GEOTECHNICAL ENGINEERING REPORT

Thomas Farm Development
NWC Golf Road and Elmhurst Road
Town of Delafield, Wisconsin

GESTRA Project No.: 23083-10
May 15, 2023

Prepared For:
Neumann Developments, Inc.
N27W24025 Paul Court, Suite 100
Pewaukee, WI 53072

GESTRA

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1.0 INTRODUCTION

GESTRA Engineering, Inc. (GESTRA) was authorized by Neuman Developments, Inc. (Neumann) to complete a subsurface exploration and geotechnical engineering report for the Thomas Farms Development project located at the northwest corner of Golf Road and Elmhurst Road in the Town of Delafield, Wisconsin. This report presents the results from the subsurface soil exploration and describes the field exploration, laboratory test results, and provides recommendations pertaining to the design and construction of the proposed buildings, roads and stormwater basins.

The engineering recommendations and analysis contained within this report are based on the following project information which is a projection of GESTRA's understanding of the project. If for any reason the actual project information differs from what is reported below, GESTRA should be contacted so that we can review our recommendations in light of any new information.

1.1 PROJECT INFORMATION

The site is bounded by the Lake County Recreation Trail on the north, Elmhurst Road on the east, an existing subdivision in the northwest, Glen Cove Road on the west and Golf Road on the south. The site plan is divided into 4 zones, described as follows and shown on the Borehole Location Plan in the Appendix. At this time, preliminary stormwater elevations are available, but detailed grading plans have not been completed.

Zone 1 – northwest quadrant. This section will include an eastern cul-de-sac extension of Crooked Creek Road and 8 single-family house lots around the cul-de-sac. A detention pond is planned on the north side.

Zone 2 – northeast quadrant. This zone includes 29 single-family house lots, a portion of the east loop road and a cul-de-sac. Detention ponds are planned on the north and west sides, a biofiltration basin near the center and dry pond basin in the southern part.

Zone 3 – southwest quadrant. This zone includes 37 single-family house lots, 28 duplex condos, west loop road with cul-de-sac and connection to the east loop road, and clubhouse amenities building. Three detention ponds are planned in the northern part and a biofiltration basin on the south side.

Zone 4 – southeast quadrant. This zone includes 81 single-family house lots, part of the east loop road with two cul-de-sacs and connection to the west loop road. Three detention ponds are planned in the west, center and southeast portions and rain garden on the south side.

2.0 SCOPE OF SERVICES

GESTRA has performed the following services for the project:

- Contacted Diggers Hotline to locate the public utilities at the site.
- Completed thirty-nine (39) standard penetration test (SPT) soil borings to depths between 4 ½ feet and 19 feet below existing grades. All borings encountered split spoon and/or auger refusal at termination. At the completion of drilling, boreholes were abandoned per WDNR requirements.
- Performed laboratory soil testing to assign classification and engineering properties to the soils encountered. The laboratory testing included hand penetrometer, moisture content, mechanical analysis, hydrometers, and Atterberg limits.
- Prepared this geotechnical engineering report presenting the results of the field exploration, laboratory testing, and providing a discussion of the subsurface conditions and the following recommendations:
    a. Buildings: general recommendations for allowable soil bearing capacity for spread foundations, estimates of settlement, anticipation and management of groundwater, subgrade modulus for design of slab on grade, lateral earth pressures, seismic site classification, and site preparation/ soil correction.
    b. Pavement: soil parameters for the pavement design consisting of estimated CBR values, and asphalt, concrete and base course thickness for the proposed roadways based on anticipated traffic volumes.
    c. Stormwater: The soil from the borings were classified per the USCS system and the Field Book for Describing and Sampling Soils, USDA, NRCS, 2012. Provided DSPS Soil and Site Evaluation – Storm forms and a discussion of soils conditions and recommendations related to infiltration and detention basin design.

3.0 EXPLORATION RESULTS

3.1 SITE CONDITIONS

The development is planned within the undeveloped parcels bounded by Golf Road to the south, Elmhurst Road to the east, Glen Cove Road to the west and the Lake County Recreation Trail/Oakton Road to the north. The majority of the development is in the southern and eastern portion which is currently farm field with several tree lines. The development in the northwest portion is located in an area that is a combination of open field and woods. Two existing residential buildings are located in the southeast part of the development and are accessible from Thomas Road which connects Golf Road and Elmhurst Road. A third residential building is located on the south side of the property near the approximate mid-point of the development. Based on historical aerial photographs available on the Waukesha County GIS website, the site has remained unchanged since the 1960's.

The topography varies significantly across the development area. The northwest portion ranges from approximately 895 feet to 915 feet, generally sloping upward from the north to the south. The highest elevation portion of the development is in the southwest part around 945 feet. From this location it slopes downward to the north to around 915 feet and slopes downward toward the east with elevations ranging from 910 or 915 feet in the southeast portion and 900 feet in the northeast portion. Ground surface elevations at our boring locations range from 946.1 feet at B-29

in the southwest, 916.3 feet at B-22 in the southeast, 899.7 feet at B-1 in the northeast, and 899.3 feet at B-37 in the northwest.

3.2 SUBSURFACE SOIL PROFILE

The general soil profile consisted of topsoil underlain by lean clay or silty clay over granular soil with various amounts of fines (silt and clay soil). At multiple boring location auger refusal was encountered and can be an indication of possible bedrock. Table 3-1 provides the depth and elevation of auger refusal at the boring locations. The topsoil thickness was typically less than 1 foot at each boring location with the exception of B-30 where approximately 2-feet of topsoil was observed.

The native lean clay was typically encountered with a medium stiff to very stiff consistency and extended to approximate depths of 2 feet to 11 ½ feet. In some shallower borings the clay extended to auger refusal. The native clay had varying amounts of sand and moisture contents of samples tested ranged from 8.3% to 30.3% with the majority of the samples tested having moisture contents greater than 20%.

Clayey sand was observed in approximately half the borings and was typically below the upper lean clay or silty clay. Based on SPT N-values, the clayey sand ranged from very loose to medium dense. Varying amounts of gravel were noted in the material.

The majority of the borings included a granular layer (sand or gravel) with varying amounts of silt above auger refusal. Based on SPT N-values, the granular material typically ranged from medium dense to very dense. Some locations of very dense soil encountered may be considered weathered bedrock. An exception to this was boring B-33 where a blueish gray medium dense to very dense silt was encountered between the upper clayey sand and auger refusal.

Table 3-1: Auger Refusal Depths (feet)

Ground Surface Elevation	Boring	Refusal Depth	Refusal Elevation	Ground Surface Elevation	Boring	Refusal Depth	Refusal Elevation
899.7	B-1	12.5	887.2	917.7	B-21	4.5	913.2
906.9	B-2	8.5	898.4	916.3	B-22	8	908.3
915.6	B-3	10	905.6	940.4	B-23	10.5	929.9
919.8	B-4	9.5	910.3	940.7	B-24	10.5	930.2
917.7	B-5	6.5	911.2	932.6	B-25	12	920.6
912.4	B-6	13.5	898.9	938.3	B-26	16	922.3
916.3	B-7	9.5	906.8	939.0	B-27	15	924.0
918.7	B-8	6.5	912.2	943.4	B-28	16	927.4
919.2	B-9	9	910.2	946.1	B-29	20	926.1
920.8	B-10	12	908.8	948.5	B-30	13	935.5
917.8	B-11	5.5	912.3	939.7	B-31	15	924.7
917.4	B-12	5	912.4	939.7	B-32	16	923.7
921.7	B-13	4.5	917.2	924.1	B-33	17	907.1
925.2	B-14	7.5	917.7	929.6	B-34	11	918.6
926.8	B-15	9.5	917.3	937.8	B-35	13	924.8
930.5	B-16	8.5	922.0	900.7	B-36	15.5	885.2

Ground Surface Elevation	Boring	Refusal Depth	Refusal Elevation
925.0	B-17	8.5	916.5
931.2	B-18	6.5	924.7
934.9	B-19	9.5	925.4
925.6	B-20	6.5	919.1

Ground Surface Elevation	Boring	Refusal Depth	Refusal Elevation
899.3	B-37	17.5	881.8
910.0	B-38	19	891.0
911.7	B-39	17.5	894.2

Notes: Ground surface elevation at B-36 obtained by GESTRA, all other ground surface elevations provided by Trio.

GESTRA reviewed the "Preliminary depth to bedrock map of Waukesha County, Wisconsin" available from the Wisconsin Geological and Natural History Survey. The map indicates that depth to bedrock in the project area is typically less than 50 feet in the project area.

Results of the field and laboratory tests and observations are depicted on the individual boring logs included in Appendix I of this report. Soils were grouped together based on similar observed properties. The stratification lines were estimated by the reviewing engineer based on available data and experience. The actual in-situ changes between layers may differ slightly and may be more gradual than depicted on the boring logs. Subsurface and groundwater conditions can vary between borehole locations and in areas not explored.

It is important to note that the soil observations, fill depths, and topsoil thickness estimates were made in small diameter boreholes. Therefore, it should be understood that thicker or thinner deposits of the individual strata are likely to be encountered within other portions of the project. Furthermore, the estimation of strata thickness at a particular location can differ from person to person due to a sometimes indistinct transition between the soils encountered. Additionally, it must be recognized that in the absence of foreign substances and/or debris within the soil samples obtained, it is sometimes difficult to distinguish between natural soils and clean soil fill.

3.3 GROUNDWATER OBSERVATIONS

Groundwater observations were typically completed during and at the completion of drilling operations. Select borings were left open for extended water level readings. The shallower groundwater appeared to be more common in the western portion of the project site. Table 3-2 provides a summary of the highest water level measured at each boring. If the extended water level readings varied by more than 1 foot from the during or after drilling water levels, both values are listed. Refer to the individual boring logs for specific information.

Table 3-2: Groundwater Measurements (feet)

Ground Surface Elevation	Boring	Groundwater	
		Depth	Elevation
899.7	B-1	4	895.7
906.9	B-2	5	901.9
915.6	B-3	NE	-
919.8	B-4	NE	-
917.7	B-5	NE	-
912.4	B-6	NE	-

Ground Surface Elevation	Boring	Groundwater	
		Depth	Elevation
917.7	B-21	NE	-
916.3	B-22	NE	-
940.4	B-23	NE	-
940.7	B-24	NE	-
932.6	B-25	7	925.6
938.3	B-26	11 [a] 5 [b]	927.3 [a] 933.3 [b]

Ground Surface Elevation	Boring	Groundwater	
		Depth	Elevation
916.3	B-7	3 [a] 0.4 [b]	913.3 [a] 915.9 [b]
918.7	B-8	NMR	NMR
919.2	B-9	NMR	NMR
920.8	B-10	NE	-
917.8	B-11	NE	-
917.4	B-12	NE	-
921.7	B-13	NE	-
925.2	B-14	NE	-
926.8	B-15	NE	-
930.5	B-16	7.5	923.0
925.0	B-17	8	917.0
931.2	B-18	NE	-
934.9	B-19	NE	-
925.6	B-20	NE	-

Ground Surface Elevation	Boring	Groundwater	
		Depth	Elevation
939.0	B-27	10	928.96
943.4	B-28	14 [a] 12 [b]	929.4 [a] 931.4 [b]
946.1	B-29	13	933.1
948.5	B-30	NE	-
939.7	B-31	8	931.7
939.7	B-32	8	931.7
924.1	B-33	3.5 [a] 2 [b]	920.6 [a] 922.1 [b]
929.6	B-34	8 [a] 3 [b]	921.6 [a] 926.6 [b]
937.8	B-35	9	928.8
900.7	B-36	4	896.7
899.3	B-37	7 [a] 5.5 [b]	892.3 [a] 893.8 [b]
910.0	B-38	NE	-
911.7	B-39	13 [a] 2 [b]	898.7 [a] 909.7 [b]

Notes: *Ground surface elevation at B-36 obtained by GESTRA, all other ground surface elevations provided by Trio.*

B-8, B-9: Clayey soils to depth of boring.

a – At completion of drilling water level reading.

b- Extended water level reading.

Groundwater level fluctuations may occur with time and seasonal changes due to variations in precipitation, evaporation, surface water runoff and local dewatering. Perched water pockets and a higher water table may also be encountered during wet weather periods, particularly in more permeable silt and sand seams or granular fill material overlying less permeable clays. Installation and monitoring of an observation well would be required to assess true groundwater elevation.

4.0 ANALYSIS AND RECOMMENDATIONS

4.1 GEOTECHNICAL CONSIDERATIONS

Based on the conditions encountered at site, we have identified potential subsurface conditions that may impact future building and site development in the following paragraphs.

Difficult Excavation: One of the primary concerns is the presence of very dense (SPT N>50) materials and possible bedrock at shallower depths. Based on preliminary plan elevation, some locations of stormwater features are designed at a lower elevation than the possible bedrock encountered. The remaining site grades have not been established, but other portions of this project may require excavation through dense to very dense ground conditions or bedrock which can result

in increased excavation costs. Additional exploration with test pits can provide a better indication of the anticipated difficulty in excavation of the material when additional project design elevations are available. Depending on the depth of excavation, the project may want to evaluate blasting.

High Moisture Content Clay Soils: Another geotechnical concern identified is the presence of higher moisture content lean clay generally located immediately below the topsoil. These soils are often unstable during earthwork, prone to disturbance by construction traffic and can lose strength over time when subjected to freeze thaw cycles, moisture entering through cracks in pavement, and repetitive traffic loading. Consolidation of this soft soil layer will occur if any new loads either from new fill and/or new structure are applied on this deposit which may lead to excessive settlement for future site construction or buildings.

Potential for Large Fill Placement: Significant cut and fill may be required during grading operations. Large and deeper fills over lower strength material may result in consolidation of the material and excessive settlement due to the weight of the new fill. Further evaluation may be required when design elevations are available.

Groundwater: Based on preliminary plan elevation, some locations of stormwater features are designed at a lower elevation than the water noted in our borings. The water may also be a concern for below grade levels for new buildings and in some excavation areas localized water should be expected. Groundwater was observed higher after completion or in next day water level readings at some locations. Further evaluation may be required when design elevations are available.

Variable Depths to Bearing Material: The estimated depth to recommended bearing material presented in this report is variable across the site. When design elevations and building loads are available, the foundations recommendations should be reviewed as significant cuts or fill may affect the foundation recommendations. Areas with lower strength soil near the surface may require a lower design bearing pressure or soil improvement if significant fills are planned.

The recommendations presented in this report include assumptions related to the project design because detailed design information has not been developed. When additional design information is known, the recommendations presented in this report should be reviewed as information such as structural loads and changes in design elevations could impact the recommendations in this report.

4.2 SITE PREPARATION

Site preparation should start with removal of any trees/bushes and vegetation, as well as surficial debris or other deleterious material (if present), organic soils and topsoil. Any additional unsuitable soil/materials exposed such as buried topsoil (if encountered), excessive vegetation roots, deleterious material, soil that contains significant amounts of organics, or other unsuitable material should be removed in their entirety from the footprint of future building and pavement areas. Existing buildings and structures should be razed and completely removed to expose suitable native material. In addition, all unused utilities (if present) should be properly removed or abandoned. Field drain tile (if present) should be properly removed or abandoned or redesigned/reconnected. Material removed from the project site should be disposed in accordance with all applicable federal, state, and local regulations. Soil should not be stockpiled near or adjacent to the excavations.

In building slab on grade area and pavement areas, after the initial site preparation described above, we recommend recompacting the exposed material. Any areas of significant deflection during re-

compaction may be disked, dried, and re-compacted if weather permits, or removed and replaced with engineered fill. After re-compaction, before any initial fill lifts are placed, and before base material is placed, a proof roll is recommended with a minimum 20-ton tri-axle dump truck, or like machinery imparting similar static loading on the soil and moving at no more than walking speed. A geotechnical engineer or their designated representative should be present during the proof roll in order to identify soft or unstable areas, if any, and subsequently recommend remediation procedures. Where soil correction is needed, the options for improvement include the methods described in the following paragraphs.

Recondition the subgrade through moisture/density control:

If this option is chosen, the upper 12-inches of subgrade should be aerated through disking and dried to within two (2) percent of its optimum moisture content. After which, the dried soils can be re-compacted in place to at least 95% of the maximum modified Proctor dry density (ASTM D1557). However, this method may not be effective if lower strength soils extend to depths greater than 1 foot below grade.

Removal and replacement:

The soft or unstable subgrade soils should be removed and the excavated subgrade material replaced with suitable engineered fill or well graded granular fill. The new fill should be compacted to at least 95% of the maximum dry density as obtained by the maximum modified Proctor dry density (ASTM D1557). To potentially reduce the amount of subgrade excavation, geogrid with appropriate granular fill may be used in the excavation correction.

Chemical Stabilization

The soft or unstable clayey (lean clay or clayey sand) or silty soil can also be stabilized with cement or fly ash. Lime stabilization may be considered for clay soil. Chemical stabilization is typically more cost effective if performed over large areas in a single mobilization. In the case of soil stabilization, a proper mix design should be performed prior to the performance of any soil modification as the variability of the soil may limit the effectiveness of soil modification. GESTRA did not perform a mix design as it was not part of our scope of services.

The type of improvement and the depth of correction needed should be determined at the time of construction based on drainage, weather, and soil conditions. If the project construction schedule does not allow for adequate time to rework site subgrade soils, excavation and replacement will likely be required or alternate site preparations could be considered such as chemical stabilization or utilizing geotextile fabric or geogrid and granular fill to provide a stable pavement subgrade. The native clay soils encountered below the topsoil in the majority of the borings were observed with high moisture content (20% or more) which is an indication of potentially unstable subgrade conditions.

As a general rule for new fill placement, the lift thickness should not exceed 12 inches for granular soils and 9 inches for cohesive soil and the maximum particle size should be limited to 25% of the lift thickness. For typical earthwork, new engineered fill placed within the building pad or in the pavement subgrade/base course should be compacted to a minimum of 95% of the modified Proctor maximum dry density value. Alternate compaction may be required where new fill is around 10 feet (or greater) as clayey fill have a greater potential to consolidate post compaction. Structural soil fill should be placed a minimum of five feet beyond the edges of the new building and pavement areas, and an additional foot horizontally for each vertical foot of new fill to be

placed to provide adequate lateral confinement. The inorganic site soils free of any deleterious material and debris that would be removed from excavations could be reused as structural fill; however, moisture conditioning of the material may be necessary and sorting of unsuitable soils from existing material may be required before it is placed as engineered fill.

Site grading should direct runoff away from planned pavement areas and should be maintained throughout construction so that the potential for the softening of the subgrade soils is reduced. Equipment and working traffic should also be kept to a minimum on subgrade surfaces, especially during times of precipitation or following spring thaw. The contractor is responsible for maintaining completed earthwork areas. Consideration should be given to installing construction roads to reduce disturbance to the subgrade soils.

