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GEOTECHNICAL ENGINEERING REPORT

School Sisters of Notre Dame Development

13105 Watertown Plank Road

Elm Grove, Wisconsin

June 3, 2019

File No. 20.0156624.00



PREPARED FOR:

Mandel Group Properties, LLC
c/o SSND Apartments, LLC
Milwaukee, Wisconsin

GZA GeoEnvironmental, Inc.

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June 3, 2020
File No. 20.0156624.00

Mr. Dan Romnek, Development Associate
Mandel Group Properties, LLC
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Milwaukee, Wisconsin 53202

Re: Geotechnical Engineering Report
School Sisters of Notre Dame Development
13105 Watertown Plank Road
Elm Grove, Wisconsin

Dear Ms. Adler:

GZA GeoEnvironmental, Inc. (GZA) is pleased to present the attached Geotechnical Engineering Report ("Report") for the proposed School Sisters of Notre Dame Development in Elm Grove, Wisconsin. The Report provides findings, conclusions and recommendations that GZA derived from our geotechnical evaluation and are based on our current understanding of the project(s).

We appreciate the opportunity to provide services for this project. Please feel free to contact us with any questions.

Very truly yours,

GZA GeoEnvironmental, Inc.

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Attachments



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1.0 INTRODUCTION

GZA GeoEnvironmental, Inc. (GZA) conducted a geotechnical engineering evaluation and prepared this report for the residential development proposed at 13105 Watertown Plank Road in Elm Grove, Wisconsin ("Site"). A Site Location Map is provided as Figure 1. GZA's services were provided in general accordance with our Proposal for Geotechnical Engineering Services, GZA File No. 20.P000208.20, dated May 6, 2019. The findings, conclusions, and recommendations that GZA derived from the geotechnical evaluation are provided for Mandel Group Properties, LLC c/o SSND Apartments, LLC ("Client") in this Geotechnical Engineering Report ("Report") and are subject to the Limitations provided in Appendix A. Elevations, when provided, are based on the National Geodetic Vertical Datum of 1929 (NGVD 29). Elevations of the borings were surveyed by Chaput Land Surveys and are assumed to be accurate to the nearest 0.25 foot.

1.1 SUMMARY

Geotechnical findings and recommendations for the proposed development are summarized below. The summary is provided for the convenience of the non-technical reader and must be read in complete context with the remaining Report.

1. Twenty-one soil borings were drilled at the locations shown on Figure 2 to depths ranging from 15 to 30 feet below ground surface (bgs) (approximate Elevation 713 to 746) to evaluate subsurface conditions. Detailed soil boring logs are provided in Appendix B.
2. In general, the soils encountered in the borings consisted of approximately 8 to 36 inches of topsoil or asphalt pavement underlain by medium-dense, well- to poorly-graded sand with silt (SW-SM and SP-SM, respectively), with occasional layers of gravel, well-graded sands, and fine-grained soils. Occasional areas of deeper topsoil, up to 6 feet, were encountered at the Site. Groundwater was encountered in the borings at depths of approximately 17 to 18 feet bgs at the time of our exploration.
3. The sandy-silty, organic topsoil observed in surface and near-surface samples from the soil borings will need to be removed beneath proposed pavements and structures. Based on conditions observed in the soil borings, the depth of stripping could range from 2 to 6 feet across portions of the Site.
4. Historical information indicates that several buildings and tunnels previously occupied the Site and were removed in the past. Demolition of these structure(s) likely disturbed the underlying soils. Additionally, the possibility exists that foundations and other building components from the previous structures may be present at the Site requiring removal. Scarification, partial over-excavation and re-compaction of the disturbed soils will likely be required prior to slab-on-grade or pavement construction.
5. Based on the subsurface conditions and estimated structural loads, it is our opinion that shallow footing foundations consisting of strip and isolated spread footings are feasible for support of the proposed buildings. A 3,000 to 4,500 pound per square foot (psf) maximum, net, allowable bearing capacity is recommended for foundation design, depending on the location and foundation elevations of the structure on the Site. Bearing soils should consist of surface compacted, native, granular soils or compacted structural fill. The net allowable soil bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base. Strip footings should be at least 18 inches wide and isolated column footings should be at least 30 inches wide. Also, we recommend that perimeter footings and footings in unheated areas should extend at least 48 inches below the lowest adjacent exterior grade or to a depth required by the local building code, for frost protection. Interior footings beneath heated areas



of the buildings may bear on suitable bearing soils at a minimum of 18 inches below the surface of the overlying floor slab, provided the soil beneath the building will not freeze.

