Technical Report

STH 15
Roadway Soils Report

Prepared for

Wisconsin Department of Transportation

Northeast Region

April 19, 2013

CH2MHILL®

135 South 84th Street
Suite 400
Milwaukee, WI 53214

Contents

Section **Page**

Project and Report Overview 1
1.1 Project Overview 1
1.2 Report Purpose and Organization 1

Exploration Program 2
2.1 Field Exploration Program 2
2.2 Laboratory Testing Program 3

Subsurface Conditions 4
3.1 Existing Subsurface Information 4
3.2 Soil Conditions 4
3.2.1 Area 1: USH 45 to West Roundabout (Sta 100+00 to 267+00) 4
3.2.2 Area 2: West Roundabout to CTH M (Sta 267+00 to 373+00) 5
3.2.3 Area 3: CTH M to East Roundabout (Sta 373+00 to 483+00) 6
3.2.4 Area 4: East Roundabout to East Terminus (Sta 483+00 to 654+00) 7
3.3 Groundwater Conditions 7

Analyses and Recommendations 8
4.1 Unsuitable Soils 8
4.2 Construction Platform 10
4.3 Bedrock Stability and Removal 10
4.4 Pavement Design 10
4.5 Hardpan Soil Removal 11
4.6 Pond Infilling 11
4.7 Construction Considerations 11
4.7.1 Clearing, Stripping, and Demolition 11
4.7.2 Proofrolling 11
4.7.3 Fill Placement 12

Appendixes
A Boring Location Diagrams
B USDA Soil Survey Diagrams and Reports
C Soil Boring Logs and General Notes Sheets
D Laboratory Testing Results
E Proposed Rock Slope Evaluation Report

Project and Report Overview

1.1 Project Overview

The Wisconsin Department of Transportation (WisDOT) is planning on reconfiguring and reconstructing approximately 10.5 miles of STH 15 from USH 45 immediately east of the City of New London to Lily of the Valley Drive in the Town of Greenville in Outagamie County. The project will include reconstruction, widening, and realignment of approximately 6.4 miles of the existing roadway, and an approximate 4.1 mile new bypass north of the Village of Hortonville. The project will involve construction of a divided four-lane highway for the project extents.

The proposed reconfiguration and construction of new alignment will involve considerable grade changes, with considerable cut areas and fill areas. There will be several grade separation structures along the route, including construction of a pair of bridges passing over an existing railroad line (west of Hortonville), a bridge pair passing over Black Otter Creek west of CTH M, a bridge pair passing over CTH M (Olk Street) and a bridge pair over Nash Street just north of the Village of Hortonville.

1.2 Report Purpose and Organization

The purpose of this roadway geotechnical report is to present subsurface conditions encountered in the numerous borings performed along the project alignment, and present recommendations pertinent to the design of the mainline (and adjacent roadways) roadway excavation, embankments and pavement design. This report identifies areas in which questionable soils are encountered, or where extraordinary construction issues may exist. Recommendations are presented to address these issues; these recommendations are subject to change as the design progresses. Recommendations pertaining to the design and construction of bridges, ponds, culverts, and other structures will be presented in separate reports.

Exploration Program

2.1 Field Exploration Program

The field exploration program for pavement subgrade evaluation consisted of drilling 128 borings. Of the 128 borings, seven were drilled in locations that are no longer on the active alignment / adjacent road alignments (the alignment changed after the borings were drilled). Accordingly, a total of 121 borings were drilled and utilized for development of recommendations presented in this report. Four rock cores were conducted in an area slated for significant rock excavation, as discussed later in this report.

Boring locations were selected to provide a representative depiction of subsurface conditions along the roadway alignment, including some borings drilled on existing pavement (in areas where the proposed alignment coincides with the existing alignment). In addition, borings were positioned (and subsequent borings added) to evaluate conditions in areas that were considered (based on the USGS soil survey maps, topographic information, and site visits) to have considerable potential for presenting difficulty during design and/or construction.

The boring locations were staked in the field by WisDOT. With the exception of the rock cores, the exploration was conducted by GESTRA Engineering, Inc. of Milwaukee, Wisconsin using a variety of truck-mounted and ATV-mounted drill rigs. The rock cores (Borings B-125 through B-128) were performed by Subsurface Exploration Services, LLC (SES) of Green Bay, Wisconsin using an ATV-mounted drill rig.

Soil borings extended to depths ranging from 1 to 45 feet, with borings that terminated shallower than 10 feet (20 borings) encountering auger refusal (indicative of likely bedrock). The methods used to advance the borings are noted on the boring logs. In general, borings were extended at least 7 feet below the anticipated subgrade elevation in areas with significant cut, and to a depth commensurate with the proposed embankment height in areas slated for fill. Some borings within planned fill areas were terminated prematurely due to the probable existence of bedrock.

Soil samples were typically obtained at 2.5-foot intervals to either a depth of 10 feet or to the bottom of fill and/or organics. Sampling at greater depths was typically performed at 5-foot intervals. Samples were obtained in general accordance with ASTM Specification D-1586 “Standard Method for Penetration and Split-Barrel Sampling of Soils”. Selected samples were obtained in general accordance with ASTM Specification D-1587 “Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes”.

As each soil sample was brought to the ground surface, the material was preliminarily classified by the driller. The driller also maintained a field log for each boring which described the method(s) of borehole advancement, sample depths, lengths of sample recoveries, and observations regarding soil and groundwater conditions. Representative portions of the split-barrel samples were then sealed in glass jars. Samples were delivered to the GESTRA lab, where the samples were stratified by a geotechnical engineer and logs generated. Logs of each soil boring are contained in Appendix C.

Rock cores were logged in the field by a CH2M HILL geotechnical engineer. The cores were delivered to the laboratory where selected rock tests were performed. CH2M HILL generated logs corresponding to the four rock cores. Logs and procedures utilized for coring are presented in Appendix E.

All borings were abandoned in accordance with Wisconsin Department of Natural Resources (“WDNR”) requirements immediately after completion. All soil and rock samples were retained by GESTRA after completion of the laboratory testing.

Each soil sample was visually examined by a geotechnical engineer, and classified on the basis of texture and plasticity in accordance with the Unified Soil Classification System (“USCS”). A chart describing this system of classification is included in the Appendix C. The two-letter designator following each soil description on the boring logs is the group symbol using this method of classification.

Similar soils were grouped into the major zones noted on the boring logs. In some cases, strata contact lines have been estimated. Where stratum changes occur between sampled depths, and the driller's field log does not indicate a stratum change depth based on drilling action, the stratum change depth is indicated as the midpoint between recovered sample depths. In-situ, the transition between soil types may not occur at the midpoint between sampled depths, and may be gradual in both the horizontal and vertical directions. For these reasons, for this report narrative, referenced soil-strata depths and thicknesses should be considered approximate.

2.2 Laboratory Testing Program

The laboratory testing program consisted of performing the following tests: water content test (ASTM D2216), Atterberg limits (ASTM D4318), grain size distribution (ASTM D422), Unconfined compressive strength test (ASTM D2166), and the one-dimensional consolidation test (ASTM D2435). The water content, grain size, and Atterberg limit tests were used as characterizing the material type, whereas the unconfined compressive strength and consolidation test are used to quantify the strength and compressibility of the soils, respectively. Compressive strength testing was performed on selected rock samples in accordance with ASTM D7012.

The laboratory test results on soil samples are presented in Appendix D, while rock test results are contained in Appendix E. Results of water content testing, unconfined testing, Atterberg limit testing are presented on the boring logs by the symbols defined in the legend on the logs.

Subsurface Conditions

3.1 Existing Subsurface Information

Soil survey information available from the United States Department of Agriculture (USDA) was reviewed during planning and before execution of the subsurface exploration program. Soil survey information generally assesses the top five feet of soil with primary focus on the ability of the soil to support various vegetation/agricultural purposes. Many soil units have been previously correlated by WisDOT to pavement design parameters.

In general the soils encountered during the subsurface exploration correlate well with the soil survey information, especially in areas where shallow rock was indicated and areas where weak/high compressibility soils were encountered.

Soil types identified along the project alignment varied considerably. For purposes of report organization the alignment was divided into four areas: Area 1 (western terminus to west roundabout, also termed “west mainline”), Area 2 (West Roundabout to CTH M, also termed “west bypass”), Area 3 (CTH M to East Roundabout, also termed “east bypass”), and Area 4 (East Roundabout to eastern terminus, also termed “east mainline”). Soil survey information for each of these areas is contained in Appendix B.

In general, most of the alignment (with the exception of Area 2) encountered silt loams and sandy loams, including significant amounts of Hortonville Silt Loam, Kolberg silt loam, and Menomonee loamy fine sand. The soils encountered in Area 2 contained considerable muck (Carbondale muck, Suamico muck, and Markey muck) along with Kolberg silty loam and Rousseau loamy fine sand. The areas identified as “muck” identified on the soil surveys corresponded well with the areas where very soft clay, organic clay, and peaty materials were encountered in the subsurface exploration program. Descriptions of each of these soil units are presented in the Soil Survey reports in Appendix B.

3.2 Soil Conditions

The following narrative is a generalization of the subsurface conditions encountered by the borings with approximate depths, and referenced to existing ground surface. For a more-detailed description of the subsurface conditions encountered at each location, please refer to the boring logs. Location of each boring and the location to existing roadways and proposed pavement alignments are presented in the Soil Boring Location Diagrams in Appendix A.

Subsurface conditions along the project alignment varied considerably. Therefore, for the ensuing discussion the alignment will be divided into four areas: Area 1 (western terminus to west roundabout), Area 2 (West Roundabout to CTH M), Area 3 (CTH M to East Roundabout) and Area 4 (East Roundabout to eastern terminus).

3.2.1 Area 1: USH 45 to West Roundabout (Sta 100+00 to 267+00)

There were 31 borings drilled along this portion of the proposed mainline alignment (and adjacent roadways) for the purpose of evaluating suitability of the existing soils to support proposed earthwork and pavement.

Four borings were drilled on the existing pavement section along this portion of the project alignment. Three of the borings encountered 8 to 10 inches of asphaltic concrete over 0 to 4 inches of granular base course, while one boring encountered 3 inches of asphaltic concrete overlying 4 inches of Portland cement concrete over 5 inches of base. One boring (B-10) was drilled on the pavement of an existing side street; this boring encountered 4 inches of asphaltic concrete over 8 inches of granular base course.

Borings drilled off of existing roadway typically encountered topsoil; the depth, where noted, was between 1 and 4 inches.

The borings encountered soils of varied stratigraphy which included stiff to very stiff clay layers, hard clay layers, loose to medium dense sand layers, and medium dense silt layers. Fill soils were commonly encountered in borings drilled near or on existing STH 15 mainline; those fill soils varied in composition from sand to silty sand, to lean clay, to clay/sand mixtures. Deeper organic soils were encountered in borings drilled in Area 1A and shallow rock was encountered in borings drilled in Area 1B (detailed below). Shallow rock was also encountered at shallow depths (3-8 ft below existing ground) near the west roundabout; since the proposed roadway will be considerably above the existing ground in this section details regarding the rock (e.g., composition, integrity) were not considered germane.

With the exception of the areas noted below, the soils encountered at the surface (or at the planned subgrade elevation where cuts are planned) were relatively strong, have low compressibility, and are considered suitable for support of the planned roadway and embankment with relatively little excavation below subgrade (EBS) anticipated.

3.2.1.1 Area 1a: Station 141+00 to 143+00 (Drainage feature)

This area contains a meandering drainage feature that extends from the northeast to the southwest. The boring in this area, B-98, encountered approximately 13 feet of soft to very soft lean to fat clay. This material is weak and very compressible, and likely not suitable for support of the planned embankment.

3.2.1.2 Area 1b: Station 204+00 to 214+00 (Curve realignment into Rock Outcrop)

This area is where the proposed alignment will extend into a rock outcrop. Four borings were drilled in this area (borings B-14, B-14A, B-15, and B-16) with borings B-15 and B-16 drilled on top of the rock bluff. Four rock cores (B-125 through B-128) were drilled in this area to provide additional quantification of rock type and strength. Details regarding the upper 20 to 30 feet of bedrock in this area are presented in Appendix E.

3.2.2 Area 2: West Roundabout to CTH M (Sta 267+00 to 373+00)

There were 37 borings drilled along this portion of the proposed mainline alignment (and adjacent roadways) for the purpose of evaluating suitability of the existing soils to support proposed earthwork and pavement.

One boring (B-124) was drilled on existing STH 15 pavement. That boring encountered 7 inches of asphalt over 5 inches of granular base material.

Borings encountered between 4 inches and 1.7 feet of topsoil, although quantification of topsoil was not provided in many of the borings. Given that the current (agricultural) use of the land traversed along this alignment there likely is one to two feet of topsoil in this area.

The borings drilled on the western portion of this area (borings B-34 to B- 40, B-121 to B-124) encountered predominantly sandy soils, transitioning to clay in borings B-122A and B-123A. The sandy soils had relative density in the very loose to medium dense range, with most samples in the loose to medium dense range. Clayey soils in borings B-122A and B-123A typically had consistencies in the stiff to very stiff range, with hard soils below Elevation 765.

The borings drilled on the eastern portion of this area (borings B-41 through B-49) encountered predominantly cohesive materials, including lean clay, fat clay, and organic clay. The consistencies of the inorganic portions of these materials were generally in the stiff to very stiff range, with the exception of soils encountered in area 2A (described below).

With the exception of the areas noted below, the soils encountered at the surface (or at the planned subgrade elevation where cuts are planned) were relatively strong, low compressibility, and are considered suitable for support of the planned roadway and embankment with relatively little EBS required.

3.2.2.1 Area 2a: Station 332+00 to 360+00 (Black Otter Creek marshland)

This area consists of low-lying vacant and agricultural land. Black Otter creek is a meandering drainage feature running south to north. The creek is approximately 3 to 5 feet below the adjacent land. Several borings drilled in this area (borings B-40A through B-40C, B-41A through B-41C, and B-45A through B-45C) encountered poor soil

consisting of very soft clay, very soft organic clay, and/or peat to depths ranging between 4 and 10.5 feet. This soil is very weak and very compressible. The soils immediately below the very soft clay and peat consisted of a stiff to very stiff inorganic lean clay. The very soft clays and organic materials are considered weak and highly compressible and not suitable for support of proposed embankment and pavement in their current state. The occurrence of unsuitable soils and the depth of such soils may be erratic along this portion of the alignment due to the meandering nature of the creek.

3.2.3 Area 3: CTH M to East Roundabout (Sta 373+00 to 483+00)

There were 34 borings drilled along this portion of the proposed mainline alignment (and adjacent roadways) for the purpose of evaluating suitability of the existing soils to support proposed earthwork and pavement. Three borings were drilled on existing pavement along this portion of the alignment; the pavement was on CTH MM. The pavement consisted of between 4 to 5 inches of asphaltic concrete overlying 4 to 5 inches of granular base course. Borings not drilled on pavement areas encountered 4 inches and 2.7 feet of topsoil, although quantification of topsoil was not provided in many of the borings.

Borings drilled on the western portion of this area generally encountered loose to medium dense granular soils overlying stiff to very stiff clays with occasional layers/pockets of gravel. The fines content in the granular soils gradually increases from west to east, with more occurrences of silty sand, and clayey sand in borings B-62 through B-66. Clay becomes more prevalent from Boring B-67 extending to the east, with thicker and shallower stiff to very stiff clay layers encountered.

Borings B-63, B-63A, B-64, B-64A, and B-65 encountered a dense to very dense granular material starting at depths ranging between 5.5 and 17.8 feet below ground surface, extending to the depth of the boring. This material is a somewhat variable mixture of sand, silt, clay, and gravel, with the common characteristic of having dense to very dense relative density. This material is commonly referred to as “hardpan” by earthwork contractors and this designator has been added to pertinent strata on the boring logs. In the geotechnical engineering terms, this material can also be classified as an intermediate geomaterial (IGM). Although this material, for purposes of excavation, is considered soil, it can be difficult to excavate and may require more-specialized equipment (and/or additional effort) to excavate. Excavation required for the portion of the alignment between stations 412+00 and 426+00 will likely require significant removal of this material.

Borings B-50 and B-52, drilled on the proposed mainline alignment on the western portion of this area, encountered auger refusal at shallow depths (3 inches and 1.3 feet, respectively). The shallow refusal is typically indicative of bedrock, which can be further collaborated by the rock outcroppings in the immediate vicinity of these borings. This area is proposed to have from 0.5 to in excess of 10 feet of fill to achieve required pavement elevation. There may be some minor rock removal required to install the pavement section, however significant rock removal is not anticipated.

Note that no subsurface exploration was done within the limits of the Village of Hortonville Landfill (Sta. 431+00 to 438+00). Information for the landfill can be obtained from the Phase 2.5 Extent and Characterization of Waste Report completed by TRC Environmental Corporation dated July 16, 2012.

With the exception of the areas noted below, the soils encountered at the surface (or at planned subgrade elevation where cuts are planned) are relatively strong, have low compressibility, and are considered suitable for support of the planned roadway and embankment with little EBS required.

3.2.3.1 Area 3a: Station 450+00 to 458+00 (Low farmland area)

Two borings (B-68 and B-69) drilled in this area encountered very loose sands and/or organic soils extending to a depth of approximately 5 feet. These borings were drilled in a low area of agricultural land adjacent to a drainage feature (ditch). The very loose sands and organic soils are considered weak and moderately compressible.

3.2.4 Area 4: East Roundabout to East Terminus (Sta 483+00 to 654+00)

There were 23 borings drilled along this portion of the proposed mainline alignment (and adjacent roadways) for the purpose of evaluating suitability of the existing soils to support proposed earthwork and pavement. Additional borings may be drilled in the future for design of culverts, ponds, or other structures.

Three borings were drilled on existing STH 15 pavement. The borings typically encountered between 4 and 7 inches of asphaltic concrete overlying 4 to 7 inches of Portland cement concrete overlying 0 to 5 inches of granular base course. The pavement section (including base course) was between 12 and 13 inches thick. Two borings were drilled on side roads; those borings encountered 4 inches of asphaltic concrete over 6 inches of granular base course. Borings not drilled on pavement generally encountered between 3 to 4 inches of topsoil.

Borings generally encountered predominantly cohesive soils consisting of stiff to hard lean clay. There were some borings which encountered significant layers of clayey sand, silty sand, and silt. There were some isolated areas where weak and/or compressible soils were encountered near the surface in borings B-82, B-84, B-87, and B-89.

With the exception of the weak and/or compressible soils mentioned in the last paragraph, the soils encountered at the surface (or at planned subgrade elevation where cuts are planned) are relatively strong, have relatively low compressibility, and are considered suitable for support of the planned roadway and embankment with little EBS required.

3.3 Groundwater Conditions

Groundwater was commonly encountered during the subsurface exploration program. Occurrences of groundwater are noted on the boring logs, and can be based on the condition of the soil sample, the elevation at which wet cuttings were observed at the surface and/or the occurrence of free water on the drill rod string. The occurrences at which groundwater was noted were often coincident with the top of a permeable soil layer immediately underneath a low permeability layer; in these instances the occurrence of groundwater may be more representative of the existence of the permeable stratum and not reflective of the actual groundwater table.

In general, groundwater was encountered at relatively shallow depths in borings which were drilled in low lying areas, typically in proximity to a river or drainage feature. Borings drilled between stations 168+00 and 197+00 (borings B-10 through B-13) all noted groundwater at approximate elevation 775 to 778, decreasing to the east. Borings drilled in proximity to Black Otter Creek (borings B-40 through B-44) encountered groundwater at elevation 761 to 757, with borings closer to Black Otter Creek exhibiting higher elevations, and several borings noting groundwater starting at the ground surface. Boring B-68 and B-69, drilled between stations 452+00 and 457+00 also had relatively shallow groundwater, occurring between depths of 3.5 and 6 feet, corresponding to elevations 825 and 830, respectively.

Groundwater was encountered at greater depths in a few other borings; given the anticipated roadway profile and the strength/compressibility of the soils these groundwater elevations (in areas other than identified above) were not considered relevant to the design of this project.

Analyses and Recommendations

The following sections provide engineering recommendations regarding unsuitable soils underlying proposed roadway and adjacent embankments, rock slope stability and anticipated required rock removal, and pavement design parameters.

4.1 Unsuitable Soils

The uppermost soils will have a significant effect on the design and performance of proposed pavements. The uppermost soils typically consisted of either stiff to very stiff cohesive soils or loose to medium dense granular soils. If left undisturbed, these soils are typically capable of supporting pavements and proposed embankment fill.

However, the subsurface exploration identified areas which contain significant thickness of soils unsuitable for support of pavement section or proposed embankments. These soils include very soft clays, organic peats, or very loose granular soils. The most important of these areas are described in Sections 3.2.1.1 (Area 1a), 3.2.2.1 (Area 2a), and 3.2.3.2 (Area 3a). We recommend that unsuitable soils in these areas be identified by proofrolling (as described in Section 4.7.2), removed and replaced with properly placed and compacted backfill, or otherwise addressed as discussed below. The length of roadway affected by each of these areas, to the precision possible with the borings drilled in the exploration program, is presented in Table 1. Please note that these lengths are for estimation purposes only; the actual extent of overexcavation can only be determined during construction earthwork operations.

Table 1 – Anticipated Areas of Overexcavation

Area	Length, feet (along roadway alignment)	Estimated Average Depth of removal, feet
1a (Sta. 141+00 to 143+00)	200	12 (marsh excavation)
2a (Sta. 332+00 to 360+00)	2,800	8 (marsh excavation)
3a (Sta 450+00 to 458+00)	800	5 (EBS excavation)
Various [a]	TBD	TBD (EBS excavation)
Unallocated [b]	TBD	TBD (EBS excavation)

[a] "Various" area is approximate aggregation of isolated areas of poor/suspected poor soils (excl. Areas 1a, 2a, 3a). Length and estimated average depth of removal of these soils will be determined during final design.

[B] "Unallocated" area is recommended approximation of areas that may need EBS that are not identified during exploration. Length and estimated average depth of removal of these soils will be determined during final design.

There are many areas along the alignment where the soils at the surface (or at the elevation of the pavement subgrade, in cut areas) consisted of stiff to very stiff clayey soils. If left undisturbed, these soils are typically capable of supporting pavements. However, during construction these soils may be disturbed (most commonly from construction equipment and/or ponding of water); the amount of disturbance will be dependent on: 1) the soil type, 2) prevailing weather conditions at the time of construction, and 3) the methods and equipment used during construction. For this reason areas not specifically discussed above may require some degree of EBS. We recommend that the contract documents include a provision for EBS as an unallocated quantity to allow the field engineer flexibility in exercising judgment in what areas may need to be undercut. Table 1 includes an "unallocated" quantity of the new alignment not included in the identified areas or included in the portion of the alignment subject to a rock cut (Area 1b). As per WisDOT directive, the magnitude of the unallocated quantity will

be determined during final design. Existing pavements and topsoil should also be removed from areas slated for new pavement; these quantities are not included in Table 1.

Groundwater will likely be a significant obstacle during removal of poor soils in Areas 1a, 2a, and 3a. Specifically, Area 2a, which extends through the marsh area of Black Otter Creek, will require removal of soils below the groundwater table. The presence of permeable soils and the proximity to the creek will make dewatering of this site unfeasible.

There are three options available in the areas where unsuitable soils exist below the groundwater table:

1) Removal and replace – the presence of groundwater and the proximity to a groundwater recharge source may make dewatering prohibitively expensive for areas 1a and 2a. It may be possible to have a progressive removal and immediate replacement using a large backhoe excavating soils from below the groundwater table and immediately backfilling with open-graded aggregate once suitable soils are encountered. In this scenario granular (open-graded aggregate or breaker run) fill is end-dumped (or similar massive placement) and surface compaction is applied, mainly through the use of vibratory rollers and the traversing of the subgrade with construction vehicles. Placement of fill above the groundwater table would be by conventional techniques (incorporating maximum layer placement and compaction standards). While this procedure presents increased risk of localized poor subgrade performance, it has been successfully used by WisDOT on other similar projects and likely has a considerably lower construction cost than other options.

2) Surcharge and/or Staged Construction – depending on schedule demands, it may be possible to sufficiently surcharge the subgrade soils in these areas to the extent where post-construction settlement may be tolerable and the soils have achieved sufficient strength to support proposed embankment and pavement loading. Surcharging of these project areas will require placement of a large height of fill (in excess of the final roadway grade, and monitoring the subgrade over an extended time frame to ensure that the subgrade has undergone a significant amount of settlement. The surcharge is then removed after which the subgrade and pavement is constructed. The surcharge material can be reused (i.e., advanced) along the poor soil area as time permits.

   Staged construction entails that the embankment be constructed as soon as possible, allowing the subgrade to equilibrate under the new load before the pavement is constructed. This will reduce, but perhaps not eliminate the potential for unacceptable settlement.

   Estimates regarding the amount of surcharge and time required for settlement equilibration are still being evaluated and are pending completion of laboratory testing. If there is sufficient time available to perform the surcharge (or staged construction), this may be a feasible alternative.

3) In-situ soil improvement and/or use of lightweight materials – There are a variety of specialized methods of improving poor soils such as those encountered in areas 1a and 2a. The most promising (and likely least costly) of these methods is rammed aggregate piers (commonly referred to as geopiers), which consist of drilling numerous large-diameter boreholes (with a grid spacing likely between 5 and 10 feet) and filling the boreholes with granular material that is tamped (compacted) at regular intervals.

   Lightweight materials, such as expanded polystyrene (EPS) or foamed lightweight concrete have also been utilized by WisDOT; however these materials will likely be more costly than other alternatives. Additional information regarding utilization of either in-situ soil improvement or lightweight materials can be provided if this method is to be considered further.

After discussion with WisDOT we concur that option 1 (remove and replace) is a reasonable approach and is therefore recommended to address the poor soil conditions in this area.

4.2 Construction Platform

The soils over most of the project alignment have the potential to become unstable with repeated construction traffic. We recommend that 12 inches of subgrade soils be removed and replaced with Breaker Run to create a stable subgrade on which construction traffic can operate. The creation of a construction platform will reduce the amount of unallocated EBS and marsh excavation indicated in Section 4.1.

4.3 Bedrock Stability and Removal

The proposed alignment in Area 1b (Sta. 204+00 to 214+00) will require significant rock removal, and a rock face will be exposed. The proposed design includes a backslope of 1 horizontal to 1 vertical (45 degree) through the rock cut. A detailed engineering analyses presented in Appendix E concludes that the existing bedrock in Area 1b should be able to safely maintain a 1 horizontal to 1 vertical slope.

As stated in the previous paragraph, a significant amount of rock will need to be removed from Area 1b to achieve the proposed roadway elevation and adjacent slopes. Rock excavation will need to be specifically called out in the project documents. For purposes of quantity estimation, the entire excavation volume slated between stations 204+00 and 214+00 right of the existing roadway should be assumed to consist of rock. Commentary and information regarding rock composition, integrity, and strength is contained in Appendix E. Information regarding rock integrity, stratigraphy, and strength will have a significant impact on removal cost and should be made available to bidders.

There is shallow bedrock in the vicinity of the proposed STH 15 mainline in the vicinity of Olk Street. Although the borings do not indicate a conflict, localized areas of higher bedrock may be encountered during construction, and therefore we consider it prudent that a small quantity of unallocated rock excavation be potentially included in the project documents during final design.

4.4 Pavement Design

WisDOT currently employs a pedological approach to pavement design. This system involves reviewing the USDA soil survey information (Section 3.1) to determine the soil groups occurring along a roadway alignment. Where the grades are significantly lower, the information available from the subsurface exploration was primarily used to determine appropriate pavement parameters. Where the grades will be significantly higher than existing, the assumption was made that the required fill will be conditioned to an acceptable water content range and properly placed and compacted to a required density, as per WisDOT standard specifications. Fill soils may consist of soils cut from elsewhere on the project, but the assumption was made that the soils will not include organic matter.

Although local variations in soil type and USDA classification exist along the alignment, we recommend that the alignment be divided into two sections: Areas 1, 3, and 4 (as defined in Section 3) and Area 2. The recommended pavement parameters for these areas are contained in Table 2. The values in Table 2 assume that the poor subgrade soils identified in Section 4.1 are removed and replaced.

Table 2 – Recommended Pavement Design Parameters		
Soil Parameter	Areas 1, 3, 4	Area 2
	Project stationing 100+00 to 270+00 and 372+00 to 653+00	Project station 270+00 to 372+00
Design Group Index	12	14
Frost Group Index	F-3	F-3
Modulus of Subgrade Reaction, lbs/in^3	150	125
Soil Support Value	4.25	4.00

4.5 Hardpan Soil Removal

As discussed in Section 3.2.3, there is a significant length of the roadway along the eastern portion of the bypass where significant depth of excavation will need to be made into a dense to very dense material comprised of a variable mixture of sand, silt, and gravel. This mixture, commonly referred to as "hardpan", will likely be more difficult for a contractor to remove (perhaps requiring different tools/procedures) and therefore presents an opportunity for contractor claims. We recommend that this material be clearly and explicitly identified in the plans and either (1) explicit language included in the bid documents that clearly requires that the unit rate for excavation should consider excavation of such material, or (2) a separate special provision, pay item, and quantity be established for removal of this material.

4.6 Pond Infilling

There will be several small ponds at approximate stations 178+00, 210+00, 270+00 – 272+00, 297+00 and 616+00 that will need to be filled as part of earthwork activities. Although the ponds are likely not deep, the surface level likely approximates the groundwater surface and therefore can be difficult to dewater. After consultation with WisDOT, we concur that infilling the pond areas can be achieved by placing crushed rock material into standing water. The crushed rock material should consist of granular material with particle size no greater than 18 inches and no more than 25 percent of the material should be finer than the No. 4 sieve. Acceptance of such large aggregate may be difficult to achieve through particle size analyses so visual inspection may also be required for acceptance. This material should extend no more than one foot above the water level. A layer of a smaller-dimension well-graded aggregate (e.g., breaker run) should then be placed to minimize downward particle migration; such a layer should not be less than 18 inches thick. Subsequent fill placement should be in accordance with general project fill requirements.

4.7 Construction Considerations

4.7.1 Clearing, Stripping, and Demolition

All pavement, surfical topsoil, surface vegetation, organic matter, and debris should be removed from areas where work is being performed by the contractor. Snow, ice, and frozen subgrades should also be removed immediately prior to fill placement or roadway construction. Refer to Part 2 (Earthwork), Sections 201 through 206 of the WisDOT Standard Specifications for guidance regarding clearing, grubbing, and structure removal.

4.7.2 Proofrolling

Once site grading has been completed, proofrolling is recommended in areas where new roadway is planned. Proofrolling operations should be performed with a fully-loaded tandem-axle dump truck having a gross weight of at least 50,000 pounds and under the observation of WisDOT or an appointed representative. The purpose of

proofrolling the subgrade is to identify the presence of any soft or unsuitable materials within the upper few feet of the surface. Any areas exhibiting excessive pumping, yielding, or rutting should be removed to a suitable subgrade.

During wet conditions, clayey and silty soils such as those anticipated over much of the alignment may lose strength and stability if they become wet or saturated over a prolonged period of time and/or are disturbed by construction activity. Before new fill is placed, disturbed granular or softened soils could be improved by compaction, or overexcavated and replaced as described in Section 4.7.3. Subgrade contact with standing water should be minimized during the project. Placement of cohesive soils during wet weather conditions is not recommended.

4.7.3 Fill Placement

Fill used to establish subgrades, as described in Section 207 of the WisDOT Standard Specifications should consist of approved, non-frozen, inorganic soil that is free from logs, stumps, brush, or other degradable material, large cobbles, boulders, and rock or other materials that significantly affect scarifying, compacting, and finishing the subgrade.

Fill should be placed in loose horizontal lifts no thicker than 8 inches and compacted. Typically vibratory drum or vibratory plat compactors are appropriate for granular soils, while a sheepsfoot, segmented foot, jumping jack, or other compactor which kneads the soil is appropriate for cohesive soils.

New fill and base course should be compacted according to the WisDOT QMP Grading Specification. The frequency of field density tests is recommended to be increased such that at least one density test is performed for every 2,000 to 4,000 square feet of fill per lift of fill. A one-point proctor in accordance with AASHTO T272 should be performed and compared to the site-specific family of curves developed in accordance with the QMP Grading Specification. If a site-specific family of proctor curves has not been developed, we recommend that a proctor test, in accordance with AASHTO T99, with a minimum of five points be performed and used to establish the maximum dry density and the optimum water content for each material type to which the field testing is compared.

Benching is recommended where embankment is proposed on existing slopes that are steeper than 3H:1V, as per Section 205.3.2 of the WisDOT Standard Specifications. Vertical bench cuts should not exceed 5 feet. Care should be exercised to prevent undermining the existing roadway or adversely affecting other structures and utilities.

Appendix A
Soil Boring Location Diagrams

CH2MHILL
MILWAUKEE, WISCONSIN

LEGEND

ROADWAY SOIL BORING

N

0 200 400
SCALE IN FEET

CANADIAN NATIONAL R.R.

USH 45

B-140

B-1

B-2

B-3

B-4

B-98

B-9

B-7

B-6

B-8

B-5

STH 15

RIVER RD

CROSS RD

LEDGEHILL RD

105' WB
105' EB
110' WB
110' EB
115' WB
115' EB
120' WB
120' EB
125' WB
125' EB
130' WB
130' EB
135' WB
135' EB
140' WB
140' EB
145' WB
145' EB
150' WB
150' EB
155' WB
155' EB

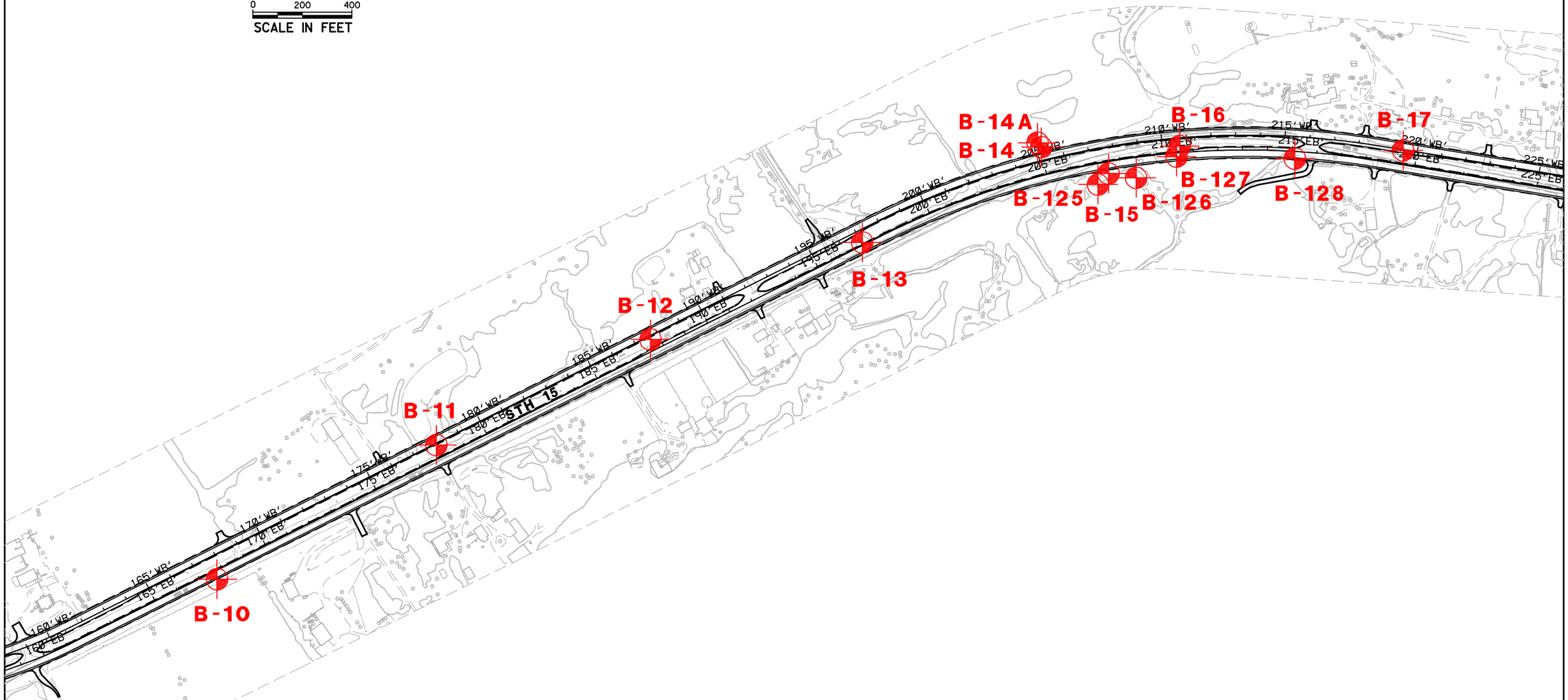
APPENDIX A - BORING LOCATION DIAGRAM (1 OF 9)

FILE NAME : c:\pw_workdir\ch2mhill_tbg\mmorgan\dms94506\STH15_Soil_Plan_1.dgn PLOT DATE : 10-APR-2013 PLOT BY : $$...plotuser...$$ PLOT NAME : PLOT SCALE : 400:1

CH2MHILL
MILWAUKEE, WISCONSIN

N

0 200 400
SCALE IN FEET



LEGEND

ROADWAY SOIL BORING

APPENDIX A - BORING LOCATION DIAGRAM (2 OF 9)

FILE NAME : c:\pw_workdir\ch2mhill_tbg\mmorgan\dms94506\STH15_Soil_Plan_2.dgn PLOT DATE : 10-APR-2013 PLOT BY : $$...plotuser...$$ PLOT NAME : PLOT SCALE : 400:1

CH2MHILL
MILWAUKEE, WISCONSIN

N

0 200 400
SCALE IN FEET

LEGEND

ROADWAY SOIL BORING

B-18
B-19
B-20
B-99
B-21
B-22
B-24
B-23
B-32
B-124
B-129
B-120
B-121
B-122A
B-122
B-123A
B-123
B-33
B-31

STH 15
OLD STH 15 WEST
GIVENS RD
KELLY DR
CANADIAN NATIONAL R.R.

230' WB' 230' EB' 235' WB' 235' EB' 240' WB' 240' EB' 245' WB' 245' EB' 250' WB' 250' EB' 255' WB' 255' EB' 260' WB' 260' EB' 265' WB' 265' EB' 270' WB' 270' EB' 275' WB' 275' EB' 280' WB' 280' EB' 285' WB' 285' EB' 290' WB' 290' EB'

55 60 65 68

APPENDIX A - BORING LOCATION DIAGRAM (3 OF 9)

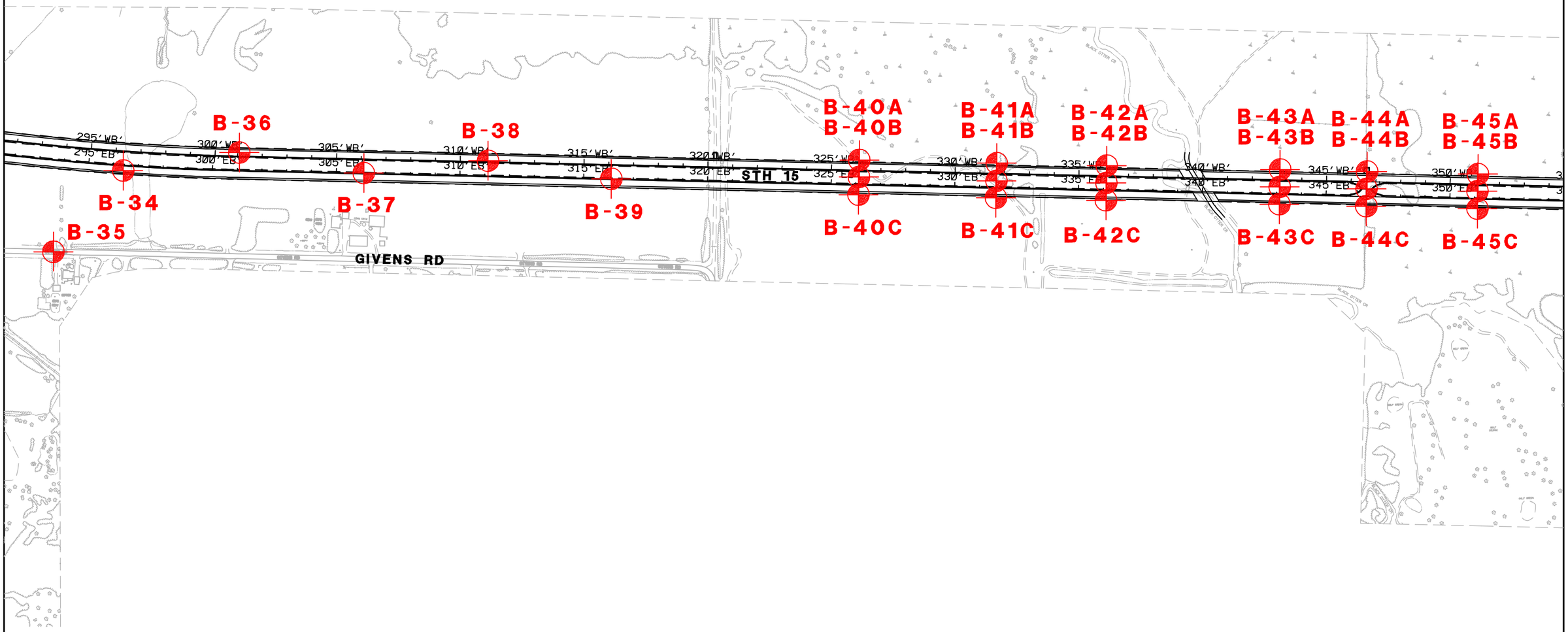
CH2MHILL
MILWAUKEE, WISCONSIN

LEGEND

ROADWAY SOIL BORING

N

0 200 400
SCALE IN FEET



APPENDIX A - BORING LOCATION DIAGRAM (4 OF 9)

CH2MHILL
MILWAUKEE, WISCONSIN

LEGEND

ROADWAY SOIL BORING

N

0 200 400
SCALE IN FEET

B-61
B-61B
B-61A
B-59
B-58
B-60
B-49A
B-50
B-52
B-54
B-62A
B-63
B-49
B-51
B-53
B-54A
B-55
B-56
B-57
B-62
B-63A
B-47A
B-47B
B-48
B-46A
B-47C
B-46B
B-46C

CRESTVIEW DR
N. CREST ST
LONE HICKORY LN
CTH M
STH 15
NASH ST

375' WB'
375' EB'
380' WB'
380' EB'
385' WB'
385' EB'
390' WB'
390' EB'
395' WB'
395' EB'
400' WB'
400' EB'
405' WB'
405' EB'
410' WB'
410' EB'
415' WB'
415' EB'
365' WB'
365' EB'
360' WB'
360' EB'
355' WB'
355' EB'

APPENDIX A - BORING LOCATION DIAGRAM (5 OF 9)

CH2MHILL
MILWAUKEE, WISCONSIN

LEGEND

ROADWAY SOIL BORING

N

0 200 400
SCALE IN FEET

B-64
B-64A
B-65A
B-65
B-67A
B-67
B-68
B-69A
B-69
B-70
B-71
B-72
B-78
B-79
B-80
B-81

420' WB'
420' EB'
425' WB'
425' EB'
430' WB'
430' EB'
435' WB'
435' EB'
440' WB'
440' EB'
445' WB'
445' EB'
450' WB'
450' EB'
455' WB'
455' EB'
460' WB'
460' EB'
465' WB'
465' EB'
470' WB'
470' EB'
475' WB'
475' EB'
480' WB'
480' EB'

STH 15

LOCAL RD

OLD STH 15 EAST
MULTI USE TRAIL

APPENDIX A - BORING LOCATION DIAGRAM (6 OF 9)

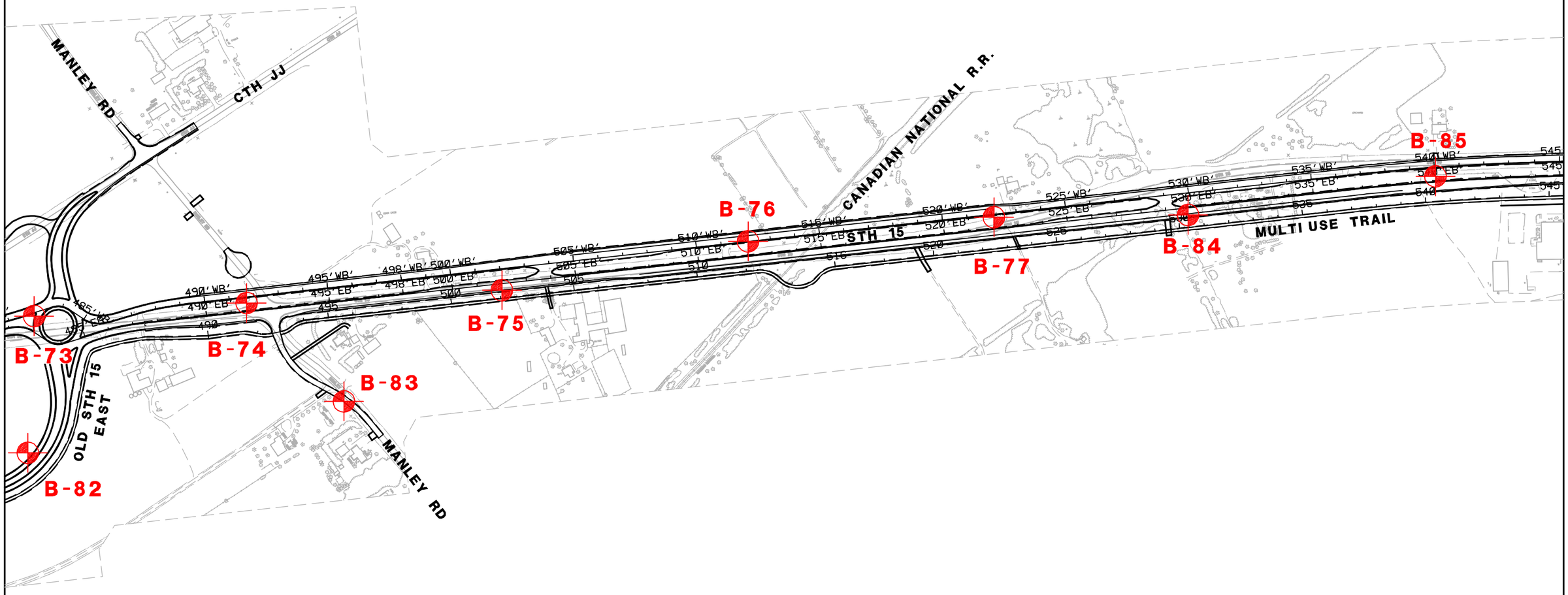
CH2MHILL
MILWAUKEE, WISCONSIN

LEGEND

ROADWAY SOIL BORING

N

0 200 400
SCALE IN FEET



APPENDIX A - BORING LOCATION DIAGRAM (7 OF 9)

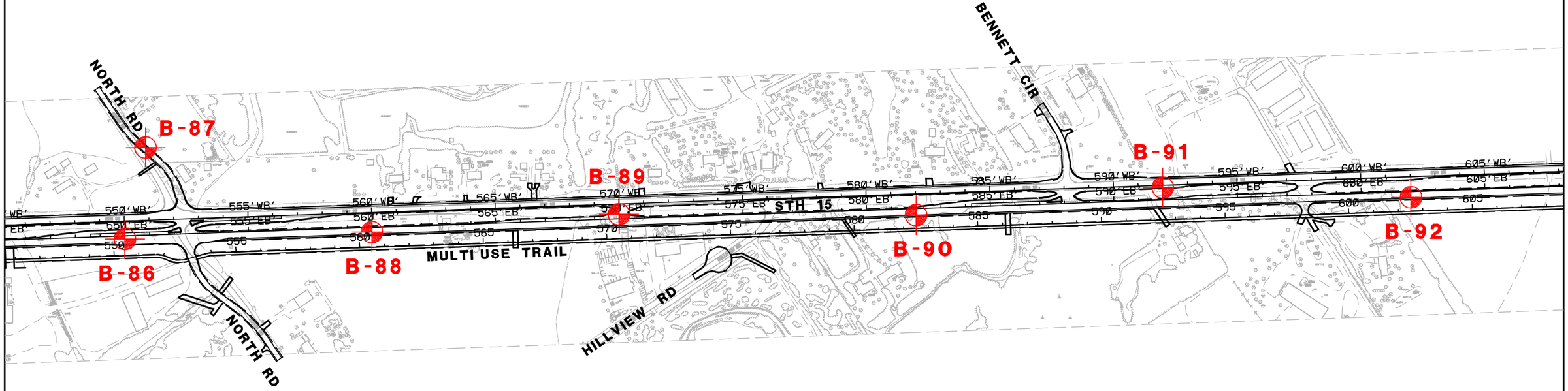
CH2MHILL
MILWAUKEE, WISCONSIN

LEGEND

ROADWAY SOIL BORING

N

0 200 400
SCALE IN FEET



APPENDIX A - BORING LOCATION DIAGRAM (8 OF 9)

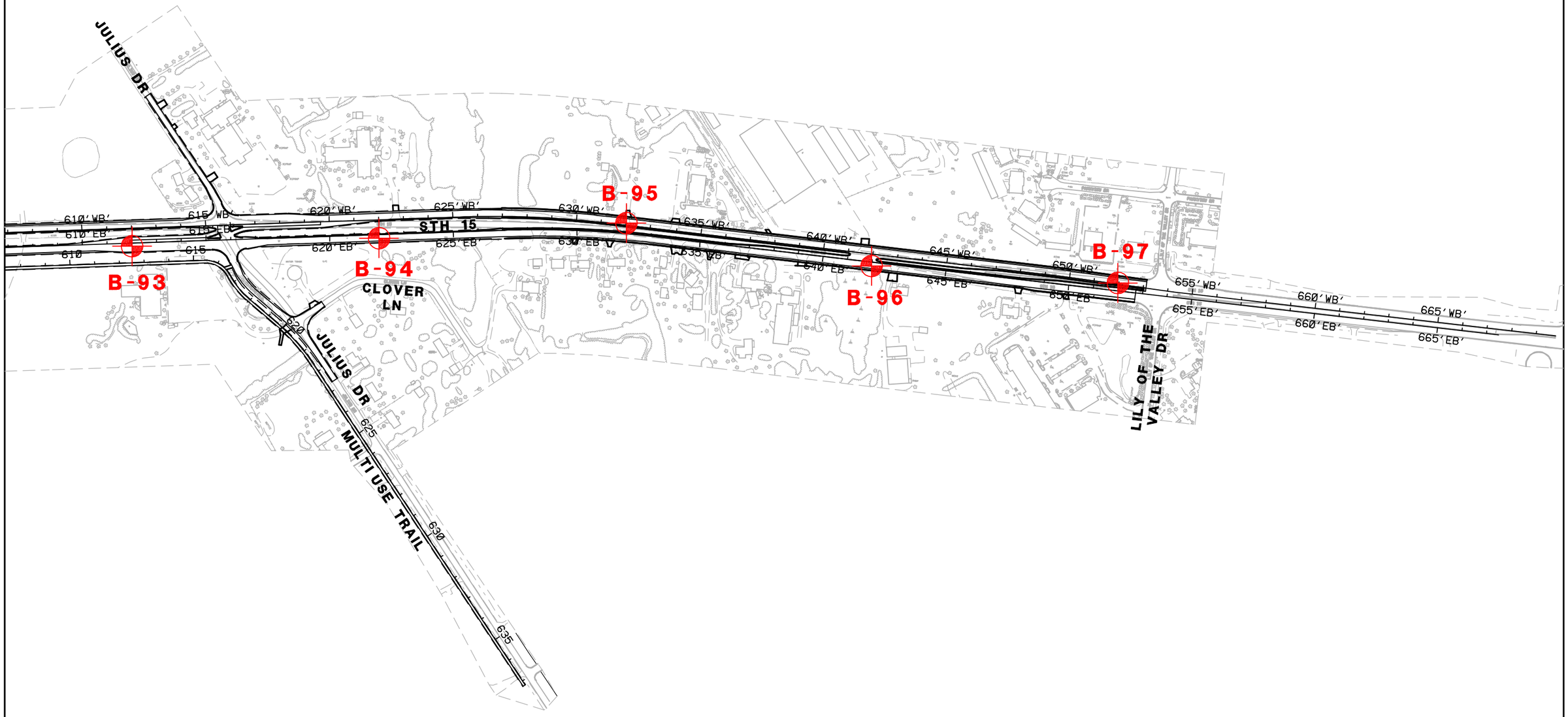
CH2MHILL
MILWAUKEE, WISCONSIN

LEGEND

ROADWAY SOIL BORING

N

0 200 400
SCALE IN FEET



APPENDIX A - BORING LOCATION DIAGRAM (9 OF 9)

Appendix B
USDA Soil Survey Diagrams and Reports

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Outagamie County, Wisconsin



November 4, 2011

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....6
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....11
Map Unit Descriptions.....12
Outagamie County, Wisconsin.....14
AdA—Allendale loamy fine sand, 0 to 3 percent slopes.....14
BnA—Bonduel silt loam, 0 to 3 percent slopes.....14
BoA—Borth silt loam, 0 to 3 percent slopes.....15
BrB—Boyer loamy sand, 2 to 6 percent slopes.....16
CnB—Channahon silt loam, 2 to 6 percent slopes.....17
Fu—Fluvaquents.....18
HnC2—Hortonville fine sandy loam, 6 to 12 percent slopes, eroded.....18
HrB—Hortonville silt loam, 2 to 6 percent slopes.....19
HrC2—Hortonville silt loam, 6 to 12 percent slopes, eroded.....20
HsB—Hortonville silt loam, limestone substratum, 2 to 6 percent slopes…21
Ke—Keowns silt loam.....22
KoB—Kolberg silt loam, 1 to 6 percent slopes.....22
KoC2—Kolberg silt loam, 6 to 12 percent slopes, eroded.....23
McA—Manawa silty clay loam, 1 to 3 percent slopes.....24
MeB—Manistee loamy fine sand, 2 to 6 percent slopes.....25
MeC2—Manistee loamy fine sand, 6 to 12 percent slopes, eroded.....26
Mk—Markey muck.....26
MsB—Menominee loamy fine sand, loamy substratum, 2 to 6 percent slopes.....27
MsC2—Menominee loamy fine sand, loamy substratum, 6 to 12 percent slopes, eroded.....28
NaB—Namur silt loam, 1 to 6 percent slopes.....29
Pe—Pella silt loam.....30
Pf—Poy silty clay loam.....30
Po—Poygan silty clay loam.....31
Ra—Rock outcrop.....32
RoB—Rousseau loamy fine sand, 2 to 6 percent slopes.....32
SeC—Shawano fine sand, rolling.....33
Su—Suamico muck.....34
SyA—Symco silt loam, 1 to 3 percent slopes.....35
Uo—Udorthents.....36
W—Water.....36
WaA—Wainola loamy fine sand, 0 to 3 percent slopes.....37
WnA—Winneconne silty clay loam, 0 to 2 percent slopes.....37
WnB—Winneconne silty clay loam, 2 to 6 percent slopes.....38
ZtA—Zittau silty clay loam, 0 to 3 percent slopes.....39

References.....41

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

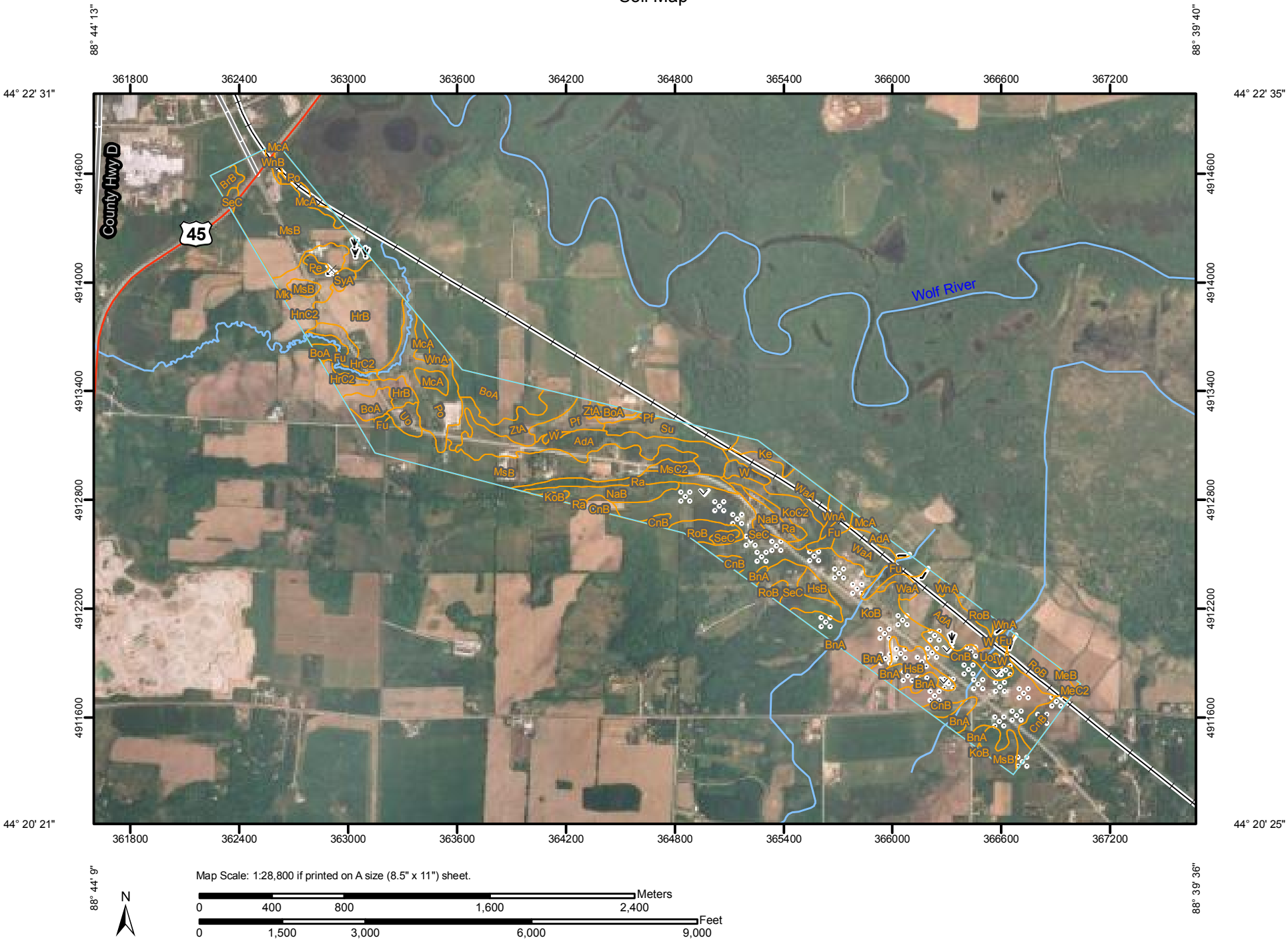
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:28,800 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Outagamie County, Wisconsin
Survey Area Data: Version 5, Mar 10, 2011

Date(s) aerial images were photographed: 6/2/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Outagamie County, Wisconsin (WI087)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AdA	Allendale loamy fine sand, 0 to 3 percent slopes	67.9	8.3%
BnA	Bonduel silt loam, 0 to 3 percent slopes	12.0	1.5%
BoA	Borth silt loam, 0 to 3 percent slopes	34.4	4.2%
BrB	Boyer loamy sand, 2 to 6 percent slopes	4.2	0.5%
CnB	Channahon silt loam, 2 to 6 percent slopes	26.7	3.3%
Fu	Fluvaquents	20.4	2.5%
HnC2	Hortonville fine sandy loam, 6 to 12 percent slopes, eroded	19.4	2.4%
HrB	Hortonville silt loam, 2 to 6 percent slopes	51.3	6.2%
HrC2	Hortonville silt loam, 6 to 12 percent slopes, eroded	9.3	1.1%
HsB	Hortonville silt loam, limestone substratum, 2 to 6 percent slopes	16.5	2.0%
Ke	Keowns silt loam	5.4	0.7%
KoB	Kolberg silt loam, 1 to 6 percent slopes	151.9	18.5%
KoC2	Kolberg silt loam, 6 to 12 percent slopes, eroded	12.9	1.6%
McA	Manawa silty clay loam, 1 to 3 percent slopes	12.1	1.5%
MeB	Manistee loamy fine sand, 2 to 6 percent slopes	0.4	0.1%
MeC2	Manistee loamy fine sand, 6 to 12 percent slopes, eroded	0.4	0.0%
Mk	Markey muck	0.2	0.0%
MsB	Menominee loamy fine sand, loamy substratum, 2 to 6 percent slopes	134.4	16.4%
MsC2	Menominee loamy fine sand, loamy substratum, 6 to 12 percent slopes, eroded	4.3	0.5%
NaB	Namur silt loam, 1 to 6 percent slopes	20.5	2.5%
Pe	Pella silt loam	1.9	0.2%
Pf	Poy silty clay loam	10.1	1.2%
Po	Poygan silty clay loam	35.0	4.3%
Ra	Rock outcrop	17.7	2.2%
RoB	Rousseau loamy fine sand, 2 to 6 percent slopes	27.7	3.4%
SeC	Shawano fine sand, rolling	18.8	2.3%
Su	Suamico muck	16.0	2.0%
SyA	Symco silt loam, 1 to 3 percent slopes	2.6	0.3%
Uo	Udorthents	9.6	1.2%
W	Water	5.4	0.7%
WaA	Wainola loamy fine sand, 0 to 3 percent slopes	36.0	4.4%
WnA	Winneconne silty clay loam, 0 to 2 percent slopes	9.5	1.2%

Outagamie County, Wisconsin (WI087)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
WnB	Winneconne silty clay loam, 2 to 6 percent slopes	2.3	0.3%
ZtA	Zittau silty clay loam, 0 to 3 percent slopes	23.4	2.9%
Totals for Area of Interest		**820.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Outagamie County, Wisconsin

AdA—Allendale loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Allendale and similar soils: 100 percent

Description of Allendale

Setting

Landform: Flats on ground moraines, flats on lake plains, drainageways on ground moraines, drainageways on lake plains
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 10 percent
Available water capacity: Low (about 5.5 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 11 inches: Loamy fine sand
11 to 39 inches: Sand
39 to 60 inches: Silty clay

BnA—Bonduel silt loam, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Bonduel and similar soils: 100 percent

Description of Bonduel

Setting

Landform: Ground moraines
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty loess over loamy till

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Rare
Calcium carbonate, maximum content: 20 percent
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 10 inches: Silt loam
10 to 20 inches: Sandy clay loam
20 to 24 inches: Loam
24 to 28 inches: Bedrock

BoA—Borth silt loam, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Borth and similar soils: 100 percent

Description of Borth

Setting

Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty lacustrine deposits over clayey lacustrine deposits over sandy lacustrine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 24 to 57 inches
Frequency of flooding: None
Frequency of ponding: Rare
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability (nonirrigated): 2s

Typical profile

0 to 18 inches: Silt loam
18 to 33 inches: Silty clay
33 to 60 inches: Sand

BrB—Boyer loamy sand, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Boyer and similar soils: 100 percent

Description of Boyer

Setting

Landform: Outwash plains
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy drift over loamy drift over sandy outwash

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 3s

Typical profile

0 to 7 inches: Loamy sand
7 to 14 inches: Loamy sand
14 to 28 inches: Sandy loam
28 to 60 inches: Sand

CnB—Channahon silt loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Channahon and similar soils: 100 percent

Description of Channahon

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty alluvium over loamy alluvium

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Low (about 3.4 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 11 inches: Silt loam
11 to 18 inches: Clay loam
18 to 22 inches: Bedrock

Fu—Fluvaquents

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Fluvaquents and similar soils: 100 percent

Description of Fluvaquents

Setting

Landform: Flood plains, drainageways
Down-slope shape: Linear
Across-slope shape: Concave

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability (nonirrigated): 6w

Typical profile

0 to 60 inches: Variable

HnC2—Hortonville fine sandy loam, 6 to 12 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Hortonville and similar soils: 100 percent

Description of Hortonville

Setting

Landform: Ground moraines
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy alluvium over silty alluvium over loamy till

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.2 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 8 inches: Fine sandy loam
8 to 27 inches: Clay loam
27 to 60 inches: Loam

HrB—Hortonville silt loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Hortonville and similar soils: 100 percent

Description of Hortonville

Setting

Landform: Ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over loamy till

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.6 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 8 inches: Silt loam
8 to 27 inches: Clay loam
27 to 60 inches: Loam

HrC2—Hortonville silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Hortonville and similar soils: 100 percent

Description of Hortonville

Setting
Landform: Moraines
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over loamy till

Properties and qualities
Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.6 inches)

Interpretive groups
Land capability (nonirrigated): 3e

Typical profile
0 to 8 inches: Silt loam
8 to 27 inches: Clay loam
27 to 60 inches: Loam

HsB—Hortonville silt loam, limestone substratum, 2 to 6 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Hortonville and similar soils: 100 percent

Description of Hortonville

Setting
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope, summit
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over loamy till

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 10 inches: Silt loam
10 to 30 inches: Silty clay loam
30 to 45 inches: Clay loam
45 to 60 inches: Bedrock

Ke—Keowns silt loam

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Keowns and similar soils: 100 percent

Description of Keowns

Setting

Landform: Depressions on lake plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty lacustrine deposits over loamy lacustrine deposits over stratified sandy and silty lacustrine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water capacity: Moderate (about 8.2 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 8 inches: Silt loam
8 to 21 inches: Silt loam
21 to 60 inches: Stratified very fine sand to silt

KoB—Kolberg silt loam, 1 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Kolberg and similar soils: 100 percent

Description of Kolberg

Setting
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty alluvium over clayey till over loamy till

Properties and qualities
Slope: 1 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 9 inches: Silt loam
9 to 22 inches: Clay
22 to 27 inches: Loam
27 to 60 inches: Bedrock

KoC2—Kolberg silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Kolberg and similar soils: 100 percent

Description of Kolberg

Setting
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty alluvium over clayey till over loamy till

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 9 inches: Silt loam
9 to 22 inches: Clay
22 to 27 inches: Loam
27 to 31 inches: Bedrock

McA—Manawa silty clay loam, 1 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Manawa and similar soils: 100 percent

Description of Manawa

Setting

Landform: Drainageways on lake plains, drainageways on ground moraines, depressions on lake plains, depressions on ground moraines
Down-slope shape: Linear, concave
Across-slope shape: Concave
Parent material: Silty loess over clayey till

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: Occasional
Available water capacity: High (about 9.4 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 11 inches: Silty clay loam
11 to 30 inches: Silty clay
30 to 60 inches: Silty clay

MeB—Manistee loamy fine sand, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Manistee and similar soils: 100 percent

Description of Manistee

Setting

Landform: Lake plains, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Moderate (about 6.2 inches)

Interpretive groups

Land capability (nonirrigated): 3s

Typical profile

0 to 14 inches: Loamy fine sand
14 to 31 inches: Sand
31 to 38 inches: Clay
38 to 60 inches: Clay

MeC2—Manistee loamy fine sand, 6 to 12 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Manistee and similar soils: 100 percent

Description of Manistee

Setting

Landform: Ground moraines, lake plains
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Moderate (about 6.2 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 14 inches: Loamy fine sand
14 to 31 inches: Sand
31 to 38 inches: Clay
38 to 60 inches: Clay

Mk—Markey muck

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Markey and similar soils: 100 percent

Description of Markey

Setting
Landform: Depressions on outwash plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over sandy glaciofluvial deposits

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 5 percent
Available water capacity: Very high (about 12.2 inches)

Interpretive groups
Land capability (nonirrigated): 6w

Typical profile
0 to 25 inches: Muck
25 to 60 inches: Sand

MsB—Menominee loamy fine sand, loamy substratum, 2 to 6 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Menominee and similar soils: 100 percent

Description of Menominee

Setting
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 4 inches: Loamy fine sand
4 to 27 inches: Fine sand
27 to 44 inches: Clay loam
44 to 60 inches: Sandy loam

MsC2—Menominee loamy fine sand, loamy substratum, 6 to 12 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Menominee and similar soils: 100 percent

Description of Menominee

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 30 percent
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups
Land capability (nonirrigated): 4e

Typical profile
0 to 4 inches: Loamy fine sand
4 to 27 inches: Fine sand
27 to 44 inches: Clay loam
44 to 60 inches: Sandy loam

NaB—Namur silt loam, 1 to 6 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Namur and similar soils: 100 percent

Description of Namur

Setting
Landform position (two-dimensional): Summit, backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty loess

Properties and qualities
Slope: 1 to 6 percent
Depth to restrictive feature: 5 to 12 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.1 inches)

Interpretive groups
Land capability (nonirrigated): 6s

Typical profile
0 to 5 inches: Silt loam
5 to 9 inches: Bedrock

Pe—Pella silt loam

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Pella and similar soils: 100 percent

Description of Pella

Setting

Landform: Depressions on ground moraines, drainageways on ground moraines
Down-slope shape: Concave, linear
Across-slope shape: Concave
Parent material: Silty alluvium over stratified loamy till

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: High (about 11.5 inches)

Interpretive groups

Land capability (nonirrigated): 6w

Typical profile

0 to 14 inches: Silt loam
14 to 26 inches: Silty clay loam
26 to 29 inches: Stratified sandy loam to silty clay loam
29 to 60 inches: Stratified sandy loam to silty clay loam

Pf—Poy silty clay loam

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Poy and similar soils: 100 percent

Description of Poy

Setting
Landform: Depressions on outwash plains, depressions on lake plains, drainageways on lake plains, drainageways on outwash plains
Down-slope shape: Concave, linear
Across-slope shape: Concave
Parent material: Silty alluvium over clayey lacustrine deposits over sandy lacustrine deposits

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 10 percent
Available water capacity: Low (about 5.7 inches)

Interpretive groups
Land capability (nonirrigated): 2w

Typical profile
0 to 8 inches: Silty clay loam
8 to 24 inches: Clay
24 to 60 inches: Sand

Po—Poygan silty clay loam

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Poygan and similar soils: 100 percent

Description of Poygan

Setting
Landform: Depressions on lake plains, depressions on ground moraines, drainageways on ground moraines, drainageways on lake plains
Down-slope shape: Concave, linear
Across-slope shape: Concave
Parent material: Silty alluvium over clayey till

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water capacity: Moderate (about 8.6 inches)

Interpretive groups

Land capability (nonirrigated): 6w

Typical profile

0 to 8 inches: Silty clay loam
8 to 24 inches: Silty clay
24 to 60 inches: Clay

Ra—Rock outcrop

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Rock outcrop: 100 percent

Description of Rock Outcrop

Properties and qualities

Depth to restrictive feature: 0 to 4 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to very high (0.00 to 19.98 in/hr)

Interpretive groups

Land capability (nonirrigated): 8s

Typical profile

0 to 60 inches: Unweathered bedrock

RoB—Rousseau loamy fine sand, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches

Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Rousseau and similar soils: 100 percent

Description of Rousseau

Setting
Landform: Lake plains, outwash plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy eolian sands

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.9 inches)

Interpretive groups
Land capability (nonirrigated): 4s

Typical profile
0 to 3 inches: Loamy fine sand
3 to 21 inches: Fine sand
21 to 60 inches: Fine sand

SeC—Shawano fine sand, rolling

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Shawano and similar soils: 100 percent

Description of Shawano

Setting
Landform: Dunes on outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Sandy outwash

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 6s

Typical profile

0 to 5 inches: Fine sand
5 to 28 inches: Fine sand
28 to 60 inches: Fine sand

Su—Suamico muck

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Suamico and similar soils: 100 percent

Description of Suamico

Setting

Landform: Lake plains, depressions on ground moraines
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over clayey glaciofluvial deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 20 percent
Available water capacity: Very high (about 15.1 inches)

Interpretive groups

Land capability (nonirrigated): 6w

Typical profile

0 to 26 inches: Muck
26 to 60 inches: Silty clay

SyA—Symco silt loam, 1 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Symco and similar soils: 100 percent

Description of Symco

Setting

Landform: Drainageways on ground moraines, depressions on ground moraines
Down-slope shape: Convex, concave
Across-slope shape: Concave
Parent material: Calcareous loamy till

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Available water capacity: High (about 9.7 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 11 inches: Silt loam
11 to 25 inches: Clay loam
25 to 60 inches: Loam

Uo—Udorthents

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Udorthents and similar soils: 100 percent

Description of Udorthents

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability (nonirrigated): 7e

Typical profile

0 to 60 inches: Variable

W—Water

Map Unit Setting

Elevation: 660 to 980 feet
Mean annual precipitation: 30 to 33 inches
Mean annual air temperature: 37 to 55 degrees F
Frost-free period: 145 to 165 days

Map Unit Composition

Water: 100 percent

Description of Water

Interpretive groups

Other vegetative classification: Not Assigned (water) (Nwat)

WaA—Wainola loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Wainola and similar soils: 100 percent

Description of Wainola

Setting

Landform: Outwash plains, lake plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy glaciofluvial deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 9 inches: Loamy fine sand
9 to 17 inches: Fine sand
17 to 33 inches: Fine sand
33 to 60 inches: Fine sand

WnA—Winneconne silty clay loam, 0 to 2 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Winneconne and similar soils: 100 percent

Description of Winneconne

Setting
Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous clayey lacustrine deposits

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 36 to 70 inches
Frequency of flooding: None
Frequency of ponding: Rare
Available water capacity: Moderate (about 6.7 inches)

Interpretive groups
Land capability (nonirrigated): 3s

Typical profile
0 to 9 inches: Silty clay loam
9 to 31 inches: Clay
31 to 60 inches: Clay

WnB—Winneconne silty clay loam, 2 to 6 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Winneconne and similar soils: 100 percent

Description of Winneconne

Setting
Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous clayey lacustrine deposits

Properties and qualities
Slope: 2 to 6 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.7 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 9 inches: Silty clay loam
9 to 31 inches: Clay
31 to 60 inches: Clay

ZtA—Zittau silty clay loam, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Zittau and similar soils: 100 percent

Description of Zittau

Setting

Landform: Terraces, lake plains
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Clayey lacustrine deposits over sandy glaciofluvial deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Available water capacity: Moderate (about 6.7 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 11 inches: Silty clay loam
11 to 32 inches: Silty clay

32 to 60 inches: Sand

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://soils.usda.gov/

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://soils.usda.gov/

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://soils.usda.gov/

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.glti.nrcs.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://soils.usda.gov/

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

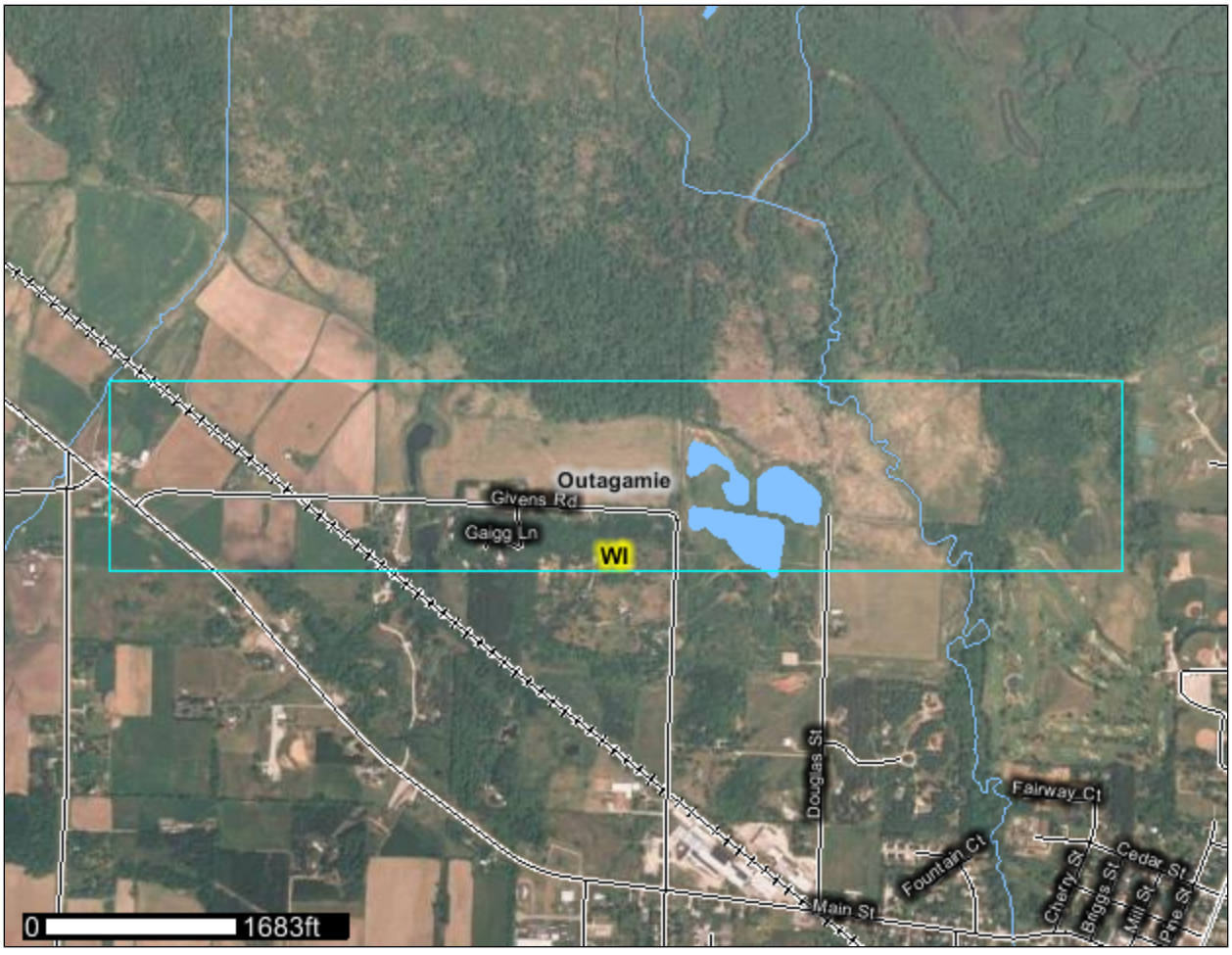
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Outagamie County, Wisconsin



November 4, 2011

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....7
Soil Map (west bypass).....8
Legend.....9
Map Unit Legend (west bypass).....10
Map Unit Descriptions (west bypass).....10
Outagamie County, Wisconsin.....13
AdA—Allendale loamy fine sand, 0 to 3 percent slopes.....13
BnA—Bonduel silt loam, 0 to 3 percent slopes.....13
BoA—Borth silt loam, 0 to 3 percent slopes.....14
Ca—Carbondale muck.....15
CnB—Channahon silt loam, 2 to 6 percent slopes.....16
Fu—Fluvaquents.....16
KaA—Kaukauna silty clay loam, 0 to 3 percent slopes.....17
KoB—Kolberg silt loam, 1 to 6 percent slopes.....18
KoC2—Kolberg silt loam, 6 to 12 percent slopes, eroded.....19
McA—Manawa silty clay loam, 1 to 3 percent slopes.....20
MeB—Manistee loamy fine sand, 2 to 6 percent slopes.....20
MeC2—Manistee loamy fine sand, 6 to 12 percent slopes, eroded.....21
Mk—Markey muck.....22
MsB—Menominee loamy fine sand, loamy substratum, 2 to 6 percent slopes.....23
NaB—Namur silt loam, 1 to 6 percent slopes.....24
Ra—Rock outcrop.....24
RoB—Rousseau loamy fine sand, 2 to 6 percent slopes.....25
SeC—Shawano fine sand, rolling.....26
ShA—Shiocton silt loam, 0 to 3 percent slopes.....26
Su—Suamico muck.....27
Uo—Udorthents.....28
W—Water.....29
WaA—Wainola loamy fine sand, 0 to 3 percent slopes.....29
WnA—Winneconne silty clay loam, 0 to 2 percent slopes.....30
WnB—Winneconne silty clay loam, 2 to 6 percent slopes.....31
References.....32

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

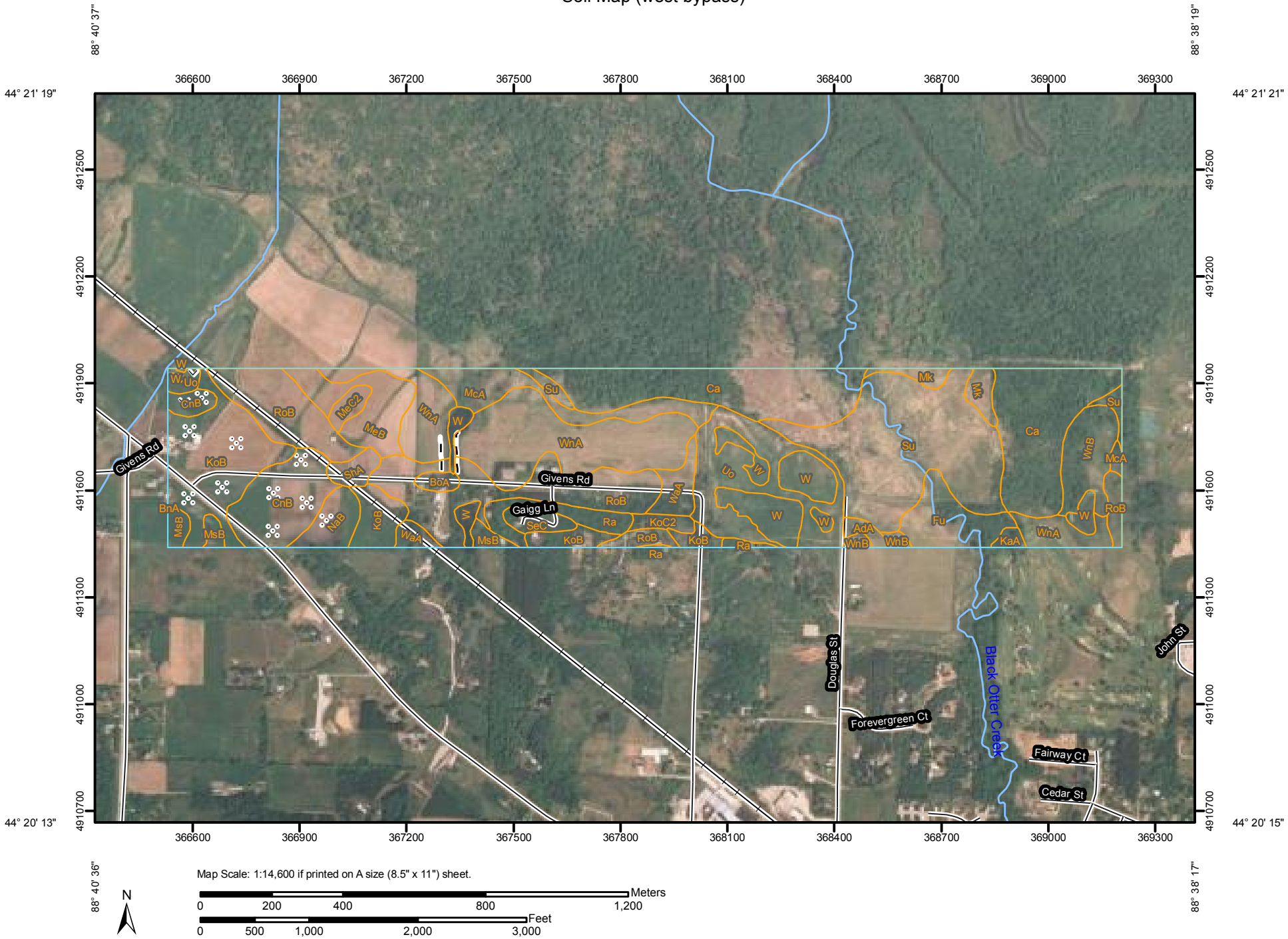
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map (west bypass)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:14,600 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Outagamie County, Wisconsin
Survey Area Data: Version 5, Mar 10, 2011

Date(s) aerial images were photographed: 6/2/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (west bypass)

Outagamie County, Wisconsin (WI087)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AdA	Allendale loamy fine sand, 0 to 3 percent slopes	1.4	0.4%
BnA	Bonduel silt loam, 0 to 3 percent slopes	0.0	0.0%
BoA	Borth silt loam, 0 to 3 percent slopes	1.4	0.4%
Ca	Carbondale muck	47.9	14.4%
CnB	Channahon silt loam, 2 to 6 percent slopes	15.6	4.7%
Fu	Fluvaquents	9.4	2.8%
KaA	Kaukauna silty clay loam, 0 to 3 percent slopes	1.0	0.3%
KoB	Kolberg silt loam, 1 to 6 percent slopes	30.7	9.2%
KoC2	Kolberg silt loam, 6 to 12 percent slopes, eroded	1.9	0.6%
McA	Manawa silty clay loam, 1 to 3 percent slopes	11.2	3.4%
MeB	Manistee loamy fine sand, 2 to 6 percent slopes	10.7	3.2%
MeC2	Manistee loamy fine sand, 6 to 12 percent slopes, eroded	2.0	0.6%
Mk	Markey muck	4.0	1.2%
MsB	Menominee loamy fine sand, loamy substratum, 2 to 6 percent slopes	3.8	1.2%
NaB	Namur silt loam, 1 to 6 percent slopes	4.9	1.5%
Ra	Rock outcrop	6.2	1.8%
RoB	Rousseau loamy fine sand, 2 to 6 percent slopes	38.5	11.6%
SeC	Shawano fine sand, rolling	2.8	0.8%
ShA	Shiocton silt loam, 0 to 3 percent slopes	2.6	0.8%
Su	Suamico muck	43.0	12.9%
Uo	Udorthents	20.5	6.2%
W	Water	16.7	5.0%
WaA	Wainola loamy fine sand, 0 to 3 percent slopes	5.6	1.7%
WnA	Winneconne silty clay loam, 0 to 2 percent slopes	40.6	12.2%
WnB	Winneconne silty clay loam, 2 to 6 percent slopes	10.4	3.1%
Totals for Area of Interest		**332.6**	**100.0%**

Map Unit Descriptions (west bypass)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named

according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or

anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Outagamie County, Wisconsin

AdA—Allendale loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Allendale and similar soils: 100 percent

Description of Allendale

Setting

Landform: Flats on ground moraines, flats on lake plains, drainageways on ground moraines, drainageways on lake plains
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 10 percent
Available water capacity: Low (about 5.5 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 11 inches: Loamy fine sand
11 to 39 inches: Sand
39 to 60 inches: Silty clay

BnA—Bonduel silt loam, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Bonduel and similar soils: 100 percent

Description of Bonduel

Setting

Landform: Ground moraines
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty loess over loamy till

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Rare
Calcium carbonate, maximum content: 20 percent
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 10 inches: Silt loam
10 to 20 inches: Sandy clay loam
20 to 24 inches: Loam
24 to 28 inches: Bedrock

BoA—Borth silt loam, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Borth and similar soils: 100 percent

Description of Borth

Setting

Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty lacustrine deposits over clayey lacustrine deposits over sandy lacustrine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 24 to 57 inches
Frequency of flooding: None
Frequency of ponding: Rare
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability (nonirrigated): 2s

Typical profile

0 to 18 inches: Silt loam
18 to 33 inches: Silty clay
33 to 60 inches: Sand

Ca—Carbondale muck

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Carbondale and similar soils: 100 percent

Description of Carbondale

Setting

Landform: Depressions on ground moraines, depressions on lake plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Very high (about 26.5 inches)

Interpretive groups

Land capability (nonirrigated): 6w

Typical profile
0 to 34 inches: Muck
34 to 60 inches: Mucky peat

CnB—Channahon silt loam, 2 to 6 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Channahon and similar soils: 100 percent

Description of Channahon

Setting
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty alluvium over loamy alluvium

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Low (about 3.4 inches)

Interpretive groups
Land capability (nonirrigated): 3e

Typical profile
0 to 11 inches: Silt loam
11 to 18 inches: Clay loam
18 to 22 inches: Bedrock

Fu—Fluvaquents

Map Unit Setting
Elevation: 590 to 1,010 feet

Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Fluvaquents and similar soils: 100 percent

Description of Fluvaquents

Setting
Landform: Flood plains, drainageways
Down-slope shape: Linear
Across-slope shape: Concave

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups
Land capability (nonirrigated): 6w

Typical profile
0 to 60 inches: Variable

KaA—Kaukauna silty clay loam, 0 to 3 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Kaukauna and similar soils: 100 percent

Description of Kaukauna

Setting
Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty lacustrine deposits over clayey lacustrine deposits over sandy and silty lacustrine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Rare
Available water capacity: High (about 10.5 inches)

Interpretive groups

Land capability (nonirrigated): 2s

Typical profile

0 to 9 inches: Silty clay loam
9 to 27 inches: Clay
27 to 34 inches: Silt loam
34 to 60 inches: Stratified very fine sand to silt

KoB—Kolberg silt loam, 1 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Kolberg and similar soils: 100 percent

Description of Kolberg

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty alluvium over clayey till over loamy till

