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August 16, 2011

City of Beaver Dam
c/o Mr. John Somers, Director of Administration
205 S. Lincoln Avenue
Beaver Dam, WI 53926

SUBJECT: Subsurface Exploration and Foundation Evaluation
Proposed Business Park
North Side Business Park
USH 151 and Kellom Road
Beaver Dam, Wisconsin
MES Project No. 7-113115

Dear Mr. Somers,

The subsurface exploration and foundation evaluation for the referenced project has been completed. Two (2) copies of the report are included herein. As requested, we have also submitted one (1) copy to MSA Professional Services, Inc.

After you have had the opportunity of reading the report, please call at any time with any questions or comments you may have. Midwest Engineering Services, Inc. appreciates the opportunity to be of service on this project, and looks forward to continuing as your geotechnical consultant during the design and construction phases, as well as on your upcoming projects.

Very truly yours,

MIDWEST ENGINEERING SERVICES, INC.

Ted A. Cera

Ted A. Cera, P.E.
Department Manager
Geotechnical Services

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James M. Becco, P.E.
Region Manager

SUBSURFACE EXPLORATION AND FOUNDATION EVALUATION

Proposed Business Park

North Side Business Park

USH 51 and Kellom Road

Beaver Dam, Wisconsin

Prepared for

City of Beaver Dam

205 S. Lincoln Avenue

Beaver Dam, Wisconsin 53926

August 16, 2011

MES Project No. 7-113115

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INTRODUCTION

General

This report presents the results of the subsurface exploration and foundation evaluation for the proposed North Side Business Park, in Beaver Dam, Wisconsin. The work was performed for the City of Beaver Dam, at the request of Mr. John Somers.

Purpose

The purpose of this study was to perform a preliminary evaluation of the subsurface conditions at specific boring locations on the site, and to provide subsurface information for general site feasibility and preliminary design planning for a proposed development. A comprehensive foundation evaluation and recommendations for specific structures were beyond the scope of this preliminary site feasibility evaluation, but are recommended when details of the development are known.

Scope

The scope of services for this preliminary geotechnical study included a site reconnaissance, the subsurface exploration, a determination of soil characteristics by field and laboratory testing, and an engineering evaluation and analysis of the data obtained. The scope of the field work, including the number, depth, and location of the borings, was determined by the client.

Authorization

The description of services and authorization to perform this subsurface exploration and analysis were in the form of a signed acceptance copy of MES Proposal No. 7-11182, dated July 6, 2011. The general conditions for the performance of the work were referenced in the proposal. This report has been prepared on behalf of, and exclusively for the use of the City of Beaver Dam. The information contained in this report may not be relied upon by any other parties without the express written consent of MES, and acceptance by such parties of MES' General Conditions.

SITE AND PROJECT DESCRIPTION

Site Features

The project site is located at the west side of USH 151, north and west of the end of the cul-de-sac of Kellom Road, in Beaver Dam, Wisconsin. At the time of the exploration, the site was generally vacant. The site was primarily covered with corn crop, with several wooded areas present as well. A farmstead with associated structures was present at the southeast corner of the site.

The topography of the general area, as well as the project site, is rolling with an elevation difference of approximately 30 feet between the various boring locations. At the time of the exploration, the surface of the site was firm and the ATV drill rig experienced no difficulty in moving around.

Project Description

From the information provided by client, it is understood that the proposed project will consist of the development of a new business park with associated parcels and roadways. Specific details regarding the size and types of structures was not available, but it is anticipated that they will generally be single-story commercial and industrial buildings of slab-on-grade constructed without basements. Specific loading criteria for proposed buildings was also not available at this time.

Roadways are anticipated to consist of asphalt or concrete on aggregate base. It is anticipated that the proposed pavement areas will be subjected to moderate traffic volumes and loading.

The existing grades across the property presently range between about EL. 944.4 and EL. 974.4. Cutting and filling are likely to be necessary to balance surface elevations. However, no proposed grades have been provided.

EXPLORATION AND LABORATORY PROCEDURES

Scope Summary

The field and laboratory data utilized in the evaluation and analysis of the subsurface materials was obtained by drilling exploratory test borings, securing soil samples by the split-spoon sampling method, and subjecting the samples to laboratory testing.

Field Exploration

Twenty-nine (29) soil test borings were drilled for this project to depths ranging from 11 feet to 21.5 feet below the existing ground surface. The number, planned depths, and locations of the borings were provided by the client. The borings were performed on a general grid layout across the site as provided by MSA. The specific boring locations were not staked at the time of drilling. Rather, the MES drill crew roughly located the borings by taping and pacing methods. The actual boring locations and surface elevations were subsequently surveyed by MSA. The elevations are included on the boring logs provided in the Appendix. Additionally, the actual boring locations are depicted on the boring location diagram provided by the client.

The borings were planned to extend to depths between 20 to 35 feet, however, auger refusal was encountered in most of the borings on cobbles, boulders or bedrock at

depths ranging from about 11 to 19± feet below existing grade (EL. 933.8 to EL. 957.9±).

The soil test borings were performed with an All Terrain Vehicle (ATV) mounted rotary drilling rig utilizing continuous flight hollow stem augers to advance the holes. The ATV rig was utilized to minimize surface disturbance due to the agricultural nature of the site. Representative samples were obtained by the Standard Penetration Test (SPT) method in general accordance with ASTM D-1586 procedures at 2.5 foot intervals to 10 feet, and then at 5 foot intervals thereafter to the end of the borings. The SPT provides a means of determining the relative density of granular soils and comparative consistency of cohesive soils, thereby providing a method of evaluating the relative strength and compressibility characteristics of the subsoils.

The SPT soil samples were transferred into clean glass jars immediately after retrieval, and returned to the laboratory upon completion of the field operations. Samples will be discarded unless other instructions are received. All soil samples were visually classified by a soils engineer in general accordance with the Unified Soil Classification System (ASTM D-2488-75). After completion of the borings, the auger holes were backfilled to the ground surface with bentonite chips.

A copy of the Soil Boring Logs and Boring Location Diagram (Figure 1) are enclosed in the Appendix. The soil stratification shown on the logs represents the approximate soil conditions in the actual boring locations at the time of the exploration. The terms and symbols used on the logs are described in the General Notes found in the Appendix.

Laboratory Physical Testing

Soil samples obtained from the exploration were visually classified in the laboratory, and subjected to testing, which included moisture content determination.

Selected cohesive soil samples were tested in unconfined compression with a controlled strain loading rate and/or with a calibrated hand penetrometer to aid in evaluating the soil strength characteristics. The values of strength tests performed on soil samples obtained by the Standard Penetration Test Method (SPT) are considered approximate, recognizing that the SPT method provides a representative but somewhat disturbed soil sample.
The laboratory testing was performed in general accordance with the respective ASTM methods, as applicable, and the results are shown on the boring logs in the Appendix.

DESCRIPTION OF SUBSURFACE CONDITIONS

General

A description of the subsurface conditions encountered at the test boring locations is shown on the Soil Boring Logs. The lines of demarcation shown on the logs represent

approximate boundaries between the various soil classifications. It must be recognized that the soil descriptions are considered representative for the specific test hole location, but that variations may occur between and beyond the sampling intervals and boring locations. Soil depths, topsoil and layer thicknesses, and demarcation lines utilized for preconstruction planning should not be expected to yield exact and final quantities. A summary of the major soil profile components is described in the following paragraphs.

Soil Conditions

The surface materials present at the boring locations consisted of about 6 to 15 inches of brown to dark brown clayey silt, sandy silt, or silty clay topsoil. The underlying soils were predominantly granular, consisting of sandy silt, silty sand, and sand and gravel, with intermixed clayey silt layers, and cobbles and/or boulders. In some locations, the topsoil was underlain by a layer of silty clay above the underlying granular soils. The granular soils were typically in a dense to very dense condition, with N-values generally increasing significantly with depth. The cohesive soils were very soft to hard in consistency. Unconfined compressive strengths ranged from 0.22 to 4.5+ tsf.