6. A vertical modulus of subgrade reaction (k_v) of 150 pounds per cubic inch (pci) is recommended for concrete slab-on-grade design where founded on native granular soil. If floor slabs are supported on fine-grained soil or soils with minor organic content, the design should use a vertical modulus of subgrade reaction (k_v) of 75 pci. A minimum 4-inch-thick concrete floor slab with at least wire mesh reinforcing is recommended for the proposed buildings. The use of a vapor retarder should be considered beneath concrete slabs-on-grade that will be covered with wood, tile, carpet, or other moisture-sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture.
7. Subgrade soils exposed during the excavation will be sensitive to moisture changes and disturbance due to construction traffic. Disturbed soils may require re-compaction, additional over-excavation, and/or subgrade preparation. The subgrade should be protected from moisture changes and monitored for disturbance from construction equipment.

1.2 PURPOSE AND SCOPE OF SERVICES

GZA's objective for this project was to develop geotechnical engineering recommendations for design and construction of foundations, slabs-on-grade, fill placement, and construction considerations for the proposed development. To achieve our objective, GZA completed the following scope of work:

- Reviewed conceptual drawings provided by the Client;
- Coordinated a geotechnical subsurface exploration program that consisted of 21 soil borings;
- Visually classified soil samples recovered from the borings and prepared soil boring logs;
- Conducted field and laboratory tests on a select number of soil samples to aid in the evaluation of the engineering properties of the subsurface soils;
- Performed geotechnical engineering analyses and developed geotechnical engineering recommendations; and
- Prepared this Report, which summarizes GZA's findings from the geotechnical evaluation and provides geotechnical recommendations for the proposed project.

2.0 **BACKGROUND**

2.1 EXISTING CONDITIONS

The approximately 30-acre Site is located at 13015 Watertown Plank Road in Elm Grove, Wisconsin and is currently developed as the School Sisters of Notre Dame. The Site is located in the northeast quarter of Sections 25, Township 7 North, Range 20 East of the 4th Principle Meridian. The Site is bounded on the north and northwest by Watertown Plank Road, followed by predominantly commercial developments; on the south and southwest by railroad tracks, followed by commercial and light industrial developments; and on the east by homes and Red Barn Lane. Site surface elevations range from about Elevation 770 on the north side of the Site to about Elevation 730 on the southeast corner of the Site.

The Site has been developed since the mid- to late 1800s, with various buildings and burial grounds. Pedestrian tunnels exist between some of the existing buildings and are in various states of repair. Historical aerial photographs of the Site



indicate that several structures have been razed since the 1940s. Former buildings/structures were present in the 1940s, along Watertown Plank Road, Red Barn Lane, and in the middle areas of the Site. It is unknown if foundations, utilities, or other construction remnants remain in these areas. Some fill piles are present on the south side of the Site that appear to contain landscape waste materials. The contractor should expect to encounter areas of fill and deleterious subsurface conditions during development. The Site is located outside of the 100- and 500-year floodplains.

2.2 PROPOSED DEVELOPMENT

Preliminary details regarding the proposed structure quantity, size, and general loading conditions of the development were provided to GZA by the Client. It is our understanding that the development will consist of approximately 300 residential units spread through two existing buildings, eight multi-story apartment buildings, and 17 single-family homes. The multi-story buildings are expected to be two to four stories with a basement and of masonry and wood frame construction. The single-family homes are expected to be one story with a basement and of wood frame construction. Several private roads and driveways will also be included in the development. It is assumed that first-floor elevations of the various structures will be at or near existing Site grades. Based on our experience with similar projects, we anticipate that maximum column and wall loads to be approximately 300 kips and 8 kips per lineal foot, respectively.

3.0 SUBSURFACE EXPLORATION PROGRAM

GZA's subsurface exploration consisted of 21 soil borings, as described below. Detailed soil boring logs of current borings are provided in Appendix B.

