
| | 103 | | | HARD tan SANDY LOAM TILL |
| | 100/9" | | | HARD tan SANDY LOAM TILL |
| 781.2 | | | | |
| | 56 | | | VERY DENSE brown dirty coarse SAND & GRAVEL |
| | 100/2" | | | VERY DENSE tan dirty SAND & GRAVEL |
| 776.7 | | | | Bottom of Hole = 49.0 feet |

LEGEND

| | |
|---|---|
| N | Standard Penetration Test N (blows/ft) |
| Qu | Unconfined Strength (tsf) |
| w% | Natural Moisture Content (%) |
| DD ▽ 507.20 | Water Surface Elevation Encountered in Boring<br>DD = during drilling<br>Oh = at completion<br>24h = 24 hours after completion |
| ▨ | Approximate Finish Grade |
| ▬ | Bottom of Footing |



| | | | |
|---|---|---|---|
| FILE NAME = | USER NAME = | DESIGNED - RGC | REVISED |
| | | CHECKED - JLD | REVISED |
| | PLOT SCALE = | DRAWN - EJM | REVISED |
| | PLOT DATE = 08/11/16 | CHECKED - KKC | REVISED |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**SUBSURFACE DATA PROFILE**
**STRUCTURE NO. 101-0207**
SHEET NO. 2 OF 2 SHEETS

| F.A.U. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| 5147 | (201-3)K & (4-1.5)R | WINNEBAGO | | |
| | | CONTRACT NO. | | |
| | ILLINOIS FED. AID PROJECT | | | |

**Illinois Department of Transportation**
Division of Highways
Illinois Department of Transportation/D-2

# SOIL BORING LOG

Date 7/25/08

ROUTE FAP 301 DESCRIPTION P92-111-06 Mulford Road Bridge over US 20 Bypass, .25 m. S. of Sandy Hollow Road LOGGED BY J. Strating

SECTION (201-3) K (4-1, 5) K LOCATION Cherry Valley Twp. - 9 NE, SEC., TWP. 43N, RNG. 2E

COUNTY Winnebago DRILLING METHOD Hollow Stem Auger HAMMER TYPE B-53 Diedrich Automatic

STRUCT. NO. _____
Station _____

BORING NO. B-1g
Station 51+57
Offset 14.00ft Lt CL
Ground Surface Elev. 825.70 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 77.00 ft

Groundwater Elev.:
First Encounter 793.2 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

| | DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) |
|---|---|---|---|---|
| SOFT brown SANDY LOAM | | | | |
| | | | 0.3 P | 14.0 |
| | 823.20 | | | |
| SOFT tan/brown SANDY LOAM | | 1 | | |
| | | 1 2 | 0.3 P | 15.0 |
| | 821.70 | | | |
| | -5 | | | |
| HARD tan SANDY LOAM TILL | | 6 | | |
| | | 9 9 | 4.5 P | 8.0 |
| | 819.20 | | | |
| VERY STIFF brown/gray CLAY LOAM | | 3 | | |
| | | 6 12 | 2.4 B | 21.0 |
| | 816.70 | | | |
| | -10 | | | |
| HARD tan SANDY LOAM TILL | | 7 | | |
| | | 7 9 | 4.5 P | 9.0 |
| | 814.20 | | | |
| tan SANDY LOAM with large piece of GRAVEL in nose | | 2 | | |
| | | 6 8 | | 11.0 |
| | 811.70 | | | |
| | -15 | | | |
| VERY STIFF brown/gray CLAY LOAM | | 3 | | |
| | | 6 9 | 2.4 B | 20.0 |
| | 809.20 | | | |
| VERY STIFF brown/gray CLAY LOAM | | 3 | | |
| | | 4 7 | 3.1 B | 22.0 |
| | 806.70 | | | |
| | -20 | | | |
| VERY STIFF brown/gray CLAY LOAM with ORGANICS | | 5 | | |
| | | 7 11 | 3.5 B | 19.0 |
| | 804.20 | | | |
| VERY STIFF dark gray SILTY CLAY LOAM | | 5 | | |
| | | 7 9 | 3.3 B | 21.0 |
| | 801.70 | | | |
| | -25 | | | |
| STIFF dark gray SILTY LOAM | | 2 | | |
| | | 4 6 | 1.3 B | 28.0 |
| | 799.20 | | | |
| STIFF gray CLAY LOAM | | 1 | | |
| | | 2 5 | 1.2 B | 25.0 |
| | 796.70 | | | |
| | -30 | | | |
| MEDIUM gray/brown CLAY LOAM with SAND lens | | 2 | | |
| | | 3 6 | 1.0 P | 21.0 |
| | 794.20 | | | |
| MEDIUM tan SANDY LOAM TILL | ▼ | 3 | | |
| | | 5 8 | 0.6 S | 9.0 |
| | 791.70 | | | |
| | -35 | | | |
| VERY STIFF tan SANDY LOAM TILL | | 4 | | |
| | | 14 13 | 2.3 P | 9.0 |
| | 789.20 | | | |
| | | 13 | | |
| | | 20 25 | | 8.0 |
| | 786.70 | | | |
| | -40 | | | |

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

Illinois Department of Transportation
Division of Highways
Illinios Department of Transportation/D-2

# SOIL BORING LOG



Date 7/25/08

ROUTE FAP 301 DESCRIPTION P92-111-06 Mulford Road Bridge over US 20 Bypass, .25 m. S. of Sandy Hollow Road LOGGED BY J. Strating

SECTION (201-3) K (4-1, 5) K LOCATION Cherry Valley Twp. - 9 NE, SEC., TWP. 43N, RNG. 2E

COUNTY Winnebago DRILLING METHOD Hollow Stem Auger HAMMER TYPE B-53 Diedrich Automatic

STRUCT. NO. _____
Station _____

BORING NO. B-1g
Station 51+57
Offset 14.00ft Lt CL
Ground Surface Elev. 825.70 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 77.00 ft

Groundwater Elev.:
First Encounter 793.2 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

| | DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) |
|---|---|---|---|---|
| HARD tan SANDY LOAM TILL | | 25 | | |
| | | 42 | | |
| 784.20 | | 61 | | |
| HARD tan SANDY LOAM TILL | | 100/9" | | |
| 781.20 | -45 | | | |
| VERY DENSE brown dirty coarse SAND & GRAVEL | | 24 | | |
| | | 26 | | |
| 779.20 | | 30 | | |
| VERY DENSE tan dirty SAND & GRAVEL | | 100/2" | | |
| 776.70 | | | | |
| End of Boring | -50 | | | |
| | -55 | | | |
| | -60 | | | |

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

BBS, from 137 (Rev. 8-99)

# Illinois Department of Transportation

Division of Highways
Illinois Department of Transportation/D-2

# SOIL BORING LOG



Date 7/27/08

ROUTE FAP 301 DESCRIPTION P92-111-06 Mulford Road Bridge over US 20 Bypass, .25 m. S. of Sandy Hollow Road LOGGED BY W. Garza