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 9 inches: Silt loam
9 to 22 inches: Clay
22 to 27 inches: Loam
27 to 60 inches: Bedrock

KoC2—Kolberg silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Kolberg and similar soils: 100 percent

Description of Kolberg

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty alluvium over clayey till over loamy till

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 9 inches: Silt loam
9 to 22 inches: Clay
22 to 27 inches: Loam
27 to 31 inches: Bedrock

McA—Manawa silty clay loam, 1 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Manawa and similar soils: 100 percent

Description of Manawa

Setting

Landform: Drainageways on lake plains, drainageways on ground moraines, depressions on lake plains, depressions on ground moraines
Down-slope shape: Linear, concave
Across-slope shape: Concave
Parent material: Silty loess over clayey till

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: Occasional
Available water capacity: High (about 9.4 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 11 inches: Silty clay loam
11 to 30 inches: Silty clay
30 to 60 inches: Silty clay

MeB—Manistee loamy fine sand, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Manistee and similar soils: 100 percent

Description of Manistee

Setting
Landform: Lake plains, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Moderate (about 6.2 inches)

Interpretive groups
Land capability (nonirrigated): 3s

Typical profile
0 to 14 inches: Loamy fine sand
14 to 31 inches: Sand
31 to 38 inches: Clay
38 to 60 inches: Clay

MeC2—Manistee loamy fine sand, 6 to 12 percent slopes, eroded

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Manistee and similar soils: 100 percent

Description of Manistee

Setting
Landform: Ground moraines, lake plains
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Moderate (about 6.2 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 14 inches: Loamy fine sand
14 to 31 inches: Sand
31 to 38 inches: Clay
38 to 60 inches: Clay

Mk—Markey muck

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Markey and similar soils: 100 percent

Description of Markey

Setting

Landform: Depressions on outwash plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over sandy glaciofluvial deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 5 percent
Available water capacity: Very high (about 12.2 inches)

Interpretive groups
Land capability (nonirrigated): 6w

Typical profile
0 to 25 inches: Muck
25 to 60 inches: Sand

MsB—Menominee loamy fine sand, loamy substratum, 2 to 6 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Menominee and similar soils: 100 percent

Description of Menominee

Setting
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups
Land capability (nonirrigated): 3e

Typical profile
0 to 4 inches: Loamy fine sand
4 to 27 inches: Fine sand
27 to 44 inches: Clay loam
44 to 60 inches: Sandy loam

NaB—Namur silt loam, 1 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Namur and similar soils: 100 percent

Description of Namur

Setting

Landform position (two-dimensional): Summit, backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty loess

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: 5 to 12 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.1 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 5 inches: Silt loam
5 to 9 inches: Bedrock

Ra—Rock outcrop

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Rock outcrop: 100 percent

Description of Rock Outcrop

Properties and qualities

Depth to restrictive feature: 0 to 4 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to very high (0.00 to 19.98 in/hr)

Interpretive groups

Land capability (nonirrigated): 8s

Typical profile

0 to 60 inches: Unweathered bedrock

RoB—Rousseau loamy fine sand, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Rousseau and similar soils: 100 percent

Description of Rousseau

Setting

Landform: Lake plains, outwash plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy eolian sands

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.9 inches)

Interpretive groups

Land capability (nonirrigated): 4s

Typical profile

0 to 3 inches: Loamy fine sand
3 to 21 inches: Fine sand
21 to 60 inches: Fine sand

SeC—Shawano fine sand, rolling

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Shawano and similar soils: 100 percent

Description of Shawano

Setting

Landform: Dunes on outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Sandy outwash

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 6s

Typical profile

0 to 5 inches: Fine sand
5 to 28 inches: Fine sand
28 to 60 inches: Fine sand

ShA—Shiocton silt loam, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Shiocton and similar soils: 100 percent

Description of Shiocton

Setting
Landform: Lake plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Silty lacustrine deposits over stratified sandy and silty lacustrine deposits

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Occasional
Frequency of ponding: Frequent
Available water capacity: High (about 9.1 inches)

Interpretive groups
Land capability (nonirrigated): 2w

Typical profile
0 to 10 inches: Silt loam
10 to 26 inches: Silt loam
26 to 60 inches: Stratified very fine sand to silt

Su—Suamico muck

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Suamico and similar soils: 100 percent

Description of Suamico

Setting
Landform: Lake plains, depressions on ground moraines
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over clayey glaciofluvial deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 20 percent
Available water capacity: Very high (about 15.1 inches)

Interpretive groups

Land capability (nonirrigated): 6w

Typical profile

0 to 26 inches: Muck
26 to 60 inches: Silty clay

Uo—Udorthents

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Udorthents and similar soils: 100 percent

Description of Udorthents

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability (nonirrigated): 7e

Typical profile

0 to 60 inches: Variable

W—Water

Map Unit Setting

Elevation: 660 to 980 feet
Mean annual precipitation: 30 to 33 inches
Mean annual air temperature: 37 to 55 degrees F
Frost-free period: 145 to 165 days

Map Unit Composition

Water: 100 percent

Description of Water

Interpretive groups

Other vegetative classification: Not Assigned (water) (Nwat)

WaA—Wainola loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Wainola and similar soils: 100 percent

Description of Wainola

Setting

Landform: Outwash plains, lake plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy glaciofluvial deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 9 inches: Loamy fine sand
9 to 17 inches: Fine sand
17 to 33 inches: Fine sand
33 to 60 inches: Fine sand

WnA—Winneconne silty clay loam, 0 to 2 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Winneconne and similar soils: 100 percent

Description of Winneconne

Setting

Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous clayey lacustrine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 36 to 70 inches
Frequency of flooding: None
Frequency of ponding: Rare
Available water capacity: Moderate (about 6.7 inches)

Interpretive groups

Land capability (nonirrigated): 3s

Typical profile

0 to 9 inches: Silty clay loam
9 to 31 inches: Clay
31 to 60 inches: Clay

WnB—Winneconne silty clay loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Winneconne and similar soils: 100 percent

Description of Winneconne

Setting

Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous clayey lacustrine deposits

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.7 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 9 inches: Silty clay loam
9 to 31 inches: Clay
31 to 60 inches: Clay

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://soils.usda.gov/

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://soils.usda.gov/

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://soils.usda.gov/

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.glti.nrcs.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://soils.usda.gov/

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Outagamie County, Wisconsin

east bypass



November 4, 2011

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....6
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....11
Map Unit Descriptions.....12
Outagamie County, Wisconsin.....14
AdA—Allendale loamy fine sand, 0 to 3 percent slopes.....14
BrB—Boyer loamy sand, 2 to 6 percent slopes.....14
Ca—Carbondale muck.....15
CcC2—Casco loam, 6 to 12 percent slopes, eroded.....16
CcD2—Casco loam, 12 to 20 percent slopes, eroded.....17
Cm—Cathro muck.....17
Fu—Fluvaquents.....18
Gp—Gravel pits.....19
HnB—Hortonville fine sandy loam, 2 to 6 percent slopes.....19
HrB—Hortonville silt loam, 2 to 6 percent slopes.....20
HrC2—Hortonville silt loam, 6 to 12 percent slopes, eroded.....21
HrD2—Hortonville silt loam, 12 to 20 percent slopes, eroded.....22
HrE—Hortonville silt loam, 20 to 30 percent slopes.....23
KaA—Kaukauna silty clay loam, 0 to 3 percent slopes.....23
KoB—Kolberg silt loam, 1 to 6 percent slopes.....24
KoC2—Kolberg silt loam, 6 to 12 percent slopes, eroded.....25
LDF—Landfill.....26
McA—Manawa silty clay loam, 1 to 3 percent slopes.....26
MeB—Manistee loamy fine sand, 2 to 6 percent slopes.....27
MfB—Manistee fine sandy loam, 2 to 6 percent slopes.....28
MsB—Menominee loamy fine sand, loamy substratum, 2 to 6 percent slopes.....29
MsC2—Menominee loamy fine sand, loamy substratum, 6 to 12 percent slopes, eroded.....29
Pe—Pella silt loam.....30
Ra—Rock outcrop.....31
RoB—Rousseau loamy fine sand, 2 to 6 percent slopes.....32
SeC—Shawano fine sand, rolling.....32
SeD—Shawano fine sand, hilly.....33
SP—Sand pit.....34
Su—Suamico muck.....34
SyA—Symco silt loam, 1 to 3 percent slopes.....35
Uf—Udifluvents.....36
Uo—Udorthents.....37
W—Water.....37
WaA—Wainola loamy fine sand, 0 to 3 percent slopes.....38

WnA—Winneconne silty clay loam, 0 to 2 percent slopes.....38
WnB—Winneconne silty clay loam, 2 to 6 percent slopes.....39
ZtA—Zittau silty clay loam, 0 to 3 percent slopes.....40
References.....42

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

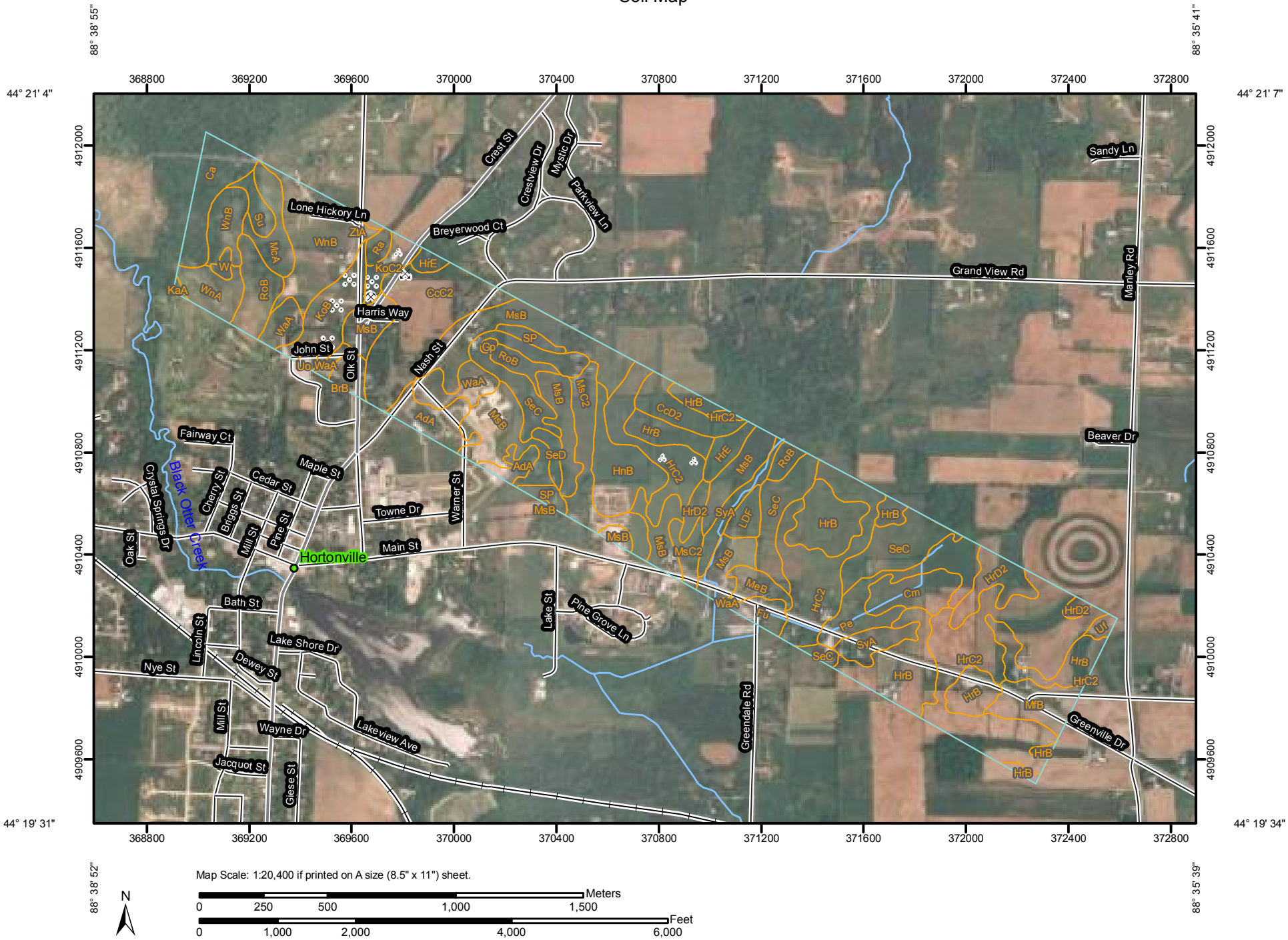
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:20,400 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 250 500 1,000 1,500

Feet: 0 1,000 2,000 4,000 6,000

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:20,400 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Outagamie County, Wisconsin
Survey Area Data: Version 5, Mar 10, 2011

Date(s) aerial images were photographed: 6/2/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Outagamie County, Wisconsin (WI087)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AdA	Allendale loamy fine sand, 0 to 3 percent slopes	14.5	2.2%
BrB	Boyer loamy sand, 2 to 6 percent slopes	4.4	0.7%
Ca	Carbondale muck	15.2	2.3%
CcC2	Casco loam, 6 to 12 percent slopes, eroded	37.0	5.7%
CcD2	Casco loam, 12 to 20 percent slopes, eroded	10.2	1.6%
Cm	Cathro muck	11.4	1.7%
Fu	Fluvaquents	5.2	0.8%
Gp	Gravel pits	0.7	0.1%
HnB	Hortonville fine sandy loam, 2 to 6 percent slopes	17.5	2.7%
HrB	Hortonville silt loam, 2 to 6 percent slopes	66.7	10.3%
HrC2	Hortonville silt loam, 6 to 12 percent slopes, eroded	102.8	15.8%
HrD2	Hortonville silt loam, 12 to 20 percent slopes, eroded	14.5	2.2%
HrE	Hortonville silt loam, 20 to 30 percent slopes	7.1	1.1%
KaA	Kaukauna silty clay loam, 0 to 3 percent slopes	0.5	0.1%
KoB	Kolberg silt loam, 1 to 6 percent slopes	15.3	2.4%
KoC2	Kolberg silt loam, 6 to 12 percent slopes, eroded	5.8	0.9%
LDF	Landfill	4.7	0.7%
McA	Manawa silty clay loam, 1 to 3 percent slopes	9.8	1.5%
MeB	Manistee loamy fine sand, 2 to 6 percent slopes	5.4	0.8%
MfB	Manistee fine sandy loam, 2 to 6 percent slopes	11.9	1.8%
MsB	Menominee loamy fine sand, loamy substratum, 2 to 6 percent slopes	86.6	13.3%
MsC2	Menominee loamy fine sand, loamy substratum, 6 to 12 percent slopes, eroded	22.5	3.5%
Pe	Pella silt loam	18.7	2.9%
Ra	Rock outcrop	2.7	0.4%
RoB	Rousseau loamy fine sand, 2 to 6 percent slopes	18.4	2.8%
SeC	Shawano fine sand, rolling	45.7	7.0%
SeD	Shawano fine sand, hilly	3.0	0.5%
SP	Sand pit	5.4	0.8%
Su	Suamico muck	4.4	0.7%
SyA	Symco silt loam, 1 to 3 percent slopes	13.4	2.1%
Uf	Udifluvents	1.8	0.3%
Uo	Udorthents	1.0	0.2%
W	Water	1.5	0.2%

Outagamie County, Wisconsin (WI087)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
WaA	Wainola loamy fine sand, 0 to 3 percent slopes	16.3	2.5%
WnA	Winneconne silty clay loam, 0 to 2 percent slopes	9.5	1.5%
WnB	Winneconne silty clay loam, 2 to 6 percent slopes	36.7	5.7%
ZtA	Zittau silty clay loam, 0 to 3 percent slopes	0.7	0.1%
Totals for Area of Interest		**649.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Outagamie County, Wisconsin

AdA—Allendale loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Allendale and similar soils: 100 percent

Description of Allendale

Setting

Landform: Flats on ground moraines, flats on lake plains, drainageways on ground moraines, drainageways on lake plains
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 10 percent
Available water capacity: Low (about 5.5 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 11 inches: Loamy fine sand
11 to 39 inches: Sand
39 to 60 inches: Silty clay

BrB—Boyer loamy sand, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Boyer and similar soils: 100 percent

Description of Boyer

Setting

Landform: Outwash plains
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy drift over loamy drift over sandy outwash

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 3s

Typical profile

0 to 7 inches: Loamy sand
7 to 14 inches: Loamy sand
14 to 28 inches: Sandy loam
28 to 60 inches: Sand

Ca—Carbondale muck

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Carbondale and similar soils: 100 percent

Description of Carbondale

Setting

Landform: Depressions on ground moraines, depressions on lake plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Very high (about 26.5 inches)

Interpretive groups
Land capability (nonirrigated): 6w

Typical profile
0 to 34 inches: Muck
34 to 60 inches: Mucky peat

CcC2—Casco loam, 6 to 12 percent slopes, eroded

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Casco and similar soils: 100 percent

Description of Casco

Setting
Landform: Eskers on outwash plains, kames on outwash plains
Landform position (two-dimensional): Backslope, shoulder, summit
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium over stratified sandy and gravelly outwash

Properties and qualities
Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Low (about 4.4 inches)

Interpretive groups
Land capability (nonirrigated): 4e

Typical profile
0 to 7 inches: Loam
7 to 19 inches: Clay loam
19 to 60 inches: Error

CcD2—Casco loam, 12 to 20 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Casco and similar soils: 100 percent

Description of Casco

Setting

Landform: Eskers on outwash plains, kames on outwash plains
Landform position (two-dimensional): Backslope, shoulder, summit
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium over stratified sandy and gravelly outwash

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Low (about 4.4 inches)

Interpretive groups

Land capability (nonirrigated): 6e

Typical profile

0 to 7 inches: Loam
7 to 19 inches: Clay loam
19 to 60 inches: Error

Cm—Cathro muck

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Cathro and similar soils: 100 percent

Description of Cathro

Setting
Landform: Depressions on lake plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over silty glaciofluvial deposits

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Available water capacity: Very high (about 17.8 inches)

Interpretive groups
Land capability (nonirrigated): 6w

Typical profile
0 to 33 inches: Muck
33 to 60 inches: Loam

Fu—Fluvaquents

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Fluvaquents and similar soils: 100 percent

Description of Fluvaquents

Setting
Landform: Flood plains, drainageways
Down-slope shape: Linear
Across-slope shape: Concave

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups
Land capability (nonirrigated): 6w

Typical profile
0 to 60 inches: Variable

Gp—Gravel pits

Map Unit Setting
Elevation: 660 to 980 feet
Mean annual precipitation: 30 to 38 inches
Mean annual air temperature: 43 to 48 degrees F
Frost-free period: 150 to 190 days

Map Unit Composition
Pits, gravel: 99 percent
Minor components: 1 percent

Description of Pits, Gravel

Setting
Parent material: Gravelly outwash

Interpretive groups
Land capability (nonirrigated): 8s
Other vegetative classification: Not Assigned (other map units) (Noth)

Typical profile
0 to 10 inches: Stratified extremely gravelly coarse sand to very gravelly sand

Minor Components

Aquents
Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip

HnB—Hortonville fine sandy loam, 2 to 6 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet

Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Hortonville and similar soils: 100 percent

Description of Hortonville

Setting
Landform: Ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy alluvium over silty alluvium over loamy till

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.2 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 8 inches: Fine sandy loam
8 to 27 inches: Clay loam
27 to 60 inches: Loam

HrB—Hortonville silt loam, 2 to 6 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Hortonville and similar soils: 100 percent

Description of Hortonville

Setting
Landform: Ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Silty loess over loamy till

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 8 inches: Silt loam
8 to 27 inches: Clay loam
27 to 60 inches: Loam

HrC2—Hortonville silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Hortonville and similar soils: 100 percent

Description of Hortonville

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over loamy till

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent

Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 8 inches: Silt loam
8 to 27 inches: Clay loam
27 to 60 inches: Loam

HrD2—Hortonville silt loam, 12 to 20 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Hortonville and similar soils: 100 percent

Description of Hortonville

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over loamy till

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability (nonirrigated): 4e

Typical profile

0 to 8 inches: Silt loam
8 to 27 inches: Clay loam
27 to 60 inches: Loam

HrE—Hortonville silt loam, 20 to 30 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Hortonville and similar soils: 100 percent

Description of Hortonville

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over loamy till

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability (nonirrigated): 6e

Typical profile

0 to 8 inches: Silt loam
8 to 27 inches: Clay loam
27 to 60 inches: Loam

KaA—Kaukauna silty clay loam, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Kaukauna and similar soils: 100 percent

Description of Kaukauna

Setting
Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty lacustrine deposits over clayey lacustrine deposits over sandy and silty lacustrine deposits

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Rare
Available water capacity: High (about 10.5 inches)

Interpretive groups
Land capability (nonirrigated): 2s

Typical profile
0 to 9 inches: Silty clay loam
9 to 27 inches: Clay
27 to 34 inches: Silt loam
34 to 60 inches: Stratified very fine sand to silt

KoB—Kolberg silt loam, 1 to 6 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Kolberg and similar soils: 100 percent

Description of Kolberg

Setting
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty alluvium over clayey till over loamy till

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 9 inches: Silt loam
9 to 22 inches: Clay
22 to 27 inches: Loam
27 to 60 inches: Bedrock

KoC2—Kolberg silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Kolberg and similar soils: 100 percent

Description of Kolberg

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty alluvium over clayey till over loamy till

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups
Land capability (nonirrigated): 3e

Typical profile
0 to 9 inches: Silt loam
9 to 22 inches: Clay
22 to 27 inches: Loam
27 to 31 inches: Bedrock

LDF—Landfill

Map Unit Setting
Elevation: 660 to 980 feet
Mean annual precipitation: 30 to 38 inches
Mean annual air temperature: 43 to 48 degrees F
Frost-free period: 150 to 190 days

Map Unit Composition
Urban land, landfill: 100 percent

Description of Urban Land, Landfill

Setting
Parent material: Human transported material

Interpretive groups
Land capability (nonirrigated): 8s

McA—Manawa silty clay loam, 1 to 3 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Manawa and similar soils: 100 percent

Description of Manawa

Setting
Landform: Drainageways on lake plains, drainageways on ground moraines, depressions on lake plains, depressions on ground moraines
Down-slope shape: Linear, concave
Across-slope shape: Concave
Parent material: Silty loess over clayey till

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: Occasional
Available water capacity: High (about 9.4 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 11 inches: Silty clay loam
11 to 30 inches: Silty clay
30 to 60 inches: Silty clay

MeB—Manistee loamy fine sand, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Manistee and similar soils: 100 percent

Description of Manistee

Setting

Landform: Lake plains, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Moderate (about 6.2 inches)

Interpretive groups

Land capability (nonirrigated): 3s

Typical profile

0 to 14 inches: Loamy fine sand
14 to 31 inches: Sand
31 to 38 inches: Clay
38 to 60 inches: Clay

MfB—Manistee fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Manistee and similar soils: 100 percent

Description of Manistee

Setting

Landform: Ground moraines, lake plains
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy lacustrine deposits over sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Moderate (about 7.1 inches)

Interpretive groups

Land capability (nonirrigated): 3s

Typical profile

0 to 14 inches: Fine sandy loam
14 to 31 inches: Sand
31 to 38 inches: Clay
38 to 60 inches: Clay

MsB—Menominee loamy fine sand, loamy substratum, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Menominee and similar soils: 100 percent

Description of Menominee

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 4 inches: Loamy fine sand
4 to 27 inches: Fine sand
27 to 44 inches: Clay loam
44 to 60 inches: Sandy loam

MsC2—Menominee loamy fine sand, loamy substratum, 6 to 12 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 1,010 feet

Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Menominee and similar soils: 100 percent

Description of Menominee

Setting
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities
Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups
Land capability (nonirrigated): 4e

Typical profile
0 to 4 inches: Loamy fine sand
4 to 27 inches: Fine sand
27 to 44 inches: Clay loam
44 to 60 inches: Sandy loam

Pe—Pella silt loam

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Pella and similar soils: 100 percent

Description of Pella

Setting
Landform: Depressions on ground moraines, drainageways on ground moraines
Down-slope shape: Concave, linear

Across-slope shape: Concave
Parent material: Silty alluvium over stratified loamy till

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: High (about 11.5 inches)

Interpretive groups
Land capability (nonirrigated): 6w

Typical profile
0 to 14 inches: Silt loam
14 to 26 inches: Silty clay loam
26 to 29 inches: Stratified sandy loam to silty clay loam
29 to 60 inches: Stratified sandy loam to silty clay loam

Ra—Rock outcrop

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Rock outcrop: 100 percent

Description of Rock Outcrop

Properties and qualities
Depth to restrictive feature: 0 to 4 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to very high (0.00 to 19.98 in/hr)

Interpretive groups
Land capability (nonirrigated): 8s

Typical profile
0 to 60 inches: Unweathered bedrock

RoB—Rousseau loamy fine sand, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Rousseau and similar soils: 100 percent

Description of Rousseau

Setting

Landform: Lake plains, outwash plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy eolian sands

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.9 inches)

Interpretive groups

Land capability (nonirrigated): 4s

Typical profile

0 to 3 inches: Loamy fine sand
3 to 21 inches: Fine sand
21 to 60 inches: Fine sand

SeC—Shawano fine sand, rolling

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Shawano and similar soils: 100 percent

Description of Shawano

Setting
Landform: Dunes on outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Sandy outwash

Properties and qualities
Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups
Land capability classification (irrigated): 4e
Land capability (nonirrigated): 6s

Typical profile
0 to 5 inches: Fine sand
5 to 28 inches: Fine sand
28 to 60 inches: Fine sand

SeD—Shawano fine sand, hilly

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Shawano and similar soils: 100 percent

Description of Shawano

Setting
Landform: Dunes on outwash plains
Landform position (two-dimensional): Shoulder, summit, backslope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy outwash

Properties and qualities

Slope: 12 to 35 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability (nonirrigated): 7s

Typical profile

0 to 5 inches: Fine sand
5 to 28 inches: Fine sand
28 to 60 inches: Fine sand

SP—Sand pit

Map Unit Setting

Elevation: 760 to 1,310 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Pits, sand: 100 percent

Description of Pits, Sand

Setting

Parent material: Sandy and gravelly outwash

Interpretive groups

Land capability (nonirrigated): 8s

Typical profile

0 to 30 inches: Sand

Su—Suamico muck

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Suamico and similar soils: 100 percent

Description of Suamico

Setting
Landform: Lake plains, depressions on ground moraines
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over clayey glaciofluvial deposits

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 20 percent
Available water capacity: Very high (about 15.1 inches)

Interpretive groups
Land capability (nonirrigated): 6w

Typical profile
0 to 26 inches: Muck
26 to 60 inches: Silty clay

SyA—Symco silt loam, 1 to 3 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Symco and similar soils: 100 percent

Description of Symco

Setting
Landform: Drainageways on ground moraines, depressions on ground moraines
Down-slope shape: Convex, concave
Across-slope shape: Concave
Parent material: Calcareous loamy till

Properties and qualities
Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Available water capacity: High (about 9.7 inches)

Interpretive groups
Land capability (nonirrigated): 2w

Typical profile
0 to 11 inches: Silt loam
11 to 25 inches: Clay loam
25 to 60 inches: Loam

Uf—Udifluvents

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Udifluvents and similar soils: 100 percent

Description of Udifluvents

Setting
Landform: Flood plains

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water capacity: High (about 9.6 inches)

Interpretive groups
Land capability (nonirrigated): 3w

Typical profile
0 to 60 inches: Variable

Uo—Udorthents

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Udorthents and similar soils: 100 percent

Description of Udorthents

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability (nonirrigated): 7e

Typical profile

0 to 60 inches: Variable

W—Water

Map Unit Setting

Elevation: 660 to 980 feet
Mean annual precipitation: 30 to 33 inches
Mean annual air temperature: 37 to 55 degrees F
Frost-free period: 145 to 165 days

Map Unit Composition

Water: 100 percent

Description of Water

Interpretive groups

Other vegetative classification: Not Assigned (water) (Nwat)

WaA—Wainola loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Wainola and similar soils: 100 percent

Description of Wainola

Setting

Landform: Outwash plains, lake plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy glaciofluvial deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 9 inches: Loamy fine sand
9 to 17 inches: Fine sand
17 to 33 inches: Fine sand
33 to 60 inches: Fine sand

WnA—Winneconne silty clay loam, 0 to 2 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Winneconne and similar soils: 100 percent

Description of Winneconne

Setting
Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous clayey lacustrine deposits

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 36 to 70 inches
Frequency of flooding: None
Frequency of ponding: Rare
Available water capacity: Moderate (about 6.7 inches)

Interpretive groups
Land capability (nonirrigated): 3s

Typical profile
0 to 9 inches: Silty clay loam
9 to 31 inches: Clay
31 to 60 inches: Clay

WnB—Winneconne silty clay loam, 2 to 6 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Winneconne and similar soils: 100 percent

Description of Winneconne

Setting
Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous clayey lacustrine deposits

Properties and qualities
Slope: 2 to 6 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.7 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 9 inches: Silty clay loam
9 to 31 inches: Clay
31 to 60 inches: Clay

ZtA—Zittau silty clay loam, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Zittau and similar soils: 100 percent

Description of Zittau

Setting

Landform: Terraces, lake plains
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Clayey lacustrine deposits over sandy glaciofluvial deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Available water capacity: Moderate (about 6.7 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 11 inches: Silty clay loam
11 to 32 inches: Silty clay

32 to 60 inches: Sand

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://soils.usda.gov/

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://soils.usda.gov/

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://soils.usda.gov/

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.glti.nrcs.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://soils.usda.gov/

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

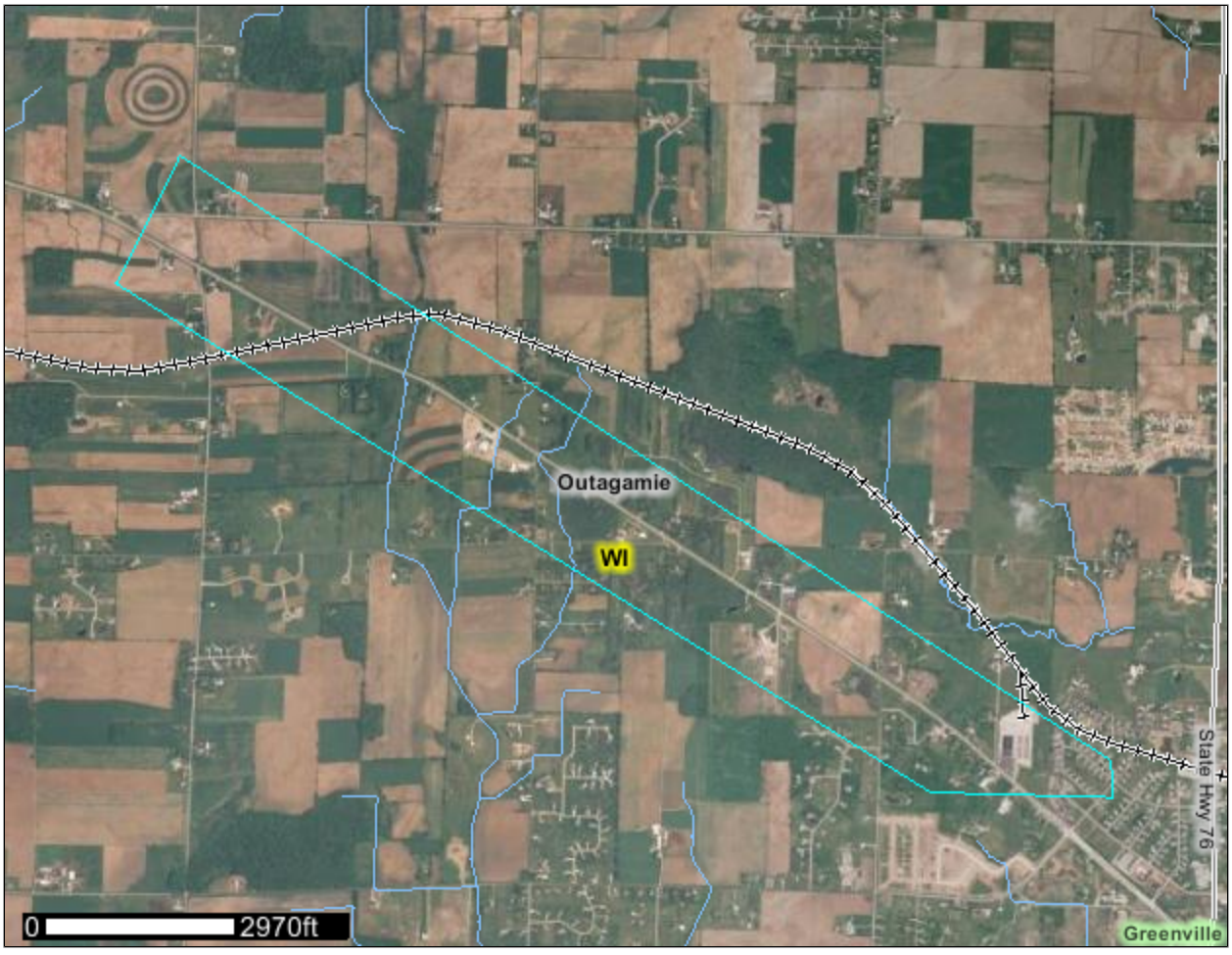
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Outagamie County, Wisconsin



November 4, 2011

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....7
Soil Map.....8
Legend.....9
Map Unit Legend.....10
Map Unit Descriptions.....10
Outagamie County, Wisconsin.....12
BtB—Briggsville silt loam, 2 to 6 percent slopes.....12
GrB—Grays silt loam, 2 to 6 percent slopes.....12
HrB—Hortonville silt loam, 2 to 6 percent slopes.....13
HrC2—Hortonville silt loam, 6 to 12 percent slopes, eroded.....14
HrD2—Hortonville silt loam, 12 to 20 percent slopes, eroded.....15
Ke—Keowns silt loam.....16
KhB—Kewaunee silt loam, 2 to 6 percent slopes.....16
KhC2—Kewaunee silt loam, 6 to 12 percent slopes, eroded.....17
MfB—Manistee fine sandy loam, 2 to 6 percent slopes.....18
NfB—Nichols very fine sandy loam, 2 to 6 percent slopes.....19
Pe—Pella silt loam.....20
ShA—Shiocton silt loam, 0 to 3 percent slopes.....20
SyA—Symco silt loam, 1 to 3 percent slopes.....21
Uf—Udifluvents.....22
W—Water.....23
References.....24

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

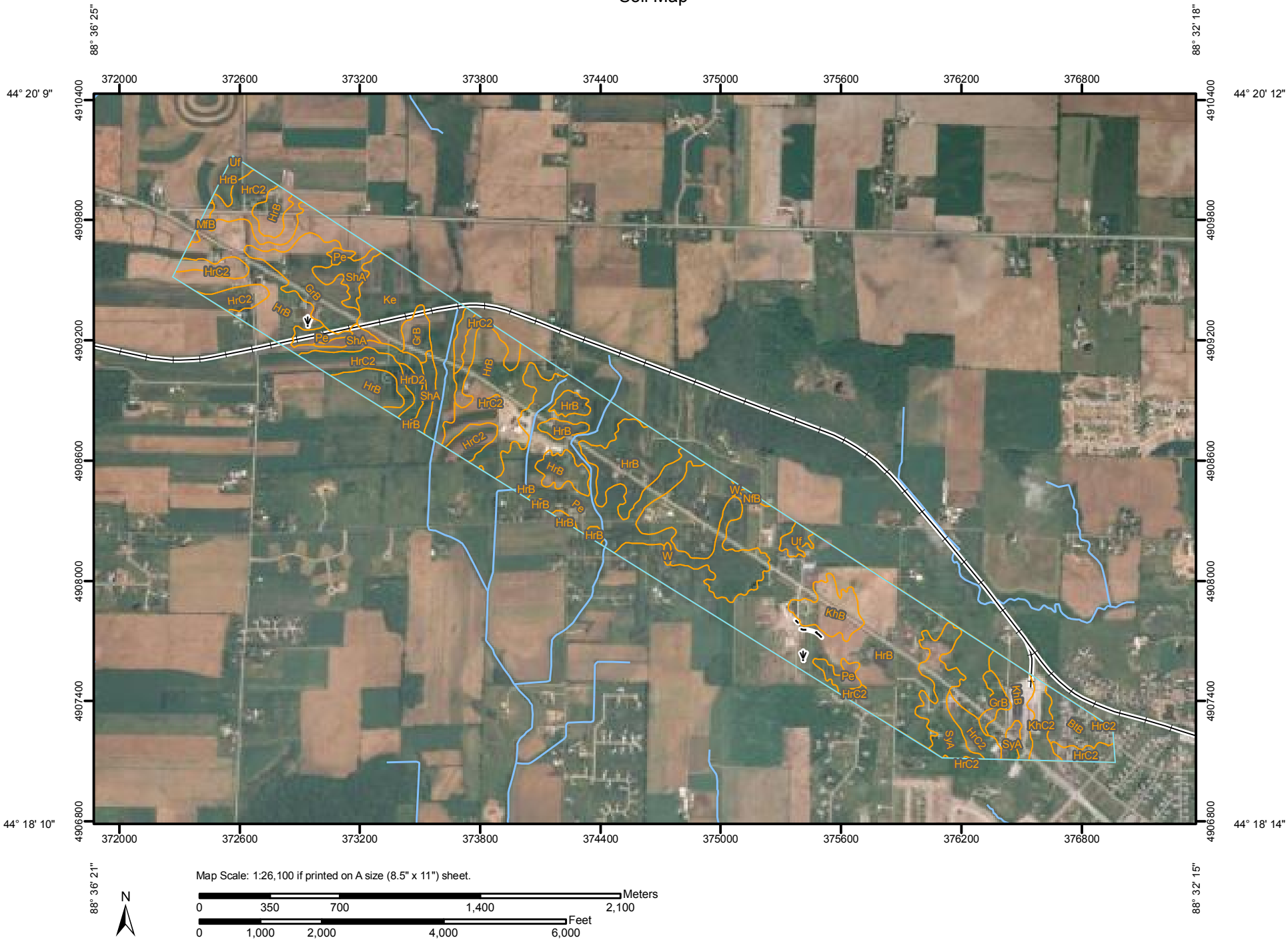
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:26,100 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Outagamie County, Wisconsin
Survey Area Data: Version 5, Mar 10, 2011

Date(s) aerial images were photographed: 6/2/2005; 6/1/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Outagamie County, Wisconsin (WI087)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BtB	Briggsville silt loam, 2 to 6 percent slopes	14.5	1.9%
GrB	Grays silt loam, 2 to 6 percent slopes	40.0	5.2%
HrB	Hortonville silt loam, 2 to 6 percent slopes	388.1	50.0%
HrC2	Hortonville silt loam, 6 to 12 percent slopes, eroded	77.0	9.9%
HrD2	Hortonville silt loam, 12 to 20 percent slopes, eroded	4.1	0.5%
Ke	Keowns silt loam	49.0	6.3%
KhB	Kewaunee silt loam, 2 to 6 percent slopes	33.7	4.3%
KhC2	Kewaunee silt loam, 6 to 12 percent slopes, eroded	9.5	1.2%
MfB	Manistee fine sandy loam, 2 to 6 percent slopes	1.9	0.3%
NfB	Nichols very fine sandy loam, 2 to 6 percent slopes	1.0	0.1%
Pe	Pella silt loam	107.8	13.9%
ShA	Shiocton silt loam, 0 to 3 percent slopes	17.1	2.2%
SyA	Symco silt loam, 1 to 3 percent slopes	26.0	3.3%
Uf	Udifluvents	4.3	0.6%
W	Water	1.3	0.2%
Totals for Area of Interest		**775.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties

and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Outagamie County, Wisconsin

BtB—Briggsville silt loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Briggsville and similar soils: 100 percent

Description of Briggsville

Setting

Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty alluvium over clayey lacustrine deposits

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: About 24 to 57 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 45 percent
Available water capacity: High (about 9.7 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 11 inches: Silt loam
11 to 27 inches: Silty clay
27 to 60 inches: Silty clay loam

GrB—Grays silt loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Grays and similar soils: 100 percent

Description of Grays

Setting
Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty alluvium over sandy and silty lacustrine deposits

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 24 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Available water capacity: High (about 11.4 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 9 inches: Silt loam
9 to 20 inches: Silty clay loam
20 to 25 inches: Silt loam
25 to 60 inches: Stratified very fine sand to silt loam

HrB—Hortonville silt loam, 2 to 6 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Hortonville and similar soils: 100 percent

Description of Hortonville

Setting
Landform: Ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over loamy till

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 8 inches: Silt loam
8 to 27 inches: Clay loam
27 to 60 inches: Loam

HrC2—Hortonville silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Hortonville and similar soils: 100 percent

Description of Hortonville

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over loamy till

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 8 inches: Silt loam
8 to 27 inches: Clay loam
27 to 60 inches: Loam

HrD2—Hortonville silt loam, 12 to 20 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Hortonville and similar soils: 100 percent

Description of Hortonville

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over loamy till

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability (nonirrigated): 4e

Typical profile

0 to 8 inches: Silt loam
8 to 27 inches: Clay loam
27 to 60 inches: Loam

Ke—Keowns silt loam

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Keowns and similar soils: 100 percent

Description of Keowns

Setting

Landform: Depressions on lake plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty lacustrine deposits over loamy lacustrine deposits over stratified sandy and silty lacustrine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water capacity: Moderate (about 8.2 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 8 inches: Silt loam
8 to 21 inches: Silt loam
21 to 60 inches: Stratified very fine sand to silt

KhB—Kewaunee silt loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Kewaunee and similar soils: 100 percent

Description of Kewaunee

Setting
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over clayey till

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 6 inches: Silt loam
6 to 27 inches: Clay
27 to 60 inches: Silty clay

KhC2—Kewaunee silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Kewaunee and similar soils: 100 percent

Description of Kewaunee

Setting
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over clayey till

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 6 inches: Silt loam
6 to 27 inches: Clay
27 to 60 inches: Silty clay

MfB—Manistee fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Manistee and similar soils: 100 percent

Description of Manistee

Setting

Landform: Ground moraines, lake plains
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy lacustrine deposits over sandy lacustrine deposits over clayey lacustrine deposits

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Moderate (about 7.1 inches)

Interpretive groups

Land capability (nonirrigated): 3s

Typical profile

0 to 14 inches: Fine sandy loam
14 to 31 inches: Sand
31 to 38 inches: Clay
38 to 60 inches: Clay

NfB—Nichols very fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Nichols and similar soils: 100 percent

Description of Nichols

Setting

Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy lacustrine deposits over stratified sandy and silty lacustrine deposits

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.2 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 9 inches: Very fine sandy loam
9 to 26 inches: Loamy sand
26 to 60 inches: Stratified fine sand to silt

Pe—Pella silt loam

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Pella and similar soils: 100 percent

Description of Pella

Setting

Landform: Depressions on ground moraines, drainageways on ground moraines
Down-slope shape: Concave, linear
Across-slope shape: Concave
Parent material: Silty alluvium over stratified loamy till

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: High (about 11.5 inches)

Interpretive groups

Land capability (nonirrigated): 6w

Typical profile

0 to 14 inches: Silt loam
14 to 26 inches: Silty clay loam
26 to 29 inches: Stratified sandy loam to silty clay loam
29 to 60 inches: Stratified sandy loam to silty clay loam

ShA—Shiocton silt loam, 0 to 3 percent slopes

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Shiocton and similar soils: 100 percent

Description of Shiocton

Setting
Landform: Lake plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Silty lacustrine deposits over stratified sandy and silty lacustrine deposits

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Occasional
Frequency of ponding: Frequent
Available water capacity: High (about 9.1 inches)

Interpretive groups
Land capability (nonirrigated): 2w

Typical profile
0 to 10 inches: Silt loam
10 to 26 inches: Silt loam
26 to 60 inches: Stratified very fine sand to silt

SyA—Symco silt loam, 1 to 3 percent slopes

Map Unit Setting
Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition
Symco and similar soils: 100 percent

Description of Symco

Setting
Landform: Drainageways on ground moraines, depressions on ground moraines
Down-slope shape: Convex, concave
Across-slope shape: Concave
Parent material: Calcareous loamy till

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Available water capacity: High (about 9.7 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 11 inches: Silt loam
11 to 25 inches: Clay loam
25 to 60 inches: Loam

Uf—Udifluvents

Map Unit Setting

Elevation: 590 to 1,010 feet
Mean annual precipitation: 27 to 34 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 130 to 150 days

Map Unit Composition

Udifluvents and similar soils: 100 percent

Description of Udifluvents

Setting

Landform: Flood plains

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 60 inches: Variable

W—Water

Map Unit Setting

Elevation: 660 to 980 feet
Mean annual precipitation: 30 to 33 inches
Mean annual air temperature: 37 to 55 degrees F
Frost-free period: 145 to 165 days

Map Unit Composition

Water: 100 percent

Description of Water

Interpretive groups

Other vegetative classification: Not Assigned (water) (Nwat)

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://soils.usda.gov/

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://soils.usda.gov/

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://soils.usda.gov/

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.glti.nrcs.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://soils.usda.gov/

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

Appendix C
Soil Boring and Rock Core Logs

GESTRA ENGINEERING, INC. -- GENERAL NOTES

DRILLING AND SAMPLING SYMBOLS

SYMBOL	DEFINATION
HSA	3 1/4" I.D. hollow Stem Auger
RWB	Rotary Wash Boring (Mud Drilling)
_FA	4", 6" or 10" Diameter Flight Auger
_HA	2", 4" or 6" Hand Auger
_DC	2 1/2" , 4" , 5" or 6" Steel Drive Casing
_RC	Size A, B, or N Rotary Casing
PD	Pipe Drill or Cleanout Tube
CS	Continuous Split Barrel Sampling
DM	Drill Mud
JW	Jetting Water
SB	2" O.D. Split Barrel Sample
_L	2 1/2" or 3 1/2" O.D. SB Liner Sample
ST	2" or 3" Thin Walled Tube Sample
3TP	3" Thin Walled Tube (Pitcher Sampler)
_TO	2" or 3" Thin Walled Tube (Osterberg Sampler)
W	Wash Sample
B	Bag Sample
P	Test Pit Sample
_Q	BQ, NQ, or PQ Wireline System
_X	AX, BX, or NX Double Tube Barrel
CR	Core Recovery – Percent
NSR	No Sample Recovered, classification based on action of drilling, equipment and/or material noted in drilling fluid or on sampling bit.
NMR	No Measurement Recorded, primarily due to presence of drilling or coring fluid.
▼	Water Level Symbol

TEST SYMBOLS

SYMBOL	DEFINATION
WC	Water Content - % of Dry Wt. – ASTM D 2216
OC	Organic Content - % of Dry Wt. – ASTM D 2974
DD	Dry Density – Pounds Per Cubic Foot
LL, PL	Liquid and Plastic Limit – ASTM D 4318
	Additional Insertions in Last Column
Qu	Unconfined Comp. Strength-psf – ASTM D 2166
Qp	Penetrometer Reading – Tons/Square Foot
Ts	Torvane Reading – Tons/Square Foot
G	Specific Gravity – ASTM D 854
SL	Shrinkage Limits – ASTM D 427
OC	Organic Content – Combustion Method
SP	Swell Pressure - Tons/Square Foot
PS	Percent Swell
FS	Free Swell – Percent
pH	Hydrogen Ion Content. Meter Method
SC	Sulfate Content – Parts/ Million, same as mg/L
CC	Chloride Content - Parts/ Million, same as mg/L
C*	One Dimensional Consolidation – ASTM D 2453
Qc*	Triaxial Compression
D.S.*	Direct Shear – ASTM D 3080
K*	Coefficient of Permeability – cm/sec
D*	Dispersion test
DH*	Double Hydrometer – ASTM D 4221
MA*	Particle Size Analysis – ASTM D 422
R	Laboratory Receptivity, in ohm – cm – ASTM G 57
E*	Pressuremeter Deformation Modulus – TSF
PM*	Pressuremeter Test
VS*	Field Vane Shear – ASTM D 2573
IR*	Infiltrometer Test – ASTM D 3385
RQD	Rock Quality Designation – Percent

*See attached data sheet or graph

WATER LEVEL

Water levels shown on the boring logs are the levels measured in the borings at the time and under the conditions indicated. In sand, the indicated levels may be considered reliable ground water levels. In clay soil, it may not be possible to determine the ground water level within the normal time required for test borings, except where lenses or layers of more pervious waterbearing soil are present. Even then, an extended period of time may be necessary to reach equilibrium. Therefore, the position of the water level symbol for cohesive or mixed texture soils may not indicate the true level of the ground water table. Perched water refers to water above an impervious layer, thus impeded in reaching the water table. The available water level information is given at the bottom of the log sheet.

DESCRIPTIVE TERMINOLOGY

DENSITY TERM	"N" VALUE
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

CONSISTENCY TERM	qu /qp VALUE (tsf)	"N" VALUE
		0-2
Very Soft	<0.25	2-4
Soft	0.25 - 0.49	4-8
Medium Stiff	0.5 - 0.99	8-16
Stiff	1.0 - 1.99	16-30
Very Stiff	2.0 - 3.99	Over 30
Hard	4.0+	

Standard "N" Penetration: per ASTM D1586

Consistency term based in relative order on Qu result, Qp result, and lastly "N" value.

Lamination	Up to 1/2" thick stratum
Layer	1/2" to 6" thick stratum
Lens	1/2" to 6" discontinuous stratum
Varved	Alternating laminations
Dry	Powdery, no noticeable water
Moist	Below saturation
Wet	Saturated, above liquid limit
Water bearing	Pervious soil below water

RELATIVE GRAVEL PROPORTIONS

CONDITION	TERM	RANGE
Coarse Grained Soils	trace of gravel	2-14%
	with gravel	15-49%
Fine Grained Soils		
15-29% + No. 200	trace of gravel	2-14%
15-29% + No. 200	with gravel	15-29%
30% + No. 200	trace of gravel	2-14%
30% + No. 200	with gravel	15-24%
30% + No. 200	gravelly	25-49%

RELATIVE SIZES

Boulder	Over 12"
Cobble	3" - 12"
Gravel	
Coarse	3/4" - 3"
Fine	#4 – 3/4"
Sand	
Coarse	#4 - #10
Medium	#10 - #40
Fine	#40- #200
Silt & Clay	- # 200, Based on Plasticity

Unified Soil Classification System (USCS)

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)			
SILTS AND CLAYS Liquid limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

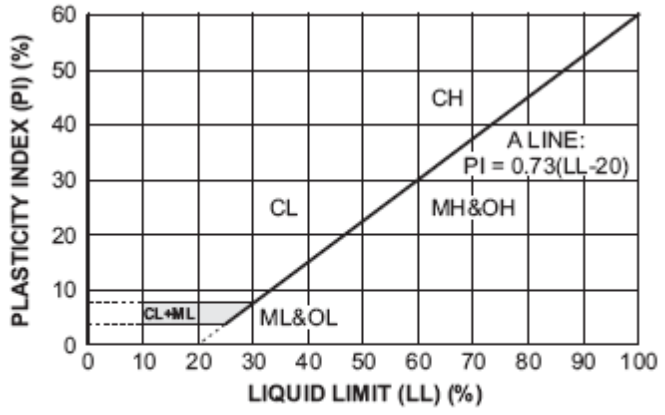
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent ---------- GW, GP, SW, SP
More than 12 percent ---------- GM, GC, SM, SC
5 to 12 percent ---------- Borderline cases requiring dual symbols

PLASTICITY CHART



WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-1**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/16/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/16/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	602299
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	744025
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	776.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0 / 776	TOPSOIL (1") 0.1 (776.1)									
1 SS	4	3 2 2	4	775	SAND, brown, moist, trace gravel and clay, (FILL)	sp								
					3 (773.2)									
2 SS	17	6 7 6	13	5	SAND, light brown, moist, medium dense, (POSSIBLE FILL)	sp								
					5.5 (770.7)									
3 SS	18	3 4 2	6	770	LEAN CLAY, red brown, moist, stiff to very stiff	cl				1.25-2.0			33	
					8 (768.2)									
4 SS	18	3 4 6	10	10	SAND, red brown, very moist, medium dense	sp							17	
					10 (766.2)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-2**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/15/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/15/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	601430
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	744386
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	778.1 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0	ASPHALT (10")									
					0.8 (777.3)									
					BASE COURSE (4")									
1 SS	14	8 6 4	10		1.2 (776.9) SAND, brown, moist, medium dense, with gray clay seam in sample SS-1	sp								
					2.8 (775.3)									
				775	LEAN CLAY, red brown, moist, very stiff to hard, with silt seams									
2 SS	18	3 4 6	10	5						4.00			22	
3 SS	18	3 7 10	17			cl				4.5+			21	
				770										
4 SS	18	3 5 10	15	10	10 (768.1)					3.25			21	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**	GESTRA	**BORING No B-3**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1

CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/17/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/17/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 600496	
LOG QC BY: R. Haque	HAMMER TYPE: Auto / EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 745002	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 781.3 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0 / 781.3	SILTY SAND, brown and black, moist, trace organic (POSSIBLE FILL)									
1 SS	15	4 5 6	11	780		sm								
				3 (778.3)										
2 SS	15	1 3 4	7	5	SAND, red brown, moist, loose, trace silt									
3 SS	14	2 3 3	6	775		sp								
4 SS	14	1 2 3	5	10										
				10.4 (770.9)										
5 SS	16	3 4 6	10	770	SILT, brown, very moist, medium dense	ml							18	
				12.5 (768.8)										

End of Boring at 12.5 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-4
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/17/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/17/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 599664
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 745524
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 786 ft

BORING LOG

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					785	LEAN CLAY, red brown, moist, stiff to very stiff, with sand seams									
1 SS	18	2 3 4	7				cl				1.5-2.25			21	
						3 (783)									
						▽CLAYEY SAND, red brown, wet, very loose									
2 SS	18	1 2 2	4												
				5			sc								
					780										
3 SS	18	0 0 2	2												
						8 (778)									
						LEAN CLAY, red brown, moist, hard, trace gravel									
4 SS	18	3 5 7	12				cl				4.5+			19	
				10		10 (776)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-5
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 6/05/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 6/05/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 597816
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 745593
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 787.9 ft

BORING LOG

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ASPHALT (4") 0.3 (787.6)									
						BASE COURSE (8") 1 (786.9)									
1 SS	12	3 3 7	10			SAND WITH CLAY, black and brown, moist, trace gravel, (FILL)	sp-sc								
					785										
						4 (783.9)									
2 SS	12	2 5 8	13			SAND, brown, very moist to wet, medium dense									
				5			sp								
3 SS	12	1 5 7	12			▽ 7.8 (780.1)									
					780	LEAN CLAY, brown, moist, stiff to very stiff									
4 SS	18	4 6 9	15	10		10 (777.9)	cl			1.75-2.25				21	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 7.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NMR	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-6**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/11/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/11/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	598002
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING	746140
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	778.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					LEAN CLAY, red brown mottled gray to brown, moist, medium stiff to stiff									Sample recovery not recorded on field logs
1 SS		2 4 4	8		Brown sand seam in SS-1	cl				0.75			16	
2 SS		2 2 3	5	775	Color change to brown in SS-2					1.75			24	
				5	5.5 (773.4)									
3 SS		10 10 5	15		SILTY CLAY, brown, moist, very stiff, trace gravel, with red brown lean clay seams	cl-ml				3.75			21	
4 SS		12 14 10	24	770						3.75			22	
				10	10 (768.9)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-7**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/15/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/15/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	598217
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	746406
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION	769.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ASPHALT (10")									Off-set boring to eastbound lane
						0.8 (769.1)									
						BASE COURSE (4")									
1 SS	15	8 12 12	24			1.2 (768.7) SAND, brown, moist to very moist, medium dense to dense, with clay seams	sp								
2 SS	18	2 8 5	13	5	765										
						5.5 (764.4) LEAN CLAY, brown, moist, stiff to very stiff, with vertical gray silt seams									
3 SS	14	4 4 4	8				cl				2.50			18	
4 SS	13	3 6 6	12			Vertical red brown silt seam in SS-4					1.50			20	
				10	760	10 (759.9)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐	
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐	
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-8**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 6/05/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 6/05/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	597556
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	746347
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	785.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				785	TOPSOIL (3") 0.3 (785.6)									
1 SS	15	4 4 4	8		LEAN CLAY, dark brown and brown, moist, trace silt and organics, with sand seams, (FILL)	cl				2.00			13	
					2.9 (783)									
2 SS	10	2 2 4	6	5	LEAN CLAY, brown, moist, trace gravel, with sand seams (FILL)	cl				1.0-1.25			15	
				780	5.2 (780.7) SILTY CLAY, brown mottled red brown, moist, stiff									
3 SS	18	2 3 5	8			cl-ml				1.75			22	
					8 (777.9) LEAN CLAY, red brown, moist, hard									
4 SS	13	3 8 10	18	10		cl				4.25-4.5+			19	
					10 (775.9)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-9
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/11/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/11/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 597749
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 747296
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 769.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SAND, brown, very moist, loose, with gray silt seams									
1 SS	9	5 3 3	6				sp								
						2.6 (767.1)									
						LEAN CLAY, brown, moist, very stiff, with sand seams									
2 SS	14	9 9 9	18	5	765		cl				2.0-3.0			28	
						5.3 (764.4)									
						CLAYEY SAND, brown, moist, medium dense									
3 SS	16	8 11 11	22				sc								
						7.9 (761.8)									
						LEAN CLAY, brown, moist, very stiff, trace gravel									
4 SS	14	11 10 11	21	10	760		cl				2.50			18	
						10 (759.7)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-10
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/15/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/15/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 597537
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 748217
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 779.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ASPHALT (3") 0.3 (779.4)									
						CONCRETE (4") 0.6 (779.1)									
1 SS	11	8 15 7	22			BASE COURSE (5") 1 (778.7)									
						CLAYEY SAND, brown and black, very moist, with cobbles (POSSIBLE FILL)	sc								
						2.7 (777)									
2 SS	13	4 5 5	10	5	775	SILT, brown, very moist, medium dense, trace sand, with gray clay seams								25	
							ml								
3 SS	13	4 5 6	11											20	
4 SS	18	5 5 6	11	10	770	10 (769.7)								25	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-11**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/17/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/17/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	597491
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	749256
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	777.3 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0 / 775	SAND, red brown, wet, very loose to medium dense, with occasional gray silt seams									
1 SS	15	5 6 7	13											
2 SS	10	2 2 2	4	5		sp								
3 SS	15	4 6 9	15	770										
				8 (769.3)										
4 SS	18	3 5 8	13	10	SILT, brown, wet, medium dense, with sand seams	ml							18	
				10 (767.3)										

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 1ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-12**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/11/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/11/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	597360
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING	750212
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	778.5 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SAND, dark brown to orangeish brown, moist, medium dense									
1 SS	16	7 10 12	22			Color change to orange brown and trace clay									
					775	▽ Wet at 3.5 ft									
2 SS	16	10 11 14	25	5		Trace silt in SS-2, SS-3, and SS-4	sp								
3 SS	14	11 13 13	26												
					770										
4 SS	16	12 14 15	29	10		10 (768.5)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-13
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/17/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/17/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 597207
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 751141
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 783.5 ft

BORING LOG

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SAND, red brown, moist to wet, loose to medium dense, trace silt									
1 SS	13	2 3 2	5												
					780										
2 SS	14	2 4 5	9	5			sp								
3 SS	14	2 4 5	9												
					775 ▽	wet at 8.5 ft									
4 SS	14	3 5 5	10	10		10 (773.5)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-14**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/14/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/14/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	597120
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	751954
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION	781 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				780	SAND, light brown, moist to very moist, loose, trace clay									
1 SS	9	3 3 4	7			sp								
				3 (778)										
					SILTY CLAY, light brown and brown, moist to very moist, medium stiff to very stiff, with red brown fat clay seams and silt seams									
2 SS	18	3 4 4	8	5						2.50			23	
				775										
3 SS	18	3 3 5	8							1.00			27	
4 SS	18	3 3 4	7	10						1.25			23	
				770										
5 ST	24				With 1/8" thick fat clay seams and 1/2" thick silt seams in ST-5 Occasional silty sand seams from sample ST-5 to end of boring	CL-ML				(0.8)	24 71	7 49	26	Dry Wt = 102 pcf Second Atterberg performed on sample ST-5 fat clay seams
6 SS	18	3 6 4	10	15 ▽									23	Unable to obtain accurate Q_p on sample SS-6 due to silt seams
				765										
7 SS	18	5 5 5	10							2.25			35	
8 SS	18	4 4 6	10	20	Color change to red brown in sample SS-8					0.75-1.25			31	
					20 (761)									
					End of Boring at 20.0 ft.									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 15ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NMR		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London				BORING No	B-14A
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 2
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 3/01/13		HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 3/01/13		LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No		LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15		NORTHING	597121
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	751956
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	783.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					TOPSOIL, (4")									Frost thickness 12"
					0.3 (782.9)									
1 SS	14	3 3 5	8		SANDY LEAN CLAY, brown, moist, stiff, with occasional black seams	cl				1.00			13	
					2.8 (780.4)									
				780	SILTY SAND, brown, moist, loose									
2 SS	18	2 3 3	6	5										
						sm								
3 SS	18	2 3 4	7		With ¼" thick red brown clayey seams in sample SS-3									
					8 (775.2)									
				775	LEAN CLAY, brown and red brown alternating layers, moist, medium stiff, with <1/8" thick sand seams									
4 SS	18	2 3 4	7	10		CL				0.5-1.0	26	12	19	
					10.5 (772.7)									
5 SS	18	2 3 5	8		SILT, brown, very moist, loose, with ¼" thick alternating layers of red brown fat clay									
				770										
6 SS	18	2 3 5	8	15	With silty clay seams in samples SS-6 and SS-7	ml								
7 SS	18	3 4 5	9											
					18 (765.2)									
				765	SILTY CLAY, gray, moist to wet, stiff to very stiff, with 1/8" to 1/4" thick red brown fat clay seams									
8 SS	18	3 4 6	10	20		cl-ml				1.0-1.5			40	

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 12ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 16ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-14A**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	2 of 2
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 3/01/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 3/01/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	597121
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	751956
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	783.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SILTY CLAY, gray, moist to wet, stiff to very stiff, with 1/8" to 1/4" thick red brown fat clay seams									
9 SS	18	4 6 6	12								1.50			25	
					760										
10 SS	18	5 5 6	11			With silt seams in sample SS-10 and SS-11					1.0-1.5			39	
				25			cl-ml								
11 SS	18	3 4 6	10			Wet in sample SS-11					2.00			26	
					755										
12 SS	18	3 4 7	11	30							2.00			28	
						30.5 (752.7)									
13 SS	18	3 4 6	10			SILT, gray, wet, medium dense, with red brown fat clay seams	ml								
					750										
14 SS	18	3 4 7	11	35		35 (748.2)									

End of Boring at 35.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 12ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 16ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**	GESTRA	**BORING No B-15**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1

CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/15/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/15/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: NQ Rock Core	ROADWAY NAME: STH-15	NORTHING: 596881	
LOG QC BY: R. Haque	HAMMER TYPE: Auto / EFFICIENCY: (6/2011) 78.9%	STATION / OFFSET	EASTING: 752121	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 839 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				835 / 5	BEDROCK									Bedrock was exposed at ground surface
					7.5 (831.5)									Blind drilled through bedrock from 0 ft to 7.5 ft Core 1: 7.5 ft to 17.5 ft REC = 97% RQD = 22%
1 CORE				830 / 10										
				825 / 15										
					17.5 (821.5)									

End of Boring at 17.5 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**	**BORING No B-16**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/15/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/15/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: NQ Rock Core	ROADWAY NAME: STH-15	NORTHING: 596812
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 78.9%	STATION / OFFSET	EASTING: 752422
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 815.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
1 SS	6	25 36 46 50/0"	R	0 / 815	SILTY SAND, brown, moist, very dense, with organics (FILL)	sm								
					1.5 (813.7)									
					WEATHERED BEDROCK									Roller-bit used to blind drill through weathered bedrock from 1.5 ft to 7.5 ft
				5 / 810										
					7.5 (807.7)									Driller noted voids at 7.5 ft
1 CORE					BEDROCK									Core 1: 7.5 ft to 17.5 ft REC = 60% RQD = 10%
				10 / 805										
				15 / 800										Driller noted voids at 11.5 ft
					17.5 (797.7)									

End of Boring at 17.5 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-17
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/11/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/11/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 596292
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 753161
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 828.6 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0		FRAGMENTED ROCK, gray									
1 SS	2	50/2"	R	1		1.2 (827.4) End of Boring at 1.2 ft.									Split spoon refusal at 1.2 ft POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**	**BORING No B-18**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/11/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/11/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 595685
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 753810
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 811.5 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SAND WITH GRAVEL, brown and dark brown, dry, dense									
1 SS	16	14 20 22	42		810		sp								Fragmented rock in SS-1 and SS-2
						2.4 (809.1)									
						SAND WITH GRAVEL, red brown, moist, dense to very dense									
2 SS	16	23 27 40	67	5											
						With orange and gray silty clay seams in SS-3 and SS-4									
3 SS	16	14 21 23	44		805		sp								
4 SS	10	21 20 37	57	10		10 (801.5)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-19
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/11/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/11/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 595014
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 754493
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 812.6 ft

BORING LOG

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SAND, brown, moist, very loose									
1 SS	14	2 2 2	4		810		sp								
						2.8 (809.8)									
						SANDY GRAVEL, gray, moist, very dense									
2 SS	9	11 50/5"	R				gp								Fragmented rock in SS-2
						4.5 (808.1)									

End of Boring at 4.5 ft.

Auger refusal at 4.5 ft
POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**		**BORING No B-20**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/11/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/11/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 594462
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 755397
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 808 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ASPHALT (8") 0.7 (807.3)									Boring offset 5.0 ft south onto WB lane
1 SS	14	5 7 7	14			SAND, brown, moist, medium dense									
					805		sp								
2 SS	16	4 9 50/5"	R			4.5 (803.5)									
						LEAN CLAY WITH SAND, brown, moist, very stiff 4.9 (803.1)	cl				3.00			15	Possible rock at 4.9 ft (driller's observation)
						Light brown fragmented rock at bottom of SS-2									Split spoon refusal at 4.9 ft POSSIBLE BEDROCK
						End of Boring at 4.9 ft.									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**		**BORING No B-21**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/14/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/14/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593799
LOG QC BY: R. Haque	HAMMER TYPE: Auto / EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 756499
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 807.1 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				805	LEAN CLAY, red brown, moist, stiff, with sand seams									
1 SS	11	3 2 3	5			cl				1.75			10	
					2.5 (804.6)									
					POORLY GRADED GRAVEL WITH SAND, gray, moist, very dense, (POSSIBLE WEATHERED BEDROCK)									
2 SS	3	11 31 50/3"	R			gp								
					4.8 (802.3)									

End of Boring at 4.8 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**		**BORING No B-22**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/15/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/15/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593547
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 756931
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 810.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
1 SS	10	2 8 8	16		SILTY CLAY WITH SAND, red brown, moist, stiff, with cobbles and/or boulders	cl-ml								Disturbed sample no Qp possible
2 SS	0	0 50/0"	R	3.5 (806.7)	End of Boring at 3.5 ft.									Auger refusal, spoon refusal at 3.5 ft POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**	GESTRA	**BORING No B-23**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1

CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/23/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/23/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 592724	
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 757067	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 831.7 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SILTY SAND, dark brown, moist, trace organics	sm								Recoveries not recorded on field log
1 SS		2 3 3	6		830	1.5 (830.2) SILTY SAND, red brown, moist	sm							9	LOI=2.0%, performed on organic portion (sample SS-1A)
2 SS		4 2 50/1"	R			4 (827.7) SANDY LEAN CLAY, red brown, moist, stiff	cl				1.25			10	
						4.6 (827.1) End of Boring at 4.6 ft.									Auger refusal, spoon refusal at 4.6 ft POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**	GESTRA	**BORING No B-24**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1

CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/24/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/24/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593288	
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 757359	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 810.5 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0 / 810	SAND, dark brown, moist, trace organics									
					1.5 (809)	sp							27	LOI=7.8%, performed on organic portion (sample SS-1A)
1 SS	12	4 6 9	15		LEAN CLAY, red brown, moist, stiff to very stiff									
					3.6 (806.9)	cl				1.50-3.5			24	
2 SS	1	50/1"	R		End of Boring at 3.6 ft.									Spoon refusal at 3.6 feet POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-31
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/24/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/24/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 592830
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 758727
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 798.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0	798.9	SANDY SILTY CLAY, dark brown, moist, (TOPSOIL)									Boring drilled offset 5 ft.
1 SS	1	50/1"	R	1.1	797.8	End of Boring at 1.1 ft.									Auger refusal, spoon refusal POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-32**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/14/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/14/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	591665
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	756996
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	847.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ASPHALT (3")									
						0.25 (847.65)/ BASE COURSE (8")	gw								
1 SS	14	5 6 9	15			1 (846.9)/ CLAYEY SAND, dark brown, moist, medium dense, trace gravel (FILL)	sc								
					845	2.8 (845.1) LEAN CLAY, brown, moist, stiff, with sand seams (FILL)									
2 SS	14	2 5 5	10	5			cl				1.75			11	
						5.1 (842.8) POORLY GRADED GRAVEL WITH SAND, gray, moist, dense, (POSSIBLE FILL)									
3 SS	9	4 12 30	42		840		gp								Driller noted cobbles and/or boulders
						9 (838.9) CLAYEY SAND, red brown, moist, very dense									
4 SS	13	17 30 34	64	10		10 (837.9)	sc								

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-33**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/14/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/14/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593013
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	759186
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	785.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0 / 785	SAND, light brown, moist, loose									
1 SS	18	2 3 3	6			sp								
				2 (783.9)	LEAN CLAY, red brown, moist, stiff to very stiff					2.25			17	
2 SS	16	3 3 5	8	5 / 780					1.25-2.25				23	
3 SS	18	3 4 5	9			cl			2.25-3.25				24	
4 SS	18	2 4 6	10	10 (775.9)						1.75			23	
				10	End of Boring at 10.0 ft.									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-34
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/24/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/24/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593206
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 759887
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 775.4 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				775	SAND, black, moist, presence of roots (TOPSOIL)									
1 SS	12	3 3 3	6		2" dark brown sand seam in sample SS-1A	sp							19	LOI = 5.8% (sample SS-1A)
					3 (772.4)								21	LOI = 4.3% (sample SS-1B)
2 SS	10	4 4 4	8	5	CLAYEY SAND, brown to dark brown, moist, loose, with 1/2" to 1" thick clay seams	sc								
				770	5.5 (769.9)									
3 SS	14	4 4 5	9		SAND WITH SILT, gray, moist to very moist, loose	sp-sm								
					8 (767.4)									
4 SS	12	2 2 2	4	10	▽ SAND, red brown, wet, very loose	sp								
				765	10.5 (764.9)									
5 SS	12	4 7 9	16		SILTY SAND, red brown, wet, medium dense	sm								
					13 (762.4)									
6 SS	14	4 5 9	14	15	LEAN CLAY, red brown, moist, stiff	cl				1.50			21	
					15 (760.4)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

BORING LOG

GESTRA

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-35
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/14/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/14/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 592879
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 759604
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 787.3 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					ASPHALT (2")									
					0.17 (787.13)									
					BASE COURSE (8")									
1 SS	10	4 9 10	19	785	0.84 (786.46) SAND, red brown, moist, medium dense, (FILL)	sp								
					3 (784.3) SAND, light brown, very moist to wet, medium dense									
2 SS	14	2 5 6	11	5	▽ wet at 5.0 ft	sp								
3 SS	17	5 8 12	20	780										
					8 (779.3) LEAN CLAY, brown and gray, moist, stiff to very stiff, with sand seams, trace gravel									
4 SS	18	8 7 10	17	10	10 (777.3)	cl			1.5-3.25				17	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NMR		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-36
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/24/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/24/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593279
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 760355
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 774.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SAND, dark brown, moist, loose	sp								
1 SS	10	1 3 2	5			1.6 (773.1)									
						SAND, brown to red brown, moist to wet, loose to medium dense									
2 SS	10	4 6 8	14	5	770										
						color change to red brown at 6.0 ft									
3 SS	12	5 6 8	14				sp								
						▽ wet at 8.5'									
4 SS	14	3 3 3	6	10	765										
5 SS	14	3 4 5	9			12.5 (762.2)									

End of Boring at 12.5 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-37
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/24/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/24/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593196
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 760858
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 773.7 ft

BORING LOG

GESTRA

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					TOPSOIL (20"), dark gray, moist									
1 SS	10	4 4 4	8		1.7 (772)								18	LOI = 4.1%
					SAND, brown, moist to wet, loose With red brown clay seams in sample SS-1									
				770	▽ wet at 3.5 ft									
2 SS	12	3 3 2	5	5										
3 SS	14	3 2 5	7			sp								
				765										
4 SS	14	3 2 3	5	10										
5 SS	18	4 4 5	9		12.5 (761.2)									

End of Boring at 12.5 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING No: B-38	
WisDOT PROJECT ID No: 1146-75-00	BORING LOG	PAGE No: 1 of 1	
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/24/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/24/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593246
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 761360
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 772.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0	TOPSOIL									Topsoil thickness not recorded on field log
					1.5 (771.3)									
1 SS	12	3 5 7	12		LEAN CLAY, red brown, moist, very stiff	cl				2.00			19	LOI = 3.8% (sample SS-1A)
				770	3 (769.8)								33	
2 SS	14	5 6 6	12		SAND, brown, moist to wet, loose to medium dense									
				5										
3 SS	14	3 3 5	8			sp								
				765										
					▽ wet at 8.5 ft.									
4 SS	14	3 4 5	9											
				10	10 (762.8)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-39
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/24/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/24/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593173
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 761858
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 774.4 ft

BORING LOG

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, dark brown and black, moist									
1 SS	10	5 6 9	15			1.5 (772.9) SAND, brown, moist to wet, medium dense					1.00			18	LOI = 3.7% (sample SS-1A)
2 SS	14	5 6 6	12		770										
				5											
						▽ wet at 6.0 ft	sp								
3 SS	10	4 5 6	11												
4 SS	16	4 5 5	10		765										
				10		10 (764.4)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-40A
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/26/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/26/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593249
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 762860
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 769 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					SILTY SAND, dark brown, moist, loose									
1 SS	10	5 4 5	9			sm								
					3 (766)									
					LEAN CLAY, red brown, moist to very moist, very stiff, with gray mottling									
2 SS	14	2 2 4	6	765 / 5		cl				2.75			36	
					5.5 (763.5)									
					SAND, brownish gray, moist to wet, loose to medium dense									
3 SS	14	2 6 5	11			sp								
					wet at 8.5 ft.									
4 SS	14	3 4 5	9	760 / 10										
					10 (759)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 7.5ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING LOG		BORING No	B-40B
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 4/26/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 4/26/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593180
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY		STATION / OFFSET	EASTING	762859
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION	770.1 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					SAND, brown, moist, loose	sp								
1 SS	12	3 3 5	8		1.6 (768.5)									
					LEAN CLAY, brown, moist, stiff to very stiff, with gray mottling					1.75			30	
2 SS	14	3 5 6	11	5 / 765		cl				3.00			36	
					5.5 (764.6)									
3 SS	14	3 3 2	5		SAND, brown, moist to wet, very loose to medium dense									
					▽ wet at 8.5 ft									
4 SS	14	3 2 1	3	10 / 760		sp								
5 SS	14	6 7 9	16		12.5 (757.6)									

End of Boring at 12.5 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NMR		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING LOG		BORING No	B-40C
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 4/26/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 4/26/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593109
LOG QC BY: E. Jeske	HAMMER TYPE: Auto	EFFICIENCY	STATION	OFFSET	EASTING: 762857
COUNTY: 44-Outagamie	TOWNSHIP	RANGE	SECTION	1/4 SECTION / 1/4 SECTION	SURFACE ELEVATION: 770.5 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				770	TOPSOIL, black, very moist, with fibrous peat seams									
					1.5 (769)									
1 SS	12	3 5 8	13		SAND, brown to grayish brown, very moist, very loose to medium dense With red brown clay seams in sample SS-1A & 1B								58	LOI = 18.3% (sample SS-1A)
2 SS	16	3 5 7	12	5										
				765		sp								
3 SS	18	3 2 2	4		color change to grayish brown at 6.0 ft.									
4 SS	18	3 3 4	7	10	10 (760.5)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-41A**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 4/25/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 4/25/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593236
LOG QC BY: E. Jeske	HAMMER TYPE: Auto	EFFICIENCY	STATION / OFFSET	EASTING	763415
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	759.5 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ORGANIC CLAY, black, moist, very soft, with peat layer/seams									Recovery not recorded on field log for sample SS-1
1 SS		0 0 0	0				oh				<0.25			49	LOI = 7.9%
						3 (756.5)									
						PEAT, black, wet, very soft									
2 ST	24				755						<0.25			573	LOI = 80.7%
				5		4.8 (754.7)									
						FAT CLAY, dark gray then brown, moist, soft to stiff					0.25 (0.4)	51	23	57	Dry Wt = 70 pcf LOI = 9.7%
						Trace root hairs in bottom of sample ST-2									
3 SS	16	4 4 6	10			Color change to brown at 6'	ch				1.25			31	
4 SS	16	4 4 6	10		750						1.00				No sample returned with driller
				10		10 (749.5)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London				BORING No	B-41B
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 4/25/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 4/25/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593165
LOG QC BY: E. Jeske	HAMMER TYPE: Auto	EFFICIENCY	STATION	OFFSET	EASTING: 763414
COUNTY: 44-Outagamie	TOWNSHIP	RANGE	SECTION	1/4 SECTION / 1/4 SECTION	SURFACE ELEVATION: 761.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						POORLY GRADED SAND WITH SILT, gray, moist to very moist, loose									
1 SS		3 3 3	6		760		sp-sm								No recovery recorded on field log for SS-1 & SS-2
						3 (758.9)									
						PEAT, black, moist to very moist, very loose									
2 SS		1 0 1	1			4.3 (757.6)	pt							235	LOI = 59.7% (sample SS-2B, peat)
				5		LEAN CLAY, red brown, moist to very moist, medium stiff					0.75			37	
						5.5 (756.4)	cl								
						SILTY CLAY, blueish gray and dark gray, moist, soft, trace roothairs									
						6.7 (755.2)	cl-ml				0.25			57	LOI = 6.9%
3 ST	19				755	FAT CLAY, brown mottled blueish gray, moist, medium stiff to stiff					0.75 (1.3)	64	40	34	Dry Wt = 88 pcf
							ch								
4 SS	14	6 6 5	11	10							1.00			46	
						10 (751.9)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London				BORING No: B-41C
WisDOT PROJECT ID No: 1146-75-00				PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/25/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/25/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593096	
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 763412	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 763.5 ft	

BORING LOG

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						LEAN CLAY, red brown, moist to very moist, stiff									
1 SS	8	2 3 4	7				cl				1.00			39	
						2.5 (761)									
					760	ORGANIC CLAY, dark gray to black, moist, medium stiff									
2 SS	10	2 3 2	5	5			oh				0.50			71	LOI = 15.1%
						5.2 (758.3)									
						LEAN CLAY, brown, moist to very moist, stiff to very stiff, with gray mottling									
3 SS	16	2 4 6	10				cl				2.50			29	
					755										
4 SS	16	4 4 5	9	10							1.75			36	
						10 (753.5)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-42A**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 4/25/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 4/25/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593226
LOG QC BY: E. Jeske	HAMMER TYPE: Auto	EFFICIENCY	STATION	OFFSET	EASTING: 763860
COUNTY: 44-Outagamie	TOWNSHIP	RANGE	SECTION	1/4 SECTION / 1/4 SECTION	SURFACE ELEVATION: 758.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0	SILTY CLAY WITH SAND, dark gray, wet, very soft									
1 SS	3	1 0 1	1			cl-ml				<0.25			35	LOI = 3.8%
				3 (755.8)										
				755	LEAN CLAY, blueish gray, wet, very soft, with peat seams									
2 SS	6	0 0 0	0			cl				<0.25			60	LOI = 9.5%
				5 (753.8)										
				5	POORLY GRADED SAND WITH SILT, grayish brown, very moist									
3 ST	24					sp-sm								Fines = 9%
				7.6 (751.2)										
					LEAN CLAY, red brown, moist, very stiff								27	
				750										
4 SS	12	4 4 6	10			cl				2.50			27	
				10 (748.8)										
				10	End of Boring at 10.0 ft.									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 0ft.	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐	
▼	WATER LEVEL AT COMPLETION: NMR	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐	
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-42B**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 4/25/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 4/25/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593157
LOG QC BY: E. Jeske	HAMMER TYPE: Auto	EFFICIENCY	STATION	OFFSET	EASTING: 763858
COUNTY: 44-Outagamie	TOWNSHIP	RANGE	SECTION	1/4 SECTION / 1/4 SECTION	SURFACE ELEVATION: 759 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						PEAT, black, very moist to wet, very loose									No recovery recorded on field log for Sample SS-1
1 SS		0 0 0	0			▽ wet at 1.5 ft								223	LOI = 37.9%
						3 (756)									
						LEAN CLAY, dark gray, very moist, trace sand and organic matter	cl								
2 ST	19				755	4.1 (754.9)						45	26	64	Dry Wt = 59 pcf Consolidation test performed on Sample ST-2
				5		SAND, gray, wet	sp								
						5.4 (753.6)									
						LEAN CLAY, brown, moist to very moist, stiff to very stiff									
3 SS	14	4 5 7	12				cl				3.50			29	
4 SS	16	8 7 6	13		750						1.00			37	
				10		10 (749)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 1.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NMR	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING LOG		BORING No	B-42C
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 4/25/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 4/25/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 593086	
LOG QC BY: E. Jeske	HAMMER TYPE: Auto	EFFICIENCY	STATION	OFFSET	EASTING: 763837
COUNTY: 44-Outagamie	TOWNSHIP	RANGE	SECTION	1/4 SECTION / 1/4 SECTION	SURFACE ELEVATION: 758.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						PEAT, black, very moist to wet, very loose									
1 ST	18													374	Dry Wt = 14 pcf LOI = 71.2% Consolidation test performed on sample ST-1 Atterberg assigned on sample ST-1, sample was non-plastic
2 SS	5	0 0 0	0	5	755									189	LOI = 28.1%
						6 (752.9)									
3 SS	3	2 2 3	5			LEAN CLAY, brown, moist to wet, very soft to stiff	cl				<0.25			39	
4 SS	18	3 4 5	9	10	750						1.00			35	
						10 (748.9)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 0ft.	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No	B-43A
WisDOT PROJECT ID No: 1146-75-00			PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/25/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/25/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING	593210
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING	764560
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION	758.6 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ORGANIC CLAY, black, moist	oh								
1 SS	16	4 4 3	7			▽ 1.6 (757)					0.50			77	LOI = 14.2% (sample SS-1A)
						SILTY SAND, brown, wet, loose 2" thick brown with gray mottling, lean clay, in SS-1A									
					755		sm								
2 SS	14	3 3 5	8	5											
						5.5 (753.1)									
						LEAN CLAY, brown, moist, very stiff									
3 SS	16	3 3 5	8								2.00			29	
							cl								
					750										
4 SS	14	3 3 5	8	10		10 (748.6)					2.00			31	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 1.6ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING No: B-43B	
WisDOT PROJECT ID No: 1146-75-00	BORING LOG	PAGE No: 1 of 1	
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/25/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/25/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593140
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 764558
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 758.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (2") 0.2 (758.6)									
1 SS	14	3 3 3	6			SANDY LEAN CLAY, brown and gray, wet, medium stiff	cl				0.50			69 26	LOI = 12.8% (sample SS-1A)
						3 (755.8)									
2 SS	14	4 5 6	11		755	SAND, brown, wet, medium dense	sp								
				5		5.5 (753.3)									
3 SS	14	3 4 6	10			LEAN CLAY, brown, moist, very stiff 1¼" thick sand seam in SS-3	cl				2.50			29	
						7.6 (751.2)									
4 ST	18				750	FAT CLAY, red brown, moist, medium stiff to stiff Thin sand seams in top 3" of ST-4	ch				0.5-1.25 (0.7)	65	43	41	Dry Wt = 80 pcf LOI = 1.6%
				10		10 (748.8)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 1ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-43C
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/25/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/25/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593070
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION / OFFSET	EASTING: 764557
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 759.1 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					TOPSOIL (1½")									
					0.5 (758.6)									
1 SS	13	1 2 2	4		SANDY LEAN CLAY, brown and gray, moist, medium stiff	cl				0.50			58 24	LOI = 11.4% (sample SS-1A)
					3 (756.1)									
2 SS	16	3 4 4	8	755 5	CLAYEY SAND, gray, moist, medium dense	sc								
					5.4 (753.7)									
3 ST	17				FAT CLAY, red brown, moist to wet, very soft to stiff					1.50 (1.9)	59	38	30	Dry Wt = 94 pcf LOI = 1.5%
					▽									
4 SS	18	2 3 5	8	750 10		ch				<0.25			61	
5 SS	18	2 3 13	16							<0.25			72	
					12.5 (746.6)									

End of Boring at 12.5 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NMR		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-44A**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 4/25/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 4/25/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 593202	
LOG QC BY: E. Jeske	HAMMER TYPE: Auto	EFFICIENCY	STATION	OFFSET	EASTING: 764912
COUNTY: 44-Outagamie	TOWNSHIP	RANGE	SECTION	1/4 SECTION / 1/4 SECTION	SURFACE ELEVATION: 760.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				760	SILTY SAND, gray, moist to wet, loose ▽									
1 SS	7	3 3 2	5		1½" thick brown clay in SS-1 2¼" thick dark gray clay in SS-1	sm							26	LOI=2.9%, performed on 2¼" clay seam
					3 (757.7)									
2 SS	12	3 2 2	4	5	LEAN CLAY WITH SAND, gray, moist to very moist, stiff to very stiff	cl				1.00			29	
				755										
3 SS		4 5 7	12							2.50			34	Recovery was not recorded on field log.
					7.8 (752.9)									
4 ST	24				SILTY SAND, brown, wet	sm								Fines = 14%
					9.3 (751.4)									
				10	LEAN CLAY, brown, moist 10 (750.7)	cl							28	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 1ft.	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NMR	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▽	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-44B**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 4/25/12		HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 4/25/12		LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV	WisDOT STRUCTURE ID No		LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15		NORTHING	593133
LOG QC BY: E. Jeske	HAMMER TYPE: Auto / EFFICIENCY	STATION	OFFSET	EASTING	764910
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION	1/4 SECTION	SURFACE ELEVATION	760.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				760	SANDY LEAN CLAY, dark gray black, moist, medium stiff, trace organics									
1 SS	10	1 3 3	6			cl				0.50			32 26	LOI = 4.7% (sample SS-1A)
					silty sand layer in SS-1									
					3 (757.8)									
2 SS	10	3 6 7	13	5	SANDY LEAN CLAY, red brown, moist, medium stiff	cl				0.75			28	
				755	6 (754.8)									
3 SS	14	4 6 8	14		FAT CLAY, brown mottled gray then brown, moist, very soft to very stiff					1.00			27	
					Color change to red brown at 8.5'									
4 ST	15			10		ch				2.25 (2.4)	59	38	29	Dry Wt = 97 pcf
				750										
5 SS		4 5 7	12							<0.25			61	No recovery recorded on field log.
					12.5 (748.3)									