3.1 SOIL BORINGS

GZA's subcontractor, GeoServe, Inc. (GeoServe) of McHenry, Illinois drilled 21 soil borings (AB-1 through AB-4; B-1 through B-16; and EB-1) within the Site boundaries. The locations of the borings are presented on Figure 2. The borings were drilled between April 21 and 24, 2020, to depths ranging between 15 and 30 feet bgs (approximate Elevation 713 to 746 [+/- 1 foot]). The actual termination depths are noted on the boring logs in Appendix B.

GeoServe utilized a Geoprobe® 7822 DT, track-mounted drill rig and 4.25-inch, inside diameter (ID), hollow-stem auger drilling techniques to advance the borings to the termination depths. Split-spoon soil samples were obtained in general accordance with American Society for Testing and Materials (ASTM) D1586, *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*. The SPT consists of driving a 1½-inch ID sampler for at least 18 inches with a 140-pound hammer falling 30 inches. The number of blows required for each 6 inches of penetration was recorded, and the number of blows required to drive the sampler from 6 to 18 inches of penetration is the SPT N-value, a commonly used indicator of soil density and consistency. The N-values are summarized on the boring logs in Appendix B. Observations of groundwater levels are discussed in Section 5.4 and are summarized on the soil boring logs.

Soil samples were collected in the split-spoon sampler and were stored in sealed, labeled, plastic jars. Samples were classified in general accordance with ASTM D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*.



4.0 FIELD AND LABORATORY TESTING PROGRAM

Soil samples were visually classified in the field to determine approximate plasticity (for cohesive soils) and grain-size distribution (for granular soils). SPT N-values and/or pocket penetrometer testing results were utilized to evaluate relative density/consistency of the soils encountered and are recorded on the boring logs.

Laboratory tests were performed on select soil samples to aid in soil classification. The testing included natural moisture content and grain-size analysis testing. Three loss on ignition tests were conducted on select samples of the upper topsoil to estimate organic content. Organic content ranged from about 1.7% to 7.7%, by weight, in the upper tested soils. Complete results of the laboratory tests are summarized on the soil boring logs in Appendix B and laboratory summary reports in Appendix C.

5.0 GENERALIZED SUBSURFACE CONDITIONS

Subsurface conditions generally consisted of pavement or topsoil at the surface extending to various depths and thereafter underlain with granular soils with isolated areas of fine-grained, clayey soils. Because of the relatively large size of the Site and the differing soil and loading conditions, the Site has been divided into three subsets, the A-Group, the B-Group, and the C-Group, for discussion purposes as follows:

- A-Group includes borings AB-1 through AB-4, and EB-1, and is located in the southernmost section of the Site, extending from about Green Meadow Place to the railroad at the south end of the Site. Based on available information provided by the Client, this area will primarily be developed with two- to three-story, multi-unit, residential structures that are expected to consist of lightly- to moderately-loaded, masonry and wood-frame structures.
- B-Group includes borings B-1 through B-3, B-5 through B-7, B-9 through B-11, and B-13. These areas encompass the north-central and northwestern portions of the Site, which are currently developed with a majority of the existing campus infrastructure. These areas are expected to be developed with larger, multi-story, masonry structures with moderate loading.
- C-Group includes borings B-4, B-8, B-12, and B-14 through B-16 and is located primarily along the easternmost portion of the Site. Based on available information provided by the Client, this area will primarily be developed with one- to two-story homes that are expected to consist of lightly-loaded, wood-frame structures.

The general geologic setting and a generalized description of the subsurface conditions encountered at the soil boring locations are summarized below. Refer to the boring logs in Appendix B for more specific information. The table below provides a brief summary of the general surface conditions encountered within the areas of the A-, B-, and C-Groups.

Group Name	Pavement or Topsoil Thickness
A	0.5 to 4 feet (Topsoil)
B	2 to 3 inches (Paved Areas) 2 to 6 feet (Topsoil)
C	2 to 8.5 feet (Topsoil)



5.1 SURFACE CONDITIONS

The surface of the Site generally consisted of asphalt parking lots or grassy/topsoil conditions. Asphalt pavement thicknesses were measured in two borings and consisted of 2 to 3 inches of bituminous asphalt pavement underlain with 4 to 9 inches of aggregate base course material. The remaining borings were drilled in grassy areas and encountered varying thicknesses of topsoil, as described above and on the soil boring logs. Loss on ignition (LOI) testing was conducted on three samples in the upper 5 feet and indicated about 1.7% to 7.7% loss (by weight). Moisture contents in the upper soils ranged from about 11% to 32%, by weight and fines content (those materials passing the U.S. No. 200 sieve) ranging from about 27% to 74%, by weight. Topsoil with organic content greater than about 5% to 7% is generally considered compressible and not suitable as bearing soils.