Auger refusal was experienced at each of the borings prior to reaching the planned depths, with the exception of B-5, B-13, B-23, B-24, and B-29, at depths of about 11 to 19 feet (EL. 933.8 to EL. 957.9±) on possible cobbles, boulders or bedrock. Refusal depths are outlined in the following table:

Boring No.	Refusal Depth (Feet)	Refusal Elevation
B-1	12.5±	944.4±
B-2	14	941.5±
B-3	11.5	957.7±
B-4	11.5	955.7±
B-5	*	*
B-6	13	938.9±
B-7	14	938.3±
B-8	17	939.4±
B-9	19	944.6±
B-10	12.5	946.2±
B-11	14.5	940.5±
B-12	12	943.3±
B-13	*	*
B-14	14.5	937.5±
B-15	11	947.3±
B-16	12	951.3±
B-17	12	956.4±
B-18	16.5	938.7±
B-19	11	943.6±

B-20	11.5	935.3±
B-21	11.5	936.6±
B-22	12.5	933.8± (low)
B-23	*	*
B-24	*	*
B-25	11.5	946.9±
B-26	16.5	957.9± (high)
B-27	16.5	938.5±
B-28	12.5	937.5±
B-29	*	*

*Planned boring depth reached.

The foregoing discussion of soil conditions on this site represents a generalized soil profile as determined at the test boring locations. A more detailed description and supporting data for each test location can be found on the individual Soil Boring Logs.

Groundwater Observations

Groundwater observations were made during the drilling operations, and in the open boreholes at completion. Groundwater was not encountered in the boreholes at the time of drilling. Most of the holes caved to varying depths upon withdrawal of the auger; therefore observations could not be made below the caved depths.

On the basis of the field observations and the soils relative moisture contents, the groundwater level is judged to be below the depth of the borings at the time of the exploration.

The groundwater observations reported herein are considered approximate. It must be recognized that groundwater levels fluctuate with time due to variations in seasonal precipitation, lateral drainage conditions, and soil permeability characteristics. Longer term monitoring would be required to better evaluate groundwater levels on this site.

EVALUATION AND RECOMMENDATIONS

General Development Considerations

In view of the subsurface conditions encountered in the test borings, conventional spread footing foundations, along with conventional slab-on-grade construction, can be used for support of proposed structures within the proposed development.

The natural soils are generally considered to be suitable for slab, pavement, and utility support; however, zones of softer soils are present in areas, and some undercutting or other forms of stabilization/remediation may be required on at least an isolated basis.

Dense soils were encountered at relatively shallow depths across the site. Additionally, auger refusal on cobbles, boulders or possible bedrock was encountered at 24 of the boring locations at depths ranging from 11 to 19 feet (EL. 933.8 to EL. 957.9±) below existing grade. Difficulty with excavation work and longer digging times in areas should be expected. Dependent on final grades, specialized excavation techniques and/or blasting may be required. Test pits are recommended as part of design planning to better evaluate the character and excavatability of the refusal materials, if excavation to or below the refusal depths is anticipated. No major difficulty with groundwater is expected for excavations performed within the depths of the borings.

Floor slabs and pavements can be supported by the existing soils below the topsoil following proper preparation, which will include the removal of soft, unstable or unsuitable zones. Conventional asphalt and concrete pavements can be used for roadways, parking lots and driveways. A discussion of the preliminary foundation design parameters, as well as the support conditions for floor slabs and pavements, is included in the following sections.

Site Preparation

The presence of organic topsoil and vegetation in the subgrade can adversely affect the serviceability of structural fills, foundations, floor slabs, pavements, and other structures placed upon them. Approximately 6 to 15 inches of topsoil were present on the surface of the site at the boring locations. However, some variation should be anticipated ,especially within agricultural fields. All topsoil, vegetation, trees, roots and other organic matter must be stripped from the areas of footings, floor slabs, pavements, sidewalks, and other structures.

Site preparation will require removal of the existing structures and remnants of former buildings, including foundations and underground utilities. Extensive areas of loose backfill material may be encountered within utility trenches, adjacent to the existing structures, and in former building and basement areas. These will also require removal. The areas, including basements, must then be properly backfilled with compacted structural fill. Prior to the backfilling, the areas must be observed by an MES representative to evaluate the suitability of the subgrade for subsequent support of the new building, utilities, or other structures.

Backfill adjacent to the existing foundation walls, and within any existing utility trenches, must be evaluated by a representative of the soil engineer to determine its suitability to support new fill, floor slabs, and footings. Some removal of loose or unsuitable soils may be expected to be necessary. New construction must be performed in a manner that will prevent the undermining of existing footings where excavations extend near the existing building. If excavation is performed within the foundation influence zone of the existing footings, the existing foundations must be properly underpinned to prevent instability and damage to existing structures. Existing utilities or portions of the existing structures that extend into planned building areas must be completely removed or rerouted, as necessary, and the area properly backfilled.

The majority of the property was a farm field at the time of the field exploration. If any drain tiles are encountered during construction, they must be tied into new drainage structures. The existing drain tiles should not be abandoned, since they may still actively drain areas of the subject site or adjacent properties.

Auger refusal on possible cobbles, boulders, or bedrock was encountered at relatively shallow depth in most of the borings. Specialized removal techniques, such as ripping and/or blasting, may be required to establish the invert elevations for utilities and planned bearing grades for footings in areas, dependent upon the site grades that are established. If blasting is performed, it is recommended that a specialty contractor be utilized. Blasting can cause noise and vibration disturbance to neighboring structures, and must be performed using extreme caution. Consideration should be given to making video or photographic documentation of the condition of nearby buildings, utilities, or other structures prior to blasting. Following the blasting, the exposed subgrade should be observed by the geotechnical engineer to ensure that disturbance of the overburden is not excessive, and that the blasted rock is sufficiently stable for piping or foundation support. It is likely that at least some compaction of blasted rock will be required. In addition, some overexcavation of larger stone may be required.

After the removal of topsoil and other unsuitable bearing materials, the subgrade should be thoroughly proofrolled to detect unstable, yielding soils, which must be removed or improved by appropriate preparation and compaction techniques. Scarification and drying of wet soils or removal and replacement with suitable fill, are two methods which can be considered, but this should be determined by the soils engineer at the time of construction. Low areas may then be raised to the planned grades with suitable properly compacted fill.

The exposed subgrade in the building and pavement areas is expected to consist of areas of cohesive soils. Such soils are considered highly moisture sensitive and subject to softening. Therefore, equipment and worker traffic must be kept to a minimum on subgrade bearing surfaces, especially during times of precipitation or following spring thaw. Some difficulty with subgrade preparation can be expected in wet or cold weather conditions. Removal of unsuitable portions of the near surface soils and replacement with structural fill will likely be required, on at least an isolated basis, especially if earthwork is not carried out during periods of relatively warm, dry weather, which provide more favorable conditions for drying of these soils. Any soft zones, which cannot be improved by scarification and aeration, must be removed and replaced with compacted structural fill, such as clean crushed stone, possibly in conjunction with the use of a geotextile fabric. Lime and fly ash modification are two additional remedial measures which can be considered. However, this must only be performed at the direction and under the supervision of the geotechnical engineer. A proper mix design must be performed prior to the performance of any modification. Substantial construction delays and difficulty with subgrade stabilization should be expected during periods of wet and/or cool weather. Consideration should be given to installing construction roads to reduce disturbance to the sensitive subgrade soils.

Every effort must be made to keep excavations dry. If construction proceeds during wet weather, some additional overexcavation may be necessary. If weather permits, the soil could be dried and recompacted. A crushed stone working mat, possibly in conjunction with a geotextile fabric may also be feasible to help stabilize subgrades. Site grading runoff should be directed to catch basins, so that the potential for the softening of the foundation and pavement subgrade soils is reduced.