The information presented in this report may be used to evaluate the site conditions for construction, but the contractor is responsible for determining site preparation means and methods required to complete the project. An aggressive construction schedule or construction during seasons with limited drying time may not allow for reconditioning of the subgrade and soil correction may require removal and replacement with imported granular fill or use of chemical stabilization.

This geotechnical report identifies or recommends material that may be used as engineered fill, but the contractor is responsible for utilizing materials that meet the project requirements and determining means and methods required for placement and compaction. Typically, clay soils are easier to dry or rework when placed over large open areas during favorable weather conditions. Clay soils can be difficult to compact or moisture condition in trench backfill situations and may increase potential for consolidation and settlement of the backfill if it is not placed or compacted properly. Granular soils may be easier to place and compact in trench backfill situations but may increase construction costs if the material has to be imported.

4.3 FOUNDATION RECOMMENDATIONS

Due to variable existing terrain, the foundations will be dependent on the final grading plan and earthwork performed during the mass grading work. The following section is provided as a general discussion for building foundation design for preliminary design purposes. The most economical foundation should consider the actual structural loads, design elevations, and building design requirements. Modifications may be required for individual buildings depending on actual design information, including building location, grades and structural loads. Soil borings were not performed at each planned building location and future building owners may want to consider performing a geotechnical exploration specific to an individual building.

Based on the conditions encountered, a typical shallow spread/strip footing system designed for an allowable bearing capacity of 1,500 psf to 2,000 psf can be considered for the proposed buildings. Spread foundations designed for a maximum net allowable soil bearing capacity of up to 2,000 psf should be supported by the medium dense native granular soil, native clay soil with a minimum unconfined compressive strength (Qp) of 1 tsf or new engineered fill placed over suitable native soil.

Layers of lower strength soil were noted that may require correction at some boring locations such as B-1, B-5, B-7, B-11, B-13, B-16, B-20, B-24, B-26, B-32, B-33, and B-38. However, the impact of these layers on future construction will in part depend on future design elevations.

Bedrock depth was variable across the project site. If bedrock is present at or near a building

foundation bearing elevation, the building should be designed such that the foundations bear entirely on bedrock or suitable soil/engineered fill to avoid potential for differential settlement.

Where unsuitable soils are encountered at the foundation elevation, soil correction should consist of additional excavation to remove the unsuitable soils. If the over-excavation is being filled with engineered fill, we recommend the over-excavation be widened at a minimum 1H:1V ratio from the edge of the foundation. The over-excavation can then be filled to grade with suitable engineered fill placed in lifts not exceeding 12 inches and compacted to at least 95% of maximum dry density as determined by the modified Proctor (ASTM D1557). Alternatively, lean concrete with a minimum compressive strength of 500 psi could be used to fill the over-excavation to grade and lateral over-excavation will not be required.

The depth of excavation required to expose suitable bearing material may vary in areas not explored by GESTRA; therefore, we recommend the foundation excavations be reviewed by a geotechnical engineer or their designated representative to determine when soils suitable to support the recommended bearing capacity are observed.

The shallow foundation design should incorporate a minimum strip footing width of 18 inches and column pad width of 24 inches, even if the allowable bearing capacity has not been fully utilized. All perimeter foundations should meet code depth requirements and are recommended to bear a minimum of 48 inches below grade for heated structures and 60 inches for unheated structures in order to protect the structure from frost heave. Interior foundations in heated buildings may bear at a shallower depth provided the bearing soils will not freeze. If the structure includes load bearing thickened slabs, subgrade preparation under the thickened slabs should follow the recommendations in this report for foundations. We recommend that foundations also be suitably reinforced in order to compensate for the effects of minor differential movements due to subsurface soil variations.

4.4 FLOOR SLAB RECOMMENDATIONS

The subgrade material evaluated and prepared according to the recommendations in this report should be suitable to support slab on grade concrete. We recommend that a subgrade reaction modulus of 125 pounds per square inch per inch of deflection (pci) be used in the design of the floor slab at grade. The modulus value was assumed based on clay and/ or sand soil as the subgrade soil, assumes a 1-foot plate is used to determine the modulus and should be adjusted for the size of the foundation and confinement effect. We recommend that the floor slabs be suitably reinforced and designed to be separate from the foundation system in order to allow for separate movements. It is recommended the structural engineer specify the floor slab thickness, reinforcing, joint details and other parameters. At a minimum, the floor slabs are recommended to be reinforced or the concrete contain an appropriate fiber mesh additive to help control shrinkage cracking.

We recommend the installation of a capillary moisture break directly below the slab. A typical capillary moisture break may consist of at least 6 inches of sand or gravel with a maximum particle size of 1-1/2 inches, containing 15-55% passing the number 4 sieve and no more than 12% passing the number 200 sieve (fines) and should follow the recommendations of ACI 302.1R-15, Chapter 6. The structural engineer, architect, or manufacturer of a floor covering should determine the need of a vapor retarder, specify the vapor retarder location, and consider the concrete curing and the effects of moisture on future flooring materials or building end use. The vapor retarder should include proper sealing at penetrations, overlap at joints, and sealing at the interface of the wall and slab and may require an adequate cushion material to prevent damage.

Given the presence of groundwater encountered in our exploration, it may be necessary to address groundwater issues in the design of a below grade slab for some structures. In these cases, a groundwater management system is recommended to maintain water level below the slab system for the serviceability of the proposed structure. This may be accomplished by installing an underslab drainage system incorporated with the recommendations for below grade wall drainage presented in this report. We recommend including cleanouts for the system in the event the subsurface drainage system becomes blocked or fails and is unable to remove the water from under the slab. A mechanical engineer should design the pumping and disposal of the water from the underslab drain and the perimeter drain system and the spacing of the cleanouts should be determined in conjunction with the structural engineer. We recommend including a redundant sump and pump system in the event larger groundwater events occur and evaluate if the system should include a backup power system. Further details for underslab drainage design will depend on the individual structure and subsurface conditions.

4.5 LATERAL EARTH PRESSURES

It is our understanding that some buildings will be designed with a below grade. Below grade walls will need to be designed to resist lateral earth pressures. The values presented in Table 4-1 assume that the walls are vertical; that a clean, free-draining granular fill is used as backfill within 2 feet behind the wall; the backfill condition at the ground surface is level; and that adequate drainage is provided to prevent the buildup of any hydrostatic pressure. In addition, the below grade walls will also be required to resist the surcharge of traffic that may occur during or after construction.

Table 4-1: Below-Grade Wall Design Parameters

Below-Grade Wall Design Parameters [a]	
Total Unit Weight of Backfill (γ)	125 pcf
Angle of Internal Friction (Φ)	26º
At-Rest Earth Pressure Coefficient, (K_o)	0.56
Active Earth Pressure Coefficient, (K_a)	0.39
Passive Earth Pressure Coefficient, (K_p)	2.56

a - Based on lean clay soil encountered

For walls that are free to rotate at least 0.001 times the height of the wall, such as a temporary earth retention system and retaining walls, then an active earth pressure condition will develop. Equivalent fluid densities can be calculated by multiplying unit weight by the listed pressure coefficients at different conditions. For passive resistance, we recommend using a minimum factor of safety of 2.0 in passive earth pressure calculations because of the large strains required to mobilize the full passive resistance, ignoring the upper 1 foot of soil in frost protected areas and ignoring the soil within the frost depth for other areas.

Drainage should be provided behind below-grade and retaining walls to prevent the buildup of hydrostatic pressures. We recommend that free-draining granular drainage aggregate be placed

within 2 feet behind the back face of the walls. Drainage pipes are recommended to be installed behind the walls and be drained by gravity or a sump pit and pump system. The drainage pipes should be surrounded by a minimum of 6 inches of drainage aggregate. Due to the native soils containing a significant percentage of fine material, the drainage aggregate should be completely wrapped in a non-woven, high survivability, geotextile fabric with an apparent opening size (AOS) in the range of 70 to 100. The geotextile fabric should prevent migration of any adjacent soil into the drainage aggregate. We do not recommend using a drainage pipe that includes a geotextile sleeve in immediate contact with the pipe.

We recommend a relatively impermeable barrier that may consist of a minimum 2 foot thick clay cap or Bituminous or Portland cement concrete (i.e. walkways and drives) be placed around each of the below-grade structures to minimize surface water infiltration into the backfill against the walls. The clay material, if used, should be placed and compacted as recommended in this report and should extend from final grade to a depth of at least 2 feet. The clay cap or impermeable barrier should slope away from the structure at a minimum 2 percent grade. Surcharge loads, including those from adjacent (present and future) structures, as well as temporary construction equipment, within a zone defined by a plane extending at a 45 degree angle above the base of the wall should also be included in the design. The size of the compactor used behind the wall and requirements before backfilling should be confirmed by the structural engineer.

Given the presence of groundwater encountered in our exploration, it may be necessary to address groundwater issues in the below grade wall drainage system for some structures. In these cases, a groundwater management system and water proofing are recommended and may require incorporation of an underslab drainage system. We recommend including cleanouts for any drainage system in the event the subsurface drainage system becomes blocked or fails and is unable to remove the water from under the slab. A mechanical engineer should design the pumping and disposal of the water from the drainage system. We recommend including a redundant sump and pump system in the event larger groundwater events occur and evaluate if the system should include a backup power system. Further details for drainage design will depend on the individual structure and subsurface conditions.

4.6 SEISMIC SITE CLASSIFICATION

Section 1613 of the International Building Code 2015 (IBC) was used to assign a soil site classification. Based on the native soil conditions observed and assuming these are consistent or better to a depth of 100 feet, the soil site classification **D** (stiff soil) may be used in the structural design of the proposed buildings. Based on site class D, and mapped spectral response acceleration S_s and S_1 for Delafield, Wisconsin, the site coefficient F_a and F_v are 1.6 and 2.4, respectively. Portions of the site may be eligible for a soil site classification C (very dense soil and soft rock), but individual structures should be evaluated on a project by project basis.

4.7 PAVEMENT RECOMMENDATIONS

The pavement subgrade soil should be prepared and proof rolled following the recommendations in this report. Our recommendations below assume the subgrade conditions are consistent with the results of our subsurface testing evaluation and that the subgrade is thoroughly prepared for construction based on the recommendations developed in this report and pass a thorough proof roll prior to base material placement. As previously noted, the native clay soils encountered below the topsoil in the majority of the borings were observed with high moisture content (20% or more) which is an indication of potentially unstable subgrade conditions. Additional corrective action

should be determined at the time of construction for areas where it is necessary to provide a more consistent subgrade. Alternatively the project could consider a subgrade stabilization or a geogrid and granular stabilization layer as part of the design.

The Wisconsin Asphalt Pavement Association (WAPA) Asphalt Pavement Design Guide, AASHTO 2021, and the results of the geotechnical evaluation were used to provide the recommendations for the new asphalt pavement. Based on clayey soils or clayey sand as the subgrade soil, GESTRA recommends that "poor soils" (estimated CBR value between 2 and 5, SSV = 2.5) conditions should be assumed as the subgrade soils. Table 4-2 below presents the recommended hot mix asphalt and base course thicknesses for planned roadways. Pavement sections may be modified if the traffic volumes are different than presented below and should be confirmed with the requirements of the local municipality.

Base course material should be placed at moisture content within 2% of optimum and compacted to a minimum of 95% of maximum dry density as determined by the modified Proctor. Hot Mix Asphalt (HMA) should be placed and compacted following the guidelines of WisDOT Standard Specifications for Highway and Structure Construction, section 460.3.

Table 4-2: Pavement Design Recommendations

Traffic Class	Pavement Layer Type	Thickness (inches)	Material Type	WisDOT Specifications
Traffic Class II, (subdivision streets, 20-year ESALs < 1 million) [a]	Hot Mix Asphalt	4.5	LT	Section 460
	Base Course (Dense Graded)	12.0	1-1/4 inch Crushed Stone	Section 305

a- Based on Table 7.2 of WAPA Asphalt Pavement Design Guide.

One of the important considerations in designing a high quality and durable pavement is providing adequate drainage. Drainage design for the proposed pavement section is out of GESTRA's scope for this project. It is important that bird baths (leeching basins) and surface waves are not created during construction of the HMA layer. A proper slope should be allowed and drainage should be provided along the edges of pavements and catch basins to prevent the accumulation of free water within the base course, which otherwise may result in subgrade softening or swelling, and pavement deterioration under exposure and repeated traffic conditions.

Pavement sections presented in the above table should not be used for areas which experience repeated truck traffic, equipment or truck parking areas, entrances and exit aprons, or contain trash dumpster loading zones. In the areas listed above, a Portland Cement Concrete (PCC) pavement should be used. The PCC layer thickness is recommended to be 6.0 inches, with a minimum of 6.0 inch-thick crushed stone base course, but may be modified depending on the final design. The reinforcement details for PCC layers should be designed by the project design engineer as the project conditions dictate.

All pavements require regular maintenance and repair in order to maintain the serviceability of the pavement. These repairs and maintenance are due to normal wear and tear of the pavement surface and are required in order to extend the serviceability life of the pavement. However, after 20 years

of service, a normal pavement structure is likely to deteriorate to a point where pavement rehabilitation may be required to maintain the serviceability.

4.8 STORMWATER FEATURES

Multiple stormwater features are planned for the project which include detention ponds and bioinfiltration basins. Trio provided a summary of the preliminary stormwater plan which generally included normal water elevation for detention ponds and bottom of basin elevations for bioinfiltration basins. For the purpose of our analyses, we assumed the bottom of wet retention stormwater ponds at 5 feet below normal water level as provided by Trio. Within this report, the bottom of basin elevation identified is termed the native soil interface. At this time, design details are not finalized, so we have provided a summary of the elevations, conditions and comments related to infiltration and retention at each boring location and separated the summary by the different zones of the development.

The samples collected from the borings were evaluated for the stormwater features, and the WDNR Soil and Site Evaluation-Storm forms are included in Appendix I. The texture of the samples collected was identified visually. The stratification lines between the soil types were identified based on the available data. The actual in-situ changes between layers may differ slightly and may be more gradual than depicted on the evaluation form. Subsurface and groundwater conditions can vary in areas not explored by GESTRA. Infiltration rates for the observed soil textures were estimated based on the information provided in WDNR Technical Standard 1002, Table 2 (dated December 2022), and are presented in the Soil and Site Evaluation-Storm forms attached in Appendix I (separated by existing parcels).

In the following tables we have provided details for the individual stormwater features planned and evaluated each for wet retention and infiltration regardless of the current plan. Within each table we have provided comments related to a wet retention pond liner and infiltration. The information presented in this report should be reviewed in conjunction with the attached boring logs and Soil Evaluation-Storm forms. Typically, the comments will fall under the following conditions.

- Liner required:

GESTRA evaluated the native soil conditions following the general guidelines of the WDNR Conservation Practice Standard 1001 for the design of Wet Detention Ponds. The existing native soil conditions were compared to Appendix D (Liner Flow Chart for Wet Detention Ponds) to determine if a liner is required. At locations where *sandy clay, silty clay or clay* were not present to at least 3 feet below the native soil interface or if bedrock (possible bedrock/auger refusal) was within 2 feet or above the native soil interface, the location is recommended for a constructed liner.

- Not suitable for infiltration:

GESTRA evaluated the native soil conditions following the general guidelines of NR 151.124(4)(c) and Wisconsin Department of Natural Resources (WDNR) Conservation Standard Practice 1002. Locations were noted as eligible for exemption from infiltration where *sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, or clay* was present at the native soil interface. Locations where bedrock (possible bedrock/auger refusal) or groundwater was less than 3 feet from native soil interface were also noted as not suitable for infiltration as adequate separation and filtering layer would not be present.

Additional exploration through test pits and further laboratory testing is required if a basin will be designed for infiltration per WDNR Conservation Standard Practice 1002. When final design elevations are determined, additional evaluation of infiltration device is also recommended to establish if the soil meets the filtering layer requirements if the bottom of the pond will be within 3 feet of the bedrock or groundwater levels encountered. NR 151 requires the soil between the bottom of the infiltration system and seasonal high groundwater have at least a 3-foot layer of soil with 20% fines or greater or a 5-foot soil layer with 10% fines or greater. Per WDNR CPS 1002, *sandy loams, loams, silt loams, silts and all clay textural classifications* are assumed to meet the percent fines limitations of a filtering layer.

Zone 1 – northwest quadrant

Pond 13P – Wet Retention

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-36 [a]	900.7	890.3	885.2	896.7	Liner required. Silt loam at native soil interface. Not suitable for infiltration. Groundwater above native soil interface.
B-37	899.3		881.8	893.8	Liner required. Sandy clay loam at native soil interface. Not suitable for infiltration. Groundwater above native soil interface and soil eligible for infiltration exemption.

Notes: a – B-36 offset as directed by Trio. Staked location in wooded area and not accessible.

Zone 2 – northeast quadrant

Pond 9P – Wet Retention

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-1	899.7	893	887.2	895.7	Liner required. Sandy clay loam at native soil interface. Not suitable for infiltration. Groundwater above native soil interface and soil eligible for infiltration exemption.
B-2	906.9		898.4	901.9	Liner required. Possible bedrock above native soil interface. Not suitable for infiltration. Groundwater and possible bedrock above native soil interface.

Basin 10B – Bioinfiltration

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-3	915.6	912	905.6	Not encountered	Liner required. Sand at native soil interface. Suitable for infiltration. Possible additional evaluation of filtering layer, sand at native soil interface.
B-4	919.8		910.3	Not encountered	Liner required. Silt loam at native soil interface. Not suitable for infiltration. Possible bedrock within 2 feet of native soil interface.

Pond 11P – Wet Retention

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-5	917.7	907.2	911.2	Not encountered	Liner required. Possible bedrock above native soil interface. Not suitable for infiltration. Possible bedrock higher than native soil interface.
B-6	912.4		898.9	Not encountered	Liner potentially required. Sandy clay loam at native soil interface. At native soil interface, soil eligible for infiltration exemption.

Basin 8B – Dry Pond

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-8	918.7	916.5	912.2	NMR	Liner potentially required. Sand clay loam at native soil interface. At native soil interface, soil eligible for infiltration exemption.
B-9	919.2		910.2	NMR	Liner potentially required. Clay at native soil interface but does not extend 3 feet. At native soil interface, soil eligible for infiltration exemption.

Notes: NMR = no measurement recorded. B-8, B-9, predominately clayey soils to depth of boring.

Zone 3 – southwest quadrant

Pond 3P – Wet Retention

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-33	924.1	917	907.1	922.1	Liner required. Sandy loam at native soil interface. Not suitable for infiltration. Groundwater above native soil interface.
B-34	929.6		918.6	926.6	Liner required. Groundwater and possible bedrock above native soil interface. Not suitable for infiltration. Possible bedrock above native soil interface.

Notes: Groundwater elevation is extended reading. At completion of drilling groundwater at 920.6 feet in B-33 and 921.6 feet in B-34 which are also higher than plan native soil interface.