5.2 GRANULAR SANDY AND GRAVELLY SOILS

The topsoil layer was generally underlain by granular soils predominantly consisting of well- to poorly-graded sand with silt (SW-SM and SP-SM, respectively) and layers of well-graded gravel with silt (GW-GM). Other various layers of granular soils were encountered, but appear to be isolated. SPT N-values of the granular outwash soils varied from 3 to 50+ blows per foot (bpf), generally increasing with depth to about 15 to 20 feet bgs and, thereafter, diminishing to about 10 bpf. The percentage by weight of soils finer than the U.S. No. 200 Sieve ranged from 4% to 39%, while moisture contents ranged from 5% to 29% moisture (by weight).

5.3 FINE-GRAINED SOILS

Clayey and silty soils (those soils with greater than 50% passing the U.S. No. 200 Sieve) were encountered at various depths in several borings. The layers appeared to generally be isolated, except for the southeast corner where the fine-grained soils appeared to be present below depths of about 9 feet consistently. Because of the gravel content in many clayey samples recovered, complete soil plasticity tests (Atterberg Limits) could not be performed. One liquid limit test was conducted on a clayey sample, which exhibited a liquid limit of 32. Additionally, five plastic limit tests were conducted with plastic limits ranging from 17 to 26, indicating low plasticity conditions. Several non-plastic, silty soils were also encountered during drilling. Moisture contents of the fine-grained soils ranged from about 16% to 40%, by weight. Pocket penetrometer tests were conducted in the field to estimate unconfined compressive strength of the clayey soils and ranged from about 0.5 to 4.5 tons per square foot (tsf), indicating soft to hard consistency.

5.4 GROUNDWATER

The soil borings were observed for the presence of groundwater during drilling. However, the hollow-stem the auger drilling techniques utilized to advance the soil borings produce a temporary casing as the drill stem is advanced and water conditions within the casing may not reflect actual groundwater levels at the Site. Based on measurements taken in borings AB-4 and EB-1, groundwater was estimated at approximately 17 to 18 feet bgs (Elevation 725 to 728 +/- 1 foot) at the time of drilling. Groundwater levels will fluctuate due to seasonal variations in the amount of precipitation, runoff, and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times over the life of the structure may be different than the levels indicated on the boring logs.



6.0 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

Geotechnical design and related earthwork construction recommendations for the proposed development are provided in the following sections. The recommendations are based on subsurface conditions encountered at the boring locations and the results of GZA's geotechnical engineering analyses. As the project design continues to develop, these recommendations should be reviewed so that more specific geotechnical design criteria can be developed, if required.

6.1 GENERAL GEOTECHNICAL CONSIDERATIONS

Based on the subsurface conditions and estimated structural loads, it is our opinion that spread footing foundations are suitable to support the buildings. Fill soils and potential remnants of previous construction at the Site are expected. The contractor should review available historical photographs, as-builts, and other publicly available information to determine areas of potential deep, undocumented fill. Fill soils were likely side-cast at the time of previous structure demolition and not moisture conditioned and/or compacted to an engineering specification. Additionally, demolition of existing structures at the Site likely resulted in disturbance of upper soils. Loose, soft, or otherwise deleterious soils should be removed from the foundation bearing areas and replaced with engineered fill or flowable cementitious lean mix. If topsoil, peat, or other organic-rich soils are encountered at foundation grades, they should similarly be removed and replaced with approved fill.

Existing undocumented fill, if present should generally be considered unsuitable for support of footings, slabs, and pavements, and should be removed from the building areas. However, the existing fill could be evaluated for floor slab and pavement support, provided it is tested during construction to determine its suitability. It may also be possible to process the existing concrete and asphalt pavement materials for re-use if mixed with suitable portions of the fill and pavement base course as structural fill, providing that the moisture content is within 1% to 2% of the optimum water content for compaction. If deeper fills and or remnants of previous structures are encountered at or below the bottom of footing elevations, removal of additional fill and subsurface obstructions will also be required to facilitate foundation installation.