End of Boring at 12.5 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 1ft.	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING LOG		BORING No	B-44C
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 4/25/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 4/25/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D120 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Allen	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 593062	
LOG QC BY: E. Jeske	HAMMER TYPE: Auto	EFFICIENCY	STATION	OFFSET	EASTING: 764909
COUNTY: 44-Outagamie	TOWNSHIP	RANGE	SECTION	1/4 SECTION / 1/4 SECTION	SURFACE ELEVATION: 760.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					760	LEAN CLAY, gray and brown, moist, medium stiff, trace to with organics									
1 SS	12	2 3 3	6				cl				0.50			49 46	LOI = 10.4% (sample SS-1A)
						3 (757.7)									
						▽SAND, gray, wet, loose									
2 SS	12	3 4 4	8	5			sp								
					755	5.8 (754.9)									
						LEAN CLAY, brown, moist, stiff to very stiff									
3 SS	14	3 5 7	12				cl				2.00			28	
4 SS	14	3 5 7	12	10							1.50			33	
						10 (750.7)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London					BORING No: B-45A
WisDOT PROJECT ID No: 1146-75-00					PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 2/27/13		HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 2/27/13		LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No		LONGITUDE
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15		NORTHING: 593192
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION	OFFSET	EASTING: 765359
COUNTY: 44-Outagamie	TOWNSHIP	RANGE	SECTION	1/4 SECTION / 1/4 SECTION	SURFACE ELEVATION: 761 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					760	TOPSOIL, (3") 0.3 (760.7)									Frost thickness 12"
1 SS	4	0 0 0	0			SILTY CLAY, brown and greenish gray, wet, very soft	cl-ml							58	LOI = 4.0%
						2.4 (758.6)									Disturbed sample SS-1, unable to obtain accurate Q_p value
2 SS	13	1 1 1	2	5		LEAN CLAY, brown mottled greenish gray, moist, medium stiff, with sand seams	cl			0.5-0.75				40	
					755	5.3 (755.7) FAT CLAY, red brown, very moist, very soft to medium stiff									
3 SS	18	1 1 3	4				CH			<0.25-0.5	73	53		59	
4 SS	18	1 1 2	3	10						<0.25-0.5				51	
					750	10.5 (750.5) SILTY SAND, grayish brown, wet, medium dense									
5 SS	18	2 6 6	12				sm								
6 SS	18	3 6 7	13	15		15 (746)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 2ft.	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 2ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-45B**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 2/27/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 2/27/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593123
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	765358
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	761 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					760	TOPSOIL, (4") 0.3 (760.7)									Frost thickness 13"
1 SS	1	0 0 0	0			SILTY SAND, dark brown, wet, very loose 2.3 (758.7)	sm								Poor recovery for sample SS-1, unable to obtain accurate Q_p value
						FAT CLAY, red brown, very moist, soft to medium stiff									
2 SS	5	0 0 2	2	5		With decomposing roots in sample SS-2	CH				0.25-0.5			51	
					755	6.2 (754.8)									
3 ST	5					POORLY GRADED SAND, grayish brown to brown, wet, loose						88	63	59	ST-3 Top: 2½" Fat Clay, disturbed sample unable to obtain Q_p ST-3 Bottom: 2½" Sand Fines = 2%
4 SS	18	2 3 4	7	10											
					750		SP								
5 SS	18	2 4 6	10			Color change to brown in sample SS-5									
6 SS	18	2 4 6	10	15		15 (746)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 3ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-45C**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 2/27/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 2/27/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593052
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	765358
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	760.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0	760	TOPSOIL, (4") 0.3 (760.4)									Frost thickness 17"
1 SS	14	1 3 3	6			LEAN CLAY, brown mottled light greenish gray, moist, stiff to very stiff	cl				1.5-2.25			28	
2 SS	14	1 3 4	7	5		5.3 (755.4)					1.0-1.5			39	
3 SS	16	2 2 4	6		755	FAT CLAY, brown, moist, stiff to very stiff	ch				1.5-2.5			33	
4 SS	16	2 2 5	7	10		10.4 (750.3)					2.0-3.0			28	
5 SS	18	3 4 6	10		750	SILTY SAND, brown, wet, medium dense	sm								
6 SS	18	3 5 6	11	15		15 (745.7)									
						End of Boring at 15.0 ft.									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 11ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-46A**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/09/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/09/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593183
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING	765763
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	760.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0 / 760	LEAN CLAY, brown, moist, very stiff									
1 SS														No sample collected for SS-1; blow counts not recorded on field log
2 SS	14	4 5 5	10	5 / 755		cl				2.50			25	
					With silt seams in SS-3									
3 SS	15	5 8 7	15							2.50			34	
					7.9 (752.9)									
					SAND, brown, moist to wet, medium dense									
4 SS	11	4 7 7	14	10 / 750 ▽										
5 SS	14	6 6 8	14			sp								
					Trace silt in SS-6									
6 SS	15	7 8 5	13	15	15 (745.8)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 11ft.	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-46B
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/09/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/09/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593115
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto; EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 765762
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 760.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				760	LEAN CLAY, brown mottled greenish gray, moist, very stiff									
1 SS	0	4 5 5	10			cl								No recovery for SS-1
2 SS	14	3 6 7	13	5						2.75			25	
					5.3 (755.5)									
				755	FAT CLAY, brown, moist, very stiff									
3 SS	15	6 9 10	19			ch				2.25-3.25			37	
					7.9 (752.9)									
					SAND, brown, moist to wet, medium dense									
4 SS	14	5 7 10	17	10										
				750										
5 SS	13	6 8 8	16			sp								
6 SS	14	7 7 6	13	15										
					15 (745.8)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING LOG		BORING No	B-46C
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/09/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/09/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 593043	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 765760	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 761.1 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				760	SILTY CLAY, dark brown and brown, moist, medium stiff, trace organics, with sand seams, (POSSIBLE FILL)									
1 SS	5	4 9 5	14			cl-ml				0.75			33	LOI = 6.1%
					2.5 (758.6) LEAN CLAY, brown mottled greenish gray, moist, hard									
2 SS	16	4 7 8	15	5		cl				4.50			28	
					5.4 (755.7) FAT CLAY, brown, moist, medium stiff to very stiff									
3 SS	16	3 4 5	9	755		ch				1.00			44	
4 ST	16				9.3 (751.8) SAND, brown, very moist to wet, medium dense					1.0-2.5 (0.5)	70	49	60	Dry Wt = 67 pcf
				10										
5 SS	15	5 8 8	16	750 ▽		sp								
6 SS	16	7 9 10	19	15	15 (746.1)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 11ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-47A
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/09/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/09/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593174
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 766159
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 764.1 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0	SAND, brown and dark brown, moist, medium dense, few organics, with clay seam (POSSIBLE FILL)									
1 SS	10	4 4 7	11			sp							20	LOI = 9.8%
				2.7 (761.4)										
					LEAN CLAY, brown mottled greenish gray, moist, very stiff									
2 SS	18	4 6 8	14	760						2.25			25	
				5		cl								
3 SS	16	5 6 10	16							3.00			27	
				7.9 (756.2)										
					FAT CLAY, brown, moist, soft to stiff									
4 SS	18	3 3 2	5	755		ch				0.25-1.0	68	46	40	
				10										
				10.5 (753.6)										
					SAND, brown, moist to wet, medium dense									
5 SS	4	8 9 9	18			sp								
					▽									
6 SS	14	5 8 11	19	750										
				15	15 (749.1)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 13.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-47B**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/09/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/09/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593104
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING	766157
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	764.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						LEAN CLAY, dark brown, moist, hard, trace organics, (POSSIBLE FILL)									
1 SS	6	5 9 6	15				cl				4.50			28	LOI = 7.9%
						2.5 (762.3)									
						LEAN CLAY, brown mottled greenish gray, moist, very stiff									
2 SS	15	4 5 7	12	5	760						2.75			32	
							cl								
3 SS	14	4 9 9	18								3.00			34	
						7.8 (757)									
						SAND, brown, wet, medium dense									
4 SS	15	5 6 9	15	10	755										
							sp								
5 SS	14	6 9 7	16												
6 SS	11	5 8 5	13	15	750										
						15 (749.8)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8ft.	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-47C**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/09/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/09/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593034
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING	766157
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	766.4 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						LEAN CLAY, brown, moist to dry, stiff									
1 SS	4	4 5 5	10		765		cl							22	Low recovery for SS-1, no Qp possible
2 SS	6	4 6 8	14			▽ 4.5 (761.9)								27	
				5		SAND, brown, moist to wet, medium dense									
3 SS	6	4 5 7	12		760	With 3 inch fat clay layer in SS-3					0.25				Qp on clay portion of SS-3
4 SS	8	4 4 7	11	10		Trace silt in SS-4	sp								
5 SS	10	5 6 6	12		755										
						12.7 (753.7)									
						SAND WITH SILT, brown, moist to wet, medium dense									
6 SS	14	7 7 6	13	15		15 (751.4)	sp-sm								

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 4.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-48
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/09/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/09/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593096
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto; EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 766574
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 770.4 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					770	LEAN CLAY, brown mottled greenish gray, moist, very stiff									
1 SS	16	3 5 6	11			With sand seams in SS-1	cl				3.00			14	
2 SS	16	4 5 7	12	5							2.75			30	
					765	5.4 (765)									
3 SS	12	4 6 6	12			SAND, brown, moist to wet, medium dense									
4 SS	10	4 5 8	13	10			sp								
5 SS	10	5 9 7	16		760	Trace silt in SS-5 and SS-6									
6 SS	14	5 9 10	19	15		15 (755.4)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**	GESTRA	**BORING No B-49**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1

CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/10/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/10/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593035	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 767054	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 777.5 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						FAT CLAY, brown mottled greenish gray, moist, medium stiff to very stiff									
1 SS	16	6 7 9	16		775		ch				2.50	102	71	35	
						4.5 (773)									
2 SS	16	6 8 10	18	5		SAND, brown, moist, medium dense				0.75-2.5				32	
3 SS	10	17 11 11	22		770		sp								
4 SS	15	8 9 10	19	10		10 (767.5)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐	
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐	
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING LOG		BORING No	B-49A
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 2
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 2/28/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 2/28/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	592979
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	767244
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	779.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (3")									Frost thickness 16"
						0.3 (779.6)									
						LEAN CLAY, brown, moist, very stiff									
1 SS	14	3 3 5	8				cl				2.0-2.75			23	
						4 (775.9)									
2 SS	18	3 7 9	16			SILTY SAND, brown, wet, medium dense to dense									
				5	775										
3 SS	18	3 6 9	15												
4 SS	18	3 6 10	16	10	770										
5 SS	18	6 10 12	22				sm								
6 SS	18	8 13 14	27	15	765										
7 SS	18	8 12 15	27												
8 SS	18	8 12 17	29	20	760										

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 4ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 6ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-49A**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	2 of 2
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 2/28/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 2/28/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	592979
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	767244
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION	779.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					SILTY SAND, brown, wet, medium dense to dense									
9 SS	18	9 14 18	32			sm								
10 SS	18	9 15 17	32	25 / 755	25 (754.9)									
					End of Boring at 25.0 ft.									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 4ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 6ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-50
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/10/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/10/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 592750
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 767688
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 796 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
1 SS	3	50/4"	R			FRAGMENTED ROCK, gray									Possible bedrock observed at surface of boring (Driller's observation)
						0.3 (795.7)									
						End of Boring at 0.3 ft.									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-51**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/10/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/10/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 592618	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 767696	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 806.5 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SAND, brown, moist, medium dense to dense, with fragmented rock									
1 SS	14	10 12 13	25		805										
2 SS	14	15 14 14	28	5			sp								
3 SS	11	10 14 19	33		800										
						7.7 (798.8)									
						GRAVEL, gray, dry, dense, and/or boulders/cobbles									Fragmented rock pieces in SS-4
4 SS	15	13 16 16	32	10		10 (796.5)	gp								

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**	GESTRA	**BORING No B-52**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1

CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/10/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/10/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 592676	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 767819	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 817.6 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						FRAGMENTED ROCK, light brown, dry									
1 SS	3	50/3"	R			1.3 (816.3) End of Boring at 1.3 ft.									Possible bedrock (Driller's observation) Split spoon refusal at 1.3 ft

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-53**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/10/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/10/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	592474
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING	768013
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	832.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					SAND, brown, moist, loose to medium dense									
1 SS	15	3 3 2	5											
				830										
2 SS	13	3 3 4	7											
				5		sp								
3 SS	16	4 5 7	12											
				825										
4 SS	16	4 4 4	8											
				10	10 (822.9)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**		**BORING No B-54**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 7/10/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 7/10/12	LATITUDE
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 592311
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING: 768334
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 852.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0	SANDY LEAN CLAY, brown, moist, very stiff									
1 SS	16	4 7 8	15	850		cl				2.50			11	
2 SS	14	12 9 22	31	5	Trace silt in SS-2					2.25			12	
					5.3 (847.5) SAND WITH CLAY, brown, moist, dense									
3 SS	11	11 20 20	40	845		sp-sc								
4 SS	16	14 17 17	34	10	10 (842.8)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING LOG		BORING No: B-54A
WisDOT PROJECT ID No: 1146-75-00				PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/28/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/28/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 592292	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 768322	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 851.2 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (3")									Frost thickness 17"
						0.3 (850.9)									
1 SS	18	8 8 6	14		850	CLAYEY SAND, red brown, moist, medium dense, with clay seams	sc								
						3 (848.2)									
2 SS	18	2 2 3	5	5		SAND WITH CLAY, orangeish brown, moist, loose	sp-sc								
						5.5 (845.7)									
3 SS	18	3 5 6	11		845	LEAN CLAY WITH SAND, brown, moist, medium stiff	cl				0.75			20	
						8 (843.2)									
4 SS	16	3 18 19	37	10		LEAN CLAY WITH SAND AND GRAVEL, brown, moist, very stiff	cl							13	Unable to obtain accurate Q_p for sample SS-4 due to gravel content
5 SS	11	9 19 43	62		840						3.50			10	Rig chatter at 11'
						12.7 (838.5)									
6 SS	12	10 18 42	60	15		LEAN CLAY WITH SAND, brown, moist, very stiff to hard, trace gravel					2.50			14	
7 SS	14	10 24 18	42		835		cl				2.50			9	
8 SS	18	10 12 18	30	20							4.0-4.5			10	
						20 (831.2)									
						End of Boring at 20.0 ft.									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: 18.5ft.	WET ☐ DRY ☐	
WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐	
WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-55**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/10/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/10/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	592075
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING	768590
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	837.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SAND, brown, moist, medium dense, trace clay									
1 SS	16	4 7 9	16		835		sp								
						2.9 (834.8)									
						SANDY LEAN CLAY, brown, moist, stiff to very stiff									
						Trace gravel in SS-2									
2 SS	14	3 5 8	13	5							2.50			9	
							cl								
3 SS	16	5 9 7	16								1.25-3.0			7	
					830										
						7.9 (829.8)									
						SAND, brown, moist, medium dense									
4 SS	16	8 8 12	20	10			sp								
						10 (827.7)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING LOG		BORING No	B-56
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/10/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/10/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	591575
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING	769339
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	827.3 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SAND, brown to light brown, moist, loose									
1 SS	9	3 3 3	6		825										
2 SS	16	2 3 4	7	5		Color change to light brown	sp								
3 SS	16	3 3 3	6		820										
						7.9 (819.4)									
4 SS	17	4 4 6	10	10		LEAN CLAY WITH SAND, brown, moist, stiff, with sand seams	cl				1.25			14	
						10 (817.3)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-57**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/10/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/10/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	591241
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING	769834
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	830.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SAND, brown, moist, loose									
1 SS	9	3 3 4	7				sp								
						2.6 (827.6)									
						LEAN CLAY, brown, moist, stiff to very stiff, trace sand and gravel									
2 SS	14	7 9 9	18	5	825						2.50			10	
3 SS	14	11 15 17	32				cl				1.75-2.5			13	
4 SS	18	19 21 22	43	10							3.00			13	
						10 (820.2)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-58
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/15/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/15/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593402
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 767737
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 784.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						LEAN CLAY, red brown, moist, stiff to very stiff									Stake missing-offset 85.0 ft east of centerline of Olk Street due east of Lone Hickory Lane, at approximate Station 10+85
1 SS	14	2 2 3	5				cl				1.5-2.0			34	
						2.8 (781.9)									
						SAND, light brown, very moist to wet, medium dense									
2 SS	14	3 7 8	15	5	780										
						wet at 6.0									
3 SS	15	5 8 10	18				sp								
4 SS	18	6 9 11	20	10	775										
						10 (774.7)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London				BORING No	B-59
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 6/04/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 6/04/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 593398	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 768282	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 806.5 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL (4")									
						0.4 (806.1)									
					805	SANDY LEAN CLAY, brown, moist, stiff									
1 SS	8	3 3 3	6				cl				1.00			11	
															Rig chatter at 2.5 ft Probable cobbles and/or boulders
2 SS	12	3 16 50/4"	R			Fragmented rock piece in sample SS-2, Gravel and/or boulders/cobbles					1.00				
						4.8 (801.7)									Auger refusal at 4.8 ft

End of Boring at 4.8 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING LOG		BORING No	B-60
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/15/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/15/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593000
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	768261
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	836.5 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ASPHALT (5") 0.4 (836.1)									
1 SS	11	14 15 10	25		835	BASE COURSE (4") 0.8 (835.7) SAND, brown, moist, trace clay, (FILL)	sp								
						2.8 (833.7) SANDY LEAN CLAY, red brown, moist, stiff									
2 SS	12	3 1 2	3	5			cl				1.25			11	
3 SS	9	10 14 8	22		830										SS-3 sample disturbed-no qp taken
						7.5 (829) POORLY GRADED GRAVEL WITH SAND, gray, moist, very dense, with cobbles	gp							12	Driller noted green sand seam in SS-3
4 SS	5	50/5"	R			9 (827.5)									

End of Boring at 9.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**		**BORING No B-61**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/15/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/15/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593482
LOG QC BY: R. Haque	HAMMER TYPE: Auto / EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 768736
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 831.6 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					ASPHALT (4") 0.3 (831.3)									
					BASE COURSE (5") 0.8 (830.8)									
1 SS	11	8 5 3	8	830	SAND WITH CLAY, brown and dark gray, moist, trace gravel, (FILL)	sp-sc								
2 SS	9	3 1 50/4"	R		Presence of asphaltic material in sample SS-2 4.8 (826.8)									

End of Boring at 4.8 ft.

Auger refusal at 4.8 ft.
POSSIBLE BEDROCK
Driller offset 25.0 ft west of B-61 and completed B-61A

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-61A
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/15/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/15/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593457
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 768736
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 831.6 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ASPHALT (4") 0.3 (831.3)									
						BASE COURSE (5") 0.8 (830.8)									
1 SS	10	4 4 4	8		830	SAND, brown and dark gray, moist, trace silt, with clay seams (POSSIBLE FILL) 2.7 (828.9)	sp								
						SILTY CLAY WITH SAND, red brown, moist, stiff, trace gravel									
2 SS	17	1 2 2	4	5			cl-ml				1.00			27	
						6 (825.6)									
3 SS	0	50/0"	R			End of Boring at 6.0 ft.									Auger refusal at 6.0 ft POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

BORING LOG

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-61B
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/15/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/15/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593492
LOG QC BY: R. Haque	HAMMER TYPE: Auto / EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 768710
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 826.6 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL (12")									
					1 (825.6)	End of Boring at 1.0 ft.									

Auger Refusal at 1.0 ft
POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-62**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/20/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/20/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼ HSA		ROADWAY NAME: STH-15	NORTHING: 590683	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 770665	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 854.4 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (6") 0.5 (853.9)									
1 SS	7	2 2 5	7			SANDY LEAN CLAY, brown, moist, stiff 2.5 (851.9)	cl				1.25			16	
2 SS	17	4 23 27	50	5	850	SAND WITH GRAVEL, brown, moist, dense 5.2 (849.2)	sp								
3 SS	12	3 10 20	30			SAND WITH CLAY, brown, moist, dense, trace gravel	sp-sc								
4 SS	15	4 13 26	39	10	845	10 (844.4)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	▨	CAVE DEPTH AT COMPLETION: 8ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-62A
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/25/13	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/25/13	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 590646
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 770742
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 859.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (5")									Frost thickness 15"
						0.4 (859.3)									
1 SS	13	3 5 5	10			LEAN CLAY WITH SAND, brown, moist, very stiff, trace gravel								10	Deformed sample, unable to obtain accurate Q_p value
							cl								
2 SS	15	2 4 6	10	5	855						3.25			11	
						6 (853.7)									
3 SS	3	50/3"	R			GRAVEL WITH SAND, gray, moist, very dense	gp								Driller noted gravel layer at 6'
						7.5 (852.2)									
						SILTY SAND WITH GRAVEL, brown, moist, dense									
4 SS	13	13 14 16	30	10	850		sm								
						10.3 (849.4)									
						LEAN CLAY WITH SAND, brown, moist, stiff, trace gravel									
5 SS	15	14 17 20	37				cl				1.50			12	
						12.9 (846.8)									
						SILTY SAND WITH GRAVEL, brown, moist, very dense	sm								
6 SS	2	50/2"	R			13.7 (846)									Driller noted gravel layer at 13.5'
						End of Boring at 13.7 ft.									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: 12ft.		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**		**BORING No B-63**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 11/20/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 11/20/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼ HSA	ROADWAY NAME: STH-15	NORTHING: 590389
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 771191
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 880.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					880	TOPSOIL, (6") 0.5 (880.2)									
1 SS	11	3 13 34	47			CLAYEY SAND, brown, moist, dense, trace gravel	sc								
						2.7 (878)									
2 SS	18	6 23 21	44	5		SAND WITH SILT, brown, moist, dense, trace gravel	sp-sm								
					875	5.5 (875.2)									
3 SS	18	4 11 12	23			CLAYEY SAND WITH GRAVEL, brown, moist, medium dense to very dense, (HARDPAN)	sc								
4 SS	18	12 30 49	79	10		10 (870.7)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	▨	CAVE DEPTH AT COMPLETION: 7.5ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-63A
WisDOT PROJECT ID No: 1146-75-00	BORING LOG	GESTRA	PAGE No: 1 of 3
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/25/13	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/25/13	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 590304
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 771204
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 879.5 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (4")									Frost thickness 17"
						0.3 (879.2)									
1 SS	15	2 4 5	9			SANDY LEAN CLAY, red brown, moist, very stiff	cl				2.5-3.0			26	
						3.8 (875.7)									
2 SS	11	2 5 7	12		875	SILTY SAND, orangeish brown, moist, medium dense	sm				1.50			25	
				5		5.2 (874.3)									
3 SS	18	11 12 14	26			SILTY SAND WITH GRAVEL, brown, moist, medium dense	sm								
						8 (871.5)									
4 SS	18	13 16 18	34		870	SAND WITH CLAY AND GRAVEL, brown, moist, dense to very dense, (HARDPAN)									
				10											
5 SS	18	6 37 37	74												
6 SS	18	6 30 31	61		865		sp-sc								
				15											
7 SS	18	18 31 40	71												
8 SS	18	23 33 50	83		860										
				20											

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 40ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-63A
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 2 of 3
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/25/13	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/25/13	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 590304
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 771204
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 879.5 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SAND WITH CLAY AND GRAVEL, brown, moist, dense to very dense, (HARDPAN)									
9 SS	17	26 35 50/5"	R												
10 SS	15	27 37 50/3"	R		855										
				25											
11 SS	15	31 40 50/3"	R												
12 SS	14	33 42 50/2"	R		850										
				30			sp-sc								
13 SS	14	36 42 50/2"	R												
14 SS	14	37 44 50/2"	R		845										
				35											
15 SS	15	39 46 50/3"	R												
16 SS	9	39 50/3"	R		840										
				40											

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	▨	CAVE DEPTH AT COMPLETION: 40ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-63A
WisDOT PROJECT ID No: 1146-75-00	BORING LOG		PAGE No: 3 of 3
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/25/13	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/25/13	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 590304
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 771204
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 879.5 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					SAND WITH CLAY AND GRAVEL, brown, moist, dense to very dense, (HARDPAN)									
17 SS	8	42 50/2"	R		Color change to gray in sample SS-17	sp-sc								
					43.7 (835.8)									
18 SS	2	50/2"	R		Poor recovery and gravel pieces in sample SS-18									Driller noted rock in split spoon shoe for sample SS-18
				835	End of Boring at 43.7 ft.									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 40ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**		**BORING No B-64**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 11/20/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 11/20/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼ HSA	ROADWAY NAME: STH-15	NORTHING: 589973
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto; EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 771722
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 874.1 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (5")									
						0.4 (873.7)									
1 SS	12	2 3 4	7			CLAYEY SAND, brown, moist, loose	sc								
						2.8 (871.3)									
2 SS	15	3 11 17	28	5	870	SILTY SAND WITH GRAVEL, brown, moist, medium dense to very dense	sm								
3 SS	10	21 50/5"	R												
						7.7 (866.4)									
4 SS	17	14 24 16	40	10	865	CLAYEY SAND, brown, moist, dense, (HARDPAN)	sc								
						10 (864.1)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 8ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**	GESTRA	**BORING No**	**B-64A**
WisDOT PROJECT ID No: 1146-75-00			PAGE No	1 of 3
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/26/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/26/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 589974	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto; EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 771723	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 874.2 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (5")									Frost thickness 15"
						0.4 (873.8)									
1 SS	16	4 6 5	11			CLAYEY SAND WITH GRAVEL, brown, moist, medium dense	sc								
2 SS	18	4 6 7	13		870										
				5											
						5.5 (868.7)									
3 SS	18	25 23 22	45			GRAVEL WITH SAND, gray, dry, dense	gp								Rig chatter at 6'
						8 (866.2)									
4 SS	18	25 22 11	33		865	CLAYEY SAND WITH GRAVEL, brown, moist, dense to very dense, (HARDPAN)									
				10											
5 SS	18	6 29 12	41												
6 SS	18	4 31 14	45		860		SC								
				15											
7 SS	18	10 26 36	62												
8 SS	18	13 29 40	69		855										
				20											

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 42ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING LOG		BORING No	B-64A
WisDOT PROJECT ID No: 1146-75-00				PAGE No	2 of 3
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/26/13		HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/26/13		LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No		LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15		NORTHING	589974
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	771723
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	874.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						CLAYEY SAND WITH GRAVEL, brown, moist, dense to very dense, (HARDPAN)									
9 SS	15	24 39 50/3"	R												
10 SS	11	27 50/5"	R		850										
				25											
11 SS	16	22 34 50/4"	R												
12 SS	15	23 38 50/3"	R		845										
				30			SC								
13 SS	9	39 50/3"	R												Fines = 38%
14 SS	8	30 50/2"	R		840										
				35											
15 SS	8	40 50/2"	R												Fines = 29%
16 SS	9	45 50/3"	R		835										
				40											

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: 42ft.		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**		**BORING No B-64A**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 3 of 3
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/26/13	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/26/13	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 589974
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto; EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 771723
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 874.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					CLAYEY SAND WITH GRAVEL, brown, moist, dense to very dense, (HARDPAN)									
17 SS	7	50 50/1"	R			SC								
18 SS	6	50/6"	R	44 (830.2) — 830										
					End of Boring at 44.0 ft.									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 42ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-65**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/20/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/20/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼ HSA		ROADWAY NAME: STH-15	NORTHING: 589642	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 772214	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 819.9 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (5")									
						0.4 (819.5)									
1 SS	11	2 4 4	8			SILTY CLAY WITH SAND, black, moist, stiff, trace organic matter, with roots, (POSSIBLE FILL) 1" thick brown silty sand layer in sample SS-1	cl-ml				1.25-1.5			23	LOI = 3.3%
						2.7 (817.2)									
						SILTY SAND WITH GRAVEL, brown and light brown, moist, medium dense									
2 SS	15	2 6 12	18	5	815		sm								
						5.4 (814.5)									
						GRAVEL WITH SAND, brown, moist, very dense, trace silt									
3 SS	14	7 33 18	51				gp								
						7.8 (812.1)									
						LEAN CLAY WITH SAND AND GRAVEL, brown, moist, medium stiff									
4 SS	18	3 10 7	17	10	810		cl				0.50			9	
						10 (809.9)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8.5ft.	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 5ft.	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London				BORING No: B-65A
WisDOT PROJECT ID No: 1146-75-00				PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/26/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/26/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 589660	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 772226	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 820 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (5")									Frost thickness 18"
						0.4 (819.6)									
1 SS	18	2 2 3	5			SILTY CLAY, black and brown, moist, trace organic matter, (TOPSOIL)								32	LOI = 5.9%
						3 (817)									
2 SS	8	3 10 23	33			GRAVEL WITH SILT AND SAND, brown and orangeish brown, moist, medium dense	gp-gm								
				5	815	5.1 (814.9)									
3 SS	18	14 17 19	36			SILTY SAND, brown, wet, dense	sm								
4 SS	10	14 27 19	46			Gravel layer in sample SS-4									Driller noted gravel layer at 8.5'
				10	810	10.2 (809.8)									
5 SS	4	50/4"	R			SAND WITH SILT AND GRAVEL, brown, wet, very dense, (HARDPAN)	sp-sm								
						13 (807)									
6 SS	0	50/0"	R			End of Boring at 13.0 ft.									Auger refusal at 13'

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 7.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 5ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-67**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/19/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/19/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼ HSA		ROADWAY NAME: STH-15	NORTHING	589011
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	773156
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	854.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (7") 0.6 (853.6)									
1 SS	9	2 3 5	8			LEAN CLAY, red brown, moist, stiff to hard, trace gravel	cl				1.5-1.75			25	
2 SS	15	2 6 7	13	5	850						2.5-4.0			17	
						5.4 (848.8)									
3 SS	9	6 16 19	35			SILTY SAND WITH GRAVEL, brown, moist, dense	sm								
						7.6 (846.6)									
4 SS	14	10 23 25	48	10	845	GRAVEL WITH SAND, gray, moist, dense 10 (844.2)	gp								

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	▨	CAVE DEPTH AT COMPLETION: 7ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-67A
WisDOT PROJECT ID No: 1146-75-00	BORING LOG	GESTRA	PAGE No: 1 of 2
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/25/13	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/25/13	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 589012
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto; EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 773178
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 855 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (5")									Frost thickness 18"
						0.4 (854.6)									
1 SS	18	2 3 4	7			LEAN CLAY, brown, moist, very stiff, trace gravel	cl				2.50			17	
2 SS	15	2 5 5	10	5	850						2.50			18	
						5.4 (849.6)									
3 SS	10	10 11 13	24			SILTY SAND WITH GRAVEL, brown, moist, medium dense	sm								
4 SS	9	11 14 16	30	10	845										
						10.1 (844.9)									
5 SS	8	7 10 12	22			SILTY SAND, brown, moist, medium dense to dense, trace gravel									
6 SS	15	9 12 9	21			With clayey seams in sample SS-6	sm								
				15	840										
7 SS	14	11 14 17	31												
						17.8 (837.2)									
8 SS	15	25 25 19	44			SAND WITH CLAY, brown, moist, dense, (HARDPAN)	sp-sc								
				20	835										

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No	B-67A
WisDOT PROJECT ID No: 1146-75-00			PAGE No	2 of 2
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/25/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/25/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 589012	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto; EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 773178	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 855 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					20.4 (834.6)	sp-sc								
9 SS	8	29 50/2"	R		SILTY SAND WITH GRAVEL, brown, moist, very dense, (HARDPAN)	sm								
10 SS	9	36 50/3"	R		24.3 (830.7)									

End of Boring at 24.3 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-68**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/19/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/19/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼ HSA		ROADWAY NAME: STH-15	NORTHING	588406
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	774106
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	830.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				830	TOPSOIL, (6") 0.5 (830.3)									
1 SS	5	0 0 1	1		SILTY CLAY, black, moist, trace organic matter, (POSSIBLE FILL) 1.3 (829.5)	cl-ml							42	LOI = 10.1% Deformed sample, unable to obtain accurate Q_p
					SILTY SAND, gray, moist to very moist, very loose, (POSSIBLE FILL)	sm								
2 SS	9	0 1 1	2		Wet gravel layer in sample SS-2								21	LOI = 1.5%
				5	5.1 (825.7)									
				825	LEAN CLAY, brown, moist, medium stiff to very stiff									
3 SS	15	4 5 5	10		Wet silty sand seams in sample SS-3	cl				1.00			18	
4 SS	16	3 4 6	10		Trace sand and gravel in sample SS-4					0.5-2.0			13	
				10	10 (820.8)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6ft.	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 5ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**	**BORING No B-69**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 11/19/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 11/19/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 588184
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 774519
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 833.3 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (6")									
						0.5 (832.8)									
1 SS	10	0 1 2	3			SILTY CLAY, dark brown, moist, very soft to stiff, trace organic matter	cl-ml				<0.25-1.0			46	LOI = 11.5%
						½" thick gray silty sand seam at bottom of sample SS-1									
						2.7 (830.6)									
					830	SILTY SAND, brown, wet, very loose									
2 SS	15	0 2 2	4	5			sm								
						5.4 (827.9)									
						LEAN CLAY, brown with gray, moist, stiff to very stiff, trace gravel									
3 SS	16	2 3 5	8								1.75-2.0			16	
					825		cl								
4 SS	18	2 3 6	9	10							2.00			15	
						10 (823.3)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3.5ft.	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 3ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-69A**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 2/25/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 2/25/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	588151
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	774570
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	835.1 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (4")									Frost thickness 18"
						0.3 (834.8) SILTY SAND, brown, moist, loose									
1 SS	18	3 4 5	9				sm								
						3 (832.1) LEAN CLAY, brown, moist, stiff to very stiff									
2 SS	18	3 4 8	12	5	830						1.5-2.0			12	
3 SS	18	3 7 8	15				cl				2.0-2.75			17	
4 SS	18	4 5 7	12	10	825	10.1 (825) SILTY CLAY, gray, very moist, stiff					2.00			19	
5 SS	18	2 4 5	9				cl-ml				1.25			19	
						13 (822.1) SILTY SAND WITH GRAVEL, gray, wet, medium dense									
6 SS	18	2 4 8	12	15		15 (820.1)	sm								

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 12.5ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 12.5ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-70
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/17/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/17/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 587952
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 774961
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 858.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						LEAN CLAY, red brown, moist, very stiff to hard, trace gravel									
1 SS	15	2 3 5	8								2.50			22	
					855										
2 SS	18	3 6 9	15	5			cl				4.50			17	
3 SS	18	3 6 12	18								3.75			16	
					850										
4 SS	18	2 6 8	14	10		10 (848.7)					3.75			17	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-71
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/17/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/17/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 587718
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 775406
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 872 ft

BORING LOG

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0		SILTY CLAY, brown, moist, (POSSIBLE TOPSOIL)									
1 SS	18	3 1 2	3		870		cl-ml							16	Disturbed sample in SS-1, no Qp
						2.7 (869.3)									
						POORLY GRADED GRAVEL WITH SAND, brown, moist, medium dense to dense									
2 SS	10	8 20 22	42	5											Fragmented rock pieces in sample SS-2
						With clay seams in SS-3	gp								
3 SS	11	13 14 10	24		865										
4 SS	18	3 10 14	24												
						9.5 (862.5)					3.50			16	
				10		LEAN CLAY, red brown, moist, very stiff, with gray sandy silt seam	cl								
						10 (862)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-72**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 6/05/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 6/05/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 587486	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 775848	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 889.5 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SANDY LEAN CLAY, brown, moist, medium stiff, trace silt									
1 SS	14	2 3 3	6				cl							9	Disturbed sample SS-1, no Qp possible
						2.8 (886.7)									
						LEAN CLAY, brown, moist, very stiff									
2 SS	18	2 3 5	8	5	885		cl				2.50			18	
						5.5 (884)									
						GRAVEL WITH SAND, light brown, moist, dense									Rig chatter at 5.5 ft Probable cobbles and/or boulders
3 SS	16	3 16 30	46				gp								Rig chatter 7 ft
						7.9 (881.6)									
						▽ SAND, brown, wet, medium dense, trace gravel and clay									
4 SS	14	6 13 6	19	10	880		sp								
						10 (879.5)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8.5ft.	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-73**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 6/05/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 6/05/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	587058
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	776759
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	902.1 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0	TOPSOIL (4")									
					0.4 (901.7)									
1 SS	9	2 2 6	8	900	SILT, brown, very moist, loose, with sand seams	ml								
					2.6 (899.5)									
					LEAN CLAY, red brown, moist, very stiff									
2 SS	15	2 4 8	12	5						3.00			15	
					Trace gravel in SS-3	cl								
3 SS	18	6 7 11	18	895						3.50				
4 SS	18	3 5 7	12	10						2.0-3.0			17	
					10 (892.1)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-74
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/16/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/16/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 586622
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 777500
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 913.9 ft

BORING LOG

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						SILT, light brown, moist, loose, with clay seams									
1 SS	12	2 3 4	7				ml							17	
						2.8 (911.1)									
						SILTY CLAY, brown, moist, stiff									
2 SS	14	1 1 2	3		910		cl-ml				1.75			25	
				5		5.3 (908.6)									
						LEAN CLAY, red brown, moist, stiff to very stiff									
3 SS	14	2 8 6	14				cl				1.5-2.0			20	
					905	Trace gravel in SS-4									
4 SS	18	4 5 8	13	10		10 (903.9)					1.25-2.5			15	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-75**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/16/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/16/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 586088	
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 778384	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 907.8 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ASPHALT (5") 0.4 (907.4)									Offset boring to westbound lane
						CONCRETE (7") 1 (906.8)									
1 SS	14	7 3 4	7			SILTY CLAY, dark brown, moist, medium stiff, trace organics	cl-ml				0.75			21	
					905	2.7 (905.1)									
2 SS	11	1 2 1	3			SANDY LEAN CLAY, red brown, moist, stiff to very stiff	cl				1.0-3.0			17	
				5		5.5 (902.3)									
3 SS	18	2 5 10	15			LEAN CLAY, red brown, moist, stiff to very stiff, trace sand					2.5-2.75			13	
					900		cl								
4 SS	18	2 4 6	10								1.75-2.5			15	
				10		10 (897.8)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-76**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/26/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/26/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 2¼" HSA		ROADWAY NAME: STH-15	NORTHING	585695
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 83.9%	STATION / OFFSET	EASTING	779319
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	895.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (5")									
					895	0.4 (895.5)									
1 SS	14	2 8 14	22			SILTY SAND WITH GRAVEL, brown, moist, medium dense	sm								
						2.8 (893.1)									
2 SS	15	8 21 9	30	5		SILT WITH GRAVEL, light brown, moist, medium dense, with clay seams	ml								
						5.4 (890.5)									
3 SS	6	6 8 8	16		890	CLAYEY SAND WITH GRAVEL, light brown, moist, medium dense, trace silt	sc								
						7.5 (888.4)									
4 SS	18	2 4 3	7	10		CLAYEY SAND, gray, wet, loose, trace silt	sc								
						10.5 (885.4)									
5 SS	16	4 12 14	26		885	GRAVEL WITH SAND, gray, wet, medium dense	gp								
						12.5 (883.4)									

End of Boring at 12.5 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 11ft.	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 5ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-77**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/16/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/16/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	585205
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	780197
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	895.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					895	ROADWAY SHOULDER GRAVEL (No Thickness Recorded)									
						0.5 (895.4)									
1 SS	11	3 5 5	10			SANDY LEAN CLAY, brown, moist, hard	cl				4.50			12	
						3 (892.9)									
2 SS	18	2 3 5	8	5		LEAN CLAY, red brown, moist, stiff to very stiff	cl				2.75			17	
					890										
3 SS	18	3 5 6	11								1.75-2.25			17	
						8 (887.9)									
4 SS	18	3 4 6	10			SANDY LEAN CLAY, red brown, moist, medium stiff to stiff	cl				0.5-1.75			18	
				10		10 (885.9)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-78**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/21/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/21/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 587629	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 774595	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 847.5 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (6") 0.5 (847)									
1 SS	14	2 2 4	6		845	LEAN CLAY, red brown, moist, stiff to hard, trace gravel					1.75-2.0			24	
2 SS	18	2 5 7	12	5			cl				3.00			17	
3 SS	18	3 8 10	18		840						3.75-4.5+			16	
4 SS	7	6 11 12	23	10		10 (837.5)					2.25			21	Deformed sample, sampler pushed stone

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	▨	CAVE DEPTH AT COMPLETION: 7.5ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-79**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/21/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/21/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	587224
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	774895
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION	869.5 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (6") 0.5 (869)									
1 SS	13	0 2 3	5			LEAN CLAY, red brown, moist, stiff to hard					1.5-1.75			31	
2 SS	17	2 4 5	9	5	865		cl				2.5-2.75			18	
3 SS	16	30 32 11	43			Trace gravel in sample SS-3					4.5+			12	
4 SS	18	6 10 11	21	10	860	10 (859.5)					4.5+			15	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	▨	CAVE DEPTH AT COMPLETION: 8.5ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-80**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/21/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/21/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	586908
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	775283
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION	893.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (6")									
						0.5 (893.4)									
1 SS	13	2 4 3	7			LEAN CLAY, red brown, moist, stiff to very stiff, trace sand and gravel					1.25-1.5			19	
					890										
2 SS	18	2 6 8	14	5			cl				3.5-3.75			18	
3 SS	18	6 5 6	11								2.0-2.5			16	
					885	Black and gray sand with gravel layer in Sample SS-4									
4 SS	11	10 10 7	17	10		10 (883.9)					2.50			12	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	▨	CAVE DEPTH AT COMPLETION: 8ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-81
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/16/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/16/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 586730
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 775749
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 909.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						LEAN CLAY, red brown, moist, very stiff									
1 SS	18	3 3 4	7				cl				2.25			25	
						4 (905.2)									
2 SS	18	2 4 5	9		905	SANDY LEAN CLAY, red brown, moist, stiff to very stiff					1.75-2.0			22	
				5											
3 SS	18	5 5 7	12				cl				1.5-2.5			17	
						Sand seams in SS-4									
4 SS	18	4 6 10	16		900						2.5-3.5			15	
				10		10 (899.2)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐	
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐	
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-82**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/16/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/16/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	586615
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	776428
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	907.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0 / 907	CLAYEY SAND, brown, moist, loose									
1 SS	18	1 2 1	3			sc								
				3 / 905										
					SILTY CLAY, brown, moist to very moist, medium stiff									
2 SS	18	0 0 2	2							0.50			33	
				5		cl-ml								
3 SS	18	3 2 4	6										39	Sample SS-3 disturbed unable to perform Qp test
				8 / 900										
					SILT, brown, moist to very moist, loose to medium dense, with clay									
4 SS	18	1 2 2	4										35	
				10		ml								
5 SS	17	0 3 10	13		With sand in SS-5								23	
				12.5 / 895										

End of Boring at 12.5 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-83**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 6/04/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 6/04/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 586072	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 777603	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 920 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ASPHALT (4")									
						0.3 (919.7)									
						BASE COURSE (6")									
						0.8 (919.2)									
1 SS	12	2 3 5	8			LEAN CLAY, red brown, moist, trace sand and gravel, (FILL)	cl				1.25			20	
2 SS	12	2 4 6	10	5	915						3.00			15	
						5.3 (914.7)									
						SILT WITH SAND, light brown, moist, dense	ml								Rig chatter at 6 ft Probable cobbles and/or boulders
3 SS	15	4 13 19	32												
						7.9 (912.1)									
						SAND, light brown, moist, very dense, trace gravel									
4 SS	18	28 30 34	64	10	910		sp								
						10 (910)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-84
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 11/21/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 11/21/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 584788
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 780853
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 887.1 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (6") 0.5 (886.6)									
1 SS	12	0 0 1	1		885	SILTY CLAY WITH SAND, black, moist, medium stiff, trace organic matter 2.8 (884.3)	cl-ml				0.50			41	LOI = 6.1%
2 SS	1	50/1"	R			GRAVEL WITH SAND, gray, moist, very dense 4 (883.1)	gp								Rig chatter at 3'

End of Boring at 4.0 ft.

Auger refusal at 4'
Driller attempted 2 offset borings. First offset boring was drilled 5' west, second offset boring was drilled 5' north. Both offset borings had auger refusal at 4'.
POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	▨	CAVE DEPTH AT COMPLETION: 3ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-85
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 6/04/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 6/04/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 584358
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 781769
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 898.1 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0 / 898.1	CLAYEY SAND WITH GRAVEL, brown, moist, loose to medium dense									
1 SS	6	3 4 4	8			sc								
				895										
2 SS	10	50 10 11	21		Gravel layer at 4.0 ft									
				5	5.2 (892.9)									
					SILTY SAND, light brown, very moist, very dense									
3 SS	5	50/5"	R			sm								
					7.4 (890.7)									Rig chatter at 7.0 ft. Probable cobbles and/or boulders
				890	CLAYEY SAND, light brown, very moist, medium dense, trace silt									
4 SS	8	10 7 7	14			sc								
				10	10 (888.1)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-86**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 6/04/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 6/04/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	583801
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	782604
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION	888.3 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL (3")									
						0.3 (888)									
						LEAN CLAY, brown, moist, stiff to very stiff									
1 SS	16	4 5 7	12								3.0-3.5			21	
					885										
2 SS	14	8 7 7	14			Trace sand in SS-2					2.25			15	
				5			cl								
3 SS	16	4 4 5	9								1.0-1.75			17	
					880										
4 SS	17	3 5 7	12								2.00			14	
				10		10 (878.3)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-87**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 6/04/12		HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 6/04/12		LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No		LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15		NORTHING: 584062	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 782880	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 888.2 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					ASPHALT (4") 0.3 (887.9)									
					BASE COURSE (8") 1 (887.2)									
1 SS	12	2 3 2	5		LEAN CLAY, black, moist, trace silt and organics, (FILL)	cl				1.50			26	LOI = 4.4%
				885	4 (884.2)									
2 SS	7	1 1 2	3	5	SILTY CLAY, brown to gray mottled brown, moist, medium stiff to stiff 5 (883.2)	cl-ml				0.5-1.5			25	
					LEAN CLAY, brown, moist to very moist, very soft to stiff									
3 SS	12	2 3 4	7		Trace sand and gravel in SS-3					1.50			16	
				880		cl								
4 SS	18	2 2 4	6	10	With sand seams in SS-4					1.25			17	
					10.5 (877.7)									
					SANDY LEAN CLAY, gray, moist, very soft to soft									
5 SS	12	3 3 2	5							0.25			15	
				875		cl								
6 SS	12	2 1 2	3		Trace gravel in SS-6					<0.25			15	
				15	15 (873.2)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-88**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/26/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/26/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 2¼" HSA		ROADWAY NAME: STH-15	NORTHING	583266
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 83.9%	STATION / OFFSET	EASTING	783446
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	892.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0	TOPSOIL, (4")									
					0.3 (892.6)									
1 SS	16	2 3 4	7		LEAN CLAY, red brown, moist, medium stiff to stiff					1.00			15	
				890		cl								
2 SS	18	2 4 3	7						0.75-2.0				22	
				5	5.5 (887.4)									
3 SS	5	2 5 9	14		SILTY SAND, brown, moist, medium dense, trace gravel, with clayey layers	sm								
					7.5 (885.4)									
				885	SILTY SAND WITH GRAVEL, brown, moist, dense									
4 SS	6	26 32 10	42			sm								
				10	10 (882.9)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	▨	CAVE DEPTH AT COMPLETION: 7ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-89**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 6/04/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 6/04/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	582767
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	784315
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	890.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					890	TOPSOIL (3") 0.3 (890.5) LEAN CLAY, brown, moist, medium stiff to very stiff									
1 SS	13	2 2 5	7								0.50			15	Deformed sample in SS-1
						Trace sand in SS-2									
2 SS	14	3 4 6	10	5			cl				1.5-2.0			15	
					885										
3 SS	18	2 3 6	9								0.75			16	
						Trace gravel in SS-4									
4 SS	17	7 5 5	10	10		10 (880.8)					0.75			15	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-90**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 6/05/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 6/05/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 582093	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 785308	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 891.1 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL (4")									
						0.3 (890.8)									
					890	LEAN CLAY, brown mottled black, moist, stiff to very stiff									
1 SS	10	2 3 5	8								2.25			25	
							cl								
						Trace sand in SS-2									
2 SS	11	2 5 4	9								1.00			14	
				5		5.2 (885.9)									
						GRAVEL WITH SAND, gray trace black, moist, medium dense									
					885										
3 SS	10	13 14 15	29				gp								Rock fragments in SS-3 and SS-4
						7.7 (883.4)									Rig chatter at 7.0 ft
						SILTY CLAY WITH GRAVEL, brown, moist, hard									Probable cobbles and/or boulders
4 SS	6	16 21 20	41				cl-ml								
				10		▽ 10 (881.1)									Disturbed sample for SS-4, no Qp possible

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 10ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-91**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 5/16/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 5/16/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 581627	
LOG QC BY: R. Haque	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 786197	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 896.4 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ASPHALT (7") 0.6 (895.8)									Drilled offset 17.0 ft north of staked location, to west bound lane
1 SS	7	30 50/1"	R		895	CONCRETE (5") 1 (895.4)									Not enough sample recovered in SS-1 to obtain Qp
						LEAN CLAY WITH SAND AND GRAVEL, dark brown, moist, (FILL)	cl								
						3 (893.4)									
2 SS	17	7 5 7	12	5		LEAN CLAY, brown, moist, very stiff, trace gravel (FILL)	cl				2.50			14	Hard drilling from 4.0 ft to 6.0 ft
						5.5 (890.9)									
3 SS	18	2 3 6	9		890	LEAN CLAY, red brown, moist, very stiff, trace to with sand	cl				2.00			20	
4 SS	18	2 6 9	15	10		With silt seam in SS-4					2.50			17	
						10 (886.4)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-92**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 6/05/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 6/05/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 581034	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 787006	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 902.3 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL (3")									
						0.3 (902)									
						CLAYEY SAND, brown, moist, medium dense									
1 SS	9	4 6 6	12		900		sc								
						2.6 (899.7)									
						LEAN CLAY, red brown, moist, very stiff to hard									
2 SS	18	3 4 8	12	5							3.50			19	
						With sand seams in SS-2									
3 SS	18	4 6 8	14		895		cl				3.0-4.5+			14	
4 SS	17	2 5 13	18	10							3.5-4.25			18	
						10 (892.3)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		BORING LOG		BORING No	B-93
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 6/05/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 6/05/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 580512	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 787859	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 889.6 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL (3")									
						0.3 (889.3)									
1 SS	12	3 4 2	6			SILTY CLAY, brown and gray, moist, stiff to very stiff, with sand seams	cl-ml				1.5-2.0			20	
						2.8 (886.8)									
						LEAN CLAY, red brown, moist, medium stiff to very stiff									
2 SS	13	2 3 3	6		885	Trace sand in SS-2					0.50			23	
				5											
3 SS	18	1 4 6	10				cl				3.00			23	
						Trace gravel in SS-4									
4 SS	18	3 5 7	12		880						2.25			24	
				10		10 (879.6)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-94**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 6/05/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 6/05/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	579980
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING	788705
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	864.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL (3") 0.3 (864.6)									
1 SS	10	2 4 11	15			SILTY CLAY, brown mottled gray, moist, stiff, with sand seams	cl-ml				1.50			15	
						2.7 (862.2)									
2 SS	6	8 15 16	31	5	860	GRAVEL WITH SAND, gray, moist, dense 5 (859.9)	gp								Rig chatter at 3.0 ft Probable cobbles and/or boulders Rock fragments in SS-2
3 SS	18	4 5 8	13			LEAN CLAY, red brown, moist, very stiff to hard	cl				3.50			23	
4 SS	16	3 9 8	17	10	855	Trace gravel in SS-4 10 (854.9)					3.75-4.5+			23	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-95
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 6/05/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 6/05/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 579471
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 789567
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 866.2 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						GRAVEL (3") 0.3 (865.9)									
1 SS	17	3 4 5	9		865	SANDY LEAN CLAY, brown, moist, very stiff to hard, trace gravel					2.75			18	
2 SS	18	3 8 10	18	5			cl				4.5+			14	
					860										
3 SS	14	3 7 10	17								3.0-3.75			14	
4 SS	12	5 6 9	15	10		10 (856.2)					3.00			16	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London				BORING No: B-96
WisDOT PROJECT ID No: 1146-75-00				PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/17/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/17/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 578763	
LOG QC BY: R. Haque	HAMMER TYPE: Auto / EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 790292	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 851.8 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						LEAN CLAY, red brown, moist, very stiff to hard, trace gravel									
1 SS	16	2 4 7	11		850						3.75-4.5+			17	
2 SS	17	2 5 8	13	5			cl				3.50			24	
3 SS	18	4 6 6	12		845						2.50			25	
4 SS	18	3 4 6	10	10		10 (841.8)					2.25			21	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-97
WisDOT PROJECT ID No: 1146-75-00	BORING LOG	GESTRA	PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/16/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/16/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 578160
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 791079
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 828 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						ASPHALT (4") 0.3 (827.7)									Boring drilled offset 5.0 ft West
						CONCRETE (4") 0.7 (827.3)									
1 SS	10	14 12 19	31			BASE COURSE (5") 1.1 (826.9)									
						SAND TRACE GRAVEL, brown, moist, dense (FILL) 2.9 (825.1)	sp								
					825	LEAN CLAY, dark brown to red brown, moist, stiff to hard									
2 SS	16	3 3 5	8								1.5-2.5			21	
				5		Turning red brown at bottom of SS-2									
						Sand seams in SS-3									
3 SS	14	2 3 5	8				cl				1.5-2.25			23	
					820										
4 SS	18	5 5 9	14								3.75-4.5+			23	
				10		10 (818)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-98**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 7/11/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 7/11/12	LATITUDE	
CREW CHIEF: R. Johnson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: B. Brown	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	598752
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 81.0%	STATION / OFFSET	EASTING	746106
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	759.3 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						FAT CLAY, dark brown, moist, soft, trace organics									Recovery not recorded on field logs for SS-2,SS- 5, & SS-6
1 ST	16					With wood fragments and roothairs in ST-1	ch				0.25	60	31	37	Dry Wt = 78 pcf LOI=7.4% Attempted SS-1 from 1.0 to 2.5 feet, poor recovery
2 SS		2 2 1	3		755									25	LOI=3.3% SS-2: Possible Poor Recovery, (~1.5" in jar), no Qp possible
				5		5.5 (753.8)									
						SILTY CLAY, dark brown, moist, very soft, trace organics	cl-ml								No recovery at attempted SS-3 from 6.0 to 7.5 ft
2 ST	24					With sand seams in ST-2					<0.25			48	LOI=11.3%
						8 (751.3)									
					750	FAT CLAY, brown, moist to very moist, very soft					<0.25	63	41	60	No recovery at attempted SS-4 from 8.5 to 10.0 ft
				10			ch								
5 SS		2 1 2	3								<0.25			63	
						13 (746.3)									
						LEAN CLAY, brown, moist, very stiff									
6 SS		4 4 8	12		745		cl				3.50			17	
				15		15 (744.3)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-99
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 5/15/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 5/15/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Ashford	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 594079
LOG QC BY: R. Haque	HAMMER TYPE: Auto; EFFICIENCY: (6/2011) 84.3%	STATION / OFFSET	EASTING: 756032
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 805.6 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				805	SILT, brown and black, moist, trace organic 1 (804.6)	ml								
1 SS	5	50/5"	R		SAND, brown, moist, very dense, trace gravel Presence of fractured rock in sample SS-1 & SS-2 3.7 (801.9)	SP								Hard drilling at 3.0 ft (POSSIBLE BEDROCK)
2 SS	2	50/2"	R		End of Boring at 3.7 ft.									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

BORING LOG

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-120
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 11/20/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 11/20/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼ HSA	ROADWAY NAME: STH-15	NORTHING: 593796
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto; EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 757028
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 805.3 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					805	TOPSOIL, (4")									
						0.3 (805)									
1 SS	8	18 50/4"	R			SILTY SAND WITH GRAVEL, light brown, moist, very dense	sm								
						3 (802.3)									
2 SS	0	50/0"	R			End of Boring at 3.0 ft.									Auger refusal at 3'. Driller attempted split spoon sample at 3', sampler refusal at 3'. POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	▩	CAVE DEPTH AT COMPLETION: 2ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-121
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 11/20/12	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 11/20/12	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼ HSA	ROADWAY NAME: STH-15	NORTHING: 593657
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 757449
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 799 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (5")									
						0.4 (798.6)									
1 SS	7	9 50/4"	R			SILTY SAND WITH GRAVEL, brown, moist, very dense, with clayey seams Wood fragments in sample SS-1	sm								
						3 (796)									
2 SS	0	50/0"	R			End of Boring at 3.0 ft.									Auger refusal at 3'. Driller attempted split spoon sample at 3', sampler refusal at 3'. POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	▨	CAVE DEPTH AT COMPLETION: 2.5ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-122**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/20/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/20/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼ HSA		ROADWAY NAME: STH-15	NORTHING	593331
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	758877
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	787.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					TOPSOIL, (5") 0.4 (787.5)									
1 SS	18	2 3 4	7		SILTY SAND, red brown, moist to wet, loose to medium dense									
				785										
2 SS	18	2 5 7	12	5		sm								
					Wet at 6'									
3 SS	16	3 4 4	8											
				780										
4 SS	15	2 7 11	18	10	10 (777.9)									

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6ft.	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐	
▼	WATER LEVEL AT COMPLETION: 5ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐	
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-122A
WisDOT PROJECT ID No: 1146-75-00	BORING LOG	GESTRA	PAGE No: 1 of 2
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/28/13	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/28/13	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593405
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 758630
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 784.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (3") 0.3 (784.5)									Frost thickness 15"
1 SS	13	2 3 6	9			SILTY SAND, brown, very moist, loose to medium dense	sm								
2 SS	14	3 3 7	10	5	780	5.3 (779.5)									
3 SS	18	2 3 4	7			LEAN CLAY, brown, moist, stiff to hard					1.0-1.75			22	
4 SS	18	2 3 5	8	10	775						1.0-2.0			23	
5 SS	18	2 3 7	10				cl				1.50			23	
6 SS	18	4 7 8	15	15	770	Trace to with gravel in samples SS-6 and SS-7					3.0-4.0			18	
7 SS	18	3 6 8	14								4.00			18	Rig chatter at 16'
8 SS	18	4 8 10	18	20	765						3.25-4.5			19	

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 15ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 16ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**		**BORING No B-122A**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 2 of 2
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/28/13	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/28/13	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593405
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 758630
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION: 784.8 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						LEAN CLAY, brown, moist, stiff to hard									
					21 (763.8)		cl								
9 SS	0	50/0"	R			End of Boring at 21.0 ft.									Auger refusal at 21'

__ 760

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 15ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 16ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-123**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/20/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/20/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 3¼ HSA		ROADWAY NAME: STH-15	NORTHING	593345
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	759394
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION	782.7 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					TOPSOIL, (4") 0.3 (782.4)									
1 SS	18	4 9 11	20		SILTY SAND, red brown, moist, medium dense 2 (780.7)	sm								
				780	SAND, light brown, moist, medium dense									
2 SS	14	3 8 11	19			sp								
				5	5.3 (777.4)									
3 SS	16	2 6 7	13		SILTY SAND, red brown, moist to wet, loose to medium dense									
				775		sm								
4 SS	18	3 3 2	5		▽ Wet at 8.5'									
				10	▽ 10.3 (772.4)									
5 SS	18	5 4 5	9		LEAN CLAY, brown, moist, stiff to very stiff					2.0-3.0			23	
				770		cl								
6 SS	18	2 4 6	10		With gray silty seams in sample SS-6					1.25-3.0			25	
				15	15 (767.7)									

End of Boring at 15.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 9ft.	CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: 10ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

WisDOT PROJECT NAME: STH-15/STH-76-New London	**BORING LOG**	GESTRA	**BORING No B-123A**
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 2

CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 2/28/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 2/28/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING: 593404	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto; EFFICIENCY: (7/2012) 80.9%	STATION	OFFSET	EASTING: 759297
COUNTY: 44-Outagamie	TOWNSHIP; RANGE; SECTION; 1/4 SECTION; 1/4 SECTION			SURFACE ELEVATION: 777.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0	TOPSOIL, (4")									Frost thickness 17"
					0.3 (777.6)									
1 SS	15	1 1 1	2		LEAN CLAY, gray mottled brown, moist, soft to medium stiff, with sandy seams, trace organic matter	cl				0.25-0.5			20	
				775										
					3.6 (774.3)									
2 SS	16	1 1 2	3		SILTY SAND, brown, very moist, very loose	sm							20	
				5	5.4 (772.5)									
					LEAN CLAY, brown, moist to very moist, stiff to hard									
3 SS	18	2 2 5	7							1.5-2.0			29	
				770										
4 SS	18	2 3 6	9		Trace sand with occasional red fat clay seams in sample SS-4					1.5-2.0			14	
				10										
5 SS	18	3 5 6	11							4.0-4.5			24	
				765		cl								
6 SS	18	3 7 7	14							4.25-4.5			24	
				15										
7 SS	18	3 7 7	14							4.50			23	
				760										
8 SS	18	3 6 9	15							4.50			21	
				20										

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 32ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London				BORING No	B-123A
WisDOT PROJECT ID No: 1146-75-00				PAGE No	2 of 2
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 2/28/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 2/28/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING	593404
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING	759297
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION	1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION	777.9 ft

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					LEAN CLAY, brown, moist to very moist, stiff to hard									
9 SS	18	4 7 8	15		Trace sand in sample SS-9					4.0-4.5			18	
				755										
10 SS	18	6 6 7	13		Trace gravel in sample SS-10					4.50			18	
				25										
11 SS	16	5 7 8	15		Very moist in sample SS-11					2.5-4.5			24	
				750		cl								
12 SS	18	4 6 7	13							4.50			22	
				30										
13 SS	18	4 5 6	11							2.75-4.0			25	
				745										
14 SS	18	6 5 7	12							3.0-4.0			17	
				35	35 (742.9)									

End of Boring at 35.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE		CAVE DEPTH AT COMPLETION: 32ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-124**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 11/26/12	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 11/26/12	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: CME 45		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: D. Harris	DRILLING METHOD / HOLE SIZE: 2¼" HSA		ROADWAY NAME: STH-15	NORTHING: 592581	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 83.9%	STATION / OFFSET	EASTING: 757825	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 819.1 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
					ASPHALT, (7") 0.6 (818.5)									Boring was drilled offset 7' north of staked location into westbound travel lane.
1 SS	16	7 5 5	10		BASE COURSE, (5") 1 (818.1) SAND, brown, moist to wet, (FILL)									
2 SS	15	3 2 3	5	5 / 815										
					5.4 (813.7) SILTY SAND, brown, wet, very dense									
3 SS	6	4 50/3"	R			sm								
					8 (811.1)									Rig chatter at 7'
4 SS	0	50/0"	R		End of Boring at 8.0 ft.									Auger refusal at 8'. Driller attempted split spoon sample at 8', sampler refusal at 8'. POSSIBLE BEDROCK

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 5ft.	■	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-125**
Sheet No.:	1 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 25	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 839.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
0										Grass							
										1.5ft							
	837.1									DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		1.62	1	R3	0	1.5	1
												1.73	1	R3	0	1.5	1
												1.78	1	R3	0	1.5	1
												1.82	1	R3	0	1.5	1
												1.96	1	R3	0	1.5	1
					5							2.26	1	R3	0	1.5	1
												2.41	1	R3	0	1.5	1
												2.71	1	R3	0	1.5	1
												2.90	1	R3	0	1.5	1
												3.14	1	R3	0	1.5	1
					4							3.32	1	R3	0	1.5	1
												3.51	1	R3	0	1.5	1
												3.70	1	R3	0	1.5	1
												3.72	1	R3	0	1.5	1
												3.75	1	R3	0	1.5	1
												3.79	1	R3	0	1.5	1
		1	100	9.2	9							3.83	1	R3	0	1.5	1
												3.86	1	R3	0	1.5	1
												4.15	1	R3	0	1.5	1
5												4.44	1	R3	0	1.5	1
												4.61	1	R3	0	1.5	1
												4.77	1	R3	0	1.5	1
												4.91	1	R3	0	1.5	1
					6							4.99	1	R3	0	1.5	1
												5.17	1	R3	0	1.5	1
												5.22	1	R3	0	1.5	1
												5.32	1	R3	0	1.5	1
												5.60	1	R3	0	1.5	1
					5							5.80	1	R3	0	1.5	1
												6.10	1	R3	0	1.5	1
												6.22	1	R3	0	1.5	1
												6.45	1	R3	0	1.5	1
												6.62	1	R3	0	1.5	1
	832.1											6.83	1	R3	0	1.5	1
												7.00	1	R3	0	1.5	1
					2							7.46	1	R3	0	1.5	1
												7.55	1	R3	0	1.5	1
												7.96	1	R3	0	1.5	1
					3							8.26	1	R3	0	1.5	1
												8.51	1	R3	0	1.5	1
												8.80	1	R3	0	1.5	1
												9.15	1	R3	0	1.5	1
		2	83	30.8	3							9.47	2	R3	5	1.5	2
10												9.65	2	R3	0	1.5	2

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-125**
Sheet No.:	2 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 25	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 839.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
10										Continuation:							
					5							10.01	2	R3	70	1.5	2
												10.27	2	R3	0	1.5	2
												10.42	1	R3	0	1.5	1
										10.7ft		10.51	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, red, medium strong (R3)		10.71	1	R3	0	1.5	1
										11.0ft		11.02	1	R3	0	1.5	1
					3					DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3)		11.23	1	R3	0	1.5	1
												11.65	1	R3	0	1.5	1
	826.9																
					2							12.40	1	R3	0	1.5	1
												12.75	1	R3	0	1.5	1
												13.23	1	R3	0	1.5	1
												13.31	1	R3	0	1.5	1
					4							13.46	1	R3	0	1.5	1
												13.73	1	R3	0	1.5	1
												14.22	1	R3	0	1.5	1
		3	100	55	5							14.50	2	R3	90	1.5	2
15												14.60	2	R3	0	1.5	2
												14.73	1	R3	0	1.5	1
												14.82	1	R3	0	1.5	1
					4												
					2							16.25	2	R3	0	3	2
												16.43	1	R3	0	1.5	1
												16.63	1	R3	20	1.5	1
												16.78	1	R3	0	1.5	1
	821.9									17.2ft		17.07	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, red, medium strong (R3)		17.33	1	R3	0	1.5	1
					4							17.40	1	R3	0	1.5	1
												17.52	1	R3	0	1.5	1
												17.76	1	R3	0	1.5	1
												17.90	1	R3	0	1.5	1
												18.04	1	R3	0	1.5	1
					3							18.44	1	R3	5	1.5	1
										18.9ft		18.81	2	R2	0	1.5	2
										SANDSTONE, fine to medium grained, light to dark brown, weak (R2)		18.85	2	R2	0	1.5	2
												19.41	2	R2	5	1.5	2
		4	98.2	65.6	3					19.6ft		19.50	1	R3	0	1.5	1
20												19.63	1	R3	0	1.5	1

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-125**
Sheet No.:	3 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 25	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 839.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
20										Continuation:							
										DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		20.12	1	R3	0	1.5	1
					3							20.68	1	R3	0	1.5	1
												20.72	1	R3	0	1.5	1
												21.08	1	R3	0	1.5	1
					4							21.27	1	R3	0	1.5	1
												21.43	1	R3	5	1.5	1
	816.9											21.97	1	R3	0	1.5	1
												22.11	1	R3	0	1.5	1
					2							22.51	1	R3	0	1.5	1
												22.85	1	R3	0	1.5	1
												23.03	1	R3	45	1.5	1
										23.3ft							
					3					SANDSTONE, fine to medium grained, light to dark brown, medium strong to weak (R2-R3)		23.34	1	R3	0	1.5	1
												23.83	1	R3	0	1.5	1
												24.00	1	R3	0	1.5	1
												24.12	1	R3	0	1.5	1
												24.32	2	R3	0	1.5	2
25		5	100	65.8	3							24.75	1	R3	5	1.5	1
												25.41	2	R3	90	1.5	2
					2							25.61	1	R3	0	1.5	1
												26.08	2	R3	70	1.5	2
					3							26.65	1	R3	0	1.5	1
	811.9											26.93	1	R3	20	1.5	1
												27.26	1	R3	0	1.5	1
												27.31	1	R3	0	1.5	1
					3							27.65	1	R3	0	1.5	1
												27.83	1	R3	0	1.5	1
30		6	12.6	6.8													

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-125**
Sheet No.:	4 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 25	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 839.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
30										Continuation:							
	806.9																
					1												
												33.74	1	R3	0	1.5	1
35		7	30.8	30.8													
	801.9																
					2							37.45	1	R3	0	1.5	1
												37.92	1	R3	0	1.5	1
												38.17	1	R3	0	1.5	1
												38.36	1	R3	0	3	1
					4							38.53	1	R3	20	1.5	1
												38.73	1	R3	0	1.5	1
												38.92	1	R3	0	1.5	1
												39.18	1	R3	0	1.5	1
												39.41	1	R3	0	1.5	1
40		8	97.8	52.2	2												

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-125**
Sheet No.:	5 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 25	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 839.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data					
												Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
40										Continuation:							
												40.14	1	R3	0	1.5	1
												40.30	1	R3	0	1.5	1
					4							40.57	1	R3	0	1.5	1
												40.83	1	R3	20	1.5	1
												40.93	1	R3	0	1.5	1
					4							41.28	1	R3	0	1.5	1
												41.56	1	R3	0	1.5	1
												41.78	1	R3	0	1.5	1
	796.9											42.09	1	R3	0	1.5	1
										End of Boring at 42.2'							
45																	
50																	

WisDOT PROJECT NAME: STH-15/STH-76-New London		**BORING LOG**		**BORING No**	**B-125A**
WisDOT PROJECT ID No: 1146-75-00				PAGE No	1 of 1
CONSULTANT	CONSULTANT PROJECT No		DATE STARTED: 3/01/13	HORIZONTAL DATUM	VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10		DATE COMPLETED: 3/01/13	LATITUDE	
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV		WisDOT STRUCTURE ID No	LONGITUDE	
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA		ROADWAY NAME: STH-15	NORTHING: 593936	
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto	EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING: 757120	
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION			SURFACE ELEVATION: 792.3 ft	

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				0 / 792	TOPSOIL, (3")									Frost thickness 13"
					0.3 (792)									
1 SS	16	6 6 7	13	790	SAND WITH SILT, light brown, moist, medium dense									
2 SS	15	6 7 8	15	5		sp-sm								
3 SS	12	3 6 6	12	785	▽									
					7.8 (784.5)									
4 SS	11	2 7 8	15	10	LEAN CLAY, brown, moist, stiff to very stiff With sandy seams in sample SS-4	cl				1.5-2.75			22	
5 SS	14	3 4 8	12	780	Trace gravel in sample SS-5					1.5-2.25			23	
					12.8 (779.5)									
6 SS	2	50/2"	R	15	SILTY SAND, light brown with white seams, wet, very dense	sm								Rig chatter at 13'
					16 (776.3)									
7 SS	0	50/0"	R		End of Boring at 16.0 ft.									Auger refusal at 16'

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6.5ft.	CAVE DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR	NE = Not Encountered; NMR = No Measurement Recorded		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-126**
Sheet No.:	1 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 27.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 837.0	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
0										Grass							
	835.0									2.0ft							
					7					DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		2.12	2	R3	0	1.5	2
												2.31	2	R3	0	1.5	2
												2.42	2	R3	0	1.5	2
												2.48	2	R3	0	1.5	2
												2.50	2	R3	0	1.5	2
												2.64	2	R3	0	1.5	2
												2.82	2	R3	0	1.5	2
					5							3.01	2	R3	0	1.5	2
												3.22	1	R3	0	1.5	1
												3.51	1	R3	20	1.5	1
												3.62	1	R3	0	1.5	1
												3.81	1	R3	0	1.5	1
												4.05	1	R3	0	1.5	1
												4.26	1	R3	0	1.5	1
		1	100	18.6	5							4.43	1	R3	0	1.5	1
5												4.67	1	R3	0	1.5	1
												4.91	1	R3	0	1.5	1
					1												
												5.84	1	R3	0	1.5	1
					5							6.13	2	R3	0	1.5	1
										6.4ft		6.34	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, light to dark brown, weak (R3) 6.6ft		6.43	1	R3	0	1.5	1
												6.58	1	R3	0	1.5	1
	829.8									DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3)		6.91	1	R3	0	1.5	1
												7.03	2	R3	80	1.5	2
												7.21	1	R3	0	1.5	1
												7.26	1	R3	0	1.5	1
					6							7.42	1	R3	0	1.5	1
												7.60	1	R3	0	1.5	1
												7.89	1	R3	0	1.5	1
												7.93	1	R3	0	1.5	1
												7.99	1	R3	0	1.5	1
												8.12	1	R3	0	1.5	1
												8.42	1	R3	0	1.5	1
					6							8.56	1	R3	0	1.5	1
										8.9ft		8.74	1	R3	0	1.5	1
										CLAY, Medium stiff, sandy clay, light brown 9.0ft		8.86	2	R3	0	1.5	2
												8.97	1	R3	0	1.5	1
										DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3)		9.06	1	R3	0	1.5	1
												9.12	2	R3	85	1.5	2
		2	100	33.6	5							9.51	1	R3	0	1.5	1
10												9.65	2	R3	90	1.5	2

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-126**
Sheet No.:	2 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 27.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 837.0	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
10										Continuation:							
												9.80	2	R3	0	1.5	2
												10.31	1	R3	0	1.5	1
					3							10.63	1	R3	0	1.5	1
												10.72	1	R3	0	1.5	1
												11.12	1	R3	0	1.5	1
					5							11.22	1	R3	0	1.5	1
												11.43	2	R3	0	1.5	2
												11.63	2	R3	0	1.5	2
												11.82	2	R3	0	1.5	2
	824.8																
												12.20	1	R3	0	1.5	1
												12.35	1	R3	0	1.5	1
					5							12.48	2	R2	0	1.5	1
										12.7ft							
										SANDSTONE, fine to medium grained, light to dark brown, weak (R2) 12.8ft		12.73	2	R2	0	1.5	1
												12.84	2	R2	0	1.5	1
												12.93	2	R2	0	1.5	2
										DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3) 13.3ft		13.14	1	R2	5	1.5	1
												13.27	1	R2	0	1.5	1
					4							13.32	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, light to dark brown, medium strong to weak (R2-R3)		13.74	1	R3	0	1.5	1
												14.12	2	R3	0	1.5	2
												14.30	2	R3	0	1.5	2
		3	98.4	46.2	3					14.7ft							
15										SANDSTONE, fine to medium grained, red, medium strong (R3)		14.65	2	R3	90	1.5	2
												15.10	2	R3	70	1.5	2
												15.46	1	R3	0	1.5	1
					4							15.60	1	R3	5	1.5	1
												15.65	1	R3	0	1.5	1
												15.93	1	R3	0	1.5	1
												16.03	1	R3	0	1.5	1
					4							16.38	1	R3	0	1.5	1
												16.67	1	R3	0	1.5	1
										16.9ft							
										SANDSTONE, fine to medium grained, light to dark brown, weak (R2)		16.90	1	R3	0	1.5	1
	819.8									17.3ft		17.12	1	R3	0	1.5	1
										DOLOMITE, fine grained, iron stained to dark gray to brown with sandstone inclusions, moderatly weathered, medium strong (R3)		17.38	1	R3	0	1.5	1
					5							17.43	1	R3	0	1.5	1
												17.60	1	R3	5	1.5	1
												17.81	1	R3	0	1.5	1
												17.85	1	R3	0	1.5	1
												18.04	1	R3	0	1.5	1
										18.4ft		18.27	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, light to dark brown, medium strong (R3)		18.34	1	R3	30	1.5	1
					5							18.45	1	R3	0	1.5	1
												18.82	1	R3	0	1.5	1
												19.28	1	R3	0	1.5	1
												19.38	1	R3	10	1.5	1
		4	94.4	32.4	4												
20												19.70	1	R3	0	1.5	1

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-126**
Sheet No.:	3 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 27.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 837.0	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
20										Continuation:							
												19.81	1	R3	0	1.5	1
												20.05	2	R3	90	1.5	2
												20.21	1	R3	5	1.5	1
					5							20.40	1	R3	15	1.5	1
												20.53	1	R3	0	1.5	1
										21.1 ft		20.96	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, red, medium strong (R3)		21.05	1	R3	0	1.5	1
					5							21.41	2	R3	0	1.5	2
												21.53	1	R3	0	1.5	1
												21.73	1	R3	20	1.5	1
												21.92	1	R3	0	1.5	1
	814.8																
					3							22.73	2	R3	0	1.5	1
										23.1 ft							
										SANDSTONE, fine to medium grained, light to dark brown, weak (R2)		23.11	1	R3	0	1.5	1
					3							23.52	2	R3	0	1.5	1
												23.86	1	R3	5	1.5	1
												24.02	1	R3	5	1.5	1
												24.41	1	R3	85	1.5	1
		5	100	72.8	3												
25												24.75	1	R3	0	1.5	1
												25.05	1	R2	0	1.5	1
					2							25.55	1	R2	0	1.5	1
												25.85	1	R2	0	1.5	1
												26.16	1	R2	0	1.5	1
					1							26.45	1	R2	0	1.5	1
	809.8																
												27.20	1	R3	0	1.5	1
					2							27.60	1	R3	0	1.5	1
												27.82	1	R3	0	1.5	1
												28.03	1	R3	0	1.5	1
					1												
												29.10	1	R3	0	1.5	1
												29.22	1	R3	0	1.5	1
												29.33	1	R3	0	1.5	1
		6	92	78.8	3												
30																	

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-126**
Sheet No.:	4 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 27.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 837.0	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data					
												Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
30										Continuation:							
					1												
												31.80	1	R3	0	1.5	1
	804.8																
					1												
												32.76	1	R2	0	1.5	1
												33.09	1	R2	0	1.5	1
					1												
35		7	96	92.4	0												
												35.12	1	R3	45	1.5	1
												35.30	1	R3	0	1.5	1
					2												
												35.92	1	R3	30	1.5	1
					0												
	799.8											37.00	1	R3	0	1.5	1
					3							37.56	1	R3	20	1.5	1
												37.68	1	R3	0	1.5	1
												37.95	1	R3	0	1.5	1
												38.00	1	R3	0	1.5	1
					3							38.56	1	R3	0	1.5	1
												38.71	1	R3	0	1.5	1
40		8	99	75.4	0												

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-126**
Sheet No.:	5 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 27.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 837.0	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data					
												Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
40										Continuation:							
												40.18	1	R3	0	1.5	1
					2							40.64	1	R3	0	1.5	1
												41.12	1	R3	0	1.5	1
					3							41.42	1	R3	0	1.5	1
												41.71	1	R3	0	1.5	1
	794.8									End of Boring at 42.2'							
45																	
50																	

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-127**
Sheet No.:	1 of 3
Job No.:	433521

Date Started: 11/20/2012	Date Completed: 11/20/2012	Logged By: RWM	Checked By:
Total Depth (ft): 27.0	Depth to Water (ft): 11.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 828.3	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
0										Grass							
	827.3									1.0ft							
					1					DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		1.65	2	R3	0	1.5	1
												2.15	1	R3	0	1.5	1
					5							2.25	1	R3	45	1.5	1
												2.57	1	R3	0	1.5	1
												2.71	1	R3	0	1.5	1
												2.90	1	R3	0	1.5	1
		1	38	23													
5																	
	822.1																
					2							6.47	2	R3	0	3	1
												6.61	2	R3	0	1.5	2
												7.15	2	R3	0	1.5	2
												7.41	2	R3	0	1.5	2
					6					7.7ft		7.53	2	R3	0	1.5	2
										SANDSTONE, fine to medium grained, light to dark brown, medium strong (R3)		7.70	2	R3	0	1.5	1
										8.0ft		7.88	2	R3	0	1.5	1
												8.00	1	R3	0	1.5	1
										DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		8.08	1	R3	40	1.5	1
												8.32	2	R2	0	1.5	2
		2	86.6	28	4							8.71	1	R3	0	1.5	1
												8.90	1	R3	0	1.5	1
												9.10	1	R3	0	1.5	1
												9.42	1	R3	0	1.5	1
					4							9.60	1	R3	0	1.5	1
10												9.73	1	R3	0	1.5	1

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-127**
Sheet No.:	2 of 3
Job No.:	433521

Date Started: 11/20/2012	Date Completed: 11/20/2012	Logged By: RWM	Checked By:
Total Depth (ft): 27.0	Depth to Water (ft): 11.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 828.3	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
10										Continuation:							
												10.00	1	R3	0	1.5	1
												10.15	1	R3	0	1.5	1
												10.33	1	R3	0	1.5	1
					3					10.5ft							
										CLAY, Medium stiff, sandy clay, light brown 10.7ft							
										DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		11.12	1	R3	0	3	1
	816.9											11.27	1	R3	0	1.5	1
					3							11.64	1	R3	0	1.5	1
												12.43	2	R3	90	1.5	2
					2							12.67	1	R3	0	1.5	1
												13.03	1	R3	0	1.5	1
												13.25	1	R3	0	1.5	1
												13.45	1	R3	90	1.5	1
												13.50	1	R3	0	1.5	1
					7							13.63	1	R3	0	1.5	1
		3	88.6	38.8								13.78	1	R3	0	1.5	1
												13.98	1	R3	0	1.5	1
												14.15	1	R3	90	1.5	1
										14.4ft							
										SANDSTONE, fine to medium grained, light to dark brown, weak (R2-R3)		14.40	1	R3	0	1.5	1
15					4							14.55	1	R3	0	1.5	1
												14.97	1	R3	0	1.5	1
												15.10	1	R3	0	1.5	1
												15.22	1	R3	0	3	1
					3							15.43	1	R3	0	1.5	1
	811.7											16.42	1	R3	0	1.5	1
												16.51	1	R3	0	1.5	1
												16.75	1	R3	0	3	1
					4							16.95	1	R3	0	1.5	1
												17.05	1	R3	0	1.5	1
												17.20	1	R3	0	1.5	1
												17.53	1	R3	0	1.5	1
					5							17.87	1	R3	0	1.5	1
												17.92	1	R3	0	1.5	1
												18.05	2	R3	0	3	2
												18.30	2	R3	90	1.5	2
												18.71	1	R3	0	1.5	1
		4	54.2	30	3												
20																	

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-127**
Sheet No.:	3 of 3
Job No.:	433521

Date Started: 11/20/2012	Date Completed: 11/20/2012	Logged By: RWM	Checked By:
Total Depth (ft): 27.0	Depth to Water (ft): 11.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 828.3	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data					
												Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
20										Continuation:							
												21.15	2	R2	0	1.5	2
												21.30	2	R2	0	1.5	2
												21.42	2	R2	0	1.5	2
												21.55	2	R2	0	1.5	2
	806.5											21.73	2	R2	0	1.5	2
					5							22.07	2	R2	0	1.5	2
												22.25	2	R2	0	1.5	2
					2												
		5	25	6.8													
25																	
	801.3									End of Boring at 27.0'							
30																	

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-128**
Sheet No.:	1 of 2
Job No.:	433521

Date Started: 11/20/2012	Date Completed: 11/20/2012	Logged By: RWM	Checked By:
Total Depth (ft): 16.6	Depth to Water (ft): 6.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 835.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
0										Grass							
	834.1									1.0ft							
					4					DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		1.22	1	R3	0	1.5	1
												1.62	1	R3	0	3	1
												1.83	1	R3	0	3	1
												2.00	1	R3	0	3	1
												2.15	1	R3	0	3	1
					4							2.38	1	R3	0	3	1
												2.48	1	R3	0	3	1
												2.65	1	R3	0	3	1
												3.04	1	R3	0	3	1
												3.14	1	R3	0	1.5	1
		1	86	22.6	6					3.4'-3.5': DOLOMITE, fine grained, light to dark gray with chert nodules, slightly weathered, medium strong (R3)		3.41	1	R3	0	1.5	1
												3.56	1	R3	0	1.5	1
												3.76	1	R3	0	1.5	1
												3.93	2	R3	0	1.5	2
					6							4.23	1	R3	0	1.5	1
												4.36	1	R3	0	1.5	1
												4.56	2	R3	0	1.5	2
5												4.63	2	R3	0	3	2
												4.76	2	R3	0	3	2
					2							5.10	2	R3	0	1.5	2
												5.30	1	R3	0	1.5	1
										6.0ft							
	828.9									CLAY, Medium stiff, sandy clay, light brown 6.1ft							
												6.12	1	R3	0	3	1
										DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3)		6.31	1	R3	0	3	1
					5							6.50	1	R3	0	3	1
												6.80	1	R3	0	3	1
												6.91	1	R3	0	3	1
												7.13	2	R3	0	3	2
												7.25	1	R3	0	1.5	1
					5							7.55	1	R3	0	1.5	1
												7.80	1	R3	45	1.5	1
												8.00	2	R3	0	3	2
												8.26	1	R3	15	1.5	1
												8.40	1	R3	0	1.5	1
		2	99.2	0	4							8.67	1	R3	0	1.5	1
												8.94	2	R3	0	3	2
												9.10	1	R3	0	1.5	1
												9.23	2	R3	0	1.5	2
					4							9.48	1	R3	0	3	1
10												9.76	2	R3	30	1.5	2

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-128**
Sheet No.:	2 of 2
Job No.:	433521

Date Started: 11/20/2012	Date Completed: 11/20/2012	Logged By: RWM	Checked By:
Total Depth (ft): 16.6	Depth to Water (ft): 6.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 835.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
10										Continuation:							
												10.08	2	R3	0	1.5	2
										10.3ft							
					5					SANDSTONE, fine to medium grained, light to dark brown, weak (R3)		10.32	1	R3	0	1.5	1
												10.40	1	R3	0	1.5	1
												10.65	1	R3	70	1.5	1
										11.0ft							
										DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3)		10.96	1	R3	0	1.5	1
												11.13	1	R3	0	1.5	1
	823.7											11.26	1	R3	15	1.5	1
												11.40	1	R3	0	1.5	1
												11.54	1	R3	0	1.5	1
					7							11.70	1	R3	0	1.5	1
												11.75	2	R3	90	1.5	2
												12.00	1	R3	0	1.5	1
												12.21	1	R3	0	1.5	1
												12.50	1	R3	0	1.5	1
					4							12.86	1	R3	0	3	1
												13.00	1	R3	0	1.5	1
												13.24	1	R3	0	3	1
												13.75	1	R3	0	3	1
		3	100	35.2	4							13.85	1	R3	90	1.5	1
												14.00	1	R3	0	1.5	2
												14.33	2	R3	0	1.5	2
15					2							14.89	2	R3	0	1.5	2
												15.09	2	R3	0	1.5	2
												15.30	1	R3	0	3	1
					5							15.57	1	R3	0	1.5	1
												15.87	1	R3	0	3	1
												16.12	1	R3	0	1.5	1
	818.5									End of Boring at 16.6'							
20																	

WisDOT PROJECT NAME: STH-15/STH-76-New London			BORING No: B-140
WisDOT PROJECT ID No: 1146-75-00			PAGE No: 1 of 1
CONSULTANT	CONSULTANT PROJECT No	DATE STARTED: 3/01/13	HORIZONTAL DATUM / VERTICAL DATUM
DRILLING CONTRACTOR: Gestra	DRILLING CONTRACTOR PROJECT No: 12015-10	DATE COMPLETED: 3/01/13	LATITUDE
CREW CHIEF: R. Jackson	DRILLING RIG: Diedrich D50 ATV	WisDOT STRUCTURE ID No	LONGITUDE
FIELD LOG BY: M. Rhodes	DRILLING METHOD / HOLE SIZE: 3¼" HSA	ROADWAY NAME: STH-15	NORTHING
LOG QC BY: L. Gliniecki	HAMMER TYPE: Auto / EFFICIENCY: (7/2012) 80.9%	STATION / OFFSET	EASTING
COUNTY: 44-Outagamie	TOWNSHIP / RANGE / SECTION / 1/4 SECTION / 1/4 SECTION		SURFACE ELEVATION

BORING LOG

Sample No / Type	Sample Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Graphic	Well Diagram	PID / FID	Unconfined Comp. Strength Q_p or (Q_u) (tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
						TOPSOIL, (4") 0.3									Frost thickness 12" Boring not surveyed. Boring drilled in US-45 Northbound right-of-way, approximately 450 ft. north of intersection of STH-15 and US-45; 100 ft. north of railroad crossing on US-45; 50 ft. east of US-45 shoulder.
1 SS	17	2 3 3	6			SILTY CLAY, gray mottled dark gray and brown, moist, stiff, trace root hairs (POSSIBLE FILL) 3	cl-ml				1.0-1.5			41	
2 SS	18	3 4 6	10	5		SILTY CLAY, black, very moist, stiff to very stiff, trace organic matter, (Possible buried topsoil) 5.5	cl-ml				1.0-2.0			61	LOI = 12.9%
3 SS	18	3 5 5	10			LEAN CLAY, brown mottled greenish white to brown, moist, medium stiff to very stiff	cl				1.75-2.0			33	
4 SS	18	3 4 7	11	10		Color change to brown with 1/8" thick sand seams in sample SS-4 10					0.5-1.0			25	

End of Boring at 10.0 ft.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 8ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

\\10.187.105.100\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/8/13

Appendix D
Laboratory Test Results

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

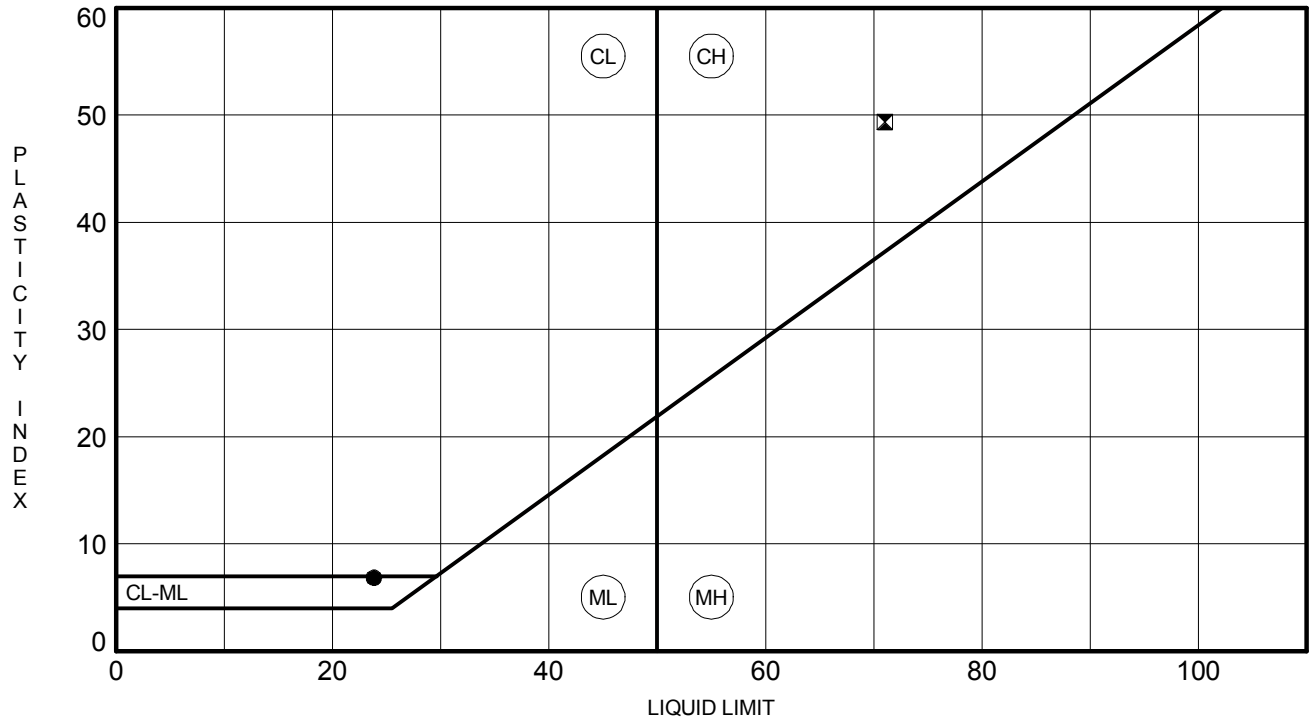
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-14	SS-1	1'										
B-14	SS-2	3.5'	23.3								2.50	
B-14	SS-3	6'	26.5								1.00	
B-14	SS-4	8.5'	23.1								1.25	
B-14	ST-5	11'	26.0			24	17	7		0.79		101.7
B-14		12'				71	22	49				
B-14	SS-6	13.5'	23.4									
B-14	SS-7	16'	34.5								2.25	
B-14	SS-8	18.5'	31.0								0.75-1.25	

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-14**	**ST-5**	**11.0'**	**26%**	**24**	**17**	**7**	**1.29**		**R. Lollar**	**L. Gliniecki**
⊠	**B-14**	**ST-5**	**12.0'**		**71**	**22**	**49**			**R. Lollar**	**L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

GESTRA Engineering, Inc
5732 95th Avenue, Suite 100
Kenosha, WI 53144
Phone: (262) 925-1888, Fax: (262) 925-1885

Laboratory Test Results of Unconfined Compressive Strength of Soil

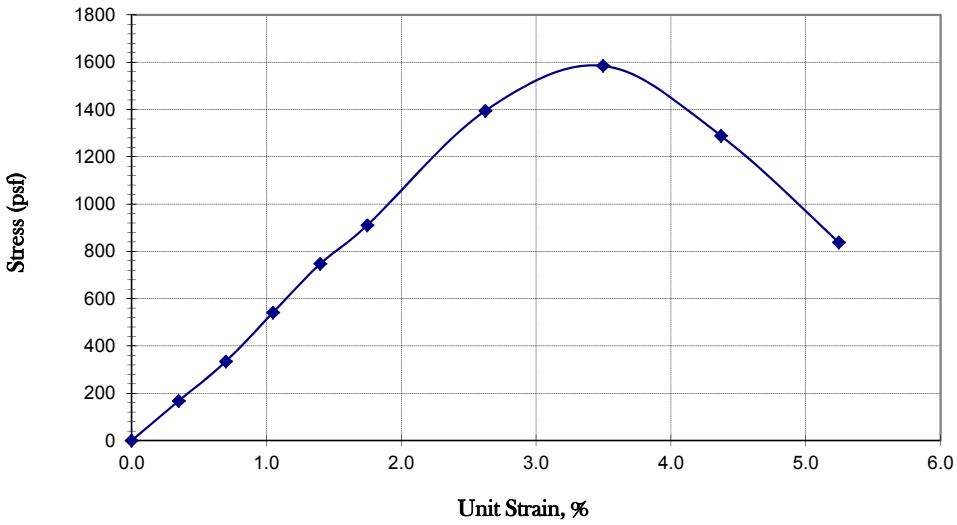
Project Name:	STH-15/STH-76-New London	Date:	January 3, 2013
Project Number:	12015-10	Report To:	CH2M Hill, Inc.
Project Location:	Outagamie County, WI		
ASTM Designation:	**D2166**		

Test Data

Deformation dial reading (0.001 in.)	Sample stress (psf)
0	0
20	168
40	335
60	542
80	747
100	910
150	1394
200	1585
250	1289
300	838

Sample Information

Boring no.:	B-14	Diameter (in)	2.82
Sample no.:	ST-5	Area (sq. in.):	6.26
Depth of Soil:	11'-13'	Height: (in.):	5.72
Description of Soil:	Silty Clay, brown, moist to very moist, medium stiff		
Strain Rate (in/min):	0.050		





UC Strength, Q_u (tsf)	**0.79**
Wet Density (pcf)	128.1
Dry Density (pcf)	101.7
Moisture Content (%)	26.0

Remarks

Performed By: REL

Reviewed By: Lauren Gliniecki
GESTRA Engineering, Inc.