Pond 1B – Wet Retention

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-26	938.3	933.5	922.3	933.3	Liner potentially required. Silty clay loam at native soil interface. Not suitable for infiltration. Groundwater within 1-foot of native soil interface. Eligible for infiltration exemption.
B-27	939		924.0	929	Liner potentially required. Silty clay loam at native soil interface. Eligible for infiltration exemption.

Notes: Groundwater elevation is extended reading, At completion of drilling groundwater at 927.3 feet in B-26. Extended water level reading used in our evaluation.

Pond 2B – Wet Retention

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-25	932.6	931	920.6	925.6	Liner potentially required. Clay loam at native soil interface. Eligible for infiltration exemption. Additional excavation required to expose non-exempt material.

Basin 4B – Bioinfiltration

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-29	946.1	936	926.1	933.1	Liner required. Sand at native soil interface. Suitable for infiltration. May require filtering layer.
B-30	948.5		935.5	Not encountered	Liner required. Sand at native soil interface. Possible bedrock within 1 foot of native soil interface. Not suitable for infiltration. Possible bedrock within 1 foot of native soil interface.

Zone 4 – southeast quadrant

Pond 12P – Wet Retention

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-17	925.0	917	916.5	917.0	Liner required. Loamy sand at native soil interface. Possible bedrock within 1 foot of native soil interface. Not suitable for infiltration. Possible bedrock within 1 foot of native soil interface.
B-18	931.2		924.7	Not encountered	Liner required. Possible bedrock above native soil interface. Not suitable for infiltration. Possible bedrock above native soil interface.

Pond 7P – Wet Retention

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-13	921.7	919.3	917.2	Not encountered	Liner required. Sandy clay loam at native soil interface. Possible bedrock within 3 feet of native soil interface. Not suitable for infiltration. Possible bedrock within 3 feet of native soil interface.
B-14	925.2		917.7	Not encountered	Liner required. Loamy sand and sandy clay loam at native soil interface. Possible bedrock within 2 feet of native soil interface. Not suitable for infiltration. Possible bedrock within 2 feet of native soil interface.

Pond 6P – Wet Retention

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-21	917.7	905	913.2	Not encountered	Liner required. Possible bedrock above native soil interface. Not suitable for infiltration. Possible bedrock above native soil interface.
B-22	916.3		908.3	Not encountered	Liner required. Possible bedrock above native soil interface. Not suitable for infiltration. Possible bedrock above native soil interface.

Rain Garden 5B

Boring Location	Existing Ground Elevation	Plan Native Soil Interface Elevation	Bedrock Elev. (feet)	Groundwater Elev. (feet)	Comments
B-20	925.6	922	919.1	Not encountered	Liner may not be required. Silty clay at native soil interface, but possible bedrock within 3 feet of native soil interface. At native soil interface, soil eligible for infiltration exemption. Not suitable for infiltration. Possible bedrock within 3 feet of native soil interface.

The following recommendations are for the construction of a storm water basin as a wet detention pond and are in part developed based on the information available in the Wisconsin Department of Safety and Professional Services Chapter SPS 382.365 and 360.30 and Appendix D of Technical Standard 1001. At this time the design requirements are not known and our recommendations are based on an assumed Type A liner.

For an assumed Type A liner, as a minimum the base, sides and berms at elevations below the design high-water level should be constructed out of clay soils with the following properties:

- an average plasticity index (PI) of 12 or more with none less than 10,
- an average liquid limit (LL) of 25 or greater with none less than 20,
- a minimum of 50% of the soil by weight finer than the #200 sieve,
- a minimum of 90% of the soil by weight finer than the #4 sieve, and
- in-place hydraulic conductivity of the compacted soils should be 1x10-7 cm/sec or less.

The fine-grained cohesive soils encountered in the borings that meet the above requirements will require sifting and sorting of the soil to remove large gravel, cobbles and boulders before placing it as liner material. Otherwise, the project should consider importing suitable clayey soil for the liner construction. A complete testing program of the proposed liner material should be performed to confirm it meets the project requirements before and after placement. The native soil encountered near the pond bottom elevation typically included gravel, cobbles and boulders.

Alternatively, a high density polyethylene (HDPE) or geosynthetic clay liner (GCL) could be considered in lieu of the installation of a clay liner. Another option would be constructing the liner using a soil-bentonite clay mix, but this system typically requires design and construction by a specialty contractor. Refer to Appendix D of Technical Standard 1001 for additional information related to the clay liner and these alternative liners.

The clay liner soils should be compacted using a sheepsfoot (or similar type) compactor to a minimum of 90% of the modified Proctor dry density value and at a moisture content at least 2% wet of optimum as determined by ASTM D1557. This material should be compacted in maximum 6-inch loose lifts and the compacted clay should be free of organics, cobbles, boulders, debris and any other unsuitable soils. The clay shall be disked or otherwise mechanically processed before compaction to break up clods so that the maximum clod size is 4 inches. The resulting clay liner should have a minimum thickness of 2 feet. Refer to NRCS Wisconsin Construction Specification 300 – Clay Liners for additional information pertaining to the placement and compaction of clay liner material.

Additional quality assurance testing is recommended during construction to confirm the material being placed meets the project requirements, including testing the clay liner materials for hydraulic conductivity and material properties. Regardless of the liner system selected, we recommend it be installed by a company with demonstrated prior experience with the product.

4.9 CONSTRUCTION CONSIDERATIONS

The detailed means and method of excavation and construction should be decided by the contractor and approved by the project design team. Based on the specific site information, geotechnical exploration results and requirements for the proposed structure, the following issues should be taken into consideration during construction.

Dewatering

For shallow excavations, substantial water is not anticipated to be encountered during excavation. If water is encountered during shallow excavations, we anticipate the appropriate number of temporary sump pits and pumps should be sufficient to remove anticipated volume of water in the excavation. The contractor should be prepared to control groundwater and surface water and prevent it from accumulating in excavations or otherwise affecting construction.

Multiple borings encountered water at depths of 10 feet or less. Therefore, water should be anticipated during excavation in these areas and may be present in other areas not explored. Perched or trapped water may also be encountered. Where excavations below water are anticipated, the contractor should be prepared to install a construction dewatering system and we recommend the water level during construction should be kept a minimum of 2 feet below the deepest excavation during construction and until the final structure below grade drainage system is operating. A specialty dewatering contractor should be consulted for appropriate dewatering methods during construction as well as to evaluate potential impact on the proposed construction and surrounding structures. If the dewatering system is not properly designed, a boiling and/or heaving subgrade could occur possibly resulting in loss of ground support and detrimental effect to the nearby existing structures. Further exploration and evaluation of the groundwater is recommended when final design elevations are established.

Excavation Stability

Caving is a common issue for excavation side walls during construction, especially if fill material, granular soils, and/or water seepage are observed. An excavation plan should be developed and the length of excavation left open should be limited to prevent caving soil from covering the suitable bearing soils.

A temporary soil retention system may also be necessary in order to prevent caving or provide support of surrounding structures or utilities during construction. Providing recommendations or designing the retention system is out of the scope of services for GESTRA. The contractor must comply with the federal, state, local and updated OSHA regulations during excavation and in retention system design to ensure excavation safety.

Occupational Safety and Health Act (OSHA) has instituted strict standards for temporary construction excavations. These standards are outlined in 29 CFR Part 1926 Subpart P. Excavations within unstable soil conditions or extending five feet or more in depth should be adequately sloped or braced according to these standards. Excavation safety is the responsibility of the contractor. Material stockpiles or heavy equipment should not be placed near the edge of the excavation slopes. The actual stable slope angle should be determined during construction and will depend upon the loading, soil, and groundwater conditions encountered.

Weather Implications

The subgrade soil or the soil at foundation level might become unstable with exposure to adverse weather such as rain, snow and freezing temperatures. The unstable areas due to weather exposure may require an additional undercut or stabilization and the representative geotechnical engineer should assist with the determination of the depth of additional undercut or stabilization procedure based on observation of the field condition.

Soil Sensitivity

Soil at the construction site will be exposed to moisture and disturbance from construction traffic, construction equipment and human factors. Due to the disturbance, soil may become sensitive with contact of water. Contractor should try to lessen the exposure the soil at the construction site may encounter to moisture and disturbances. Therefore, the foundations, floor slabs and pavements should be constructed immediately after the review of the representative geotechnical engineer.

5.0 EXPLORATION AND TESTING PROCEDURES

5.1 LAYOUT AND ELEVATION PROCEDURES

A total of thirty-nine (39) soil borings were completed at the approximate locations shown on the attached Borehole Location Map in Appendix I. The location of the borings were selected, located in the field, and ground surface elevation provided by Trio (project civil engineer). One boring location B-36 was in a wooded area and inaccessible. GESTRA adjusted the location per the direction of Trio and noted the offset location and ground elevation.

5.2 FIELD TESTING PROCEDURES

The boreholes were drilled using a track mounted drill rig. The boreholes were initiated and advanced by using hollow stem augers. 24-inch split spoon samples were collected continuously to the depth of the boring. Borings were planned to be drilled to a maximum depth of 20 feet, but were terminated at auger refusal shallower than planned depth.

All representative soil samples were taken in general accordance with the "Standard Method for Penetration Test and Split-Barrel Sampling of Soils" (ASTM D1586). After each sampling, a soil sample was retained and placed in a jar and recorded for type, color, consistency, and moisture, sealed and then transported to the laboratory for further review and testing, if required. The specific drilling method used including the depths, rig type, crew chief, are included on each of the individual boring logs as it may change for each borehole.

5.3 LABORATORY TESTING PROCEDURES

After completion of drilling operations, all of the retained soil samples were transported to GESTRA's laboratory and classified by a geotechnical engineer using the Unified Soil Classification System (USCS) and the Field Book for Describing and Sampling Soils, USDA, NRCS, 2012. Charts describing the classification systems used are included in Appendix I of this report. The engineer assigned laboratory testing suited to extract important index properties of the soil layers. These tests included hand penetrometer, moisture content, mechanical analysis, hydrometers, and Atterberg limits.

STANDARD OF CARE

Our exploration was limited to evaluating subsurface soil and groundwater conditions pertaining to the proposed project. GESTRA did not perform any environmental, chemical, or hydrogeologic testing as these were not part of our work scope.

This report should be made available in its entirety to bidding contractors for information purposes. The soil boring logs and borehole location map should not be detached from this report. Our report is not valid if used for purposes other than what is described in the report.

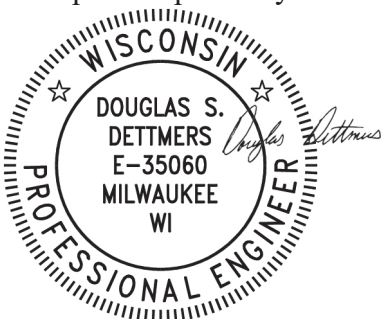
All OSHA regulations such as those regarding proper sloping and temporary shoring of excavations should be followed during the entire construction process.

GESTRA has presented our professional opinions in this report in the form of recommendations. Our opinions are based on our understanding of current project information and related accepted engineering practices at the time of this report. Other than this, no warranty is implied or intended.

Sincerely,

GESTRA Engineering, Inc.

Report Prepared By:



Douglas Dettmers
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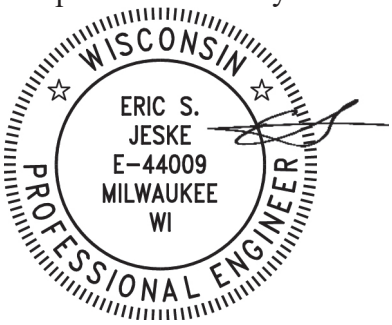
Date: 2023.05.16 11:06:29 -05'00'

Douglas Dettmers, P.E.
Senior Engineer

Report Reviewed By:



Eric Jeske
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Eric Jeske, P.E.
Senior Engineer

APPENDIX I

SITE LOCATION MAP, BOREHOLE LOCATION MAP, TEST BORING LOGS, SOIL EVALUATION-STORM FORMS, GENERAL NOTES AND SOILS CLASSIFICATION

= Project Area

Base map obtained from Waukesha County GIS website

GESTRA Engineering, Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: (414) 933-7444
Fax: (414) 933-7844

Project Name & Location:
Thomas Farm Development
NWC Golf Road and Elmhurst Road
Town of Delafield, Wisconsin

Drawing Title:
Site Location Map

Project No.: 23083-10

Scale: Not to Scale

Drawing No.: 1 of 2

Prepared by: JM

Checked by: DD

Date: May 6th, 2023

ATER REPORT:
O THE PRELIMINARY
VATER PLAN REPORT ADDITIONAL
AND CALCULATIONS

ATER PLAN NOTES:
POSED DEVELOPMENT (ALL PHASES) ARE SERVED
TE SHARED STORMWATER FACILITIES, AS SHOWN
RELIMINARY STORMWATER PLAN.
RMWATER FACILITIES WILL BE CONSTRUCTED WITH
RRESPONDING PHASE OF DEVELOPMENT.
RMWATER FACILITIES WILL BE LOCATED WITHIN
AND/OR DRAINAGE EASEMENTS.
DENTIAL LOTS AND CONDOMINIUM UNITS WILL BE
A MASTER HOMEOWNERS ASSOCIATION.
TER HOMEOWNERS ASSOCIATION WILL BE
SIBLE FOR THE REPAIR, MAINTENANCE AND
TION OF THE STORMWATER PRACTICES.

= Zone Boundary

= Borehole Location

GESTRA

GESTRA Engineering, Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: (414) 933-7444
Fax: (414) 933-7844

Project Name & Location:
Thomas Farms Development
NWC Golf Road and Elmhurst Road
Town of Delafield, Wisconsin

Drawing Title:
Borehole Location Map

Project No.: 23083-10

Date: May 6th, 2023

Prepared by: JM

Checked by: DD

Drawing No.: 2 of 2

Scale: 1 inch = 300 feet

Base Map obtained from "Map 5 - Preliminary Stormwater Plan" dated 04/07/2023 provided to GESTRA
Document Size = 11"x17"

DISCHARGE POINT
DISCHARGE POINT
OAKTON RD
Lake Country Recreation Trail
Zone 1
Zone 2
Zone 3
Zone 4
13P POND
Top = 899.8
Spillway = 898.8
NWL = 895.3
POND 9P
Top = 904
Spillway = 903
NWL = 898
BIOFILTER 10B
Top = 916
Spillway = 915
Bottom = 912
11P POND
Top = 917.5
Spillway = 916.5
NWL = 912.2
POND 2B
(1' DEPTH)
Top = 933
Spillway = 932
Bot = 931
POND 3P
Top = 929
Spillway = 928
NWL = 922
1B POND
Top = 938.5
Spillway = 937.5
NWL/Bot = 933.5
12P POND
Top = 927
Spillway = 926
NWL = 922
DRY POND 8B
Top = 920.5
Spillway = 919.5
Bottom = 916.5
POND 7P
Top = 923.3
Spillway = 922.3
NWL/Bot = 919.3
POND 6P
Top = 916
Spillway = 915
NWL = 910
4B
Top = 940
Spillway = 939
Bottom = 936
5B RAIN GARDEN
Top = 926
Spillway = 925
Bottom = 922
B-1 B-2 B-3 B-4 B-5 B-6 B-7 B-8 B-9 B-10 B-11 B-12 B-13 B-14 B-15 B-16 B-17 B-18 B-19 B-20 B-21 B-22 B-23 B-24 B-25 B-26 B-27 B-28 B-29 B-30 B-31 B-32 B-33 B-34 B-35 B-36 B-37 B-38 B-39
EXISTING WETLAND
EXISTING PEC
SHORELAND ZONING
100-YR SETBACK
ULTIMATE OVERFLOW
PRIMARY ENVIRONMENTAL CORRIDOR
Landscape Berm
CROOKED CREEK
PRAIRIE WOOD CT
HIDDEN CREEK CT
GLEN COVE ROAD
ELMHURST ROAD
GOLF ROAD
CTH 'DR'
I-94
GOLF RDG
REGRAD
PROVIDE
DRAINAG
DISCHARGE POINT
ROOKSTONE CIR
ONE CIR
4100 N
BROO
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info