The floor slab subgrade should be thoroughly observed, density tested and/or proof rolled and tested by GZA prior to placing the layer of new controlled fill.

Groundwater is not expected to be a concern during construction and excavation for the proposed structures.

6.2 BUILDING FOUNDATIONS

It is our opinion that the buildings can be supported on conventional shallow-spread footing foundations bearing on the native undisturbed, granular (sand or gravel) soils, below the topsoil. Allowable bearing capacities are a function of the building location and anticipated depth of footings. It is not known if all structures will have basements or consist of slab-on-grade construction. As such, multiple allowable bearing capacities are provided for design purposes. The table below summarizes various options for net allowable bearing capacity based on a maximum anticipated settlement of 1 inch for strip footing and isolated column pad foundation design founded on native granular soils or stiff to hard, fine-grained soils.

Group	Allowable Bearing at 4 feet bgs	Allowable Bearing at 8 feet bgs
A-Group	3,000 psf	3,500 psf
B-Group	3,000 psf	4,500 psf
C-Group	2,500 psf	3,500 psf



The net allowable soil bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base. Strip footing foundations should be at least 18 inches wide and isolated column pads should be at least 30 inches wide to reduce the possibility of punching shear failure within foundation support material, regardless of calculated bearing pressure.

If undocumented fill materials are encountered during construction, use of a lean-mix cement slurry (1,500 pounds per square inch [psi] minimum compressive strength) can be used to backfill over-excavations or structural compacted fill can be used for backfill as an option. If lean-mix is utilized, the width of the excavation only needs to be as wide as the planned footing width, provided the excavation side walls are stable. Where granular, native soils are present, some caving may occur. To reduce the caving potential, sloping may be needed. If structural compacted fill is used to backfill over-excavations, the fill will need to be extended laterally at least 1 foot for every 2 vertical feet of soil removal.

We recommend that perimeter footings and foundations in unheated areas that will be subject to freezing conditions bear at least 48 inches below the lowest adjacent exterior grade or to a depth required by the local building code for frost protection. Interior footings may bear on suitable soils at a minimum depth of 18 inches below the surface of the overlying floor slab, provided the soil beneath the foundations will not freeze.

Roof drains and surface water should be directed away from the proposed buildings and paved areas, collected, and discharged from the Site by acceptable means.

Post-construction settlements of foundations will depend on the actual structural loads and the quality of the foundation preparation performed by the contractor. GZA has not been provided the final design loads for the proposed buildings. However, based on the subsurface conditions and estimated structural loads from our experience with similar buildings, we estimate that the post-construction total settlement will be 1 inch or less for foundations that are designed and constructed in accordance with the recommendations in this Report. We also estimate that the post-construction differential settlement will be approximately ½-inch or less over a distance of about 20 feet. These settlement estimates assume that footings will be supported on the compacted, native soils or a prepared subgrade.

6.3 FLOOR SLAB

Based on the subsurface information, floor slabs placed over fine-grained soil or soils with minor organic content may be designed using a vertical modulus of subgrade reaction (k_v) of 75 pci, provided the slab subgrade, subbase, and base are prepared in accordance with this Report. Additionally, floor slabs placed on coarse-grained, sandy or gravelly soils may be designed using a K_v of 150 pci. The floor slab should be isolated from walls and columns to allow for independent movement. Joints should be constructed at regular intervals, as recommended by the American Concrete Institute (ACI). The structural engineer should specify actual details of the floor slab, including thickness, reinforcing, and joint details.