Where the removal of unsuitable bearing material is performed beneath proposed footings, the excavation must extend laterally beyond the perimeter of the foundation for a distance at least equal to the thickness of the fill below the footing bottom. This general guideline also applies to instances where a raised structural fill pad is constructed to achieve a bearing elevation greater than existing grades. The influence zone of footing stresses can be represented as an imaginary 45° line extending downward and outward from the footing bottom. All fill placed within this zone after cutting to firm soil must be properly engineered, from the bottom of the cut, up to the floor slab subgrade elevation.

If site grades are raised in excess of 2 feet, the first lift of new fill must be placed so as to extend a minimum lateral distance of 5 feet beyond the planned top building pad dimension (for fills less than 5 feet in thickness), or for a distance equal to at least 1 foot laterally beyond the top pad dimension for every foot of fill thickness (for fills greater than 5 feet in depth). Subsequent lifts can then be placed on an approximate 1H:1V slope back up to the planned top perimeter dimension of the pad. Proper moisture control is essential to reduce the amount of compactive effort necessary to achieve the desired densities.

When a firm and stable subgrade is established, low areas may be raised to planned grades with properly compacted structural fill. Any new fill should be a clean granular soil, such as those materials meeting the gradations outlined in Section 209 or 305 of the State of Wisconsin Standard Specification for Highway and Structure Construction. If fine-grained soils, such as those with high silt or clay content are used, they should generally be placed over large open areas, where conditions are more favorable for the proper placement and compaction of such materials. It must be recognized that high silt or clay content materials are difficult to compact when placed at moisture contents beyond a few percent of the optimum moisture content. In addition, the near surface soils across the site are considered moisture sensitive; therefore, some difficulty with subgrade preparation should be expected, especially if they become wet during construction. Fill must be placed in layers of not more than nine (9) inches in thickness, at moisture contents at or near optimum, and be compacted to a minimum density of 95 percent of the maximum dry density as determined by ASTM designation D-698. The on-site soils beneath the topsoil are considered suitable for use as new fill to raise grades, generally over large areas. However, some sorting or moisture conditioning may be required. Silt, clay, and wet granular soils are not suitable for reuse as compacted fill in trenches, or adjacent to foundation stem walls or retaining walls.

Proper moisture control is essential to reduce the amount of compactive effort necessary to achieve the desired densities. This is especially true of clayey soils, where scarification and aeration may be required to achieve near - optimum moisture levels prior to compaction. A sheepsfoot roller is generally required for compaction of clayey soils, whereas a vibratory smooth drum roller is preferred for granular material. Small hand-operated compactors should be used in confined areas; granular fills are generally more readily compacted to the required densities in such applications.

It is recommended that well-graded granular soils be utilized as backfill in new utility trenches and along side below grade walls to reduce the potential for consolidation and settlement of the fill. All fill soils must be placed and compacted under engineering controlled conditions, to provide suitable support for overlaying structures and roadways. Additional guidance can be provided at the time of construction in the selection process for grade-raising fill and trench backfill.

When excavations encroach upon or extend below the groundwater or perched zones, and into sandy or silty soils, subgrade instability and sloughing/caving of sidewalls can occur. Some overexcavation of softened or loosened soils, in conjunction with the use of a crushed stone working mat, may be necessary. Additionally, significantly widened excavations may result, or be required for stability.
The selection of fill materials for various applications should be done in consultation with the soils engineer. Similarly, the evaluation of the subgrade and placement and compaction of fill for structural applications should be monitored and tested by a qualified representative of the soils engineer.

Preliminary Foundation Design Recommendations

The following is a general overview of the subsurface conditions for the site, as it relates to foundation analysis, and can be used in preliminary site planning. It is recommended that a more in depth investigation be conducted when specific design details are known (such as the sizes, types, and locations of structures), prior to construction, to determine more specific recommendations.

Based on the data obtained at the soil borings for this study, conventional spread foundations bearing upon suitable natural soils can be used to support proposed structures. Spread foundations bearing upon suitable natural soils or compacted structural fill soils can generally be dimensioned to exert a net allowable bearing pressure in the range of 1,500 to 4,000 psf, depending upon location and bearing elevation. Some softer zones of natural soils were encountered within the borings in areas. Dependant upon final grades, some undercutting may be required on an isolated basis.

The preceding analysis is based upon the conditions encountered at the borings. Variations may occur between and beyond these locations. Some nominal overexcavation within natural soils may be necessary to utilize the recommended

bearing capacities. The bearing subgrade within all foundation excavations should be tested and verified by a representative of the geotechnical engineer at the time of construction utilizing static cone penetrometer tests or dynamic cone penetrometer tests for cohesive and granular soils, respectively. Where unsuitable soils are present, they must be removed throughout a zone extending one foot laterally for each foot removed below the foundation, on either side of the planned footing. The overexcavated area can then be backfilled with structural compacted fill.

It should be recognized that refusal depths may vary between and beyond boring locations, and could be encountered at even shallower depths in other areas. Specialized removal techniques, such as ripping and/or blasting, may be required to establish the planned elevations for the proposed structures or to establish the invert elevations for utilities. If blasting is performed, it is recommended that an experienced specialty contractor be utilized to perform the blasting operations. Blasting can cause noise and vibration disturbance to neighboring buildings, utilities, or other structures, and must be performed using extreme caution. Following the blasting, the exposed subgrade should be observed by the geotechnical engineer to ensure that disturbance of the overburden is not excessive, and that the blasted rock is sufficiently stable for piping or foundation support. It is likely that at least some compaction of blasted rock will be required. In addition, some overexcavation of larger stone may be required.
The suitability of the existing soils for support of proposed foundations must be determined by testing by a qualified geotechnical engineer during construction, utilizing static cone penetrometer tests or dynamic cone penetrometer tests for cohesive and granular soils, respectively. Soft, loose, or otherwise unsuitable materials not disclosed by the borings, may be encountered in the foundation excavations at the bearing elevation. If unsuitable existing soil is present, it must be removed throughout a zone extending one foot laterally for each two feet removed below the foundation, on either side of the planned footing. The over-excavated area must be backfilled with structural compacted fill. As an alternate, the excavation could extend 4 inches beyond the plan footing width to suitable bearing soil and then backfilled with lean (500 to 1000 psi) concrete mix to planned footing grade to reduce lateral over-excavation.

All perimeter footings must be placed at a depth of 4 feet below the finish grade for frost protection. Due to periodic severity of winters in this area, it is recommended that footings in poorly heated or unheated areas of the building also be placed at least 4 feet below the adjacent exterior grade. Interior footings not subject to frost action may be placed at a shallow depth of 18 inches below the floor slab, provided they bear on suitable natural soils or engineered fills. All footings must be protected from the effects of frost if construction is carried out during winter months.

It is recommended that the footings supporting individual columns have a minimum dimension of 24 inches, and continuous footings have a minimum width of 18 inches, even if the maximum recommended allowable bearing pressure is not fully utilized. In order to minimize the effects of any slight differential movement that may occur due to variations in the character of the supporting soils and any variations in seasonal

moisture contents, it is recommended that all continuous footings be suitably reinforced to make them as rigid as needed.

In general, the performance of foundation systems on this site is dependent on the various factors discussed herein. The excavation, preparation, and concreting of foundations should be monitored and tested by a representative of the soils engineer.

Preliminary Floor Slab Design Recommendations

Prior to constructing the floor slabs, and prior to the placement of any fill used to raise grades, the exposed subgrade must be prepared utilizing the proofrolling procedures described previously. In areas that exhibit soft, yielding or unstable soil conditions, the following remedial measures are recommended to provide a stable subgrade. It must be recognized that the high silt and clay content soils are highly sensitive to increases in moisture and construction disturbance. It will therefore be necessary to maintain these materials in a relatively dry condition to allow for proper subgrade preparation. It is recommended that the proofcompacting and proofrolling operations be monitored by a representative of the geotechnical engineer to ensure that a firm, suitable subgrade is present prior to placement of new fills, or to construction of floor slabs and pavements.