p 5
ELIMINARY STORMWATER PLAN

SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME	Thomas Farms Development
PROJECT LOCATION	Delafield, Wisconsin
DATE DRILLING STARTED	4/10/2023
DATE DRILLING ENDED	4/10/2023
BORING NUMBER	B-1
PROJECT NUMBER	23083-10
DRILLING RIG	Geoprobe
BORING DRILLED BY	FIRM: GESTRA CREW CHIEF: D. Harvey
FIELD LOG	B. Griffin
LAB LOG / QC	D. Dettmers
NORTHING	389790
EASTING	2415434
DRILLING METHOD	2¼" HSA
SURFACE ELEVATION	899.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	17	0 1 1 2	2			TOPSOIL (10-inches) 0.8 (898.9) LEAN CLAY WITH SAND, brown, moist, medium stiff 2 (897.7)	CL			.50			21.9	Driller noted standing water around boring.
SS - 2	18	2 2 4 4	6			CLAYEY SAND WITH GRAVEL, light brown at 3', trace gray mottling, moist, loose 3.8 (895.9)	SC			.50				Gravel = 21.3% Sand = 29.4% P200 =49.2%
SS - 3	12	4 6 4 4	10	5	895.0	CLAYEY SAND, light brown, wet, medium dense, trace gravel	SC							
SS - 4	14	5 5 9 6	14			8 (891.7)								
SS - 5	12	5 9 14 17	23	10	890.0	SILTY SAND WITH GRAVEL, light brown, moist to wet, medium dense	SM							
SS - 6	18	3 4 17 16	21			12.2 (887.5)								
SS - 7	2	50/2"	R			End of Boring at 12.2 ft.								Auger Refusal at 12.5'. Possible bedrock.
				15	885.0									
				20	880.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 4 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 2 HOURS: 4 ft.			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA Engineering Inc.
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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-2
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 389629 EASTING: 2415563	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 906.9 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	15	5 6 6 6	12	905.0	TOPSOIL (7-inches) 0.6 (906.3) LEAN CLAY, brown, moist, stiff, trace sand and gravel	CL			1.5	43	26	22.6	
SS - 2	12	3 7 8 5	15		2 (904.9) CLAYEY SAND WITH GRAVEL, light brown, very moist, medium dense	SC							
SS - 3	14	8 20 27 16	47	5	4 (902.9) SILTY CLAYEY SAND, light brown, moist to wet, medium dense to dense, gray gravel with sand layer around 5'	SC-SM							
SS - 4	12	3 8 7 38	15	900.0									
SS - 5	6	12 50/5"	R		8.9 (898) End of Boring at 8.9 ft.								Driller noted auger refusal at 8.5'. Possible bedrock.
				10									
				895.0									
				15									
				890.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 6 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 3 HOURS: 5 ft.			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/7/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/7/2023	BORING NUMBER: B-3
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 389426 EASTING: 2415140	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 915.6 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	14	2 3 4 6	7	915.0	TOPSOIL (6-inches) 0.5 (915.1) LEAN CLAY, brown, moist, stiff, trace sand, gravelly (1'-2') 2 (913.6)	CL			1.50			26.2	
SS - 2	12	3 23 42 29	55		GRAVEL WITH SAND, light brown, moist, medium dense to very dense, sand with gravel layers, (Possible Weathered Bedrock)	GP							
SS - 3	10	21 14 12 14	26	5 910.0									
SS - 4	14	7 15 48 18	63										
SS - 5	14	18 50/3" 15 14	65/3		SS-5: with silt								
SS - 6	0	50/1"	R	10 905.0	10 (905.6) End of Boring at 10.0 ft.								Driller noted auger refusal at 10'. Possible bedrock.
				15 900.0									
				20 895.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER NE HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/7/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/7/2023	BORING NUMBER: B-4
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 389283 EASTING: 2415140	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 919.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	20	2 1 2 2	3			TOPSOIL (10-inches) 0.8 (919) LEAN CLAY, brown, moist, stiff, trace sand, with gravel at 3'	CL			1.75			22.1	
SS - 2	10	1 4 6 10	10			4 (915.8)				1.00			23.1	
SS - 3	10	25 31 28 15	59	5	915.0	SAND WITH SILT AND GRAVEL, light brown, moist, very dense, possible cobbles 6 (913.8)	SP-SM							
SS - 4	11	10 10 8 14	18			CLAYEY GRAVEL WITH SAND, light brown, moist, medium dense to very dense, sand with silt layers	GC							P200 = 32.5%
SS - 5	10	28 38 50/3	R	10	910.0	9.3 (910.5) End of Boring at 9.3 ft.								Auger Refusal at 9.5'. Possible bedrock
				15	905.0									
				20	900.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER NE HOURS: NMR			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-5
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 389182 EASTING: 2414717	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 917.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	9	2 2 3 3	5		TOPSOIL (10-inches) 0.8 (916.9) CLAYEY SAND, light brown, moist, very loose to dense								
SS - 2	15	3 3 3 4	6	915.0		SC							
SS - 3	15	2 16 22 31	38	5 5 (912.7)	GRAVEL WITH SAND AND SILT, brown and gray, moist, dense to very dense	GP-GM							
SS - 4	3	4 50/5"	R		6.9 (910.8) End of Boring at 6.9 ft.								Driller noted auger refusal at 6.5. Possible bedrock.
				910.0									
				10									
				905.0									
				15									
				900.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		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: NE			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-6
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 389011 EASTING: 2414577	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 912.4 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	14	1 2 1 2	3		TOPSOIL (11-inches) 0.9 (911.5) LEAN CLAY, brown, moist, stiff	CL			1.0			20.1	
SS - 2	14	2 6 7 6	13	910.0	3 (909.4) CLAYEY SAND WITH GRAVEL, light brown, moist, medium dense to very dense, brown sand layer at 6'								Gravel = 25.0% Sand = 33.2% P200 =41.8%
SS - 3	16	4 16 9 4	25	5									
SS - 4	12	13 9 10 43	19	905.0									
SS - 5	13	16 15 14 12	29			SC-SM							
SS - 6	14	24 32 32 25	64	10									
SS - 7	18	64 55 60/2"	R	900.0	13.5 (898.9) End of Boring at 13.2 ft.								Driller noted auger refusal at 13.5'. Possible bedrock.
				15									
				895.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		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			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-7
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 388598 EASTING: 2414571	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 916.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	18	0 1 2 4	3	915.0	TOPSOIL (10-inches) 0.8 (915.5) LEAN CLAY, brown, moist, stiff, trace sand 2 (914.3)	CL			1.00			22.7	
SS - 2	14	0 2 3 2	5		LEAN CLAY WITH SAND, light brown, moist to very moist, medium stiff, trace gravel				0.50			12.3	
SS - 3	12	2 5 6 8	11	5 910.0		CL			0-0.25			9.2	
SS - 4	9	3 5 4 3	9		8 (908.3)				0-0.25			9	
SS - 5	14	8 30 50/3"	R		GRAVEL WITH SAND, brown and gray, wet, very dense 9.3 (907)	GP							
				10 905.0	End of Boring at 9.3 ft.								Driller noted auger refusal at 9.5'. Possible bedrock.
				15 900.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 7.5 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 3 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 3 HOURS: 0.4 ft.			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/10/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/10/2023	BORING NUMBER: B-8
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 388826 EASTING: 2415086	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 918.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	16	2 2 2 2	4			TOPSOIL (10-inches) 0.8 (917.9) SANDY LEAN CLAY, brown, moist, stiff				1.00	48	27	21.7	
SS - 2	13	2 2 3 2	5		915.0		CL			1.00			27.6	P200 = 52.8%
SS - 3	12	1 1 2 50/5"	3	5									9.2	
						5.9 (912.8) Gravelly at 5.5' End of Boring at 5.9 ft.								Auger Refusal at 6.5'. Possible bedrock.
					910.0									
				10										
					905.0									
				15										
					900.0									
				20										

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR ft.		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			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/10/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/10/2023	BORING NUMBER: B-9
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 388693 EASTING: 2415182	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 919.2 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
						TOPSOIL (thickness not recorded)								
SS - 1	15	2 2 3 3	5			LEAN CLAY, brown, moist, stiff, trace to with sand	CL			1.00			23.8	
SS - 2	17	2 4 3 3	7							1.00			26	
					915.0	4 (915.2)								
SS - 3	13	2 6 3 3	9	5		CLAYEY SAND WITH GRAVEL, brown, moist to wet, loose	SC-SM							Gravel = 17.1% Sand = 36.5% P200 =46.4%
						6 (913.2)								
SS - 4	17	1 2 3 5	5			LEAN CLAY, brown, moist, stiff, with gravel and sand at 8.5'	CL			1.50			20	
SS - 5	4	11 50/3"	R			8.8 (910.4)				0.50			20.1	
					910.0	End of Boring at 8.8 ft.								Driller noted auger refusal at 9'. Possible bedrock.
				10										
					905.0									
				15										
					900.0									
				20										

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR ft.		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			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/7/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/7/2023	BORING NUMBER: B-10
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 389054 EASTING: 2415325	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 920.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	18	2 1 2 3	3	920.0	TOPSOIL (9-inches) 0.8 (920)								
					LEAN CLAY, brown, moist, stiff to very stiff, trace sand, with gravel at 3'				1.25-2.00			21.1	
SS - 2	9	2 3 3 4	6			CL			1.25			18.7	
SS - 3	15	2 4 16 19	20	5 915.0	5 (915.8) GRAVEL WITH SILT AND SAND, light brown, moist, medium dense to dense								
SS - 4	19	16 20 25 22	45										
SS - 5	14	18 26 26 24	52	10		GP-GM							
SS - 6	14	9 34 50/4"	R	910.0	SS-6: Silty Sand with gravel layer 11.3 (909.5)								
					End of Boring at 11.3 ft.								Auger Refusal at 12'. Possible bedrock.
				15 905.0									
				20 900.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER NE HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/7/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/7/2023	BORING NUMBER: B-11
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 388704 EASTING: 2415559	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 917.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	24	2 2 3 3	5		TOPSOIL (9-inches) 0.8 (917)								
					LEAN CLAY, brown, moist, stiff to very stiff, trace sand 2 (915.8)	CL			1.25-2.00			25	
SS - 2	18	2 1 1 2	2	915.0	CLAYEY SAND WITH GRAVEL, light brown, very moist, very loose 4 (913.8)	SC							
SS - 3	9	4 50/3"	R		LEAN CLAY, light brown, moist, very stiff, trace sand 4.8 (913)	CL			2.5			14.4	
				5	End of Boring at 4.8 ft.								Driller noted auger refusal at 5.5'. Possible bedrock.
				910.0									
				10									
				905.0									
				15									
				900.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER NE HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/7/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/7/2023	BORING NUMBER: B-12
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 388072 EASTING: 2415606	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 917.4 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	21	2 2 2 3	4		TOPSOIL (10.5-inches) 0.9 (916.5)								
				915.0	LEAN CLAY, brown, moist, stiff, trace sand 3 (914.4)	CL			1.25			18.3	
SS - 2	14	2 39 50/2	R		GRAVEL WITH SAND, light brown, moist, very dense, trace to with silt, (Possible Weathered Bedrock)	GP							
SS - 3	4	13 15 50/0"	R	5	5 (912.4) End of Boring at 5.0 ft.								Driller noted auger refusal at 5'. Possible bedrock.
				910.0									
				10									
				905.0									
				15									
				900.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER NE HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/10/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/10/2023	BORING NUMBER: B-13
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 388168 EASTING: 2415163	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 921.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	14	2 2 4 3	6	920.0	TOPSOIL (10-inches) 0.8 (920.9) LEAN CLAY, brown, moist, very stiff	CL			2.50			25.1	
SS - 2	15	2 2 2 1	4		2 (919.7) CLAYEY SAND, light brown, moist to wet, very loose	SC							
SS - 3	1	50/2"	R		4.2 (917.5) End of Boring at 4.2 ft.								Driller noted auger refusal at 4.5'. Possible bedrock.
				5 / 915.0									
				10 / 910.0									
				15 / 905.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER NE HOURS: NMR			

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-14
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 388248 EASTING: 2414917	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 925.2 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	15	2 1 2 6	3			TOPSOIL (10-inches) 0.8 (924.4) LEAN CLAY, brown, moist, very stiff, trace sand 2 (923.2)	CL			2.5			25.4	
SS - 2	18	6 10 15 14	25			SILTY SAND WITH CLAY AND GRAVEL, reddish brown, moist, medium dense								
SS - 3	12	13 21 15 14	36	5	920.0		SP-SM							P200 = 22.5%
SS - 4	15	7 9 16 23	25											
SS - 5		50/1"	R			7.6 (917.6) End of Boring at 7.6 ft.								Driller noted no recovery for SS-5. Auger refusal at 7.5'. Possible bedrock.
				10	915.0									
				15	910.0									
				20	905.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		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			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-15
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 387917 EASTING: 2414812	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 926.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	15	2 2 2 2	4	925.0	TOPSOIL (10-inches) 0.8 (926) LEAN CLAY, brown, moist, stiff	CL			1.0			21.8	
SS - 2	8	1 4 5 5	9		4 (922.8) CLAYEY SAND, light brown, moist to very moist, loose to very dense, trace to with gravel				1.5			27.3	
SS - 3	17	4 4 9 5	13	5		SC							
SS - 4	12	4 5 5 6	10	920.0	SS-4: black sand layer								
SS - 5	0	5 50/5"	R		8.9 (917.9) End of Boring at 8.9 ft.								Driller noted auger refusal at 9.5'. Possible bedrock.
				10									
				915.0									
				15									
				910.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		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			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-16
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 387955 EASTING: 2414415	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 930.5 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
					930.0	TOPSOIL (9-inches)								
						0.8 (929.7)								
SS - 1	18	1 1 2 2	3			LEAN CLAY, brown, moist, stiff, trace sand	CL			1.0			21.2	
SS - 2	9	2 17 5 5	22							1.5			22.8	
						4 (926.5)								
SS - 3	9	2 3 4 3	7	5	925.0	LEAN CLAY WITH SAND, light brown to brown, moist, medium stiff, trace to with gravel	CL			0.5			12.3	
						6 (924.5)								
SS - 4	6	2 5 6 9	11			GRAVEL WITH SAND AND SILT, light brown, moist to wet, medium dense to very dense	GP-GM							
SS - 5	4	50/5"	R			8.4 (922.1)								
						End of Boring at 8.4 ft.								Driller noted auger refusal at 8.5'. Possible bedrock.
				10	920.0									
				15	915.0									
				20	910.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 8 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 1.5 HOURS: 7.5 ft.			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-17
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 388402 EASTING: 2414212	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 925 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	15	1 1 2 3	3		TOPSOIL (6.5-inches) 0.5 (924.5) LEAN CLAY, brown, moist, stiff, trace sand	CL			1.5			26	
SS - 2	11	1 3 4 12	7		3.5 (921.5) SAND WITH SILT AND GRAVEL, brown, moist to wet, medium dense to very dense SS-3: sandy lean clay layer							13.2	
SS - 3	15	4 17 14 9	31	5 / 920.0		SP-SM							
SS - 4	15	14 17 12 9	29										
SS - 5	2	50/5"	R		8.4 (916.6) End of Boring at 8.4 ft.								Driller noted auger refusal at 8.5'. Possible bedrock.
				10 / 915.0									
				15 / 910.0									
				20 / 905.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 8 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 2 HOURS: 8 ft.			

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-18
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 388286 EASTING: 2414066	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 931.2 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	12	2 2 3 3	5	930.0	TOPSOIL (6-inches) 0.5 (930.7) LEAN CLAY, brown, moist, stiff, trace sand and gravel	CL			1.0			26.5	
SS - 2	11	2 4 16 20	20		3 (928.2) GRAVEL WITH SILT AND SAND, light brown, moist, medium dense to dense	GP-GM							
SS - 3	13	16 15 17 18	32	5									P200 = 17.9%
SS - 4	1	50/3"	R	925.0	6.3 (924.9) End of Boring at 6.3 ft.								Driller noted auger refusal at 6.5'. Possible bedrock.
				10									
				920.0									
				15									
				915.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		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			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-19
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 387504 EASTING: 2414212	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 934.9 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	18	4 5 4 5	9			TOPSOIL (10") 0.8 (934.1) CLAYEY SAND, brown, moist, loose to medium dense	SC							P200 = 44.5%
SS - 2	18	4 5 13 12	18			3 (931.9) SAND, brown, moist, medium dense	SP							
SS - 3	18	15 18 22 22	40	5	930.0	4.7 (930.2) CLAYEY SAND, red brown, dry to moist, dense to very dense, trace gravel	SC							P200 = 42.9%
SS - 4	18	9 20 24 22	44											
SS - 5		16 22 50/1"	R			9.1 (925.8) End of Boring at 9.1 ft.								Driller did not record recovery on field log. Driller noted auger refusal at 9.5'. Possible bedrock.
				10	925.0									
				15	920.0									
				20	915.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.	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		