SECTION (201-3) K (4-1, 5) K LOCATION Cherry Valley Twp. - 9 NE, SEC., TWP. 43N, RNG. 2E

COUNTY Winnebago DRILLING METHOD Hollow Stem Auger HAMMER TYPE B-53 Diedrich Automatic

STRUCT. NO. _____
Station _____

BORING NO. B-2g
Station 50+10
Offset 34.00ft Lt CL
Ground Surface Elev. 803.70 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 77.00 ft

Groundwater Elev.:
First Encounter 793.7 ft ▼
Upon Completion 790.7 ft ▽
After _____ Hrs. _____ ft

| | DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) |
|---|---|---|---|---|
| MEDIUM brown SILTY CLAY LOAM | | | | |
| | | | 0.5 P | 18.0 |
| | 801.20 | | | |
| STIFF tan SILTY CLAY LOAM | | 3 | | |
| | | 5 | 1.5 B | 26.0 |
| | 799.70 | 6 | | |
| | -5 | | | |
| MEDIUM brown SANDY LOAM | | 2 | | |
| | | 3 | 0.8 P | 17.0 |
| | 797.20 | 5 | | |
| MEDIUM tan dirty SAND | | 2 | | |
| | | 4 | | 14.0 |
| | 794.70 | 7 | | |
| | ▼-10 | | | |
| LOOSE tan dirty SAND | | 7 | | |
| | | 3 | | 11.0 |
| | 792.20 | 4 | | |
| VERY DENSE tan SANDY LOAM TILL with GRAVEL | ▽ | 19 | | |
| | | 23 | | 9.0 |
| | 789.70 | 33 | | |
| | -15 | | | |
| VERY DENSE tan SANDY LOAM TILL with GRAVEL | | 17 | | |
| | | 27 | | |
| | 787.20 | 31 | | |
| VERY DENSE tan SANDY LOAM TILL with GRAVEL | | 19 | | |
| | | 27 | | |
| | 784.70 | 33 | | |
| | -20 | | | |

| | DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) |
|---|---|---|---|---|
| VERY DENSE tan SANDY LOAM TILL with GRAVEL | | 12 | | |
| | | 20 | | |
| | 782.20 | 30 | | |
| VERY DENSE light brown fine SAND | | 13 | | |
| | | 21 | | |
| | 779.20 | 30 | | |
| | -25 | | | |
| VERY DENSE gray CLAY LOAM | | 21 | | |
| | | 22 | | 13.0 |
| | 776.70 | 45 | | |
| VERY DENSE gray clean medium SAND | | 10 | | |
| | | 27 | | |
| | 774.70 | 52 | | |
| End of Boring | -30 | | | |
| | -35 | | | |
| | -40 | | | |

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

BBS, from 137 (Rev. 8-99)

**Illinois Department of Transportation**
Division of Highways
Illinois Department of Transportation/D-2

# SOIL BORING LOG

Date 7/28/08

ROUTE FAP 301 DESCRIPTION P92-111-06 Mulford Road Bridge over US 20 Bypass, .25 m. S. of Sandy Hollow Road LOGGED BY W. Garza

SECTION (201-3) K (4-1, 5) K LOCATION Cherry Valley Twp. - 9 NE, SEC., TWP. 43N, RNG. 2E

COUNTY Winnebago DRILLING METHOD Hollow Stem Auger HAMMER TYPE B-53 Diedrich Automatic

STRUCT. NO. _____
Station _____

BORING NO. B-3g
Station 48+70
Offset 15.00ft Rt CL
Ground Surface Elev. 824.20 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 77.00 ft

Groundwater Elev.:
First Encounter 801.7 ft ▼
Upon Completion 805.2 ft ▽
After _____ Hrs. _____ ft

| | DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) |
|---|---|---|---|---|
| Shoulder | | | | |
| | | | | |
| | | | | |
| | | | | |
| | 821.70 | | | |
| HARD brown SANDY LOAM | | 16 | | |
| | | 11 | 4.0 | 11.0 |
| | 820.20 | 9 | P | |
| | -5 | | | |
| MEDIUM tan SANDY LOAM | | 3 | | |
| | | 4 | 0.8 | 10.0 |
| | 817.70 | 7 | P | |
| | | | | |
| STIFF tan SANDY LOAM with GRAVEL | | 4 | | |
| | | 11 | 1.0 | 13.0 |
| | 815.20 | 10 | P | |
| | -10 | | | |
| VERY STIFF brown SILTY CLAY LOAM | | 2 | | |
| | | 5 | 2.5 | 23.0 |
| | 812.70 | 7 | B | |
| | | | | |
| VERY STIFF brown SILTY CLAY LOAM | | 3 | | |
| | | 7 | 2.9 | 21.0 |
| | 810.20 | 11 | B | |
| | -15 | | | |
| VERY STIFF gray SILTY CLAY | | 5 | | |
| | | 8 | 3.5 | 18.0 |
| | 807.70 | 11 | B | |
| | | | | |
| VERY STIFF gray SILTY CLAY LOAM | | 5 | | |
| | | 7 | 2.5 | 22.0 |
| | 805.20▽ | 9 | P | |
| | -20 | | | |

| | DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) |
|---|---|---|---|---|
| STIFF gray SILTY CLAY LOAM | | 2 | | |
| | | 3 | 1.5 | 25.0 |
| | 802.70 | 5 | B | |
| | ▼ | | | |
| SOFT gray SILTY CLAY LOAM | | 1 | | |
| | | 1 | 0.3 | 29.0 |
| | | 3 | B | |
| | 799.70 | | | |
| | -25 | | | |
| LOOSE tan dirty moist SAND | | 2 | | |
| | | 2 | | |
| | | 3 | | |
| | 797.20 | | | |
| MEDIUM tan SANDY LOAM TILL | | 1 | | |
| | | 3 | 0.6 | 10.0 |
| | 795.20 | 4 | P | |
| | -30 | | | |
| MEDIUM tan SANDY LOAM TILL with SAND lens | | 1 | | |
| | | 5 | 0.8 | 9.0 |
| | 792.70 | 9 | P | |
| | | | | |
| DENSE tan SANDY LOAM TILL with GRAVEL | | 10 | | |
| | | 17 | | 9.0 |
| | 790.20 | 20 | | |
| | -35 | | | |
| VERY DENSE tan SANDY LOAM TILL with GRAVEL | | 18 | | |
| | | 26 | | |
| | 787.70 | 33 | | |
| | | | | |
| VERY DENSE tan GRAVEL | | 100/2" | | |
| Hard Drilling | | | | |
| | 785.20 | | | |
| | -40 | | | |

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

**Illinois Department of Transportation**
Division of Highways
Illinois Department of Transportation/D-2

# SOIL BORING LOG

Date 7/28/08

ROUTE FAP 301 DESCRIPTION P92-111-06 Mulford Road Bridge over US 20 Bypass, .25 m. S. of Sandy Hollow Road LOGGED BY W. Garza

SECTION (201-3) K (4-1, 5) K LOCATION Cherry Valley Twp. - 9 NE, SEC., TWP. 43N, RNG. 2E