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

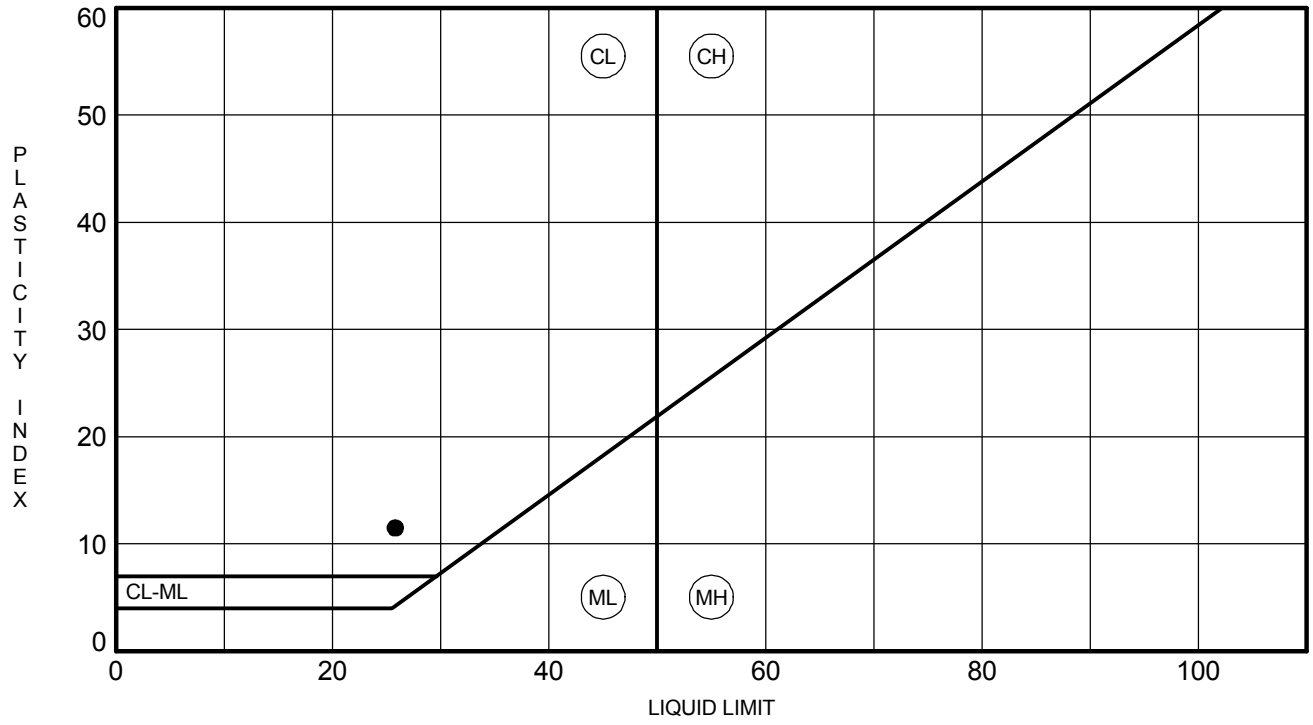
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-14A	SS-1	1'	13.3								1.00	
B-14A	SS-2	3.5'										
B-14A	SS-3	6'										
B-14A	SS-4	8.5'	18.6			26	14	12			0.50	
B-14A	SS-5	11'										
B-14A	SS-6	13.5'										
B-14A	SS-7	16'										
B-14A	SS-8	18.5'	39.8								1.0-1.5	
B-14A	SS-9	21'	24.9								1.50	
B-14A	SS-10	23.5'	38.8								1.0-1.5	
B-14A	SS-11	26'	26.4								2.00	
B-14A	SS-12	28.5'	28.4								2.00	
B-14A	SS-13	31'										
B-14A	SS-14	33.5'										

\\GESTRASERVER-11\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/2/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-14A**	**SS-4**	**8.5'**	**19%**	**26**	**14**	**12**	**0.42**		**B. Bills**	**L. Gliniecki**

\\GESTRASERVER-11\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/2/13

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

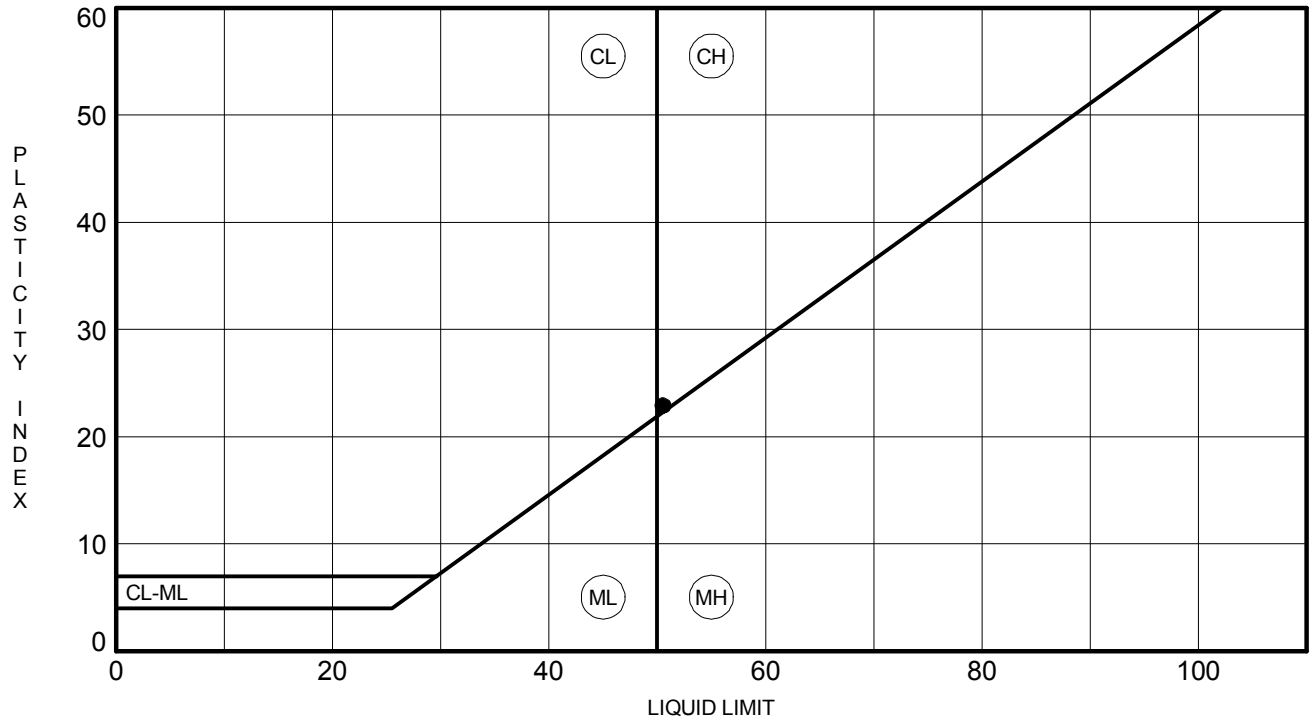
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-41A	SS-1	1'	48.9	7.9							<0.25	
B-41A	ST-2	3.5'										
B-41A		3.6'	572.7	80.4							<0.25	
B-41A		4.8'	57.3	9.7		51	28	23		0.39	0.25	69.8
B-41A	SS-3	6'	31.4								1.25	
B-41A	SS-4	8.5'									1.00	

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-41A**	ST-2	**4.8'**	**57%**	**51**	**28**	**23**	**1.26**		**R. Lollar**	**L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

GESTRA Engineering, Inc
5732 95th Avenue, Suite 100
Kenosha, WI 53144
Phone: (262) 925-1888, Fax: (262) 925-1885

Laboratory Test Results of Unconfined Compressive Strength of Soil

Project Name: STH-15/STH-76-New London
Project Number: 12015-10
Project Location: Outagamie County, WI
ASTM Designation: **D2166**

Date: January 4, 2013
Report To: CH2M Hill, Inc.

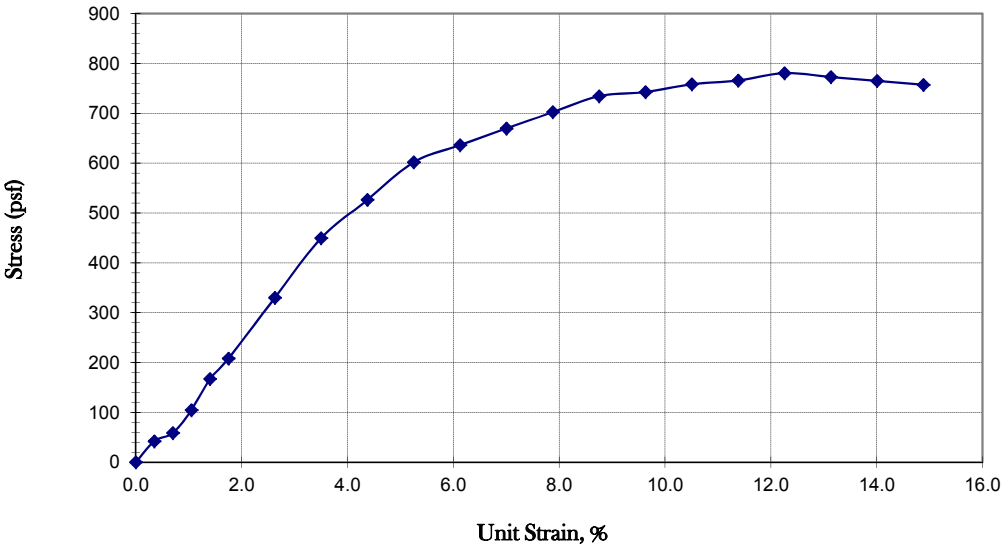
Test Data

Deformation dial reading (0.001 in.)	Sample stress (psf)
0	0
20	42
40	59
60	105
80	167
100	208
150	330
200	450
250	527
300	602
350	636
400	670
450	702
500	734
550	743
600	758
650	766
700	781
750	773
800	765
850	757
857	756

Sample Information

Boring no.: B-41 A
Sample no.: ST-2
Depth of Soil: 3.5'-5.5'
Description of Soil: Fat clay, dark gray, moist, soft
Strain Rate (in/min): 0.050

Diameter (in) 2.82
Area (sq. in.): 6.23
Height: (in.): 5.71





UC Strength, Q_u (tsf)	**0.39**
Wet Density (pcf)	109.9
Dry Density (pcf)	69.8
Moisture Content (%)	57.3

Remarks

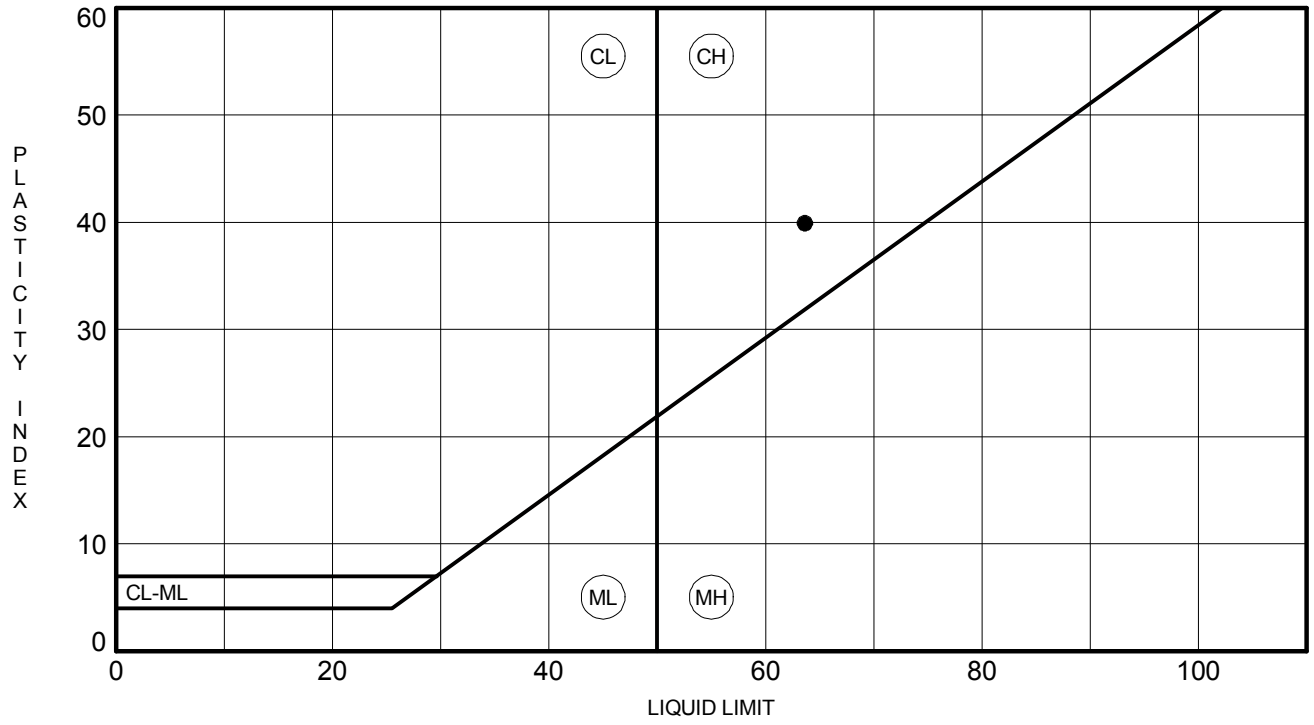
Performed By: REL

Reviewed By: Lauren Gliniecki
GESTRA Engineering, Inc.

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-41B**	ST-3	**6.7'**	**34%**	**64**	**24**	**40**	**0.25**		**R. Lollar**	**L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

GESTRA Engineering, Inc
5732 95th Avenue, Suite 100
Kenosha, WI 53144
Phone: (262) 925-1888, Fax: (262) 925-1885

Laboratory Test Results of Unconfined Compressive Strength of Soil

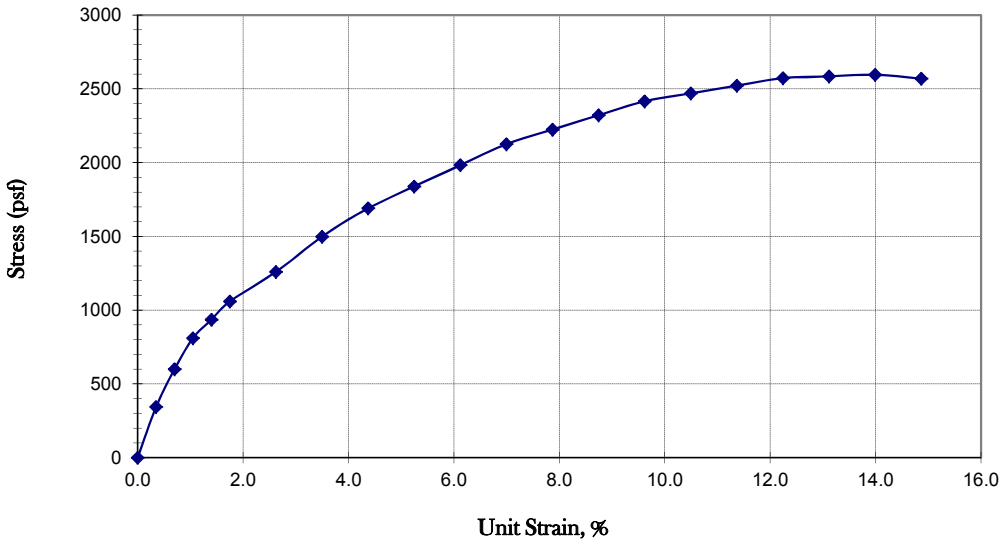
Project Name:	STH-15/STH-76-New London	Date:	January 4, 2013
Project Number:	12015-10	Report To:	CH2M Hill, Inc.
Project Location:	Outagamie County, WI		
ASTM Designation:	**D2166**		

Test Data

Deformation dial reading (0.001 in.)	Sample stress (psf)
0	0
20	344
40	599
60	811
80	935
100	1059
150	1259
200	1498
250	1690
300	1838
350	1983
400	2125
450	2224
500	2321
550	2416
600	2470
650	2522
700	2573
750	2585
800	2596
850	2569
858	2565

Sample Information

Boring no.:	B-41 B	Diameter (in)	2.79
Sample no.:	ST-3	Area (sq. in.):	6.12
Depth of Soil:	6'-8'	Height: (in.):	5.72
Description of Soil:	Fat clay, brown mottled blueish gray, moist, stiff		
Strain Rate (in/min):	0.050		





UC Strength, Q_u (tsf)	**1.30**
Wet Density (pcf)	117.2
Dry Density (pcf)	87.7
Moisture Content (%)	33.6

Remarks

Performed By: REL

Reviewed By: Lauren Gliniecki
GESTRA Engineering, Inc.

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

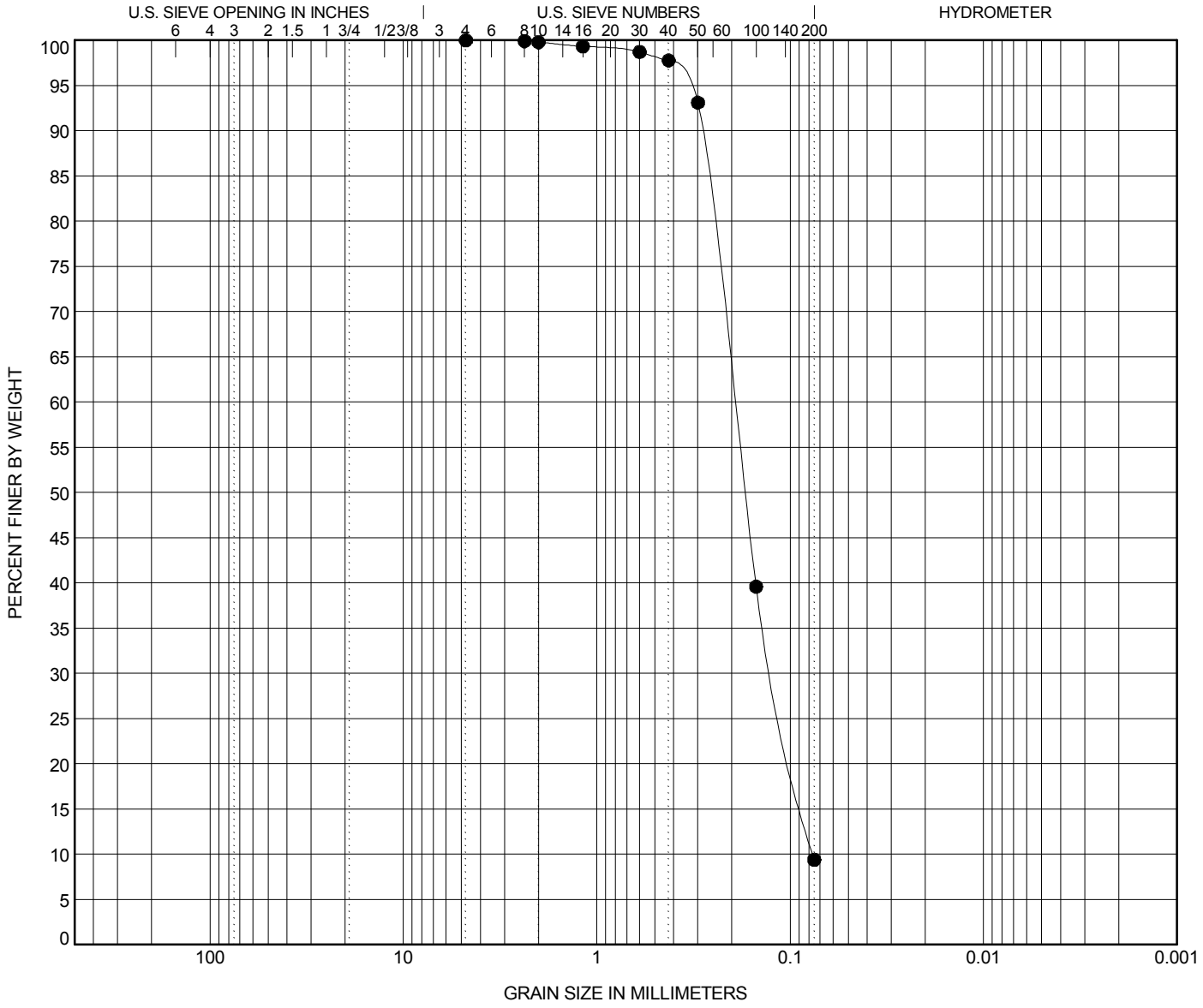
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-42A	SS-1	1'	35.3	3.8							<0.25	
B-42A	SS-2	3.5'	60.2	9.5							<0.25	
B-42A	ST-3	6'										
B-42A		6.1'							9			
B-42A		7.6'	26.7									
B-42A	SS-4	8.5'	27.4								2.50	

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

GRAIN SIZE DISTRIBUTION
(ASTM D422)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● **B-42A,** ST-3	**6.1'**	**POORLY GRADED SAND WITH SILT (SP-SM)**				**0.97**	**2.57**

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **B-42A,** ST-3	**6.1'**	**4.75**	**0.195**	**0.12**	**0.076**	**0.0**	**90.6**	**9.4**	

PERFORMED BY: R. Lollar **CHECKED BY: L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

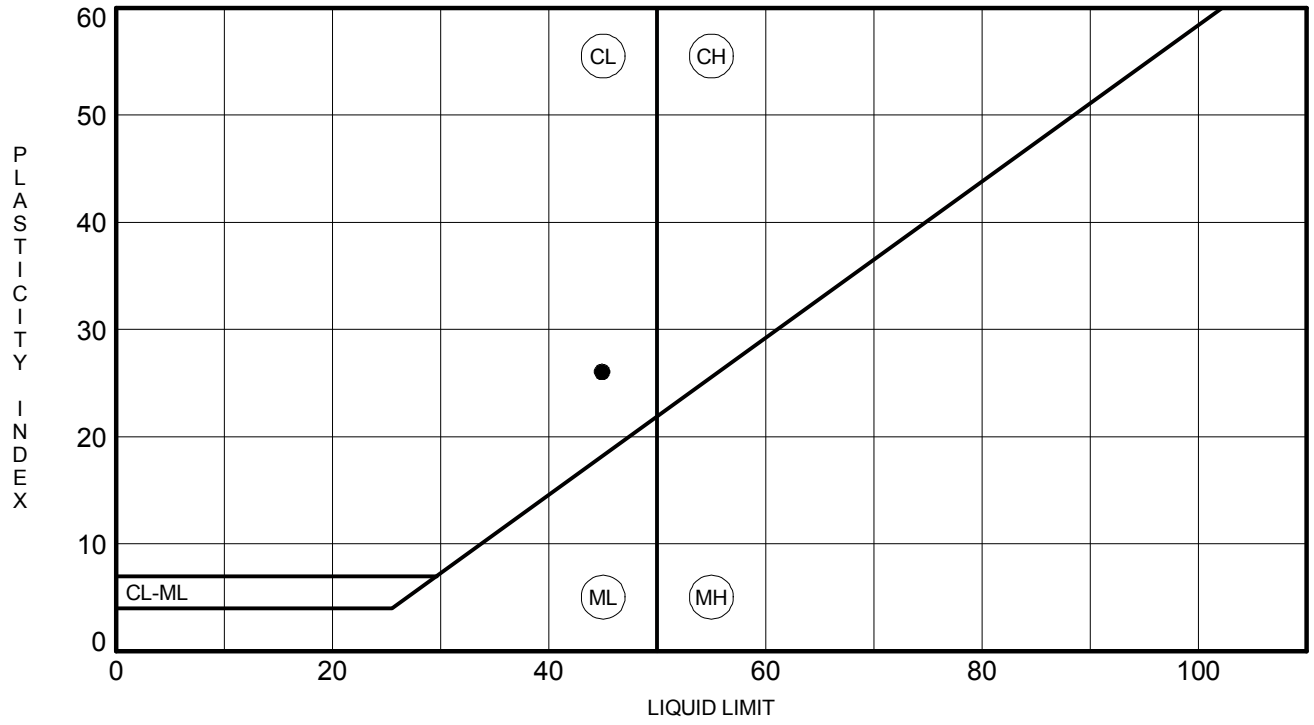
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-42B	SS-1	1'	222.8	37.9								
B-42B	ST-2	3.5'										
B-42B		3.6'	64.3			45	19	26				59.3
B-42B	SS-3	6'	29.3								3.50	
B-42B	SS-4	8.5'	37.0								1.00	

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-42B**	ST-2	**3.6'**	**64%**	**45**	**19**	**26**	**1.73**		**D. Born**	**S. Lee**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

GESTRA Engineering, Inc
1626 W. Fond du Lac Avenue
Milwaukee, WI 53205
Phone: (414) 933-7444; Fax: (414) 933-7844

One Dimensional Consolidation Test Report

Project Name:	STH 15	Client:	CH2M Hill
Project Location:	Outagamie Co.	Report Date:	1/4/2013
Project Number:	12015-10	Test Method :	ASTM D2435 Test Method B
Boring Number:	B42B	Tester Name:	JB
Sample Number:	2	Test Period	12/26/12 to 12/27/12
Depth of Sample:	3'-5'	Sampling Date:	
Sample Description:	LEAN CLAY, lt. sand, tr. organics	Specific Gravity:	2.7 (assumed)
	gray to dk. gray, very moist		
Sample Preparation:	Using cutting shoe		
Condition of Test:	Natural moisture		
Test Method for Coefficient of Consolidation:	Sqrt of Time		
Atterberg Limit Results			
L.L. 45	P.L. 19	P.I. 26	

	Before Test	After Test
Water Content (%):	64.3	25.3
Saturation (%):	94	117
Void Ratio:	1.84	0.59
dry unit weight (pcf):	59.3	106.2

Summary Table of Loading Procedure and Test Results

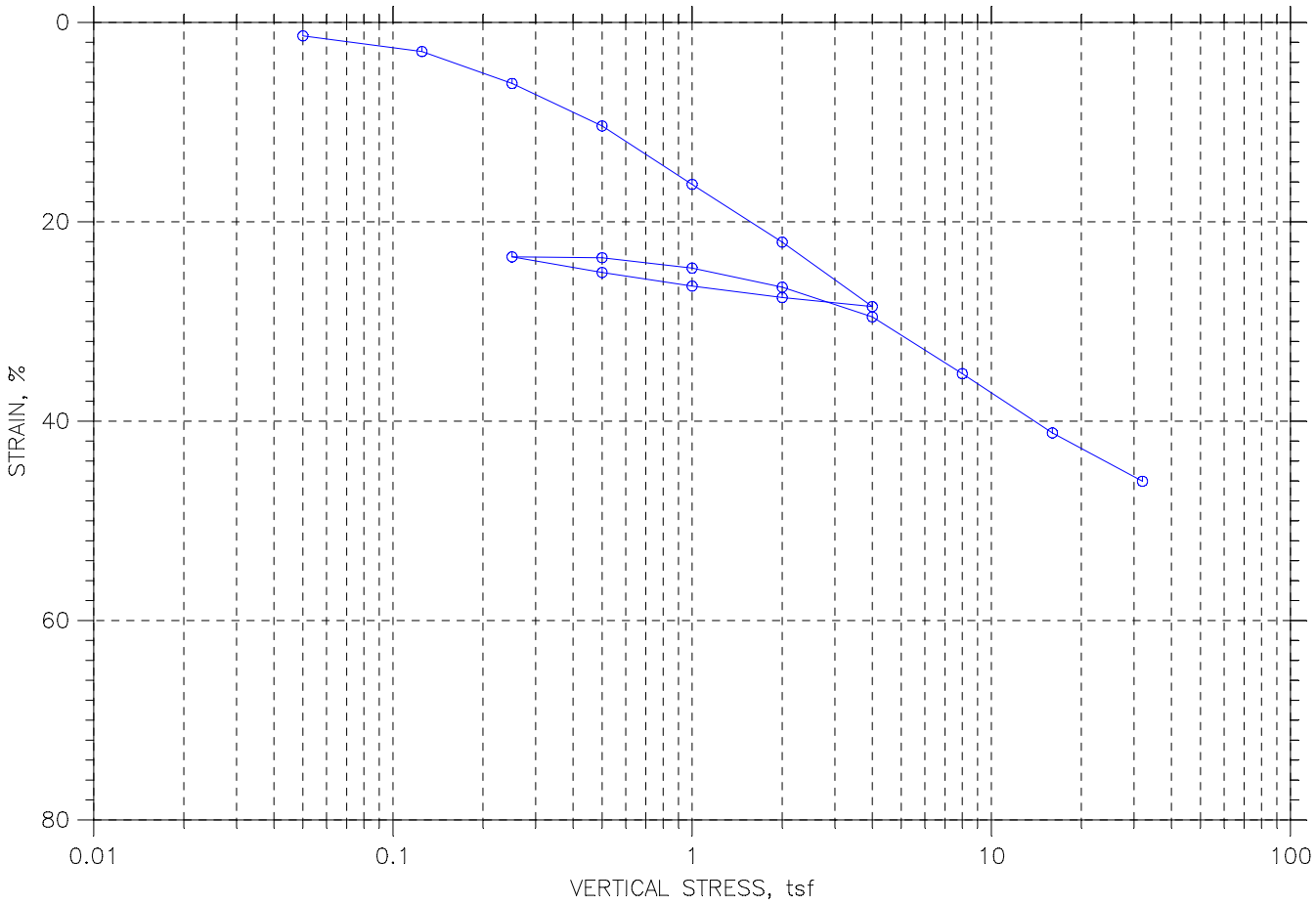
Stage	Applied Stress (tsf)	Final Displ. (inch)	Void Ratio	Strain at	T_{90} (minute)	Coeff. of Consolidation (ft^2/sec)	Coeff. of Volume Compressibility	Hydraulic Conductivity (ft/day)
1	5.00E-02	1.34E-02	1.81E+00	1.35E+00	1.94E+01	1.22E-06	2.70E-01	8.92E-04
2	1.25E-01	2.90E-02	1.76E+00	2.92E+00	1.95E+01	1.18E-06	2.10E-01	6.70E-04
3	2.50E-01	6.07E-02	1.67E+00	6.13E+00	1.97E+01	1.11E-06	2.56E-01	7.70E-04
4	5.00E-01	1.03E-01	1.55E+00	1.04E+01	1.33E+01	1.52E-06	1.71E-01	7.01E-04
5	1.00E+00	1.61E-01	1.38E+00	1.63E+01	2.00E+01	9.07E-07	1.17E-01	2.86E-04
6	2.00E+00	2.18E-01	1.22E+00	2.20E+01	1.48E+01	1.06E-06	5.79E-02	1.66E-04
7	4.00E+00	2.83E-01	1.03E+00	2.85E+01	1.91E+01	7.06E-07	3.23E-02	6.15E-05
8	2.00E+00	2.74E-01	1.06E+00	2.76E+01	6.00E-01	2.11E-05	4.50E-03	2.56E-04
9	1.00E+00	2.62E-01	1.09E+00	2.65E+01	1.46E+01	8.82E-07	1.16E-02	2.75E-05
10	5.00E-01	2.49E-01	1.13E+00	2.51E+01	2.46E+01	5.39E-07	2.72E-02	3.95E-05
11	2.50E-01	2.33E-01	1.18E+00	2.35E+01	6.85E+01	2.02E-07	6.29E-02	3.42E-05
12	5.00E-01	2.34E-01	1.17E+00	2.36E+01	9.40E+00	1.50E-06	3.64E-03	1.47E-05
13	1.00E+00	2.44E-01	1.14E+00	2.47E+01	1.50E+01	9.28E-07	2.08E-02	5.21E-05
14	2.00E+00	2.63E-01	1.09E+00	2.66E+01	9.50E+00	1.40E-06	1.92E-02	7.23E-05
15	4.00E+00	2.93E-01	1.00E+00	2.95E+01	1.42E+01	8.79E-07	1.49E-02	3.52E-05
16	8.00E+00	3.49E-01	8.41E-01	3.52E+01	2.46E+01	4.48E-07	1.43E-02	1.72E-05
17	1.60E+01	4.08E-01	6.72E-01	4.12E+01	1.91E+01	4.80E-07	7.43E-03	9.62E-06
18	3.20E+01	4.56E-01	5.34E-01	4.60E+01	1.90E+01	4.03E-07	3.03E-03	3.30E-06

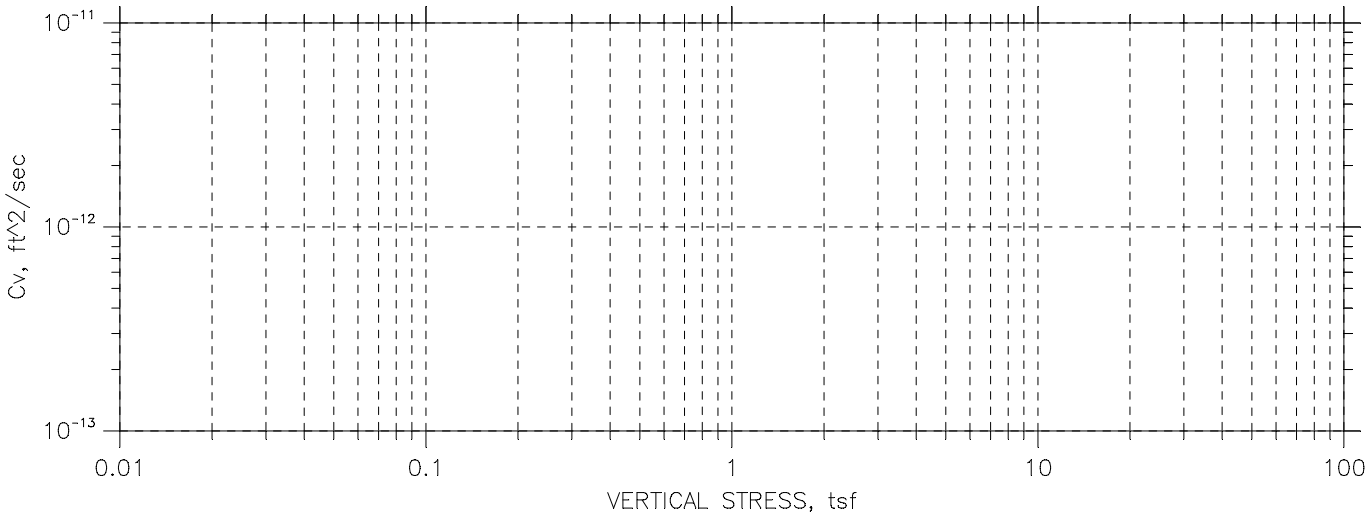
Remarks: ***100 psf was applied as a seating load**
Last unloading stage skipped per client request

Checked by Sangho Lee Jan/4/2013

CONSOLIDATION TEST DATA

SUMMARY REPORT



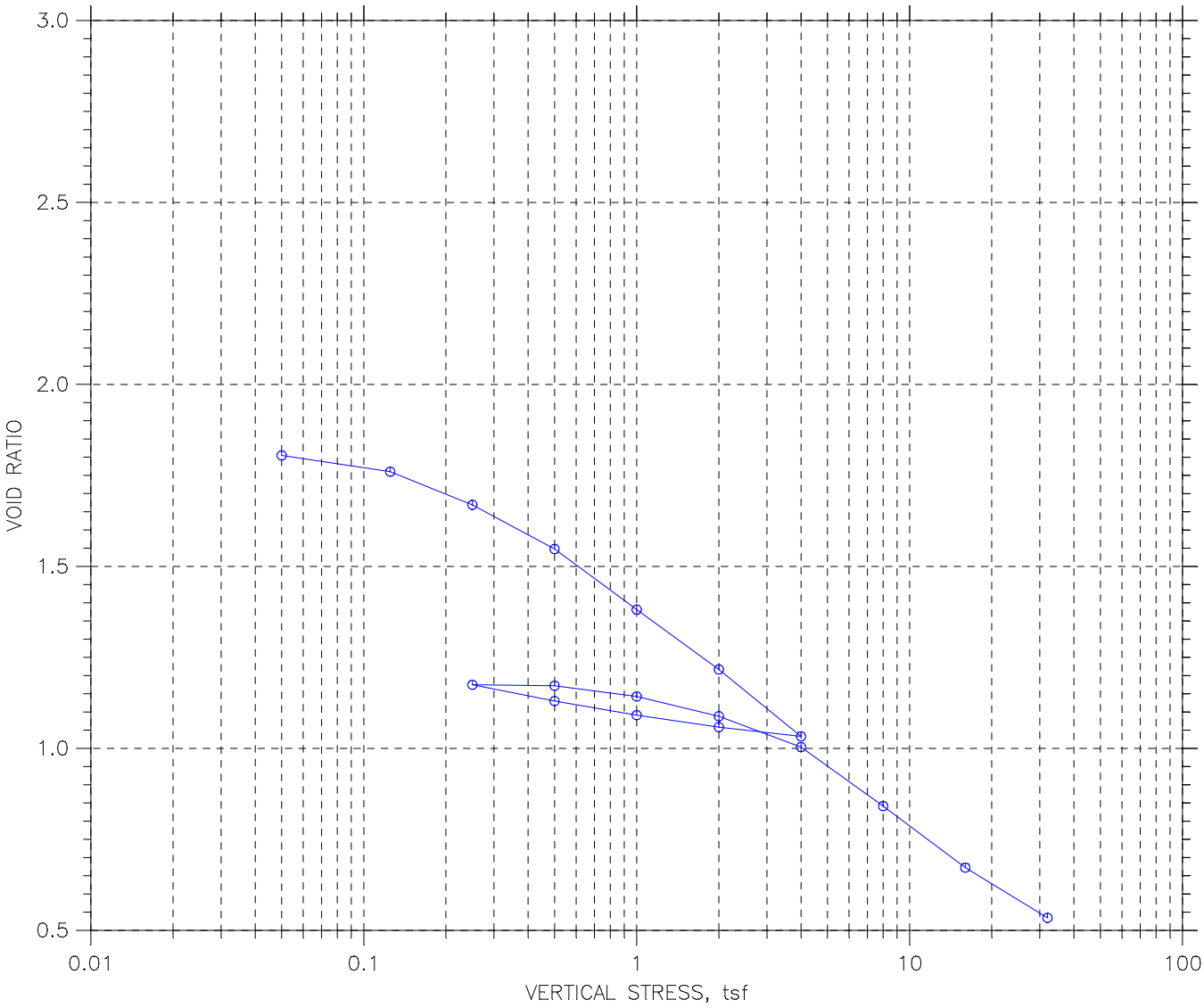


Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

Fri, 04-JAN-2013 10:54:29

CONSOLIDATION TEST DATA

SUMMARY REPORT



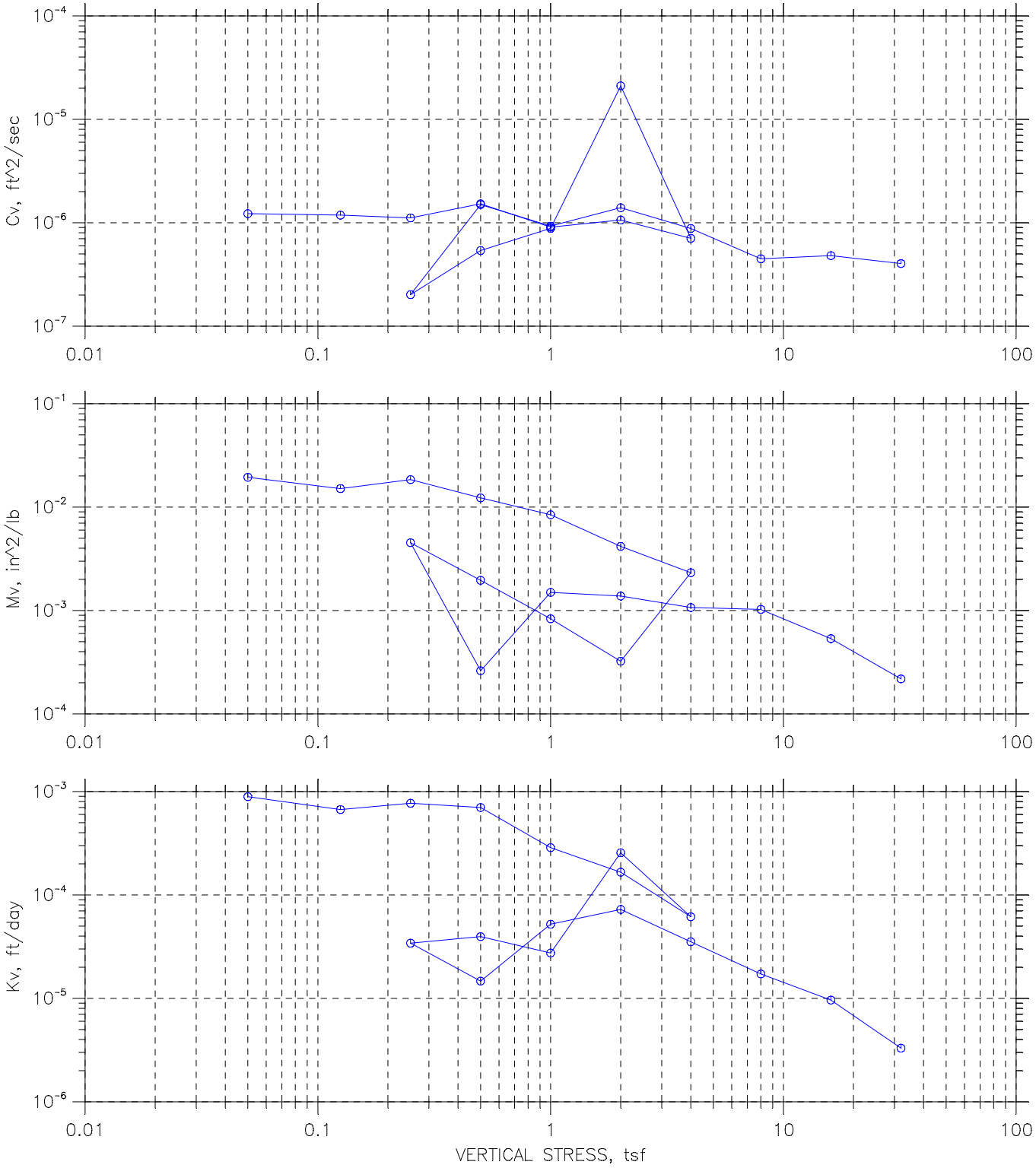
					Before Test	After Test
Overburden Pressure, tsf:				Water Content, %	64.33	25.33
Preconsolidation Pressure, tsf:				Dry Unit Weight, pcf	59.283	106.24
Compression Index:				Saturation, %	94.24	116.61
Diameter: 2.499 in		Height: 0.991 in		Void Ratio	1.84	0.59
LL: 45	PL: 19	PI: 26	GS: 2.70	Back Pressure, tsf	0	0

Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

Fri, 04-JAN-2013 10:38:13

CONSOLIDATION TEST DATA

ROOT of TIME COEFFICIENTS

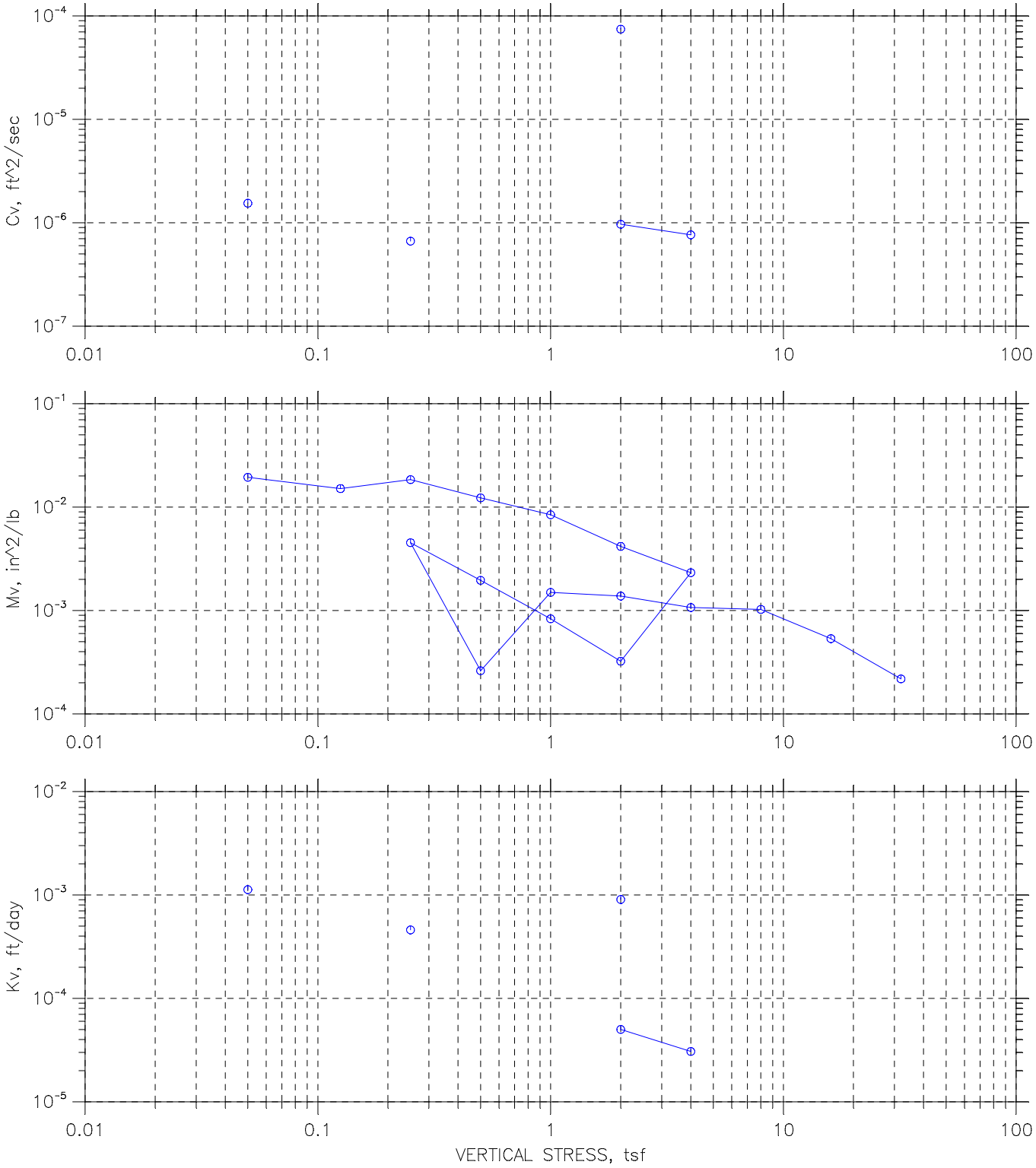


Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

Fri, 04-JAN-2013 10:38:13

CONSOLIDATION TEST DATA

LOG of TIME COEFFICIENTS



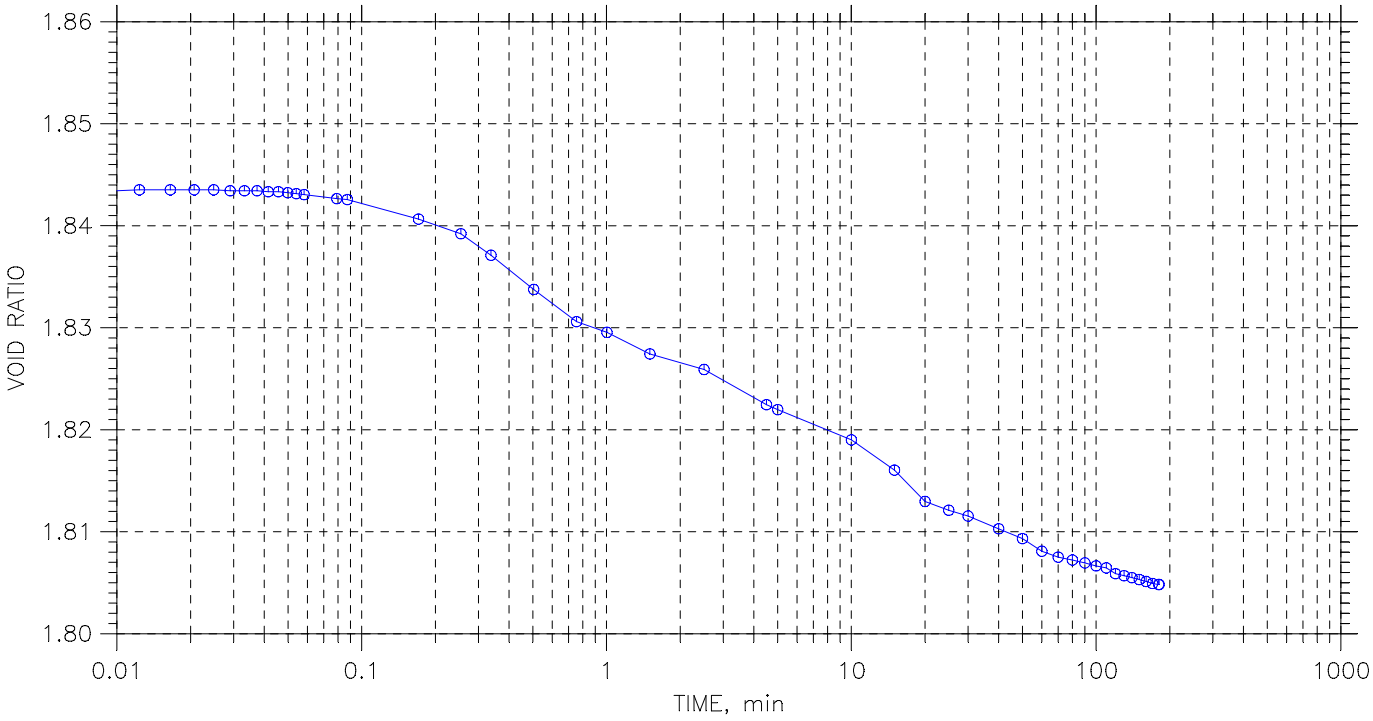
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

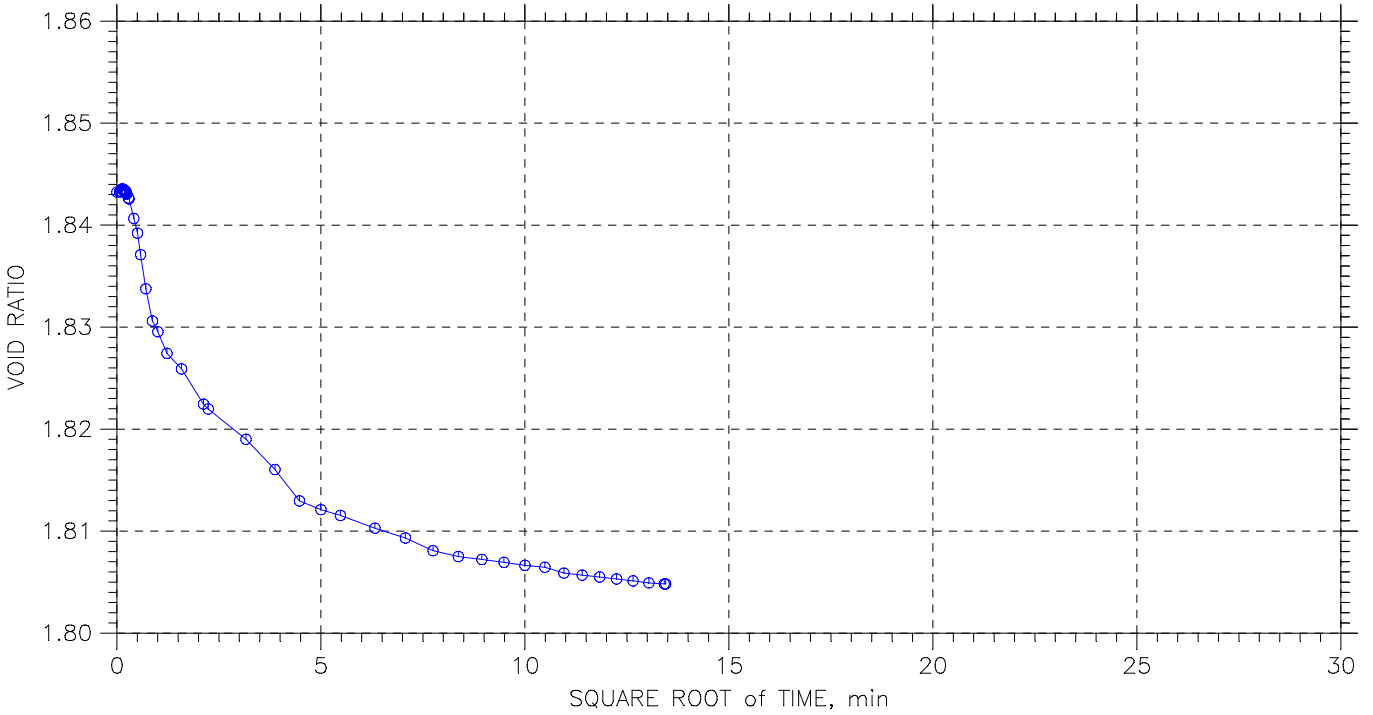
CONSOLIDATION TEST DATA

TIME CURVES

Step: 1 of 18

Stress: 5.e-002 tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

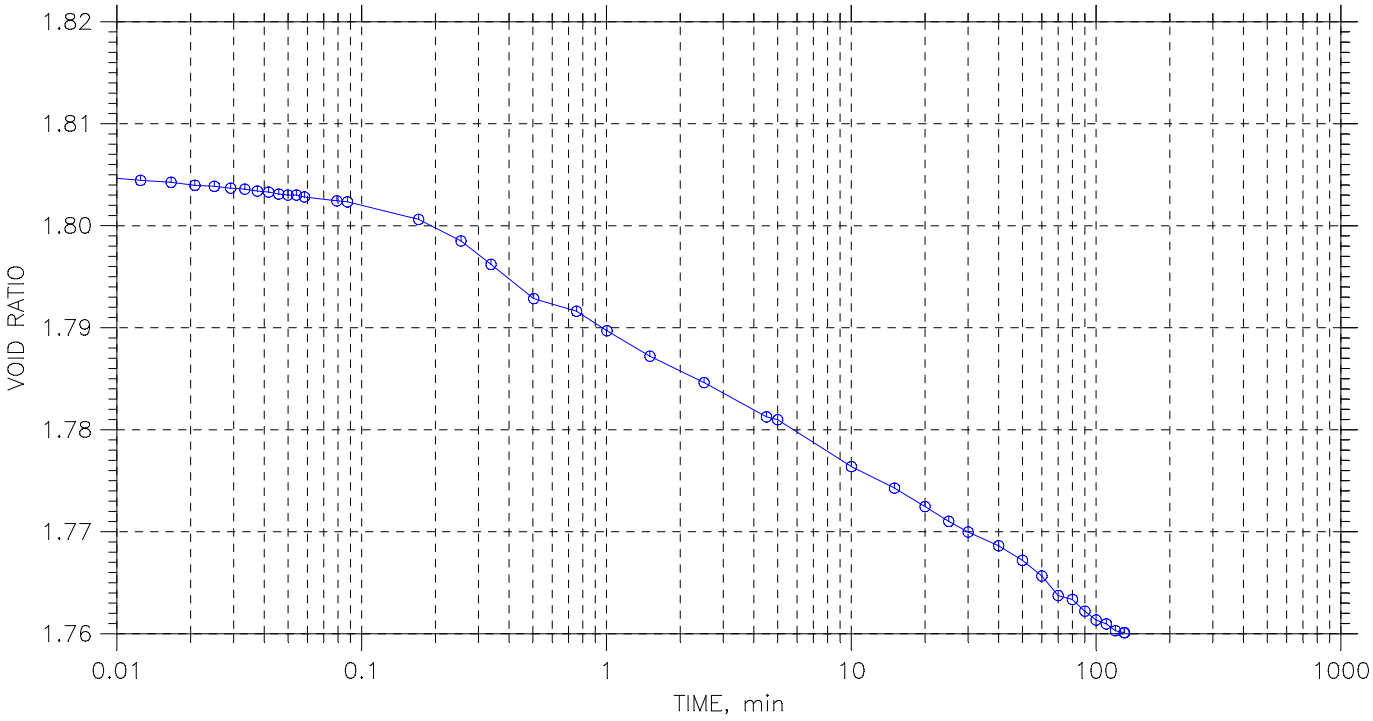
Fri, 04-JAN-2013 10:38:14

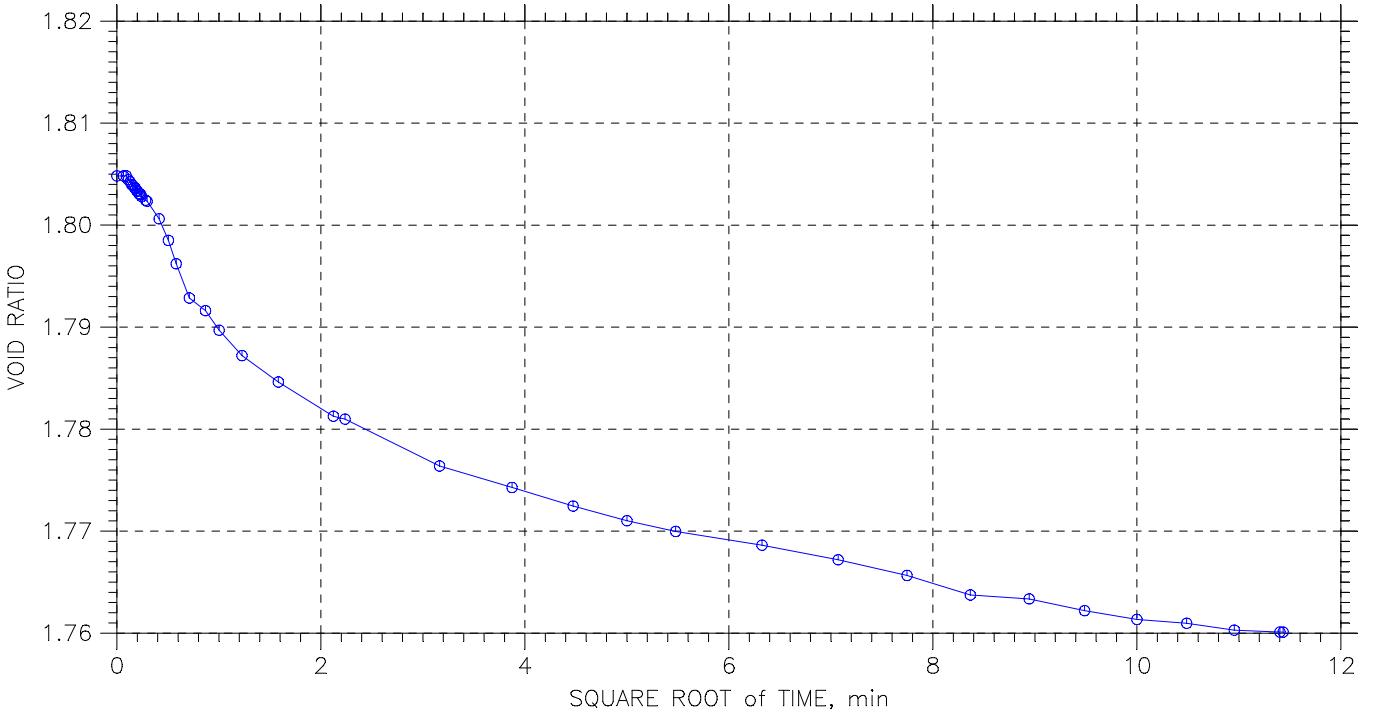
CONSOLIDATION TEST DATA

TIME CURVES

Step: 2 of 18

Stress: 0.125 tsf





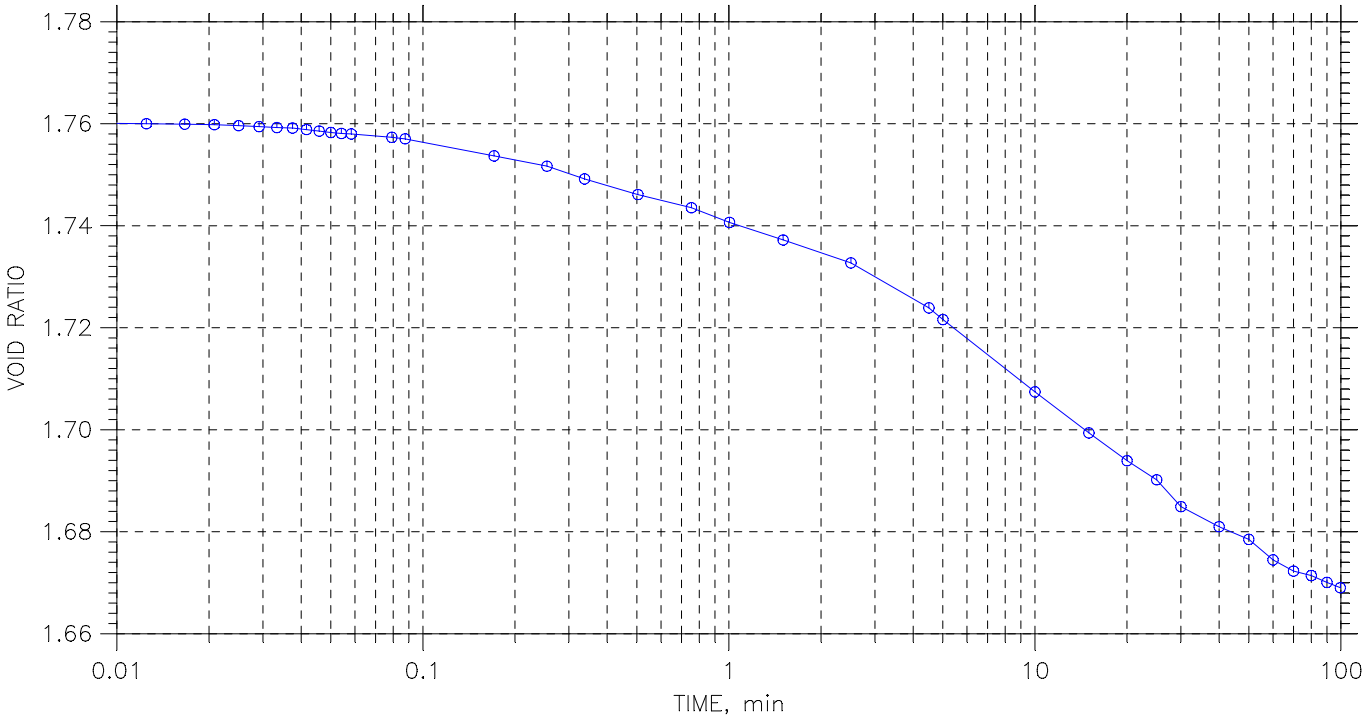
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

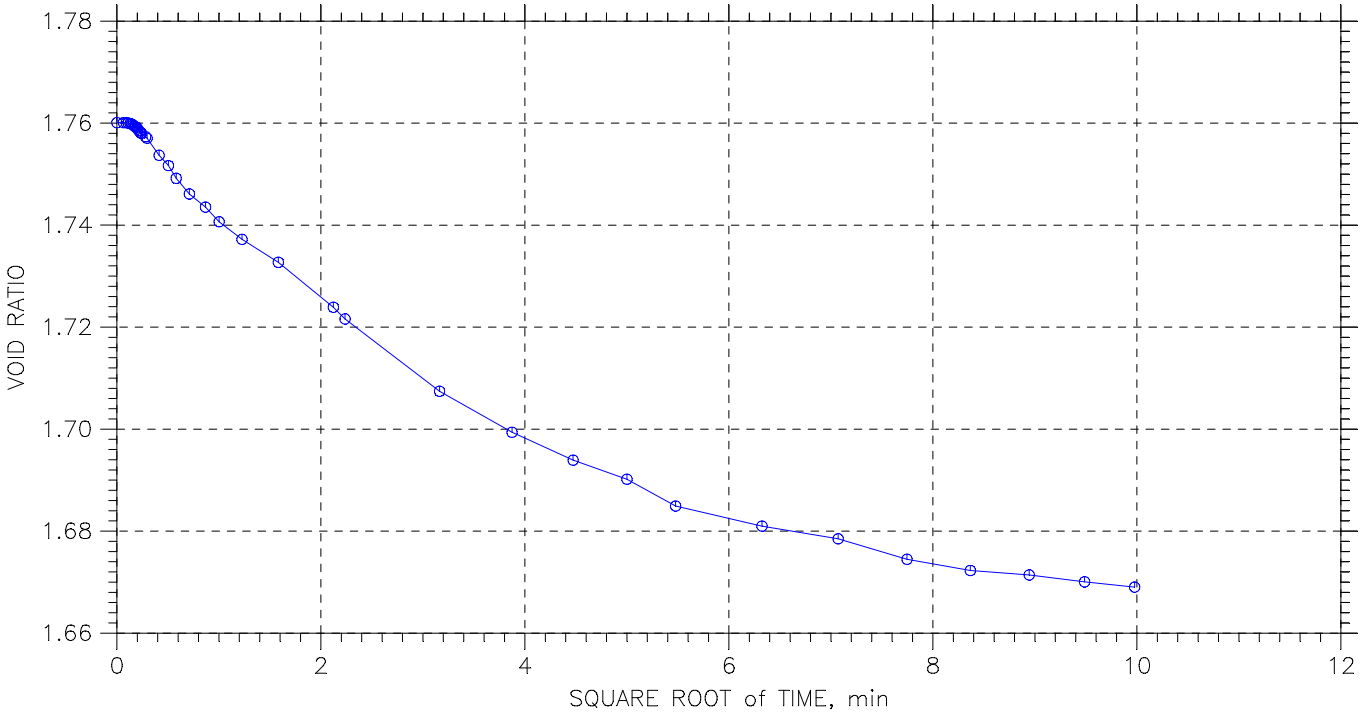
CONSOLIDATION TEST DATA

TIME CURVES

Step: 3 of 18

Stress: 0.25 tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

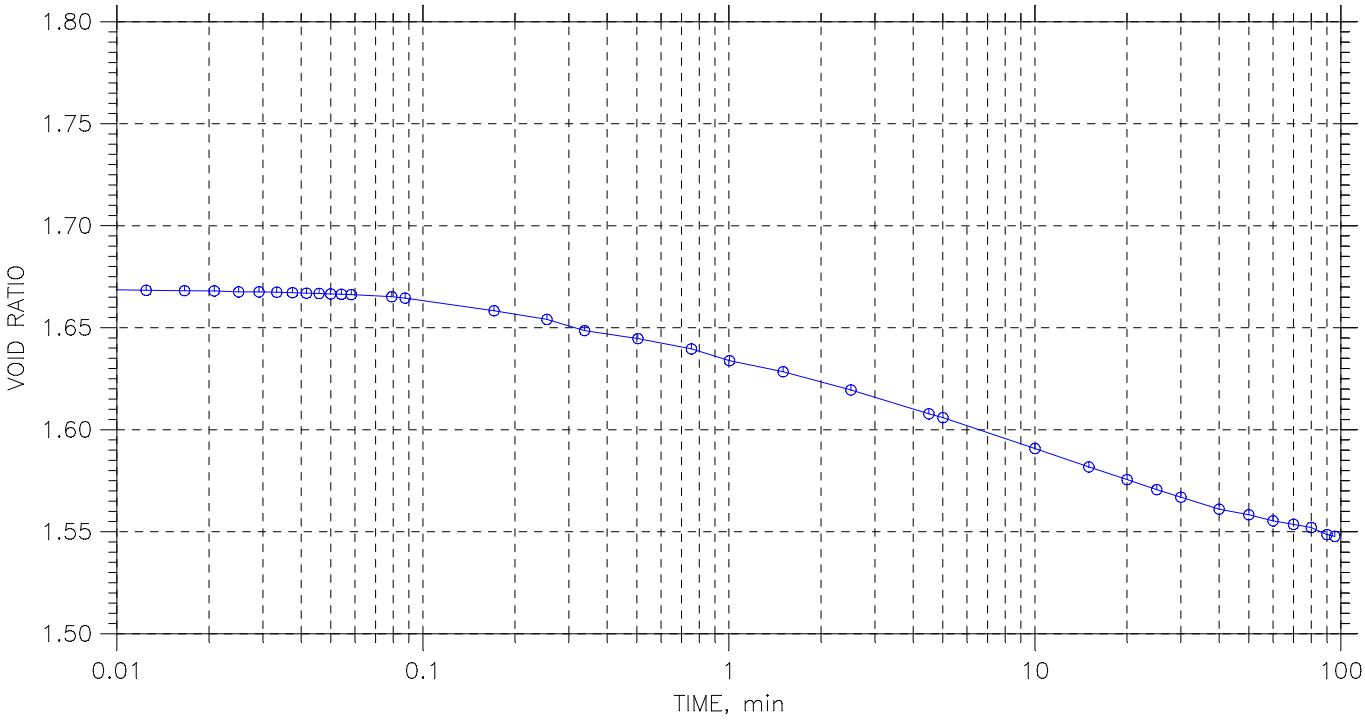
Fri, 04-JAN-2013 10:38:14

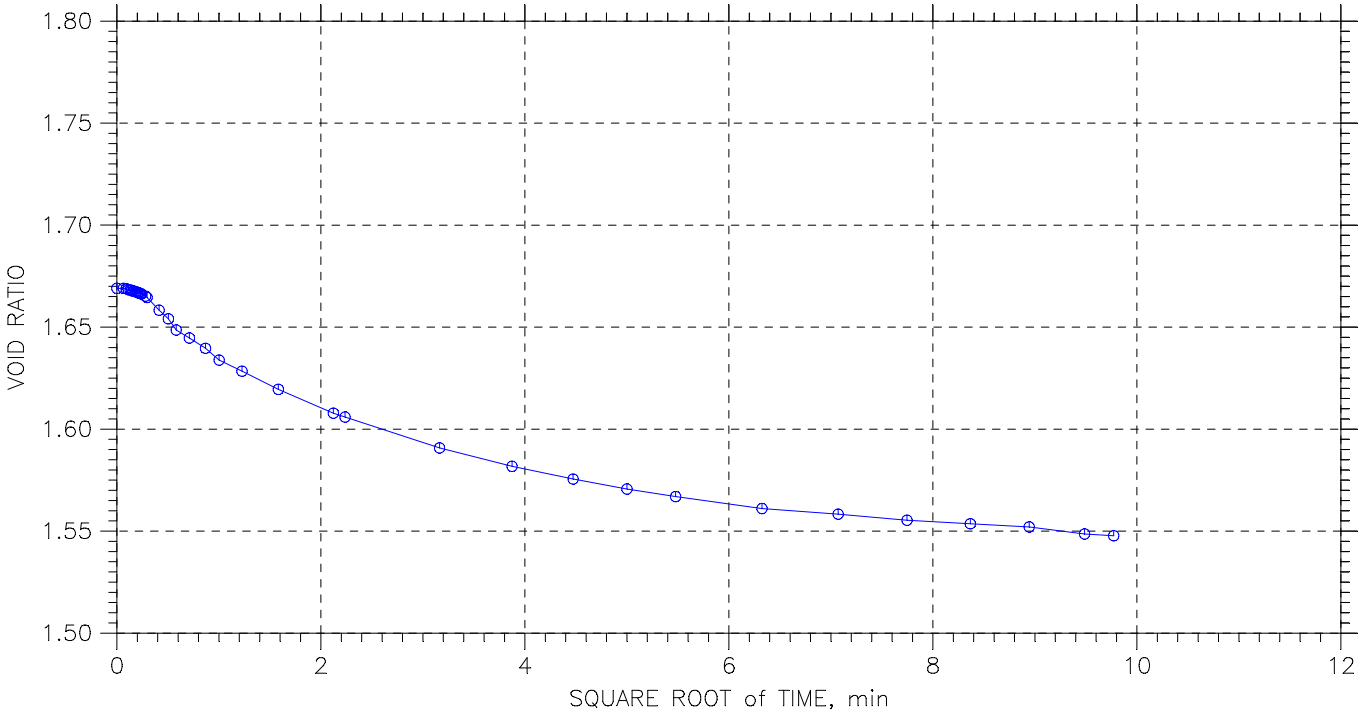
CONSOLIDATION TEST DATA

TIME CURVES

Step: 4 of 18

Stress: 0.5 tsf





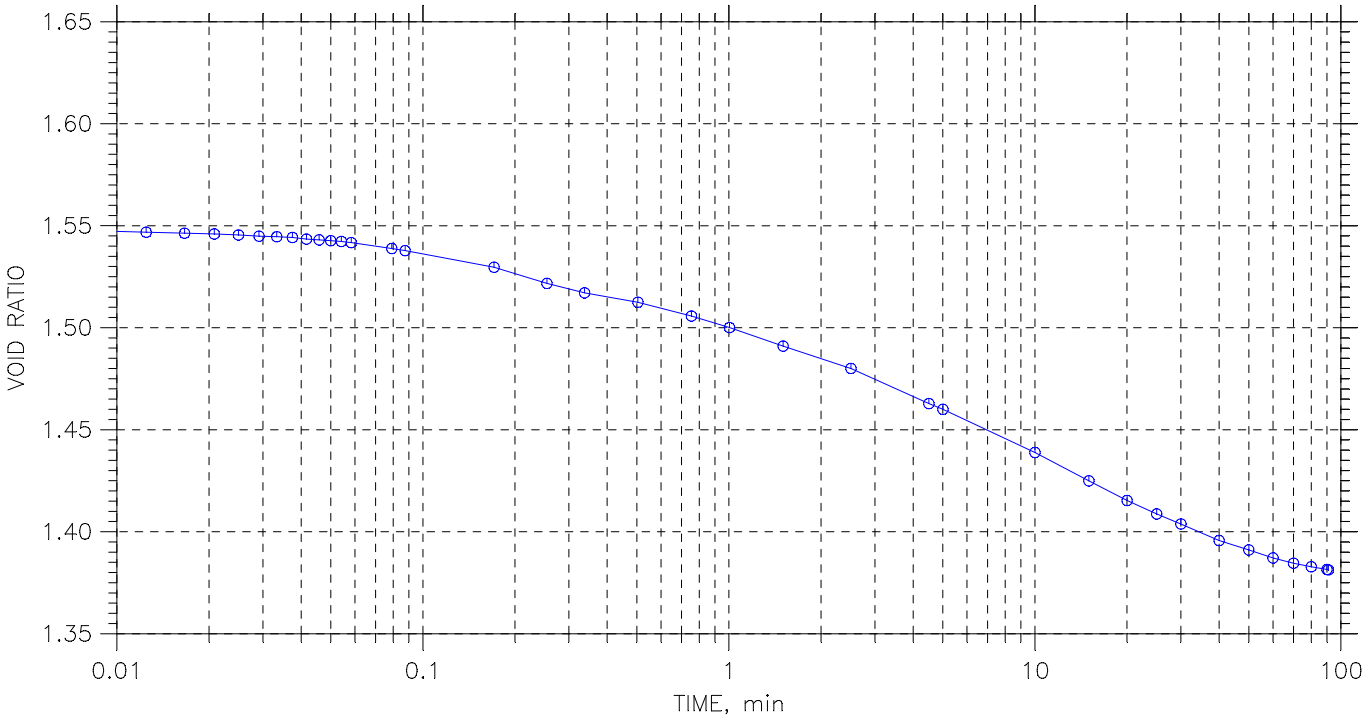
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