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-20
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 387522 EASTING: 2414883	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 925.6 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	10	2 3 3 4	6	925.0	TOPSOIL (9-inches) 0.8 (924.8)								
					LEAN CLAY, brown with gray and black mottling, moist, very soft to very stiff, trace sand				1.0			24.7	
SS - 2	14	2 4 3 4	7			CL			2.0	35	20	22.1	
					SS-3: with silt								
SS - 3	10	1 0 1 1	1	5 / 920.0					0-0.25			20.6	
SS - 4	0	0 50/1"	R		SS-4: with silt 6.6 (919)				0.5-1.5			18.6	Driller noted auger refusal at 6.5'. Possible bedrock.
					End of Boring at 6.6 ft.								
				10 / 915.0									
				15 / 910.0									
				20 / 905.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		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			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-21
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 387595 EASTING: 2415285	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 917.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	9	3 50/3"			TOPSOIL (8-inches) 0.7 (917)								
					GRAVEL WITH SAND, brown and light brown, moist, dense to very dense, possible cobbles or boulders at 1'								
SS - 2	3	10 18 26 35	44	915.0		GP							
SS - 3	1	50/1"	R	5	4.6 (913.1) End of Boring at 4.6 ft.								Driller noted auger refusal at 4.5'. Possible bedrock.
				910.0									
				10									
				905.0									
				15									
				900.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		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			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-22
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 387698 EASTING: 2415438	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 916.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	20	0 0 1 2	1	915.0	TOPSOIL (9-inches) 0.8 (915.5) LEAN CLAY WITH SAND, brown, moist, stiff, trace gravel, layer of brown/gray silty clay at 5'	CL			1			22.8	
SS - 2	19	0 3 3 3	6						2.25			23.5	
SS - 3	10	2 1 2 5	3	5 5 (911.3)	CLAYEY SAND WITH GRAVEL, brown, moist, medium dense	SC-SM			1.5				Gravel = 21.1% Sand = 33.6% P200 =45.4%
SS - 4	23	6 8 12 29	20	910.0									
SS - 5	1	50/1"	R	7.5 (908.8)	GRAVEL, light brown, moist, medium dense, with sand 8.1 (908.2) End of Boring at 8.1 ft.	GP							Driller noted auger refusal at 8.1'. Possible bedrock.
				10									
				905.0									
				15									
				900.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.	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		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-23
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 387716 EASTING: 2413881	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 940.4 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	20	2 4 12 9	16	940.0	TOPSOIL (10-inches) 0.8 (939.6) CLAYEY SAND WITH GRAVEL, brown, moist, medium dense								
SS - 2	9	9 9 9 7	18			SC							
SS - 3	9	3 9 12 10	21	5 935.0	6 (934.4) SAND WITH SILT AND GRAVEL, light brown, moist, medium dense								
SS - 4	12	7 10 10 7	20			SP-SM							
SS - 5	16	19 24 33 29	57	10	8 (932.4) SILTY SAND WITH GRAVEL, light brown to brown, moist, very dense, trace clay	SM							
SS - 6	5	21 50/2"	R	930.0	10.7 (929.7) End of Boring at 10.7 ft.								Driller noted auger refusal at 10.5'. Possible bedrock.
				15 925.0									
				20 920.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		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			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-24
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 387950 EASTING: 2413836	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 940.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	14	2 6 12 12	18	940.0	TOPSOIL (8-inches) 0.7 (940) SAND WITH GRAVEL, light brown, moist, medium dense 2 (938.7)	SP							
SS - 2	17	3 3 3 3	6		CLAYEY SAND, light brown, moist, trace to with gravel	SC							
SS - 3	24	1 4 6 7	10	5 935.0									
SS - 4	21	3 14 16 18	30		7 (933.7) SILTY/CLAYEY SAND WITH GRAVEL, light brown, moist, dense SS-4: 10" clay layer	SC-SM							
SS - 5	21	5 14 22 50/3"	36	10 930.0	9.8 (930.9) End of Boring at 9.8 ft.								Driller noted auger refusal at 10.5'. Possible bedrock.
				15 925.0									
				20 920.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		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			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-25
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 388347 EASTING: 2413452	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 932.6 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	18	2 1 2 2	3		TOPSOIL (7.5-inches) 0.6 (932) LEAN CLAY WITH SAND, brown, moist, stiff, possible cobble or boulder at 2.5'				1.5			21.5	
SS - 2	6	1 50/2"	R	930.0		CL			1.0			25	
SS - 3	9	6 6 6 5	12	5	4 (928.6) SILTY SAND WITH GRAVEL, moist, medium dense	SM							P200 = 19.5%
SS - 4	12	3 7 5 5	12	925.0	8 (924.6) GRAVEL WITH SAND, brown, very dense, trace silt	GP							
SS - 5	6	15 30 18 14	48	10									
SS - 6	12	18 41 24	65										
SS - 7	1	50/1"	R	920.0	12.1 (920.5) End of Boring at 12.1 ft.								Driller noted auger refusal at 12'. Possible bedrock
				15									
				915.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 7 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 3 HOURS: 7 ft.			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-26
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: S. Gonyer	FIELD LOG: C. Ray LAB LOG / QC: D. Dettmers	NORTHING: 388013 EASTING: 2413386	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 3¼" HSA SURFACE ELEVATION: 938.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	13	1 1 2 2	3		TOPSOIL (8-inches) 0.7 (937.6) LEAN CLAY, brown, moist, very stiff, trace sand	CL			2.5			21.4	
SS - 2	14	1 3 3 3	6	935.0	4 (934.3) SILTY CLAY, light brown, moist, medium stiff to stiff				2.0			26.9	
SS - 3	14	1 2 3 4	5	5		CL-ML			0.5-1.0			19.3	P200 = 97.2%
SS - 4	15	1 3 14 5	17		7 (931.3) SANDY LEAN CLAY WITH GRAVEL, brown, moist to wet, stiff				1.0			20.2	
SS - 5	15	4 15 17 19	32	930.0					1.5			9.3	
SS - 6	14	5 14 19 21	33	10	SS-6: rock pieces	CL			1.5			8.3	
SS - 7	19	9 45 19 16	64	925.0	13 (925.3) GRAVEL WITH SILT AND SAND, light brown, wet, very dense, rock pieces (possible weathered bedrock)	GP-GM							
SS - 8	12	6 24 50/3"	R	15	15.3 (923) End of Boring at 15.3 ft.								Driller noted auger refusal at 16'. Possible bedrock.
				920.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 14 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 11 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 48 HOURS: 5 ft.			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-27
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: A. Woerpel	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 387887 EASTING: 2413473	PROJECT NUMBER: 23083-10 DRILLING RIG: Diedrich D50 ATV DRILLING METHOD: 3¼" HSA SURFACE ELEVATION: 939 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	4	2 2 3 4	5		TOPSOIL (4-inches) 0.3 (938.7) LEAN CLAY, dark brown, moist, medium stiff	CL			0.5			25	
					1.1 (937.9) LEAN CLAY, brown, moist, medium stiff, trace sand	CL							
SS - 2	15	2 3 4 5	7		1.6 (937.4) LEAN CLAY, light brown with gray mottling, moist, medium stiff to stiff				1.0	25	10	18.9	
				935.0		CL							
SS - 3	16	2 2 2 4	4	5					1.0			18	
					6.5 (932.5) SANDY LEAN CLAY WITH GRAVEL, light brown, moist, stiff								
SS - 4	11	1 3 4 8	7						1.5			10.1	
SS - 5	10	5 28 30 16	58		SS-5: rock pieces								
				930.0		CL						8.8	
				10 ▼									
SS - 6	13	19 12 17 34	29	▽									
					11.5 (927.5) GRAVEL, brown, wet, medium dense to very dense								
SS - 7	10	9 5 23 23	28			GP							
				925.0									
SS - 8	12	4 7 50/2"	R		clayey gravel at 14'								
				15 ▼	15.2 (923.8) End of Boring at 15.2 ft.								Driller noted auger refusal at 15'. Possible bedrock.
				920.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 11.5 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 15 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 24 HOURS: 10 ft.			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-28
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: S. Gonyer	FIELD LOG: C. Ray LAB LOG / QC: D. Dettmers	NORTHING: 387470 EASTING: 2413507	PROJECT NUMBER: 23083-10 DRILLING RIG: LC 55 DRILLING METHOD: 3¼" HSA SURFACE ELEVATION: 943.4 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	17	1 1 2 3	3		TOPSOIL (10-inches) 0.8 (942.6) LEAN CLAY, brown, moist, stiff				1.5			19.8	
SS - 2	16	2 3 4 5	7	940.0	with gravel at 2-4'	CL			1.5			15.8	
SS - 3	16	2 4 5 7	9	5	4 (939.4) CLAYEY GRAVEL WITH SAND, light brown, moist, loose 5.5 (937.9)	GC							Gravel = 45.8% Sand = 25.7% P200 =28.5%
SS - 4	19	5 12 17 16	29		SAND WITH GRAVEL, brown, moist, medium dense 8 (935.4)	SP							
SS - 5	20	7 17 27 14	44	935.0	SAND WITH SILT AND GRAVEL, light brown, moist, medium dense to dense	SP-SM							
SS - 6	18	4 12 14 18	26	10	12 (931.4)								
SS - 7	17	12 24 30 54	54	930.0	GRAVEL WITH CLAY AND SAND, brown, moist to wet, very dense	GP-GC							
SS - 8	5	7 50/3"	R	15	clayey sand layer at 14' SS-8: rock pieces								
SS - 9	0	50/1"			16.1 (927.3) End of Boring at 16.1 ft.								Driller noted no recovery. Auger refusal at 16'. Possible bedrock.
				925.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 14 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 16 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 48 HOURS: 12 ft.			

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SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-29
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: S. Gonyer	FIELD LOG: C. Ray LAB LOG / QC: D. Dettmers	NORTHING: 387445 EASTING: 2412979	PROJECT NUMBER: 23083-10 DRILLING RIG: LC 55 DRILLING METHOD: 3¼" HSA SURFACE ELEVATION: 946.1 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	13	2 2 3 5	5	945.0	TOPSOIL (9-inches) 0.8 (945.3) LEAN CLAY, brown, moist, stiff to very stiff 2 (944.1)	CL			1.0-2.0			21.7	
SS - 2	18	2 3 3 4	6		SANDY LEAN CLAY, brown to light brown, moist, stiff, trace gravel	CL			1.0			7.6	
SS - 3	16	3 4 5 5	9	5 940.0					1.0			8.5	
SS - 4	19	5 11 16 20	27		7 (939.1) SILTY SAND WITH GRAVEL, light brown, moist, medium dense	SM			0.5				
SS - 5	16	5 14 18 18	32		9 (937.1) SILTY SAND, light brown, moist, medium dense to dense	SM							P200 = 23.6%
SS - 6	18	5 12 17 20	29	10 935.0									
SS - 7	20	12 35 24 42	59		12 (934.1) SILTY SAND WITH GRAVEL, light brown, moist to wet, dense to very dense	SM							
SS - 8	0	12 20 13 16	33	15 930.0									
SS - 9	7	22 50/5"			17 (929.1) GRAVEL WITH SAND, light brown, wet, very dense, rock pieces (possible weathered bedrock) 18.1 (928)	GP							
SS - 10	1	50/1"	R		End of Boring at 18.1 ft.								Driller noted auger refusal at 20'. Possible bedrock.
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 13 ft.		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			

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SOIL BORING LOG

GESTRA Engineering Inc.
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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-30
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: S. Gonyer	FIELD LOG: C. Ray LAB LOG / QC: D. Dettmers	NORTHING: 387504 EASTING: 2412823	PROJECT NUMBER: 23083-10 DRILLING RIG: LC 55 DRILLING METHOD: 3¼" HSA SURFACE ELEVATION: 948.5 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	8	2 2 2 4	4			TOPSOIL (24-inches), LEAN CLAY, dark brown, moist							21	
						2 (946.5)								
SS - 2	13	2 3 4 7	7		945.0	SANDY LEAN CLAY, light brown, moist, stiff, trace gravel	CL			1.0			9.1	
						4 (944.5)								
SS - 3	12	5 6 7 8	13	5		SILTY CLAY WITH GRAVEL, light brown, moist, stiff	CL-ML			1.0			10.7	
SS - 4	15	9 10 10 13	20			7 (941.5)								
SS - 5	5	16 25 50/5"	R		940.0	GRAVEL WITH SAND, light brown, moist, medium dense	GP							
						9 (939.5)								
SS - 6	4	35 50/3"	R	10		GRAVEL WITH SAND, gray and light brown, moist, very dense, rock pieces (possible weathered bedrock)	GP							
SS - 7	4	20 50/1"	R			12.7 (935.8)								
						End of Boring at 12.7 ft.								
					935.0									Driller noted auger refusal at 13'. Possible bedrock.
				15										
					930.0									
				20										

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.	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: NE		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-31
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: A. Woerpel	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 387799 EASTING: 2413138	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 939.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	16	3 3 3 6	6			TOPSOIL (10-inches) 0.8 (938.9) LEAN CLAY, brown, moist, stiff to very stiff				2.5			22.3	
SS - 2	10	3 4 4 5	8			trace of black lean clay at 2-4' 4.3 (935.4)	CL			1.5-2.0			26.1	
SS - 3	12	2 2 4 8	6	5	935.0	CLAYEY SAND WITH GRAVEL, brown to light brown, moist to wet, loose to medium dense								
SS - 4	12	3 7 10 22	17			▽	SC							
SS - 5	13	7 6 8 8	14	10	930.0									
SS - 6	17	11 15 50/5"	R			11 (928.7) SILTY SAND, light brown, wet, very dense, possible weathered bedrock								
SS - 7	8	50/5"	R			▼	SM							
SS - 8	5	50/5"	R			14.5 (925.2)								
				15	925.0	End of Boring at 14.5 ft.								Drilller noted auger refusal at 15'. Possible bedrock.
				20	920.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 12 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-32
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: S. Gonyer	FIELD LOG: C. Ray LAB LOG / QC: D. Dettmers	NORTHING: 388020 EASTING: 2413038	PROJECT NUMBER: 23083-10 DRILLING RIG: LC 55 DRILLING METHOD: 3¼" HSA SURFACE ELEVATION: 939.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	15	1 2 3 3	5		TOPSOIL (8-inches) 0.7 (939)								
					LEAN CLAY, brown, moist, stiff to very stiff	CL			1.5-2.5			21.1	
SS - 2	14	1 2 3 2	5		3 (936.7)				1.5				
					CLAYEY SAND, light brown, moist, loose, trace gravel							20.3	
SS - 3	17	1 1 4 5	5	5 / 935.0		SC							
SS - 4	12	16 40 18 12	58		7 (932.7)								
					SAND WITH SILT AND GRAVEL, light brown, moist, very dense	SP-SM							
					8 (931.7)								
SS - 5	17	12 16 20 21	36	10 / 930.0	GRAVEL WITH SAND, light brown, wet, dense	GP							
					10 (929.7)								
SS - 6	15	13 25 19 18	44		SILTY SAND WITH GRAVEL, light brown, wet, dense to very dense, trace clay								
SS - 7	0	50/1"	R		possible weathered bedrock 12' to EOB	SM							Driller noted no reovery.
SS - 8	5	9 50/3"	R	15 / 925.0	14.8 (924.9)								
					End of Boring at 14.8 ft.								Driller noted auger refusal at 16'. Possible bedrock.
				20 / 920.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 9 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 48 HOURS: 9 ft.			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-33
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: A. Woerpel	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 388433 EASTING: 2412595	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 924.1 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	10	4 4 5 6	9		TOPSOIL (6-inches) 0.5 (923.6) LEAN CLAY WITH GRAVEL, brown, moist, very stiff, organics (possible fill) 2.2 (921.9)	CL			2.0			21.8	
SS - 2	13	3 5 3 2	8		CLAYEY SAND, light brown, loose to medium dense, trace gravel	SC							
SS - 3	13	2 3 4 6	7	920.0 5									
SS - 4	8	3 4 12 9	16										Gravel = 14.9% Sand = 42.9% P200 =42.2%
SS - 5	13	4 11 11 11	22	915.0 10									
SS - 6	19	5 14 14 21	28		10.4 (913.7) SILT, blueish gray with brown mottling, dry to moist, medium dense to very dense	ML						7.8	
SS - 7	16	6 11 12	23	910.0								9.8	
SS - 8	17	9 19 31 27	50	15	16 (908.1) End of Boring at 16.0 ft.								
SS - 9	6	50/0"	R										Driller noted auger refusal at 17'. Possible bedrock.
				905.0 20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 3.5 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 24 HOURS: 2 ft.			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-34
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: A. Woerpel	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 388315 EASTING: 2412460	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 929.6 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	11	3 3 4 6	7		TOPSOIL (5-inches) 0.4 (929.2) LEAN CLAY, brown, moist, very stiff	CL			3.0			21.7	
SS - 2	12	3 4 6 5	10		2.5 (927.1) CLAYEY SAND, light brown, moist to wet, medium dense, trace to with gravel								P200 = 21.0%
SS - 3	0	5 7 10 7	17	925.0 5									Driller noted no recovery.
SS - 4	0	4 5 6 8	11			SC							Driller noted no recovery. Flight auger sample.
SS - 5	15	6 11 16 38	27	920.0 10									
SS - 6	10	27 50/4"	R		10.5 (919.1) GRAVEL WITH SAND, dark brown, wet, very dense 10.8 (918.8) End of Boring at 10.8 ft.	GP							Driller noted auger refusal at 11'. Possible bedrock.
				915.0 15									
				910.0 20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 9 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 8 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 24 HOURS: 3 ft.			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/11/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/11/2023	BORING NUMBER: B-35
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: S. Gonyer	FIELD LOG: C. Ray LAB LOG / QC: D. Dettmers	NORTHING: 387880 EASTING: 2412395	PROJECT NUMBER: 23083-10 DRILLING RIG: LC 55 DRILLING METHOD: 3¼" HSA SURFACE ELEVATION: 937.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	15	1 2 2 2	4		TOPSOIL (9-inches) 0.8 (937) LEAN CLAY, brown, moist, stiff to very stiff				2.0			21.2	
SS - 2	12	1 2 3 4	5	935.0	sandy lean clay 2-4'	CL			1.0				
SS - 3	19	2 3 3 5	6	5	4 (933.8) CLAYEY SAND WITH GRAVEL, light brown, moist, loose	SC							
SS - 4	16	7 18 18 16	36	930.0	7 (930.8) SAND WITH SILT AND GRAVEL, light brown, moist, dense to very dense	SP-SM							
SS - 5	4	26 50/6"	R		8.5 (929.3) GRAVEL WITH SAND, light brown, moist to wet, very dense, possible weathered bedrock								
SS - 6	3	50/5"	R	10		GP							
SS - 7	6	7 50/5"	R		SS-7: trace to with clay 12.9 (924.9)								
				925.0	End of Boring at 12.9 ft.								Driller noted auger refusal at 13'. Possible bedrock.
				15									
				920.0									
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 10 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▽	WATER LEVEL AT COMPLETION: 10 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 48 HOURS: 9 ft.			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-36
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 389672 EASTING: 2413827	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 900.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	24	0 1 3 3	4	900.0	TOPSOIL (9-inches) 0.8 (899.9) LEAN CLAY, brown, moist, stiff to very stiff, trace sand	CL			1.5			25.9	Staked location not accessible. B-36 offset 100' S and 135' E. GESTRA obtained coordinates and elevations.
SS - 2	11	0 2 1 1	3		▼ 4 (896.7)				1.5-2.5			26.1	
SS - 3	11	4 6 5 4	11	5 895.0	CLAYEY SILTY SAND, light brown, very moist to wet, loose to dense	SC-SM							
SS - 4	20	3 4 5 4	9										
SS - 5	7	11 12 22 13	34	10	10 (890.7)								
SS - 6	14	16 50 50/4"	R	890.0	SILTY SAND, light brown, moist, very dense	SM							Driller noted possible cobbles or boulders at 11'.
SS - 7	17	20 32 50/5"	R										
SS - 8	16	36 56 50/4"	R	15	15.4 (885.3)								
				885.0	End of Boring at 15.4 ft.								Driller noted auger refusal at 15.5'. Possible bedrock.
				20 880.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 4 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 4 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0.5 HOURS: 4 ft.			

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SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-37
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: D. Harvey	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 389770 EASTING: 2413886	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 899.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	19	2 2 3 3	5		TOPSOIL (7.5-inches) 0.6 (898.7) LEAN CLAY WITH SAND, brown, moist, stiff	CL			1.25			17.3	
SS - 2	17	2 3 5 9	8		3 (896.3) CLAYEY SAND, light brown, very moist, loose to medium dense, trace gravel	SC						11	Gravel = 14.7% Sand = 40.8% P200 =44.5%
SS - 3	1	5 7 7 6	14	895.0 5									Driller noted rock in SS-3. Possible cobble and/or boulder.
SS - 4	20	4 8 9 10	17		6 (893.3) SILTY CLAYEY SAND, light brown, moist, medium dense to very dense, trace gravel								
SS - 5	23	10 18 17 23	35	890.0 10									
SS - 6	24	13 21 23 23	44			SC-SM							
SS - 7	24	28 36 34 33	70										
SS - 8	19	19 32 42 39	74	885.0 15	wet at 14' moist at 15'								
SS - 9	14	31 41 50/2"	R		wet at 16' 17.2 (882.1) End of Boring at 17.2 ft.								Driller noted auger refusal at 17.5'. Possible bedrock.
				880.0 20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 14 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 7 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 1 HOURS: 5.5 ft.			

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SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-38
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: A. Woerpel	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 389394 EASTING: 2413909	PROJECT NUMBER: 23083-10 DRILLING RIG: Diedrich D50 ATV DRILLING METHOD: 3¼" HSA SURFACE ELEVATION: 910 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
						TOPSOIL (measurement not recorded)								
						0.5 (909.5)								
SS - 1	8	2 3 4 35	7			LEAN CLAY, red and brown with black mottling, moist, stiff	CL			1.0			24.3	Driller noted possible boulder.
						2 (908)								
SS - 2	12	3 3 4 6	7			CLAYEY SAND, light brown, moist to very moist, loose to medium dense								
SS - 3	13	3 5 11 8	16	5	905.0	sandy gravel layer at 4.5'	SC							
SS - 4	14	3 4 10 8	14											
						8 (902)								
SS - 5	10	4 31 15 11	46			SANDY LEAN CLAY, light brown, moist, very stiff gravel layer at 9'				2.5			7.4	
				10	900.0		CL							
SS - 6	16	6 9 13	22							2.0			5.7	
						12 (898)								
SS - 7	15	3 3 5	8			SANDY LEAN CLAY, gray, moist, stiff	CL			1.0			10.1	
						14 (896)								
SS - 8	12	4 8 7	15	15	895.0	CLAYEY/SILTY SAND, gray, very moist to moist, medium dense to very dense, trace to with gravel	SC-SM							
SS - 9	10	15 30 50/2"	R											
						17.2 (892.8)								
						End of Boring at 17.2 ft.								
				20	890.0									Driller noted auger refusal at 19'. Possible bedrock.