COUNTY Winnebago DRILLING METHOD Hollow Stem Auger HAMMER TYPE B-53 Diedrich Automatic

STRUCT. NO. _____
Station _____

BORING NO. B-3g
Station 48+70
Offset 15.00ft Rt CL
Ground Surface Elev. 824.20 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 77.00 ft

Groundwater Elev.:
First Encounter 801.7 ft ▼
Upon Completion 805.2 ft ▽
After _____ Hrs. _____ ft

| | DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) |
|---|---|---|---|---|
| DENSE tan SANDY LOAM TILL | | 25 | | |
| | | 19 | | |
| | 782.70 | 11 | | |
| STIFF gray SANDY LOAM TILL | | 4 | | |
| | | 11 | 1.6 | 8.0 |
| | 780.20 | 15 | B | |
| | -45 | | | |
| VERY STIFF gray SANDY LOAM TILL with GRAVEL | | 6 | | |
| | | 9 | 2.5 | 8.0 |
| | 777.70 | 12 | S | |
| STIFF gray SANDY LOAM TILL | | 5 | | |
| | | 9 | 1.5 | 10.0 |
| | | 10 | B | |
| | 774.70 | | | |
| | -50 | | | |
| MEDIUM gray fine SAND with medium GRAVEL | | 2 | | |
| | | 6 | | |
| | 772.70 | 23 | | |
| DENSE gray fine SAND | | 12 | | |
| | | 17 | | |
| | 770.20 | 19 | | |
| | -55 | | | |
| VERY DENSE tan SAND with GRAVEL | | 42 | | |
| | | 100/7" | | |
| | 767.70 | | | |
| VERY DENSE tan SANDY LOAM TILL with SANDY GRAVEL lens | | 29 | | |
| | | 100/9" | | |
| | 765.20 | | | |
| | -60 | | | |

| | DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) |
|---|---|---|---|---|
| VERY DENSE tan fine SAND | | 30 | | |
| | | 100/11" | | |
| | 762.70 | | | |
| End of Boring | | | | |
| | -65 | | | |
| | -70 | | | |
| | -75 | | | |
| | -80 | | | |

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

BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

# SOIL BORING LOG



Date 2/17/16

ROUTE FAI 39 & FAP 301 DESCRIPTION P92-111-06 Mulford Road over Byapss 20 LOGGED BY W. Garza

SECTION (201-3)K & 4-1,5)K LOCATION Cherry Valley Twp. - 10NW, SEC. , TWP. 43N, RNG. 2E

COUNTY Winnebago DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME-55

STRUCT. NO.
Station

Latitude 42° 13' 11.65" Northing 2,024,824.8893
Longitude -88° 59' 54.20" Easting 2,613,032.2599

BORING NO. B-4g
Station 2606+77
Offset 117.00ft Rt
Ground Surface Elev. 802.00 ft

Surface Water Elev. ft
Stream Bed Elev. ft
Groundwater Elev.:
First Encounter 793.0 ft ▼
Upon Completion 768.0 ft ▽
After Hrs. ft

| DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) | Soil Description |
|---|---|---|---|---|
| | | | | MEDIUM brown SILTY CLAY LOAM |
| | | 0.7 P | 23.0 | |
| 800.50 | | | | |
| | 1 3 3 | 1.5 B | 28.0 | STIFF tan SILTY CLAY LOAM |
| 799.00 | | | | |
| -5 | 1 2 3 | 0.4 P | 25.0 | SOFT tan LOAM with SAND, medium GRAVEL lens |
| 796.00 | | | | |
| | 0 1 3 | | | LOOSE tan dirty SANDY GRAVEL |
| 793.50 | | | | |
| -10 | 1 3 4 | 0.5 B | 11.0 | MEDIUM tan SANDY LOAM TILL |
| 791.50 | | | | |
| | 2 3 7 | 2.0 P | 10.0 | STIFF tan SANDY LOAM TILL |
| 789.00 | | | | |
| -15 | 22 17 22 | | | DENSE, No Recovery, assume as above. |
| 786.50 | | | | |
| | 11 12 22 | | | DENSE, No Recovery, assume as above. |
| 784.00 | | | | |
| -20 | 6 10 | 2.8 | | DENSE, VERY STIFF tan SANDY LOAM TILL |

| DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) | Soil Description |
|---|---|---|---|---|
| | 24 | P | | DENSE, VERY STIFF tan SANDY LOAM TILL *(continued)* |
| 781.00 | | | | |
| | 13 29 18 | | | DENSE tan fine SAND |
| 779.00 | | | | |
| -25 | 34 41 43 | | | VERY DENSE tan fine SAND |
| 776.50 | | | | |
| | 14 11 19 | | | MEDIUM/DENSE tan very fine SAND |
| 774.00 | | | | |
| -30 | 3 18 17 | | | DENSE tan fine SAND with CLAY lens |
| 771.00 | | | | |
| | 10 14 21 | 3.7 S | 9.0 | VERY STIFF gray SANDY LOAM TILL with SAND lens |
| 769.00 | | | | |
| ▽ | | | | |
| -35 | 11 15 25 | 6.0 S | 12.0 | HARD gray LOAM TILL |
| 766.50 | | | | |
| | 12 16 21 | 5.9 S | 12.0 | HARD gray LOAM TILL with ORGANICS |
| 764.00 | | | | |
| -40 | 8 45 | 4.8 | 10.0 | HARD gray LOAM TILL |

Northing and Easting were calculated using the ILHP-WF coordinate system

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

Illinois Department of Transportation
Division of Highways
IDOT

# SOIL BORING LOG

Date 2/17/16

ROUTE FAI 39 & FAP 301 DESCRIPTION P92-111-06 Mulford Road over Byapss 20 LOGGED BY W. Garza

SECTION (201-3)K & 4-1,5)K LOCATION Cherry Valley Twp. - 10NW, SEC. , TWP. 43N, RNG. 2E

COUNTY Winnebago DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME-55

STRUCT. NO.
Station

Latitude 42° 13' 11.65" Northing 2,024,824.8893
Longitude -88° 59' 54.20" Easting 2,613,032.2599

BORING NO. B-4g
Station 2606+77
Offset 117.00ft Rt
Ground Surface Elev. 802.00 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 793.0 ft
Upon Completion 768.0 ft
After Hrs. ft

| DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) |
|---|---|---|---|
| HARD gray LOAM TILL *(continued)* | 23 | S | |
| 761.50 | | | |
| VERY DENSE gray SANDY LOAM TILL | 19<br>60<br>26 | | |
| 759.00 | | | |
| VERY DENSE light gray SANDY LOAM TILL | 23<br>100/8" | | |
| -45 | | | |
| 756.00 | | | |
| VERY DENSE light gray weathered LIMESTONE | 26<br>32<br>29 | | |
| 754.00 | | | |
| VERY DENSE light gray weathered LIMESTONE | 25<br>27<br>67 | | |
| -50 | | | |
| 748.00 | | | |
| -55 | | | |
| 743.00 | | | |
| -60 | | | |
| 738.00 | | | |
| -65 | | | |
| 733.00 | | | |
| No Refusal to 74.0' | | | |
| -70 | | | |
| 728.00 | | | |
| End of Boring | | | |
| -75 | | | |
| -80 | | | |

Northing and Easting were calculated using the ILHP-WF coordinate system

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

Illinois Department of Transportation
Division of Highways
IDOT

# SOIL BORING LOG



Date 5/19/16

ROUTE FAI 39 & FAP 301 DESCRIPTION P92-111-06 Mulford Road over Byapss 20 LOGGED BY W. Garza

SECTION (201-3)K & 4-1,5)K LOCATION , SEC. , TWP. , RNG.