Localized wet, soft or unstable areas can be undercut to such depths determined necessary in the field to reach stable material, and the area backfilled with imported crushed stone, such as the 1¼-inch gradation specified in Section 305 of the WisDOT Standard Specifications, placed and compacted as recommended in the Site Preparation section of this report. If relatively thick zones or areas of extensive yielding are observed, and they cannot be stabilized by normal discing, aeration and recompaction procedures, undercutting and replacement with crushed stone and geotextile fabric (if needed) may also be required in these areas.

On a preliminary basis, proposed floor slabs may be designed utilizing an estimated modulus of subgrade reaction of 150 pci based on the presence of silty clay soils, prepared as discussed in this report. The final design and detailing should be performed by a qualified structural engineer based on the intended slab use, loading conditions and anticipated subgrade conditions.

A granular mat, which can be designed as a drainage layer, should be provided below the floor slab. This must be a minimum of six (6) inches in thickness and properly compacted. In moisture sensitive areas, a vapor retarder may be placed beneath the floor slab or base course, however, it is recommended that the architect be consulted in this regard. The proper use of a vapor retarder may not completely prevent moisture beneath or on top of slabs. If the base course contains sharp particles, a cushion layer of sand approximately 2 inches in thickness may be required to provide protection from puncture.

Floor slabs should be suitably reinforced to make them as rigid as necessary and proper joints provided at the junction of slabs and the foundation system so that a small

amount of independent movement can occur without causing damage. Large floor areas must be provided with joints at frequent intervals (maximum spacing of 30 times the slab thickness, per ACI) to compensate for concrete volume changes (shrinkage). Where slabs will be supporting live loads, such as from moving vehicles, joints must be keyed or dowelled to permit proper load transfer. It is recommended that appropriate construction methods and curing procedures be used to minimize shrinkage and curling of floor slabs.

Exterior/Unheated Area Slabs

Proposed entry slabs, sidewalks, aprons, and other slabs in exterior or unheated areas may bear upon silty or clayey soils in some portions of the site. Such materials are highly frost susceptible and poorly drained. Slabs placed directly upon such soils are subject to heaving and subsequent settlement due to freeze/thaw cycles. This can result in cracking, misalignment, and other related effects (especially at joints). It is recommended that consideration be given to limited undercutting of the frost susceptible materials to a depth of 1 to 2 feet below the slabs, and replacement with well graded, properly placed and compacted granular soils. A properly designed underdrain system connected to the municipal sewer (if permissible) or directed to on-site stormwater management areas should also be incorporated to reduce the potential effects of freeze/thaw cycles.

Utility Construction

In general, the on-site soils can be used for support of utility lines. However, some isolated undercutting of soft soils, in conjunction with the placement of crushed stone or other suitable granular backfill may be necessary to establish a stable working mat and/or bearing subgrade in areas. Substantial difficulty with the stability of utility trenches should be expected due to the presence of granular soils across the site. The use of shoring, bracing, or trench boxes will be required. The presence of dense soils and auger refusal conditions (possible cobbles, boulders, or bedrock) at relatively shallow depths in portions of the site will present difficulty with excavation work. Blasting may be required for utility installation in at least some areas, depending on final design depths. This must be performed by a specialty contractor, in accordance with any applicable regulations, protecting nearby structures from vibration related disturbance. Test pits are recommended to better evaluate refusal materials and elevations in the areas of utilities, to assist in establishing design elevations. Utility construction should be performed in accordance with "The Standard Specifications for Sewer and Water Line Construction" for the State of Wisconsin.

It is recommended that well graded granular soils such as those specified in Tables 37 and 39 of the Standard Specification for Sewer and Water Construction be utilized as backfill in utility trenches to reduce the potential for consolidation and settlement of the backfill. All fill soils should be properly placed and compacted under engineering controlled conditions to provide suitable support for overlaying structures and roadways. Silty and clayey soils, organic soils, and wet granular materials are not

recommended for use as backfill within utility trenches due to the substantial difficulty of obtaining proper compaction in confined areas.

As with all excavation work, all open cut trenches must be properly shored and braced as required by applicable federal and state OSHA codes, and as necessary to protect life and property.

Preliminary Pavement Design Recommendations

Based upon the borings, the near surface pavement subgrade soils are anticipated to generally consist of natural sandy silt, silt sand, or silty clay soils; or new fill used to raise grades. The following recommendations are based upon the poorer silty clay soils. These cohesive soils have been assigned an estimated visual classification of A-6 by the AASHTO soil classification method. They are generally rated as poor for pavement subgrade support due to moderate to high frost susceptibility, poor drainage characteristics, and high susceptibility to strength loss when exposed to free water. Provided that the subgrade soils are prepared as outlined in the Site Preparation section of this report, the in-place subgrade soils and any new structural fill can be used for standard flexible or rigid pavement construction.
Analysis of the visual soil classification has been made in estimating pertinent subgrade design coefficients as described in the Wisconsin Soils Manual for Pavement Design. Based on the soils encountered, and with proper subgrade preparation and drainage, the following pavement subgrade design parameters are recommended for the pavement section design. However, if soils with support characteristics different from the silty clay materials are encountered or are used to raise grades in new pavement areas, revised coefficients will need to be provided.

PAVEMENT SUBGRADE DESIGN COEFFICIENTS

AASHTO Soil Classification	A-6
Design Frost Index	F-3
Design Group Index	14
Soil Support Value	4.0
Estimated Subgrade Modulus (k)	150 pci

The subject site is located in an area that experiences annual freezing cycles and the subgrade soils encountered have been classified as highly susceptible to frost action when free water is present. In order to reduce the potential for frost action, it will be necessary to control surface runoff and water seepage as complete removal and replacement of the frost susceptible subgrade soils is not considered economically feasible. It is recommended that underdrains be placed within the subgrade, just below the granular base, to help reduce the potential for trapping water within the aggregate base layer. At a minimum, this should consist of installing 3 to 4 drain tiles extending radially outward, 20 feet from each interior catch basin. In addition, drain tiles should extend along curb lines, 20 feet up the slope from curb inlets. The drain tile should be directly connected to the storm sewer manholes or catch basins. The drain tile should consist of 4 inch diameter perforated PVC pipe placed beneath the base layer,

extending at least 8 inches into the subgrade. The pipe should be surrounded by 1 inch size clean stone, with the pipe and stone being wrapped with a geotextile filter fabric to reduce the potential of soils from migrating into and obstructing the pipe. It is also recommended that roof drains be connected to the stormwater collection system to minimize the potential for this water to enter the base and subgrade.

CONSTRUCTION CONSIDERATIONS

Groundwater Control

Because no groundwater was encountered in the upper levels of the boreholes during the exploration, no major difficulties during excavation and construction of shallow foundation systems on the site is anticipated. A gravity drainage system and filtered sump pumps or other conventional dewatering procedures, should be adequate to control perched water if encountered. In addition, more comprehensive dewatering may be necessary if larger volumes of groundwater are encountered below the refusal depths of the borings.
Since the foundation materials are subject to softening when exposed to free moisture, every effort should be made to keep excavations dry. Discharge water from roof drains should be directed away from the building, and the site grading direct runoff to catch basins, so that the potential for the softening of the foundation and pavement subgrade soils is reduced.

While little or no groundwater was encountered at the time the borings were drilled, seasonal variations in precipitation and site drainage conditions can cause groundwater to be present in the upper soils.

Excavations and Site Drainage

Sloping, shoring or bracing of the excavation sidewalls will be necessary. Trenching in granular soils may be difficult due to the instability of vertical slopes, and will therefore require a flattening of trench sides, or some other means of protection, to facilitate construction and to protect life and property. Sloughing and caving should be expected within unprotected excavations. The degree of excavation instability problems is dependent upon the depth and length of time that excavations remain open, excavation bank slopes, water levels and the effectiveness of any dewatering systems. However, severe instability can be expected within granular soils, especially encroaching upon and extending below the groundwater. All excavation work must be performed in accordance with OSHA and local building code requirements.