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		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			

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SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: Thomas Farms Development		DATE DRILLING STARTED: 4/12/2023	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Delafield, Wisconsin		DATE DRILLING ENDED: 4/12/2023	BORING NUMBER: B-39
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: A. Woerpel	FIELD LOG: B. Griffin LAB LOG / QC: D. Dettmers	NORTHING: 389169 EASTING: 2413830	PROJECT NUMBER: 23083-10 DRILLING RIG: Geoprobe DRILLING METHOD: 2¼" HSA SURFACE ELEVATION: 911.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	12	2 3 4 4	7	910.0	TOPSOIL (5-inches) 0.4 (911.3) LEAN CLAY, brown, moist, very stiff, trace sand 2 (909.7)	CL			2.0			30.3	
SS - 2	12	2 6 7 6	13		LEAN CLAY WITH SAND, light brown with gray mottling, moist, stiff, trace gravel 4.8 (906.9)	CL			1.5			16.5	
SS - 3	18	3 9 8 16	17	5	CLAYEY SAND, light brown, moist, medium dense, trace gravel gravelly at 5'								
SS - 4	24	2 3 3 5	6	905.0	 8 (903.7)	SC							
SS - 5	18	3 4 6 8	10		SANDY LEAN CLAY, light brown, moist to very moist, stiff				1.0			9.9	
SS - 6	24	7 8 12 11	20	10	 12 (899.7)	CL			1.0			9	
SS - 7	22	2 3 6 13	9	900.0	CLAYEY SAND, gray, moist, loose to medium dense, trace gravel								
SS - 8	14	3 11 11 25	22		Wet black sand at 14' 15 (896.7)	SC						9.5	
SS - 9	13	21 47 50/1"	R	15 895.0	SANDY SILT, gray, moist, very dense, trace gravel 17.1 (894.6)	ML						7	
					End of Boring at 17.1 ft.								Driller noted auger refusal at 17.5'. Possible bedrock.
				20									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 13 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 14 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 24 HOURS: 2 ft.			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

Wis. Dept. of Safety and Professional Services
Division of Industry Services

SOIL EVALUATION - STORM

in accordance with SPS 382.365 and 385, Wis. Adm. Code

Attach complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information.

Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04 (1) (m)).

County: Waukesha

Parcel I.D.: DELT0809995

Reviewed by: J. Metzinger, E.I.T

Date: 04/24/2023

Property Owner	Property Location
THE ROBERT G AND ANN B THOMAS REVOCABLE TRUST	Govt. Lot SE 1/4 NE 1/4 S 23 T 7 N R 18 ☑ E (or) ☐ W
Property Owner's Mailing Address: N20W29352 OAKTON RD	Lot # / Block # / Subd. Name or CSM#
City: PEWAUKEE State: WI Zip Code: 53072 Phone Number: ( )	☐ City ☐ Village ☒ Town: DELAFIELD Nearest Road: THOMAS ROAD

Drainage area _____ ☐ sq. ft. ☐ acres
Optional:

Test Site Suitable for (check all that apply)

☐ Irrigation ☐ Bioretention trench ☐ Trench(es)
☐ Rain garden ☐ Grassed swale ☐ Reuse
☐ Infiltration trench ☐ SDS (> 15' wide) ☐ Other _____

Hydraulic Application Test Method:

☒ Morphological Evaluation
☐ Double-Ring Infiltrometer
☐ Other (specify) _____

B-1 Obs. # ☒ Boring ☐ Pit Ground surface elev. 899.7 ft. Depth to limiting factor -48 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	36	10YR 3/4	-	CL	2, VF, SBK	MFI	-	< 10	0.03
C	45	10YR 6/4	c, 2, D, 10YR 7/1	GRSL	0, M	MFR	-	26.9	0.50
C	96	10YR 6/6	-	GRSCL	0, SG	MVFR	-	15 - 30	0.11
C	150	10YR 6/4	-	XGRLS	0, M	MFR	-	50 - 65	1.63

B-2 Obs. # ☒ Boring ☐ Pit Ground surface elev. 906.9 ft. Depth to limiting factor -60 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydrualic App. Rate Inches/Hr
A	7	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
BC	24	10YR 3/4	-	C	2, VF, SBK	MVFI	-	<10	0.07
C	48	10YR 6/6	-	GRSL	0, M	MFR	-	15 - 20	0.50
C	60	10YR 6/4	-	GRSIL	0, M	MFR	-	15 - 30	0.13
C	66	10YR 8/1	-	VGRS	0, SG	MLO	-	35 - 55	3.60
C	102	10YR 6/4	-	GRSIL	0, M	MFR	-	15 - 30	0.13

CST/PSS Name (Please Print)	Signature	CST/PSS Number
Douglas Dettmers, PE	Douglas Dettmers	35060-6

Address	Date Evaluation Conducted	Telephone Number
GESTRA Engineering, Inc. - 191 W. Edgerton Avenue, Milwaukee, WI 53207	04/24/2023	414-933-7444

Property Owner THE ROBERT G AND ANN B THOMAS REVOCABLE TRU Parcel ID # DELT0809995 Page 2 of 5

B-3 Obs. # ☒ Boring ☐ Pit Ground surface elev. 915.6 ft. Depth to limiting factor -120 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	6	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	24	10YR 3/6	-	SC	2, VF, SBK	MFI	-	5 - 14	0.04
Cr	120	10YR 8/2	-	XGRS	0, SG	MLO	-	60 - 80	3.60

B-4 Obs. # ☒ Boring ☐ Pit Ground surface elev. 919.8 ft. Depth to limiting factor -114 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	36	10YR 3/4	-	C	2, VF, SBK	MFI	-	< 10	0.07
C	48	10YR 3/4	-	VGRC	0, M	MFI	-	35 - 45	0.07
C	72	10YR 7/2	-	XGRSL	0, SG	0, SG	-	70 - 80	0.50
C	114	10YR 6/4	-	VGRSIL	0, M	MFR	-	50 - 59	0.13

B-8 Obs. # ☒ Boring ☐ Pit Ground surface elev. 918.7 ft. Depth to limiting factor -78 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 3/1	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	66	10YR 3/6	-	SCL	2, VF, SBK	MFI	-	< 5	0.11
C	78	10YR 5/4	-	GRSICL	0, M	MFI	-	20 - 30	0.04

Property Owner THE ROBERT G AND ANN B THOMAS REVOCABLE TRU Parcel ID # DELT0809995 Page 3 of 5

B-13 Obs. # ☒ Boring ☐ Pit Ground surface elev. 921.7 ft. Depth to limiting factor -54 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 3/3	-	SIL	2, VF, SBK	MFR		< 5	0.13
B	24	10YR 3/6	-	C	2, VF, SBK	MVFI		< 10	0.07
C	54	10YR 5/8	-	SCL	0, M	MVFR		5 - 14	0.11

B-14 Obs. # ☒ Boring ☐ Pit Ground surface elev. 925.2 ft. Depth to limiting factor -90 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	24	10YR 3/6	-	C	2, VF, SBK	MVFI	-	< 10	0.07
C	72	10YR 5/4	-	VGRLS	0, SG	MLO	-	35 - 45	1.63
C	90	7.5YR 4/3	-	VGRSCL	0, M	MVFI	-	40 - 50	0.11

B-21 Obs. # ☒ Boring ☐ Pit Ground surface elev. 917.7 ft. Depth to limiting factor -54 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	8	10YR 2/1	-	L	2, VF, SBK	MFR	-	< 5	0.24
C	54	10YR 7/2 and 10YR 4/1	-	GR/CB	0, SG	MLO	-	> 90	3.60

Property Owner THE ROBERT G AND ANN B THOMAS REVOCABLE TRU Parcel ID # DELT0809995 Page 4 of 5

B-22 Obs. # ☒ Boring ☐ Pit Ground surface elev. 916.3 ft. Depth to limiting factor -96 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	9	10YR 2/2	-	L	2, VF, SBK	MFR	-	< 5	0.24
B	60	10YR 3/6	-	CL	2, VF, SBK	MFI	-	< 5	0.03
C	90	10YR 4/6	-	GRSL	0, M	MFI	-	32.9	0.50
C	97	10YR 6/6	-	XGRS	0, SG	MLO	-	70 - 85	3.60

B-9 Obs. # ☒ Boring ☐ Pit Ground surface elev. 919.2 ft. Depth to limiting factor -108 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	12	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	48	10YR 3/4	-	C	2, VF, SBK	MFI	-	< 10	0.03
C	72	10YR 5/6	-	GRSL	0, M	MVFR	-	23.7	0.50
C	102	10YR 5/6	-	SICL	0, M	MFI	-	< 10	0.04
C	108	10YR 5/6	-	GRSICL	0, M	MFI	-	15 - 20	0.04

B-10 Obs. # ☒ Boring ☐ Pit Ground surface elev. 920.8 ft. Depth to limiting factor -144 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	9	10YR 3/3	-	SICL	2, VF, SBK	MFI	-	< 5	0.04
B	36	10YR 3/4	-	CL	2, VF, SBK	MFI	-	< 10	0.03
C	60	10YR 5/6	-	GRSL	0, M	MFR	-	15 - 20	0.50
C	72	10YR 6/6	-	XGRLS	0, SG	MLO	-	70 - 80	1.63
C	96	10YR 5/8	-	VGRLS	0, SG	MLO	-	35 - 50	1.63
C	144	10YR 6/6	-	XGRLS	0, SG	MLO	-	60 - 80	1.63

B-11 Obs. # ☒ Boring ☐ Pit Ground surface elev. 917.8 ft. Depth to limiting factor -66 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	24	10YR 3/4	-	C	2, VF, SBK	MFI	-	< 10	0.07
C	48	10YR 5/6	-	SCL	0, M	MVFR	-	10 - 14	0.11
C	66	10YR 5/8	-	SICL	0, M	MFI	-	< 10	0.04

B-12 Obs. # ☒ Boring ☐ Pit Ground surface elev. 917.4 ft. Depth to limiting factor -60 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10.5	10YR 2/1	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	36	10YR 3.5/6	-	CL	2, VF, SBK	MFI	-	< 10	0.03
Cr	48	10YR 7/6	-	XGRLS	0, SG	MLO	-	60 - 80	1.63
Cr	60	10YR 5/8	-	XGRS	0, SG	MLO	-	60 - 80	3.60

Test Results and/or Summary Comments

*All borings terminated on possible bedrock refusal.

**Depth to limiting layer determined based on shallowest groundwater level observed during/after drilling, or depth to top of bedrock refusal.

B-9: Topsoil thickness assumed (not measured)

Wis. Dept. of Safety and Professional Services
Division of Industry Services

SOIL EVALUATION - STORM

in accordance with SPS 382.365 and 385, Wis. Adm. Code

Attach complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information.

Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04 (1) (m)).

County: Waukesha

Parcel I.D.: DELT0809996

Reviewed by: J. Metzinger, E.I.T.

Date: 04/24/2023

Property Owner	Property Location
KELLEN H WESSON	Govt. Lot SW 1/4 NE 1/4 S 23 T 7 N R 18 ☑ E (or) ☐ W
Property Owner's Mailing Address: 11663 N BOBOLINK LN	Lot # / Block # / Subd. Name or CSM#
City: MEQUON; State: WI; Zip Code: 53092; Phone Number: ( )	☐ City ☒ Village ☐ Town; Nearest Road: CROOKED CREEK ROAD

Drainage area _____ ☐ sq. ft. ☐ acres

Optional:

Test Site Suitable for (check all that apply)

☐ Irrigation ☐ Bioretention trench ☐ Trench(es)

☐ Rain garden ☐ Grassed swale ☐ Reuse

☐ Infiltration trench ☐ SDS (> 15' wide) ☐ Other _____

Hydraulic Application Test Method:

☒ Morphological Evaluation

☐ Double-Ring Infiltrometer

☐ Other (specify) _____

B-5 Obs. # ☒ Boring ☐ Pit Ground surface elev. 917.7 ft. Depth to limiting factor -78 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
C	60	10YR 6/6	-	GRSCL	0, M	MFR	-	15 - 25	0.11
C	83	10YR 6/6	-	XGRLS	0, SG	MLO	-	60 - 75	1.63

B-6 Obs. # ☒ Boring ☐ Pit Ground surface elev. 912.4 ft. Depth to limiting factor -162 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydrualic App. Rate Inches/Hr
A	11	10YR 3/2	-	SIL	2, VF, SBK	MFI	-	< 5	0.13
B	36	10YR 4/6	-	GRSL	0, M	MFR	-	30.6	0.50
C	108*	10YR 6/6	c, 1, P, 10YR 6/1	VGRSCL	0, M	MFI	-	35 - 45	0.11
C	162	10YR 5/8	-	XGRSCL	0, M	MVFI	-	60 - 75	0.11
	*With 10YR 3/4 sand layer at 72 inches								

CST/PSS Name (Please Print): Douglas Dettmers, PE

Signature: Douglas Dettmers

CST/PSS Number: 35060-6

Address: GESTRA Engineering, Inc. - 191 W. Edgerton Avenue, Milwaukee, WI 53207

Date Evaluation Conducted: 04/24/2023

Telephone Number: 414-933-7444

Property Owner KELLEN H WESSON Parcel ID # DELT0809996 Page 2 of 3

B-36 Obs. # ☒ Boring ☐ Pit Ground surface elev. 900.7 ft. Depth to limiting factor -48 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	9	10YR 2/1	-	SICL	2, VF. SBK	MFR	-	< 5	0.04
B	48	10YR 3/4	-	C	2, VF. SBK	MVFI	-	< 10	0.07
C	72	10YR 5/8	-	GRSL	0, M	MVFR	-	15 - 25	0.50
C	120	10YR 5/8	-	GRSCL	0, M	MFI	-	15 - 25	0.11
C	144	10YR 6/4	-	GRSIL	0, M	MFR	-	15 - 20	0.13
C	186	10YR 5/6	-	VGRSIL	0, M	MVFI	-	35 - 45	0.13

B-37 Obs. # ☒ Boring ☐ Pit Ground surface elev. 899.3 ft. Depth to limiting factor -66 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	7.5	10YR 2/2	-	SIL	2, VF, SBK	MFR		< 5	0.13
B	36	10YR 3/4	-	C	2, VF, SBK	MVFI		< 10	0.07
C	72	10YR 5/8	-	GRSL	0, M	MVFR		22.3	0.50
C	144	10YR 5/8	-	GRSCL	0, M	MFI - MVFI		15 - 25	0.11
C	168	10YR 6/6	-	VGRSIL	0, M	MVFI		35 - 45	0.13
C	210	10YR 5/8	-	VGRLS	0, SG	MLO		40 - 50	1.63

B-38 Obs. # ☒ Boring ☐ Pit Ground surface elev. 910.0 ft. Depth to limiting factor -228 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	6	10YR 2/2	-	L	2, VF, SBK	MFR	-	< 5	0.24
B	24	10YR 3/4	-	C	2, VF, SBK	MVFI	-	< 10	0.07
C	54	10YR 5/8	-	GRSCL	0, M	MFR	-	15 - 25	0.11
C	96	10YR 5/8	-	GRSICL	0, M	MFI	-	15 - 25	0.04
C	144	10YR 5/6 to 10YR 6/4	-	GRSCL	0, M	MFI - MVFI	-	15 - 30	0.11
C	168	10YR 5/1	-	GRSC	0, M	MVFI	-	15 - 20	0.04
C	228	10YR 6/1	-	GRSIL	0, M	MFR - MVFI	-	20 - 34	0.13

Property Owner KELLEN H WESSON Parcel ID # DELT0809996 Page 3 of 3

B-39 Obs. # ☒ Boring ☐ Pit Ground surface elev. 911.7 ft. Depth to limiting factor -24 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	5	10YR 2/2	-	SICL	2, VF, SBK	MFR	-	< 5	0.04
B	24	10YR 3/4	-	C	2, VF, SBK	MFI	-	< 10	0.07
C	57	10YR 6/4	m, 1, D, 10YR 6/1	SICL	0, M	MFI	-	5 - 14	0.04
C	96	10YR 5/8	-	GRSCL	0, M	MFI	-	15 - 25	0.11
C	144	10YR 6/4	-	GRSICL	0, M	MFI	-	15 - 25	0.04
C	168	10YR 5/1	-	SIC	0, M	MFI	-	10 -14	0.07
C	180	N 1/	-	S	0, SG	MLO	-	< 5	3.60
C	210	10YR 6/1	-	VGRSIL	0, M	MFR	-	35 - 45	0.13

☐ Obs. # ☐ Boring ☐ Pit Ground surface elev. _____ ft. Depth to limiting factor _____ in.

Horizon	Depth ft.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr

Test Results and/or Summary Comments

*All borings terminated on possible bedrock refusal.

**Depth to limiting layer determined based on shallowest groundwater level observed during/after drilling, or depth to top of bedrock refusal.

B-38: Topsoil thickness assumed (not measured).

Wis. Dept. of Safety and Professional Services
Division of Industry Services

SOIL EVALUATION - STORM

in accordance with SPS 382.365 and 385, Wis. Adm. Code

Attach complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information.

Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04 (1) (m)).