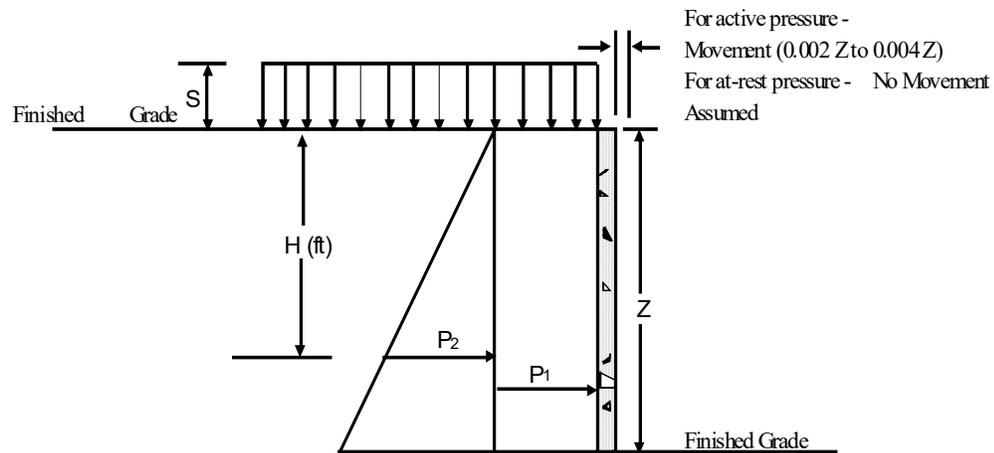
The need for and placement of the vapor retarder should be determined by the environmental engineer, architect, or structural engineer based on the proposed floor covering treatment, building function, concrete properties, placement techniques, and construction schedule. For further guidance concerning the use of vapor retarders, the designer should refer to ACI 302, *Construction of Concrete Floors*, and ACI 360, *Guide to Design of Slabs-on-Ground*.

Floor slabs should be a minimum of 4 inches thick and generally be underlain by a minimum 8-inch thick, coarse aggregate base course. The thickness of the aggregate base course may be reduced to 6 inches in areas of subgrade improvement if surficial compaction of the subgrade soils is undertaken and tested. The coarse aggregate base course should consist of material meeting the requirements for Wisconsin Department of Transportation (WisDOT) Standard Specifications for Highway and Structure Construction. Base course materials should be placed and compacted in accordance with Section 6.7.2. An experienced geotechnical engineer should test and approve base course material prior to placement.



6.4 LATERAL EARTH PRESSURES

Potential below grade walls, if any, and/or retaining walls with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to those indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction, and the strength of the materials being restrained. Two wall restraint conditions are shown. Active earth pressure is commonly used for design of freestanding cantilever retaining walls that are unrestrained at the tops and free to move. The “at-rest” condition should be used for walls restrained from movement and rotation and would be appropriate for any below grade walls proposed. The recommended design lateral earth pressures are for cast-in-place concrete walls only and do not include a factor of safety or any provision for possible hydrostatic pressure on the walls.



Earth Pressure Coefficients

	Coefficient for Backfill Types	Equivalent Fluid Pressure (pcf)	Surcharge Pressure, P_1 (psf)	Earth Pressure, P_2 (psf)
Active (K_a)	Granular - 0.30	33	(0.33)S	(33)H
At-Rest (K_o)	Granular - 0.46	55	(0.46)S	(55)H
Passive (K_p)	Granular - 3.0	360	---	---

Conditions applicable to the above conditions include:

- For active earth pressure, the wall must rotate about base, with top lateral movements 0.002 Z to 0.004 Z, where Z is wall height;
- For passive earth pressure, the wall must move horizontally to mobilize resistance;
- Uniform surcharge, where S is the surcharge pressure;
- A maximum in-situ soil backfill weight of 115 pounds per cubic foot (pcf) should be used for granular backfill;



- Horizontal backfill, compacted to at least 90% of the ASTM D1557, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort*, maximum dry density;
- Loading from heavy compaction equipment is not included;
- No groundwater is acting on wall;
- No safety factor is included; and
- Ignore passive pressure in frost zone.

Backfill placed against walls can consist of on-Site granular soils. For the granular values to be valid, the granular backfill should extend out from the base of the wall at an angle of at least 45° and 60° from vertical for the active and passive cases, respectively. Additional design considerations are required where these conditions are not met. To calculate the resistance to sliding, a value of 0.35 could be used as the allowable coefficient of friction between the footing and the underlying soil.