Auger refusal on possible cobbles, boulders, or bedrock was encountered at relatively shallow depths below existing grade at the test boring locations. Substantial difficulty digging and longer excavation times should be expected. In addition, excavations in some areas may encroach upon and extend below the refusal depths, depending on design depths. Additional subsurface exploration with backhoe test pits is

recommended as part of design planning to further evaluate refusal depths, and the type and excavatability of the materials, if excavation to or below the refusal depths is anticipated. Specialized removal techniques, such as ripping and/or blasting, may be required to establish the planned elevations for proposed structures or to establish invert elevations for utilities. If blasting is performed, it is recommended that a specialty contractor be utilized to perform the blasting operations. Blasting can cause noise and vibration disturbance to neighboring structures, and must be performed using extreme caution. Consideration should be given to the performance of video and/or photographic documentation of the condition of nearby buildings, utilities, and other structures prior to any blasting. Following the blasting, the exposed subgrade should be observed by the geotechnical engineer to ensure that disturbance of the overburden is not excessive, and that the blasted rock is sufficiently stable for piping or foundation support. It is likely that at least some compaction of the blasted rock will be required. In addition, some overexcavation of larger stone may be required.

Since the subgrade soils are generally sensitive to moisture, every effort should be made to provide adequate drainage across the site during construction, and to prevent ponding of runoff on the subgrade. These soils are also subject to erosion caused by runoff, and erosion control measures should be implemented where needed or required by local ordinances.

Seismic Design Considerations

On-site natural soils generally consist of stiff to very stiff cohesive soils and loose to medium dense granular soils. The on-site natural soils are considered to meet the criteria for Site Class C in accordance with Table 1613.5.2 of the International Building Code-2006.

GENERAL COMMENTS

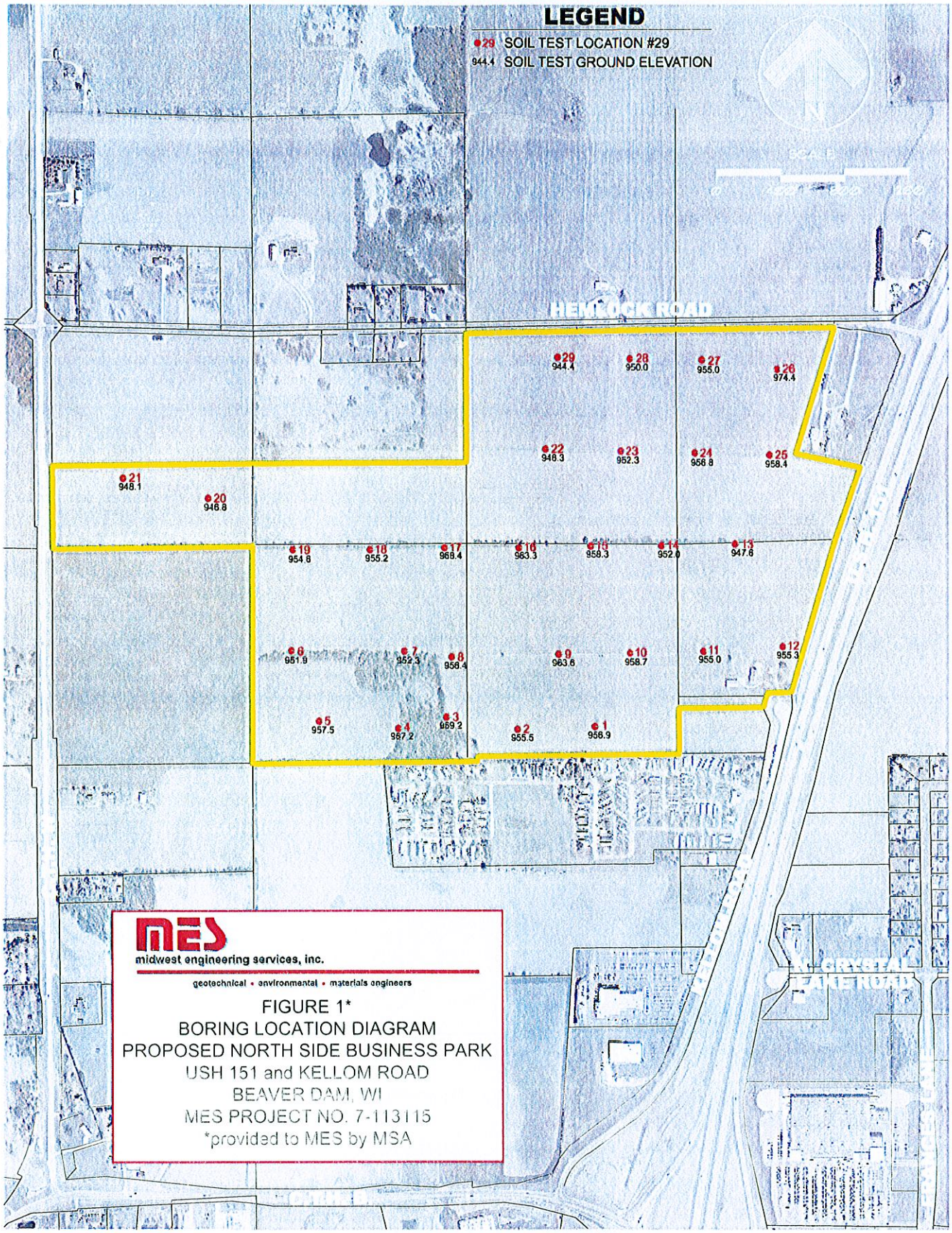
This geotechnical exploration and foundation analysis has been prepared to aid in the evaluation of the foundation conditions on this site. The recommendations presented herein are based on the available soil information and the design information provided. Any changes in the design information or building locations should be brought to the attention of the soils engineer to determine if modifications in the recommendations are required. The final design plans and specifications should also be reviewed by the soils engineer to determine that the recommendations presented herein have been interpreted and implemented as intended.

This geotechnical study has been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. The findings, recommendations and opinions contained herein have been promulgated in accordance with generally accepted practice in the fields of foundation engineering, soils mechanics, and engineering

geology. No other representations, expressed or implied, and no warranty or guarantee is included or intended in this report.

It is recommended that the earthwork and foundation operations be monitored by the soils engineer, to test and evaluate the bearing capacities, and the selection, placement and compaction of controlled fills.

APPENDIX



SUBSURFACE SOIL INVESTIGATION MAP
PROPOSED PROJECT SITE
Part of Section 21-12-14 and Section 22-12-14
Town of Beaver Dam, Dodge County, WI

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SOIL BORING LOG: B-1

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 25, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 956.9	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 / 956.9	11" Dark brown Clayey SILT, moist (Topsoil)	1-AU	-	-	-	22	-	
1 / 955.9								
2 / 954.9								
3 / 953.9	Brown Sandy SILT, with gravel, moist	2-SS	26	-	-	8	-	
4 / 952.9								
5 / 951.9								
6 / 950.9		3-SS	72/9"	-	-	6	-	
7 / 949.9								
8 / 948.9		4-SS	43	-	-	9	-	
9 / 947.9	Brown Silty SAND & GRAVEL, damp							
10 / 946.9								
11 / 945.9		5-SS	64	-	-	5	-	
12 / 944.9								

End of Boring: 12½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 8 ± ft (El. 948.9±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-2

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 25, 2011

Depth Below Surface (ft)	Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 955.5	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1	954.5	15" Dark brown Sandy SILT, moist	1-AU	-	-	-	19	-	
2	953.5	Brown Silty CLAY, trace sand, moist							
3	952.5		2-SS	7	2.0	1.13	26	-	
4	951.5								
5	950.5		3-SS	6	0.5	1.15	19	-	
6	949.5								
7	948.5								
8	947.5	Brown Sandy to Clayey SILT, with gravel, moist	4-SS	17	-	-	13	-	
9	946.5								
10	945.5	Brown Silty SAND and GRAVEL, with cobbles, moist	5-SS	50/3"	-	-	2	-	
11	944.5								
12	943.5								
13	942.5								
14	941.5								

End of Boring: 14' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 10 ± ft (El. 945.5±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-3