COUNTY Winnebago DRILLING METHOD Shelby HAMMER TYPE Shelby

STRUCT. NO. _____ Latitude _____ Northing _____
Station _____ Longitude _____ Easting _____

BORING NO. B-4g Shelby
Station 2606+50
Offset 75.00ft Rt
Ground Surface Elev. 801.60 ft

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

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

| | DEPTH (ft) | BLOWS (/6") | UCS Qu (tsf) | MOIST (%) |
|---|---|---|---|---|
| 25" Recovery<br>799.10 | | | | |
| 16" Recovery<br>796.60 | -5 | | | |
| 21" Recovery<br>794.10 | | | | |
| 22" Recovery<br>791.60 | -10 | | | |
| 30" Recovery<br>789.10 | | | | |
| Lifted Truck @ 14'<br>Pushed 20"<br>20" Recovery<br>786.60 | -15 | | | |
| End of Boring | -20 | | | |

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

# SUMMARY OF LABORATORY TEST RESULTS

**Project:** Ramp BD North, Ramp BD South, Perryville, Mulford
**Client:** WBK
**Wang Job:** 412-04-10

**Prepared by:** C. Iordache
**Checked by:** L. Iordache
**Date:** 8/1/2016

| SAMPLE IDENTIFICATION | | | | LABORATORY TESTS AND SOIL CLASSIFICATION | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | **Water Content** | **Atterberg Limits** | | | **Visual Soil Classification** | **Unconfined Compressive Strength** | **One-Dimensional Consolidation** | | | | | **UU Triaxial Compression** | | |
| | | | | AASHTO | AASHTO | | | IDOT | AASHTO | AASHTO | | | | | AASHTO | | |
| | | | | T265 | T89 & T90 | | | 1999 | T208 | T216 | | | | | T296 | | |
| **Site** | **Boring** | **Sample** | **Top Depth** | w | LL | PL | PI | IDH | $q_u$ | Cc | Cs | OCR | $\sigma_1$ | $S_u$ | $\sigma_1$ | $S_u$ | $\sigma_1$ | $S_u$ |
| | | | ft | % | % | % | % | | tsf | | | | psi | tsf | psi | tsf | psi | tsf |
| Mulford | B-4g | ST-2a | 2.5 | 8 | | | | GRAVELLY SAND | NA | | | | | | | | | |
| Mulford | B-4g | ST-2b | 3.5 | 20 | 49 | 19 | 30 | SILTY CLAY | | 0.129 | 0.042 | 6.32 | | | | | | |
| Mulford | B-4g | ST-3a | 5.0 | 25 | 40 | 19 | 21 | SILTY CLAY | 1.18 | 0.211 | 0.045 | 2.61 | | | | | | |
| Mulford | B-4g | ST-3b | 6.0 | 11 | | | | | | | | | | | | | | |
| Mulford | B-4g | ST-4a | 7.5 | 31 | | | | SILTY CLAY | 0.61 | | | | | | | | | |
| Mulford | B-4g | ST-4b | 8.5 | | | | | SILTY CLAY LOAM | | | | | | | | | | |
| Mulford | B-4g | ST-5a | 10.0 | 20 | | | | SANDY LOAM | 0.25 | | | | | | | | | |
| Mulford | B-4g | ST-5b | 11.0 | | | | | SANDY LOAM | | | | | | | | | | |
| Mulford | B-4g | ST-6a | 12.5 | 15 | | | | SANDY LOAM | 0.15 | | | | | | | | | |
| Mulford | B-4g | ST-6b | 13.5 | | | | | SANDY LOAM | | | | | | | | | | |
| Perryville | B-6e | ST-1a | 0.0 | | | | | SANDY LOAM | | | | | | | | | | |
| Perryville | B-6e | ST-1b | 1.0 | 22 | | | | SILTY CLAY | 1.58 | | | | | | | | | |
| Perryville | B-6e | ST-2a | 2.5 | 24 | 42 | 19 | 23 | SILTY CLAY | | 0.197 | 0.063 | 3.08 | | | | | | |
| Perryville | B-6e | ST-2b | 3.5 | | | | | SILTY CLAY | | | | | | | | | | |
| Perryville | B-6e | ST-3a | 5.0 | 20 | | | | SILTY CLAY | 1.03 | | | | | | | | | |

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# ONE-DIMENSIONAL CONSOLIDATION TEST

## AASHTO T 216 / ASTM D 2435

**Project:** SN 101-0207, Mulford
**Client:** Wills, Burke, Kelsey & Associates
**Soil Sample ID:** Boring B-4g, ST#3, 5 to 7.5 feet
**Sample Description:** Brown and gray SILTY CLAY

**Tested by:** M. Snider
**Prepared by:** M. Snider
**Test date:** 7/14/2016
**WEI:** 412-04-10

| | | | | | |
|---|---|---|---|---|---|
| Initial sample height = | 1.000 | in | Ring diameter = | 2.495 | in |
| Initial sample mass = | 154.09 | g | Ring mass = | 109.54 | g |
| Initial water content = | 25.26% | | Initial sample and ring mass = | 263.63 | g |
| Initial dry unit weight = | 95.87 | pcf | Tare mass = | 84.94 | g |
| Initial void ratio = | 0.757 | | Final ring and sample mass = | 259.32 | g |
| Initial degree of saturation = | 90.04% | | Mass of wet sample and tare = | 234.36 | g |
| | | | Mass of dry sample and tare = | 207.96 | g |
| Final sample mass = | 149.42 | g | Initial dial reading = | 0.01000 | in |
| Final dry sample mass = | 123.02 | g | Final dial reading = | 0.13531 | in |
| Final water content = | 21.46% | | LL= | 40 | % |
| Final dry unit weight = | 109.61 | pcf | PL= | 19 | % |
| Final void ratio = | 0.537 | | % Sand= | n.a. | % |
| Final degree of saturation = | 100.00% | | % Silt= | n.a. | % |
| Estimated specific gravity = | 2.70 | | % Clay= | n.a. | % |
| | | | **In-Situ Vertical Effective Stress =** | 750 | psf |