6.5 UTILITIES

Existing utilities are present on the Site and old pedestrian tunnels are also reported to be on the Site. If below grade utilities will remain for use with the new development, those utilities should be protected by crane mats or other bridging devices during and after construction. Abandoned utility pipes and tunnels should be properly abandoned, removed, or plugged so they will not serve as conduits for water inflow and subsequent soil wetting and/or subsurface erosion, which could adversely affect new foundations, floor slabs, and pavements.

New underground pipes and utilities should be placed on bedding in accordance with manufacturer recommendations. Trench backfill should be placed in loose lifts not to exceed 6 inches thick and should be compacted in accordance with the specifications provided in this Report.

6.6 SEISMIC PARAMETERS

Based on the subsurface conditions encountered in the borings, the Site Class is considered to be “D” based on Table 1613.5.2 of the 2015 International Building Code. The following seismic design parameters presented below are calculated using the United State Geological Survey (USGS) *Seismic Hazard Curves and Uniform Hazard Response Spectra* calculator using Site Class “D” parameters.

Parameter	Value (unit)
S_s = Short Period Mapped Spectral Acceleration	0.087 (g)
S_1 =1-second Period Mapped Spectral Acceleration	0.046 (g)
F_a = Short Period Site Coefficient	1.6 (unitless)
F_v = 1-sec. Period Site Coefficient	2.4 (unitless)
$SM_s = S_s \times F_a$	0.139 (g)
$SM_1 = S_1 \times F_v$	0.112 (g)
$SD_s = 0.667 \times SM_s$	0.093 (g)
$SD_1 = 0.667 \times SM_1$	0.074 (g)



6.7 SITE PREPARATION AND CONSTRUCTION

6.7.1 Subgrade Preparation

The topsoil at the boring locations was present to highly variable depths. Trees and landscaped areas are also on the property. These materials will need to be cleared and grubbed and removed prior to development. After stripping and cutting to the design subgrade elevation, the exposed subgrade should be proof rolled with a fully loaded, quad-axle dump truck with a 10-cubic yard capacity to detect unstable soil or other appropriate testing methods. A GZA geotechnical engineer should observe the exposed subgrade conditions and proof roll operations. Unsuitable bearing soil detected during proof rolling should be scarified and compacted in-place, replaced with fill material, or stabilized, as recommended by the geotechnical engineer. Once the subgrade is determined to be stable, Site grades may be raised, where needed, by placing and compacting General Fill material. Recommendations regarding fill placement and compaction of fill materials are provided in Section 6.7.2.

6.7.2 Placement and Compaction of Fill

Fill material should be placed on a properly prepared subgrade, as noted in Section 6.7.1. Also, the subgrade or fill soil should not be frozen. Fill soil should be placed and compacted in uniform, loose lifts that are between 6 and 12 inches thick. A GZA geotechnical engineer should determine the actual fill thickness based on characteristics of the fill materials and the type of compaction equipment that is used.

Fill, base course and backfill materials should be compacted to at least the minimum degree of compaction relative to the maximum dry density determined by the modified Proctor test (ASTM D1557), as noted in the following table. Vibratory compaction methods should be used with caution for fill placed on wet, native soils or near the water table. During placement, fill soil should have uniform water content within about 2% of the optimum water content determined by the modified Proctor compaction test.

Fill Area	Percent of Maximum Dry Density Determined by ASTM D1557
Below Foundations, Slabs-on-Grade and Slab-on-Grade Base Course	95
Pavement Base Course and Within 2 Feet of Surface Pavement Base Course	95
More Than 2 Feet Below Pavement Base Course	92
Below Landscape Areas	90

We recommend that a GZA geotechnical engineer test each layer of fill to measure in-place dry density and water content. Subsequent layers of fill should not be placed until the densities and water contents of the prior lift are in accordance with our recommendations. Improperly placed and compacted fill material should be scarified; moisture conditioned and re-compacted or replaced with suitable compacted fill. Also, in-place fill should be protected from moisture increases and construction traffic disturbance. Disturbed fill material may be scarified, moisture conditioned, and re-compacted, or it may be replaced with suitable fill material. Properly placed and compacted fill should be protected from freezing. General Fill, as defined in Appendix D, can be used to raise Site grades.