Project: North Side Business Park | **Project No.: 7-113115**

Location: USH 151 & Kellom Road, Beaver Dam, WI | **Drill Date: July 25, 2011**

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 969.2	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
	8" Brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	19	- -	
1 — 968.2								
2 — 967.2								
3 — 966.2		2-SS	36	-	-	5	-	
4 — 965.2								
5 — 964.2								
6 — 963.2	Brown Silty SAND to Sandy SILT, with gravel and cobbles, damp	3-SS	50/5**	-	-	6	-	
7 — 962.2								
8 — 961.2		4-SS	24	-	-	9	-	
9 — 960.2								
10 — 959.2								
11 — 958.2		5-SS	50/5**	-	-	8	-	

End of Boring: 11½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Auger refusal at 6.5' during intial attempt

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 7 ± ft (El. 962.2±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: 5 feet east

Reason for Offset: Refusal at original location

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-4

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 22, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 967.2	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 — 967.2	8" Brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	14	-	
1 — 966.2	Brown Silty SAND, trace gravel, moist							
2 — 965.2								
3 — 964.2		2-SS	7	-	-	9	-	
4 — 963.2	Brown Silty SAND and GRAVEL, moist							
5 — 962.2								
6 — 961.2	Brown Sandy SILT, trace gravel, moist	3-SS	21	-	-	8	-	
7 — 960.2								
8 — 959.2		4-SS	80*	-	-	10	-	
9 — 958.2	Brown Silty SAND, with gravel and cobbles, moist							
10 — 957.2								
11 — 956.2		5-SS	63/9"*	-	-	5	-	

End of Boring: 11½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 7.5 ± ft (El. 959.7±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-5

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 22, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 957.5	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 / 957.5	8" Dark brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	13	-	
1 / 956.5	Brown Clayey SILT, moist							
2 / 955.5								
3 / 954.5		2-SS	5	1.5	0.91	23	-	
4 / 953.5								
5 / 952.5	Brown Silty CLAY, trace sand, moist							
6 / 951.5		3-SS	8	1.0	-	18	-	
7 / 950.5								
8 / 949.5		4-SS	39	-	-	10	-	
9 / 948.5								
10 / 947.5		5-SS	39	-	-	6	-	
11 / 946.5								
12 / 945.5								
13 / 944.5								
14 / 943.5								
15 / 942.5	Brown Silty SAND and GRAVEL, with cobbles, moist	6-SS	50/5"*	-	-	4	-	
16 / 941.5								
17 / 940.5								
18 / 939.5								
19 / 938.5								
20 / 937.5		7-SS	50/9"*	-	-	3	-	
21 / 936.5								

End of Boring: 21½'

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 16 ± ft (El. 941.5±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

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SOIL BORING LOG: B-6

Project: North Side Business Park | **Project No.: 7-113115**

Location: USH 151 & Kellom Road, Beaver Dam, WI | **Drill Date: July 25, 2011**

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 951.9	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 / 951.9	9" Black Silty CLAY, moist (Topsoil)	1-AU	-	-	-	27	-	
1 / 950.9								
2 / 949.9								
3 / 948.9		2-SS	9	-	-	12	-	
4 / 947.9	Brown Sandy SILT, damp							
5 / 946.9		3-SS	19	-	-	8	-	
6 / 945.9								
7 / 944.9		4-SS	51*	-	-	9	-	
8 / 943.9								
9 / 942.9								
10 / 941.9	Brown Sandy SILT, some gravel, moist	5-SS	40*	-	-	7	-	
11 / 940.9								
12 / 939.9								
13 / 938.9								

End of Boring: 13' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 9 ± ft (El. 942.9±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-7

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 20, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 952.3	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 — 952.3	8" Black Clayey SILT, moist (Topsoil)	1-AU	-	-	-	21	-	
1 — 951.3								
2 — 950.3	Brown Silty CLAY, trace sand and gravel, moist							
3 — 949.3		2-SS	5	-	-	20	-	
4 — 948.3								
5 — 947.3								
6 — 946.3	Brown Sandy to Clayey SILT, trace gravel, moist	3-SS	12	1.5	1.20	15	-	
7 — 945.3								
8 — 944.3		4-SS	21	-	-	14	-	
9 — 943.3								
10 — 942.3	Brown Sandy SILT, with gravel and cobbles, damp							
11 — 941.3		5-SS	46	-	-	9	-	
12 — 940.3								
13 — 939.3								
14 — 938.3								

End of Boring: 14' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 10.5 ± ft (El. 941.8±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

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SOIL BORING LOG: B-8

Project: North Side Business Park | **Project No.: 7-113115**

Location: USH 151 & Kellom Road, Beaver Dam, WI | **Drill Date: July 20, 2011**

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 956.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 955.4	12" Dark brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	16	-	
2 — 954.4	Brown Silty CLAY to Clayey SILT, little sand, moist							
3 — 953.4		2-SS	6	-	-	15	-	
4 — 952.4								
5 — 951.4								
6 — 950.4	Brown Silty CLAY, trace sand, moist	3-SS	10	3.0	1.40	25	-	
7 — 949.4								
8 — 948.4	Brown Silty CLAY to Clayey SILT, trace sand and gravel, moist	4-SS	17	-	-	12	-	
9 — 947.4								
10 — 946.4								
11 — 945.4		5-SS	20	-	-	11	-	
12 — 944.4								
13 — 943.4								
14 — 942.4								
15 — 941.4								
16 — 940.4	Brown Sandy SILT, with gravel and cobbles, damp	6-SS	65*	-	-	11	-	
17 — 939.4								

End of Boring: 17' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level During Drilling: None

Water Level Upon Completion: None

Caved at Upon Completion: 12.5 ± ft (El. 943.9±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-9

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 20, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 963.6	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 962.6	7" Brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	15	-	
2 — 961.6	Brown Silty SAND to Clayey SILT, damp							
3 — 960.6		2-SS	8	-	-	18	-	
4 — 959.6								
5 — 958.6	Brown Sandy SILT, with gravel and cobbles, damp	3-SS	50*	-	-	4	-	
6 — 957.6								
7 — 956.6	Brown Sandy SILT, moist	4-SS	16	-	-	12	-	
8 — 955.6								
9 — 954.6								
10 — 953.6	Brown SAND and GRAVEL, with cobbles, moist	5-SS	50/6"*	-	-	9	-	
11 — 952.6								
12 — 951.6								
13 — 950.6								
14 — 949.6								
15 — 948.6		6-SS	52*	-	-	3	-	
16 — 947.6								
17 — 946.6								
18 — 945.6								
19 — 944.6								

End of Boring: 19' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level During Drilling: None ▽

Water Level Upon Completion: None

Caved at Upon Completion: 11.5 ± ft (El. 952.1±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-10

Project: North Side Business Park | **Project No.: 7-113115**

Location: USH 151 & Kellom Road, Beaver Dam, WI | **Drill Date: July 20, 2011**

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 958.7	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 957.7	6" Brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	6	-	
2 — 956.7								
3 — 955.7		2-SS	20	-	-	9	-	
4 — 954.7	Brown Sandy SILT, with gravel, moist							
5 — 953.7		3-SS	19	-	-	9	-	
6 — 952.7								
7 — 951.7		4-SS	42*	-	-	3	-	
8 — 950.7								
9 — 949.7		5-SS	54*	-	-	2	-	
10 — 948.7	Brown SAND & GRAVEL, with cobbles, damp							
11 — 947.7								
12 — 946.7								

End of Boring: 12½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 8 ± ft (El. 950.7±)

▼

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-11

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 20, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 955.0	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 954.0	13" Dark brown SILT, damp (Topsoil)	1-AU	-	-	-	20	-	
2 — 953.0	Brown Silty CLAY, trace sand, moist							
3 — 952.0		2-SS	9	-	-	21	-	
4 — 951.0								
5 — 950.0								
6 — 949.0		3-SS	11	-	-	21	-	
7 — 948.0								
8 — 947.0		4-SS	42*	-	-	10	-	
9 — 946.0								
10 — 945.0								
11 — 944.0	Brown SAND and GRAVEL, with cobbles, damp	5-SS	55*	-	-	2	-	
12 — 943.0								
13 — 942.0								
14 — 941.0								