**Compression and Swelling Indices**

| | | | |
|---|---|---|---|
| Compression index $C_c$ = | 0.200 | **Preconsolidation pressure,$s_C$** | |
| Field corrected $C_c$ = | 0.211 | Casagrande Method = | 1959 psf |
| Swelling index $C_s$ = | 0.045 | **Over-Consolidation Ratio (OCR) =** | 2.61 |

| Load number | Vertical stress | Dial reading | System deflection | Vertical strain | Void ratio | $C_v$ | Cae | Elapsed time |
|---|---|---|---|---|---|---|---|---|
| | psf | in | in | % | | $ft^2$/day | % | min |
| 1 | 100.0 | 0.01023 | 0.00010 | 0.03 | 0.757 | N/A | N/A | 480 |
| 2 | 200.0 | 0.01195 | 0.00023 | 0.22 | 0.753 | 0.1851 | 0.05 | 960 |
| 3 | 500.0 | 0.01765 | 0.00058 | 0.82 | 0.743 | 0.2816 | 0.15 | 1412 |
| 4 | 1000.0 | 0.02671 | 0.00090 | 1.76 | 0.726 | 0.2688 | 0.05 | 480 |
| 5 | 2000.0 | 0.04036 | 0.00135 | 3.17 | 0.702 | 0.2589 | 0.16 | 960 |
| 6 | 4000.0 | 0.06711 | 0.00193 | 5.90 | 0.654 | 0.2385 | 0.25 | 831 |
| 7 | 8000.0 | 0.10022 | 0.00253 | 9.27 | 0.594 | 0.1866 | 0.32 | 523 |
| 8 | 16000.0 | 0.13367 | 0.00324 | 12.69 | 0.534 | 0.1752 | 0.26 | 960 |
| 9 | 32000.0 | 0.16697 | 0.00413 | 16.11 | 0.474 | 0.1490 | 0.30 | 960 |
| 10 | 8000.0 | 0.16603 | 0.00295 | 15.90 | 0.478 | N/A | N/A | 960 |
| 11 | 2000.0 | 0.15622 | 0.00198 | 14.82 | 0.497 | N/A | N/A | 480 |
| 11 | 500.0 | 0.13676 | 0.00123 | 12.80 | 0.532 | N/A | N/A | 1200 |

Prepared by: _____ Date: _____

Checked by: _____ Date: _____



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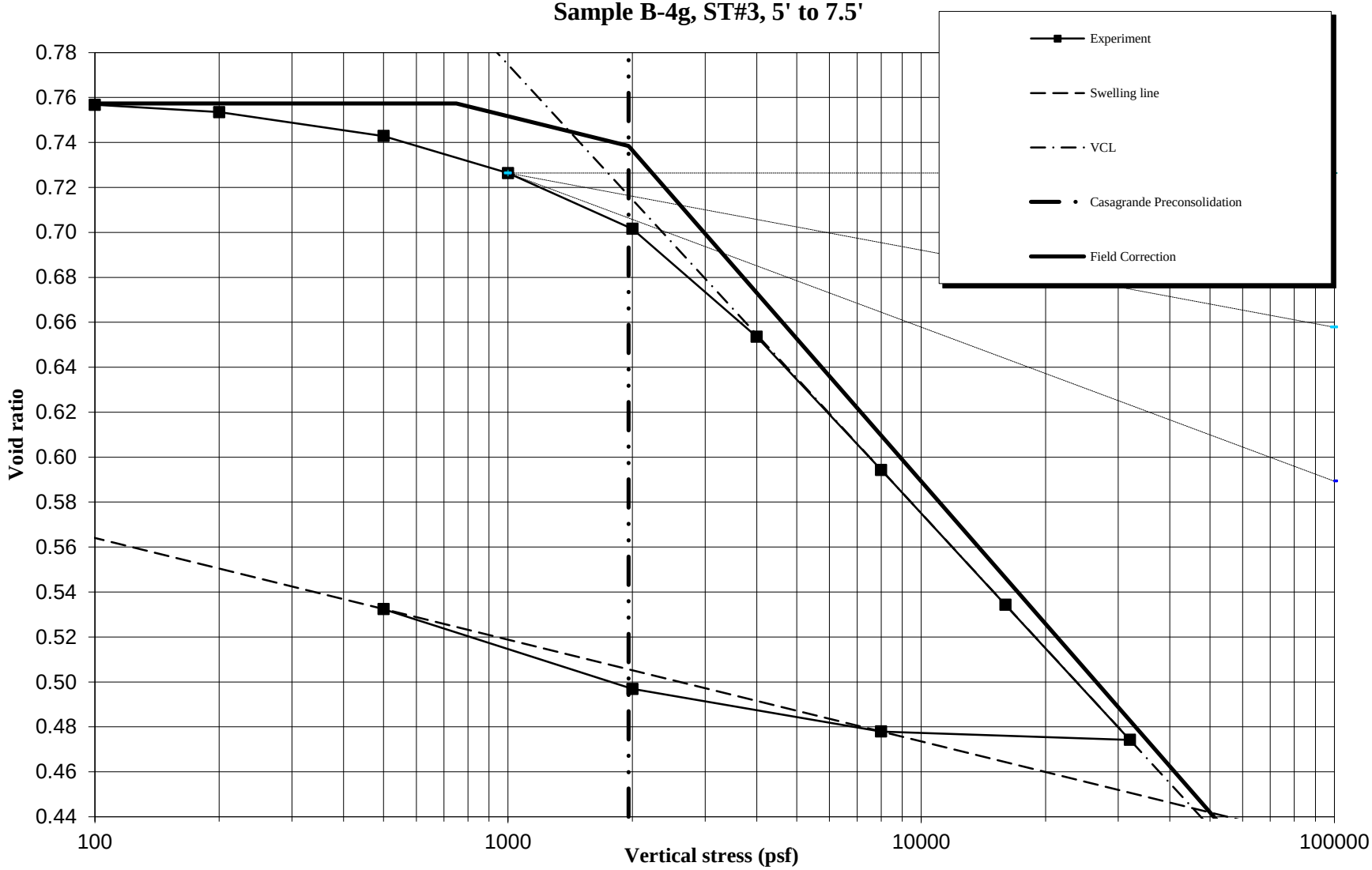
# CONSOLIDATION CURVE