County: Waukesha

Parcel I.D.: DELT0811999

Reviewed by: J. Metzinger, E.I.T

Date: 04/24/2023

Property Owner: KELLEN H WESSON

Property Owner's Mailing Address: 11663 N BOBOLINK LN

City: MEQUON | State: WI | Zip Code: 53092 | Phone Number: ( )

Property Location

Govt. Lot | NE 1/4 SE 1/4 S 23 T 7 N R 18 | ☑ E (or) ☐ W

Lot # | Block # | Subd. Name or CSM#

☐ City ☐ Village ☒ Town | Nearest Road: GOLF ROAD

DELAFIELD

Drainage area _____ ☐ sq. ft. ☐ acres

Optional:

Test Site Suitable for (check all that apply)

☐ Irrigation ☐ Bioretention trench ☐ Trench(es)

☐ Rain garden ☐ Grassed swale ☐ Reuse

☐ Infiltration trench ☐ SDS (> 15' wide) ☐ Other _____

Hydraulic Application Test Method:

☒ Morphological Evaluation

☐ Double-Ring Infiltrometer

☐ Other (specify) _____

B-17 Obs. # ☒ Boring ☐ Pit Ground surface elev. 925.0 ft. Depth to limiting factor -96 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	6	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	42	10YR 3/6	-	C	2, VF, SBK	MVFI	-	< 5	0.07
C	102	10YR 7/6	-	XGRLS	0, SG	MLO	-	70 - 85	1.63

B-18 Obs. # ☒ Boring ☐ Pit Ground surface elev. 931.2 ft. Depth to limiting factor -78 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydrualic App. Rate Inches/Hr
A	6	10YR 3/3	-	SIL	2, VF, SBK	MFR		< 5	0.13
B	36	10YR 3/6	-	C	2, VF, SBK	MFI		< 10	0.07
C	48	10YR 8/2	-	XGRS	0, SG	MLO		80 - 89	3.60
Cr	78	10YR 7/6	-	XGRLS	0, SG	MLO		70 - 85	1.63

CST/PSS Name (Please Print): Douglas Dettmers, PE

Signature: Douglas Dettmers

CST/PSS Number: 35060-6

Address: GESTRA Engineering, Inc. - 191 W. Edgerton Avenue, Milwaukee, WI 53207

Date Evaluation Conducted: 04/24/2023

Telephone Number: 414-933-7444

Property Owner KELLEN H WESSON Parcel ID # DELT0811999 Page 2 of 8

B-25 Obs. # ☒ Boring ☐ Pit Ground surface elev. 932.6 ft. Depth to limiting factor -84 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	7.5	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	48	10YR 3/6	-	CL	2, VF, SBK	MFI	-	< 5	0.03
C	96	10YR 4/4	-	VGRLS	0, SG	MLO	-	35 - 45	1.63
C	144	10YR 5/8	-	XGRS	0, SG	MLO	-	80 - 89	3.60

B-26 Obs. # ☒ Boring ☐ Pit Ground surface elev. 938.3 ft. Depth to limiting factor -60 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	8	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	48	10YR 4/6	-	CL	2, VF, SBK	MFI	-	< 10	0.03
C	84	10YR 5/6	-	SICL	0, M	MFI	-	< 5	0.04
C	120	10YR 5/6	-	GRSCL	0, M	MFR - MFI	-	15 - 25	0.11
C	156	10YR 5/8	-	GRSCL	0, M	MVFI	-	20 - 34	0.11
Cr	180	10YR 5/6	-	XGRS	0, SG	MLO	-	60 - 70	3.60
Cr	192	10YR 6/6	-	XGRLS	0, SG	MLO	-	65 - 85	1.63

B-27 Obs. # ☒ Boring ☐ Pit Ground surface elev. 939.0 ft. Depth to limiting factor -120 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	13	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	19	10YR 4/6	-	SC	2, VF, SBK	MFI	-	< 10	0.04
C	78	10YR 5/6	f, 1, P, 10YR 6/1	SICL	0, M	MFI	-	< 5	0.04
C	138	10YR 5/6	-	GRSCL	0, M	MFI	-	15 - 25	0.11
C	168	10YR 5/8	-	GR	0, SG	MLO	-	> 90	3.60
C	180	10YR 5/4	-	XGRCL	0, SG	MLO	-	70 - 85	0.03

Property Owner KELLEN H WESSON Parcel ID # DELT0811999 Page 3 of 8

B-29 Obs. # ☒ Boring ☐ Pit Ground surface elev. 946.1 ft. Depth to limiting factor -156 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	9	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	24	10YR 3/6	-	CL	2, VF, SBK	MFI	-	< 5	0.03
C	48	10YR 4/6	-	GRSCL	0, M	MFI	-	15 - 20	0.11
C	84	10YR 6/4	-	GRSL	0, M	MFR	-	15 - 20	0.50
C	108	10YR 5/6	-	VGRLS	0, SG	MLO	-	35 - 45	1.63
C	144	10YR 5/8	-	S	0, SG	MLO	-	< 5	3.60
C	204	10YR 5/8	-	L	0, M	MFR	-	< 10	0.24
Cr	240	10YR 7/4	-	GR	0, SG	MLO	-	< 90	3.60

B-30 Obs. # ☒ Boring ☐ Pit Ground surface elev. 948.5 ft. Depth to limiting factor -156 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	24	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	48	10YR 3/6	c, 1, P, 10YR 3/3	C	2, VF, SBK	MFI	-	< 10	0.07
C	84	10YR 5/8	-	GRSCL	0, M	MFI	-	15 - 34	0.11
C	108	10YR 5/8	-	VGRS	0, SG	MLO	-	35 - 45	3.60
Cr	156	10YR 7/2	-	XGRS	0, SG	MLO	-	75 - 89	3.60

B-33 Obs. # ☒ Boring ☐ Pit Ground surface elev. 924.1 ft. Depth to limiting factor -24 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	6	10YR 2/2	-	L	2, VF, SBK	MFR	-	< 5	0.24
B/FILL	24	10YR 3/4	-	C	2, VF, PL	MFI	-	< 10	0.07
B/FILL	29	10YR 3/3	-	GRSC	2, VF, SBK	MFI	-	14 - 20	0.04
C	125	10YR 5/6	-	GRSL	0, M	MFR	-	23.8	0.50
Cg	204	5G 5/1	c, 2, D, 2.5Y 4/2	SICL	0, M	DEH	-	5 - 10	0.04

B-34 Obs. # ☒ Boring ☐ Pit Ground surface elev. 929.6 ft. Depth to limiting factor -36 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	5	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	30	10YR 3/4	-	C	2, VF, SBK	MVFI	-	< 10	0.07
C	132*	10YR 5/6	-	VGRSL	0, M	MFR	-	35 - 55	0.50
	*With 10YR 2/1 gravel layer at 126 inches								

B-7 Obs. # ☒ Boring ☐ Pit Ground surface elev. 916.2 ft. Depth to limiting factor -4.8 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 2/1	-	SICL	2, VF, SBK	MFR	-	< 5	0.04
B	24	10YR 5/3	f, 1, D, 10YR 4/6	SICL	2, VF, SBK	MFR	-	< 10	0.04
C	48	10YR 6/6	-	GRSCL	0, M	MFR	-	15 - 30	0.11
C	96	10YR 6/4	c, 1, D, 10YR 6/1	VGRSCL	0, M	MFR	-	35 - 45	0.11
C	114	10YR 6/2	-	XGRLS	0, SG	MLO	-	75 - 84	1.63

B-15 Obs. # ☒ Boring ☐ Pit Ground surface elev. 926.8 ft. Depth to limiting factor -114 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	48	10YR 3/4	-	CL	2, VF, SBK	MFI	-	< 10	0.03
C	72	10YR 5/8	-	GRSCL	0, M	MFR	-	20 - 30	0.11
C	78	10YR 2/2	-	VGRS	0, SG	MLO	-	35 - 40	3.60
C	114	10YR 5/6	-	GRSIL	0, SG	MLO	-	15 - 25	0.13

B-16 Obs. # ☒ Boring ☐ Pit Ground surface elev. 930.5 ft. Depth to limiting factor -90 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	9	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	48	10YR 3/4	-	CL	2, VF, SBK	MFI	-	< 10	0.03
C	72	10YR 5/8	-	GRSCL	0, M	MFR	-	15 - 25	0.11
C	102	10YR 5/8	-	VGRLS	0, SG	MLO	-	40 - 55	1.63

B-19 Obs. # ☒ Boring ☐ Pit Ground surface elev. 934.9 ft. Depth to limiting factor -114 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	9	10YR 3/3	-	SICL	2, VF, SBK	MFI	-	< 5	0.04
B	36	10YR 5/4	-	SC	2, VF, SBK	MVFI	-	< 5	0.04
C	56	10YR 5/6	-	S	0, SG	MLO	-	< 5	3.60
C	114	10YR 5/6	-	GRSCL	0, M	MEF	-	15 - 25	0.11

B-20 Obs. # ☒ Boring ☐ Pit Ground surface elev. 925.6 ft. Depth to limiting factor -78 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	9	10YR 2/1	-	SIL	2, VF, SBK	MFR	-	< 10	0.13
B	24	10YR 3/4	f, 1, D, 10YR 2/1	C	2, VF, SBK	MVFI	-	< 10	0.07
B	48	10YR 4/3	c, 1, D, 10YR 7/1	SIC	2, VF, SBK	MFR	-	5 - 14	0.07
C	78	10YR 5/8	c, 1, P, 10YR 6/2	SIC	0, M	MFR	-	< 10	0.07

B-23 Obs. # ☒ Boring ☐ Pit Ground surface elev. 940.9 ft. Depth to limiting factor -126 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	48	10YR 3/6	-	GRL	2, VF, SBK	MFI	-	15 - 30	0.24
C	72	10YR 5/8	-	VGRLS	0, SG	MVFR	-	35 -45	1.63
C	96	10YR 5/6	-	VGRS	0, SG	MLO	-	35 - 45	3.60
C	126	10YR 5/6	-	VGRLS	0, SG	MVFR	-	40 - 50	1.63

B-24 Obs. # ☒ Boring ☐ Pit Ground surface elev. 940.7 ft. Depth to limiting factor -10.5 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	8	10YR 3/3	-	L	2, VF, SBK	MFR	-	< 5	0.24
C	24	10YR 7/4	-	XGRS	0, SG	MLO	-	70 - 85	3.60
C	84	10YR 5/6	-	GRSCL	0, M	MFI	-	15 - 30	0.11
C	126	10YR 5/8	-	VGRSICL	0, M	MVFI	-	35 - 45	0.04

B-28 Obs. # ☒ Boring ☐ Pit Ground surface elev. 943.4 ft. Depth to limiting factor -144 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	48	10YR 3/4	-	C	2, VF, SBK	MFI	-	5 - 14	0.07
C	66	10YR 5/8	-	VGRSL	0, M	MFR	-	51.9	0.50
C	96	10YR 5/8	-	XGRS	0, SG	MLO	-	70 - 80	3.60
C	144	10YR 5/8	-	VGRS	0, SG	MLO	-	40 - 59	3.60
C	168	10YR 5/4	-	XGRLS	0, SG	MLO	-	80 - 89	1.63
C	193	10YR 4/4	-	VGRSCL	0, M	MVFI	-	45 - 55	0.11

B-31 Obs. # ☒ Boring ☐ Pit Ground surface elev. 939.7 ft. Depth to limiting factor -96 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	10	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	52	10YR 3/6	-	SICL	2, VF, SBK	MFI	-	< 5	0.04
C	132	10YR 5/8	-	GRSIL	0, M	MFR - MFI	-	15 - 25	0.13
Cr	180	10YR 7/4	-	XGRSL	0, SG	MLO	-	75 - 85	0.50

B-32 Obs. # ☒ Boring ☐ Pit Ground surface elev. 939.7 ft. Depth to limiting factor -96 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	8	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	36	10YR 3/6	-	SICL	2, VF, SBK	MFI	-	< 10	0.04
C	84	10YR 6/4	-	GRSCL	0, M	MFR	-	15 - 25	0.11
C	96	10YR 8/2	-	XGRS	0, SG	MLO	-	60 - 75	3.60
C	120	10YR 6/6	-	XGRLS	0, SG	MLO	-	60 - 75	1.63
C	144	10YR 6/6	-	XGRSICL	0, M	MFR	-	60 - 75	0.04
Cr	192	10YR 6/6	-	XGRLS	0, SG	MLO	-	70 - 85	1.63

B-35 Obs. # ☒ Boring ☐ Pit Ground surface elev. 937.8 ft. Depth to limiting factor -108 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	9	10YR 3/3	-	SIL	2, VF, SBK	MFR	-	< 5	0.13
B	24	10YR 3/6	-	SIC	2, VF, SBK	MFI	-	< 10	0.07
C	48	10YR 3/4	-	SC	0, M	MFR	-	10 - 14	0.04
C	84	10YR 5/8	-	GRSCL	0, M	MFR	-	15 - 25	0.11
C	102	10YR 6/6	-	VGRS	0, SG	MLO	-	40 - 55	3.60
C	144	10YR 7/6	-	XGRS	0, SG	MLO	-	70 - 80	3.60
C	156	10YR 4/6	-	VGRSCL	0, M	MLO	-	70 - 80	0.11

Obs. # ☐ Boring ☐ Pit Ground surface elev. _____ ft. Depth to limiting factor _____ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr

Obs. # ☐ Boring ☐ Pit Ground surface elev. _____ ft. Depth to limiting factor _____ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr

Test Results and/or Summary Comments

*All borings terminated on possible bedrock refusal.

**Depth to limiting layer determined based on shallowest groundwater level observed during/after drilling, or depth to top of bedrock refusal.

GENERAL NOTES

DRILLING AND SAMPLING SYMBOLS

SYMBOL	DEFINITION
HSA	Hollow Stem Auger
HSA w/ RW	Hollow Stem Auger converted to Rotary Wash Boring (initiated with Mudding Fluid)
SS	2" O.D. Split Spoon Sample – (ASTM D 1586)
SH	3" Thin-Walled Tube Sample (Shelby Tube) – (ASTM D 1587)
AU	Solid Stem Auger Sample
CA	Modified California Sample – (ASTM D 3550)
RC	Rock Core Sample – (ASTM D 2113)
HA	Hand Auger Sample
GB	Grab Bag Sample
R	SPT Refusal (N-value of 50 blows for less than 6 inches of penetration)
NMR	No Measurement Recorded
NE	Not Encountered

TEST SYMBOLS

SYMBOL	DEFINITION
MC	Moisture Content (%) – (ASTM D 2216)
LOI	Organic Content (Loss on Ignition) (%) – (ASTM D 2974)
Qp	Hand Penetrometer Reading (tsf)
Qu	Unconfined Comp. Strength (tsf) – (ASTM D 2166)
γ_d	Dry Density (pcf) – (ASTM D 7263)
γ_T	Total (Moist) Density (pcf)
LL, PL	Liquid and Plastic Limit (%) – (ASTM D 4318)
PI	Plasticity Index (%)
P200	Percent passing the #200 Sieve – (ASTM D 1140)
Ts	Hand Torvane Reading (tsf)
SG	Specific Gravity – (ASTM D854)
pH	Hydrogen Ion Content – (ASTM D4972)
RQD	Rock Quality Designation (%) – (ASTM D6032)

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 some soils, it may not be possible to determine the groundwater level within the normal time required for test borings and an extended period of time may be necessary to reach equilibrium. Therefore, the position of the water level symbol may not indicate the true level of the groundwater 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 respective boring log sheet.

DESCRIPTIVE TERMINOLOGY

DENSITY TERM	SPT N-VALUE
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Over 50

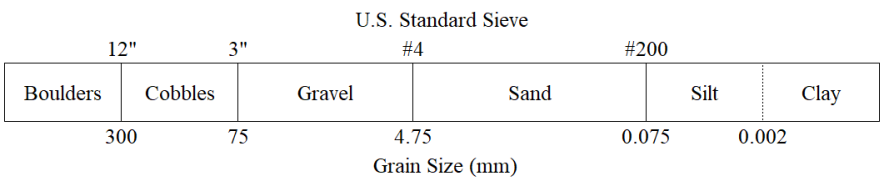
CONSISTENCY TERM	Unconfined Compressive Strength, (tsf)	SPT N-VALUE
Very Soft	<0.25	0 - 2
Soft	0.25 - 0.49	2 - 4
Medium Stiff	0.50 - 0.99	4 - 8
Stiff	1.00 - 1.99	8 - 16
Very Stiff	2.00 - 3.99	16 - 30
Hard	4.0+	Over 30

Lamination	Up to 1/2" thick horizontal stratum
Layer	1/2" thick or greater horizontal stratum
Lens	1/2" to 6" discontinuous horizontal stratum
Varved	Alternating laminations
Dry	Powdery, dusty
Moist	Damp, below saturation
Wet	Saturated, above liquid limit

Standard Penetration Test N-Value: Blows per Foot of a 140 Pound Hammer Falling 30 inches on a 2-inch OD Split Barrel Sampler

Note: If unconfined compressive strength data is not available, then N-value should be used to describe consistency term

RELATIVE SIZES



SOILS CLASSIFICATION FOR ENGINEERING PURPOSES

ASTM Designation: D 2487 - 83

(Based on Unified Soil Classification System)

SOIL ENGINEERING

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]					Soil Classification[B] Group Symbol	Soil Classification[B] Group Name
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	Cu ≥ 4 and 1≤ Cc ≤ 3[E]		GW	Well-graded gravel[F]
			Cu < 4 and/or 1 > Cc > 3[E]		GP	Poorly-graded gravel[F]
		Gravels with Fines more than 12% fines[C]	Fines Classify as ML or MH		GM	Silty gravel[F.G.]
			Fines classify as CL or CH		GC	Clayey gravel[F.G.]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean sands Less than 5% fines[D]	Cu ≥ 6 and 1 ≤ Cc ≤ 3[E]		SW	Well-graded sand[H]
			Cu < 6 and/or 1 > Cc > 3[E]		SP	Poorly-graded sand[H]
		Sands with Fines more than 12% fines[D]	Fines Classify as ML or MH		SM	Silty sand[G.H]
			Fines classify as CL or CH		SC	Clayey sand[G.H]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid Limit less than 50	Inorganic	PI > 7 and plots on or above " A" line[I]		CL	Lean clay[J.K.L]
			PI < 4 or plots below " A " line[I]		ML	Silt[J.K.L]
		Organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OL	Organic clay[J.K.L.M] Organic Silt[J.K.L.N]
	Silts and Clays Liquid Limit 50 or more	Inorganic	PI plots on or above " A " line		CH	Fat clay[J.K.L]
			PI plots below " A " line		MH	Elastic silt[J.K.L]
		Organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OH	Organic clay[J.K.L.O] Organic Silt[J.K.L.P]
Highly organic soils		Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-in (75- mm) sieve

[B] If field sample contained cobbles or boulders, or both, add with cobbles and/or boulders after group name

[C] Gravels with 5 to 12 % fines require dual symbols:
GW - GM (well-graded gravel with silt)
GW - GC (well-graded gravel with clay)
GP - GM (poorly-graded gravel with silt)
GP - GC (poorly-graded gravel with clay)

[D] Sands with 5 to 12 % fines require dual symbols:
SW -SM (well-graded sand with silt)
SW - SC (well-graded sand with clay)
SP - SM (poorly-graded sand with silt)
SP - SC (poorly-graded sand with clay)

[E] $Cu = \frac{D_{60}}{D_{10}}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" after group name

[G] If fines classify as CL-ML, use dual symbol GC-GM. or SC-SM

[H] If soil contains ≥ 15% gravel, add "with gravel" after group name.