End of Boring: 14½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level During Drilling: None

Water Level Upon Completion: None

Caved at Upon Completion: 10 ± ft (El. 945±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

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SOIL BORING LOG: B-12

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 25, 2011

Depth Below Surface/Elev. (ft)		VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 955.3	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
		8" Dark brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	24	-	
1	954.3								
2	953.3								
3	952.3	Brown Silty CLAY, trace sand, moist	2-SS	6	1.5	-	25	-	
4	951.3								
5	950.3								
6	949.3		3-SS	19	-	-	8	-	
7	948.3								
8	947.3		4-SS	21	-	-	6	-	
9	946.3	Brown Silty SAND and GRAVEL, damp							
10	945.3								
11	944.3		5-SS	39	-	-	7	-	
12	943.3								

End of Boring: 12' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 9 ± ft (El. 946.3±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-13

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 22, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 947.6	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 946.6	9" Dark brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	24	-	
2 / 945.6								
3 / 944.6		2-SS	5	2.5	2.23	24	-	
4 / 943.6								
5 / 942.6	Brown Silty CLAY, trace sand, moist							
6 / 941.6		3-SS	3	1.0	-	26	-	
7 / 940.6								
8 / 939.6		4-SS	11	-	-	11	-	
9 / 938.6								
10 / 937.6								
11 / 936.6	Brown Sandy to Clayey SILT, trace gravel, moist	5-SS	11	1.5	0.91	12	-	
12 / 935.6								
13 / 934.6								
14 / 933.6								
15 / 932.6								
16 / 931.6		6-SS	70*	-	-	4	-	
17 / 930.6	Brown Silty SAND and GRAVEL, with cobbles, damp							
18 / 929.6								
19 / 928.6								
20 / 927.6								
21 / 926.6		7-SS	49*	-	-	10	-	

End of Boring: 21½'

Notes:

Auger refusal experienced at 7.5' due to cobbles or boulders. Borehole offset 6' east.

Water Level / Caving Observations:

Water Level During Drilling: None

Water Level Upon Completion: None

Caved at Upon Completion: 16 ± ft (El. 931.6±)

▼

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: 6 feet east

Reason for Offset: Refusal at original location

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-14

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 22, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 952.0	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 / 952.0	13" Black Clayey SILT, damp (Topsoil)	1-AU	-	-	-	27	-	
1 / 951.0								
2 / 950.0								
3 / 949.0		2-SS	7	1.5	1.48	23	-	
4 / 948.0	Brown Silty CLAY, moist							
5 / 947.0		3-SS	5	1.25	0.91	25	-	
6 / 946.0								
7 / 945.0		4-SS	50/3"*	-	-	25	-	
8 / 944.0								
9 / 943.0		5-SS	10	-	-	13	-	
10 / 942.0								
11 / 941.0	Brown Sandy to Clayey SILT, with gravel and cobbles, moist							
12 / 940.0								
13 / 939.0								
14 / 938.0								

End of Boring: 14½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level During Drilling: None

Water Level Upon Completion: None

Caved at Upon Completion: 11.5 ± ft (El. 940.5±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-15

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 21, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 958.3	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 / 958.3	7" Dark brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	20	-	
1 / 957.3								
2 / 956.3								
3 / 955.3	Brown Silty CLAY, trace sand, moist	2-SS	14	1.5	0.92	24	-	
4 / 954.3								
5 / 953.3								
6 / 952.3		3-SS	30	-	-	7	-	
7 / 951.3	Brown Sandy SILT, with gravel, moist							
8 / 950.3		4-SS	32	-	-	10	-	
9 / 949.3								
10 / 948.3								
11 / 947.3	Brown Silty SAND and GRAVEL, with cobbles, moist	5-SS	50/6"*	-	-	8	-	

End of Boring: 11½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 7.5 ± ft (El. 950.8±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-16

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 21, 2011

Depth Below Surface/Elev. (ft)		VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 963.3	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
		12" Brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	5	-	
1	962.3								
2	961.3								
3	960.3		2-SS	8	3.0	-	21	-	
4	959.3	Brown Silty CLAY, trace sand, moist							
5	958.3								
6	957.3		3-SS	24	-	-	14	-	
7	956.3								
8	955.3		4-SS	35*	-	-	4	-	
9	954.3	Brown SAND & GRAVEL, with silt and cobbles, moist							
10	953.3								
11	952.3		5-SS	59*	-	-	3	-	
12	951.3								

End of Boring: 12' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 6.5 ± ft (El. 956.8±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-17

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 21, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 968.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 — 968.4	7" Brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	2	-	
1 — 967.4								
2 — 966.4								
3 — 965.4		2-SS	23	-	-	10	-	
4 — 964.4								
5 — 963.4	Brown Sandy SILT, trace gravel, damp							
6 — 962.4		3-SS	26	-	-	11	-	
7 — 961.4								
8 — 960.4		4-SS	16	-	-	13	-	
9 — 959.4								
10 — 958.4								
11 — 957.4	Brown SAND and GRAVEL, with cobbles, damp	5-SS	43*	-	-	8	-	
12 — 956.4								

End of Boring: 12' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 8.5 ± ft (El. 959.9±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-18

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 21, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 955.2	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 / 955.2	12" Dark brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	17	-	
1 / 954.2								
2 / 953.2								
3 / 952.2		2-SS	5	1.5	1.20	27	-	
4 / 951.2	Brown Silty CLAY, moist							
5 / 950.2		3-SS	5	1.0	0.41	24	-	
6 / 949.2								
7 / 948.2		4-SS	50/6"*	-	-	14	-	
8 / 947.2	Brown Sandy SILT, with gravel, moist							
9 / 946.2		5-SS	16	-	-	10	-	
10 / 945.2								
11 / 944.2								
12 / 943.2								
13 / 942.2	Brown SAND and GRAVEL, with cobbles, damp							
14 / 941.2								
15 / 940.2								
16 / 939.2		6-SS	53*	-	-	7	-	

End of Boring: 16½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 11.5 ± ft (El. 943.7±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-19

Project: North Side Business Park | **Project No.: 7-113115**

Location: USH 151 & Kellom Road, Beaver Dam, WI | **Drill Date: July 21, 2011**

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 954.6	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 953.6	8" Dark brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	10	-	
2 — 952.6	Brown Silty CLAY, trace sand, damp							
3 — 951.6		2-SS	8	-	-	17	-	
4 — 950.6								
5 — 949.6	Brown Sandy to Clayey SILT, damp							
6 — 948.6		3-SS	10	-	-	11	-	
7 — 947.6								
8 — 946.6		4-SS	68*	-	-	2	-	
9 — 945.6								
10 — 944.6	Brown SAND and GRAVEL, with cobbles, damp							
11 — 943.6		5-SS	50/1"*	-	-	-	-	

End of Boring: 11' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 6 ± ft (El. 948.6±)

▼

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-20

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 22, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 946.8	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 / 946.8	12" Brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	9	-	
1 / 945.8	Brown Sandy SILT, moist							
2 / 944.8								
3 / 943.8		2-SS	14	-	-	12	-	
4 / 942.8								
5 / 941.8		3-SS	17	-	-	14	-	
6 / 940.8								
7 / 939.8		4-SS	50/9"*	-	-	11	-	
8 / 938.8	Brown SAND and GRAVEL, with cobbles, damp							
9 / 937.8								
10 / 936.8		5-SS	50/8"*	-	-	2	-	
11 / 935.8								

End of Boring: 11½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 8 ± ft (El. 938.8±)