## Sample B-4g, ST#3, 5' to 7.5'



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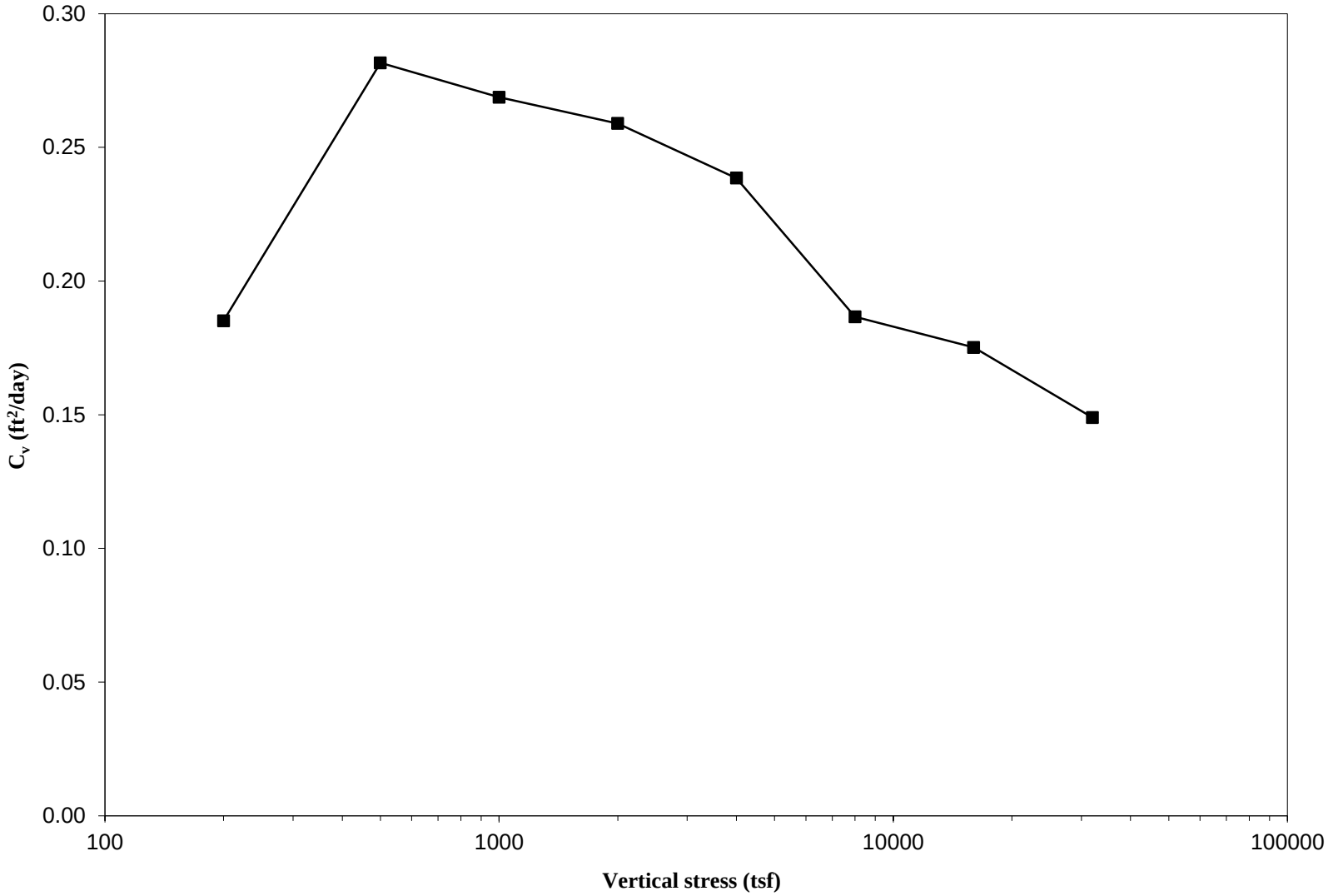
# CONSOLIDATION COEFFICIENT ($C_v$) vs. VERTICAL STRESS

**Sample B-4g, ST#3, 5' to 7.5'**

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# UNCONFINED COMPRESSIVE STRENGTH of COHESIVE SOIL

**(AASHTO T 208 / ASTM D 2166)**

**Project:** SN 101-0207 Mulford
**Client:** Wills, Burke, Kelsey Associates
**WEI Job No.:** 412-04-10
**Soil Sample ID:** B-4g, ST#3a, 5.0 to 6.5 feet
**Type/Condition:** ST/ Undisturbed
Liquid Limit (%): 40
Plastic Limit (%): 19

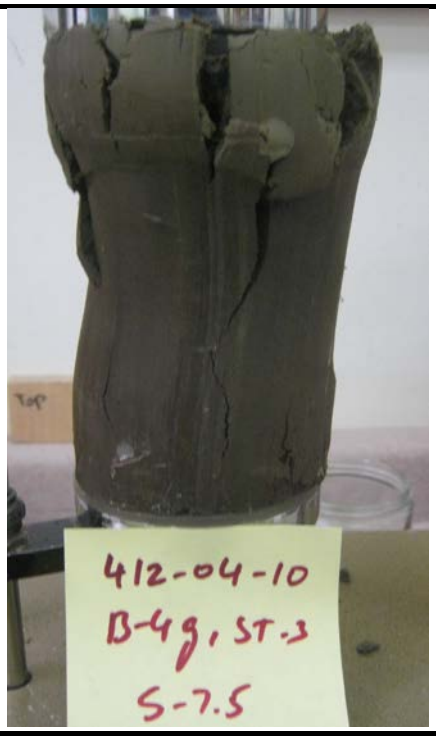
**Analyst name:** A. Mohammed
**Date received:** 6/3/2016
**Test date:** 7/14/2016
**Sample description:** Brown & Gray SILTY CLAY

Sand(%): NA
Silt(%): NA
Clay(%): NA

| | | |
|---|---|---|
| Average initial height $h_0$ = | 6.09 | in |
| Average initial diameter $d_0$ = | 2.87 | in |
| Height to diameter ratio= | 2.12 | |
| Mass of wet sample = | 1299.82 | g |
| Mass of dry sample and tare = | 1091.31 | g |
| Mass of tare = | 13.76 | g |
| Specific gravity = | 2.76 | (estimated) |

| | | |
|---|---|---|
| Initial water content w = | 20.63% | (specimen) |
| Initial unit weight g = | 126.03 | pcf |
| Initial dry unit weight $g_d$ = | 104.48 | pcf |
| Initial void ratio $e_0$ = | 0.65 | |
| Initial degree of saturation $S_r$ = | 88% | |
| Average Rate of Strain= | 1%/min | |
| Unconfined compressive strength $q_u$ = | 1.18 | tsf |
| Shear Strength= | 0.59 | tsf |

| Displacement (in) Δh | Force (lbs) F | Strain (%) e | Stress (tsf) s |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 0.03 | 24.89 | 0.49 | 0.28 |
| 0.06 | 41.48 | 0.99 | 0.46 |
| 0.09 | 57.04 | 1.48 | 0.63 |
| 0.12 | 66.37 | 1.97 | 0.73 |
| 0.15 | 74.66 | 2.46 | 0.81 |
| 0.18 | 82.96 | 2.96 | 0.90 |
| 0.21 | 89.18 | 3.45 | 0.96 |
| 0.24 | 95.40 | 3.94 | 1.02 |
| 0.27 | 97.48 | 4.43 | 1.04 |
| 0.30 | 99.55 | 4.93 | 1.06 |
| 0.35 | 105.77 | 5.75 | 1.11 |
| 0.40 | 107.85 | 6.57 | 1.12 |
| 0.45 | 112.00 | 7.39 | 1.16 |
| 0.50 | 114.07 | 8.21 | 1.17 |
| 0.55 | 116.14 | 9.03 | 1.18 |
| 0.60 | 117.18 | 9.85 | 1.18 |
| 0.65 | 117.18 | 10.68 | 1.17 |
| 0.70 | 117.18 | 11.50 | 1.16 |
| 0.80 | 117.18 | 13.14 | 1.14 |
| 0.90 | 117.18 | 14.78 | 1.11 |
| 1.00 | 97.48 | 16.42 | 0.91 |