[I] If Atterberg limits plot in hatched area, soil is a CL-ML (silty clay)

[J] If soil contains 15 to 29% plus No. 200, add, "with sand" or " with gravel", whichever is predominant

[K] If soil contains ≥ 30% plus No.200, and predominantly sand, add "sandy" before the group name

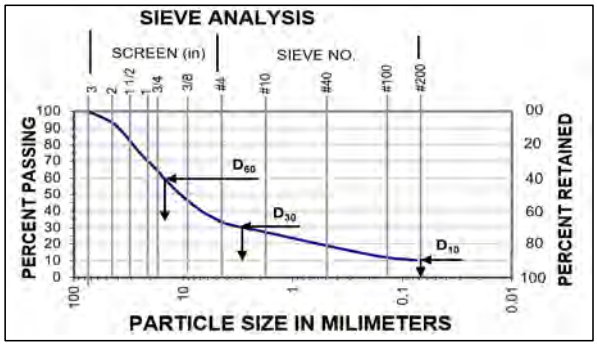
[L] If soil contains ≥ 30% plus No.200, and predominantly gravel, add "gravelly" before the group name

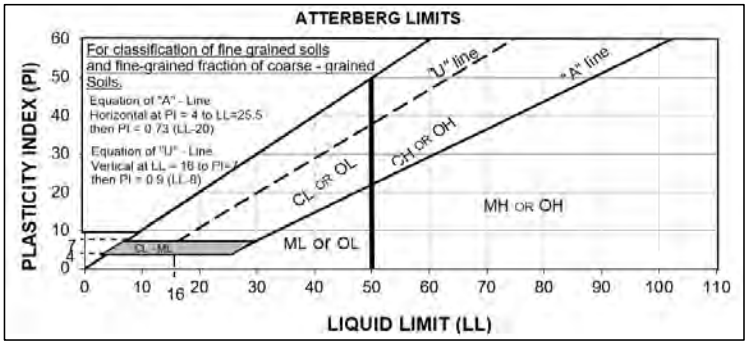
[M] PI ≥ 4 and plots on or above "A" Line

[N] PI < 4 or plots below "A" Line

[O] PI plots on or above "A" Line

[P] PI plots below "A" Line





SOILS CLASSIFICATION FOR ENGINEERING PURPOSES

(Based on United States Department of Agriculture - Natural Resources Conservations Service)

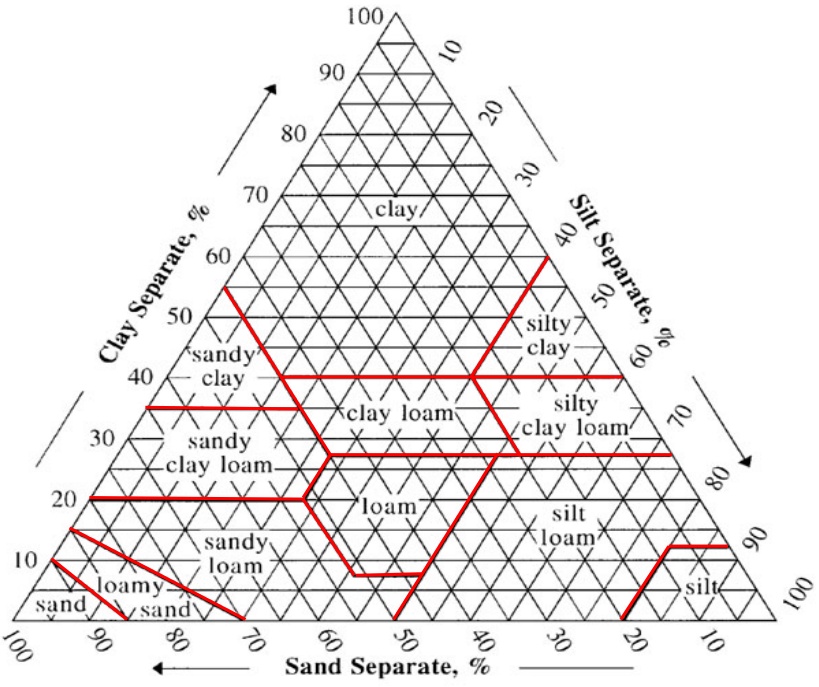
SOIL ENGINEERING

Criteria for Soil Classification Based on Particle Size Distribution [A]

		U.S. Standard Sieve No.	USDA Soil Name Classification
ROCK FRAGMENTS		> 25"	Boulders
		10" < 25"	Stones
		3" < 10"	Cobbles
		3/4" < 3"	Coarse Gravel
		#4 < 3/4"	Medium Gravel
		#10 < #4	Fine Gravel
FINE EARTH	Sand	#18 < #10	Very Coarse Sand
		#35 < #18	Coarse Sand
		#60 < #35	Medium Sand
		#140 < #60	Fine Sand
		#300 < #140	Very Fine Sand
	Silt	0.02 mm < 0.05 mm	Coarse Silt
		0.002 mm < 0.02 mm	Fine Silt
	Clay	0.0002 mm < 0.002 mm	Coarse Clay
		< 0.0002 mm	Fine Clay

(Soil) Textural Triangle: [B]

Fine Earth Texture Classes (—)



Texture Classes [C]	Code
Coarse Sand	COS
Sand	S
Fine Sand	FS
Very Fine Sand	VFS
Loamy Coarse Sand	LCOS
Loamy Sand	LS
Loamy Fine Sand	LFS
Loamy Very Fine Sand	LVFS
Coarse Sandy Loam	COSL
Sandy Loam	SL
Fine Sandy Loam	FSL
Very Fine Sandy Loam	VFSL
Loam	L
Silt Loam	SIL
Silt	SI
Sandy Clay Loam	SCL
Clay Loam	CL
Silty Clay Loam	SICL
Sandy Clay	SC
Silty Clay	SIC
Clay	C

Rock Fragment Texture Modifiers [B]	Vol. %
None	< 15
Size Adjective (i.e. Gravelly)	15 to < 35
Very (Size Adjective)	35 to < 60
Extremely (Size Adjective)	60 to < 90
Fragment Size Class Name	≥ 90

A Based on page 2-45 of Field Book for Describing and Sampling Soils V3.0

B Based on page 2-38 of Field Book for Describing and Sampling Soils V3.0

C Based on page 2-37 of Field Book for Describing and Sampling Soils V3.0

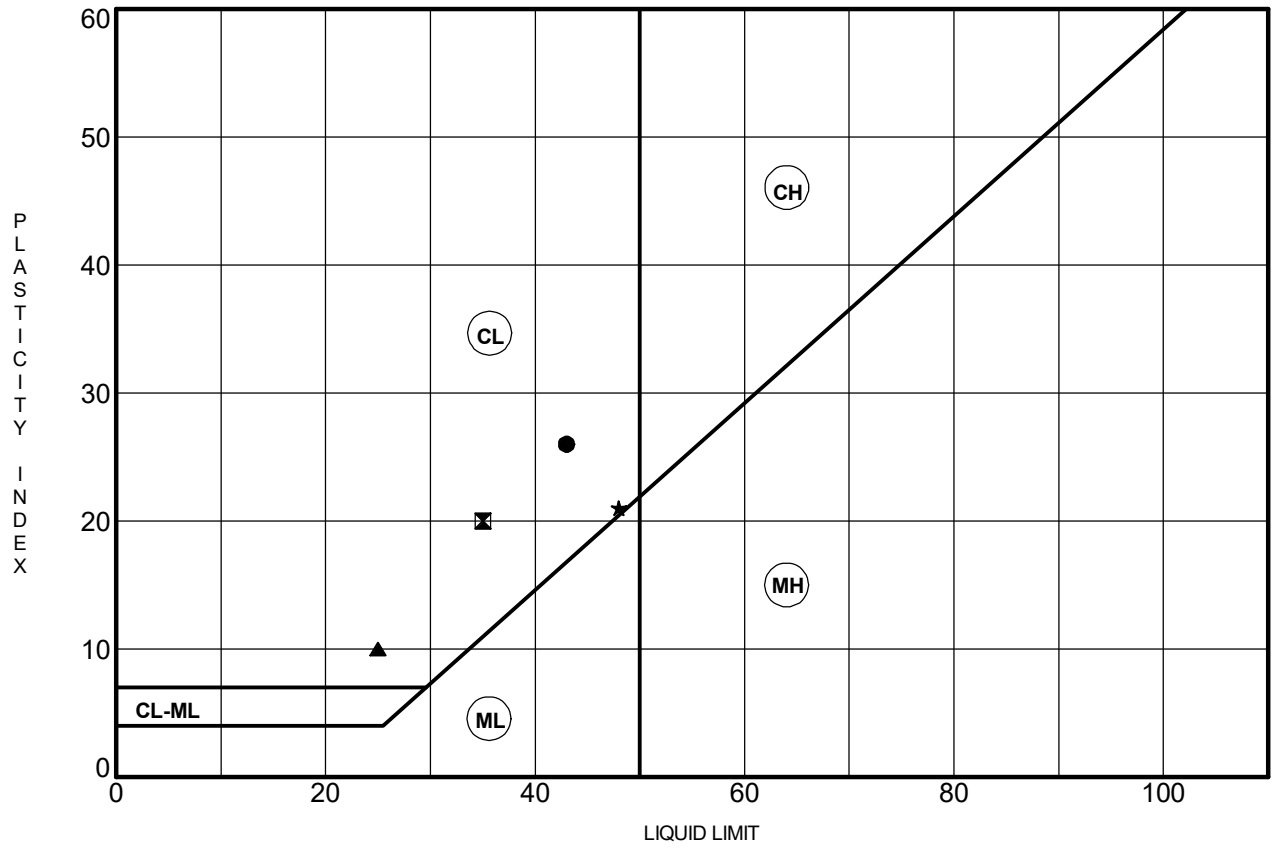
APPENDIX II

LABORATORY TEST RESULTS

GESTRA Engineering, Inc
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: (414) 933-7444, Fax: (414) 933-7844

LABORATORY TEST RESULTS
ATTERBERG LIMITS RESULTS (ASTM D4318)

Project Name: Thomas Farms Development
Project Number: 23083-10
Project Location: Delafield, Wisconsin



Unless otherwise noted, Atterberg limit sample was air-dried, Liquid limit was performed using mutiple points, and plastic limit test was hand rolled.

	Specimen Identification		LL	PL	PI	Fines	MC	Notes
●	B-2, SS-1	0'-2'	43	17	26		22.6	
⊠	B-20, SS-2	2'-4'	35	15	20		22.1	
▲	B-27, SS-2	2'-4'	25	15	10		18.9	
★	B-8, SS-1	0'-2'	48	27	21		21.7	

GESTRA Engineering, Inc
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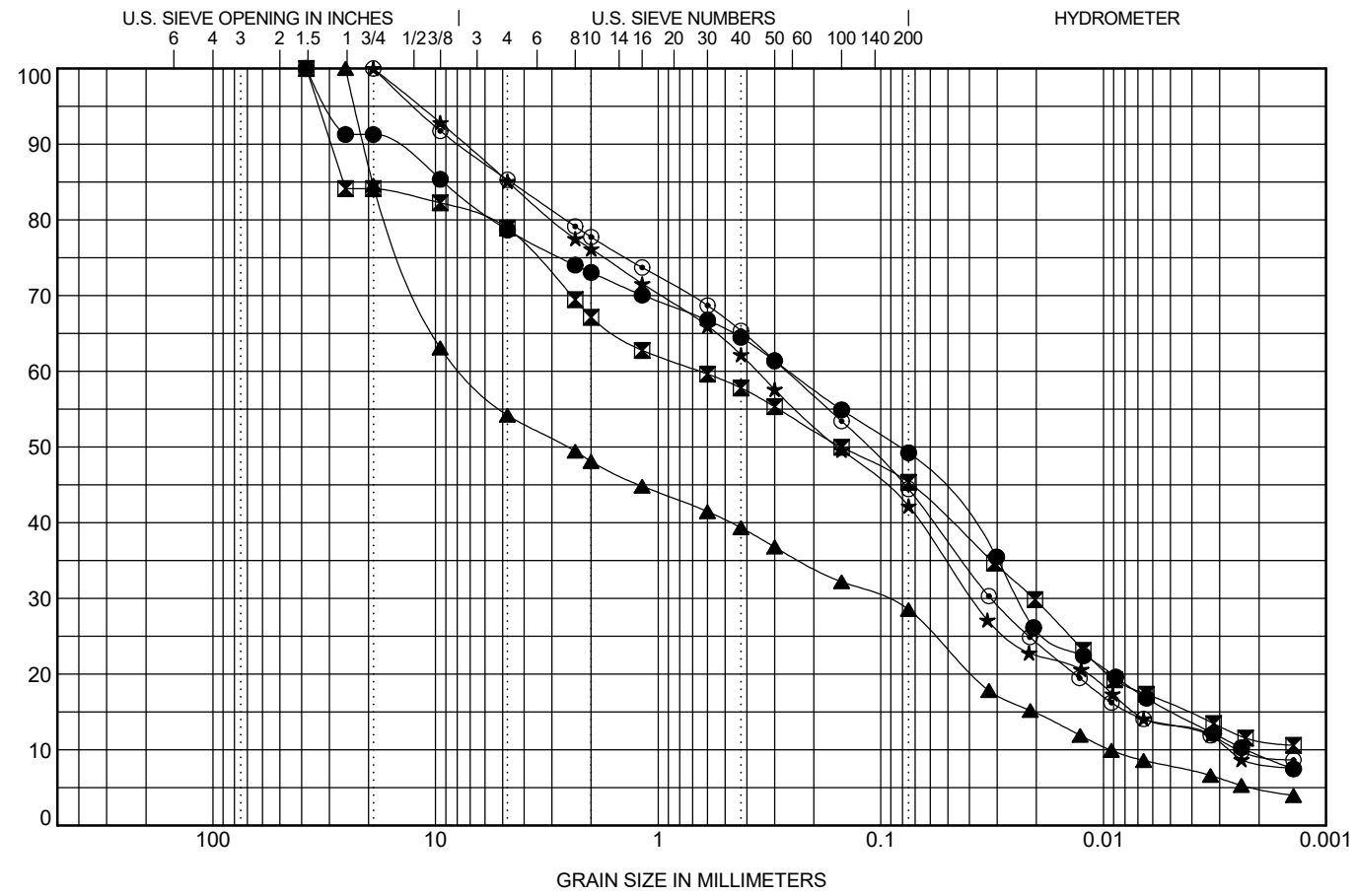
LABORATORY TEST RESULTS
GRAIN SIZE DISTRIBUTION (ASTM D6913 and D7928)

Project Name: Thomas Farms Development
Project Number: 23083-10
Project Location: Delafield, Wisconsin



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	B-1, SS-2	2'-4'					0.99	113.66
⊠	B-22, SS-3	4'-6'						
▲	B-28, SS-3	4'-6'					0.14	802.28
★	B-33, SS-4	6'-8'					1.53	131.83
⊙	B-37, SS-2	2'-4'					1.54	106.25

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1, SS-2	2'-4'	38.1	0.259	0.024	0.002	21.3	29.4	34.1	15.1
⊠	B-22, SS-3	4'-6'	38.1	0.65	0.021		21.1	33.6	29.4	16.0
▲	B-28, SS-3	4'-6'	25.4	7.489	0.099	0.009	45.8	25.7	20.7	7.8
★	B-33, SS-4	6'-8'	19.05	0.36	0.039	0.003	14.9	42.9	29.0	13.2
⊙	B-37, SS-2	2'-4'	19.05	0.265	0.032	0.002	14.7	40.8	31.3	13.2

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Milwaukee, WI 53207
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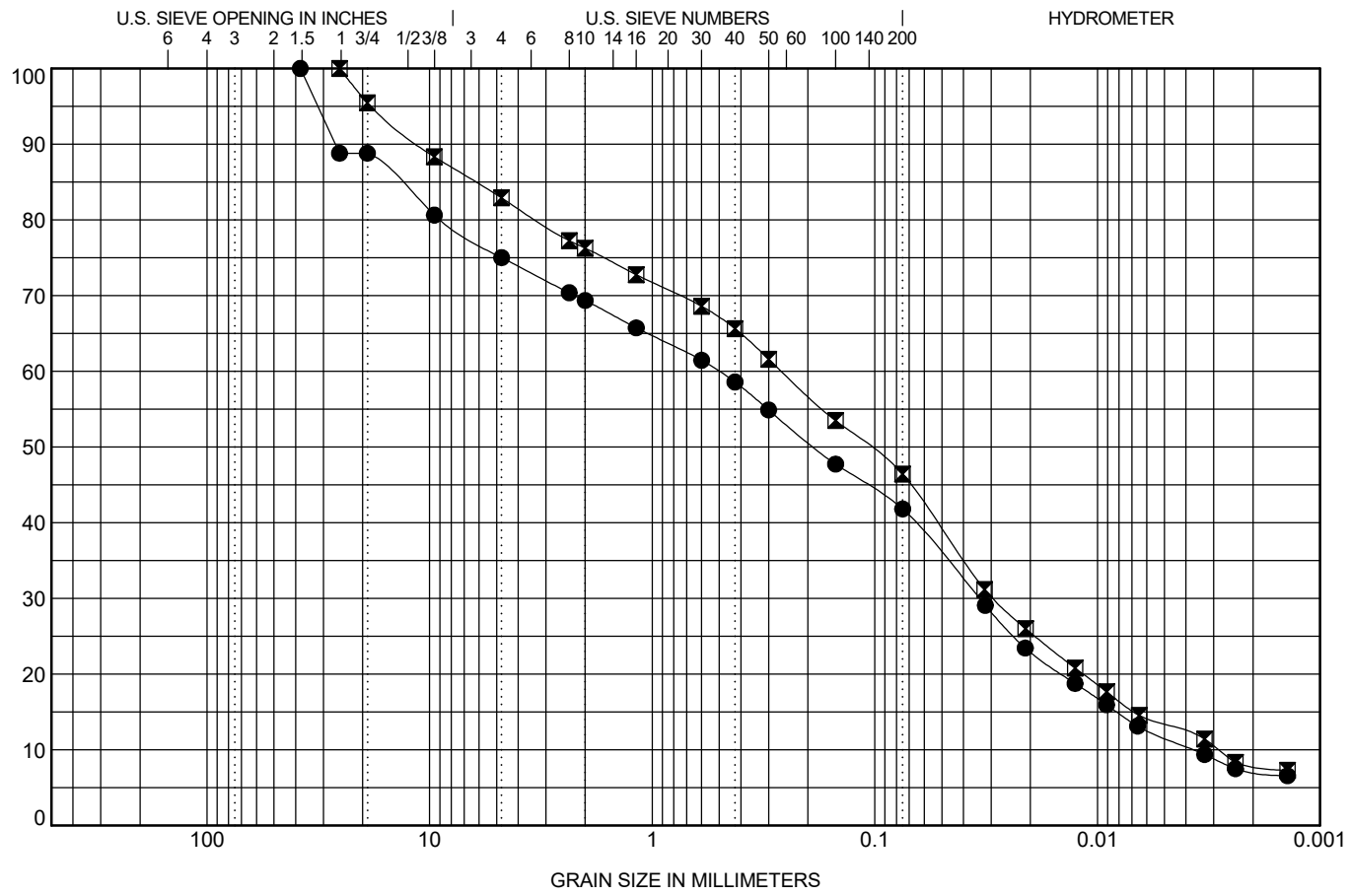
LABORATORY TEST RESULTS
GRAIN SIZE DISTRIBUTION (ASTM D6913 and D7928)

Project Name: Thomas Farms Development
Project Number: 23083-10
Project Location: Delafield, Wisconsin



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	B-6, SS-2	2'-4'					0.62	136.10
⊠	B-9, SS-3	4'-6'					1.14	91.81

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-6, SS-2	2'-4'	38.1	0.504	0.034	0.004	25.0	33.2	30.2	11.6
⊠	B-9, SS-3	4'-6'	25.4	0.262	0.029	0.003	17.1	36.5	33.1	13.3

GRAIN SIZE - GINT STD US LAB.GDT - 5/5/23 12:56 - T:\PROJECTS\2023\MILWAUKEE - 10 (GEOTECH)\23083-10 DD (THOMAS FARM DEVELOPMENT)\LOGS\THOMAS FARMS DEVELOPMENT_2023-04-11.GPJ