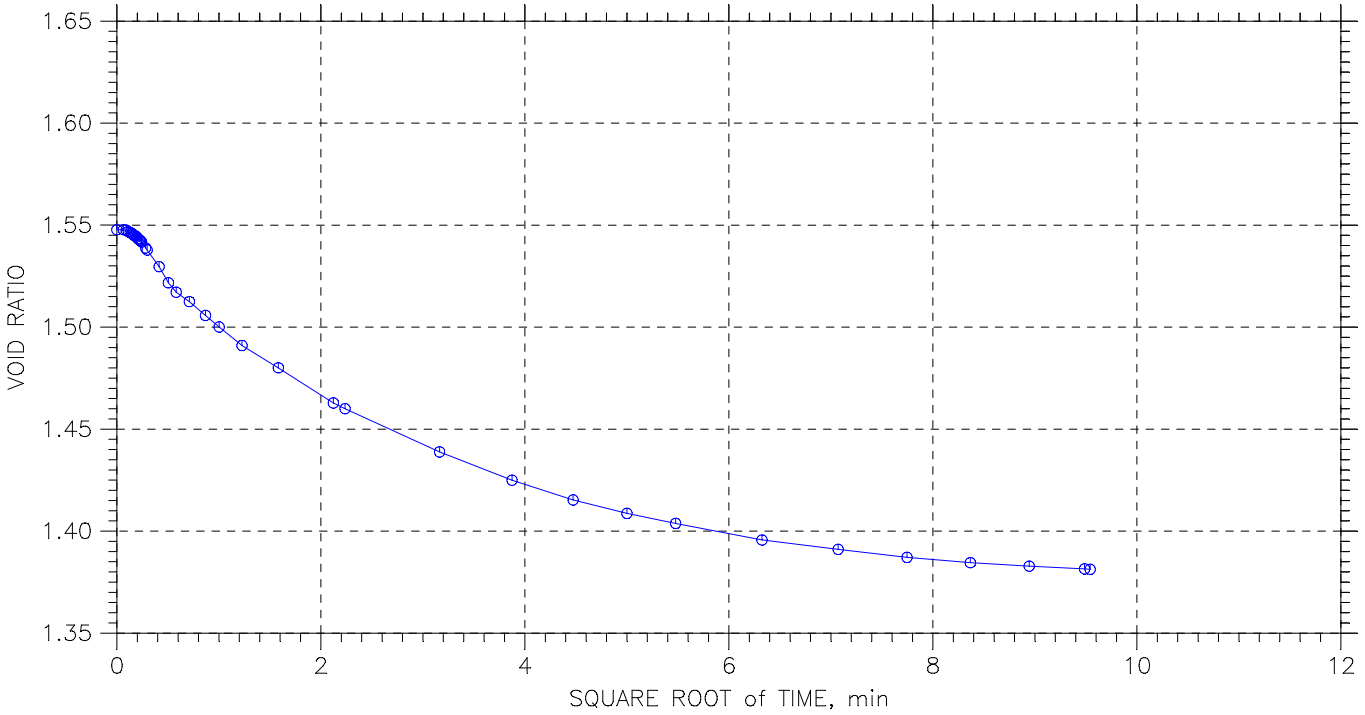
CONSOLIDATION TEST DATA

TIME CURVES

Step: 5 of 18

Stress: 1. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

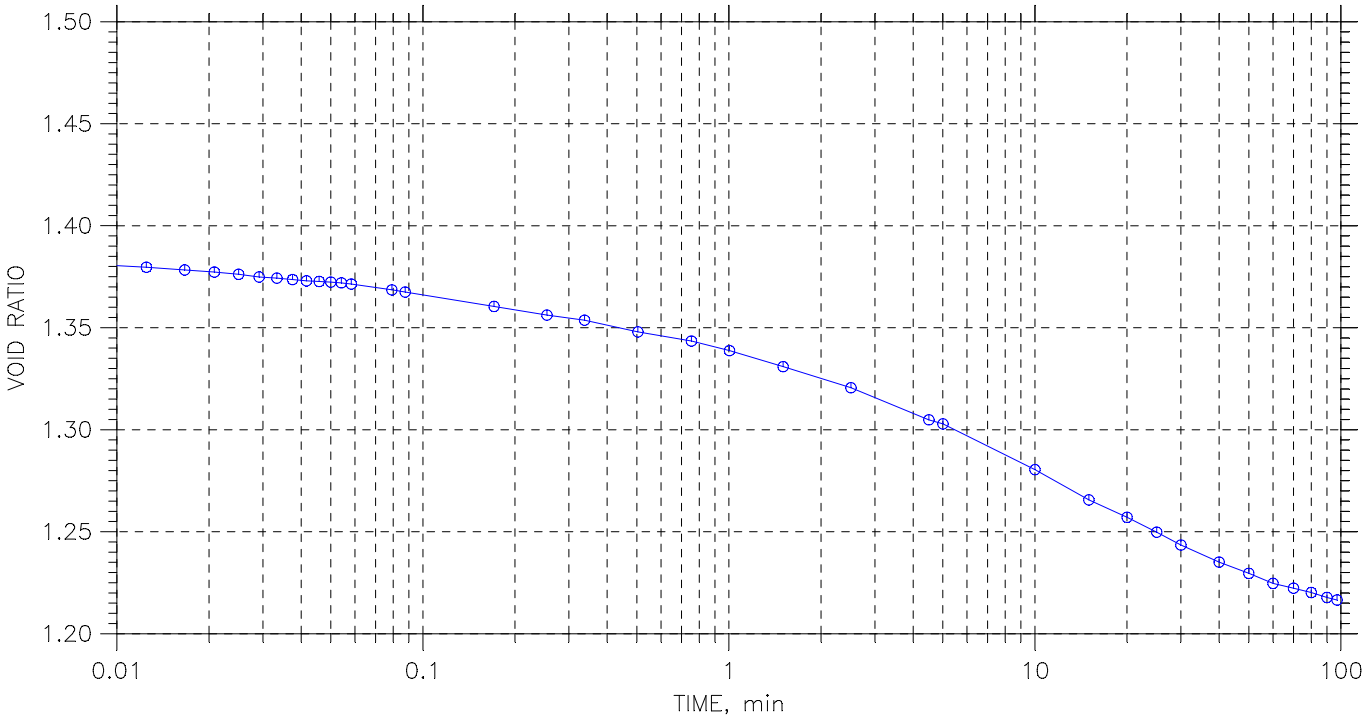
Fri, 04-JAN-2013 10:38:15

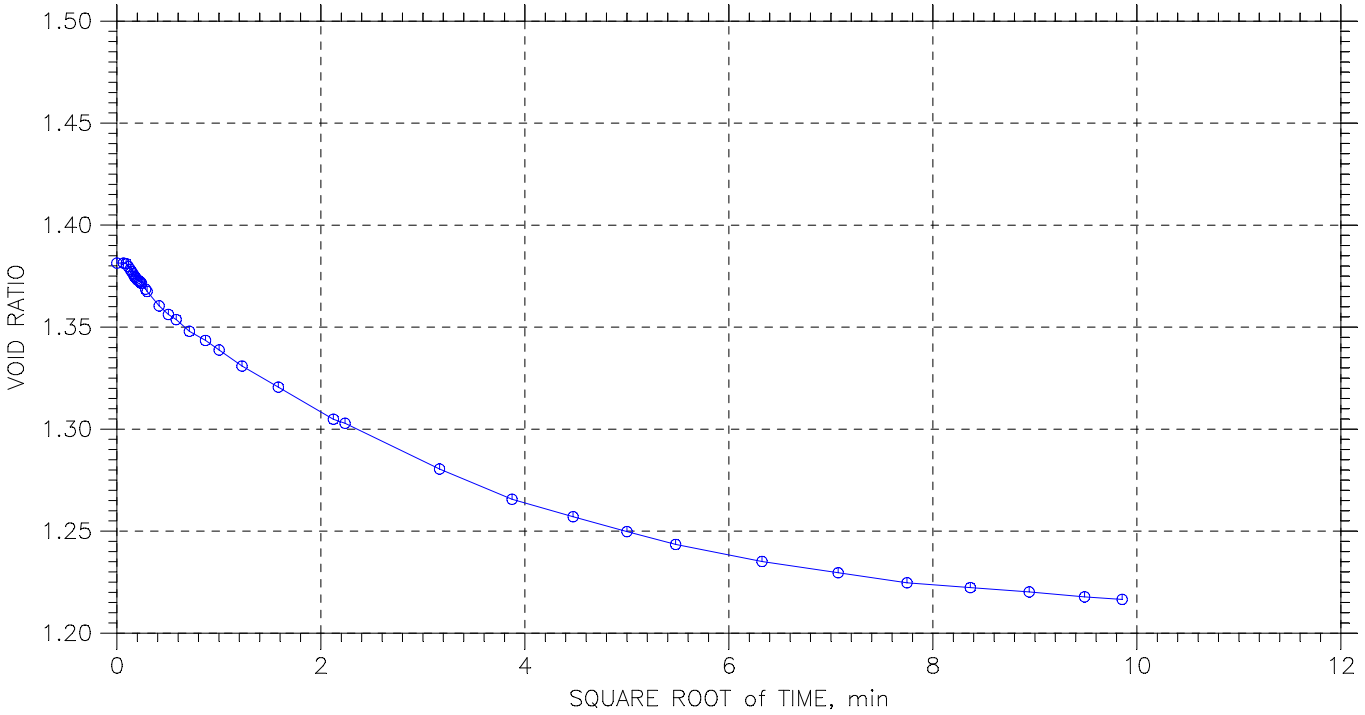
CONSOLIDATION TEST DATA

TIME CURVES

Step: 6 of 18

Stress: 2. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

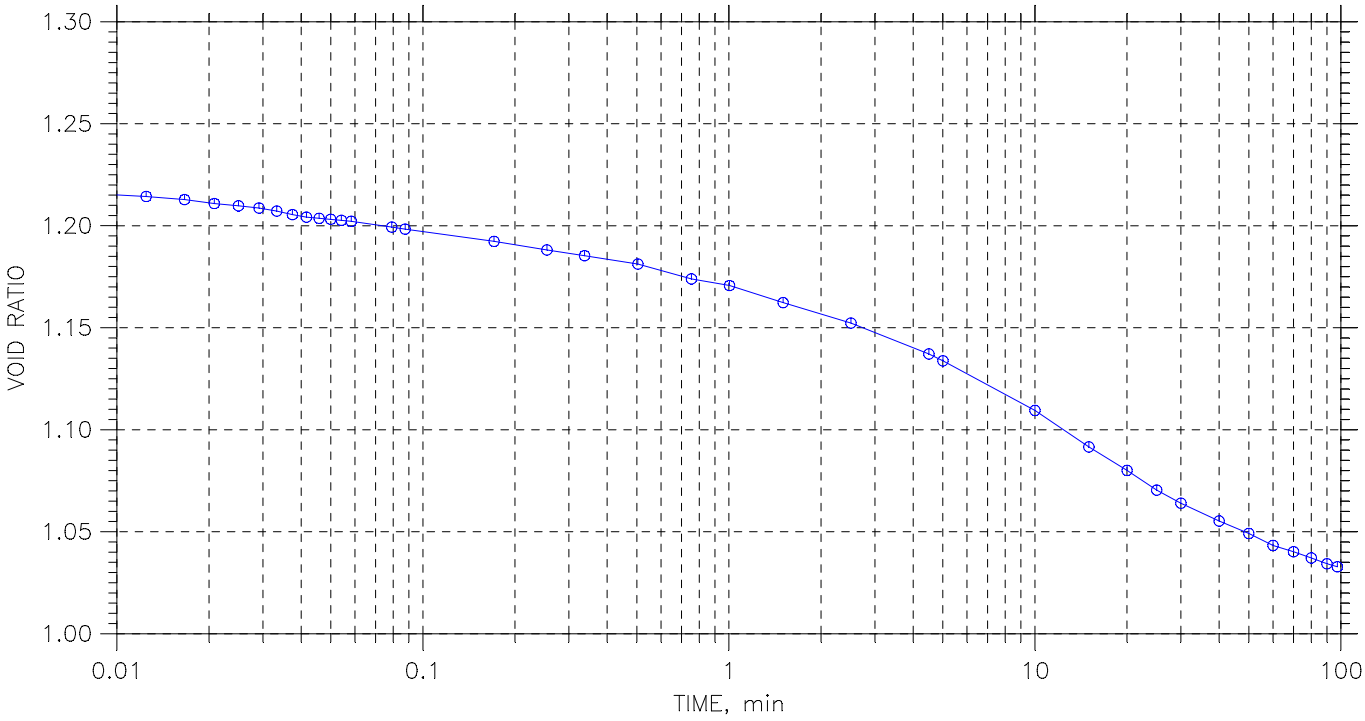
Fri, 04-JAN-2013 10:38:16

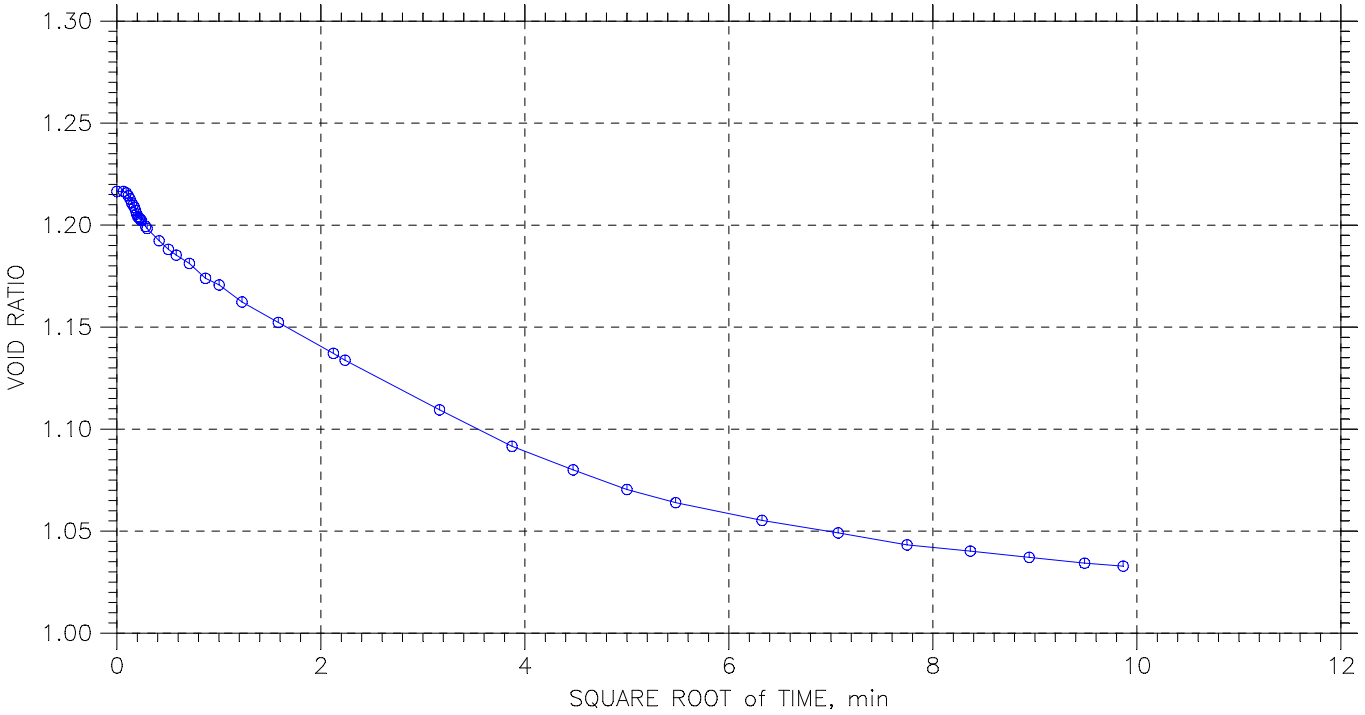
CONSOLIDATION TEST DATA

TIME CURVES

Step: 7 of 18

Stress: 4. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

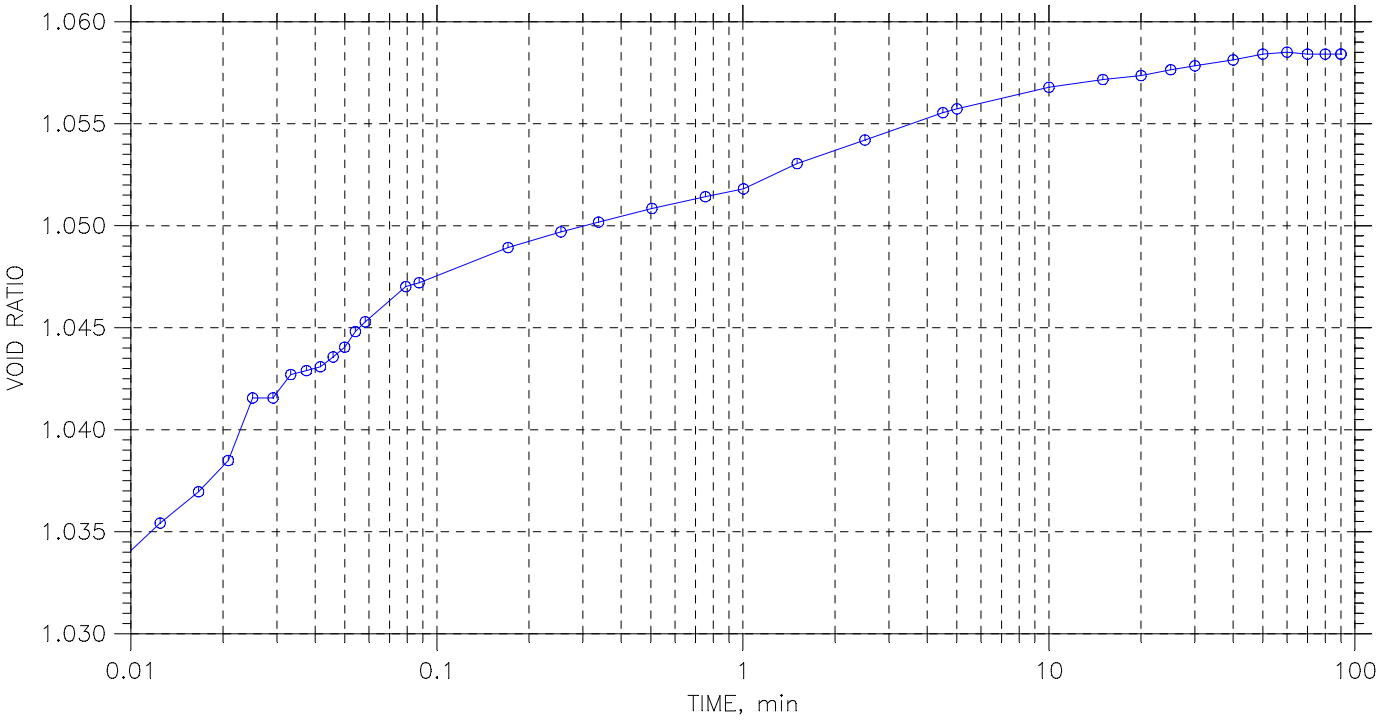
Fri, 04-JAN-2013 10:38:16

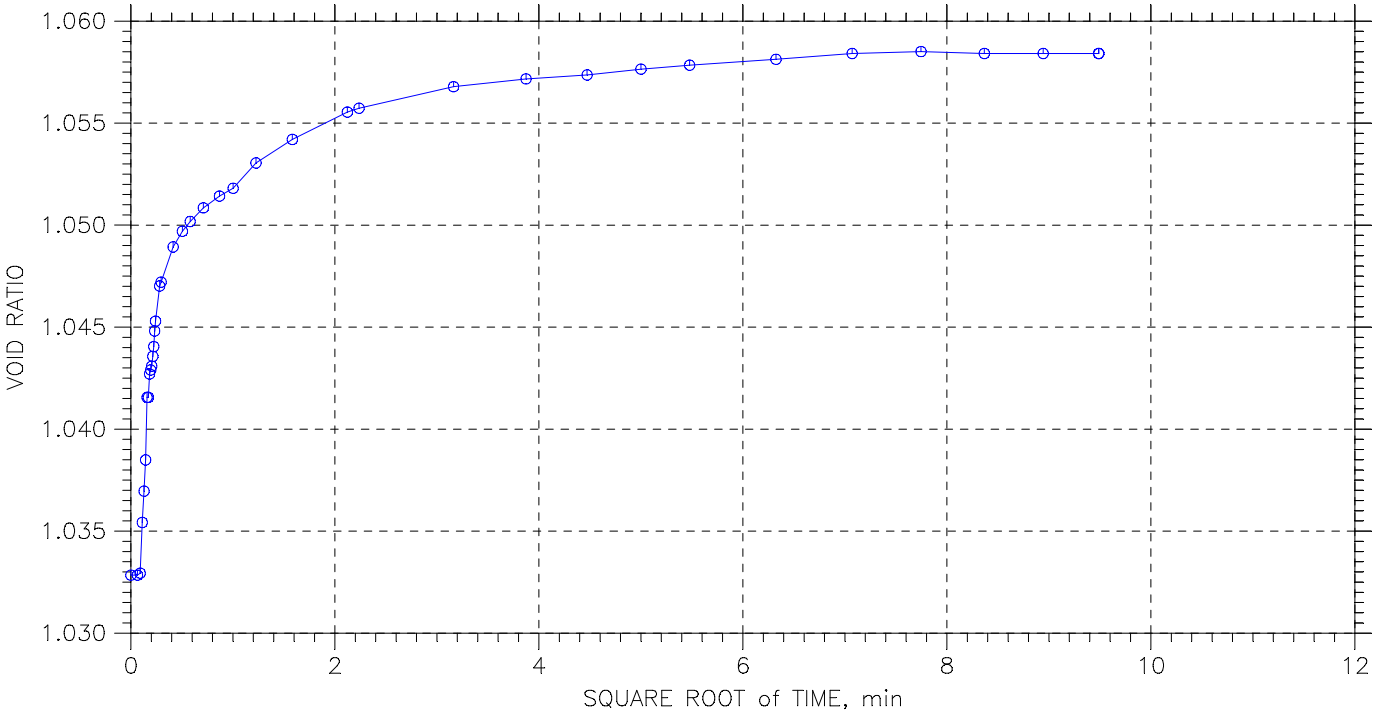
CONSOLIDATION TEST DATA

TIME CURVES

Step: 8 of 18

Stress: 2. tsf





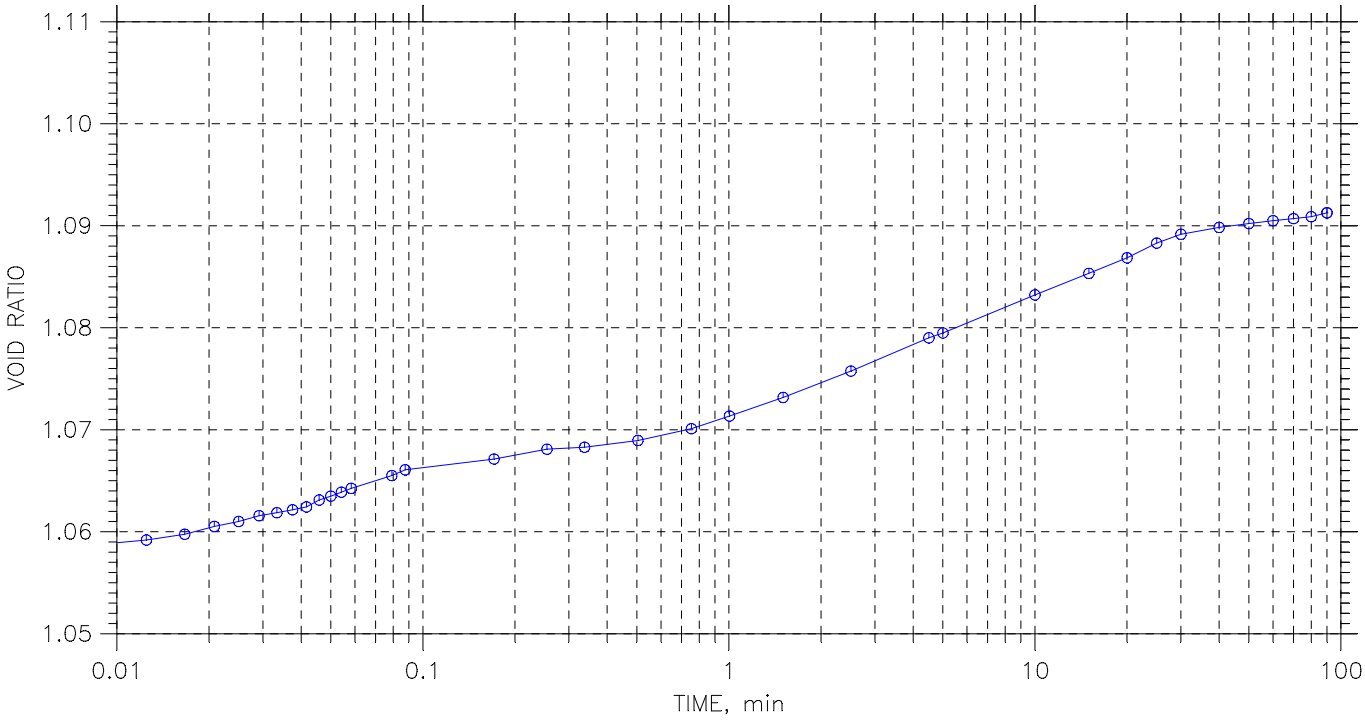
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

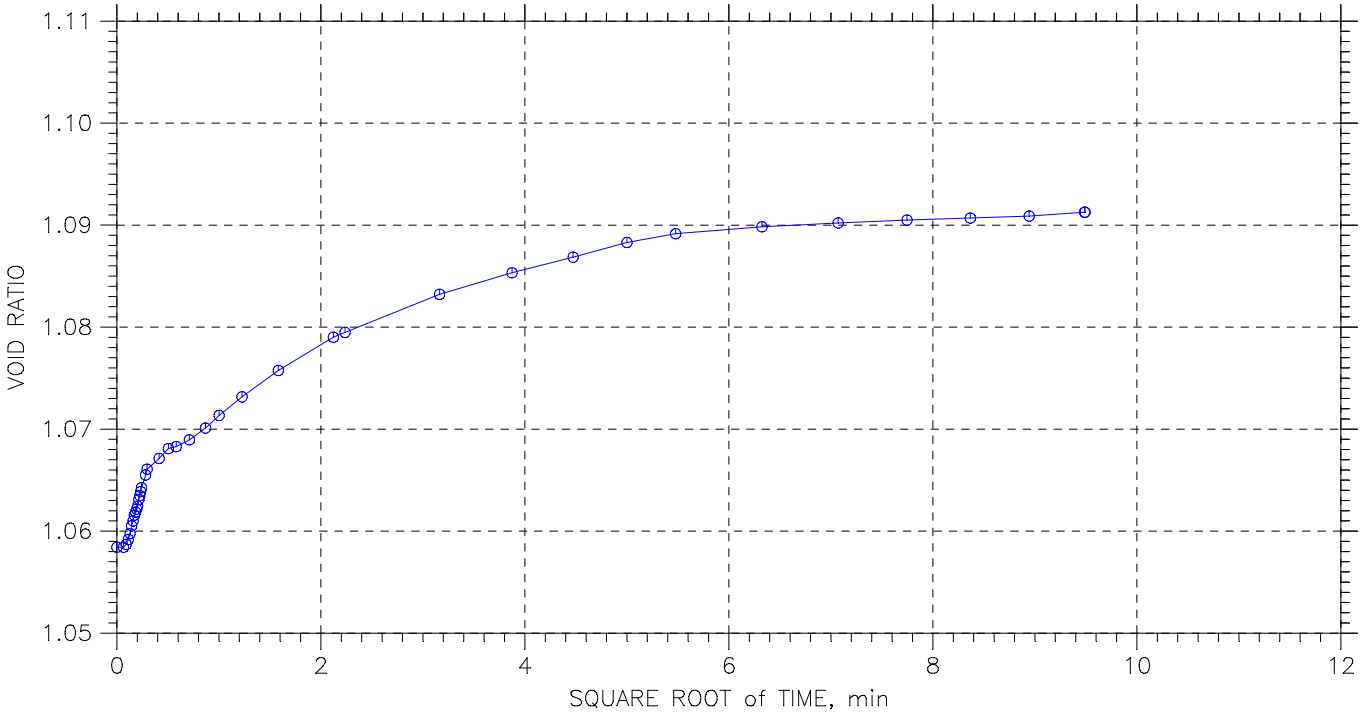
CONSOLIDATION TEST DATA

TIME CURVES

Step: 9 of 18

Stress: 1. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

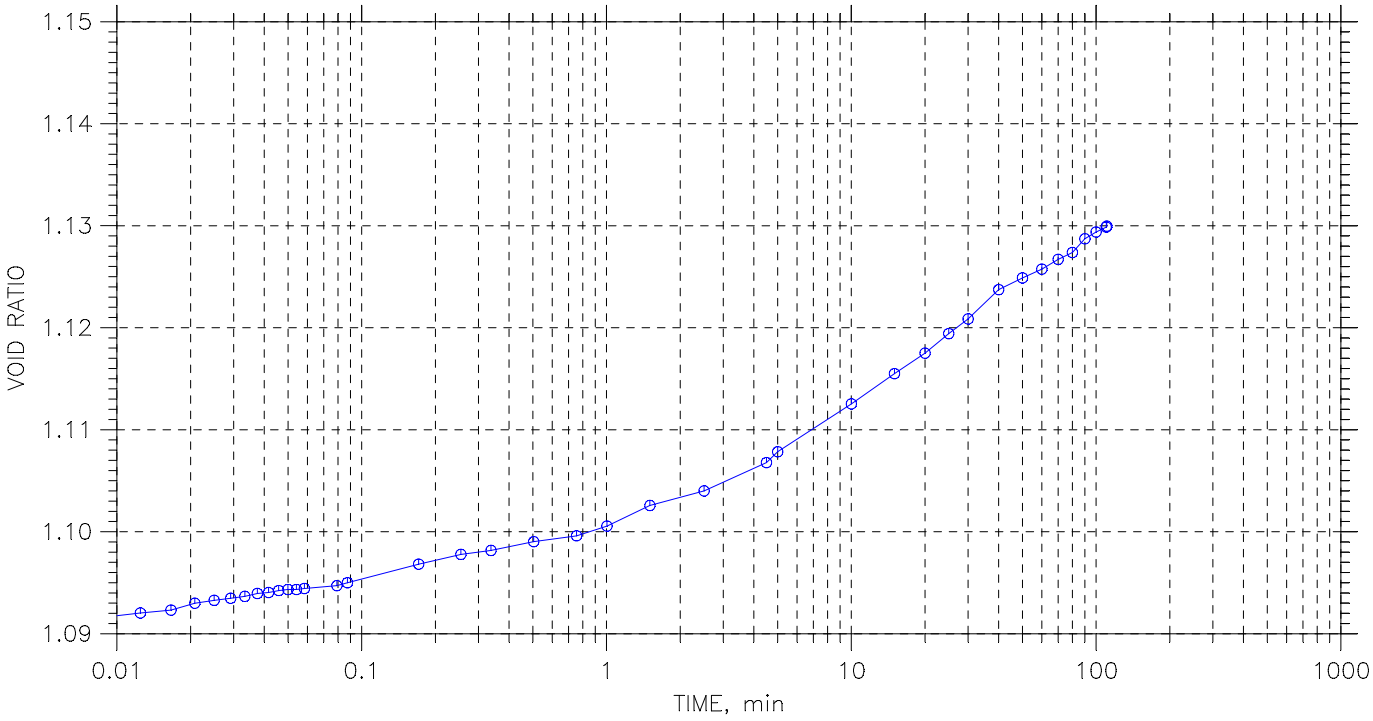
Fri, 04-JAN-2013 10:38:17

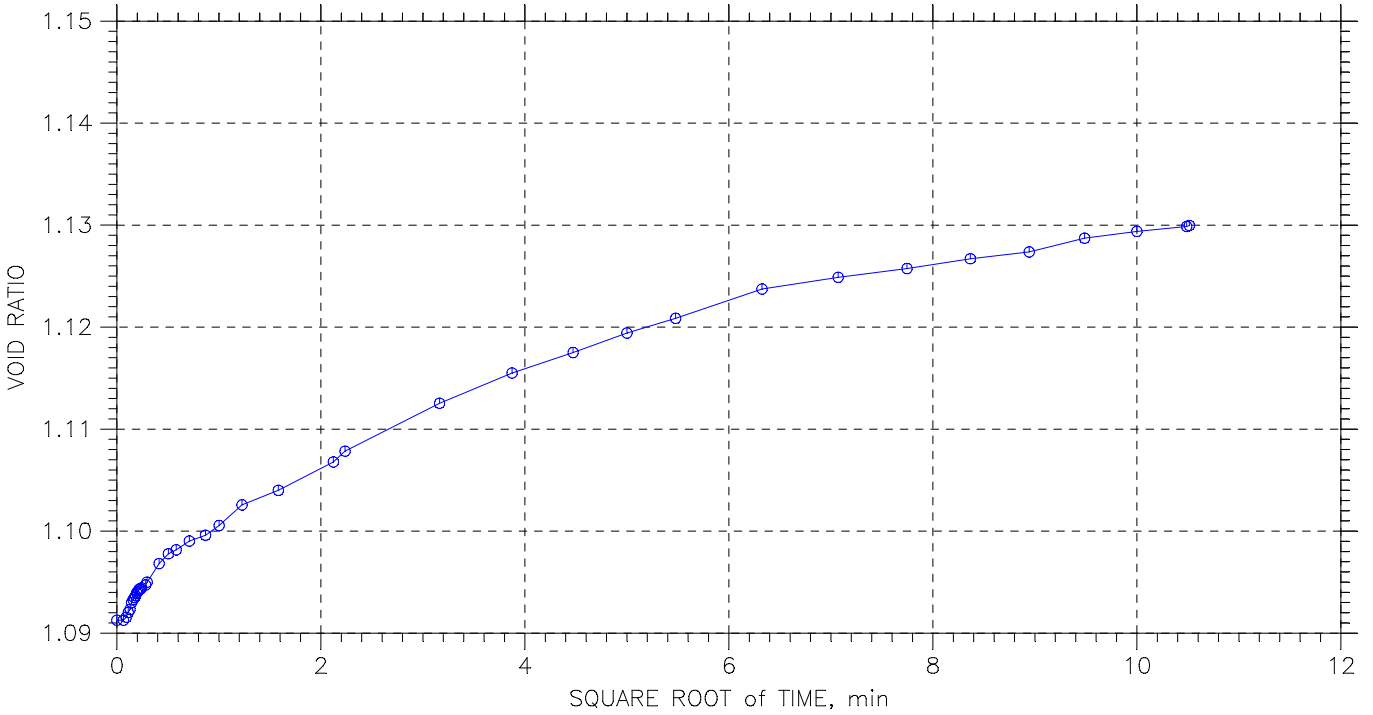
CONSOLIDATION TEST DATA

TIME CURVES

Step: 10 of 18

Stress: 0.5 tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

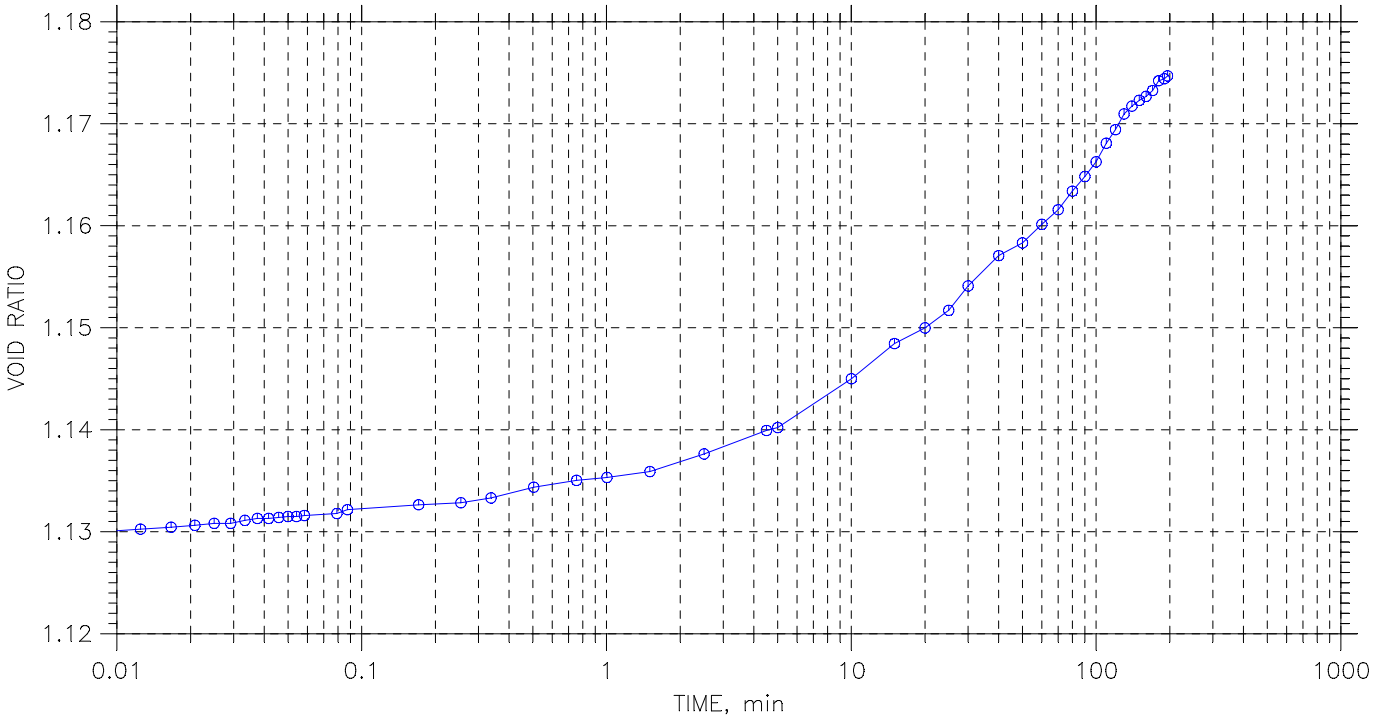
Fri, 04-JAN-2013 10:38:17

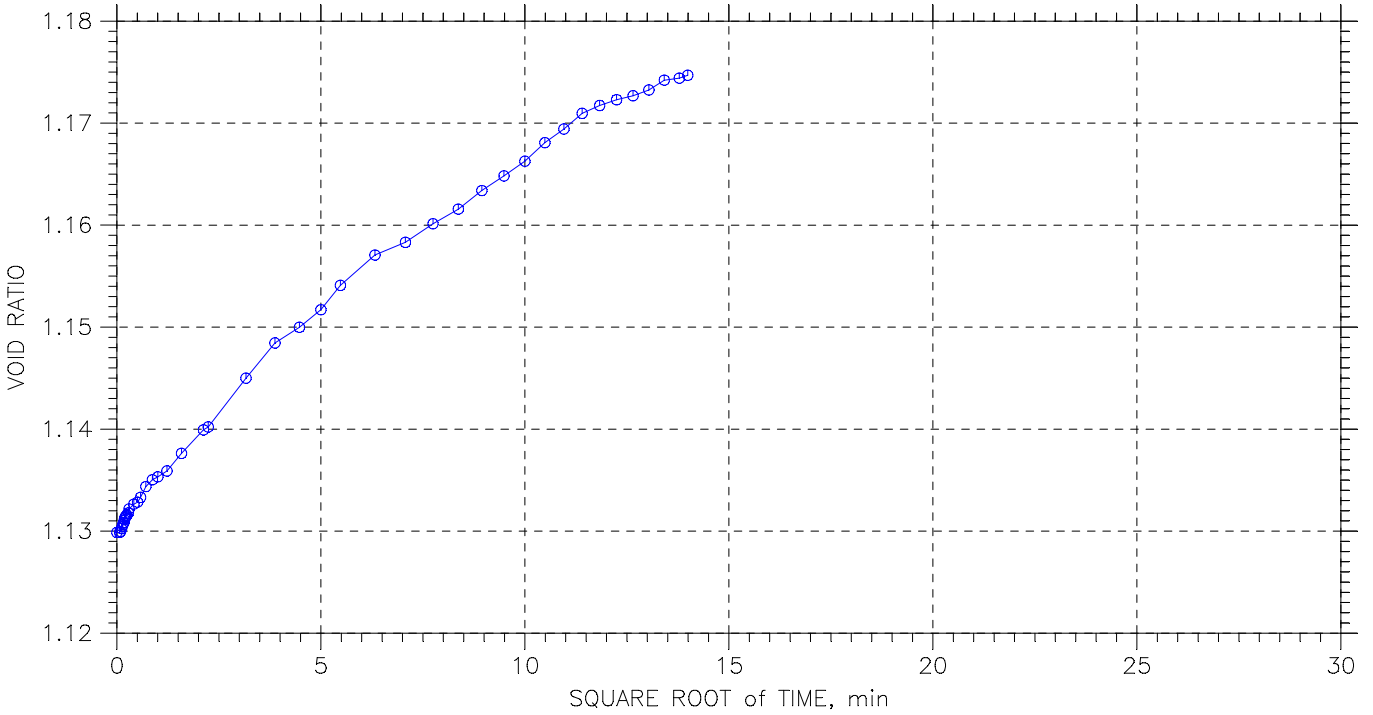
CONSOLIDATION TEST DATA

TIME CURVES

Step: 11 of 18

Stress: 0.25 tsf





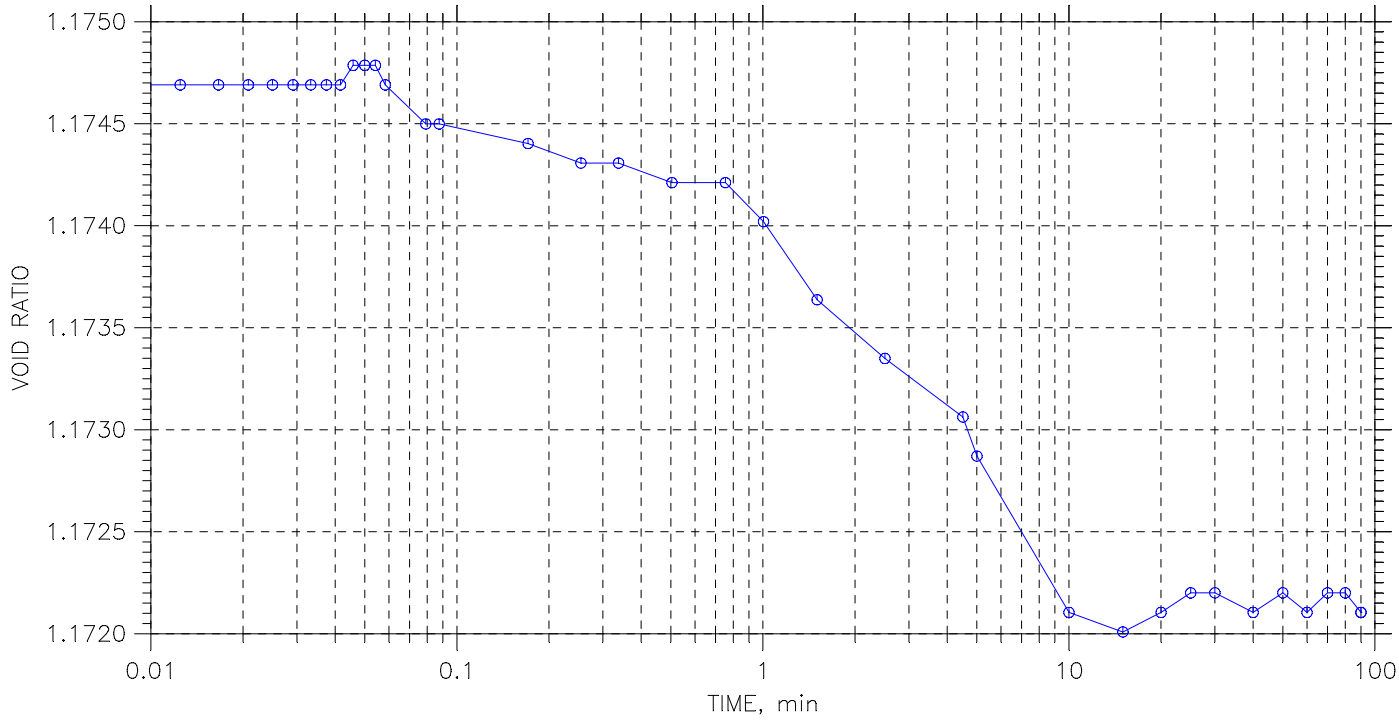
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

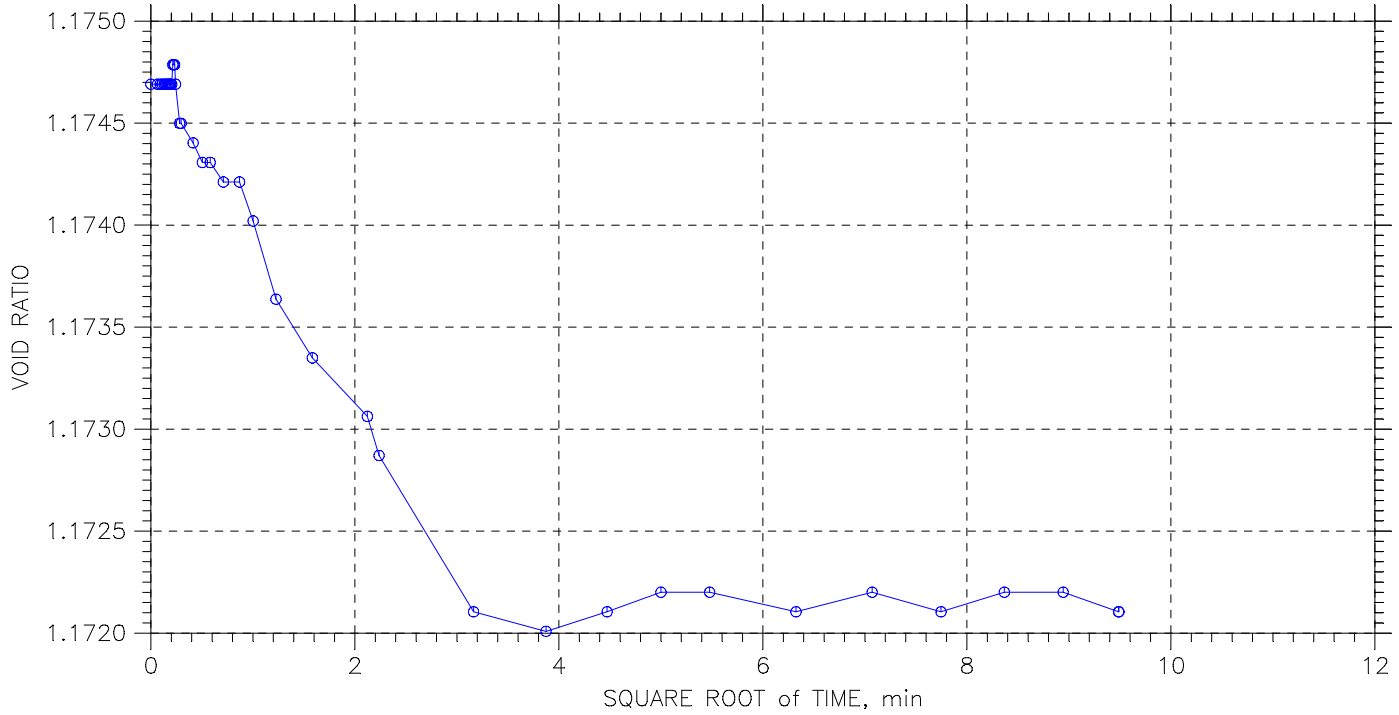
CONSOLIDATION TEST DATA

TIME CURVES

Step: 12 of 18

Stress: 0.5 tsf





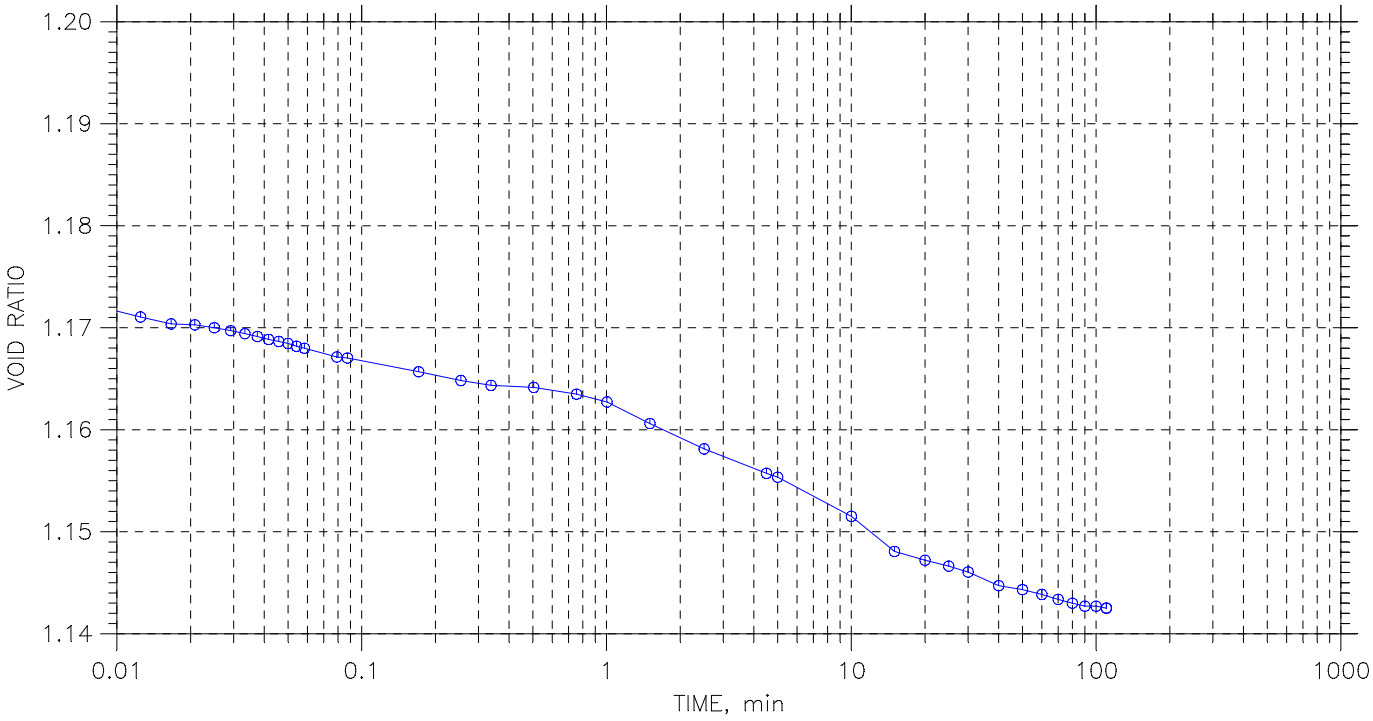
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

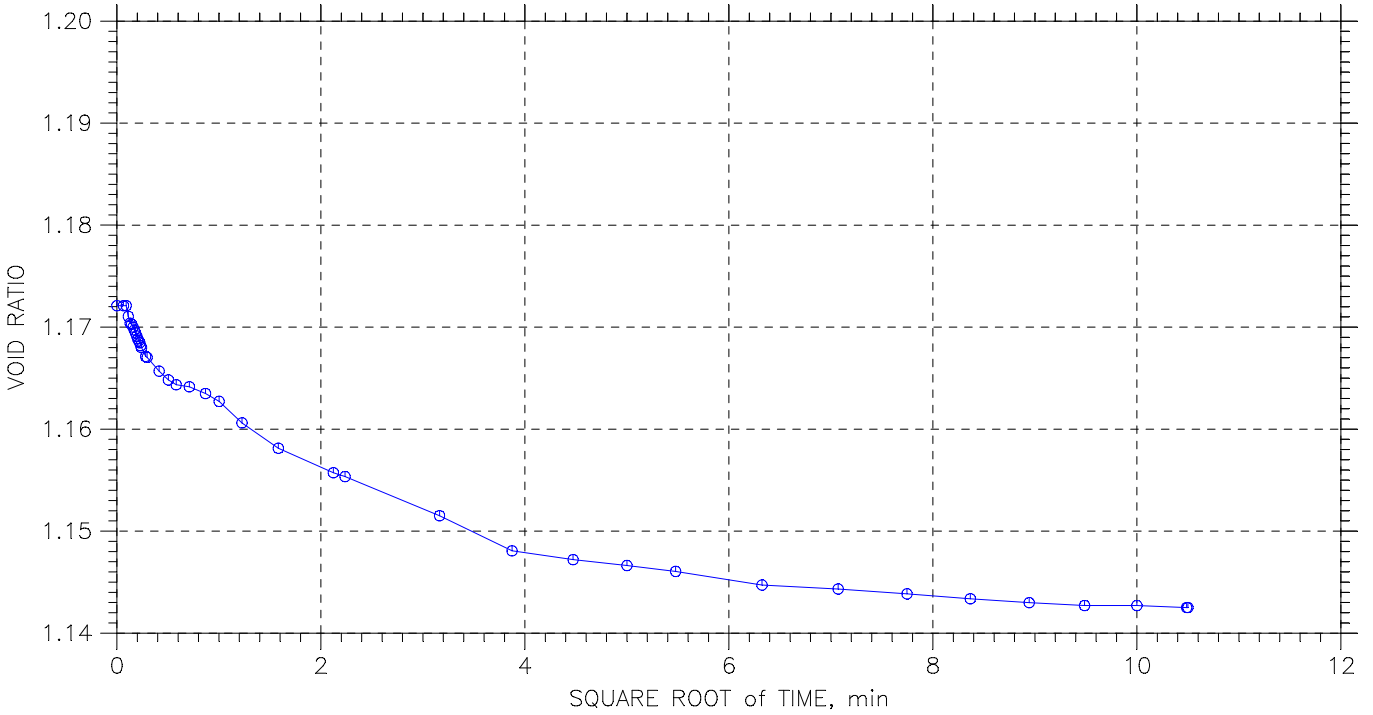
CONSOLIDATION TEST DATA

TIME CURVES

Step: 13 of 18

Stress: 1. tsf





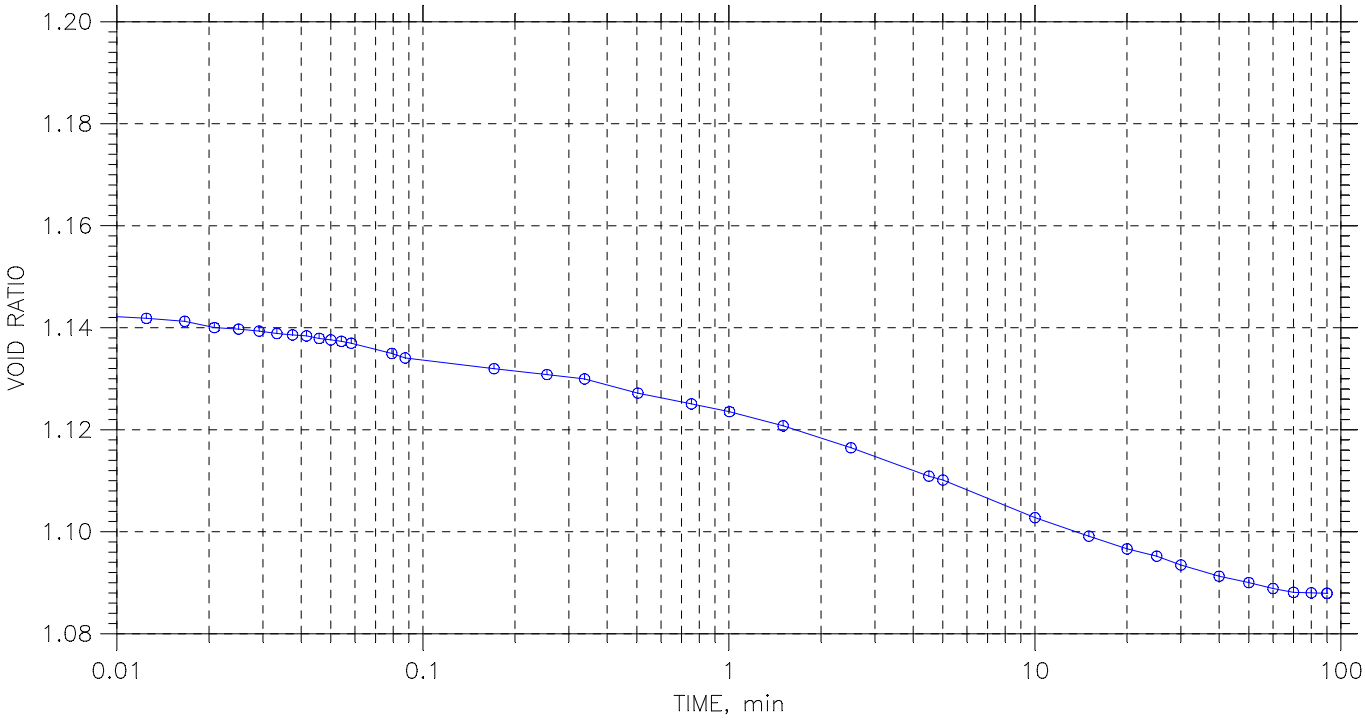
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

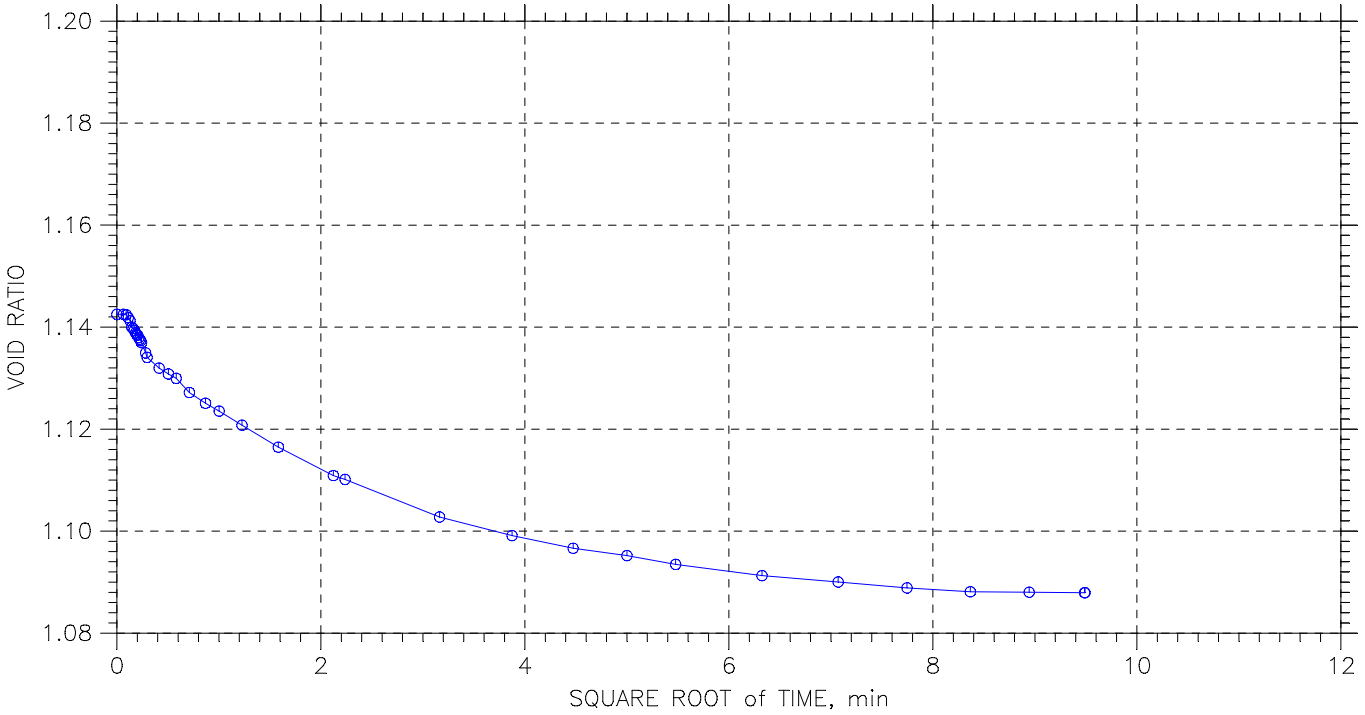
CONSOLIDATION TEST DATA

TIME CURVES

Step: 14 of 18

Stress: 2. tsf





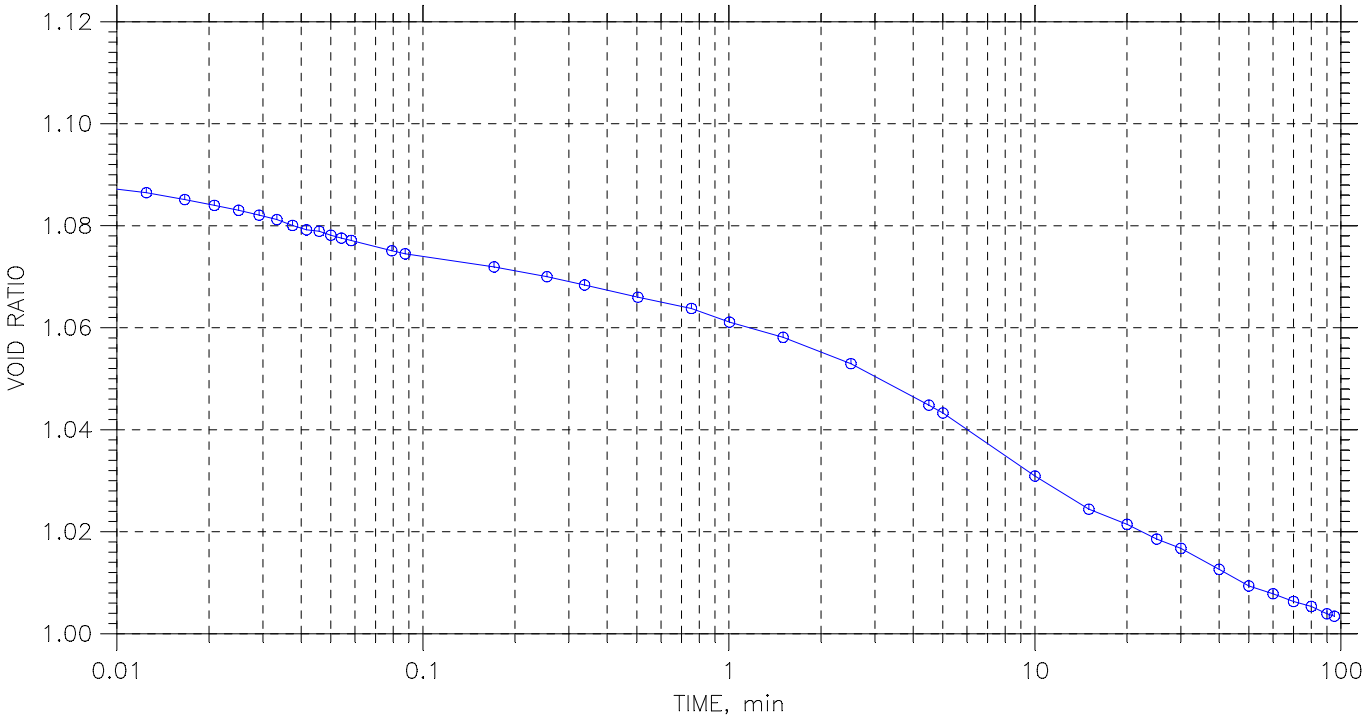
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

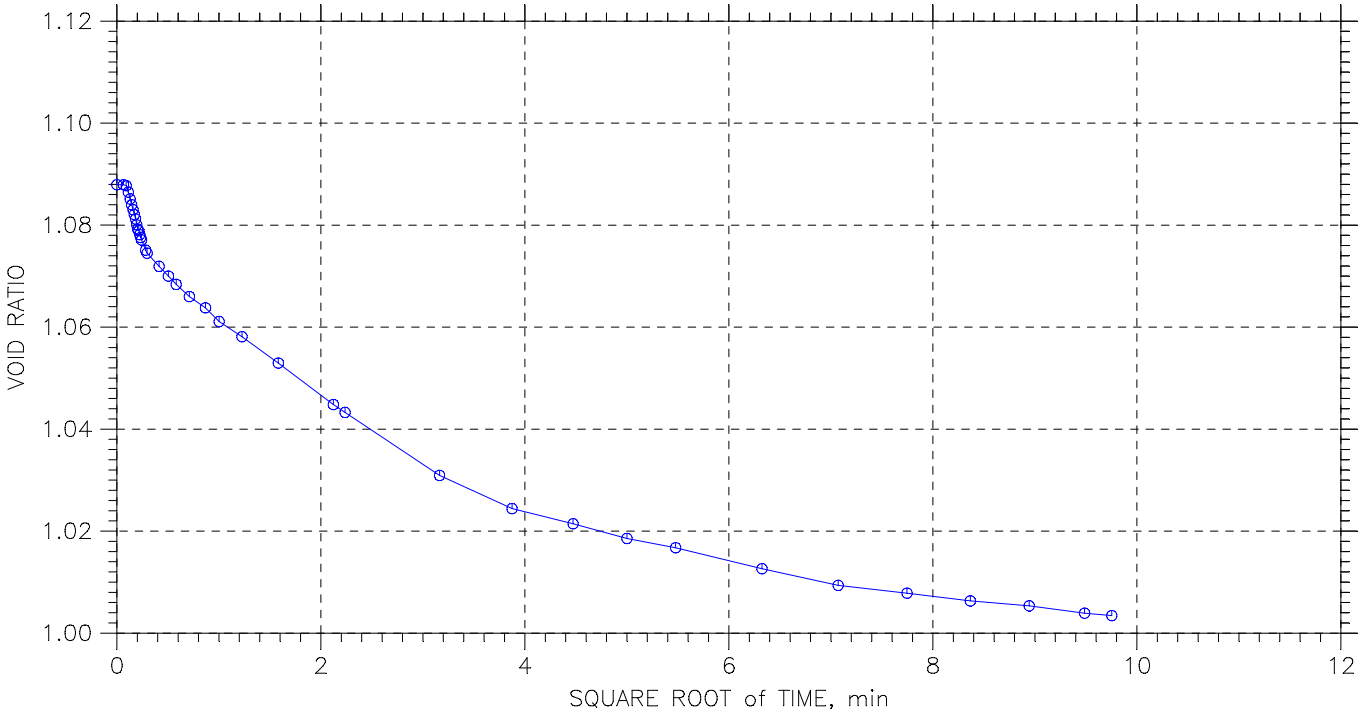
CONSOLIDATION TEST DATA

TIME CURVES

Step: 15 of 18

Stress: 4. tsf





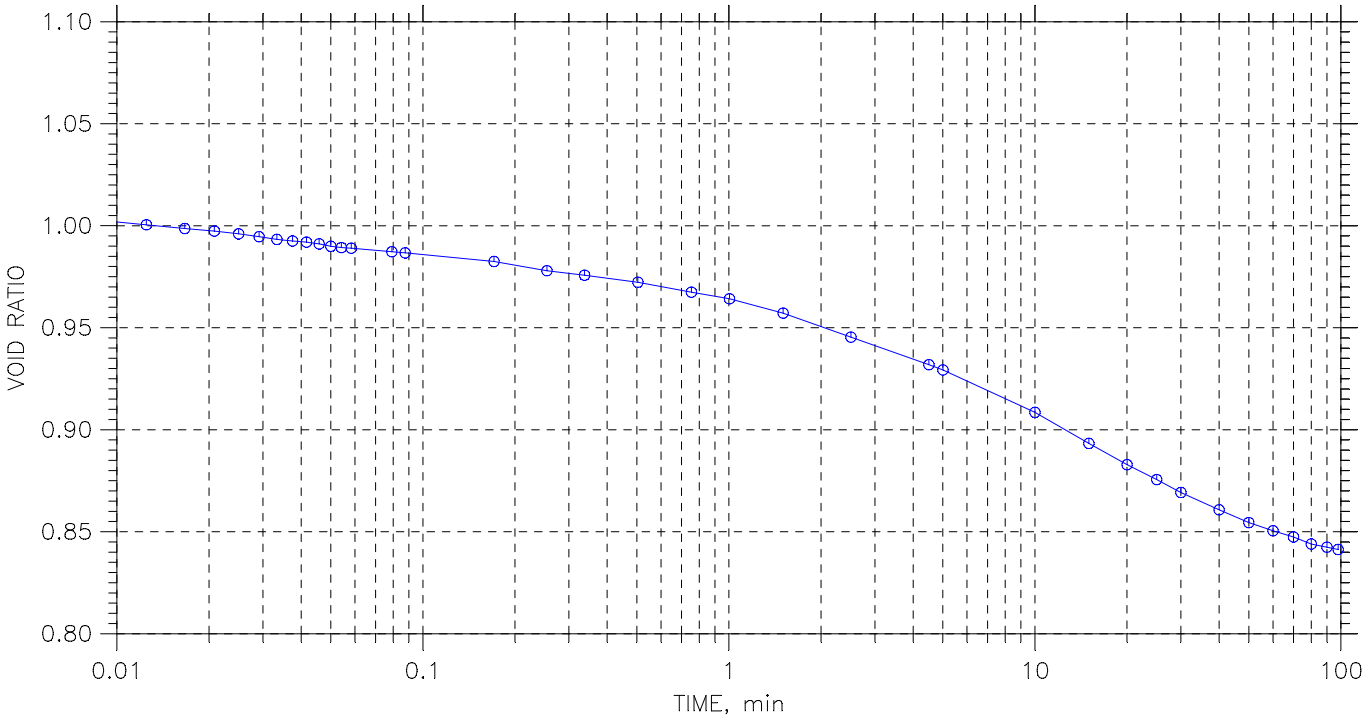
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

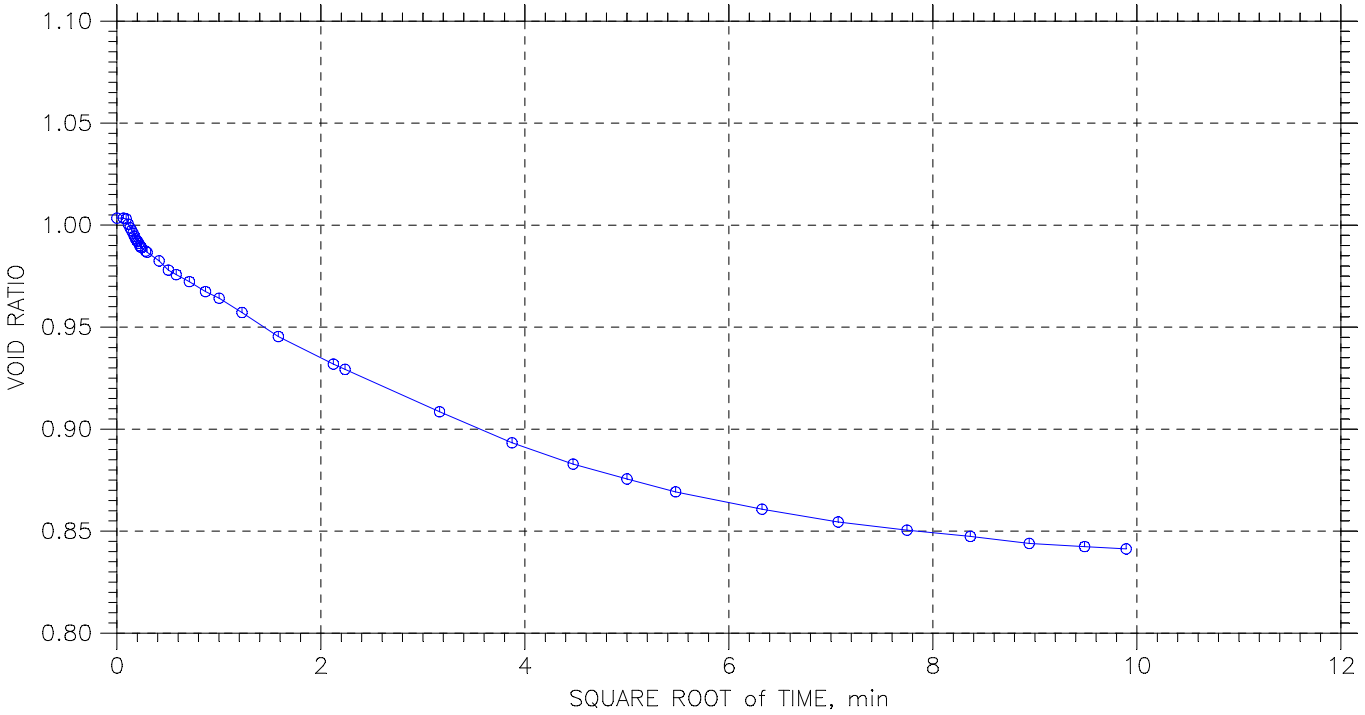
CONSOLIDATION TEST DATA

TIME CURVES

Step: 16 of 18

Stress: 8. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

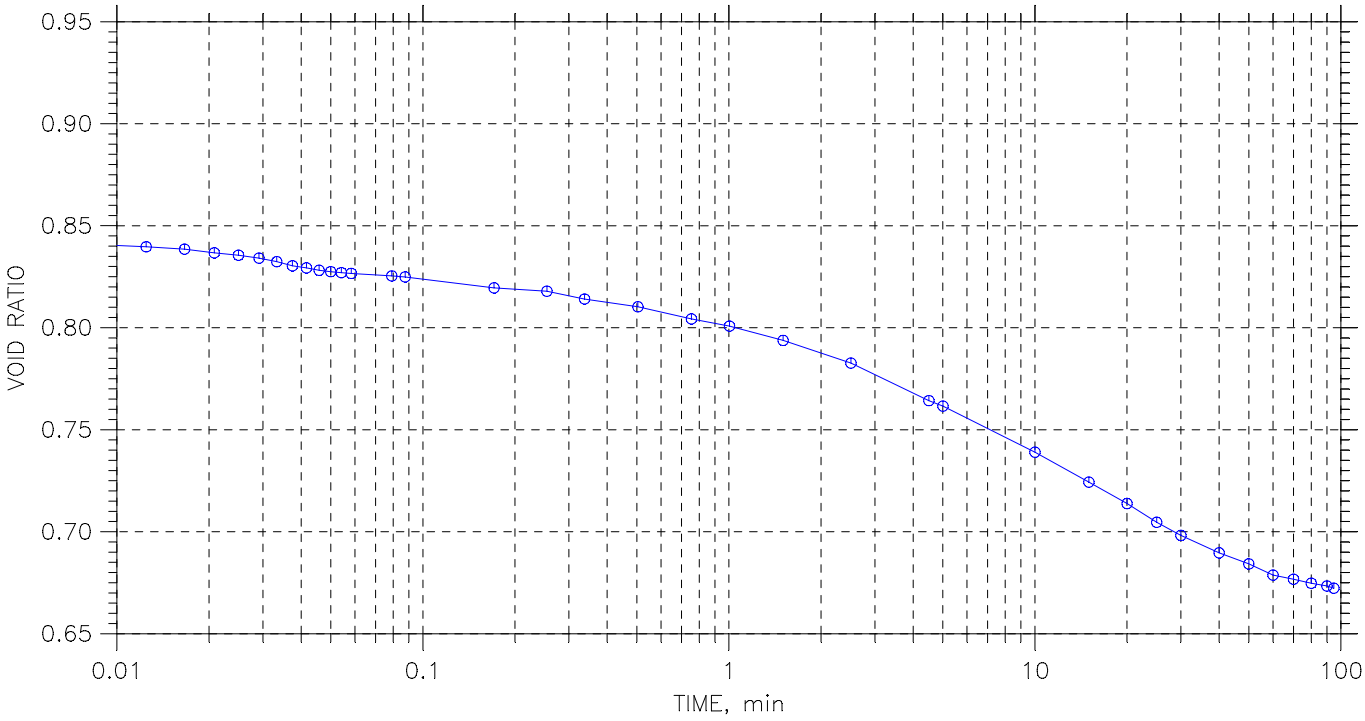
Fri, 04-JAN-2013 10:38:19

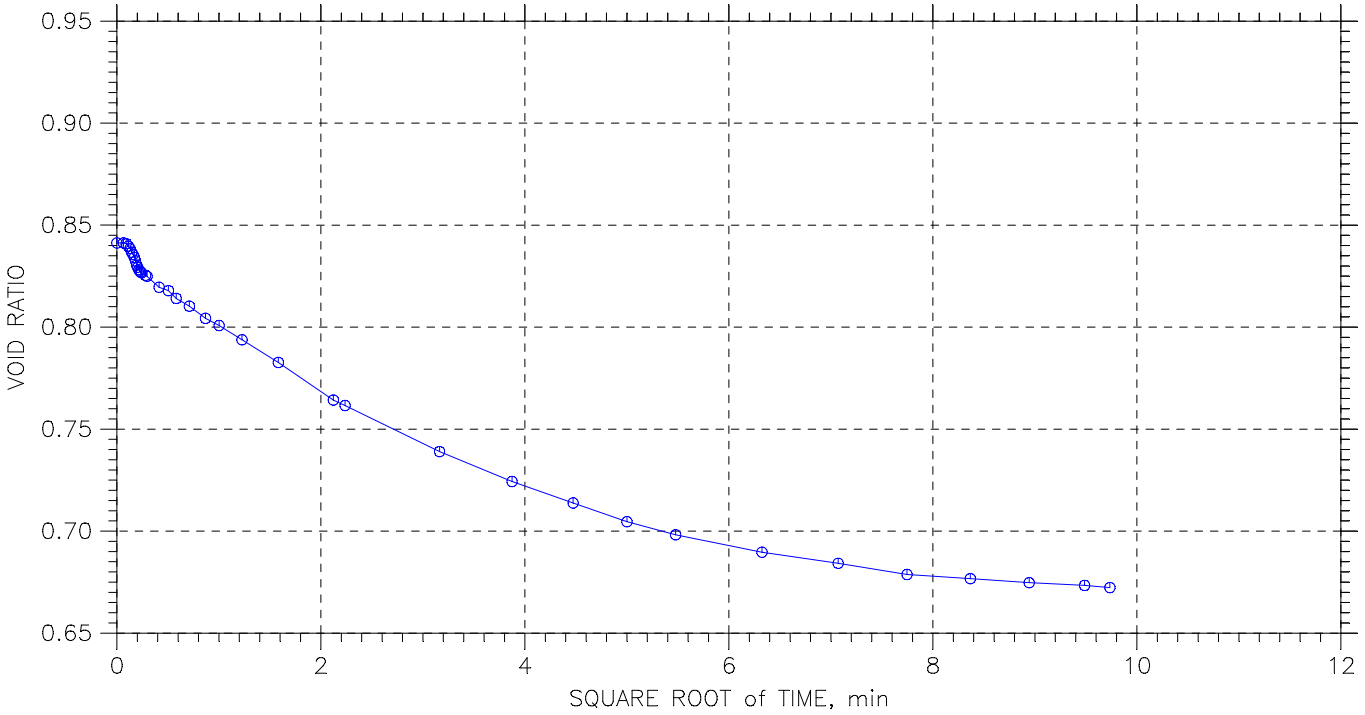
CONSOLIDATION TEST DATA

TIME CURVES

Step: 17 of 18

Stress: 16. tsf





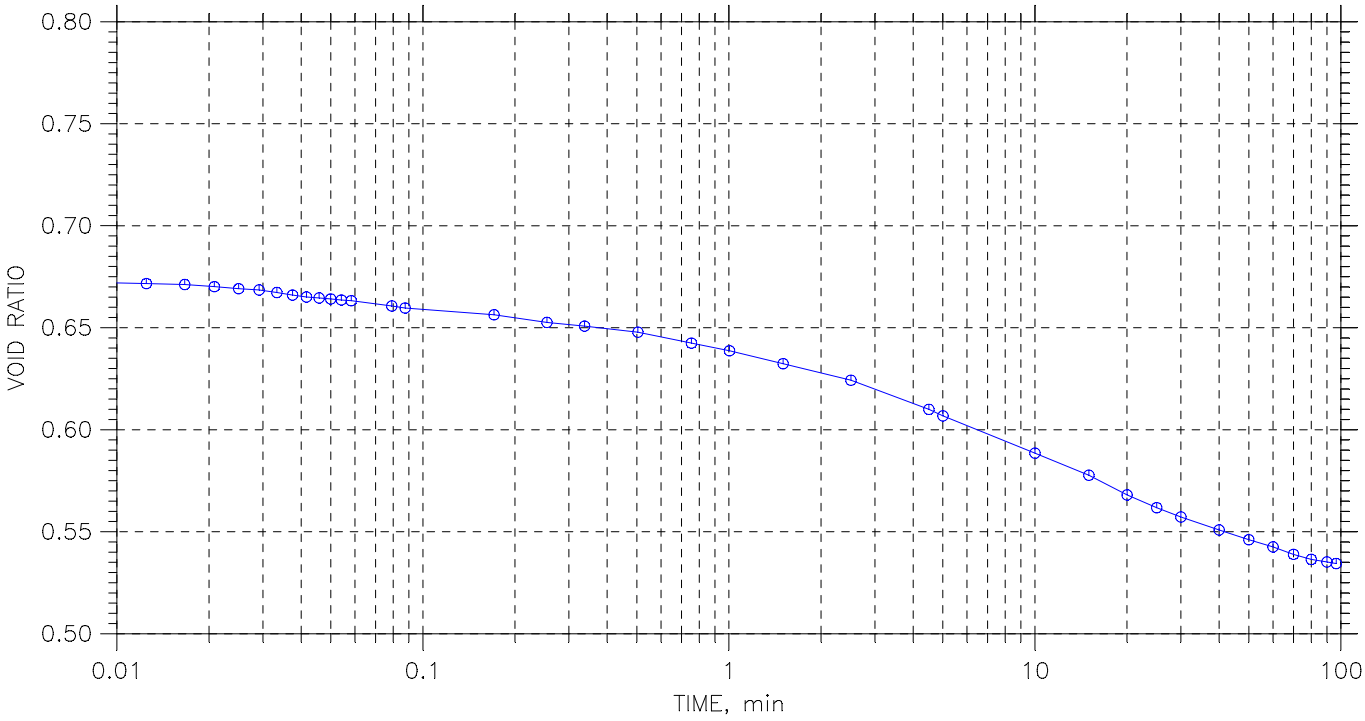
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

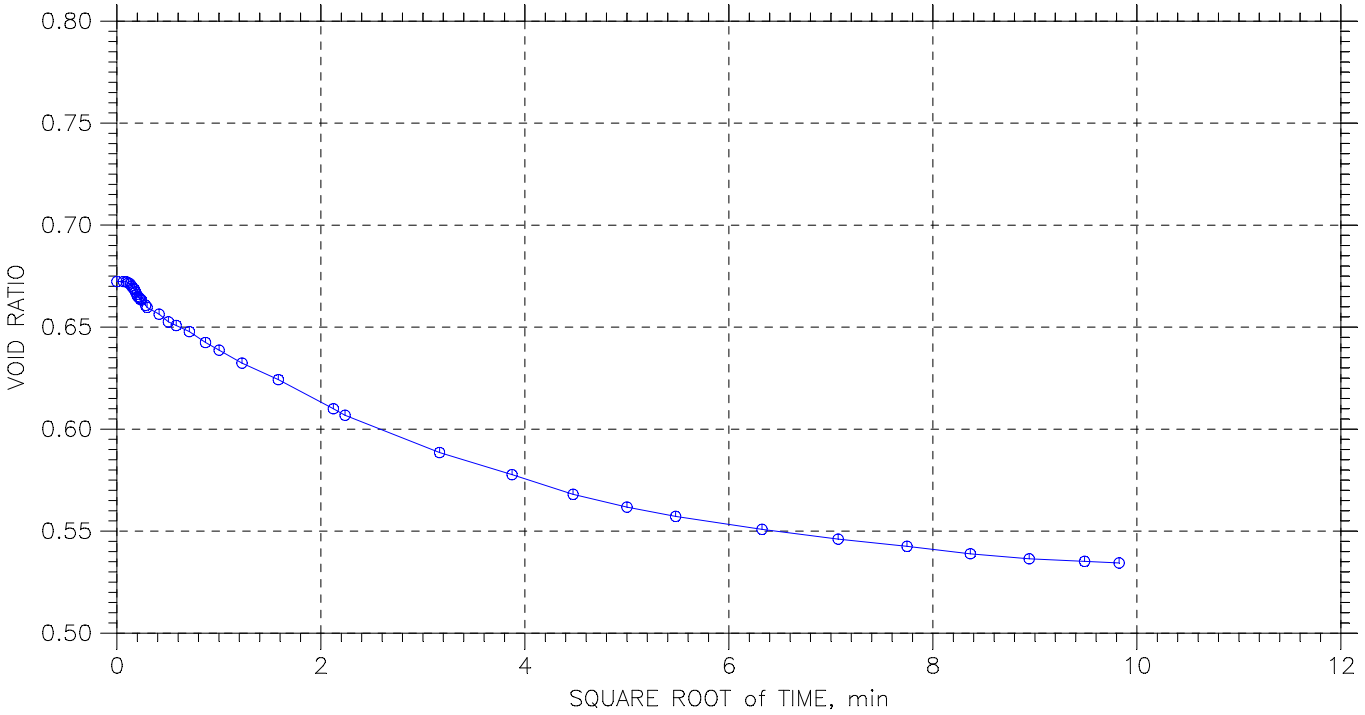
CONSOLIDATION TEST DATA

TIME CURVES

Step: 18 of 18

Stress: 32. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42B	Tested By: JB	Checked By: SL
Sample No.: 2	Test Date: 12/26/12	Depth: 3'-5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Lean clay little sand trace organics, gray to very dark gray, very moist		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

Fri, 04-JAN-2013 10:38:20

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-42C	ST-1	1'	374.2	71.2								14.1
B-42C	SS-2	3.5'	189.2	28.1								
B-42C	SS-3	6'	38.5								<0.25	
B-42C	SS-4	8.5'	34.8								1.00	

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

GESTRA Engineering, Inc
1626 W. Fond du Lac Avenue
Milwaukee, WI 53205
Phone: (414) 933-7444; Fax: (414) 933-7844

One Dimensional Consolidation Test Report

Project Name:	STH-15	Client:	CH2M HILL
Project Location:	Outagamie Co., WI	Report Date:	12/28/2012
Project Number:	12015-10	Test Method :	ASTM D2435 Test Method B
Boring Number:	B-42C	Tester Name:	JB
Sample Number:	1	Test Period	12/18/2012 to 12/21/12
Depth of Sample:	1'-2.5	Sampling Date:	
Sample Description:	Peat, black, very moist to wet	Specific Gravity:	1.60 (assumed)

Sample Preparation:	Using cutting shoe		
Condition of Test:	Natural moisture		
Test Method for Coefficient of Consolidation:	Sqrt of Time		
Atterberg Limit Results			
L.L. NP	P.L. NP	P.I. NP	

	Before Test	After Test
Water Content (%):	374.3	84.4
Saturation (%):	98	128
Void Ratio:	6.11	1.06
dry unit weight (psf):	14.06	48.52

Summary Table of Loading Procedure and Test Results

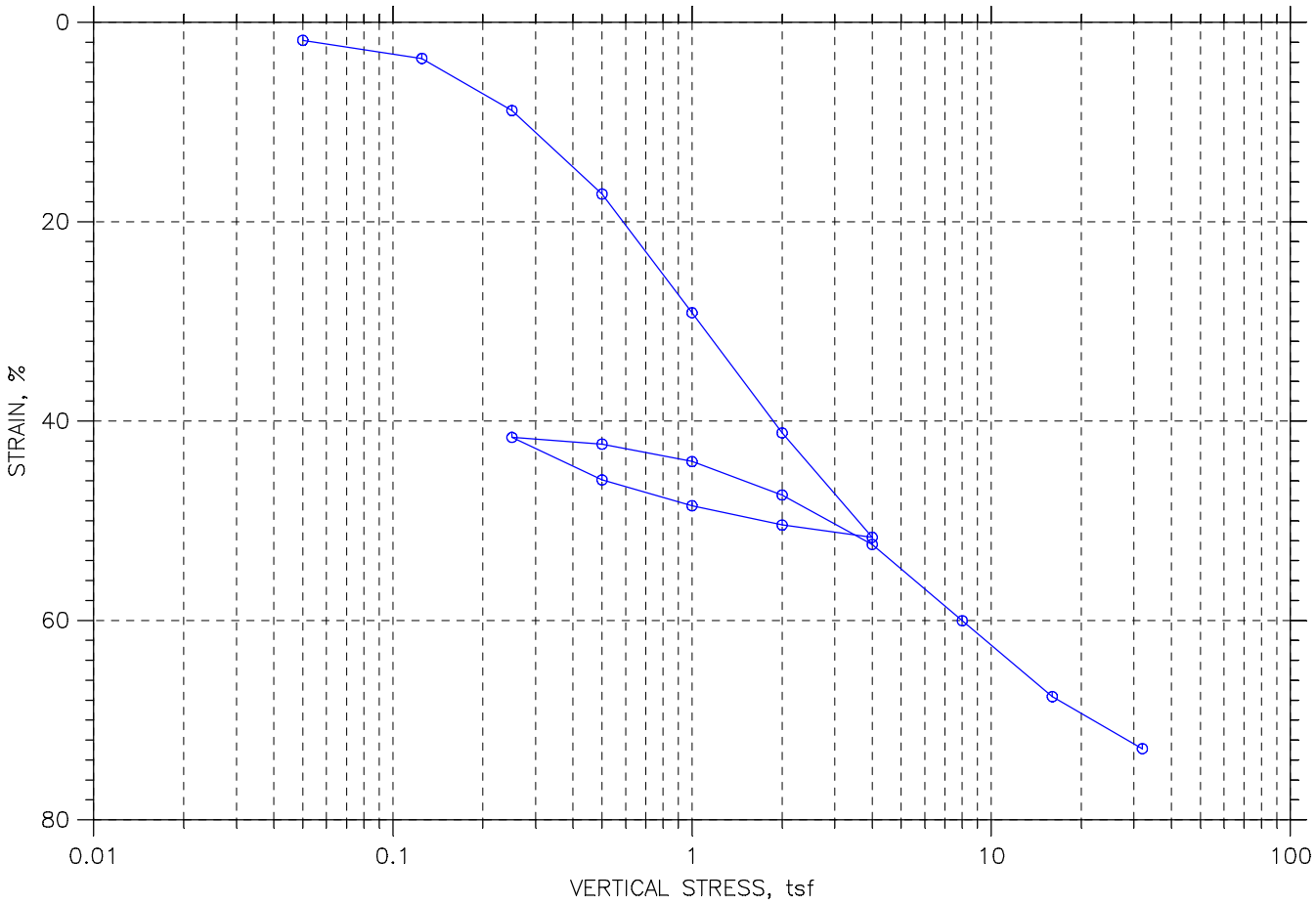
Stage	Applied Stress (tsf)	Final Displ. (inch)	Void Ratio	Strain at End (%)	T_{90} (minute)	Coeff. of Consolidation (ft^2/sec)	Coeff. of Volume Compressibility	Hydraulic Conductivity (ft/day)
1	0.05	0.01783	5.977	1.8	97.9	2.41E-07	3.61E-01	2.34E-04
2	0.125	0.03585	5.848	3.63	12.2	1.86E-06	2.43E-01	1.22E-03
3	0.25	0.08747	5.477	8.84	19.8	1.06E-06	4.17E-01	1.20E-03
4	0.5	0.1703	4.882	17.22	18.7	9.72E-07	3.35E-01	8.79E-04
5	1	0.2881	4.035	29.13	14.8	9.54E-07	2.38E-01	6.13E-04
6	2	0.4074	3.179	41.19	25	4.04E-07	1.21E-01	1.31E-04
7	4	0.5109	2.435	51.66	29.6	2.33E-07	5.24E-02	3.29E-05
8	2	0.4987	2.522	50.43	14.9	3.85E-07	6.18E-03	6.41E-06
9	1	0.4796	2.66	48.5	36.7	1.67E-07	1.93E-02	8.69E-06
10	0.5	0.454	2.844	45.9	126.6	5.29E-08	5.19E-02	7.40E-06
11	0.25	0.4118	3.147	41.64	588.6	1.29E-08	1.70E-01	5.92E-06
12	0.5	0.4185	3.099	42.32	28.8	2.81E-07	2.70E-02	2.05E-05
13	1	0.4357	2.975	44.06	19.2	4.03E-07	3.48E-02	3.78E-05
14	2	0.4689	2.736	47.42	19.4	3.65E-07	3.36E-02	3.30E-05
15	4	0.518	2.384	52.37	28	2.15E-07	2.48E-02	1.44E-05
16	8	0.5937	1.84	60.03	46.6	9.88E-08	1.91E-02	5.10E-06
17	16	0.669	1.299	67.64	107.6	2.92E-08	9.52E-03	7.49E-07
18	32	0.7207	0.928	72.87	148.3	1.43E-08	3.27E-03	1.26E-07

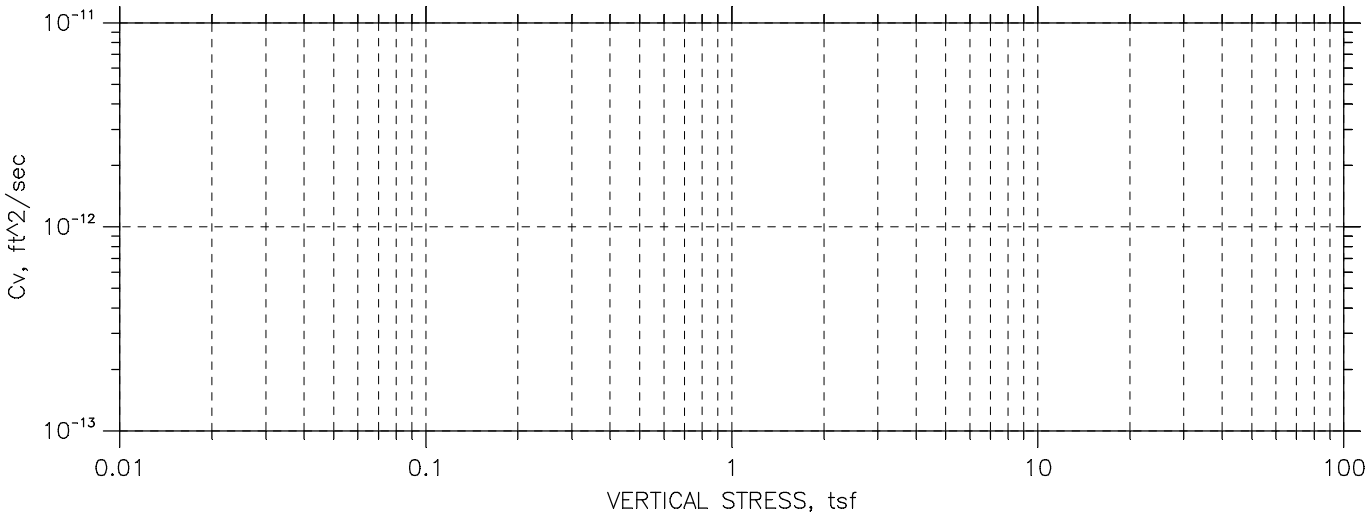
Remarks: *100 psf was applied as a seating load; LOI= 71.2%