*NOTES:*

Prepared by: _____ Date: _____

Checked by: _____ Date: _____

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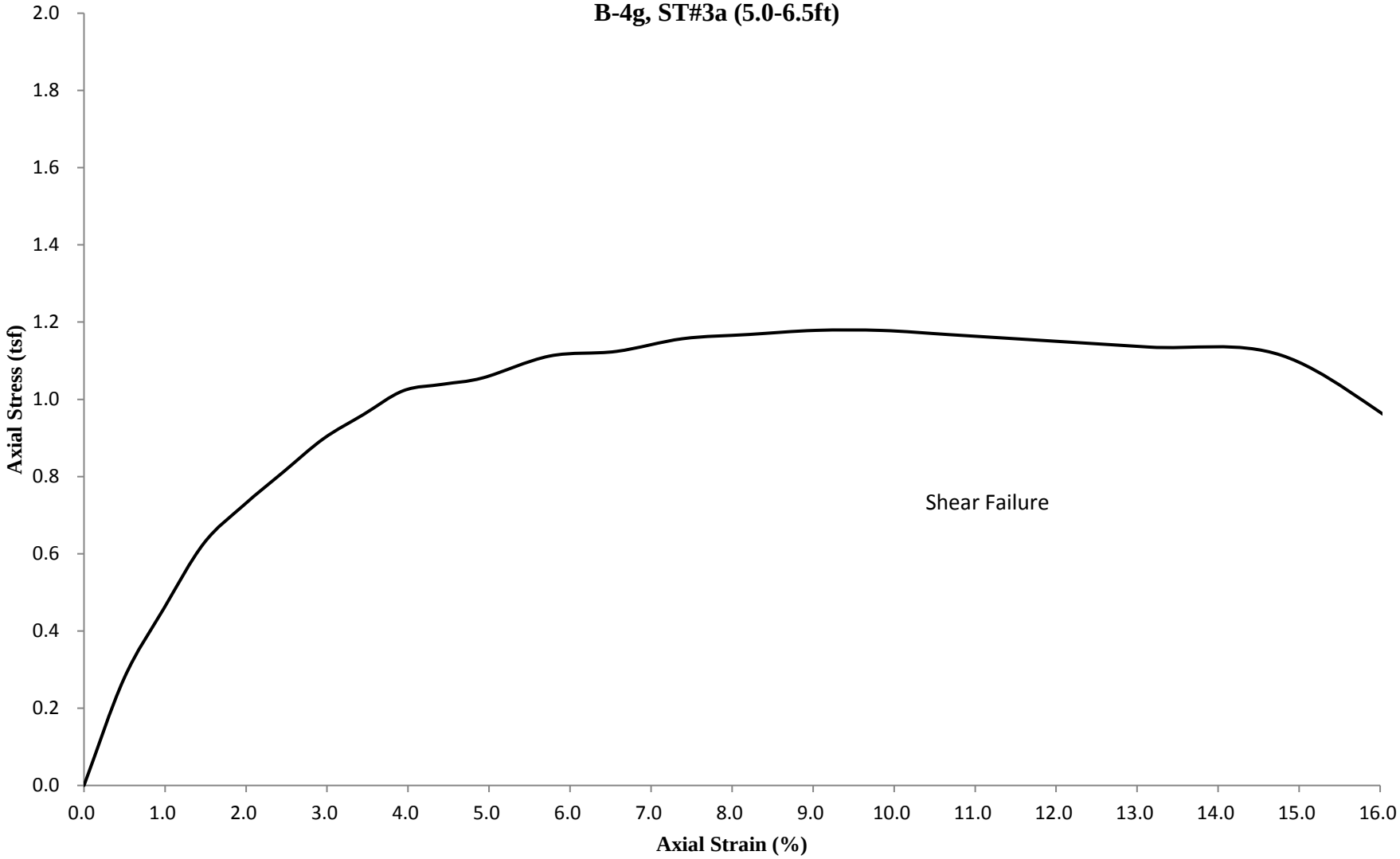
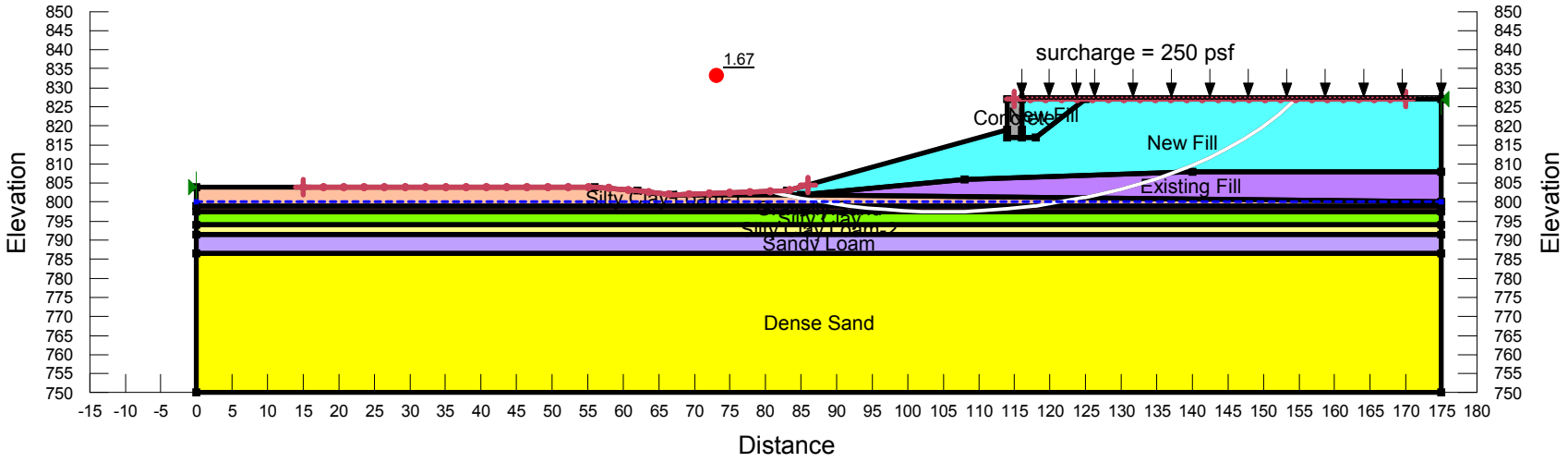
## Unconfined Axial Stress v. Axial Strain
## B-4g, ST#3a (5.0-6.5ft)