▼

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-21

Project: North Side Business Park | **Project No.: 7-113115**

Location: USH 151 & Kellom Road, Beaver Dam, WI | **Drill Date: July 22, 2011**

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 948.1	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 947.1	12" Brown Sandy SILT, damp, (Topsoil)	1-AU	-	-	-	7	-	
2 / 946.1	Light brown Sandy SILT to Silty SAND, moist							
3 / 945.1		2-SS	20	-	-	13	-	
4 / 944.1								
5 / 943.1								
6 / 942.1		3-SS	12	-	-	12	-	
7 / 941.1								
8 / 940.1		4-SS	50*	-	-	12	-	
9 / 939.1	Brown Silty SAND and GRAVEL, with cobbles, damp							
10 / 938.1								
11 / 937.1		5-SS	50*	-	-	3	-	

End of Boring: 11½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 7.5 ± ft (El. 940.6±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-22

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 25, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 946.3	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 945.3	9" Brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	10	-	
2 — 944.3								
3 — 943.3	Grayish brown Silty CLAY, trace sand, moist	2-SS	5	1.0	-	29	-	
4 — 942.3								
5 — 941.3								
6 — 940.3		3-SS	7	-	-	17	-	
7 — 939.3								
8 — 938.3		4-SS	26	-	-	9	-	
9 — 937.3	Brown Silty SAND and GRAVEL, with cobbles, moist							
10 — 936.3								
11 — 935.3		5-SS	50*	-	-	8	-	
12 — 934.3								

End of Boring: 12½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 9 ± ft (El. 937.3±)

▼

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-23

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 26, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 952.3	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 951.3	12" Dark brown Clayey SILT, moist (Topsoil)	1-AU	-	-	-	24	-	
2 / 950.3	Brown Silty CLAY, trace sand, moist							
3 / 949.3								
4 / 948.3		2-SS	17	-	-	7	-	
5 / 947.3								
6 / 946.3	Brown Silty SAND and GRAVEL, moist	3-SS	16	-	-	10	-	
7 / 945.3								
8 / 944.3		4-SS	28	-	-	10	-	
9 / 943.3								
10 / 942.3								
11 / 941.3	Brown Sandy SILT, with gravel, moist	5-SS	16	-	-	15	-	
12 / 940.3								
13 / 939.3								
14 / 938.3								
15 / 937.3								
16 / 936.3		6-SS	41	-	-	10	-	
17 / 935.3								
18 / 934.3	Brown SAND and GRAVEL, damp							
19 / 933.3								
20 / 932.3								
21 / 931.3		7-SS	31	-	-	9	-	

End of Boring: 21½'

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 14 ± ft (El. 938.3±)

▼

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

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SOIL BORING LOG: B-24

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 25, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 956.8	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 / 955.8	12" Dark brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	15	-	
1 / 954.8								
2 / 953.8								
3 / 952.8		2-SS	25	-	-	9	-	
4 / 951.8								
5 / 950.8		3-SS	42	-	-	7	-	
6 / 949.8								
7 / 948.8		4-SS	43	-	-	10	-	
8 / 947.8								
9 / 946.8		5-SS	33	-	-	-	-	
10 / 945.8	Brown Silty SAND to Sandy SILT, with gravel and cobbles, damp							
11 / 944.8								
12 / 943.8								
13 / 942.8								
14 / 941.8		6-SS	79*	-	-	4	-	
15 / 940.8								
16 / 939.8								
17 / 938.8								
18 / 937.8								
19 / 936.8		7-SS	78/9"*	-	-	3	-	
20 / 935.8								
21	**End of Boring: 21½'**							

Notes:

Water Level / Caving Observations:

Water Level During Drilling: None

Water Level Upon Completion: None

Caved at Upon Completion: 12 ± ft (El. 944.8±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-25

Project: North Side Business Park | **Project No.: 7-113115**

Location: USH 151 & Kellom Road, Beaver Dam, WI | **Drill Date: July 25, 2011**

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 958.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0	12" Dark brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	24	-	
1 / 957.4								
2 / 956.4								
3 / 955.4		2-SS	8	4.5+	-	19	-	
4 / 954.4	Brown Silty CLAY to Clayey SILT, moist							
5 / 953.4								
6 / 952.4		3-SS	10	2.5	-	22	-	
7 / 951.4								
8 / 950.4		4-SS	29	-	-	8	-	
9 / 949.4	Brown Sandy SILT, with gravel and cobbles, moist							
10 / 948.4								
11 / 947.4		5-SS	50/5"*	-	-	7	-	

End of Boring: 11½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 9 ± ft (El. 949.4±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-26

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 24, 2011

Depth Below Surface/Elev. (ft)		VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 974.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
		8" Dark brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	21	-	
1	973.4	Brown Silty CLAY, trace sand, moist							
2	972.4								
3	971.4		2-SS	71*	-	-	6	-	
4	970.4								
5	**969.4**								
6	968.4		3-SS	62*	-	-	22	-	
7	967.4								
8	966.4		4-SS	28	-	-	9	-	
9	965.4	Brown Silty SAND to Sandy SILT, with gravel and cobbles, damp							
10	**964.4**								
11	963.4		5-SS	92*	-	-	21	-	
12	962.4								
13	961.4								
14	960.4								
15	**959.4**								
16	958.4		6-SS	50/5"*	-	-	3	-	

End of Boring: 16½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 11 ± ft (El. 963.4±)

▼

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-27

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 26, 2011

Depth Below Surface (ft)	Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 955.0	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
		12" Dark brown Clayey SILT, moist (Topsoil)	1-AU	-	-	-	22	-	
1	954.0								
2	953.0								
3	952.0		2-SS	7	1.0	-	25	-	
4	951.0								
5	950.0								
6	949.0	Brown Silty CLAY, trace sand, moist	3-SS	5	-	0.22	29	-	
7	948.0								
8	947.0		4-SS	6	0.5	-	21	-	
9	946.0								
10	945.0								
11	944.0		5-SS	28	-	-	11	-	
12	943.0								
13	942.0								
14	941.0	Brown Silty SAND and GRAVEL, with cobbles, damp							
15	940.0								
16	939.0		6-SS	50/5"*	-	-	4	-	

End of Boring: 16½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None ▽

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 12 ± ft (El. 943±)

▼

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-28

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 26, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 950.0	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 949.0	8" Dark brown Sandy SILT, damp (Topsoil)	1-AU	-	-	-	18	-	
2 — 948.0								
3 — 947.0	Brown Silty CLAY, trace sand, moist	2-SS	6	1.5	-	25	-	
4 — 946.0								
5 — 945.0								
6 — 944.0		3-SS	44*	-	-	7	-	
7 — 943.0								
8 — 942.0		4-SS	47*	-	-	7	-	
9 — 941.0	Brown Silty SAND and GRAVEL, with cobbles, damp							
10 — 940.0								
11 — 939.0		5-SS	73*	-	-	8	-	
12 — 938.0								

End of Boring: 12½' due to auger refusal on possible cobbles, boulders, or bedrock

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 10 ± ft (El. 940±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-29

Project: North Side Business Park

Project No.: 7-113115

Location: USH 151 & Kellom Road
Beaver Dam, WI

Drill Date: July 26, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 944.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 943.4	9" Brown SILT, damp (Topsoil)	1-AU	-	-	-	19	-	
2 / 942.4								
3 / 941.4		2-SS	4	-	-	31	-	
4 / 940.4								
5 / 939.4	Brown and gray Silty CLAY, trace sand, moist	3-SS	3	0.41	-	29	-	
6 / 938.4								
7 / 937.4		4-SS	3	-	-	30	-	
8 / 936.4								
9 / 935.4		5-SS	27	-	-	21	-	
10 / 934.4								
11 / 933.4	Brown and gray SILT, trace sand, moist							
12 / 932.4								
13 / 931.4		6-SS	65*	-	-	2	-	
14 / 930.4								
15 / 929.4	Brown SAND, GRAVEL and COBBLES, damp							
16 / 928.4								
17 / 927.4		7-SS	50/5"*	-	-	3	-	
18 / 926.4								
19 / 925.4								
20 / 924.4								
21 / 923.4								

End of Boring: 21½'

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: None

Water Level $_{\text{Upon Completion}}$: None

Caved at $_{\text{Upon Completion}}$: 16 ± ft (El. 928.4±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:

Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*