Checked by Ryan English Dec/28/12

CONSOLIDATION TEST DATA

SUMMARY REPORT



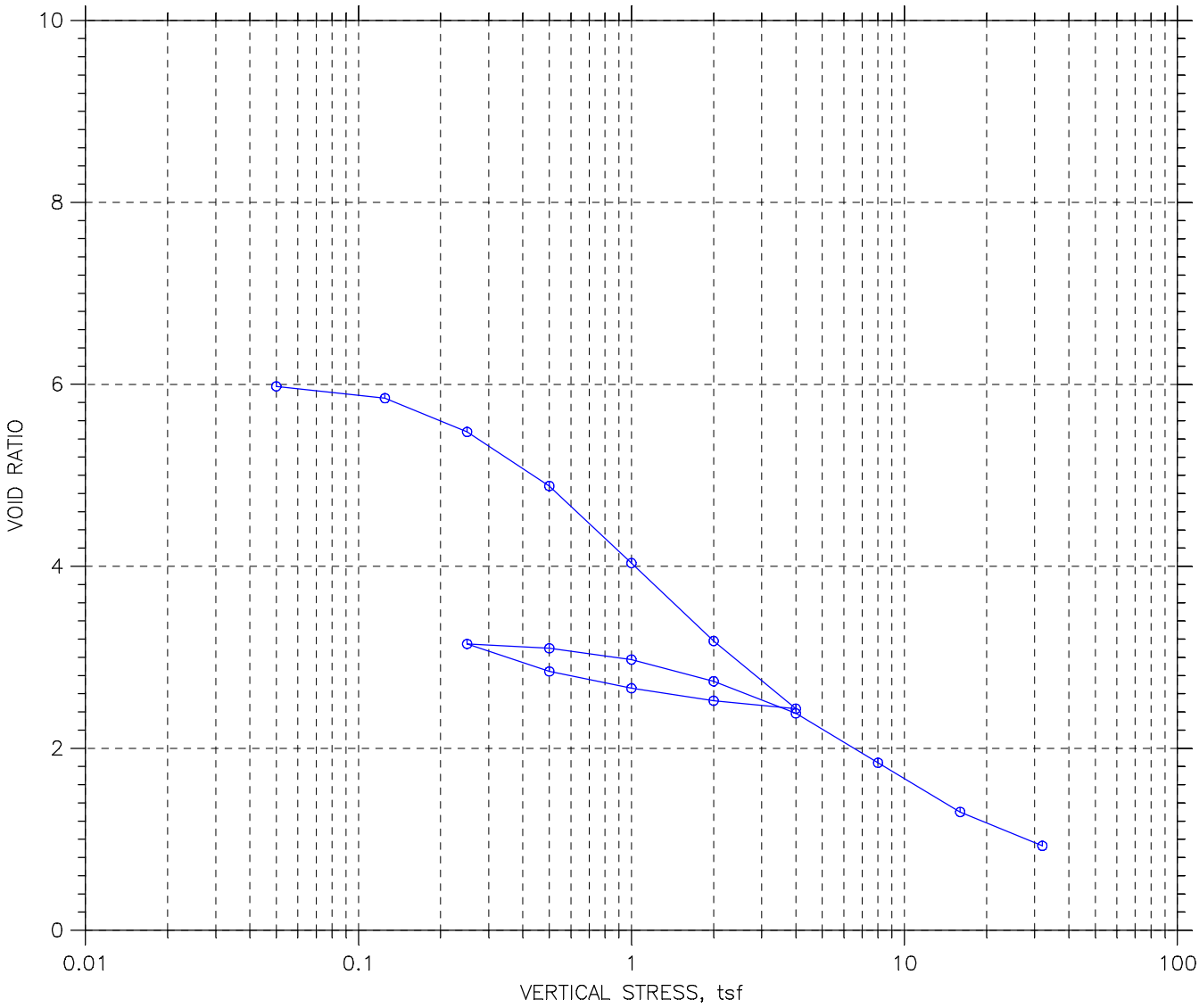


Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

Fri, 04-JAN-2013 11:29:10

CONSOLIDATION TEST DATA

SUMMARY REPORT



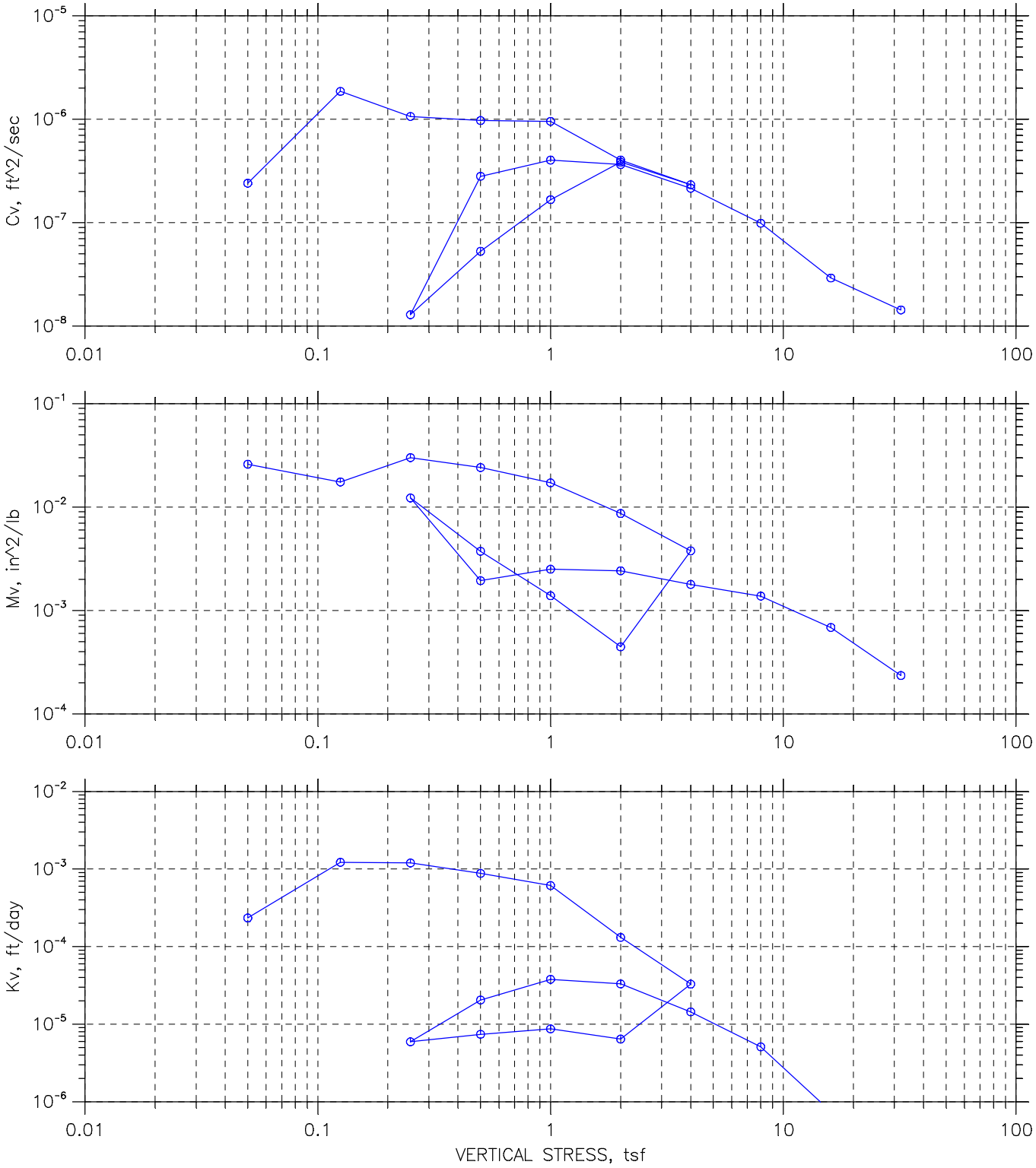
					Before Test	After Test
Overburden Pressure, tsf:				Water Content, %	374.30	84.36
Preconsolidation Pressure, tsf:				Dry Unit Weight, pcf	14.058	48.524
Compression Index:				Saturation, %	98.09	127.52
Diameter: 2.499 in		Height: 0.989 in		Void Ratio	6.11	1.06
LL: ---	PL: ---	PI: ---	GS: 1.60	Back Pressure, tsf	0	0

Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

Fri, 04-JAN-2013 11:28:00

CONSOLIDATION TEST DATA

ROOT of TIME COEFFICIENTS

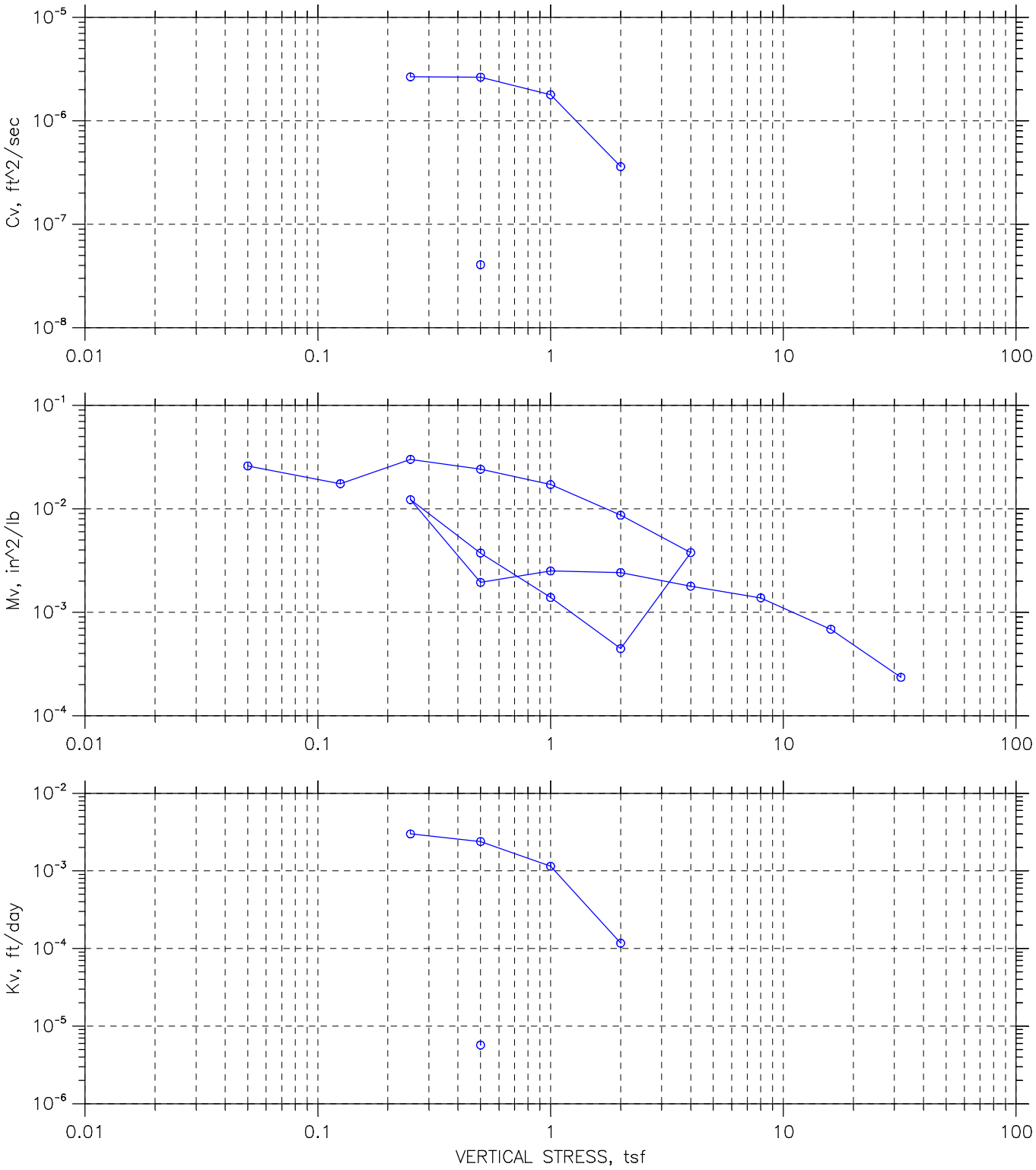


Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

Fri, 04-JAN-2013 11:28:00

CONSOLIDATION TEST DATA

LOG of TIME COEFFICIENTS



Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

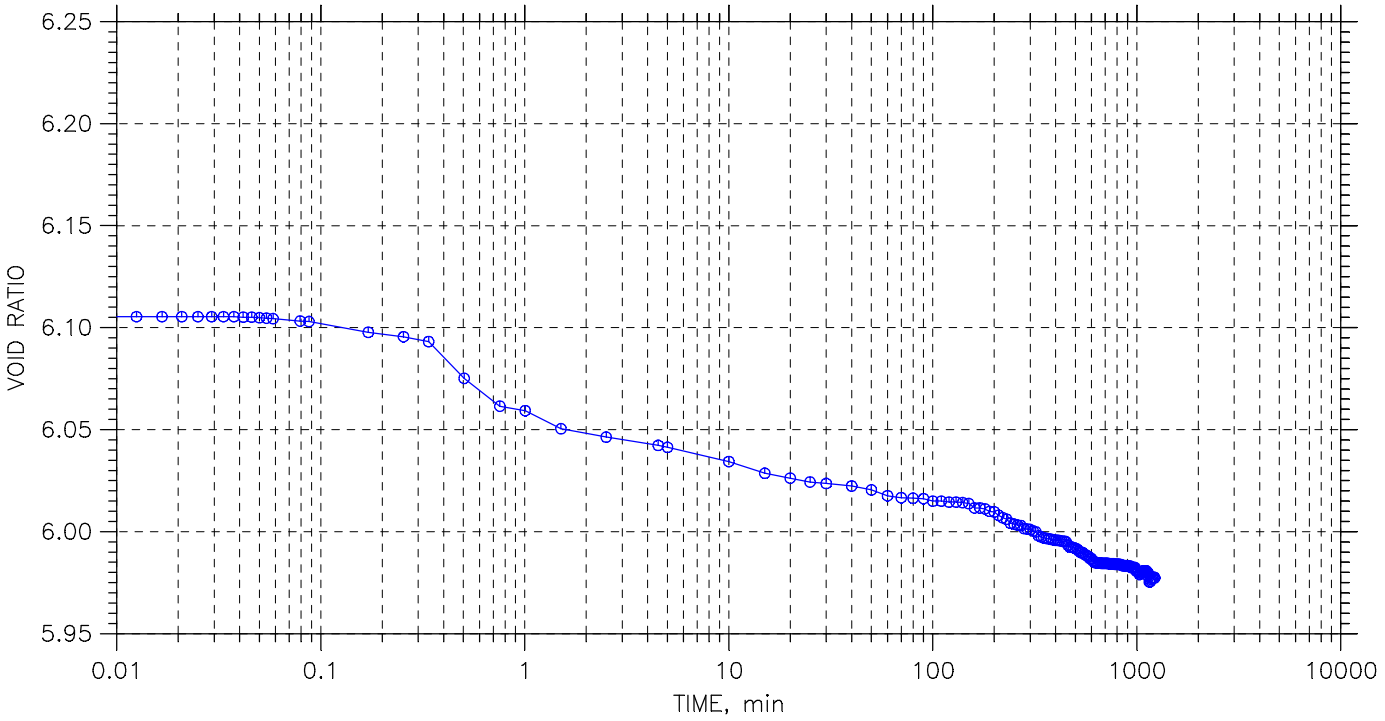
Fri, 04-JAN-2013 11:28:00

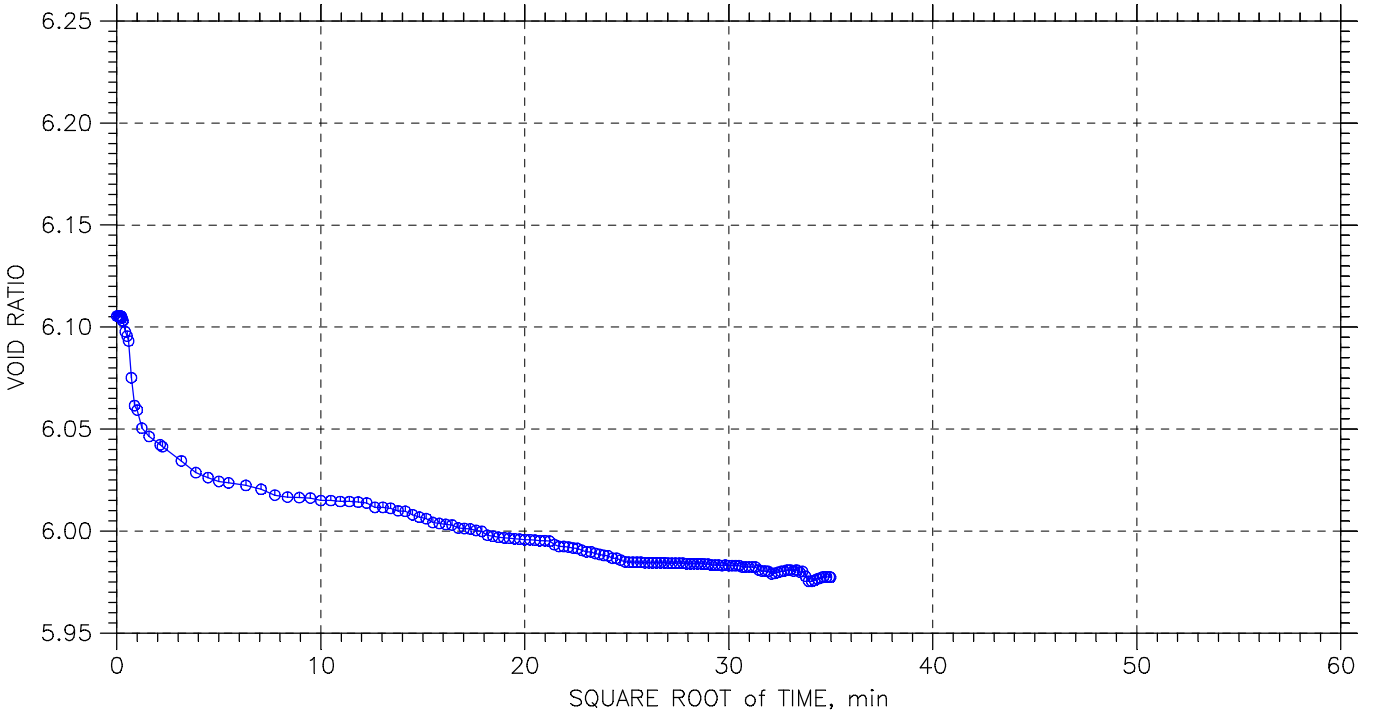
CONSOLIDATION TEST DATA

TIME CURVES

Step: 1 of 18

Stress: 5.e-002 tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

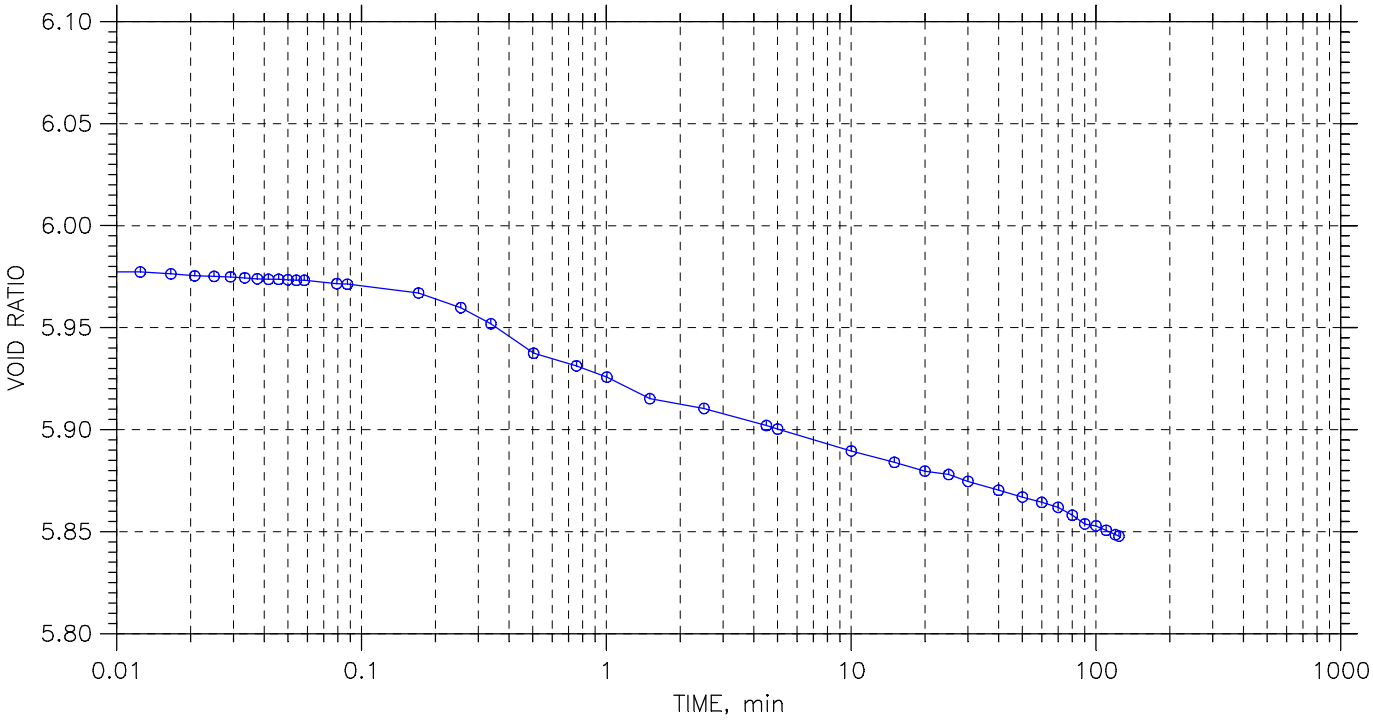
Fri, 04-JAN-2013 11:28:00

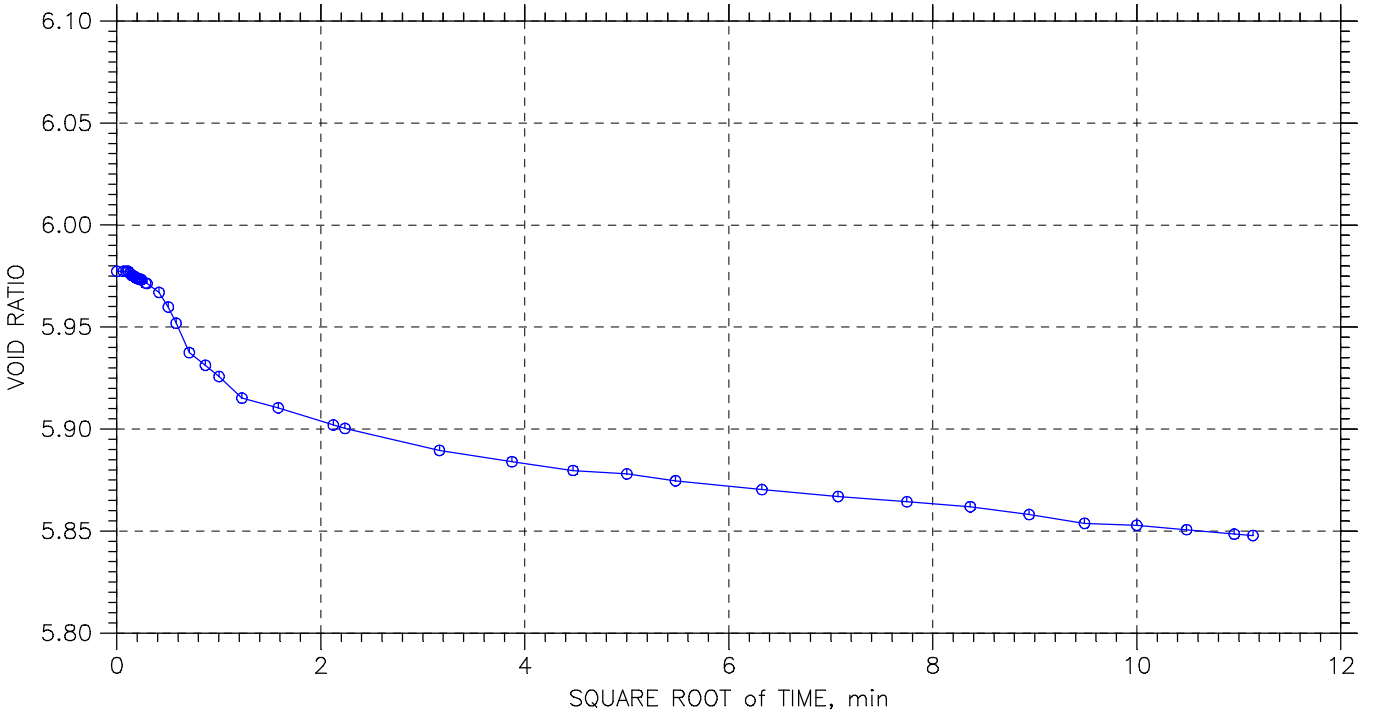
CONSOLIDATION TEST DATA

TIME CURVES

Step: 2 of 18

Stress: 0.125 tsf





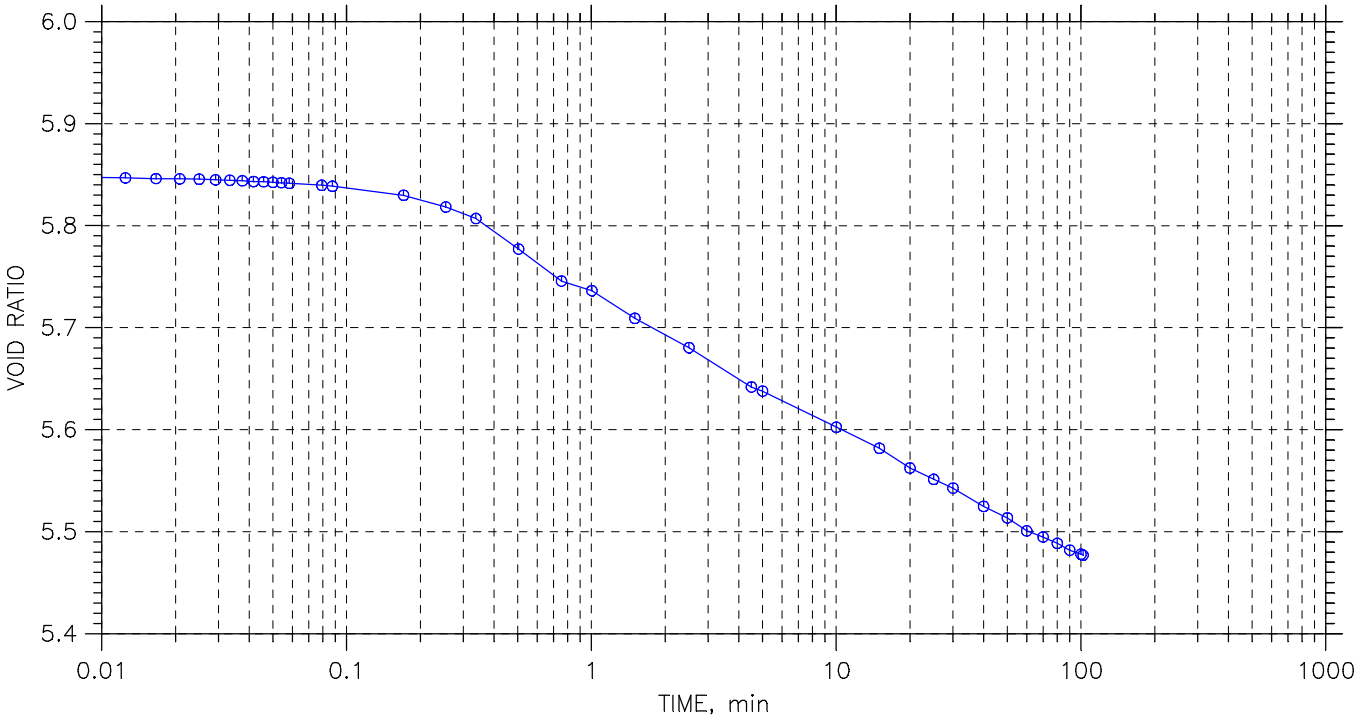
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

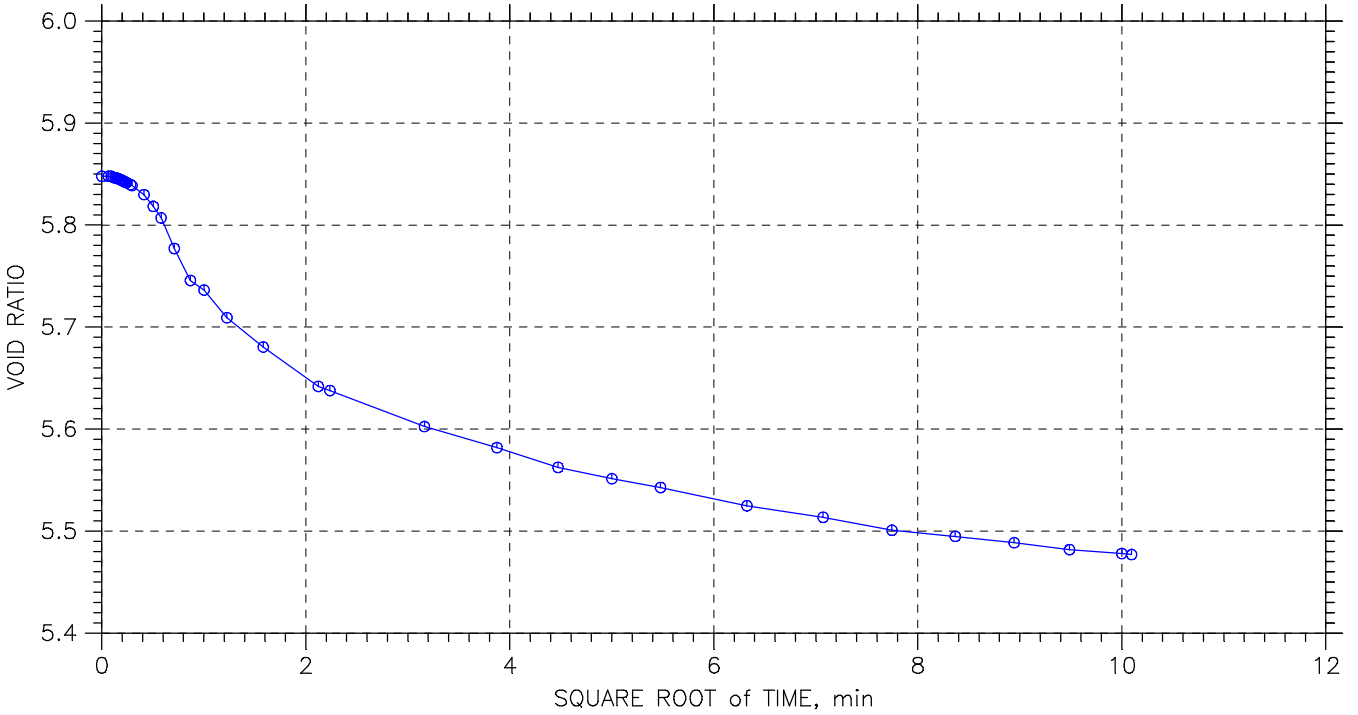
CONSOLIDATION TEST DATA

TIME CURVES

Step: 3 of 18

Stress: 0.25 tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

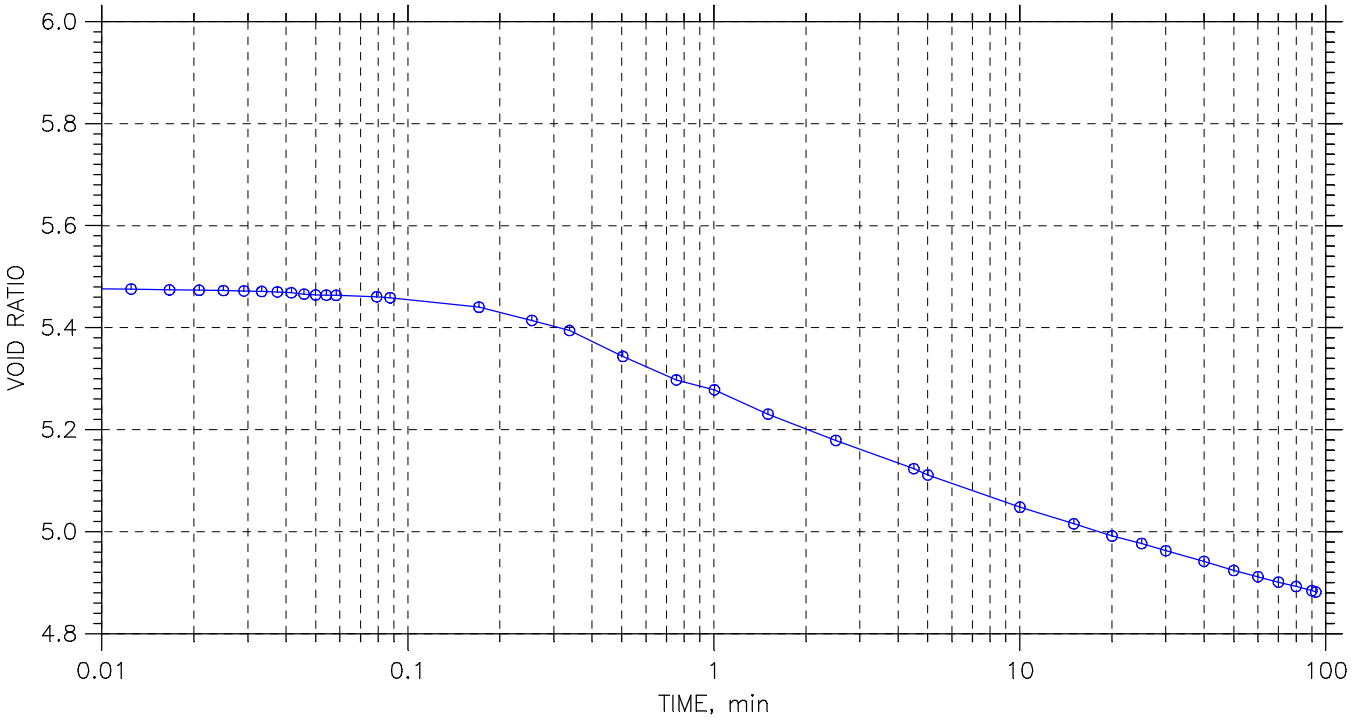
Fri, 04-JAN-2013 11:28:00

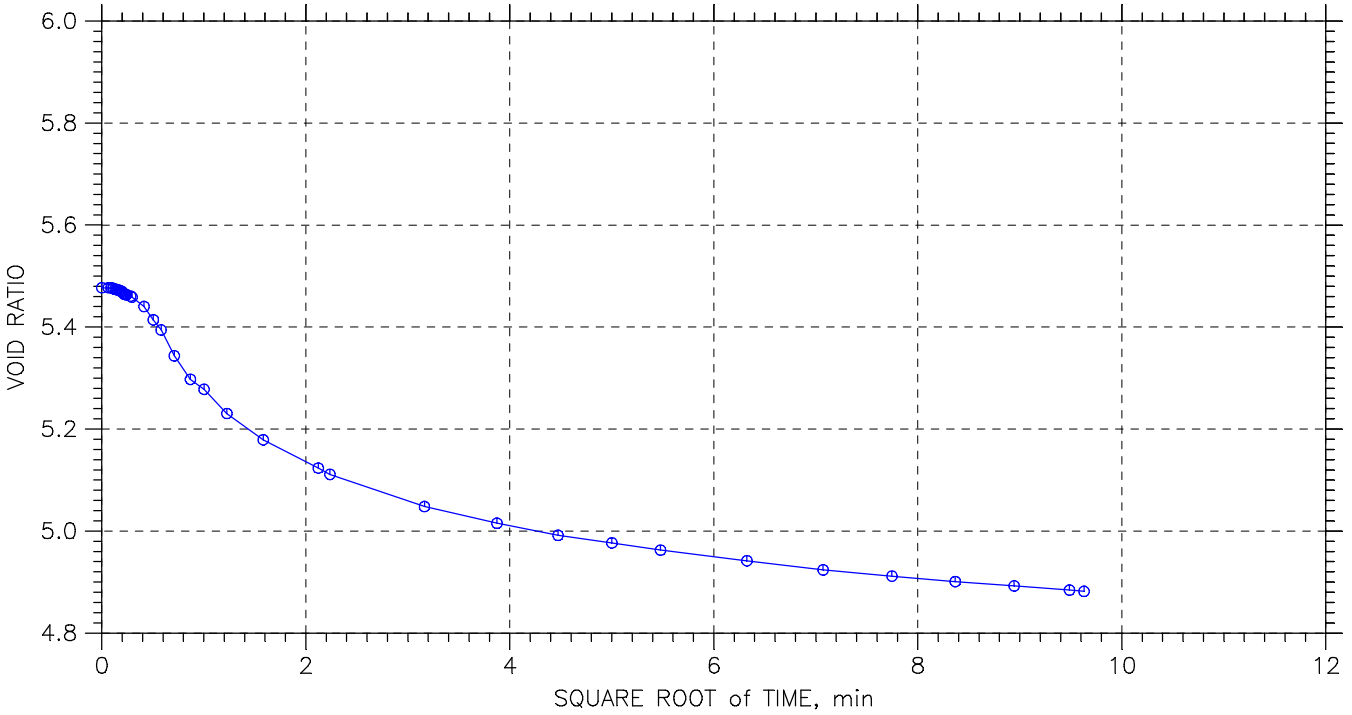
CONSOLIDATION TEST DATA

TIME CURVES

Step: 4 of 18

Stress: 0.5 tsf





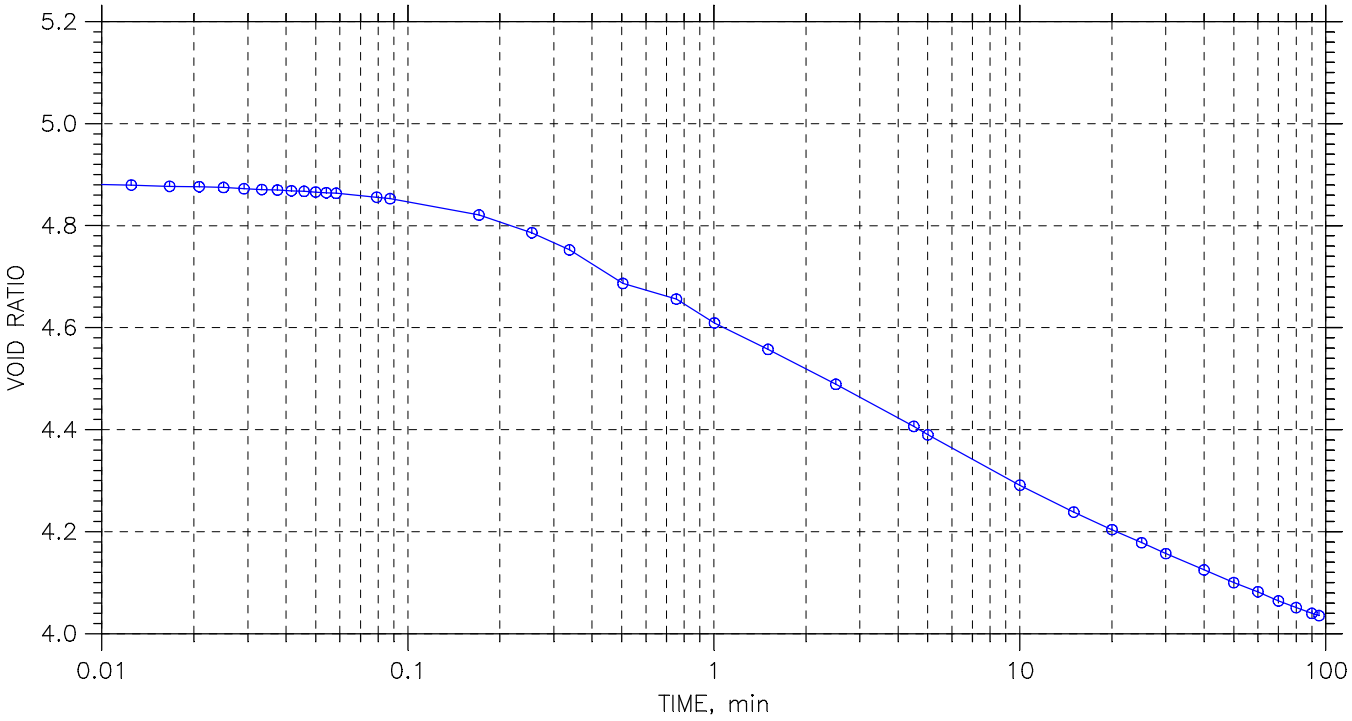
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

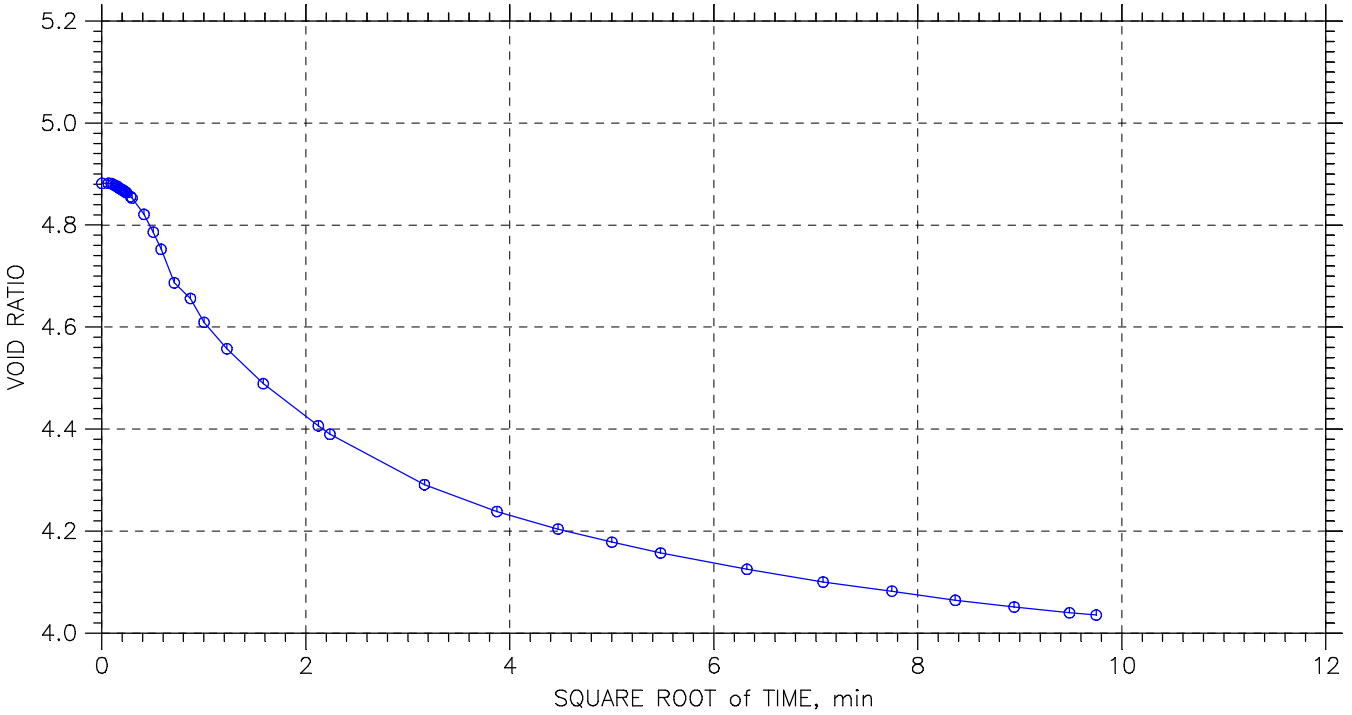
CONSOLIDATION TEST DATA

TIME CURVES

Step: 5 of 18

Stress: 1. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

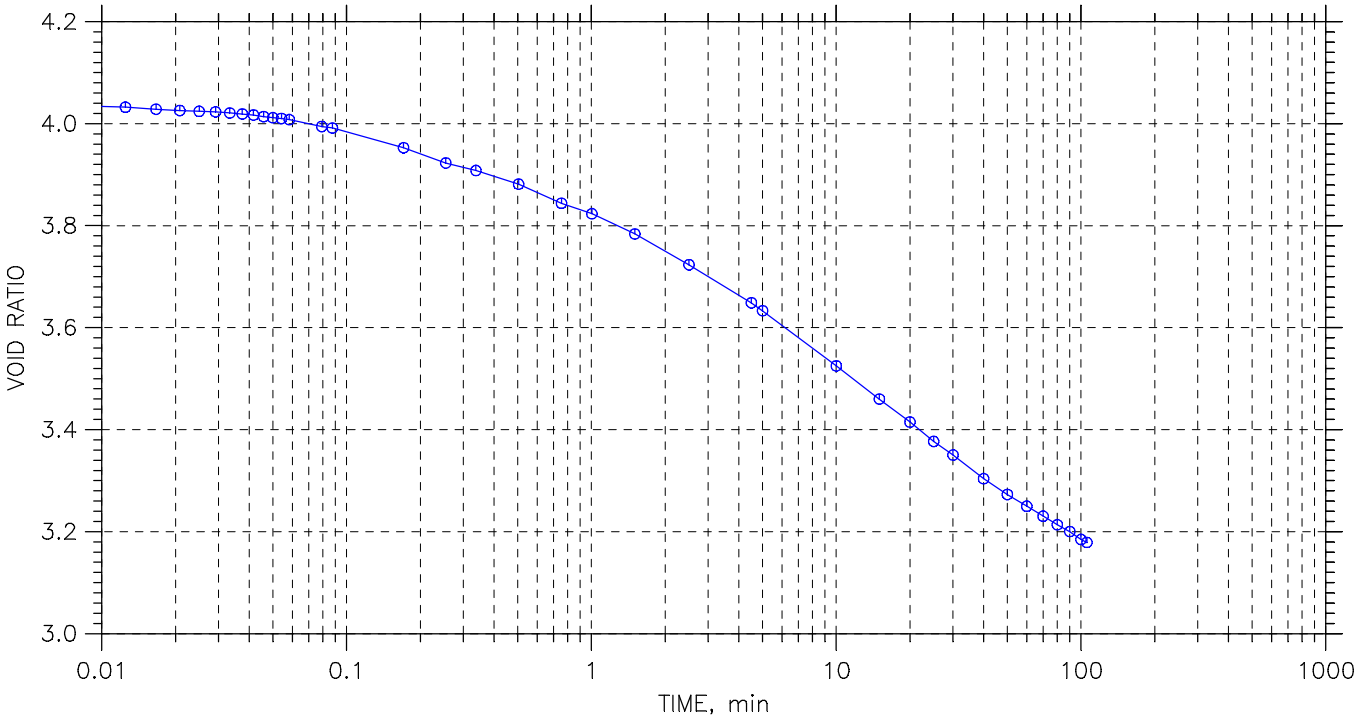
Fri, 04-JAN-2013 11:28:00

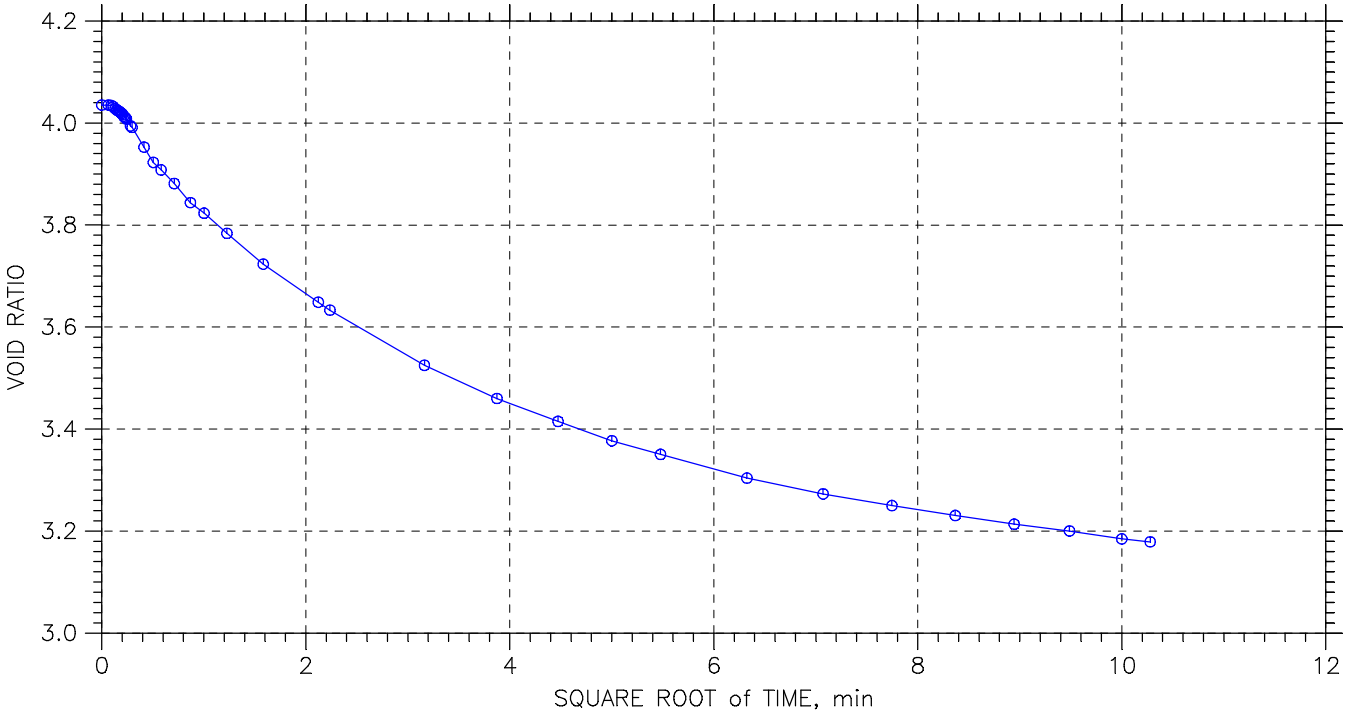
CONSOLIDATION TEST DATA

TIME CURVES

Step: 6 of 18

Stress: 2. tsf





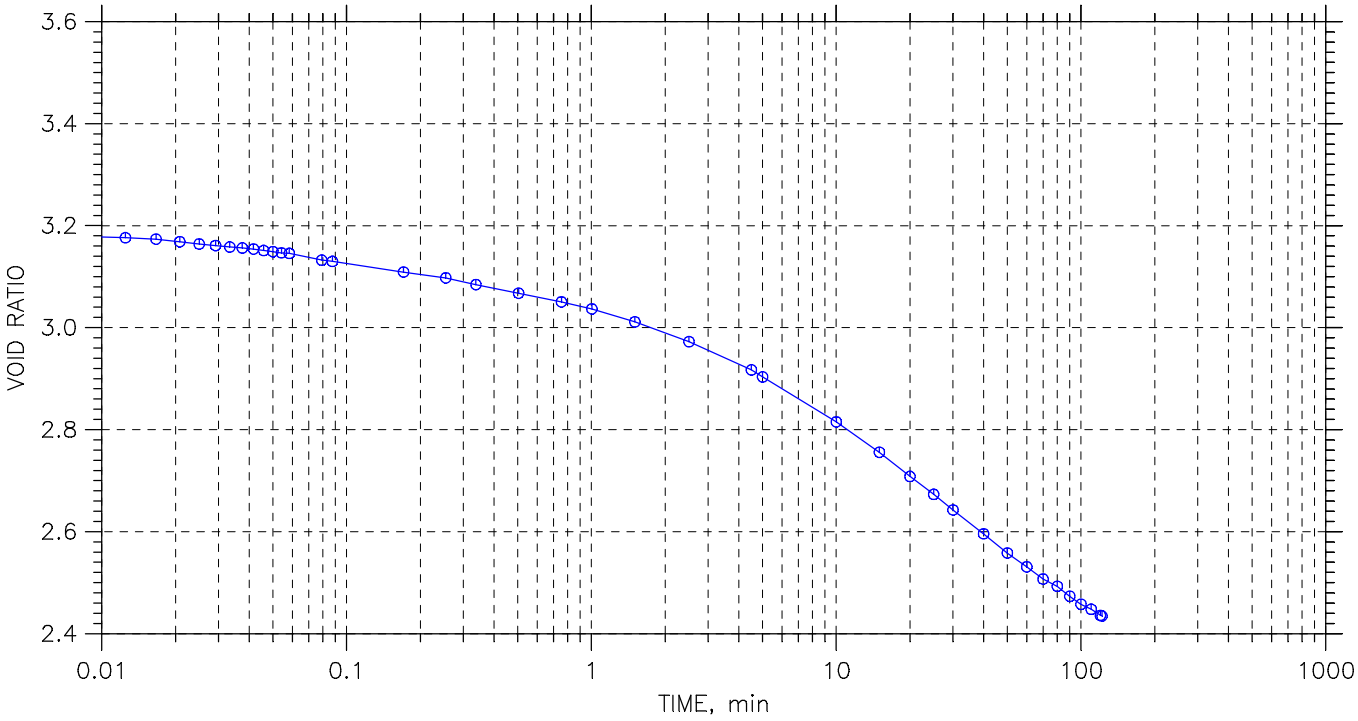
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

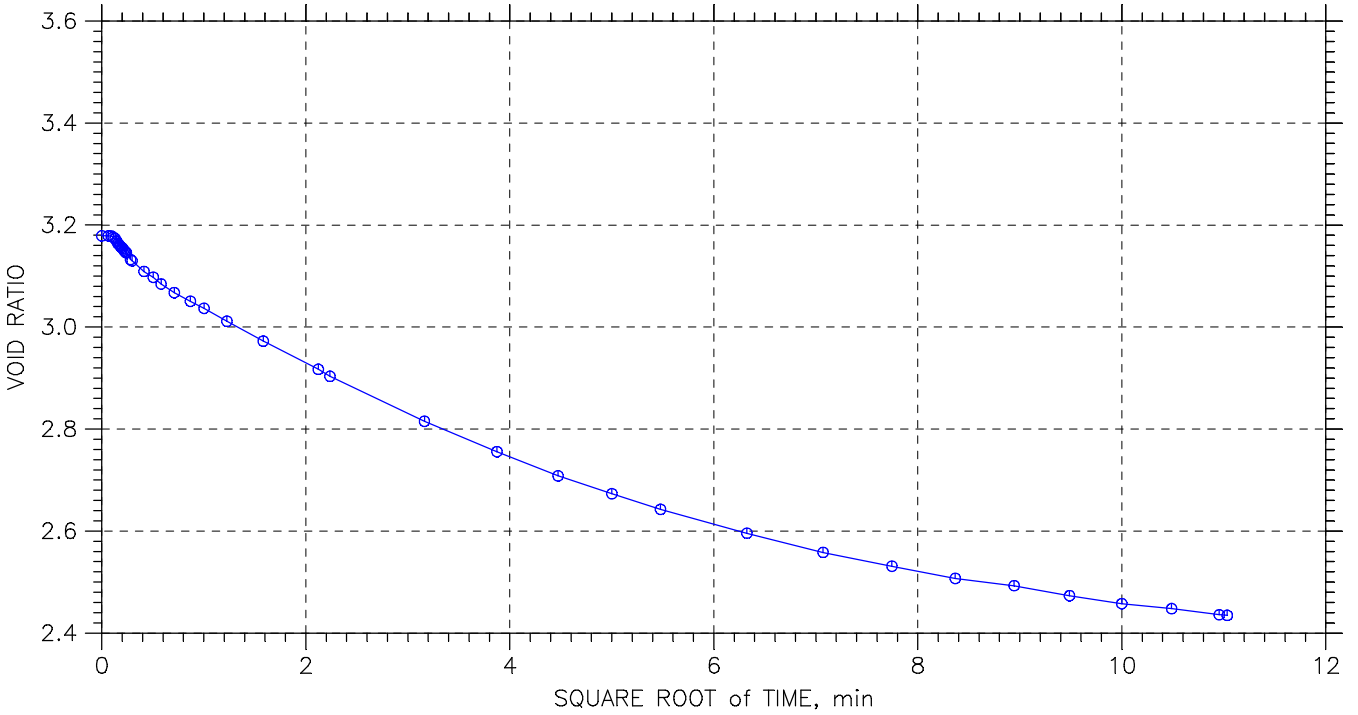
CONSOLIDATION TEST DATA

TIME CURVES

Step: 7 of 18

Stress: 4. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

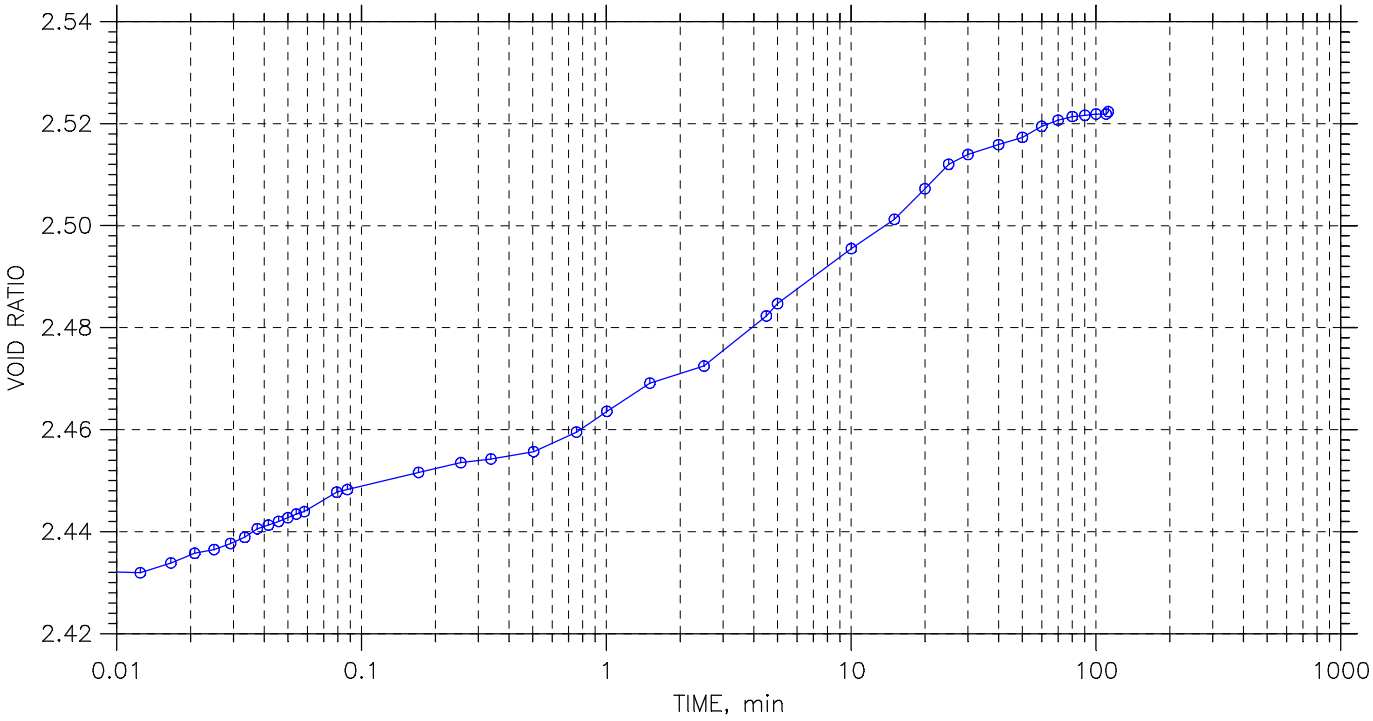
Fri, 04-JAN-2013 11:28:00

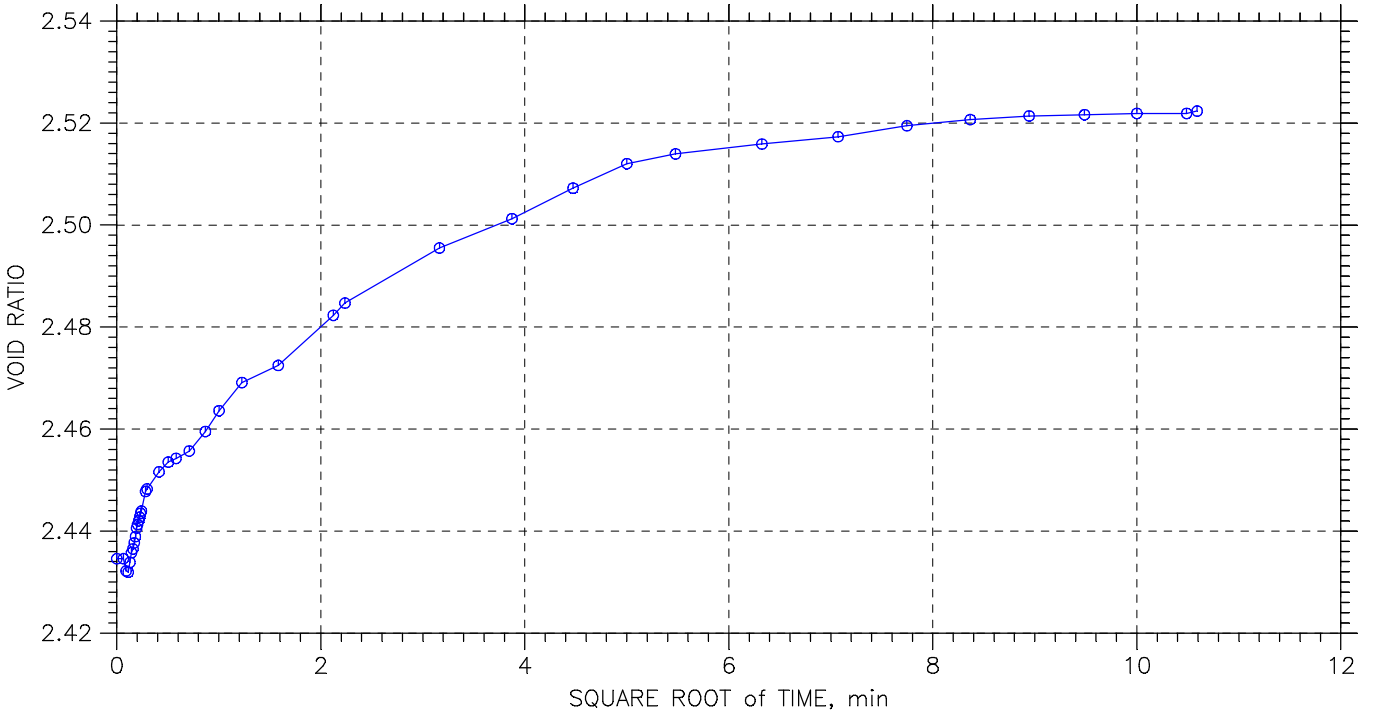
CONSOLIDATION TEST DATA

TIME CURVES

Step: 8 of 18

Stress: 2. tsf





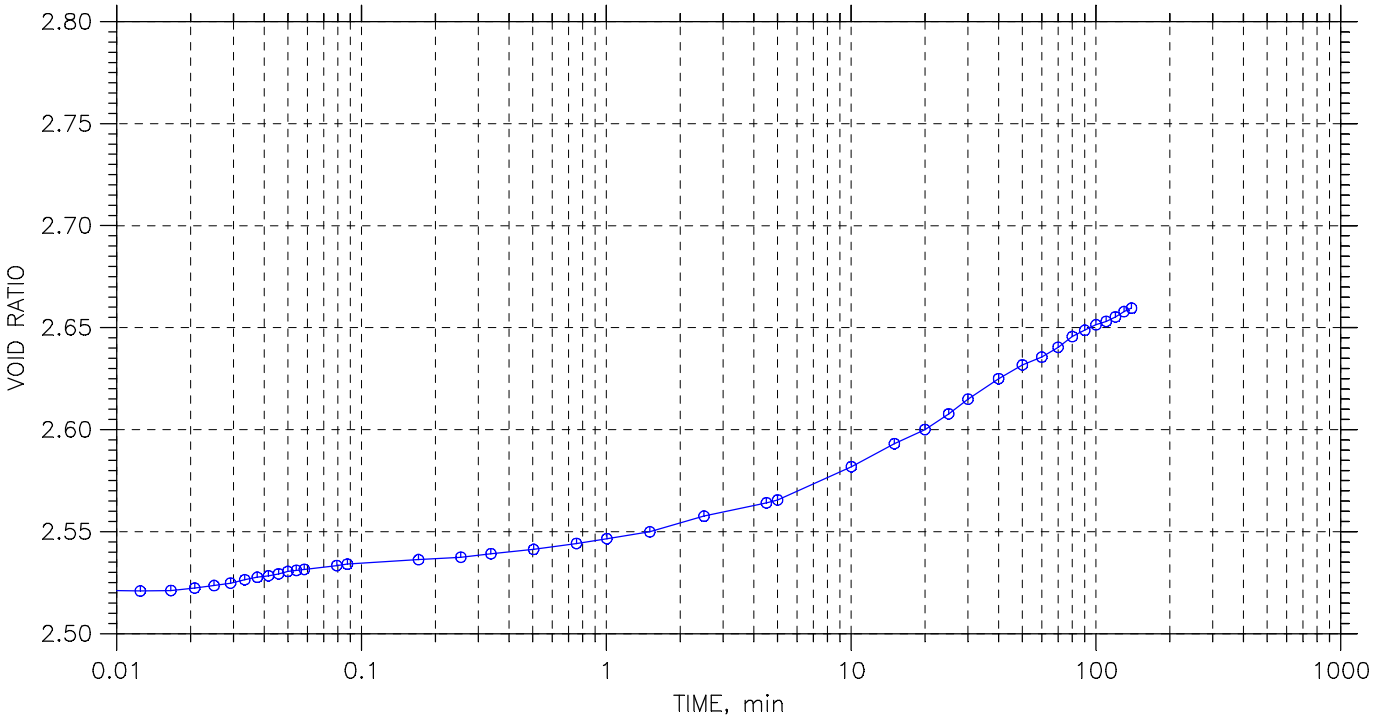
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

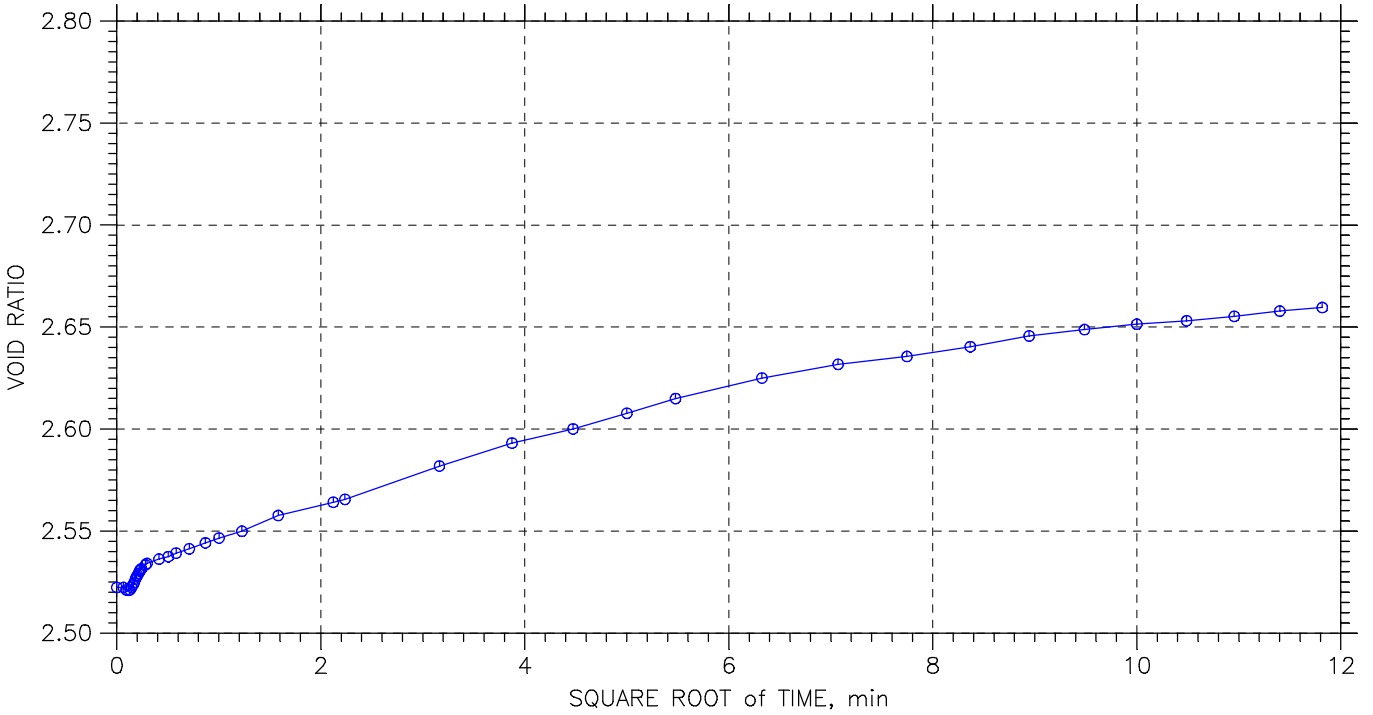
CONSOLIDATION TEST DATA

TIME CURVES

Step: 9 of 18

Stress: 1. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

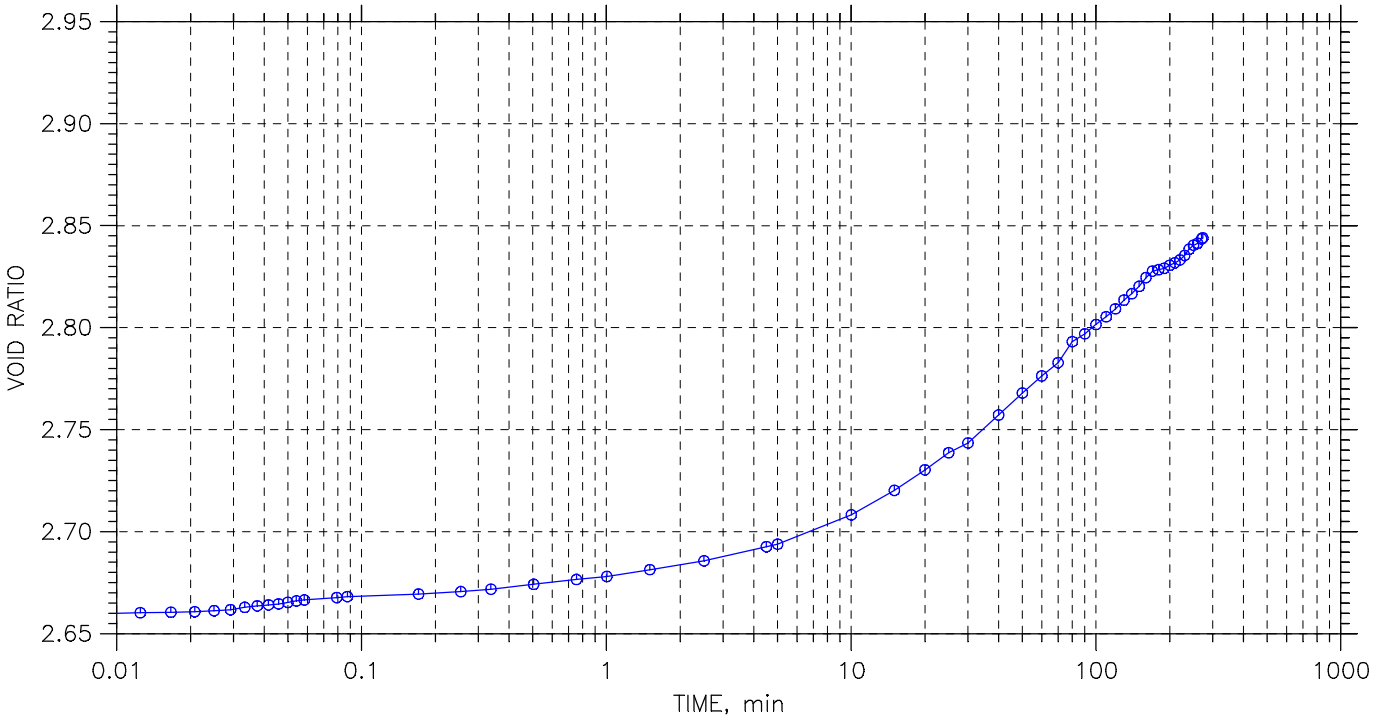
Fri, 04-JAN-2013 11:28:01

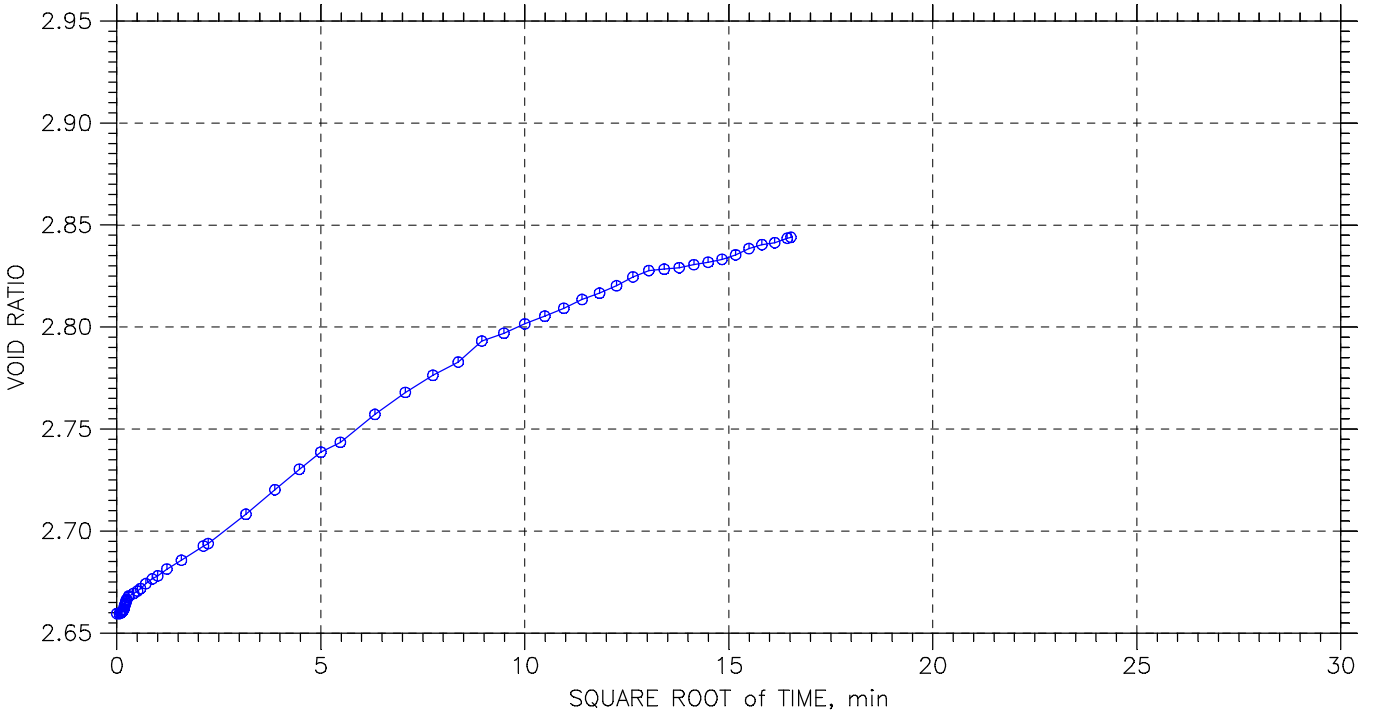
CONSOLIDATION TEST DATA

TIME CURVES

Step: 10 of 18

Stress: 0.5 tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

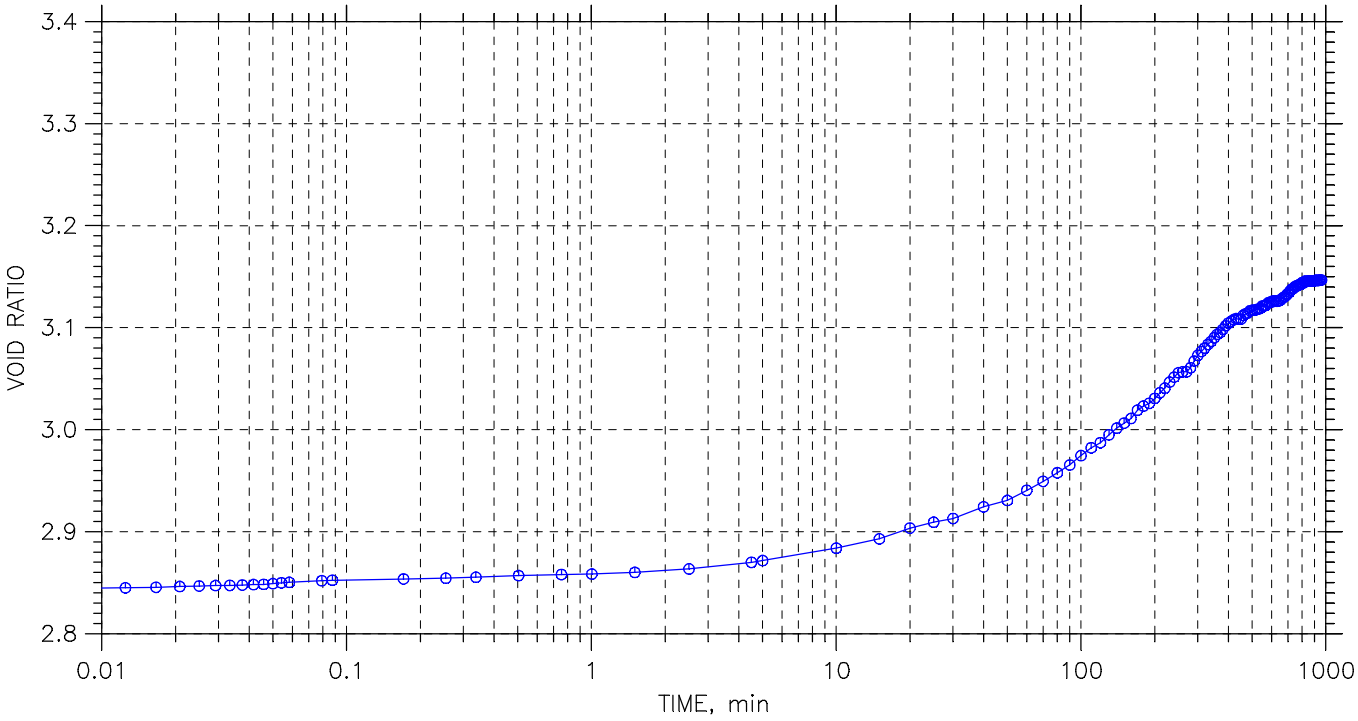
Fri, 04-JAN-2013 11:28:01

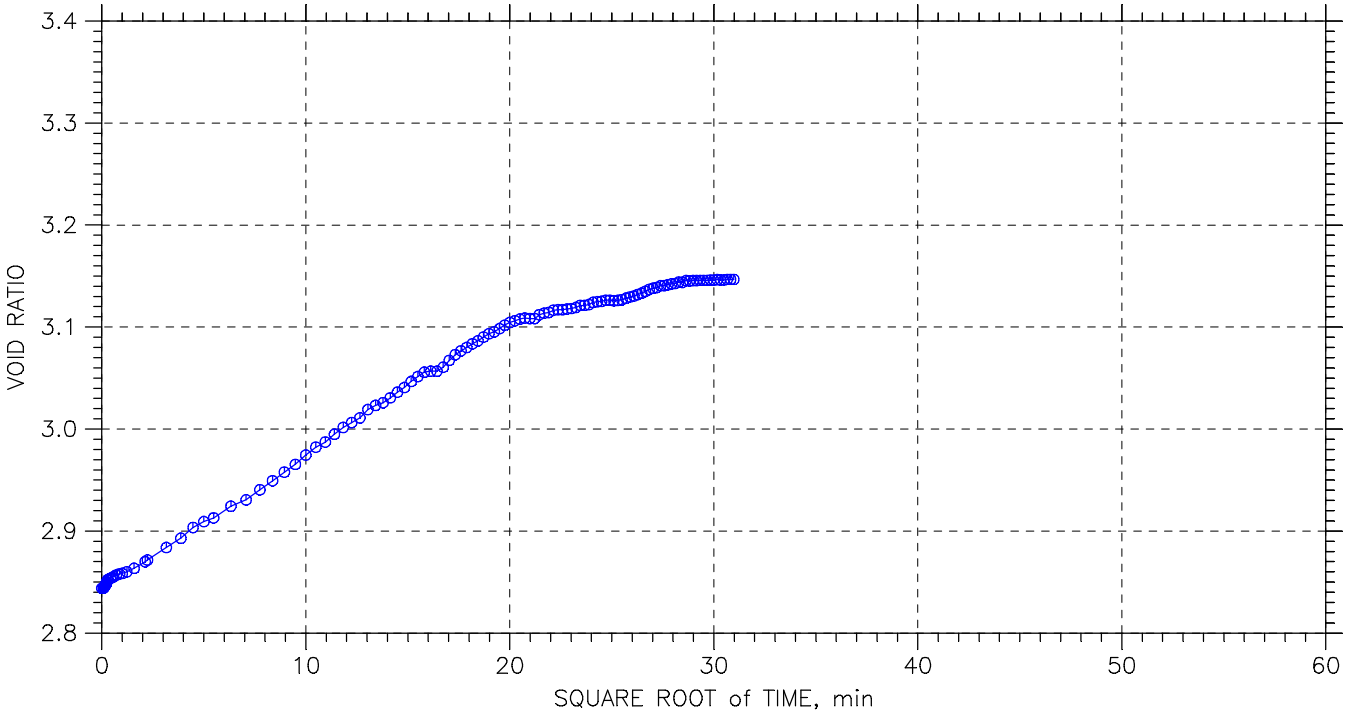
CONSOLIDATION TEST DATA

TIME CURVES

Step: 11 of 18

Stress: 0.25 tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

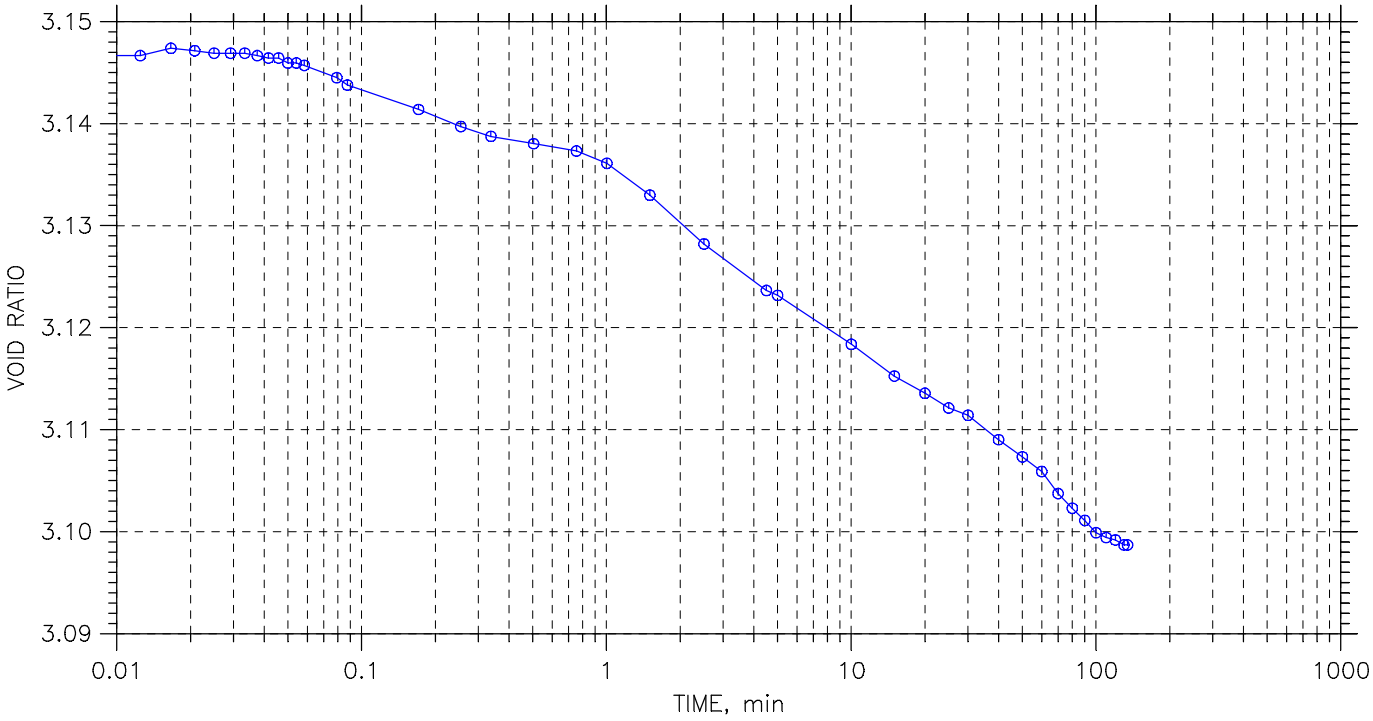
Fri, 04-JAN-2013 11:28:01

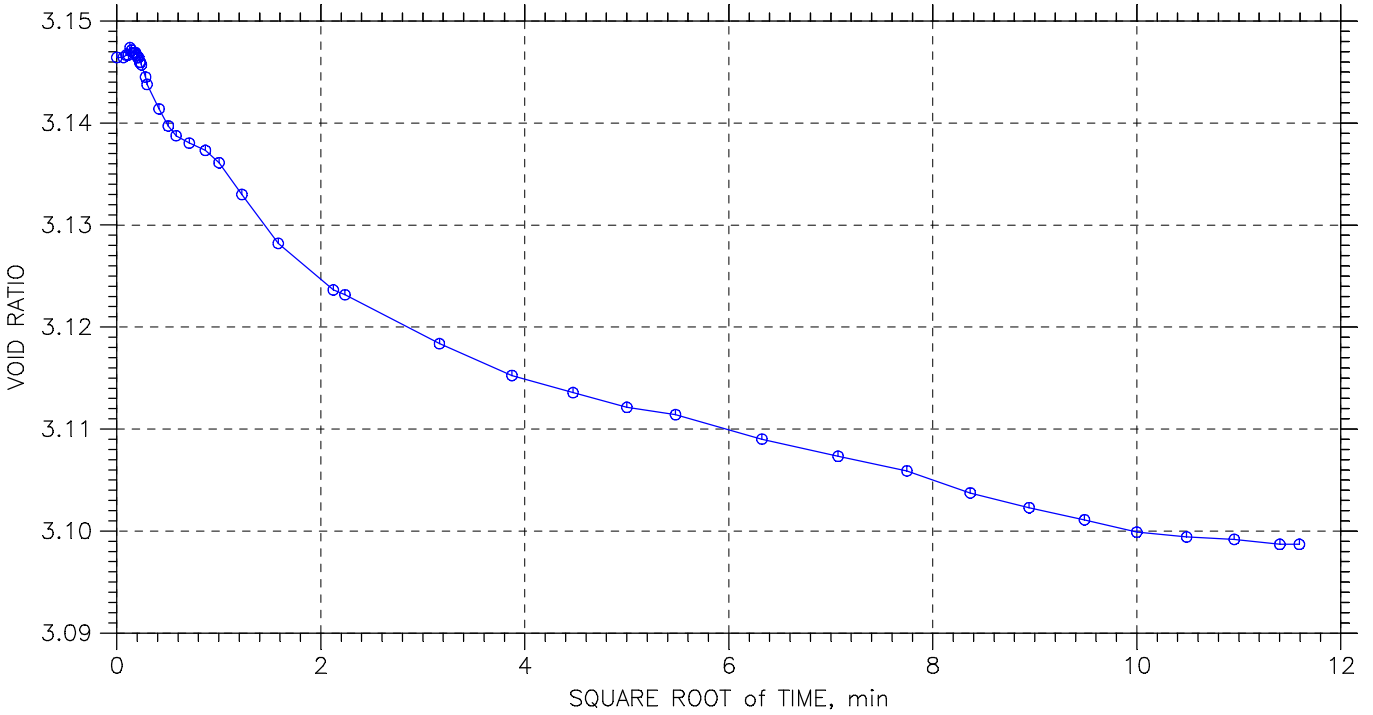
CONSOLIDATION TEST DATA

TIME CURVES

Step: 12 of 18

Stress: 0.5 tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

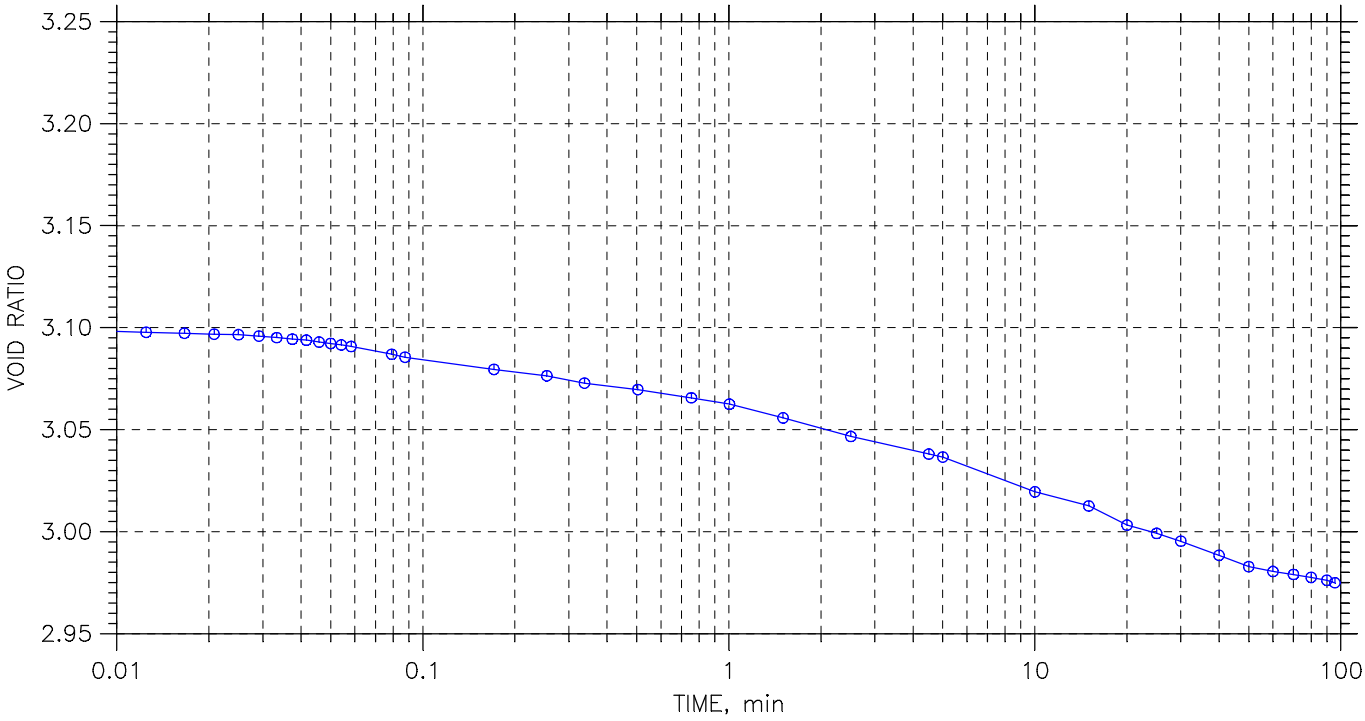
Fri, 04-JAN-2013 11:28:01

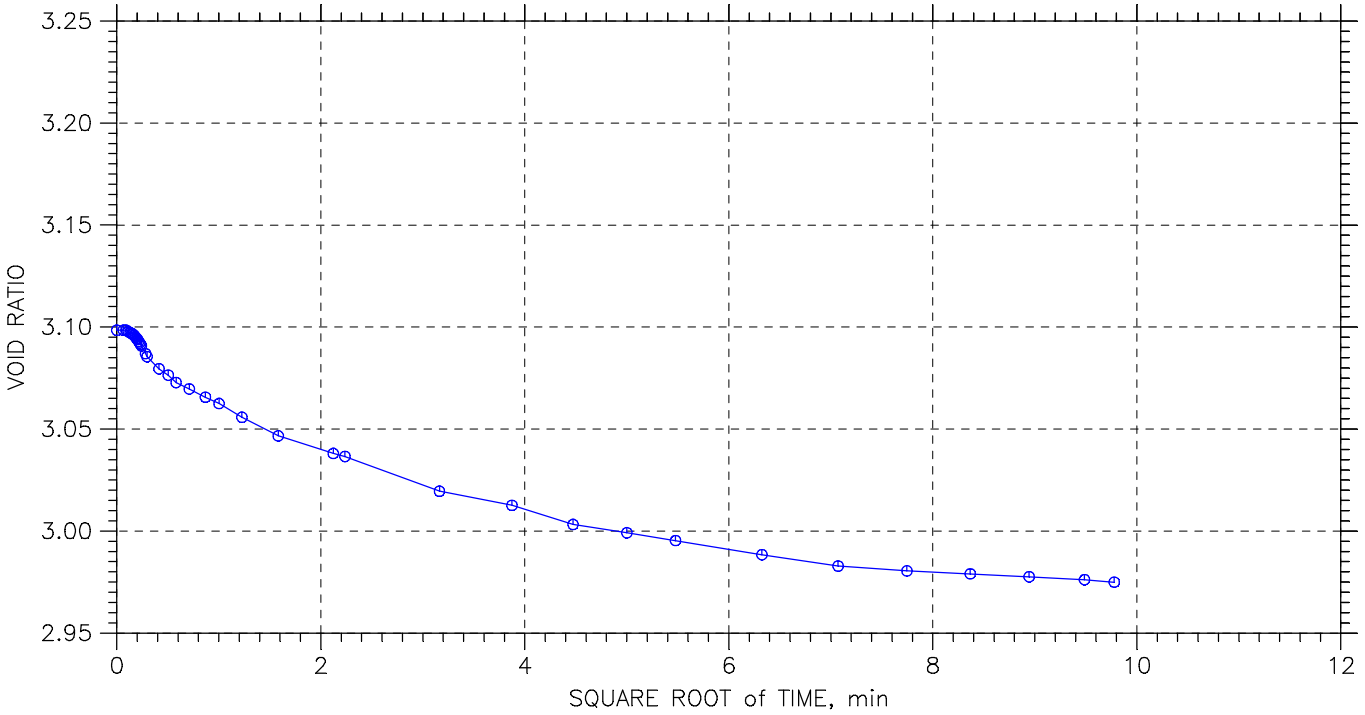
CONSOLIDATION TEST DATA

TIME CURVES

Step: 13 of 18

Stress: 1. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

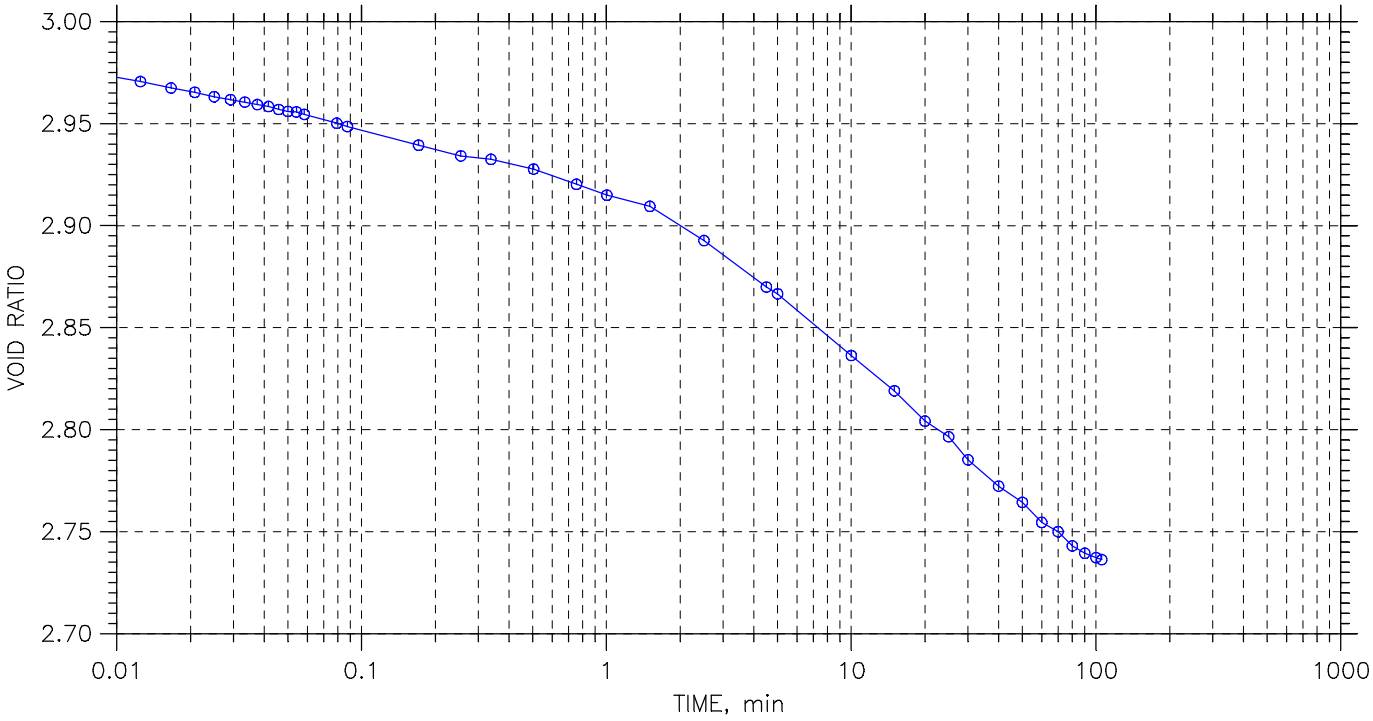
Fri, 04-JAN-2013 11:28:01

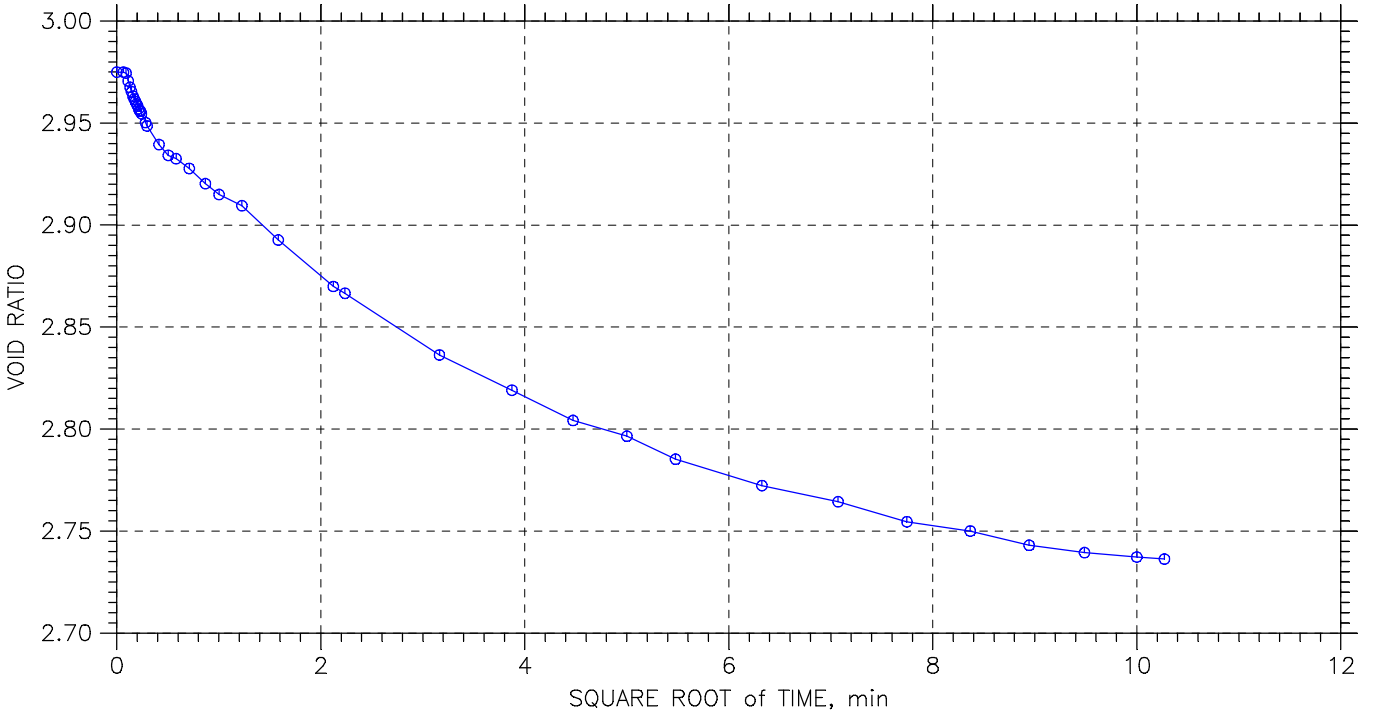
CONSOLIDATION TEST DATA

TIME CURVES

Step: 14 of 18

Stress: 2. tsf





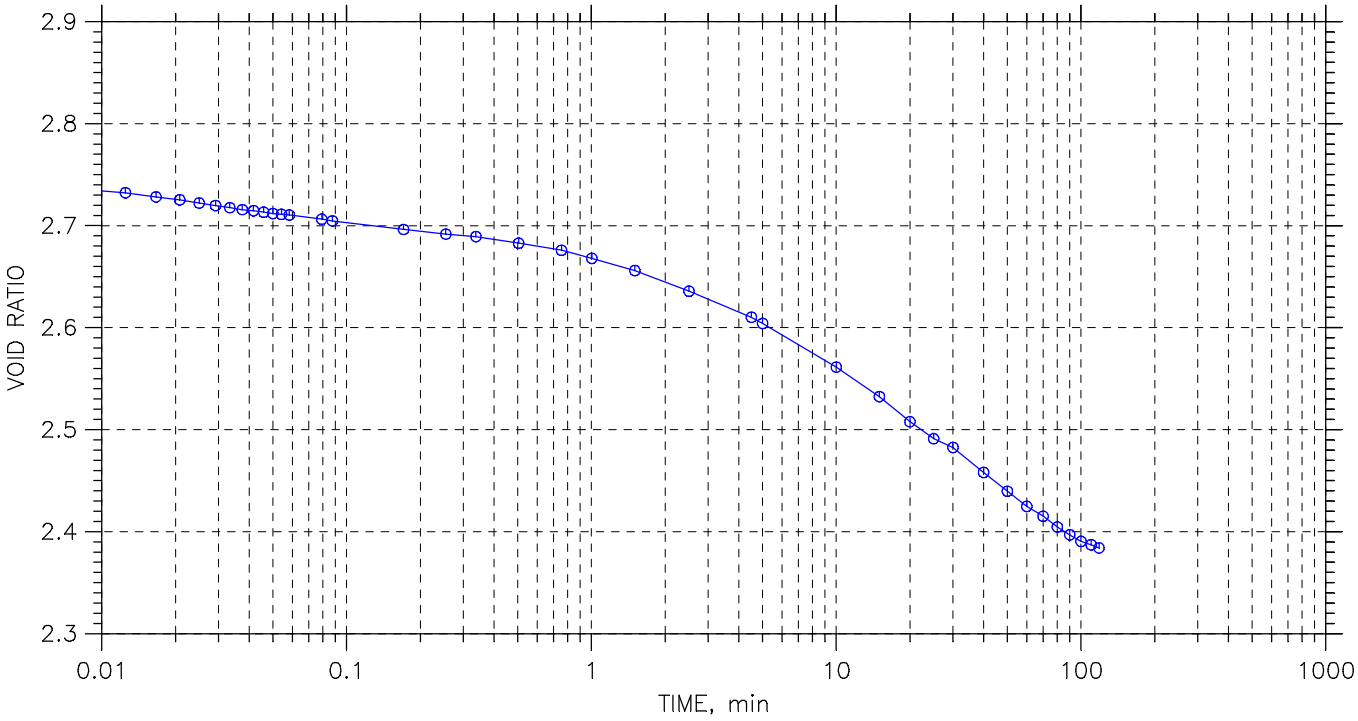
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