# SOUTH ABUTMENT [END SLOPE] SHELBY TUBE SOIL PARAMETERS




Name: Silty Clay Loam-1 Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 1,500 psf Phi': 0 °
Name: Silty Clay Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 1,180 psf Phi': 0 °
Name: Sandy Loam Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion': 0 psf Phi': 28 °
Name: New Fill Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion': 1,000 psf
Name: Concrete Model: High Strength Unit Weight: 150 pcf
Name: Dense Sand Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 36 °
Name: Existing Fill Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion': 1,500 psf
Name: Gravelly Sand Model: Undrained (Phi=0) Unit Weight: 110 pcf Cohesion': 30 psf
Name: Silty Clay Loam-2 Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 610 psf Phi': 0 °

Title: Mulford ove U.S. 20
Name: 207 South Abutment End Slope
Created By: Jennifer Damery
Date: 8/17/2016

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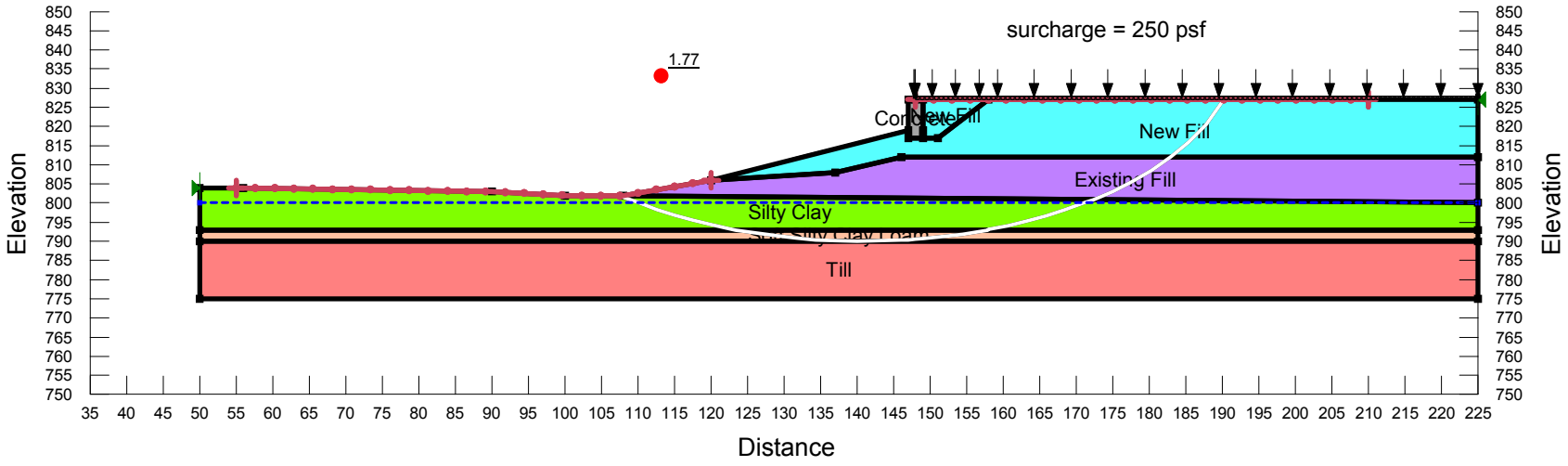
# NORTH ABUTMENT [END SLOPE] SPT SOIL PARAMETERS




Name: Soft Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 118 pcf Cohesion': 600 psf Phi': 0 °
Name: Silty Clay Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 1,150 psf Phi': 0 °
Name: New Fill Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion': 1,000 psf
Name: Concrete Model: High Strength Unit Weight: 150 pcf
Name: Existing Fill Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion': 1,500 psf
Name: Till Model: Undrained (Phi=0) Unit Weight: 135 pcf Cohesion': 4,500 psf

Title: Mulford ove U.S. 20
Name: 207 North Abutment End Slope
Created By: Jennifer Damery
Date: 8/17/2016

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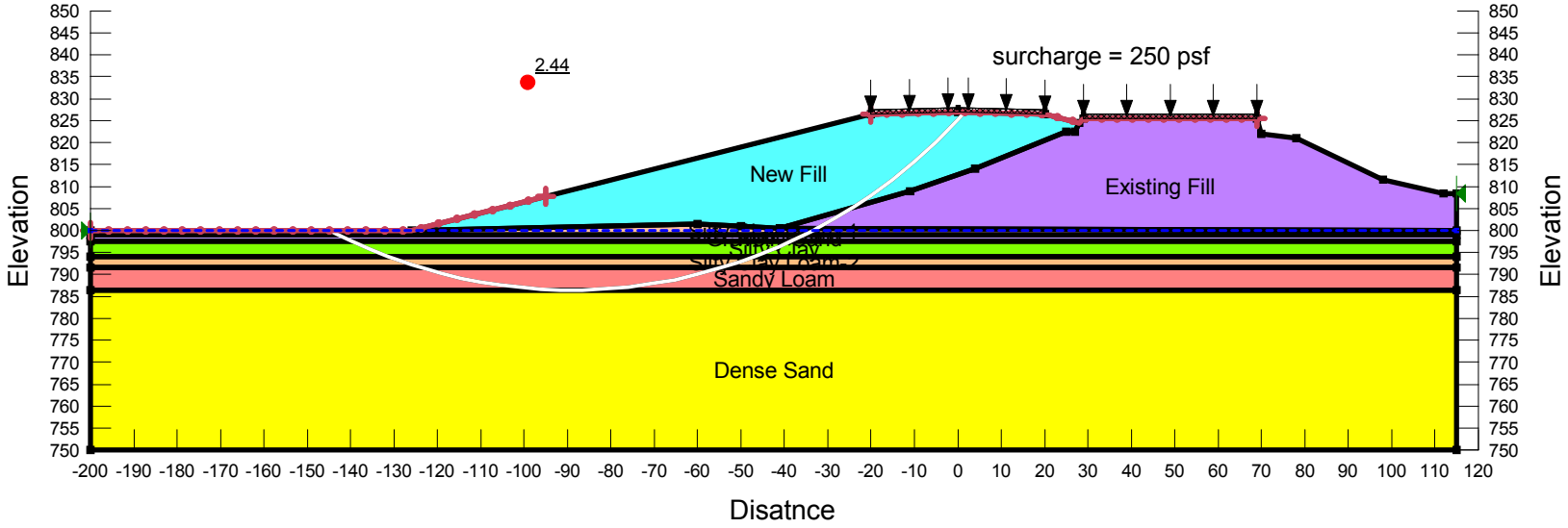
# SOUTH APPROACH [SIDE SLOPE] SHELBY TUBE SOIL PARAMETERS




Name: Silty Clay Loam-1 Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 1,500 psf Phi': 0 °
Name: Silty Clay Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 1,180 psf Phi': 0 °
Name: Gravelly Sand Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion': 0 psf Phi': 30 °
Name: New Fill Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion': 1,000 psf
Name: Dense Sand Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 36 °
Name: Existing Fill Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion': 1,500 psf
Name: Sandy Loam Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion': 0 psf Phi': 28 °
Name: Silty Clay Loam-2 Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 610 psf Phi': 0 °

Title: Mulford ove U.S. 20
Name: 207 Abutment Side Slope
Created By: Jennifer Damery
Date: 8/17/2016

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