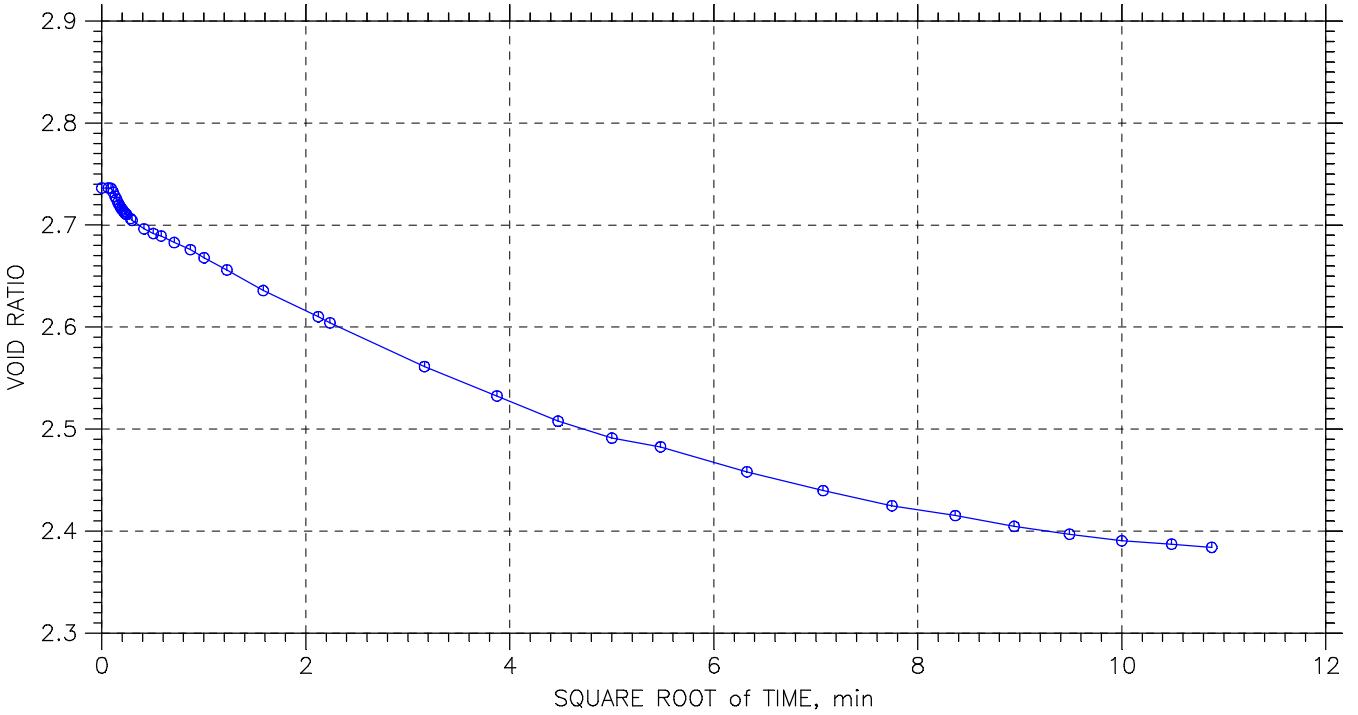
CONSOLIDATION TEST DATA

TIME CURVES

Step: 15 of 18

Stress: 4. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

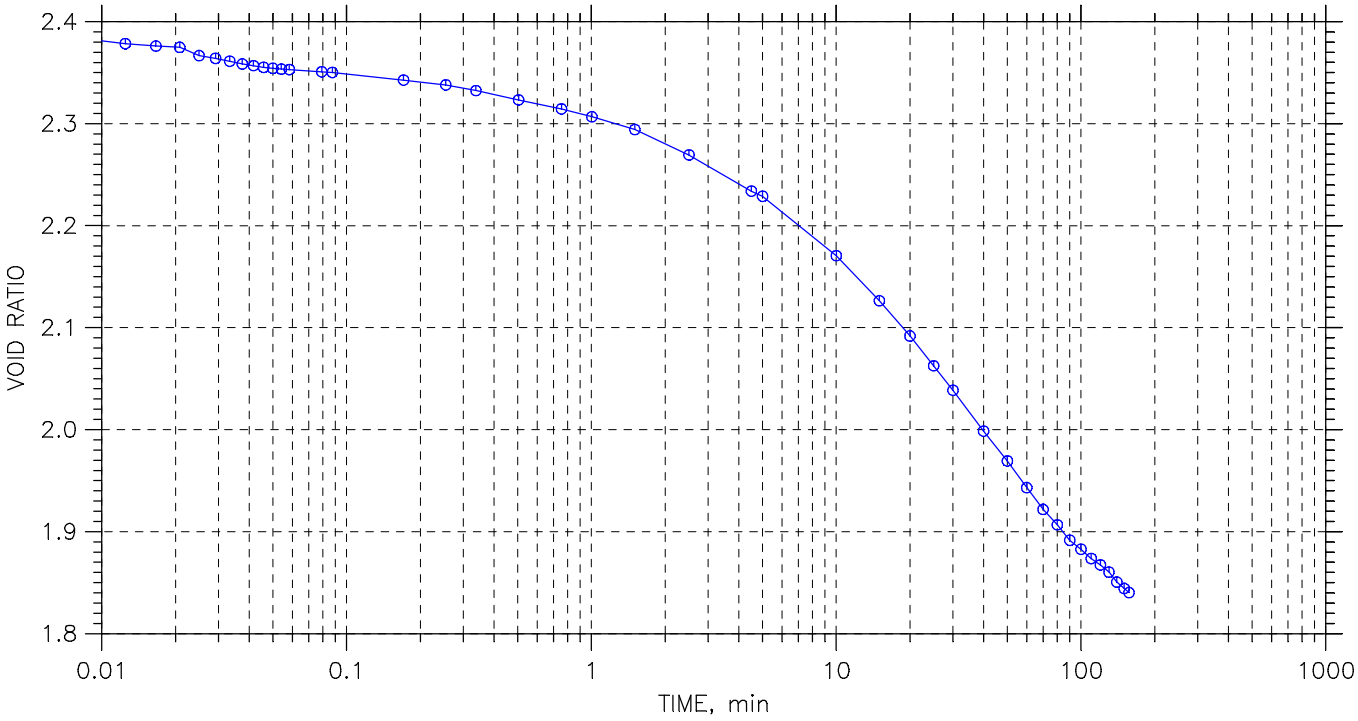
Fri, 04-JAN-2013 11:28:01

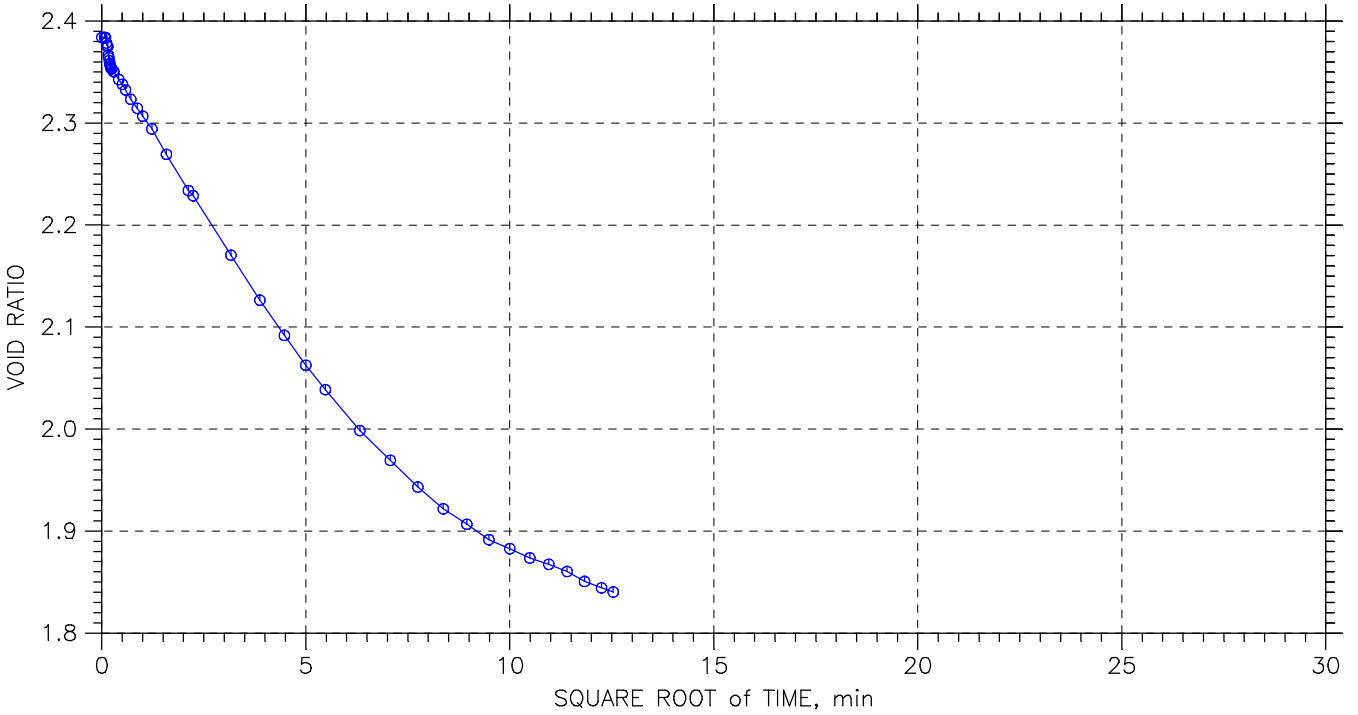
CONSOLIDATION TEST DATA

TIME CURVES

Step: 16 of 18

Stress: 8. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

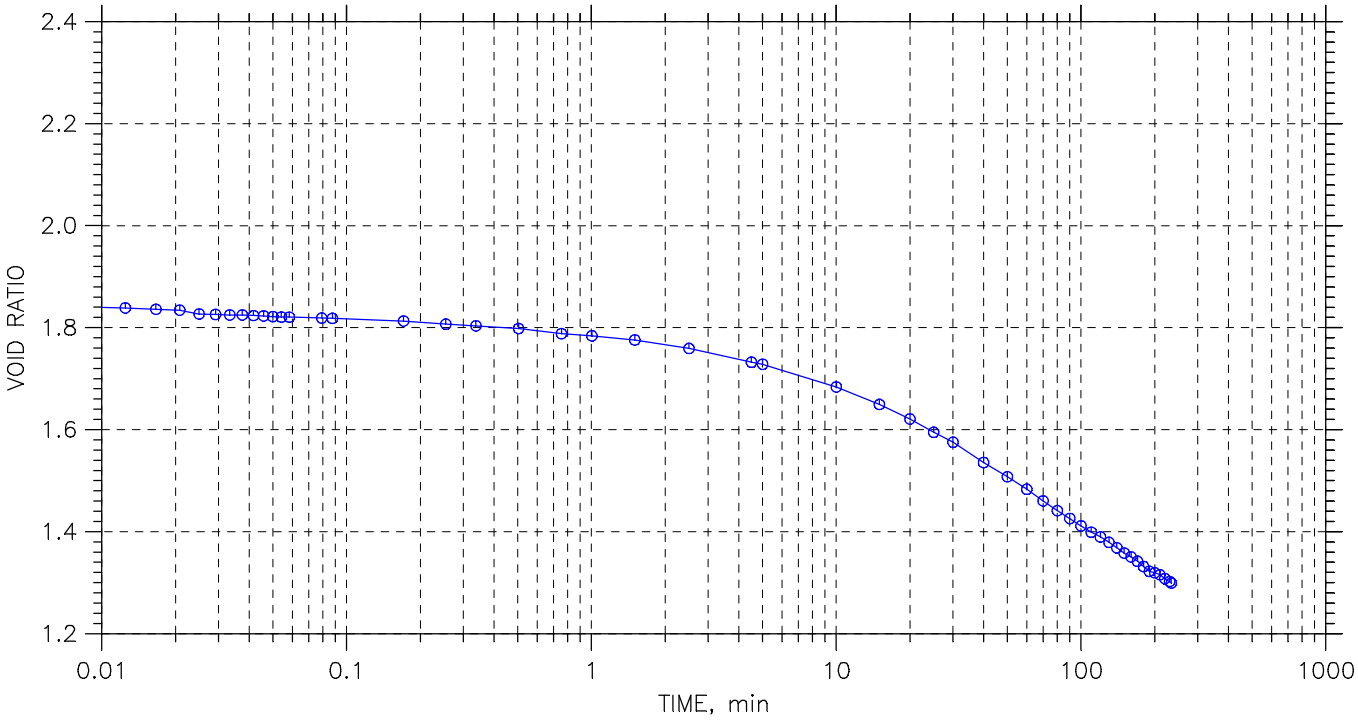
Fri, 04-JAN-2013 11:28:01

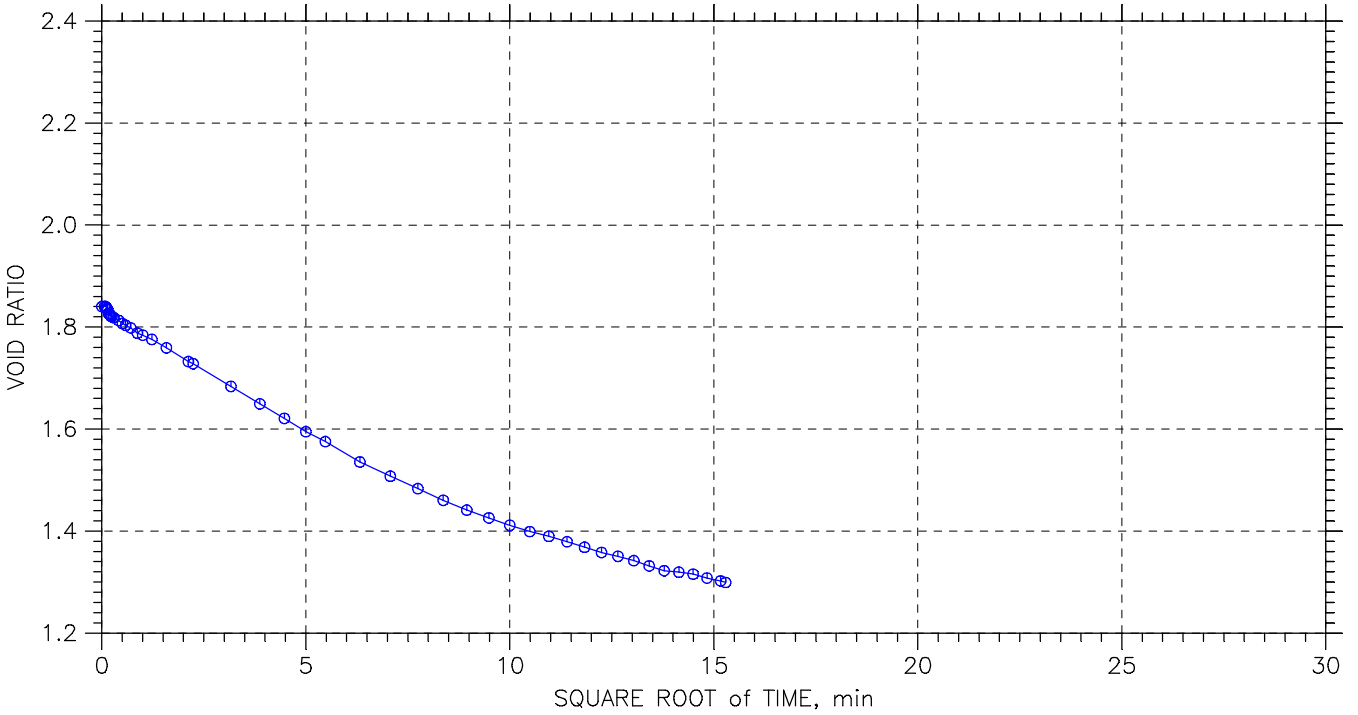
CONSOLIDATION TEST DATA

TIME CURVES

Step: 17 of 18

Stress: 16. tsf





Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

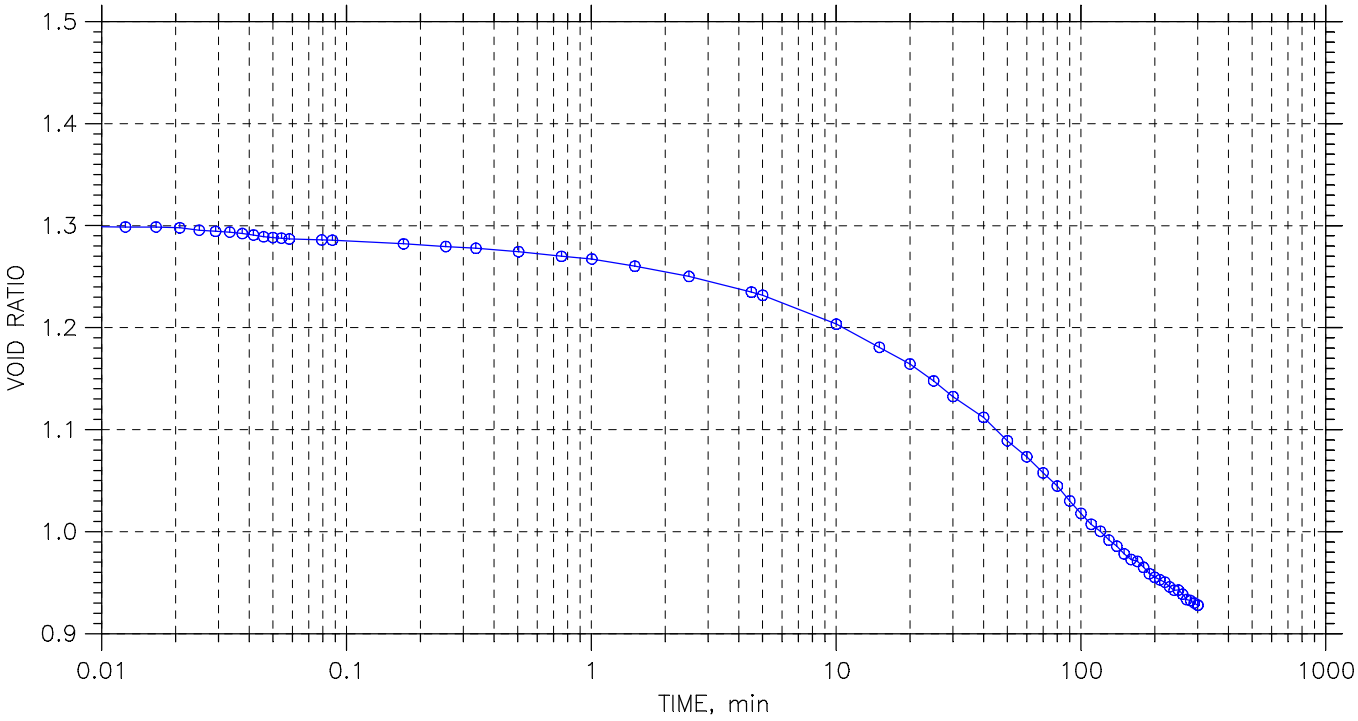
Fri, 04-JAN-2013 11:28:01

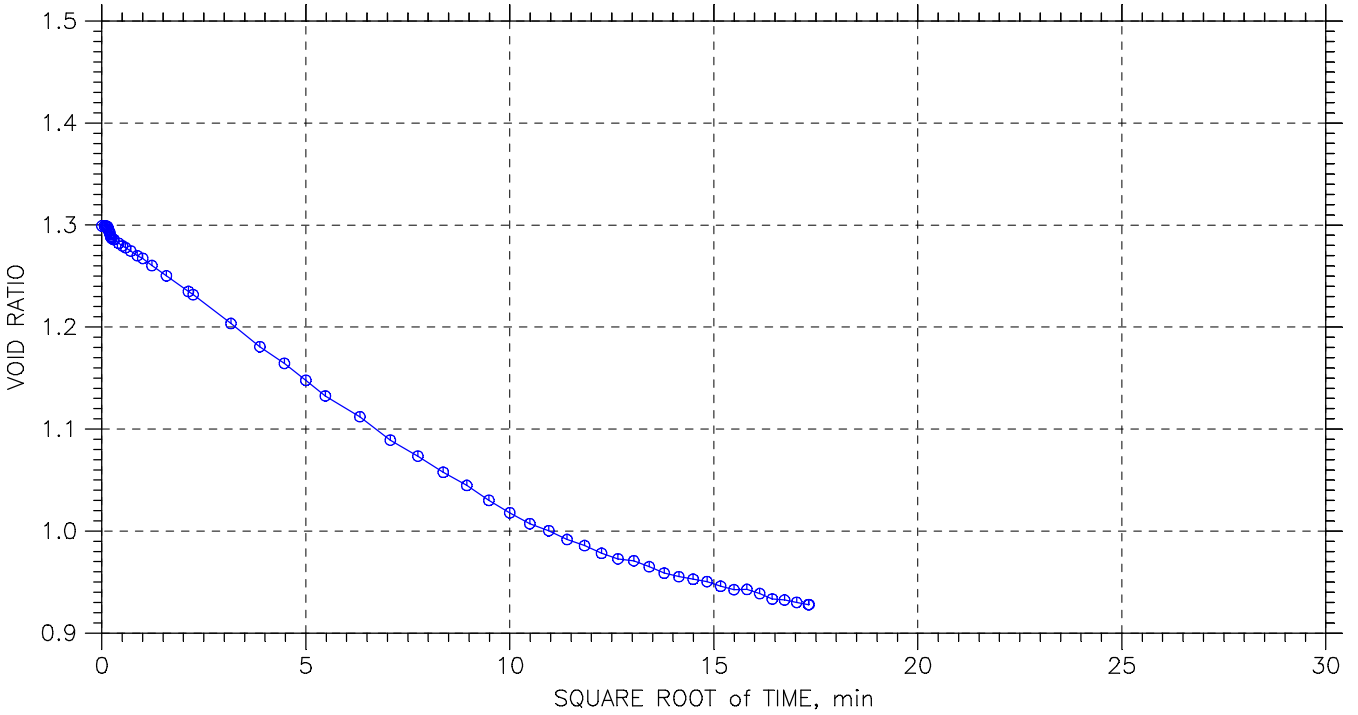
CONSOLIDATION TEST DATA

TIME CURVES

Step: 18 of 18

Stress: 32. tsf





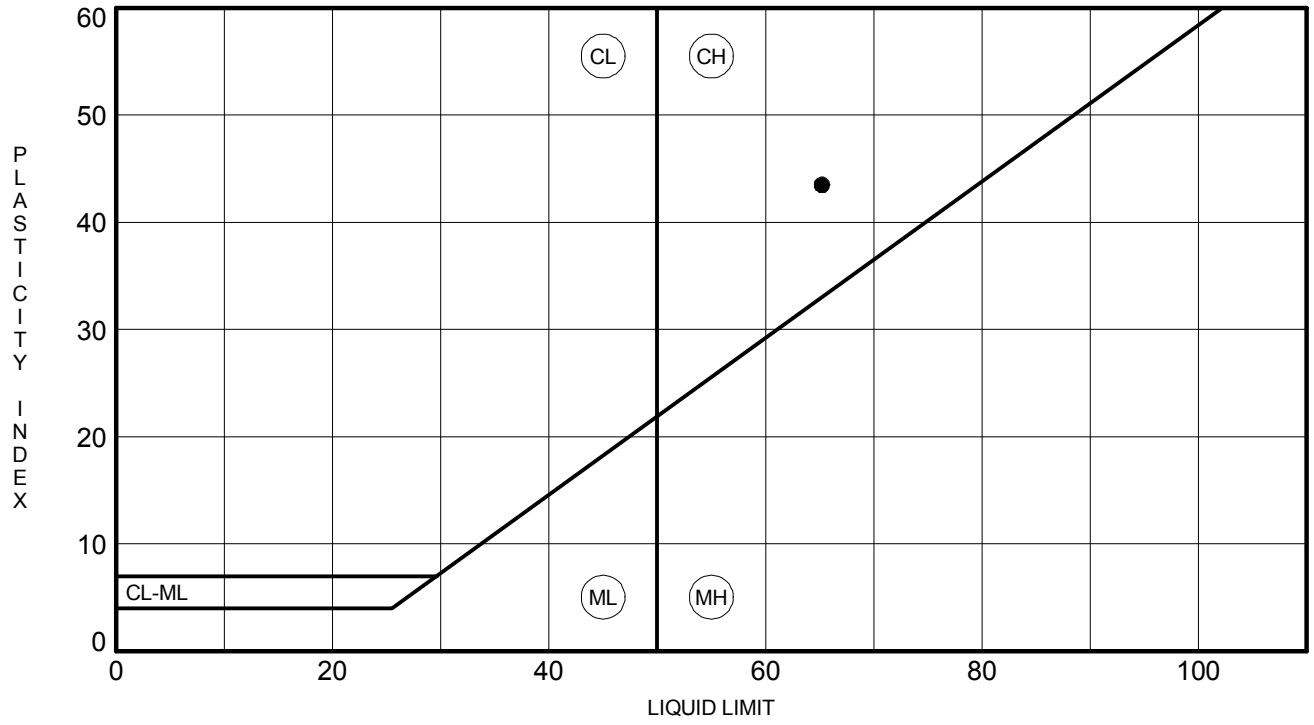
Project: STH-15	Location: Outagamie Co., WI	Project No.: 12015-10
Boring No.: 42C	Tested By: JB	Checked By: RE
Sample No.: 1	Test Date: 12/18/12	Depth: 1'-2.5'
Test No.: 1	Sample Type: Shelby Tube	Elevation:
Description: Peat, black, very moist to wet		
Remarks: Machine calibration completed by Cal-Cert on September 5th, 2012		

Fri, 04-JAN-2013 11:28:01

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-43B**	**ST-4**	**8.0'**	**41%**	**65**	**22**	**43**	**0.44**		**R. Lollar**	**L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-43B	SS-1	1'									0.50	
B-43B		1.1'	69.0	12.8								
B-43B		1.5'	25.8									
B-43B	SS-2	3.5'										
B-43B	SS-3	6'	29.4								2.50	
B-43B	ST-4	8'	40.5	1.6		65	22	43		0.74	0.5-1.25	79.8

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

GESTRA Engineering, Inc
5732 95th Avenue, Suite 100
Kenosha, WI 53144
Phone: (262) 925-1888, Fax: (262) 925-1885

Laboratory Test Results of Unconfined Compressive Strength of Soil

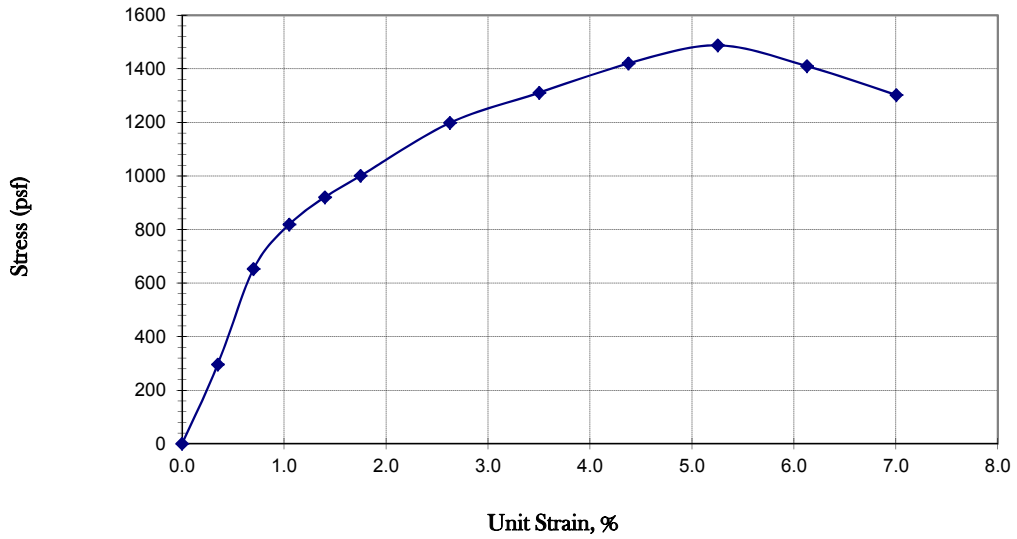
Project Name:	STH-15/STH-76-New London	Date:	January 8, 2013
Project Number:	12015-10	Report To:	CH2M Hill, Inc.
Project Location:	Outagamie County, WI		
ASTM Designation:	**D2166**		

Test Data

Deformation dial reading (0.001 in.)	Sample stress (psf)
0	0
20	296
40	653
60	819
80	920
100	1001
150	1198
200	1310
250	1420
300	1488
350	1410
400	1302

Sample Information

Boring no.:	B-43B	Diameter (in)	2.81
Sample no.:	ST-4	Area (sq. in.):	6.21
Depth of Soil:	8'-10'	Height: (in.):	5.71
Description of Soil:	Fat clay, red brown, moist, medium stiff		
Strain Rate (in/min):	0.050		





UC Strength, Q_u (tsf)	**0.74**
Wet Density (pcf)	114.6
Dry Density (pcf)	79.8
Moisture Content (%)	43.6

Remarks

Performed By: REL

Reviewed By: Lauren Gliniecki
GESTRA Engineering, Inc.

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

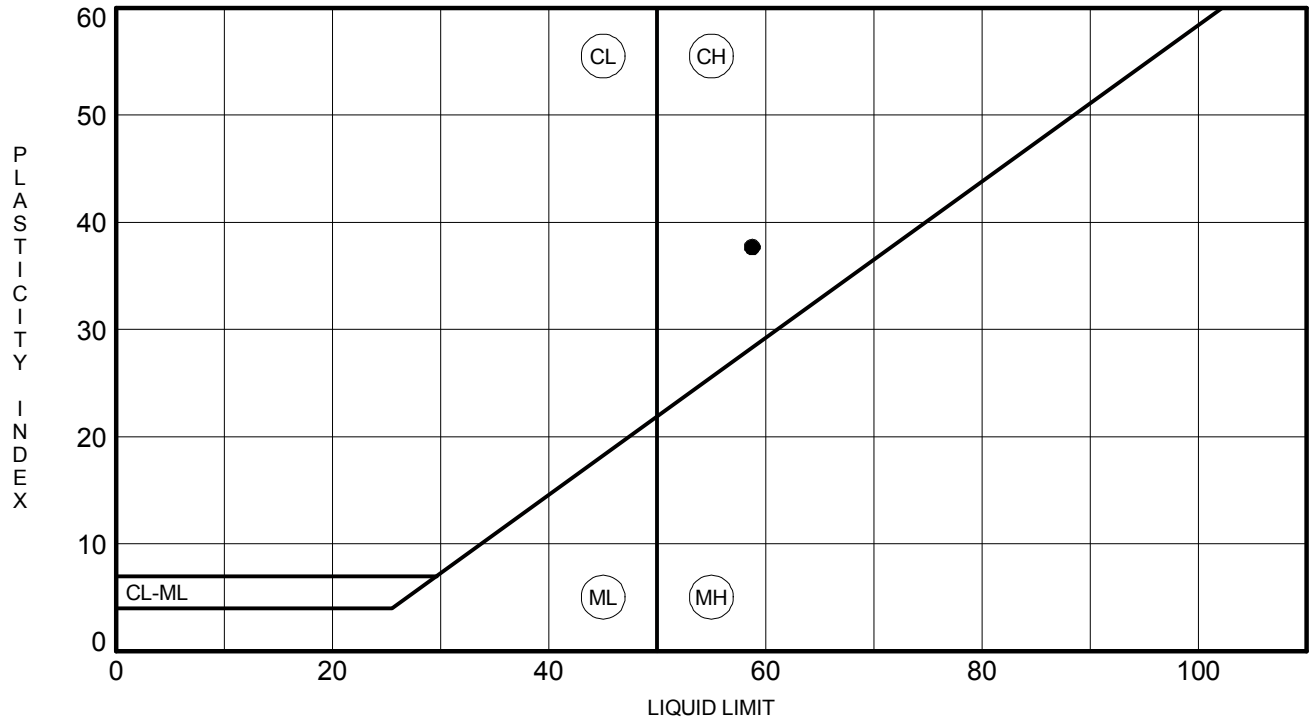
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-43C	SS-1	1'									0.50	
B-43C		1.1'	57.5	11.4								
B-43C		1.8'	23.9									
B-43C	SS-2	3.5'										
B-43C	ST-3	6'	30.1	1.5		59	21	38		1.92	1.50	94.2
B-43C	SS-4	8.5'	60.6								<0.25	
B-43C	SS-5	11'	72.4								<0.25	

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-43C**	**ST-3**	**6.0'**	**30%**	**59**	**21**	**38**	**0.24**		**R. Lollar**	**L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

GESTRA Engineering, Inc
5732 95th Avenue, Suite 100
Kenosha, WI 53144
Phone: (262) 925-1888, Fax: (262) 925-1885

Laboratory Test Results of Unconfined Compressive Strength of Soil

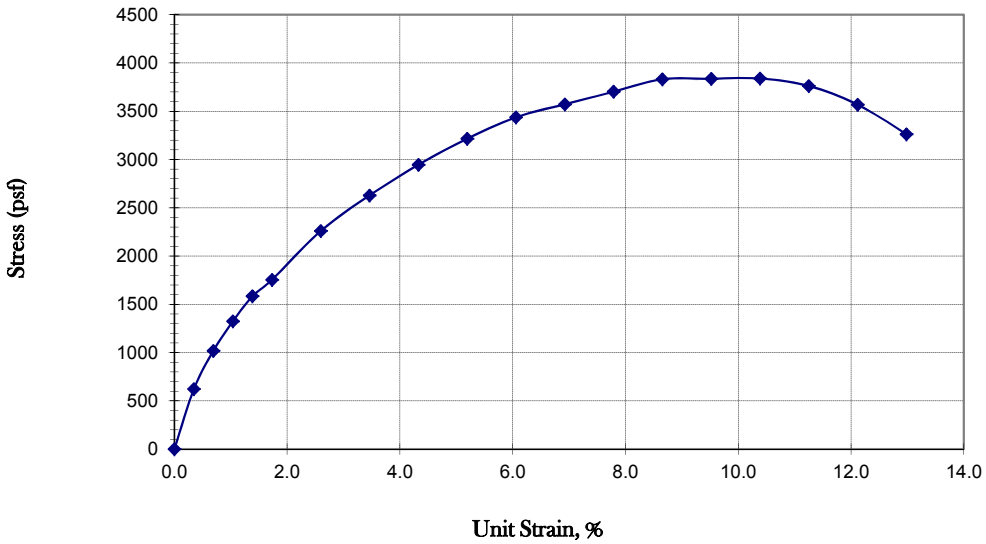
Project Name:	STH-15/STH-76-New London	Date:	January 8, 2013
Project Number:	12015-10	Report To:	CH2M Hill, Inc.
Project Location:	Outagamie County, WI		
ASTM Designation:	**D2166**		

Test Data

Deformation dial reading (0.001 in.)	Sample stress (psf)
0	0
20	623
40	1019
60	1325
80	1584
100	1754
150	2260
200	2628
250	2946
300	3215
350	3438
400	3572
450	3703
500	3832
550	3836
600	3839
650	3762
700	3569
750	3262

Sample Information

Boring no.:	B-43C	Diameter (in)	2.74
Sample no.:	ST-3	Area (sq. in.):	5.91
Depth of Soil:	6'-8'	Height: (in.):	5.78
Description of Soil:	Fat clay, red brown, moist, stiff		
Strain Rate (in/min):	0.050		





UC Strength, Q_u (tsf)	**1.92**
Wet Density (pcf)	122.0
Dry Density (pcf)	94.2
Moisture Content (%)	29.5

Remarks

Performed By: REL

Reviewed By: Lauren Gliniecki
GESTRA Engineering, Inc.

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

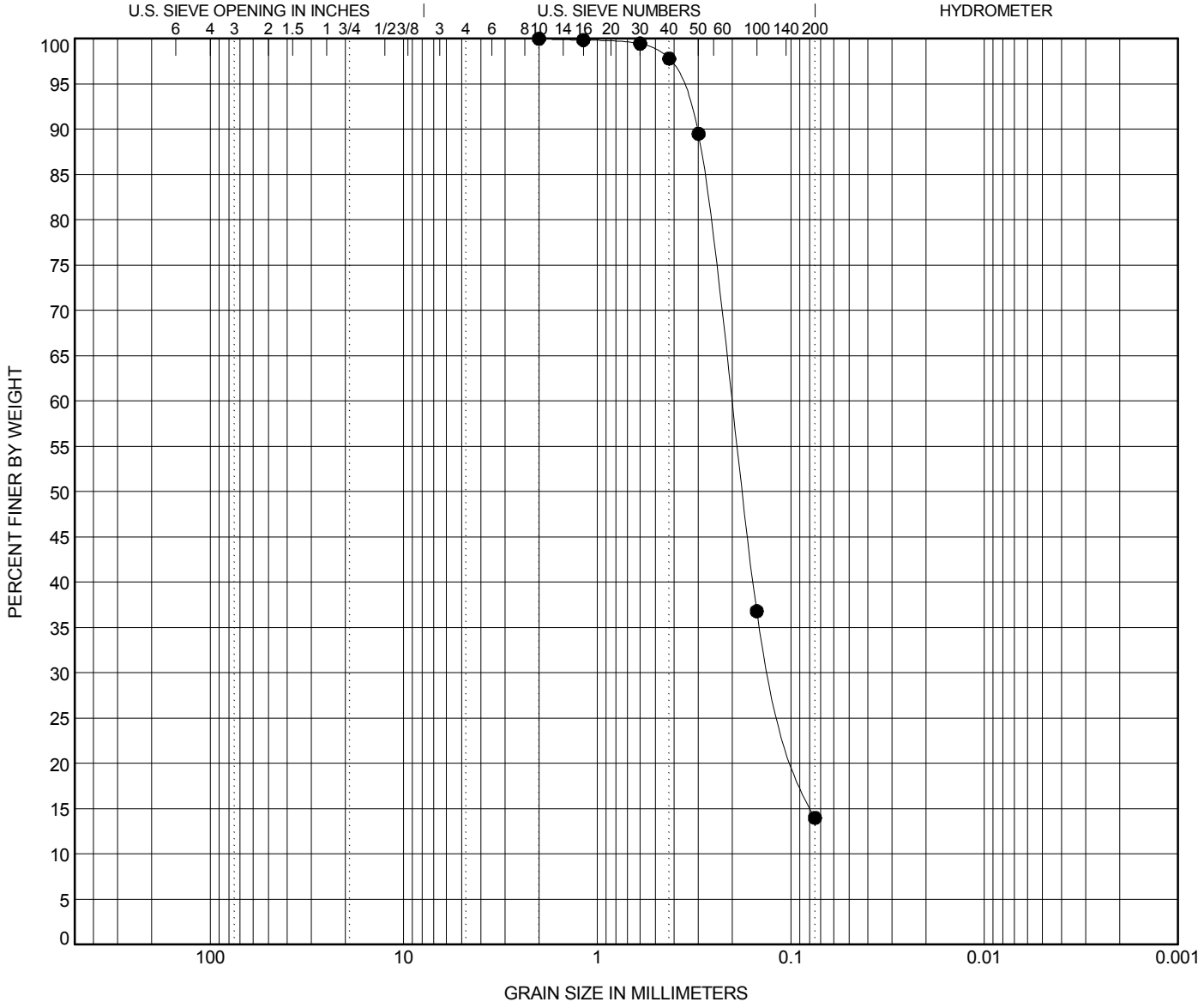
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-44A	SS-1	1'										
B-44A		2'	26.3	2.9								
B-44A	SS-2	3.5'	28.7								1.00	
B-44A	SS-3	6'	34.4								2.50	
B-44A	ST-4	8'										
B-44A		8.1'							14			
B-44A		9.3'	27.6									

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

GRAIN SIZE DISTRIBUTION
(ASTM D422)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● **B-44A,** ST-4	**8.1'**	**SILTY SAND (SM)**					

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **B-44A,** ST-4	**8.1'**	**2**	**0.204**	**0.122**		**0.0**	**86.0**	**14.0**	

PERFORMED BY: R. Lollar **CHECKED BY: L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

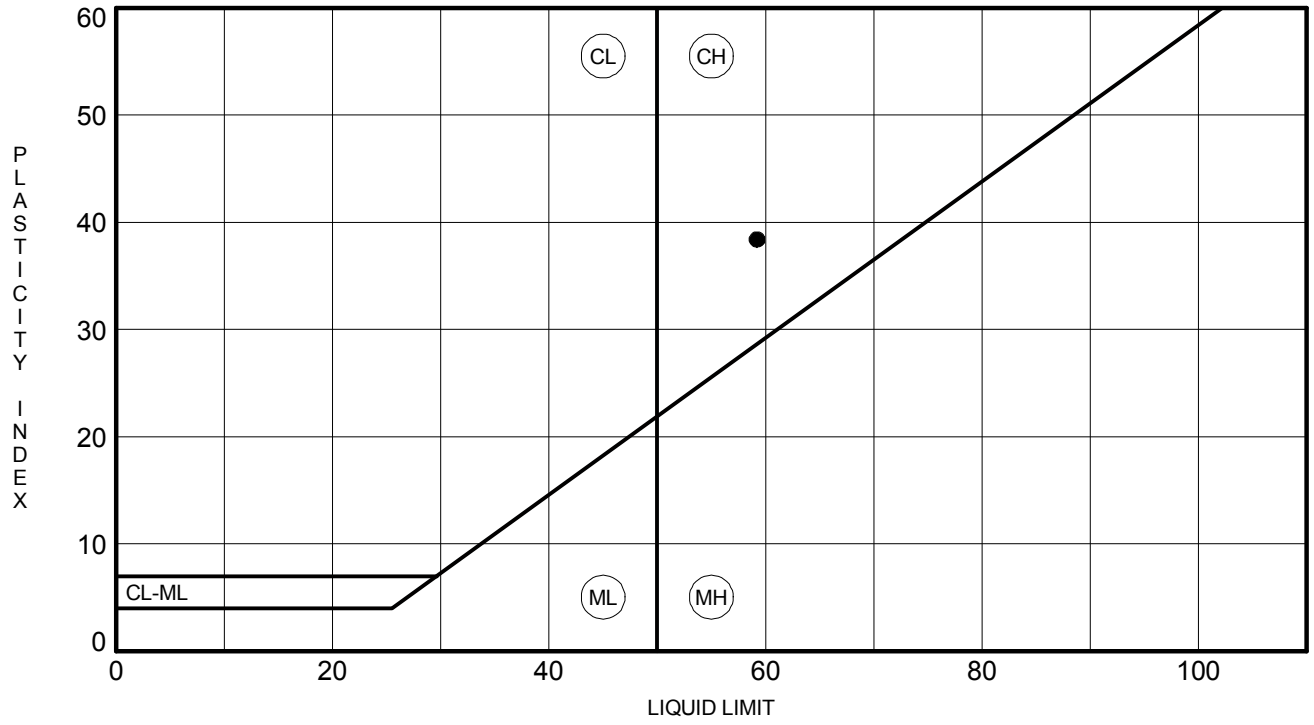
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-44B	SS-1	1'	26.4								0.50	
B-44B		1.1'	31.8	4.7								
B-44B	SS-2	3.5'	27.9								0.75	
B-44B	SS-3	6'	26.8								1.00	
B-44B	ST-4	8.5'	29.0			59	21	38		2.4	2.25	97.1
B-44B	SS-5	11'	61.5								<0.25	

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-44B**	**ST-4**	**8.5'**	**29%**	**59**	**21**	**38**	**0.21**		**R. Lollar**	**L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

GESTRA Engineering, Inc
5732 95th Avenue, Suite 100
Kenosha, WI 53144
Phone: (262) 925-1888, Fax: (262) 925-1885

Laboratory Test Results of Unconfined Compressive Strength of Soil

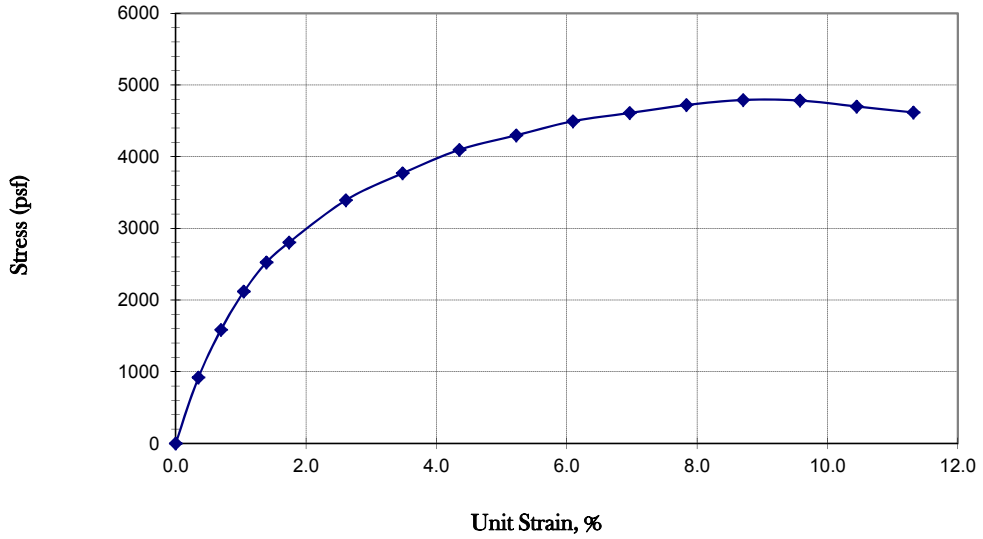
Project Name:	STH-15/STH-76-New London	Date:	January 8, 2013
Project Number:	12015-10	Report To:	CH2M Hill, Inc.
Project Location:	Outagamie County, WI		
ASTM Designation:	**D2166**		

Test Data

Deformation dial reading (0.001 in.)	Sample stress (psf)
0	0
20	920
40	1584
60	2119
80	2525
100	2805
150	3394
200	3768
250	4096
300	4297
350	4494
400	4609
450	4721
500	4791
550	4783
600	4700
650	4617

Sample Information

Boring no.:	B-44B	Diameter (in)	2.83
Sample no.:	ST-4	Area (sq. in.):	6.28
Depth of Soil:	8.5'-10.5'	Height: (in.):	5.74
Description of Soil:	Fat clay, red brown, moist, very stiff		
Strain Rate (in/min):	0.042		





UC Strength, Q_u (tsf)	**2.40**
Wet Density (pcf)	125.3
Dry Density (pcf)	97.1
Moisture Content (%)	29.0

Remarks

Performed By: REL

Reviewed By: Lauren Gliniecki
GESTRA Engineering, Inc.

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

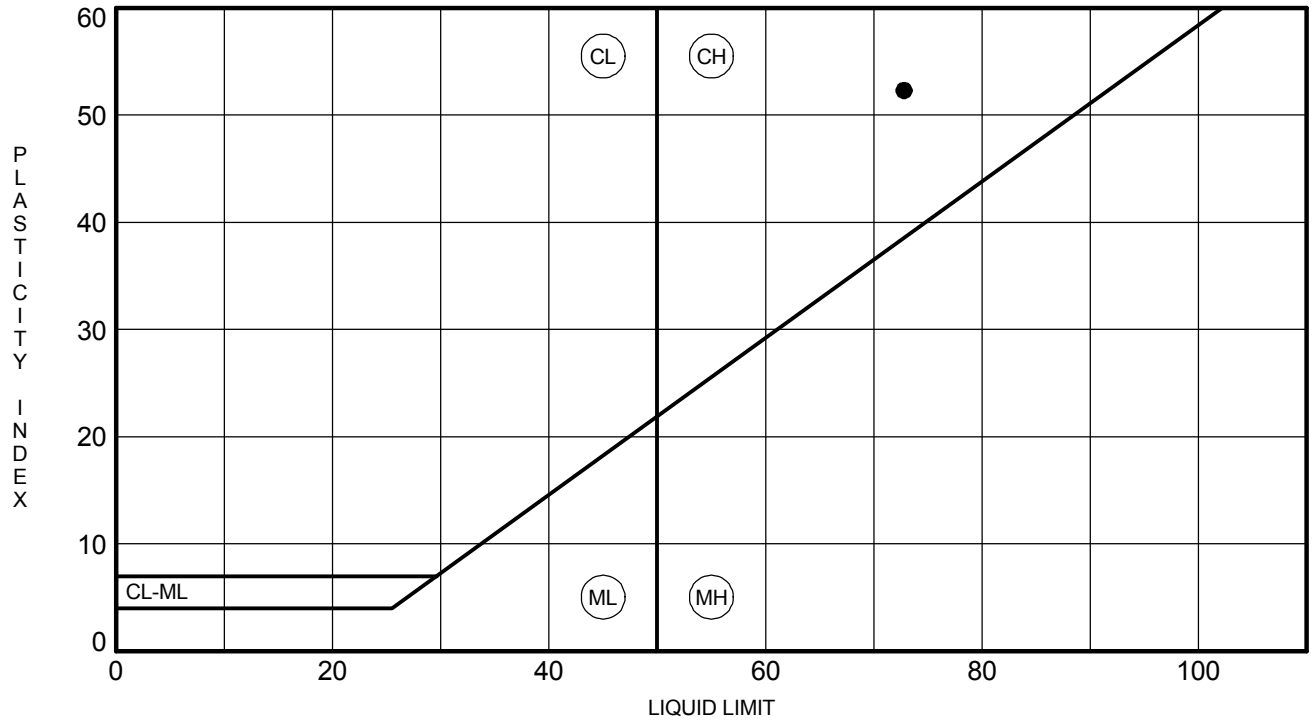
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-45A	SS-1	1'	57.8	4								
B-45A	SS-2	3.5'	39.9								0.5-0.75	
B-45A	SS-3	6'	59.2			73	20	53			<0.25-0.5	
B-45A	SS-4	8.5'	51.5								<0.25-0.5	
B-45A	SS-5	11'										
B-45A	SS-6	13.5'										

\\GESTRASERVER-11\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/2/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-45A**	**SS-3**	**6.0'**	**59%**	**73**	**20**	**53**	**0.74**		**D. Born**	**L. Gliniecki**

\\GESTRASERVER-11\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/2/13

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

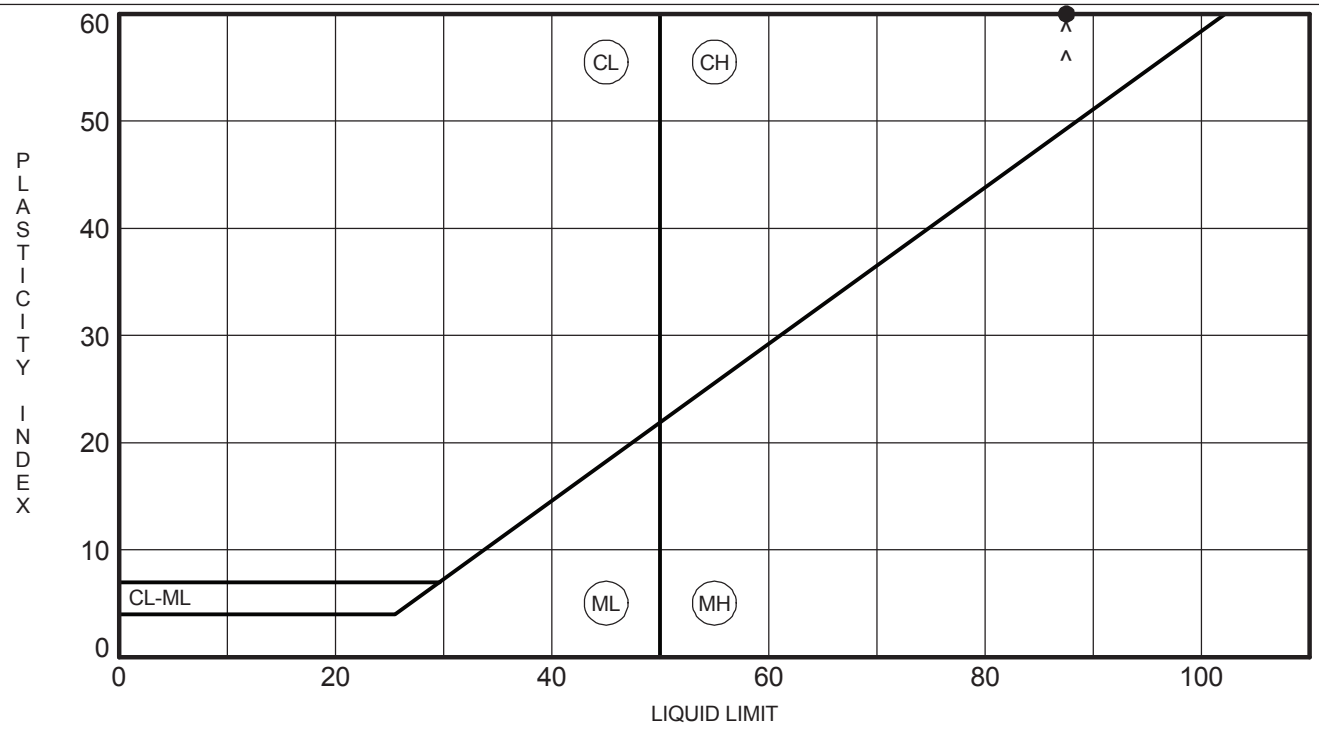
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-45B	SS-1	1'										
B-45B	SS-2	3.5'	50.7								0.25-0.5	
B-45B	ST-3	6'	58.7			88	25	63	2			
B-45B	SS-4	8.5'										
B-45B	SS-5	11'										
B-45B	SS-6	13.5'										

\\GESTRASERVER-11\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/2/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



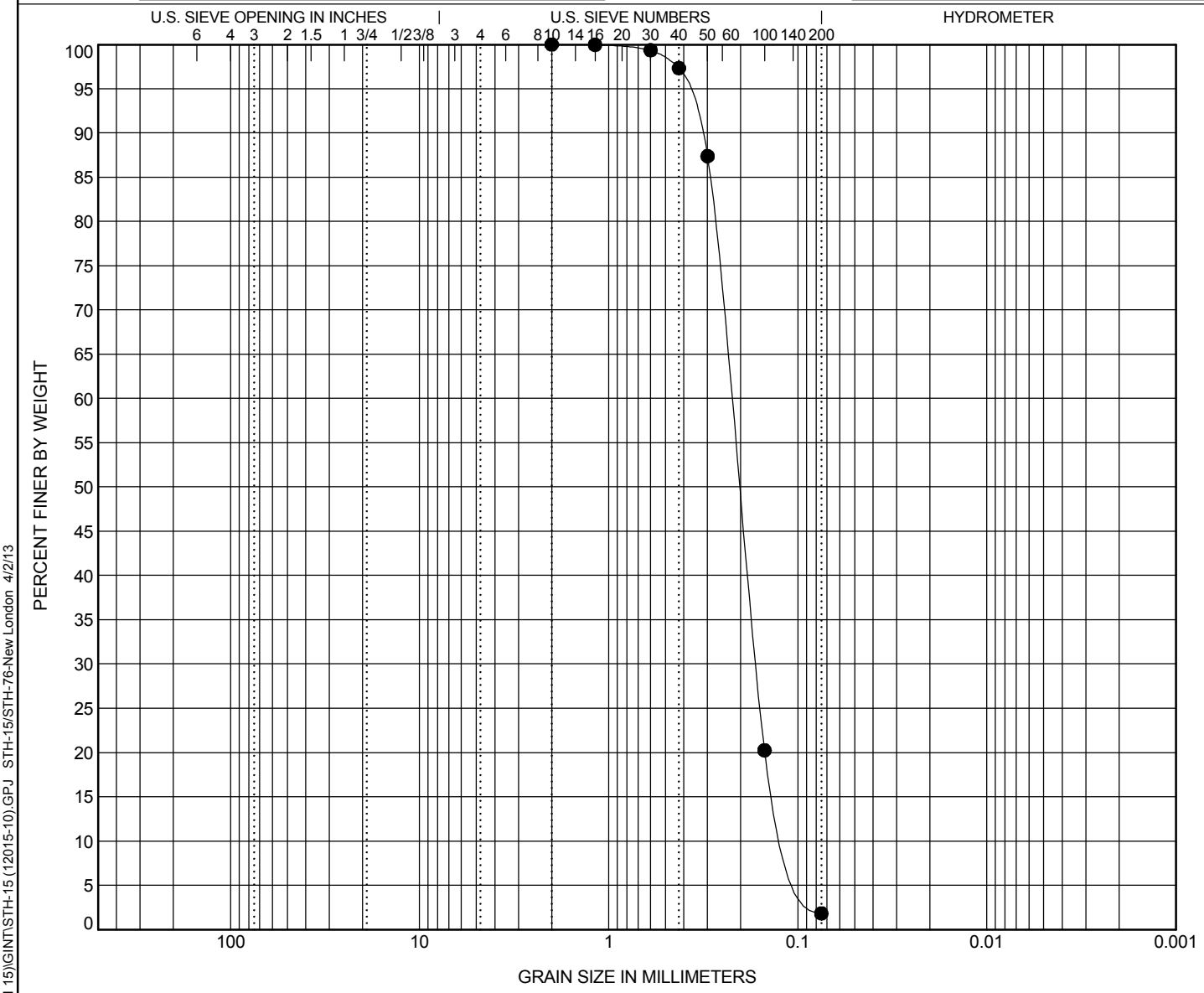
	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-45B**	**ST-3**	**6.0'**	**59%**	**88**	**25**	**63**	**0.54**		**B. Bills**	**L. Gliniecki**

\\GESTRASERVER-11\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/2/13

GRAIN SIZE DISTRIBUTION
(ASTM D422)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● **B-45B, ST-3**	**6.0'**	**POORLY GRADED SAND(SP)**	**88**	**25**	**63**	**1.19**	**2.22**

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **B-45B, ST-3**	**6.0'**	**2**	**0.226**	**0.166**	**0.102**	**0.0**	**98.2**	**1.8**	

PERFORMED BY: J. Bruesewitz **CHECKED BY: L. Gliniecki**

\\GESTRASERVER-11\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/2/13

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

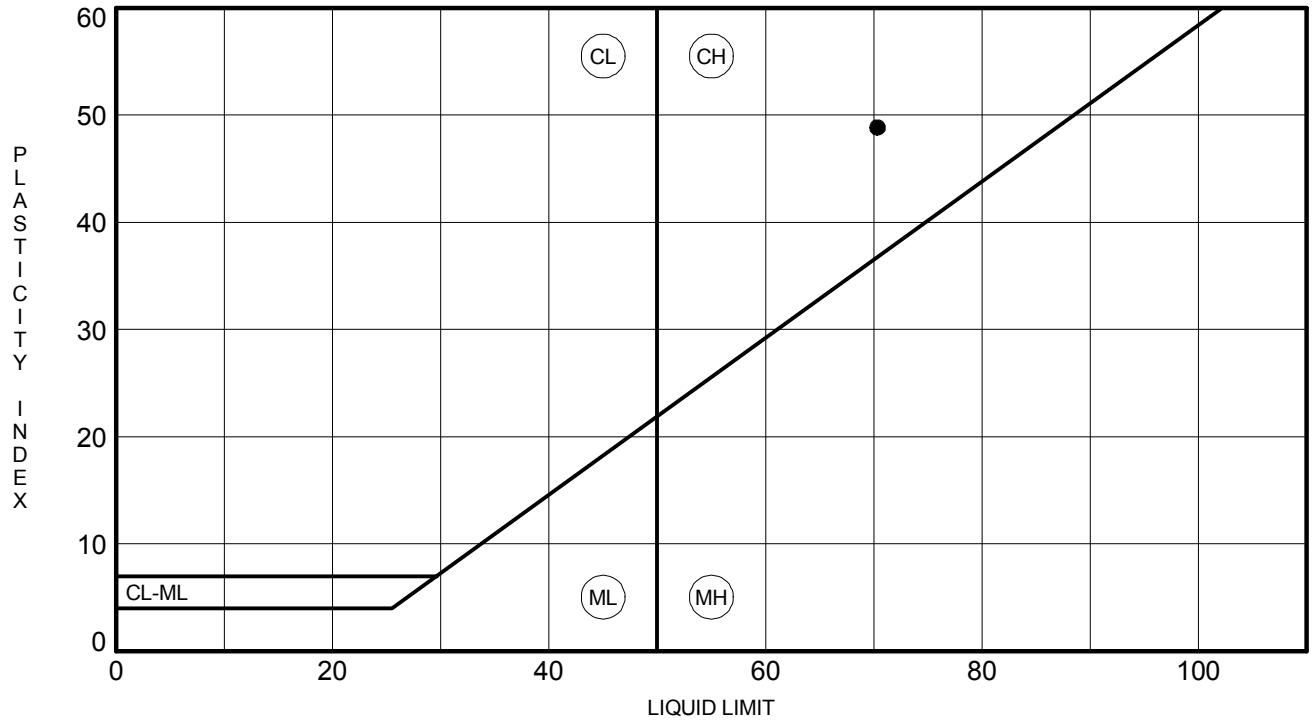
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-46C	SS-1	1'	32.6	6.1							0.75	
B-46C	SS-2	3.5'	27.8								4.50	
B-46C	SS-3	6'	44.3								1.00	
B-46C	ST-4	8'										
B-46C		8.1'	59.6			70	21	49		0.49	1.0-2.5	66.7
B-46C	SS-5	11'										
B-46C	SS-6	13.5'										

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-46C**	ST-4	**8.1'**	**60%**	**70**	**21**	**49**	**0.8**		**R. Lollar**	**L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

GESTRA Engineering, Inc
5732 95th Avenue, Suite 100
Kenosha, WI 53144
Phone: (262) 925-1888, Fax: (262) 925-1885

Laboratory Test Results of Unconfined Compressive Strength of Soil

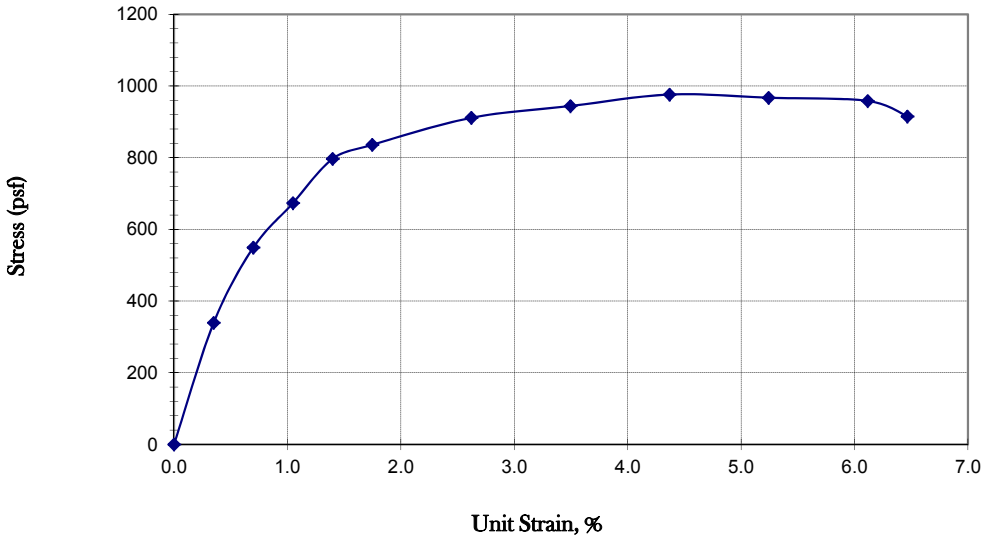
Project Name:	STH-15/STH-76-New London	Date:	January 8, 2013
Project Number:	12015-10	Report To:	CH2M Hill, Inc.
Project Location:	Outagamie County, WI		
ASTM Designation:	**D2166**		

Test Data

Deformation dial reading (0.001 in.)	Sample stress (psf)
0	0
20	339
40	549
60	673
80	797
100	836
150	911
200	944
250	976
300	967
350	958
370	915

Sample Information

Boring no.:	B-46C	Diameter (in)	2.81
Sample no.:	ST-4	Area (sq. in.):	6.20
Depth of Soil:	8'-10'	Height: (in.):	5.72
Description of Soil:	Fat clay, brown, moist medium siff		
Strain Rate (in/min):	0.050		





UC Strength, Q_u (tsf)	**0.49**
Wet Density (pcf)	106.4
Dry Density (pcf)	66.7
Moisture Content (%)	59.6

Remarks

Performed By: REL

Reviewed By: Lauren Gliniecki
GESTRA Engineering, Inc.

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

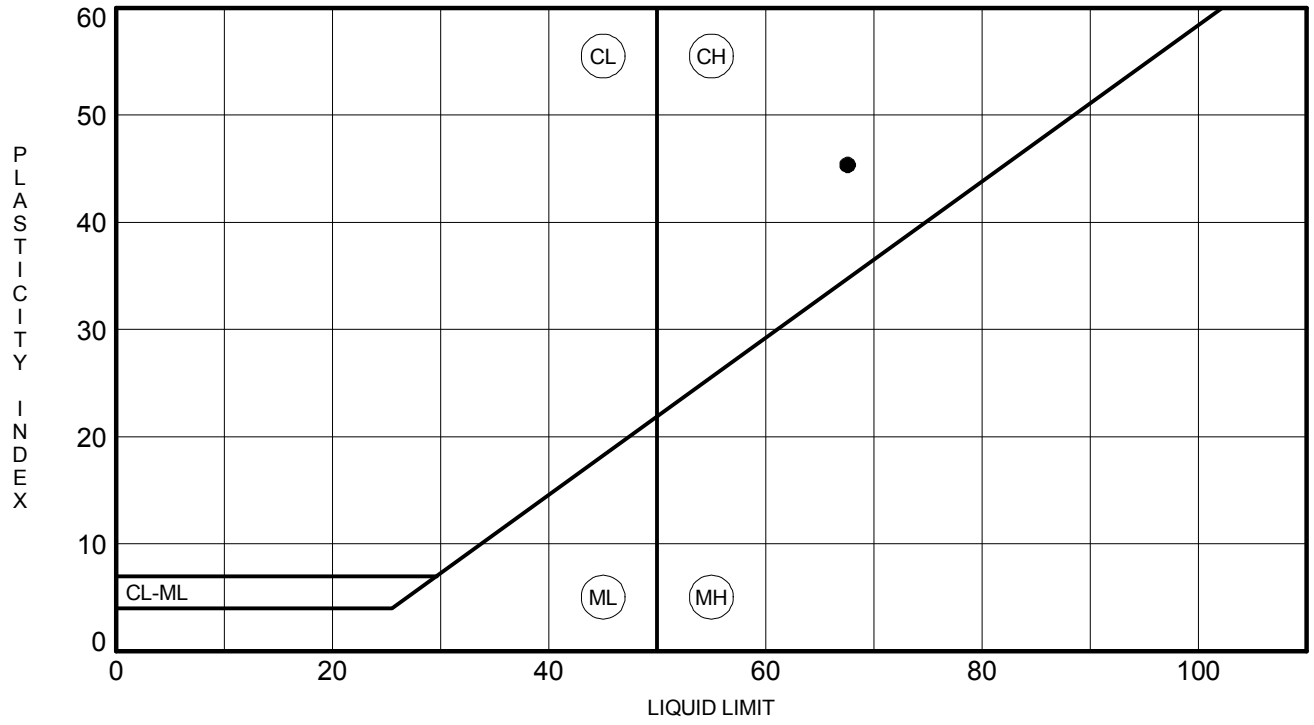
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-47A	SS-1	1'	20.1	9.8								
B-47A	SS-2	3.5'	24.6								2.25	
B-47A	SS-3	6'	26.5								3.00	
B-47A	SS-4	8.5'	39.7			68	22	46			0.25-1.0	
B-47A	SS-5	11'										
B-47A	SS-6	13.5'										

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-47A**	**SS-4**	**8.5'**	**40%**	**68**	**22**	**46**	**0.39**		**R. Lollar**	**L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

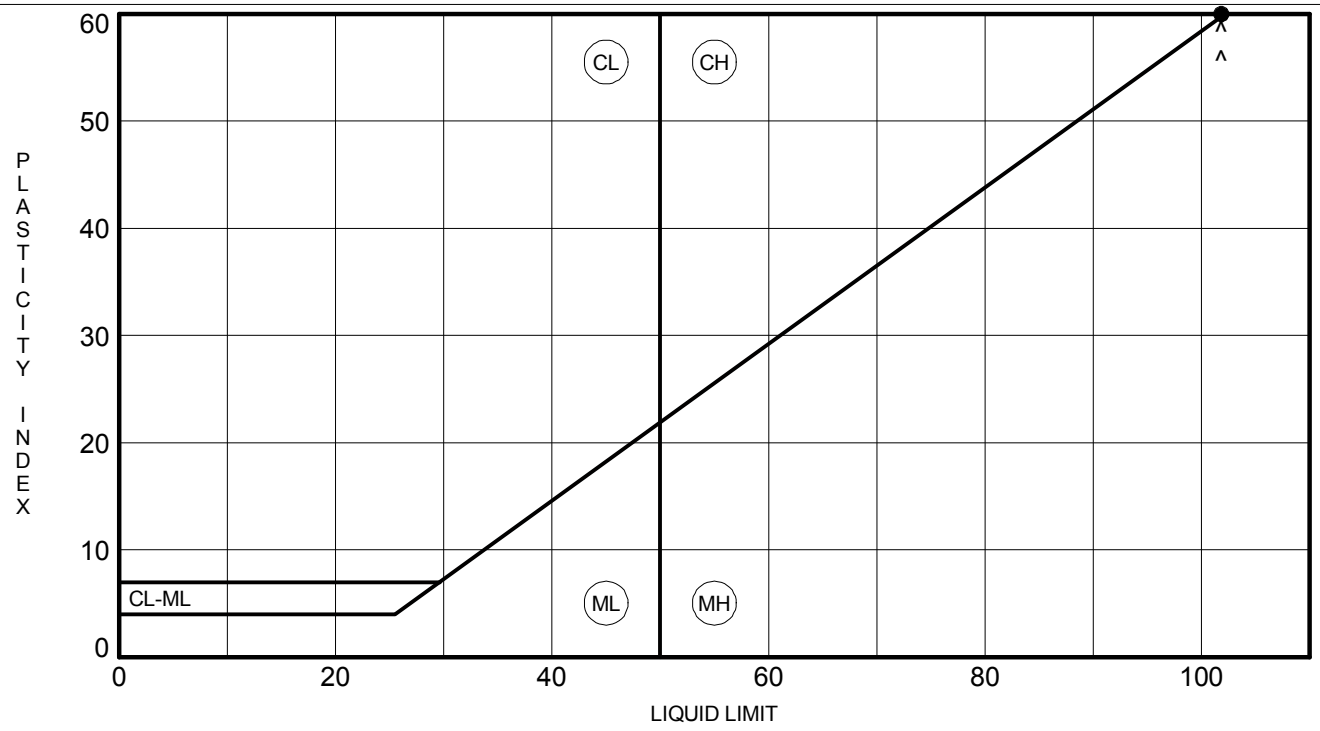
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-49	SS-1	1'	35.2			102	31	71			2.50	
B-49	SS-2	3.5'	32.1								0.75-2.5	
B-49	SS-3	6'										
B-49	SS-4	8.5'										

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-49**	**SS-1**	**1.0'**	**35%**	**102**	**31**	**71**	**0.06**		**R. Lollar**	**L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/11/13

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-64A	SS-1	1'										
B-64A	SS-2	3.5'										
B-64A	SS-3	6'										
B-64A	SS-4	8.5'										
B-64A	SS-5	11'										
B-64A	SS-6	13.5'										
B-64A	SS-7	16'										
B-64A	SS-8	18.5'										
B-64A	SS-9	21'										
B-64A	SS-10	23.5'										
B-64A	SS-11	26'										
B-64A	SS-12	28.5'										
B-64A	SS-13	31'							38			
B-64A	SS-14	33.5'										
B-64A	SS-15	36'							29			
B-64A	SS-16	38.5'										
B-64A	SS-17	41'										
B-64A	SS-18	43.5'										

\\GESTRASERVER-11\REPORT\2012\GEO-MILWAUKEE-10\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 4/2/13

SUMMARY OF LABORATORY RESULTS

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra

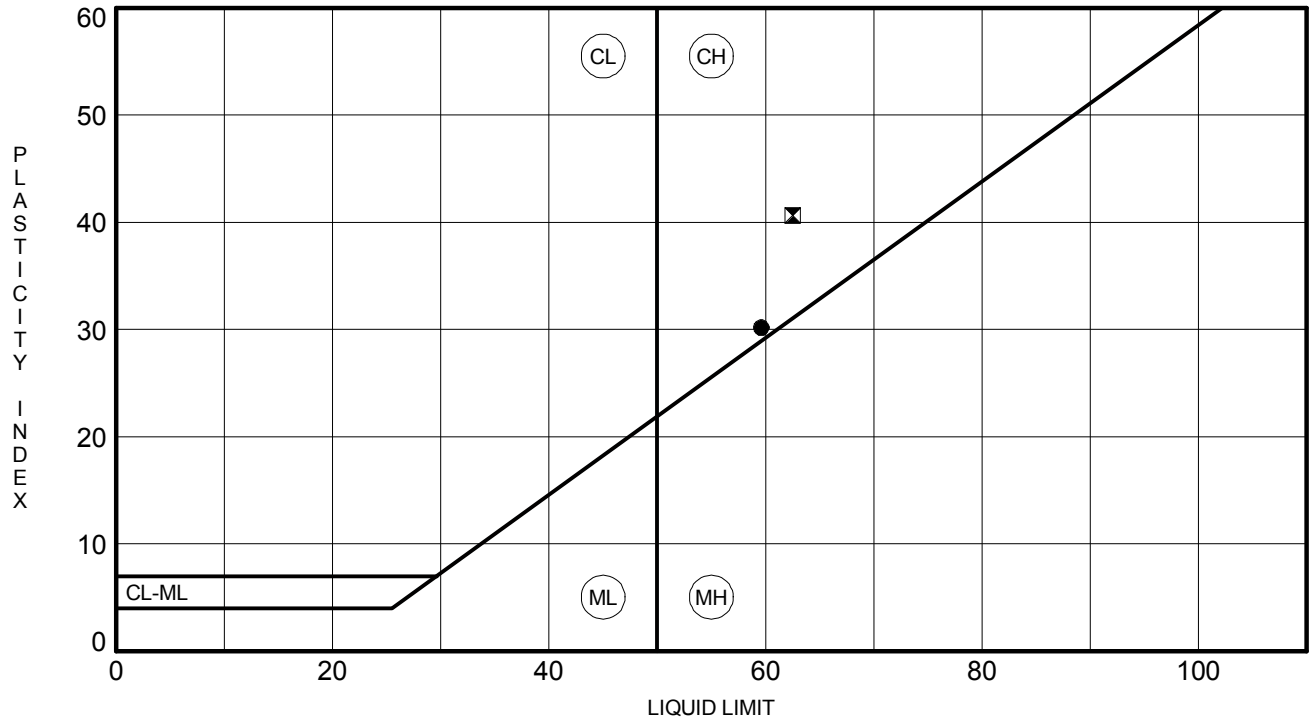
Borehole	Sample	Depth	Water Content (%)	LOI (%)	G_s	LL	PL	PI	%<#200 Sieve	Q_u	Q_p	Dry Density (pcf)
B-98	ST-1	1'	37.1	7.4		60	29	31			0.25	78.4
B-98	SS-2	3.5'	24.5	3.3								
B-98	ST-2	7'										
B-98		7.1'	48.5	11.3							<0.25	
B-98		8'	59.6			63	22	41			<0.25	
B-98	SS-5	11'	62.7								<0.25	
B-98	SS-6	13.5'	17.5								3.50	

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/14/13

ATTERBERG LIMITS' RESULTS
(ASTM D4318)

PROJECT NAME STH-15/STH-76-New London **CONSULTANT**

PROJECT No 1146-75-00 **LAB TEST PERFORMED BY** Gestra



	BOREHOLE	SAMPLE	DEPTH	MC	LL	PL	PI	LI	Fines	Performed By	Checked By
●	**B-98**	**ST-1**	**1.0'**	**37%**	**60**	**29**	**31**	**0.26**		**R. Lollar**	**L. Gliniecki**
⊠	**B-98**	**ST-2**	**8.0'**	**60%**	**63**	**22**	**41**	**0.93**		**R. Lollar**	**L. Gliniecki**

\\GESTRASERVER-KE\REPORT\2012\GEO MILWAUKEE\12015-10 (STH 15)\GINT\STH-15 (12015-10).GPJ STH-15/STH-76-New London 1/14/13

Appendix E
Proposed Rock Slope Evaluation Report

State Highway 15 – Proposed Rock Slope Evaluation Hortonville, Wisconsin

PREPARED FOR: Charles Winter/WKH CH2M HILL
PREPARED BY: Robert Martin/MKE CH2M HILL
COPIES: File
DATE: January 11, 2013
PROJECT NUMBER: 433521

Introduction

The road alignment of the State Highway 15 in Hortonville, Wisconsin is being modified to better meet the needs of the traveling public. As a result of this work, excavation of a rock slope along the highway will need to be modified and laid back at a proposed slope of 1:1. The purpose of this memorandum is to provide a summary of kinematic analysis completed for the proposed cut slope and site investigation required to support the analysis.

Subsurface Investigation

A subsurface exploration program was performed for the proposed rock cut slope. The principal purpose of the borings was to identify material types and properties at each borehole and obtain samples for laboratory testing. The subsurface exploration conducted for evaluating the roadway cut slopes consists of four borings (B-125 through B-128). The borehole locations and elevations were surveyed by WisDOT using traditional surveying methods before drilling started. The boreholes were drilled using either a CME-850 track mounted rig by Subsurface Exploration Services, LLC, under subcontract to CH2M HILL. The boreholes were advanced to their termination depths, as shown in Table 1, using NQ size double-tube rock core barrels.

TABLE 1
Boring Summary Information

Boring Id	Ground Surface Elevation (ft)	Bottom of Boring Elevation (ft)	Top of Rock Elevation (ft)	Groundwater Elevation (ft)
B-125	839.1	796.9	837.6	814.1
B-126	837.0	794.8	835.0	809.5
B-127	828.3	801.3	827.3	816.8
B-128	835.1	818.5	834.1	828.6

A Geotechnical engineer from CH2M HILL maintained the field logs that described sample intervals, recovery, field test data, groundwater occurrence, and other pertinent conditions. The borings were logged in accordance ISRM and ASTM standards. Boring logs are provided in Attachment 1 and core box photos are provided in Attachment 2.

Laboratory Testing

Laboratory tests were performed on selected rock samples taken from the borings to verify field classifications and to identify engineering properties. Unconfined compressive strength tests were performed on selected intact rock samples. A summary of unconfined compressive strength (UCS) of intact rock samples for the rock cut slope borings is presented in Table 2 and laboratory reports are included in Attachment 3.

COPYRIGHT 2011 BY CH2M HILL CANADA LIMITED • ALL RIGHTS RESERVED • COMPANY CONFIDENTIAL

TABLE 2
Summary of Laboratory Testing

Boring	Rock Type	Test Completed	Elevation of Test (ft)	UCS (psi)
B-125	Dolomite	UCS	823.57	15,170
B-125	Dolomite	UCS	818.70	12,460
B-125	Dolomite	UCS	817.40	15,300
B-126	Dolomite	UCS	823.47	8,770
B-126	Sandstone	UCS	800.54	8,760

Rock Mapping

Field mapping of the rock outcrop along State Highway 15 was completed using a Brunton compass, tape measures. The Brunton compass is a compact device that permits compass bearings to be made upon linear features (including strike lines) and lines connecting any two points. The Brunton may also function as a protractor (when placed upon a map) and as a device for measuring structural dip and vertical angles (using its internal clinometer). The tape measure was a reel-in variety, which is marked in feet and has a length of 100 ft. Data was recorded in a field log book.

Rock mapping included the recording orientation (i.e., attitude) of strata and other planar features. Strike, dip direction, and dip magnitude of rock layers and other planar geological features (e.g., foliation) were obtained to understand completely all the geological structures (i.e., folds and fault patterns) of an area. Generally, the intent was to obtain as many orientation or attitude measurements as possible in the field area being studied. The rock mapping location is shown in Attachment 4, Figure 4-1 and data collected is presented in Table 3.

TABLE 3
Field Mapping of Outcrop Data

Location Id	Station Location (Approximate)	Type	Dip (degrees)	Dip Direction (degrees)
1	209+32	Joint	82	67 NE
2	209+25	Joint	90	63 NE
3	209+16	Bedding	03	42 NE
4	280+99	Joint	90	05 NW
5	208+97	Joint	90	55 NE
7	208+91	Joint	79	20 NW
8	208+87	Joint	86	24 NW
9	208+74	Joint	89	66 NE
10	208+75	Joint	88	51 NW
11	208+69	Bedding	03	33 NE
12	208+47	Joint	89	56 NE
13	208+40	Joint	90	16 NW
14	208+37	Joint	87	64 NW
15	208+14	Joint	90	03 NE
16	208+12	Joint	90	55NE
17	207+79	Joint	81	31 NW
18	207+01	Joint	89	29 NW
19	208+00	Bedding	10	41 NE

COPYRIGHT 2013 BY CH2M HILL, INC. • COMPANY CONFIDENTIAL

TABLE 3
Field Mapping of Outcrop Data

Location Id	Station Location (Approximate)	Type	Dip (degrees)	Dip Direction (degrees)
20	208+23	Joint	90	168 NE
21	208+33	Joint	87	22 NW
22	208+38	Joint	88	70 NE
23	208+45	Bedding	19	41 SE
24	209+38	Joint	90	44 NE
25	209+04	Bedding	03	45 NE

Rock Cut Slope Evaluation

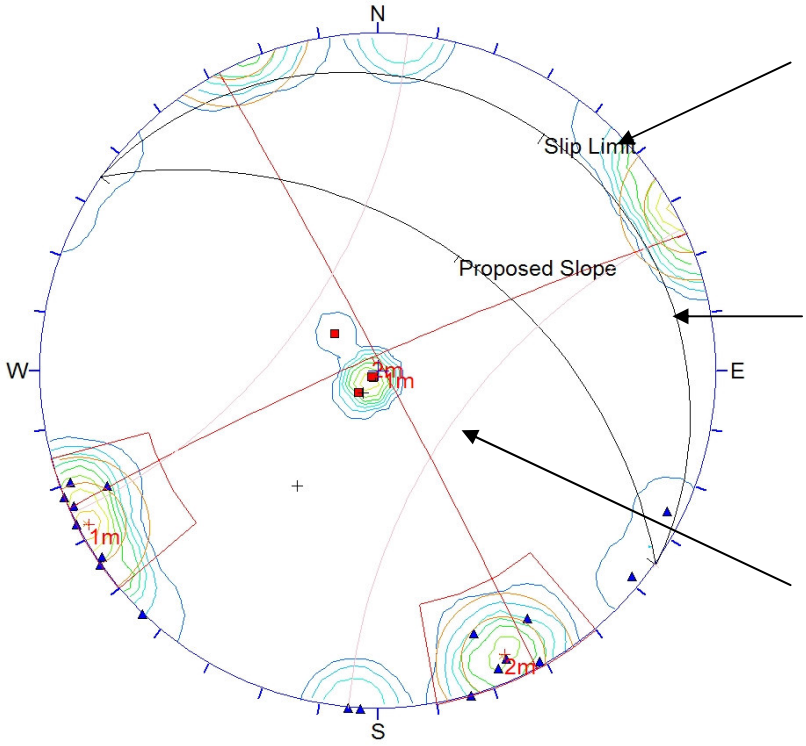
A kinematic analysis was used to determine the stability of the proposed rock slope in which the relationship between the orientation of the discontinuity sets and the face of the cut slope were evaluated to identify possible failure modes. Three potential failure modes were considered, as described by Wyllie and Mah (2004):

- Toppling failure - Typically in strong rock containing discontinuities dipping steeply into the face,
- Plane failure – Typically in rock containing persistent joints dipping out of the slope face, and striking parallel to the face, and
- Wedge failure – Typically in rock with three intersecting discontinuities.

From observations of the existing cut slopes and measurements of the discontinuity orientation, it is reasonable to expect that rockfall generated by any of these three failure modes is likely to be small. Persistence, or the lack thereof, of the discontinuities were not considered in the kinematic analyses, but does play a role in subsequent limit equilibrium analysis.

The kinematic analyses of the rock discontinuities were performed using the computer program DIPS, version 5.1, by Rocscience, Inc. The program was used to plot the different discontinuity data mapped in the field, and to check for risk of toppling, planar sliding, and wedge sliding. The rock mapping data used in the evaluation are provided in Table 3. The procedures for evaluating the potential for toppling failure, planar sliding, and wedge sliding are illustrated on Figures 1, 2 and 3, respectively.

COPYRIGHT 2013 BY CH2M HILL, INC. • COMPANY CONFIDENTIAL

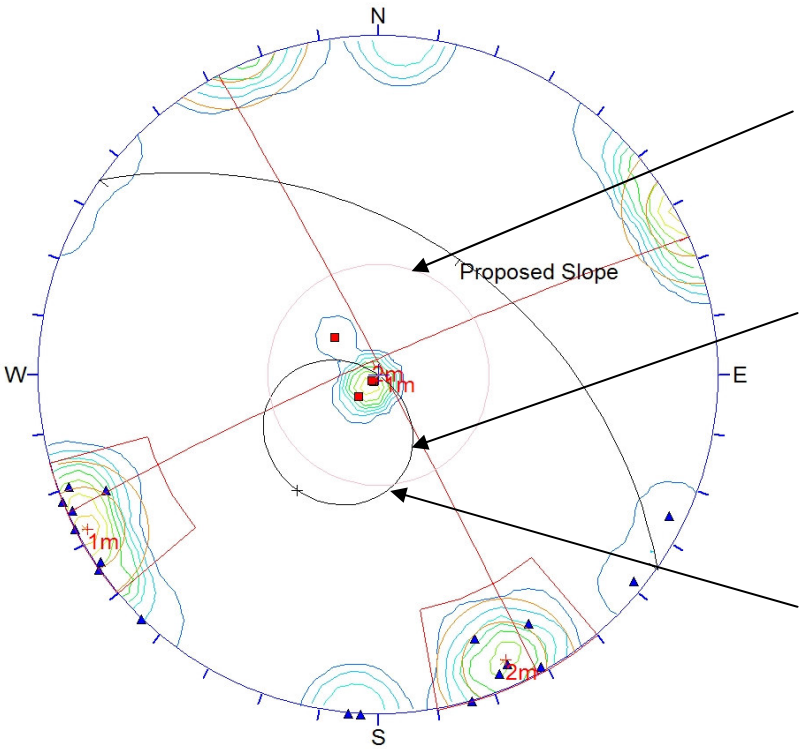


Toppling is indicated when a pole plots inside the pole toppling region, i.e. in this case there are no poles falling within the pole toppling region, indicating a very low risk of toppling failure.

Construct a slip limit with a dip angle equal to the cut slope angle minus the friction angle of the rock. The dip direction of the slip limit is the same as the cut slope.

Construct cone with trend equal to the dip direction of the cut slope face plus 90 degrees. The dip angle of the cone is 60 degrees, i.e. for toppling failure to occur, the dip direction of the discontinuities dipping into the face must be within about 30 degrees of the dip direction of the face so that a series of slabs are formed parallel to the face.

FIGURE 1
Procedures for Determining the Risk of Toppling Failure



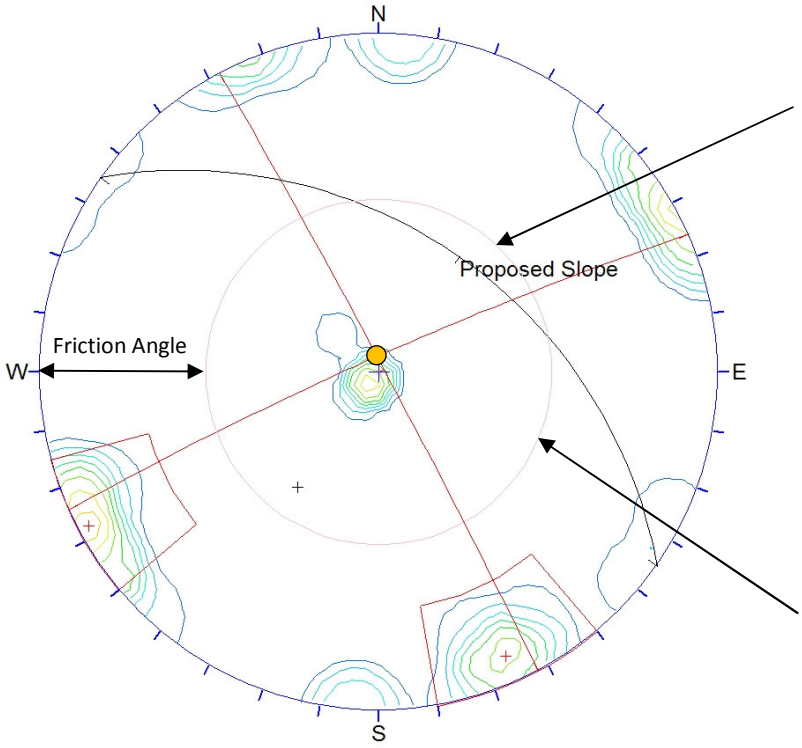
Construct a pole friction cone with a plunge of zero with a dip angle equal to the rock friction angle.

Construct a daylight envelope for the cut slope plane.

Plane sliding is indicated when the poles plot within the pole plane sliding region. In this case there are no poles that plot within the sliding region, indicating a low risk of plane sliding

FIGURE 2
Procedures for Determining the Risk Of Planar Sliding Failure

COPYRIGHT 2013 BY CH2M HILL, INC. • COMPANY CONFIDENTIAL



The zone outside the cut slope but enclosed by the friction cone (angle = 90deg-friction angle) represents the zone of wedge sliding. Any plane intersections (highlighted by the orange dots) that fall within this zone are unstable and require support. Note that the plane friction cone is measured from the equator of the stereonet. No intersection points between the planes fall within the wedge sliding zone indicating a low risk for wedge sliding.

Construct a pole friction cone with a plunge of zero with a dip angle equal to the rock friction angle.

FIGURE 3
Procedures for Determining the Risk Of Wedge Sliding Failure

Results of Analysis

The analysis results are provided in Attachment 4, and are summarized in Table 4. Columns 2 to 4 provide a qualitative measure of the risk for toppling, planar failure, and wedge failure, respectively, as determined from the screening kinematic analyses using DIPS. The qualitative measures that were used are low, moderate, and high. For this analysis, a designation of “LOW” implied that none or only isolated poles fall within the sliding zones, with the pole set falling clearly outside the sliding zone. A designation of “MODERATE” indicated that a number of poles fall within the sliding zone or the pole set falls very close to or on the border of the sliding zone. A designation of “HIGH” was assigned when a relatively large percentage of the poles fall within the sliding zone, or when the set clearly falls within the sliding zone.

TABLE 4
Kinematic Analysis Results

Rock Cut	Toppling	Planar Sliding	Wedge Sliding	Additional Analysis
B-125	LOW	LOW	LOW	Not Required
B-126	LOW	LOW	LOW	Not Required
B-127	LOW	LOW	LOW	Not Required
B-128	LOW	LOW	LOW	Not Required

The risk for toppling, planar failure, and wedge failure, respectively, as determined from the kinematic analyses using DIPS for the proposed slope dipping at 45 degrees, orientated at 35 degrees is **LOW** and no further analysis is required. It should be noted that a rock fall catchment ditch will likely be required but was not analyzed as part of this evaluation.

COPYRIGHT 2013 BY CH2M HILL, INC. • COMPANY CONFIDENTIAL

Construction Considerations

Many factors should be considered when evaluating the applicability of an excavation method. These include the hardness and strength of the intact rock, the degree of fracturing, jointing, and bedding of the rock mass.

According to the laboratory UCS test results, the strength of intact rock samples varied from 8,760 psi to 15,300 psi, with an average UCS of 12,092 psi. Field measurements of strength ranged from R2-R3 indicating a weak to moderately strong rock mass, however the laboratory testing indicates a strong rock mass (R4). The rock observed in the borings and outcrop is moderately to thinly bedded, but there were portions of the formation in the existing rock cut that can be described as thick-bedded dolomite and sandstone. The moderate to thinly bedded and more-jointed areas can be easier to excavate than the more-massive rock. Moderately to thinly bedded dolomite was typically encountered at the top of the proposed cut slope.

Given the rock conditions described above, it is anticipated that the most cost-effective excavation method for the largest part of the proposed cut slopes would be line drilling, pre-splitting, or controlled blasting, also ripping, or other mechanical equipment can be used effectively in some areas, especially where the dolomite is moderately bedded or fractured. Other mechanical equipment excavation methods that may be considered include hand-operated jackhammers, tractor-mounted rock breakers, or boom mounted hydraulic impact hammers – these are chisel points that are driven into the rock by falling weights or by hydraulic or pneumatic hammers.

It is anticipated that most of the sandstone could be excavated using ripping. Ripping is accomplished by using long narrow teeth mounted behind a crawler tractor to loosen rock so it can be removed with dozers or loaders.

The stability and long-term performance of the rock cuts will depend to a large extent on the blasting methods, so it is important that the methods selected do the least possible damage to the rock behind the final face. The amount of overbreak (rock breakage beyond the intended excavation line) will typically increase the construction costs by increasing muck, or backfill quantities. Overbreak will be strongly affected by the discontinuities intersecting the face of the excavation and the strength of the rock.

The potential for damage from blasting comes primarily from vibrations and flyrock, with blast overpressure also posing a hazard for personnel or facilities. Where flyrock is a concern, blasting mats consisting of rubber tires or strips of conveyor belting chained together can be used. Alternatively, or in combination, the overburden soils in place can be used to dampen flyrock. A proper blasting design is essential to prevent overblasting and ensure the success of the rock excavation. Therefore, an experienced blasting consultant will be retained to independently review the blasting plan and inspect the blasting activities.

References

Bieniawski, Z. T. 1989. Engineering Rock Mass Classification. Wiley, New York.

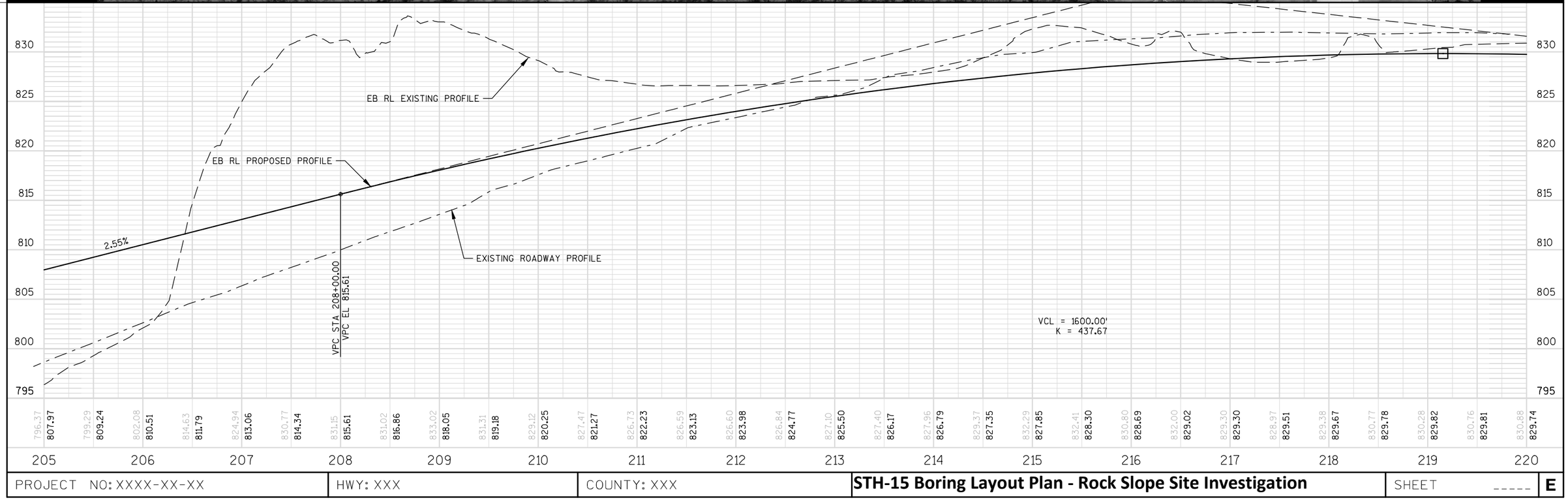
Wyllie and Mah (2004). Rock Slope Engineering. Fourth Edition, Spon Press.

COPYRIGHT 2013 BY CH2M HILL, INC. • COMPANY CONFIDENTIAL

Attachment 1
Borehole Location Map and Coring Logs

COPYRIGHT 2011 BY CH2M HILL CANADA LIMITED • ALL RIGHTS RESERVED • COMPANY CONFIDENTIAL





PROJECT NO: XXXX-XX-XX	HWY: XXX	COUNTY: XXX	**STH-15 Boring Layout Plan - Rock Slope Site Investigation**	SHEET _____	E

FILE NAME : C:\CIVIL 3D PROJECTS\433521\GR_STH15_C3D_PP_TEMP.DWG PLOT DATE : 10/30/2012 4:47 PM PLOT BY : BENJAMIN OITZINGER PLOT NAME : ---------- PLOT SCALE : 1:100_XREF

WISDOT/CADDS SHEET 44

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-128**
Sheet No.:	1 of 2
Job No.:	433521

Date Started: 11/20/2012	Date Completed: 11/20/2012	Logged By: RWM	Checked By:
Total Depth (ft): 16.6	Depth to Water (ft): 6.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 835.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
0										Grass							
	834.1									1.0ft							
					4					DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		1.22	1	R3	0	1.5	1
												1.62	1	R3	0	3	1
												1.83	1	R3	0	3	1
												2.00	1	R3	0	3	1
												2.15	1	R3	0	3	1
					4							2.38	1	R3	0	3	1
												2.48	1	R3	0	3	1
												2.65	1	R3	0	3	1
												3.04	1	R3	0	3	1
												3.14	1	R3	0	1.5	1
		1	86	22.6	6					3.4'-3.5': DOLOMITE, fine grained, light to dark gray with chert nodules, slightly weathered, medium strong (R3)		3.41	1	R3	0	1.5	1
												3.56	1	R3	0	1.5	1
												3.76	1	R3	0	1.5	1
												3.93	2	R3	0	1.5	2
					6							4.23	1	R3	0	1.5	1
												4.36	1	R3	0	1.5	1
												4.56	2	R3	0	1.5	2
5												4.63	2	R3	0	3	2
												4.76	2	R3	0	3	2
					2							5.10	2	R3	0	1.5	2
												5.30	1	R3	0	1.5	1
										6.0ft							
	828.9									CLAY, Medium stiff, sandy clay, light brown 6.1ft							
												6.12	1	R3	0	3	1
										DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3)		6.31	1	R3	0	3	1
					5							6.50	1	R3	0	3	1
												6.80	1	R3	0	3	1
												6.91	1	R3	0	3	1
												7.13	2	R3	0	3	2
												7.25	1	R3	0	1.5	1
					5							7.55	1	R3	0	1.5	1
												7.80	1	R3	45	1.5	1
												8.00	2	R3	0	3	2
												8.26	1	R3	15	1.5	1
												8.40	1	R3	0	1.5	1
		2	99.2	0	4							8.67	1	R3	0	1.5	1
												8.94	2	R3	0	3	2
												9.10	1	R3	0	1.5	1
												9.23	2	R3	0	1.5	2
					4							9.48	1	R3	0	3	1
10												9.76	2	R3	30	1.5	2

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-128**
Sheet No.:	2 of 2
Job No.:	433521

Date Started: 11/20/2012	Date Completed: 11/20/2012	Logged By: RWM	Checked By:
Total Depth (ft): 16.6	Depth to Water (ft): 6.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 835.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
10										Continuation:							
												10.08	2	R3	0	1.5	2
										10.3ft							
					5					SANDSTONE, fine to medium grained, light to dark brown, weak (R3)		10.32	1	R3	0	1.5	1
												10.40	1	R3	0	1.5	1
												10.65	1	R3	70	1.5	1
										11.0ft							
										DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3)		10.96	1	R3	0	1.5	1
												11.13	1	R3	0	1.5	1
	823.7											11.26	1	R3	15	1.5	1
												11.40	1	R3	0	1.5	1
												11.54	1	R3	0	1.5	1
					7							11.70	1	R3	0	1.5	1
												11.75	2	R3	90	1.5	2
												12.00	1	R3	0	1.5	1
												12.21	1	R3	0	1.5	1
												12.50	1	R3	0	1.5	1
					4							12.86	1	R3	0	3	1
												13.00	1	R3	0	1.5	1
												13.24	1	R3	0	3	1
												13.75	1	R3	0	3	1
		3	100	35.2	4							13.85	1	R3	90	1.5	1
												14.00	1	R3	0	1.5	2
												14.33	2	R3	0	1.5	2
15					2							14.89	2	R3	0	1.5	2
												15.09	2	R3	0	1.5	2
												15.30	1	R3	0	3	1
					5							15.57	1	R3	0	1.5	1
												15.87	1	R3	0	3	1
												16.12	1	R3	0	1.5	1
	818.5									End of Boring at 16.6'							
20																	

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-127**
Sheet No.:	1 of 3
Job No.:	433521

Date Started: 11/20/2012	Date Completed: 11/20/2012	Logged By: RWM	Checked By:
Total Depth (ft): 27.0	Depth to Water (ft): 11.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 828.3	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
0										Grass							
	827.3									1.0ft							
					1					DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		1.65	2	R3	0	1.5	1
												2.15	1	R3	0	1.5	1
					5							2.25	1	R3	45	1.5	1
												2.57	1	R3	0	1.5	1
												2.71	1	R3	0	1.5	1
												2.90	1	R3	0	1.5	1
		1	38	23													
5																	
	822.1																
					2							6.47	2	R3	0	3	1
												6.61	2	R3	0	1.5	2
												7.15	2	R3	0	1.5	2
												7.41	2	R3	0	1.5	2
					6					7.7ft		7.53	2	R3	0	1.5	2
										SANDSTONE, fine to medium grained, light to dark brown, medium strong (R3)		7.70	2	R3	0	1.5	1
										8.0ft		7.88	2	R3	0	1.5	1
												8.00	1	R3	0	1.5	1
										DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		8.08	1	R3	40	1.5	1
												8.32	2	R2	0	1.5	2
		2	86.6	28	4							8.71	1	R3	0	1.5	1
												8.90	1	R3	0	1.5	1
												9.10	1	R3	0	1.5	1
												9.42	1	R3	0	1.5	1
					4							9.60	1	R3	0	1.5	1
10												9.73	1	R3	0	1.5	1

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-127**
Sheet No.:	2 of 3
Job No.:	433521

Date Started: 11/20/2012	Date Completed: 11/20/2012	Logged By: RWM	Checked By:
Total Depth (ft): 27.0	Depth to Water (ft): 11.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 828.3	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
10										Continuation:							
												10.00	1	R3	0	1.5	1
												10.15	1	R3	0	1.5	1
												10.33	1	R3	0	1.5	1
					3					10.5ft							
										CLAY, Medium stiff, sandy clay, light brown 10.7ft							
										DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		11.12	1	R3	0	3	1
	816.9											11.27	1	R3	0	1.5	1
					3							11.64	1	R3	0	1.5	1
												12.43	2	R3	90	1.5	2
					2							12.67	1	R3	0	1.5	1
												13.03	1	R3	0	1.5	1
												13.25	1	R3	0	1.5	1
												13.45	1	R3	90	1.5	1
												13.50	1	R3	0	1.5	1
					7							13.63	1	R3	0	1.5	1
		3	88.6	38.8								13.78	1	R3	0	1.5	1
												13.98	1	R3	0	1.5	1
												14.15	1	R3	90	1.5	1
										14.4ft							
										SANDSTONE, fine to medium grained, light to dark brown, weak (R2-R3)		14.40	1	R3	0	1.5	1
15					4							14.55	1	R3	0	1.5	1
												14.97	1	R3	0	1.5	1
												15.10	1	R3	0	1.5	1
												15.22	1	R3	0	3	1
					3							15.43	1	R3	0	1.5	1
	811.7											16.42	1	R3	0	1.5	1
												16.51	1	R3	0	1.5	1
												16.75	1	R3	0	3	1
					4							16.95	1	R3	0	1.5	1
												17.05	1	R3	0	1.5	1
												17.20	1	R3	0	1.5	1
												17.53	1	R3	0	1.5	1
					5							17.87	1	R3	0	1.5	1
												17.92	1	R3	0	1.5	1
												18.05	2	R3	0	3	2
												18.30	2	R3	90	1.5	2
												18.71	1	R3	0	1.5	1
		4	54.2	30	3												
20																	

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-127**
Sheet No.:	3 of 3
Job No.:	433521

Date Started: 11/20/2012	Date Completed: 11/20/2012	Logged By: RWM	Checked By:
Total Depth (ft): 27.0	Depth to Water (ft): 11.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 828.3	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data					
												Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
20										Continuation:							
												21.15	2	R2	0	1.5	2
												21.30	2	R2	0	1.5	2
												21.42	2	R2	0	1.5	2
												21.55	2	R2	0	1.5	2
	806.5											21.73	2	R2	0	1.5	2
					5							22.07	2	R2	0	1.5	2
												22.25	2	R2	0	1.5	2
					2												
		5	25	6.8													
25																	
	801.3									End of Boring at 27.0'							
30																	

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-126**
Sheet No.:	1 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 27.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 837.0	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
0										Grass							
	835.0									2.0ft							
					7					DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		2.12	2	R3	0	1.5	2
												2.31	2	R3	0	1.5	2
												2.42	2	R3	0	1.5	2
												2.48	2	R3	0	1.5	2
												2.50	2	R3	0	1.5	2
												2.64	2	R3	0	1.5	2
												2.82	2	R3	0	1.5	2
					5							3.01	2	R3	0	1.5	2
												3.22	1	R3	0	1.5	1
												3.51	1	R3	20	1.5	1
												3.62	1	R3	0	1.5	1
												3.81	1	R3	0	1.5	1
												4.05	1	R3	0	1.5	1
												4.26	1	R3	0	1.5	1
		1	100	18.6	5							4.43	1	R3	0	1.5	1
5												4.67	1	R3	0	1.5	1
												4.91	1	R3	0	1.5	1
					1												
												5.84	1	R3	0	1.5	1
					5							6.13	2	R3	0	1.5	1
										6.4ft		6.34	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, light to dark brown, weak (R3) 6.6ft		6.43	1	R3	0	1.5	1
												6.58	1	R3	0	1.5	1
	829.8									DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3)		6.91	1	R3	0	1.5	1
												7.03	2	R3	80	1.5	2
												7.21	1	R3	0	1.5	1
												7.26	1	R3	0	1.5	1
					6							7.42	1	R3	0	1.5	1
												7.60	1	R3	0	1.5	1
												7.89	1	R3	0	1.5	1
												7.93	1	R3	0	1.5	1
												7.99	1	R3	0	1.5	1
												8.12	1	R3	0	1.5	1
												8.42	1	R3	0	1.5	1
					6							8.56	1	R3	0	1.5	1
										8.9ft		8.74	1	R3	0	1.5	1
										CLAY, Medium stiff, sandy clay, light brown 9.0ft		8.86	2	R3	0	1.5	2
												8.97	1	R3	0	1.5	1
										DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3)		9.06	1	R3	0	1.5	1
												9.12	2	R3	85	1.5	2
		2	100	33.6	5							9.51	1	R3	0	1.5	1
10												9.65	2	R3	90	1.5	2

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-126**
Sheet No.:	2 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 27.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 837.0	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
10										Continuation:							
												9.80	2	R3	0	1.5	2
												10.31	1	R3	0	1.5	1
					3							10.63	1	R3	0	1.5	1
												10.72	1	R3	0	1.5	1
												11.12	1	R3	0	1.5	1
					5							11.22	1	R3	0	1.5	1
												11.43	2	R3	0	1.5	2
												11.63	2	R3	0	1.5	2
												11.82	2	R3	0	1.5	2
	824.8																
												12.20	1	R3	0	1.5	1
												12.35	1	R3	0	1.5	1
					5							12.48	2	R2	0	1.5	1
										12.7ft							
										SANDSTONE, fine to medium grained, light to dark brown, weak (R2) 12.8ft		12.73	2	R2	0	1.5	1
												12.84	2	R2	0	1.5	1
												12.93	2	R2	0	1.5	2
										DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3) 13.3ft		13.14	1	R2	5	1.5	1
												13.27	1	R2	0	1.5	1
					4							13.32	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, light to dark brown, medium strong to weak (R2-R3)		13.74	1	R3	0	1.5	1
												14.12	2	R3	0	1.5	2
												14.30	2	R3	0	1.5	2
		3	98.4	46.2	3					14.7ft							
15										SANDSTONE, fine to medium grained, red, medium strong (R3)		14.65	2	R3	90	1.5	2
												15.10	2	R3	70	1.5	2
												15.46	1	R3	0	1.5	1
					4							15.60	1	R3	5	1.5	1
												15.65	1	R3	0	1.5	1
												15.93	1	R3	0	1.5	1
												16.03	1	R3	0	1.5	1
					4							16.38	1	R3	0	1.5	1
												16.67	1	R3	0	1.5	1
										16.9ft							
										SANDSTONE, fine to medium grained, light to dark brown, weak (R2)		16.90	1	R3	0	1.5	1
	819.8									17.3ft		17.12	1	R3	0	1.5	1
										DOLOMITE, fine grained, iron stained to dark gray to brown with sandstone inclusions, moderatly weathered, medium strong (R3)		17.38	1	R3	0	1.5	1
					5							17.43	1	R3	0	1.5	1
												17.60	1	R3	5	1.5	1
												17.81	1	R3	0	1.5	1
												17.85	1	R3	0	1.5	1
												18.04	1	R3	0	1.5	1
										18.4ft		18.27	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, light to dark brown, medium strong (R3)		18.34	1	R3	30	1.5	1
					5							18.45	1	R3	0	1.5	1
												18.82	1	R3	0	1.5	1
												19.28	1	R3	0	1.5	1
												19.38	1	R3	10	1.5	1
		4	94.4	32.4	4												
20												19.70	1	R3	0	1.5	1

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-126**
Sheet No.:	3 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 27.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 837.0	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
20										Continuation:							
												19.81	1	R3	0	1.5	1
												20.05	2	R3	90	1.5	2
												20.21	1	R3	5	1.5	1
					5							20.40	1	R3	15	1.5	1
												20.53	1	R3	0	1.5	1
										21.1 ft		20.96	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, red, medium strong (R3)		21.05	1	R3	0	1.5	1
					5							21.41	2	R3	0	1.5	2
												21.53	1	R3	0	1.5	1
												21.73	1	R3	20	1.5	1
												21.92	1	R3	0	1.5	1
	814.8																
					3							22.73	2	R3	0	1.5	1
										23.1 ft							
										SANDSTONE, fine to medium grained, light to dark brown, weak (R2)		23.11	1	R3	0	1.5	1
					3							23.52	2	R3	0	1.5	1
												23.86	1	R3	5	1.5	1
												24.02	1	R3	5	1.5	1
												24.41	1	R3	85	1.5	1
		5	100	72.8	3												
25												24.75	1	R3	0	1.5	1
												25.05	1	R2	0	1.5	1
					2							25.55	1	R2	0	1.5	1
												25.85	1	R2	0	1.5	1
												26.16	1	R2	0	1.5	1
					1							26.45	1	R2	0	1.5	1
	809.8																
												27.20	1	R3	0	1.5	1
					2							27.60	1	R3	0	1.5	1
												27.82	1	R3	0	1.5	1
												28.03	1	R3	0	1.5	1
					1												
												29.10	1	R3	0	1.5	1
												29.22	1	R3	0	1.5	1
												29.33	1	R3	0	1.5	1
		6	92	78.8	3												
30																	

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-126**
Sheet No.:	4 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 27.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 837.0	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data					
												Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
30										Continuation:							
					1												
												31.80	1	R3	0	1.5	1
	804.8																
					1												
												32.76	1	R2	0	1.5	1
												33.09	1	R2	0	1.5	1
					1												
35		7	96	92.4	0												
												35.12	1	R3	45	1.5	1
												35.30	1	R3	0	1.5	1
					2												
												35.92	1	R3	30	1.5	1
					0												
	799.8											37.00	1	R3	0	1.5	1
					3							37.56	1	R3	20	1.5	1
												37.68	1	R3	0	1.5	1
												37.95	1	R3	0	1.5	1
												38.00	1	R3	0	1.5	1
					3							38.56	1	R3	0	1.5	1
												38.71	1	R3	0	1.5	1
40		8	99	75.4	0												

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-126**
Sheet No.:	5 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 27.5	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 837.0	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data					
												Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
40										Continuation:							
												40.18	1	R3	0	1.5	1
					2							40.64	1	R3	0	1.5	1
												41.12	1	R3	0	1.5	1
					3							41.42	1	R3	0	1.5	1
												41.71	1	R3	0	1.5	1
	794.8									End of Boring at 42.2'							
45																	
50																	

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-125**
Sheet No.:	1 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 25	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 839.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
0										Grass							
										1.5ft							
	837.1									DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		1.62	1	R3	0	1.5	1
												1.73	1	R3	0	1.5	1
												1.78	1	R3	0	1.5	1
												1.82	1	R3	0	1.5	1
												1.96	1	R3	0	1.5	1
					5							2.26	1	R3	0	1.5	1
												2.41	1	R3	0	1.5	1
												2.71	1	R3	0	1.5	1
												2.90	1	R3	0	1.5	1
												3.14	1	R3	0	1.5	1
					4							3.32	1	R3	0	1.5	1
												3.51	1	R3	0	1.5	1
												3.70	1	R3	0	1.5	1
												3.72	1	R3	0	1.5	1
												3.75	1	R3	0	1.5	1
												3.79	1	R3	0	1.5	1
		1	100	9.2	9							3.83	1	R3	0	1.5	1
												3.86	1	R3	0	1.5	1
												4.15	1	R3	0	1.5	1
5												4.44	1	R3	0	1.5	1
												4.61	1	R3	0	1.5	1
												4.77	1	R3	0	1.5	1
												4.91	1	R3	0	1.5	1
					6							4.99	1	R3	0	1.5	1
												5.17	1	R3	0	1.5	1
												5.22	1	R3	0	1.5	1
												5.32	1	R3	0	1.5	1
												5.60	1	R3	0	1.5	1
					5							5.80	1	R3	0	1.5	1
												6.10	1	R3	0	1.5	1
												6.22	1	R3	0	1.5	1
												6.45	1	R3	0	1.5	1
												6.62	1	R3	0	1.5	1
	832.1											6.83	1	R3	0	1.5	1
												7.00	1	R3	0	1.5	1
					2							7.46	1	R3	0	1.5	1
												7.55	1	R3	0	1.5	1
												7.96	1	R3	0	1.5	1
					3							8.26	1	R3	0	1.5	1
												8.51	1	R3	0	1.5	1
												8.80	1	R3	0	1.5	1
												9.15	1	R3	0	1.5	1
		2	83	30.8	3							9.47	2	R3	5	1.5	2
10												9.65	2	R3	0	1.5	2

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-125**
Sheet No.:	2 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 25	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 839.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
10										Continuation:							
					5							10.01	2	R3	70	1.5	2
												10.27	2	R3	0	1.5	2
												10.42	1	R3	0	1.5	1
										10.7ft		10.51	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, red, medium strong (R3)		10.71	1	R3	0	1.5	1
										11.0ft		11.02	1	R3	0	1.5	1
					3					DOLOMITE, fine grained, iron stained to dark gray with sandstone inclusions, moderatly weathered, medium strong (R3)		11.23	1	R3	0	1.5	1
												11.65	1	R3	0	1.5	1
	826.9																
					2							12.40	1	R3	0	1.5	1
												12.75	1	R3	0	1.5	1
												13.23	1	R3	0	1.5	1
												13.31	1	R3	0	1.5	1
					4							13.46	1	R3	0	1.5	1
												13.73	1	R3	0	1.5	1
												14.22	1	R3	0	1.5	1
		3	100	55	5							14.50	2	R3	90	1.5	2
15												14.60	2	R3	0	1.5	2
												14.73	1	R3	0	1.5	1
												14.82	1	R3	0	1.5	1
					4												
					2							16.25	2	R3	0	3	2
												16.43	1	R3	0	1.5	1
												16.63	1	R3	20	1.5	1
												16.78	1	R3	0	1.5	1
	821.9									17.2ft		17.07	1	R3	0	1.5	1
										SANDSTONE, fine to medium grained, red, medium strong (R3)		17.33	1	R3	0	1.5	1
					4							17.40	1	R3	0	1.5	1
												17.52	1	R3	0	1.5	1
												17.76	1	R3	0	1.5	1
												17.90	1	R3	0	1.5	1
												18.04	1	R3	0	1.5	1
					3							18.44	1	R3	5	1.5	1
										18.9ft		18.81	2	R2	0	1.5	2
										SANDSTONE, fine to medium grained, light to dark brown, weak (R2)		18.85	2	R2	0	1.5	2
												19.41	2	R2	5	1.5	2
		4	98.2	65.6	3					19.6ft		19.50	1	R3	0	1.5	1
20												19.63	1	R3	0	1.5	1

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-125**
Sheet No.:	3 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 25	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 839.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
20										Continuation:							
										DOLOMITE, fine grained, light to dark gray with sandstone inclusions, slightly weathered, medium strong (R3)		20.12	1	R3	0	1.5	1
					3							20.68	1	R3	0	1.5	1
												20.72	1	R3	0	1.5	1
												21.08	1	R3	0	1.5	1
					4							21.27	1	R3	0	1.5	1
												21.43	1	R3	5	1.5	1
	816.9											21.97	1	R3	0	1.5	1
												22.11	1	R3	0	1.5	1
					2							22.51	1	R3	0	1.5	1
												22.85	1	R3	0	1.5	1
												23.03	1	R3	45	1.5	1
										23.3ft							
					3					SANDSTONE, fine to medium grained, light to dark brown, medium strong to weak (R2-R3)		23.34	1	R3	0	1.5	1
												23.83	1	R3	0	1.5	1
												24.00	1	R3	0	1.5	1
												24.12	1	R3	0	1.5	1
												24.32	2	R3	0	1.5	2
25		5	100	65.8	3							24.75	1	R3	5	1.5	1
												25.41	2	R3	90	1.5	2
					2							25.61	1	R3	0	1.5	1
												26.08	2	R3	70	1.5	2
					3							26.65	1	R3	0	1.5	1
	811.9											26.93	1	R3	20	1.5	1
												27.26	1	R3	0	1.5	1
												27.31	1	R3	0	1.5	1
					3							27.65	1	R3	0	1.5	1
												27.83	1	R3	0	1.5	1
30		6	12.6	6.8													

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-125**
Sheet No.:	4 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 25	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 839.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data: Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
30										Continuation:							
	806.9																
					1												
												33.74	1	R3	0	1.5	1
35		7	30.8	30.8													
	801.9																
					2							37.45	1	R3	0	1.5	1
												37.92	1	R3	0	1.5	1
												38.17	1	R3	0	1.5	1
												38.36	1	R3	0	3	1
					4							38.53	1	R3	20	1.5	1
												38.73	1	R3	0	1.5	1
												38.92	1	R3	0	1.5	1
												39.18	1	R3	0	1.5	1
												39.41	1	R3	0	1.5	1
40		8	97.8	52.2	2												

ROCK CORING LOG

CH2MHILL

Project: *State Highway 15 - Rock Excavation*
Client: *Wisconsin Department of Transportation*

Boring:	**B-125**
Sheet No.:	5 of 5
Job No.:	433521

Date Started: 11/19/2012	Date Completed: 11/19/2012	Logged By: RWM	Checked By:
Total Depth (ft): 42.2	Depth to Water (ft): 25	Northing:	
Drilling Contr.: SES	Driller: Randy	Easting:	
Drill Rig: CME 850	Core Barrel: NQ	Ground Elev.: 839.1	

Depth (ft)	Elevation (ft)	Run No.	Recovery (%)	RQD (%)	Fractures per foot	WPT (cm/s)	UCS (psi)/ Modulus (psf)	Density (pcf)	Hard Layer (%)	Lithologic Descriptions/ Notes	Lithology	Discontinuity Data					
												Depth (ft)	Weathering	Strength	Angle (deg)	Jr	Ja
40										Continuation:							
												40.14	1	R3	0	1.5	1
												40.30	1	R3	0	1.5	1
					4							40.57	1	R3	0	1.5	1
												40.83	1	R3	20	1.5	1
												40.93	1	R3	0	1.5	1
					4							41.28	1	R3	0	1.5	1
												41.56	1	R3	0	1.5	1
												41.78	1	R3	0	1.5	1
	796.9											42.09	1	R3	0	1.5	1
										End of Boring at 42.2'							
45																	
50																	

Attachment 2
Core Box
Photographs

COPYRIGHT 2011 BY CH2M HILL CANADA LIMITED • ALL RIGHTS RESERVED • COMPANY CONFIDENTIAL



Figure 2-1
State Highway 15 – Proposed Rock Cut Slope
Core Box Photo – B-125, 10.7 to 20.1

CH2MHILL



Figure 2-2
State Highway 15 – Proposed Rock Cut Slope
Core Box Photo – B-125, 20.1 to 33.7

CH2MHILL



Figure 2-3
State Highway 15 – Proposed Rock Cut Slope
Core Box Photo – B-125, 33.7 to 42.2

CH2MHILL



Figure 2-4

State Highway 15 – Proposed Rock Cut Slope

Core Box Photo – B-126, 2.0 to 11.4

CH2MHILL



Figure 2-5
State Highway 15 – Proposed Rock Cut Slope
Core Box Photo – B-126, 11.4 to 18.5

CH2MHILL



Figure 2-6
State Highway 15 – Proposed Rock Cut Slope
Core Box Photo – B-126, 18.5 to 31.8

CH2MHILL



Figure 2-7

State Highway 15 – Proposed Rock Cut Slope
Core Box Photo – B-126, 31.8 to 41.5

CH2MHILL



Figure 2-8

State Highway 15 – Proposed Rock Cut Slope
Core Box Photo – B-126, 41.5 to 42.2

CH2MHILL



Figure 2-9

State Highway 15 – Proposed Rock Cut Slope
Core Box Photo – B-127, 1.0 to 14.4

CH2MHILL



Figure 2-10

State Highway 15 – Proposed Rock Cut Slope

Core Box Photo – B-127, 14.2 to 26.0

CH2MHILL



Figure 2-11

State Highway 15 – Proposed Rock Cut Slope
Core Box Photo – B-128, 1.0 to 11.0

CH2MHILL



Figure 2-12
State Highway 15 – Proposed Rock Cut Slope
Core Box Photo – B-128, 11.0 to 16.2

CH2MHILL

Attachment 3
Laboratory Testing Results

COPYRIGHT 2011 BY CH2M HILL CANADA LIMITED • ALL RIGHTS RESERVED • COMPANY CONFIDENTIAL

AECOM
1555 N RiverCenter Drive
Suite 214
Milwaukee, Wisconsin 53212
www.aecom.com

414 944 6103 tel
414 944 6080 fax

Memorandum

To	Tom Tesch	Page	1
CC			
Subject	Uniaxial Compressive Strength of Rock for STH-15		
From	Jim Toonen		
Date	12/13/11		

Attached are the 5 compressive strength tests for the STH-15 Project. All samples will be discarded after 60 days.

AECOM

Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying Stress and Temperatures
ASTM D 7012-07
Method C

Laboratory Services Group *750 Corporate Woods Parkway Vernon Hills, Il 60061* *Phone: (847) 279-2500 Fax: (847) 279-2550*

Project No.:	60249529	Tested By:	JRT	Date:	12/12/12
Project Name:	STH-15	Calculated By:	JRT	Date:	12/13/12
Boring No (ft.):	B-125	Checked By:	WPQ	Date:	12/13/12
Depth:	15.0-15.3	Sample No.:	1		

Sample Description: Dolomite

Rock Sample Moisture Condition: [x] As Recovered from core box [ ] See Remarks [ ] Saturated [ ] Oven Dry

TOLERANCE CHECK

End Flatness: Max. Amplitude	1)	0.0001	2)	0.0001	3)	0.0001	in.	<0.0010	Yes
Squarness: >0.01 in. gap at 2 in?		No	If Yes, 0.01 in. at				in.		
Sides: Max. Amplitude	1)	0.004	2)	0.004	3)	0.004	in.	< 0.01 in.?	Yes

Angle of Core Axis to Bedding _____ Stress or Strain Rate: 0.03 % / min.

Length (in):	1)	3.761	2)	3.761	3)	3.761	Avg.	3.761 in.
Diameter (in):	1)	1.869	2)	1.869	3)	1.869	Avg.	1.869 in.

Uniaxial Compressive Strength: **15170** psi Weight: 465.3 grams

L/D: **2.0** Weight: 1.025 lbs.

Load: **41610** lbs. **As Tested Unit Weight:** **172** pcf

Uniaxial Compressive Strength Corrected for L/D <2 **NA**

YOUNG'S MODULUS

E_t (50% Co)

POISSON'S RATIO

υ_t (50% Co)

REMARKS:

Before



After



AECOM

Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying Stress and Temperatures

ASTM D 7012-07

Method C

Laboratory Services Group *750 Corporate Woods Parkway Vernon Hills, Il 60061* *Phone: (847) 279-2500 Fax: (847) 279-2550*

Project No.:	60249529	Tested By:	JRT	Date:	12/12/12
Project Name:	STH-15	Calculated By:	JRT	Date:	12/13/12
Boring No (ft.):	B-125	Checked By:	WPQ	Date:	12/13/12
Depth:	20.2-20.6	Sample No.:	2		

Sample Description: Dolomite

Rock Sample Moisture Condition: [x] As Recovered from core box [ ] See Remarks [ ] Saturated [ ] Oven Dry

TOLERANCE CHECK

End Flatness: Max. Amplitude	1)	0.0001	2)	0.0001	3)	0.0001	in.	<0.0010	Yes
Squarness: >0.01 in. gap at 2 in?		No	If Yes, 0.01 in. at				in.		
Sides: Max. Amplitude	1)	0.003	2)	0.004	3)	0.002	in.	< 0.01 in.?	Yes

Angle of Core Axis to Bedding _____ Stress or Strain Rate: 0.03 % / min.

Length (in):	1)	3.686	2)	3.686	3)	3.686	Avg.	3.686 in.
Diameter (in):	1)	1.882	2)	1.882	3)	1.882	Avg.	1.882 in.

Uniaxial Compressive Strength: **12460** psi Weight: 450.2 grams

L/D: **2.0** Weight: 0.992 lbs.

Load: **34650** lbs. **As Tested Unit Weight:** **167** pcf

Uniaxial Compressive Strength Corrected for L/D <2 **NA**

YOUNG'S MODULUS	
E_t (50% Co)	

POISSON'S RATIO	
υ_t (50% Co)	

REMARKS:

Before



After



AECOM

Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying Stress and Temperatures

ASTM D 7012-07

Method C

Laboratory Services Group *750 Corporate Woods Parkway Vernon Hills, Il 60061* *Phone: (847) 279-2500 Fax: (847) 279-2550*

Project No.:	60249529	Tested By:	JRT	Date:	12/12/12
Project Name:	STH-15	Calculated By:	JRT	Date:	12/13/12
Boring No (ft.):	B-125	Checked By:	WPQ	Date:	12/13/12
Depth:	21.5-21.8	Sample No.:	3		

Sample Description: Dolomite

Rock Sample Moisture Condition: [x] As Recovered from core box [ ] See Remarks [ ] Saturated [ ] Oven Dry

TOLERANCE CHECK

End Flatness: Max. Amplitude	1)	0.0001	2)	0.0001	3)	0.0001	in.	<0.0010	Yes
Squarness: >0.01 in. gap at 2 in?		No	If Yes, 0.01 in. at				in.		
Sides: Max. Amplitude	1)	0.003	2)	0.003	3)	0.002	in.	< 0.01 in.?	Yes

Angle of Core Axis to Bedding _____ Stress or Strain Rate: 0.03 % / min.

Length (in):	1)	3.673	2)	3.673	3)	3.673	Avg.	3.673 in.
Diameter (in):	1)	1.870	2)	1.870	3)	1.870	Avg.	1.870 in.

Uniaxial Compressive Strength: **15300** psi Weight: 439.2 grams

L/D: **2.0** Weight: 0.967 lbs.

Load: **42000** lbs. **As Tested Unit Weight:** **166** pcf

Uniaxial Compressive Strength Corrected for L/D <2 **NA**

YOUNG'S MODULUS

E_t (50% Co)

POISSON'S RATIO

υ_t (50% Co)

REMARKS:

Before



After



AECOM

Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying Stress and Temperatures
ASTM D 7012-07
Method C

Laboratory Services Group *750 Corporate Woods Parkway Vernon Hills, Il 60061* *Phone: (847) 279-2500 Fax: (847) 279-2550*

Project No.:	60249529	Tested By:	JRT	Date:	12/12/12
Project Name:	STH-15	Calculated By:	JRT	Date:	12/13/12
Boring No (ft.):	B-126	Checked By:	WPQ	Date:	12/13/12
Depth:	13.4-13.7	Sample No.:	4		

Sample Description: Dolomite

Rock Sample Moisture Condition: [x] As Recovered from core box [ ] See Remarks [ ] Saturated [ ] Oven Dry

TOLERANCE CHECK

End Flatness: Max. Amplitude	1)	0.0001	2)	0.0001	3)	0.0001	in.	<0.0010	Yes
Squarness: >0.01 in. gap at 2 in?		No	If Yes, 0.01 in. at				in.		
Sides: Max. Amplitude	1)	0.003	2)	0.003	3)	0.002	in.	< 0.01 in.?	Yes

Angle of Core Axis to Bedding _____ Stress or Strain Rate: 0.03 % / min.

Length (in):	1)	3.702	2)	3.702	3)	3.702	Avg.	3.702 in.
Diameter (in):	1)	1.871	2)	1.871	3)	1.871	Avg.	1.871 in.

Uniaxial Compressive Strength: **8770** psi Weight: 394.6 grams

L/D: **2.0** Weight: 0.869 lbs.

Load: **24090** lbs. **As Tested Unit Weight:** **148** pcf

Uniaxial Compressive Strength Corrected for L/D <2 **NA**

YOUNG'S MODULUS

E_t (50% Co)

POISSON'S RATIO

υ_t (50% Co)

REMARKS:

Before



After



AECOM

Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying Stress and Temperatures
ASTM D 7012-07
Method C

Laboratory Services Group *750 Corporate Woods Parkway Vernon Hills, Il 60061* *Phone: (847) 279-2500 Fax: (847) 279-2550*

Project No.:	60249529	Tested By:	JRT	Date:	12/12/12
Project Name:	STH-15	Calculated By:	JRT	Date:	12/13/12
Boring No (ft.):	B-126	Checked By:	WPQ	Date:	12/13/12
Depth:	36.1-36.4	Sample No.:	5		

Sample Description: Sandstone

Rock Sample Moisture Condition: [x] As Recovered from core box [ ] See Remarks [ ] Saturated [ ] Oven Dry

TOLERANCE CHECK

End Flatness: Max. Amplitude	1)	0.0001	2)	0.0001	3)	0.0001	in.	<0.0010	Yes
Squarness: >0.01 in. gap at 2 in?		No	If Yes, 0.01 in. at				in.		
Sides: Max. Amplitude	1)	0.003	2)	0.002	3)	0.002	in.	< 0.01 in.?	Yes

Angle of Core Axis to Bedding _____ Stress or Strain Rate: 0.03 % / min.

Length (in):	1)	3.660	2)	3.660	3)	3.660	Avg.	3.660 in.
Diameter (in):	1)	1.774	2)	1.774	3)	1.774	Avg.	1.774 in.

Uniaxial Compressive Strength: **8760** psi Weight: 348.1 grams

L/D: **2.1** Weight: 0.767 lbs.

Load: **21630** lbs. **As Tested Unit Weight:** **146** pcf

Uniaxial Compressive Strength Corrected for L/D <2 **NA**

YOUNG'S MODULUS

E_t (50% Co)

POISSON'S RATIO

υ_t (50% Co)

REMARKS:

Before



After



Attachment 4
Kinematic Analysis
Results

COPYRIGHT 2011 BY CH2M HILL CANADA LIMITED • ALL RIGHTS RESERVED • COMPANY CONFIDENTIAL

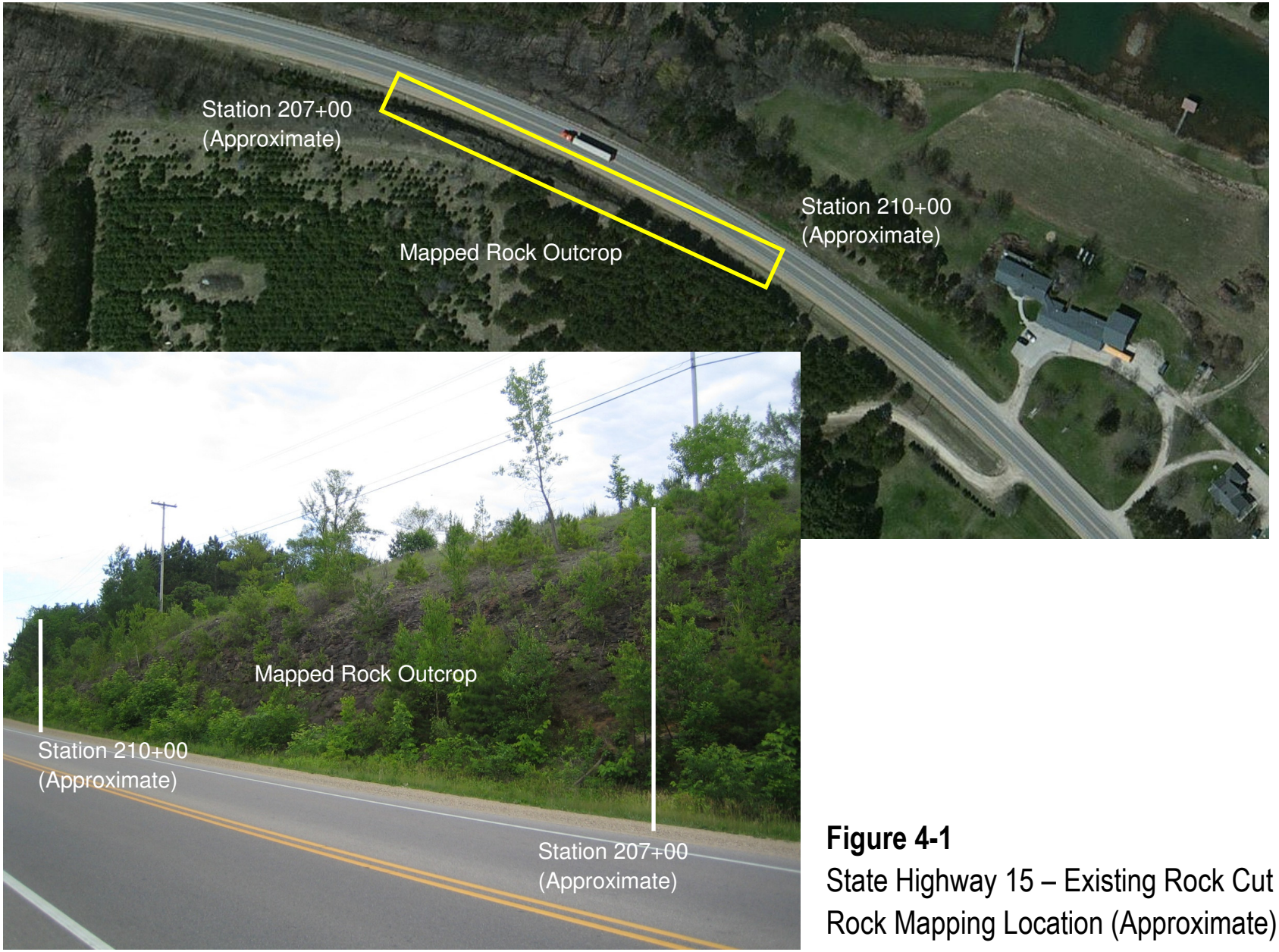


Figure 4-1
State Highway 15 – Existing Rock Cut Slope
Rock Mapping Location (Approximate)

CH2MHILL

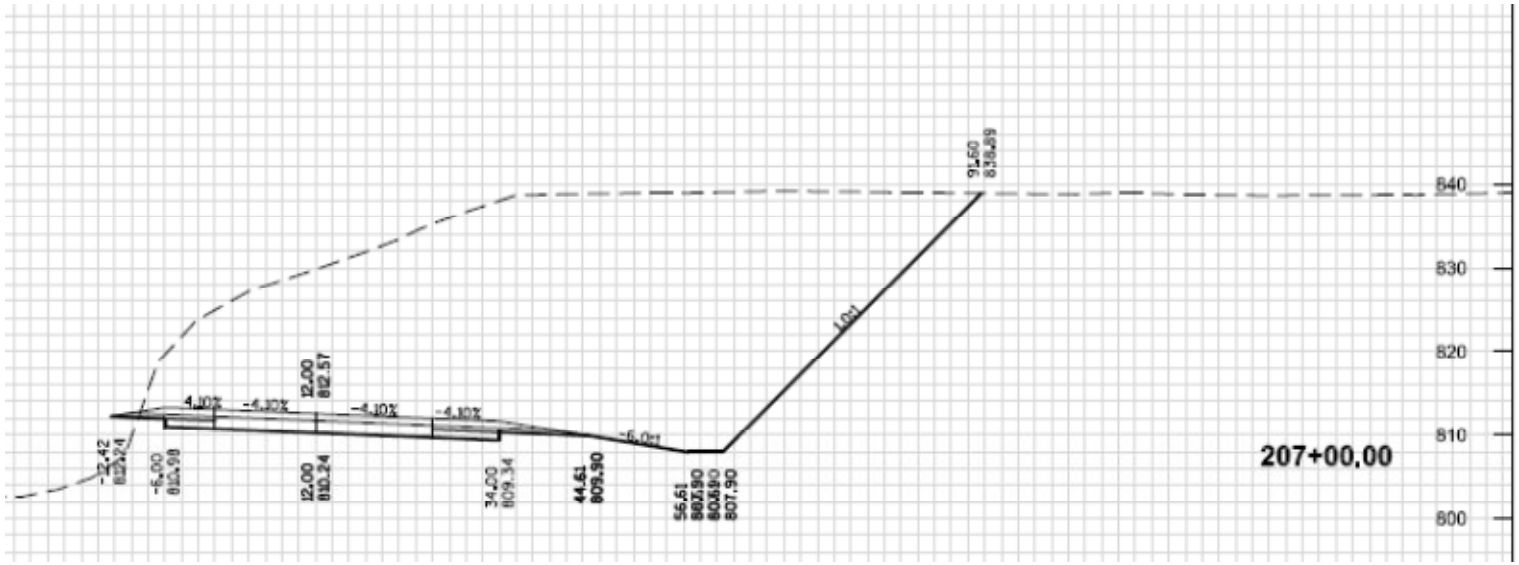
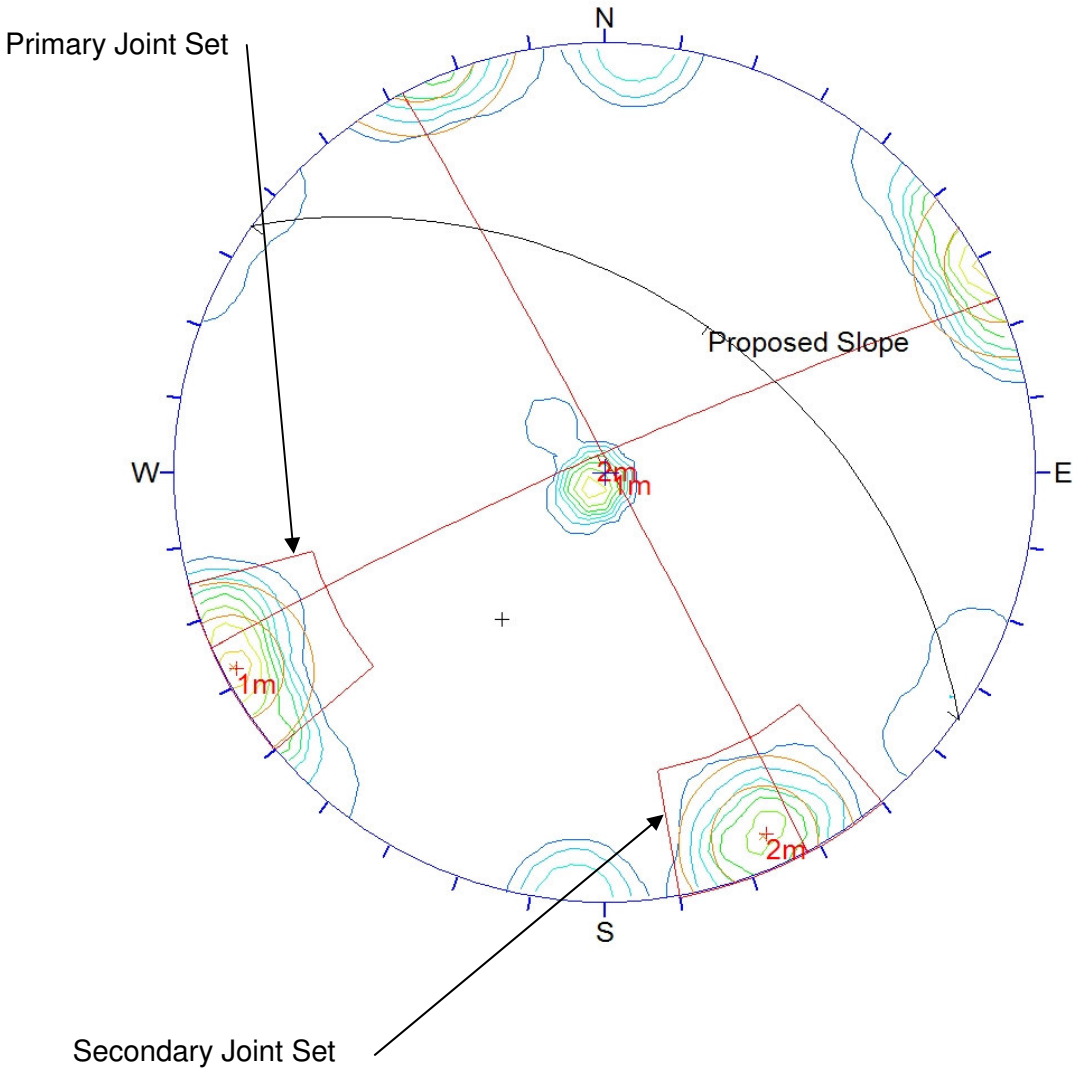


Figure 4-2
State Highway 15 – Existing Rock Cut Slope
Proposed Cut Slope Geometry

CH2MHILL



Orientations

ID		Dip / Direction
1		45 / 035
1	m	88 / 062
2	m	85 / 336

Equal Angle
Lower Hemisphere
24 Poles
24 Entries

Figure 4-3

State Highway 15 – Proposed Rock Cut Slope
Major Discontinuity Sets

CH2MHILL

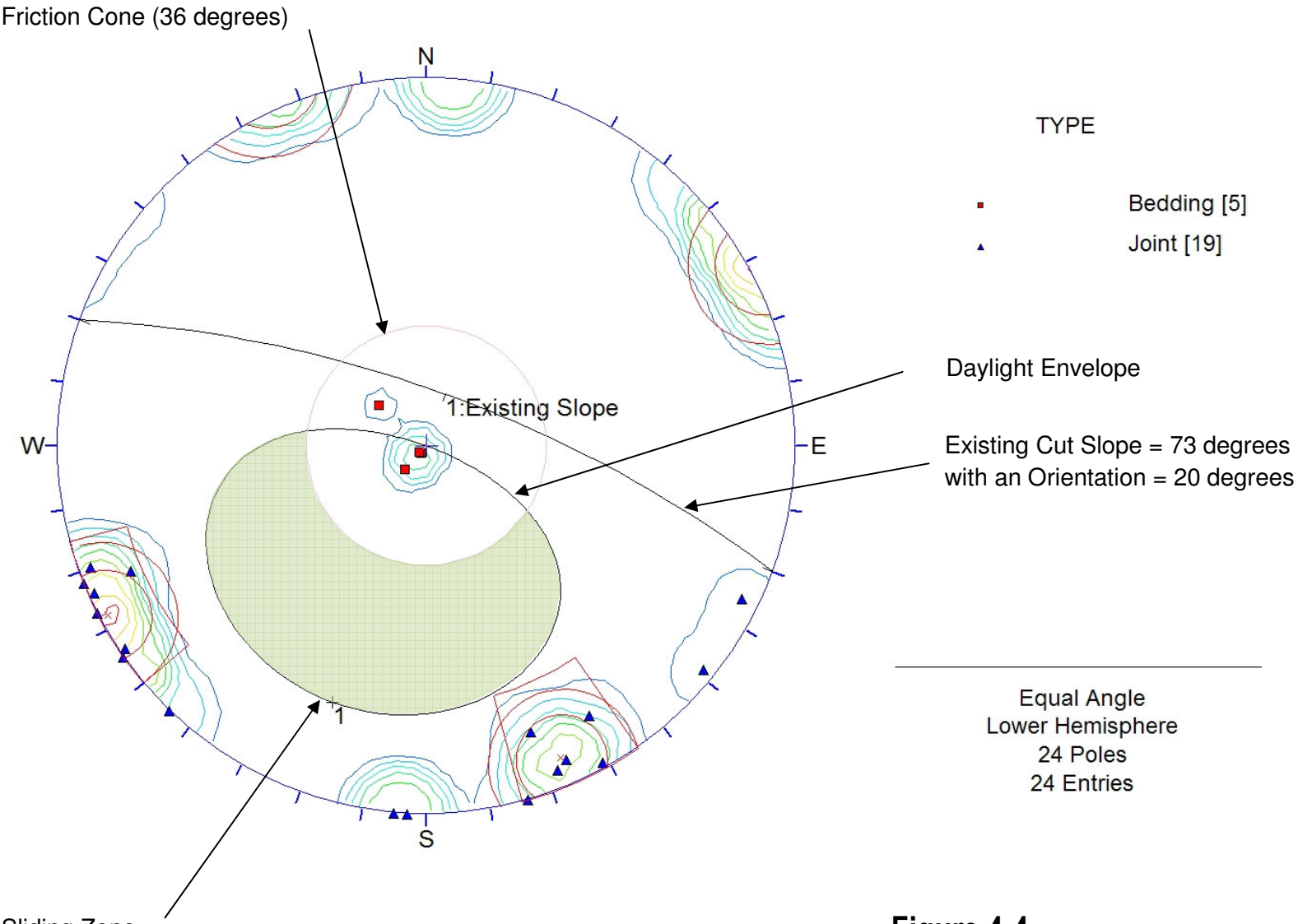
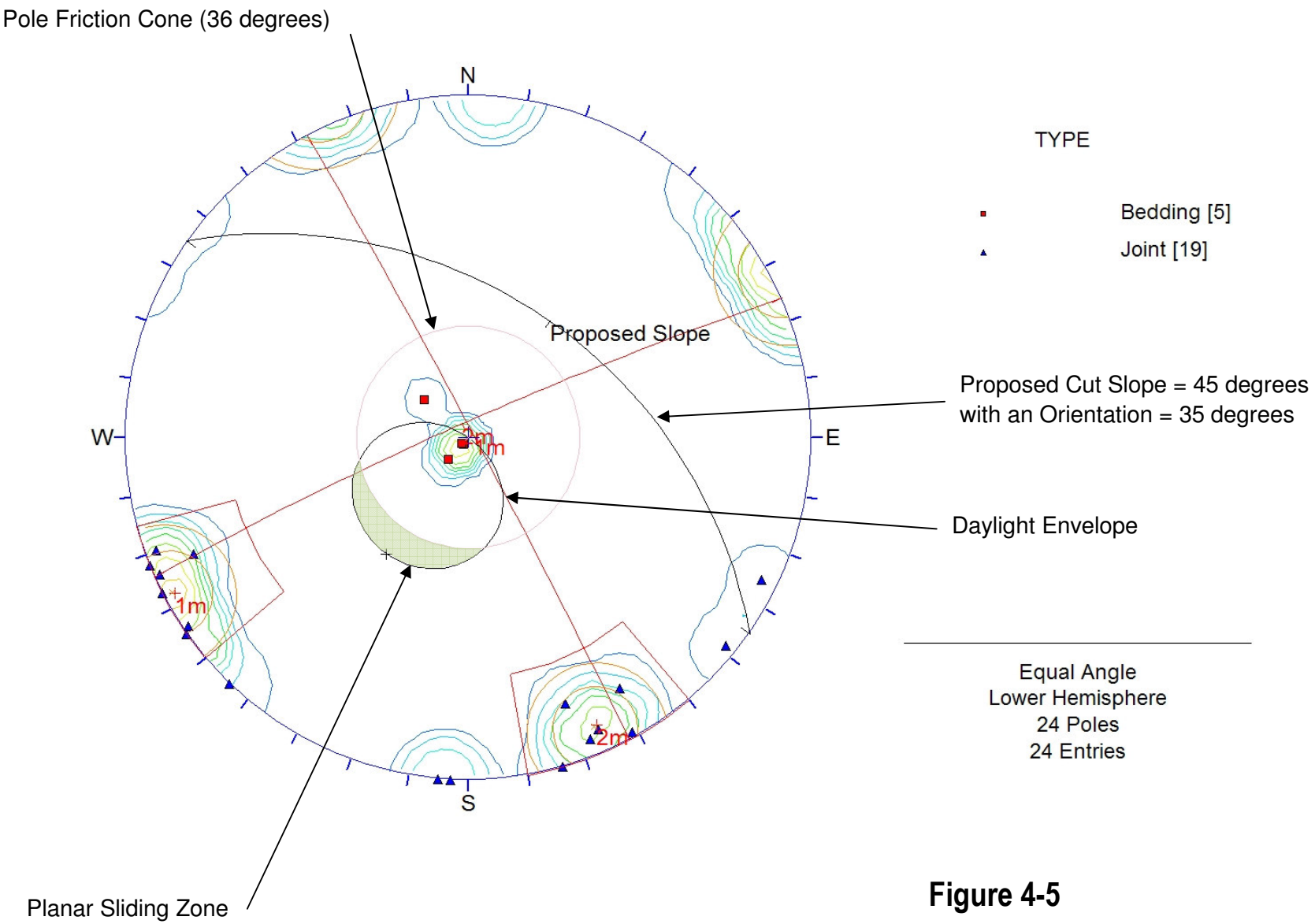


Figure 4-4

State Highway 15 – Existing Rock Cut Slope
Planar Sliding Check

CH2MHILL

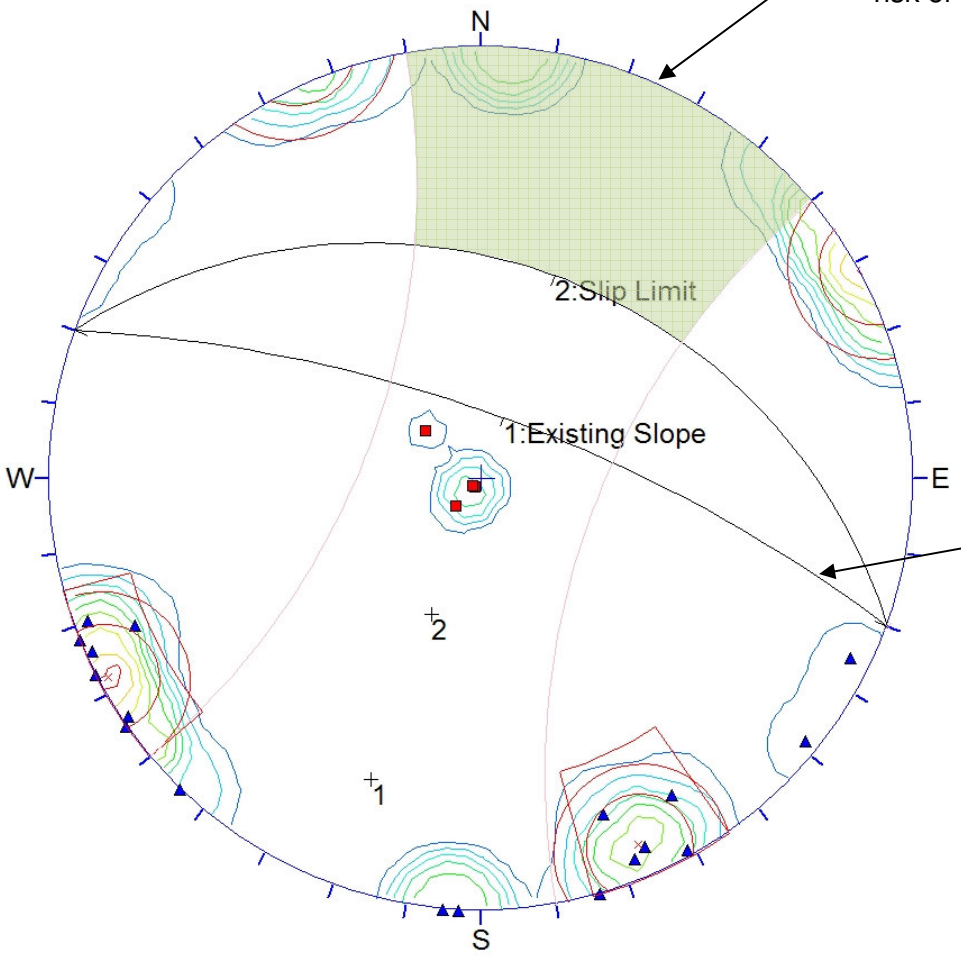


No poles fall within the Planar Sliding Zone, indicating a very low risk of sliding failure

Figure 4-5

State Highway 15 – Proposed Rock Cut Slope
Planar Sliding Check

CH2MHILL



Toppling Region
No poles fall within the Toppling Region, indicating a very low risk of toppling failure

TYPE

Bedding [5]

Joint [19]

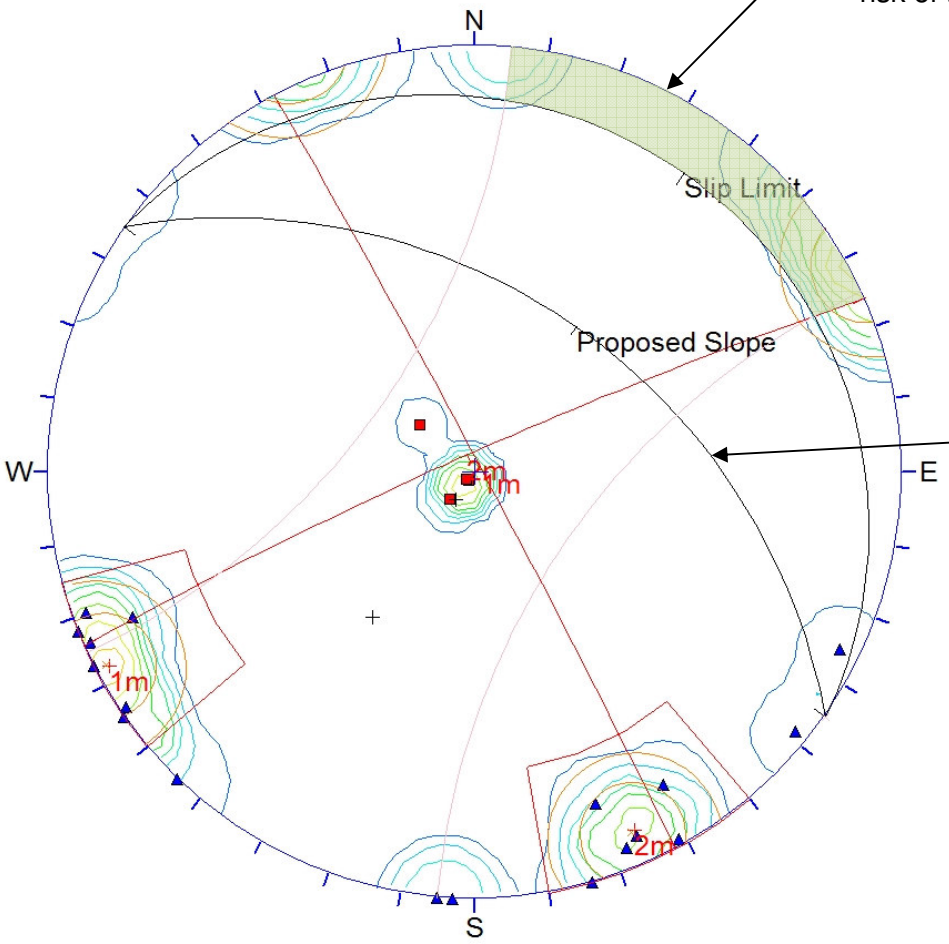
Existing Cut Slope = 73 degrees with an Orientation = 20 degrees

Equal Angle
Lower Hemisphere
24 Poles
24 Entries

Figure 4-6

State Highway 15 – Existing Rock Cut Slope Toppling Check

CH2MHILL



Toppling Region

No poles fall within the Toppling Region, indicating a very low risk of toppling failure

TYPE

Bedding [5]

Joint [19]

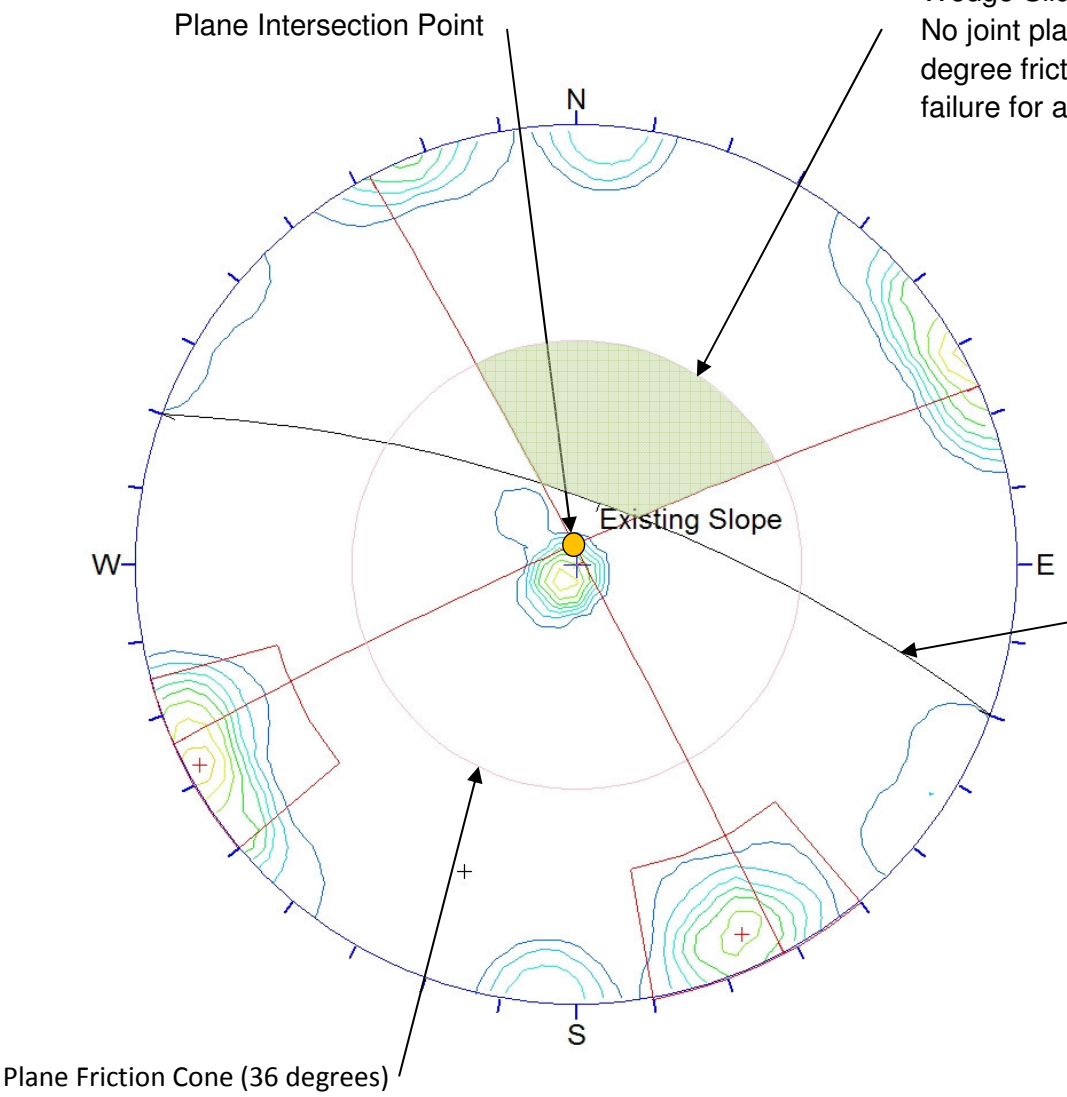
Proposed Cut Slope = 45 degrees with an Orientation = 35 degrees

Equal Angle
Lower Hemisphere
24 Poles
24 Entries

Figure 4-7

State Highway 15 – Proposed Rock Cut Slope Toppling Check

CH2MHILL



Wedge Sliding Zone
No joint planes intersect outside the cut slope and inside to 36 degree friction cone, indicating a low risk of wedge sliding failure for a joint friction angle greater than 36 degrees.

Orientations

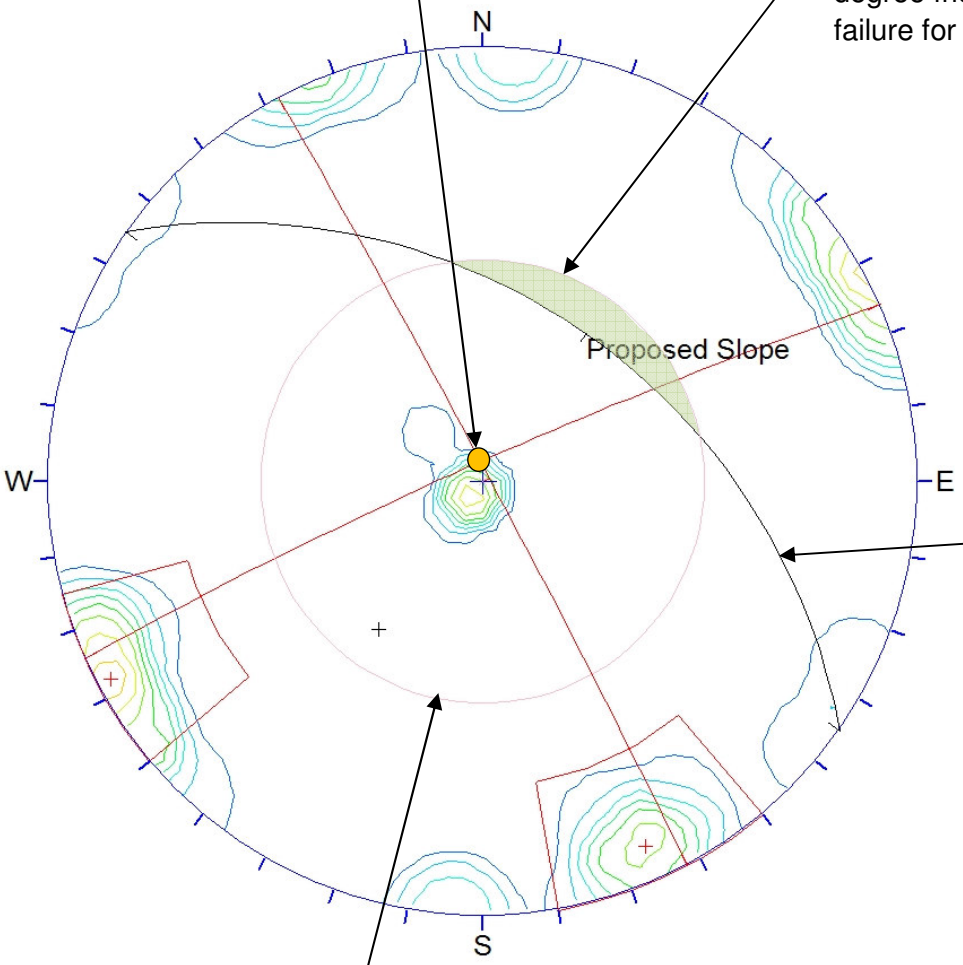
ID		Dip / Direction
1		73 / 020
1	m	88 / 062
1	w	88 / 062
2	m	85 / 336
2	w	85 / 336

Existing Cut Slope = 73 degrees with an Orientation = 20 degrees

Equal Angle
Lower Hemisphere
24 Poles
24 Entries

Figure 4-8
State Highway 15 – Existing Rock Cut Slope Wedge Sliding Check

CH2MHILL



Plane Intersection Point

Wedge Sliding Zone
No joint planes intersect outside the cut slope and inside to 36 degree friction cone, indicating a low risk of wedge sliding failure for a joint friction angle greater than 36 degrees.

Orientations

ID		Dip / Direction
1		45 / 035
1	m	88 / 062
1	w	88 / 062
2	m	85 / 336
2	w	85 / 336

Proposed Cut Slope = 45 degrees with an orientation = 35 degrees

Equal Angle
Lower Hemisphere
24 Poles
24 Entries

Plane Friction Cone (36 degrees)

Figure 4-9
State Highway 15 – Proposed Rock Cut Slope
Wedge Sliding Check

CH2MHILL