6.7.3 Foundations

We recommend that a GZA geotechnical engineer check foundation subgrades prior to concrete placement to confirm that the foundation soil resistance (blow counts) is consistent with the design parameters. The use of a dynamic cone penetrometer is recommended for verification of granular soil strength properties. If areas of weak or deleterious soils



are encountered, we recommend that the soils be over-excavated and re-placed and/or re-compacted with acceptable fill materials.

Foundations should be constructed immediately after subgrade preparation and soil testing to protect the soil bearing surface. In addition, foundation excavations should be backfilled as soon as possible after foundation construction. Excavations along foundation walls should be filled such that the fill at the interior and exterior sides of the walls are at about the same height for lateral pressure considerations. Backfill along foundation walls may consist of General Fill.

6.7.4 Excavation Slopes and Shoring

Excavations should be in accordance with current United States Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines to protect workers and others during construction. Excavations must be shored, sloped, or benched, as required by OSHA. Per OSHA Standard 29 CFR 1926 Subpart P, the upper soils present at the Site should be classified as Type "C" soils. Excavations should also be in accordance with local, State, and Federal safety regulations. Due to the granular native soils, excavations are expected to slough or cave rapidly. The presence of old foundations and utility trenches within or near the excavation may also cause instability to occur. Exposed excavation slope faces should be protected. The geotechnical engineer should evaluate the stability of proposed slopes.

6.8 SHORT- AND LONG-TERM DEWATERING RECOMMENDATIONS

Based on the planned excavation depths, groundwater will likely not be encountered during construction. If deeper excavations are required that extend below the groundwater level, we anticipate that sump and pump methods should maintain levels within the excavation. The groundwater pumping rates required to maintain conditions suitable for construction will depend on the construction methods, soils encountered, and depth of excavation required.

Considering the length of time that the Sisters of Notre Dame have owned the property in its use, it is possible that field drain tiles may be present from past farming. If drain tiles are encountered, those should be connected to new storm sewers to allow for continued drainage unless re-grading does not require continued drain tile functionality.

It also appears that the groundwater level will be below the proposed basement depth and that long-term management of groundwater infiltration will be related to downward seepage from surface or perched groundwater in the backfill on the exterior of the basement walls. Assuming the groundwater levels remain at or below current elevations, long-term drainage can be accomplished through the design of a perimeter drainage system. The system should include exterior and interior perimeter drain lines consisting of slotted PVC pipe with a minimum diameter of 4 inches. The invert of drain lines should be at least 12 inches below the finished subgrade elevation of the interior slab or at least at footing base level and connected to a sump and pump system. The drain line should be sloped to provide positive gravity drainage and should be surrounded by free-draining (less than 3% fines), granular material graded to prevent the intrusion of fines, or an alternative open-graded, free-draining, granular material encapsulated with suitable filter fabric. At least a 2-foot wide section of free-draining, granular fill should be used for backfill above the drain line and adjacent to the wall. Backfill placed between the basement walls should be carefully placed to avoid overcompaction, which could result in excessive lateral earth pressures. The drainage section should extend to within 2 feet of final grade and be capped with low permeability, compacted, cohesive soils to minimize infiltration of surface water into the drain system. The exterior of the basement walls should be damp-proofed prior to backfill placement.



6.9 PAVEMENT RECOMMENDATIONS

We understand that areas of pavement outside of the proposed structures will include drive lanes and parking areas. Based on the soil conditions in the borings and our understanding of the proposed grades, we assume that the subgrade in these areas will generally consist of native sand and gravel surface compacted material. Topsoil and organic-rich material should be stripped from the paved areas and replaced with compacted granular fill as needed to establish grades. Based on our experience within these materials, a CBR value of about 5 was used by GZA to determine the recommended pavement thickness. Similarly, a modulus of subgrade reaction value equal to 150 pci could be used for design of rigid concrete pavement sections placed on compacted aggregate base course. Prior to placement of base course, subgrade soils should be prepared in accordance with this Report.

Typical pavement thickness recommendations are provided in the following table for asphalt and concrete pavements. The recommended pavement sections are based on an assumed moderate volume of passenger vehicle traffic and low volume of traffic from delivery or garbage trucks, and also should be considered minimum design thicknesses. Thickness recommendations for Passenger Vehicle Parking sections are based on light passenger vehicle traffic (gross weight less than 4 tons) and only occasional truck traffic such as fire trucks and snow removal trucks (2001 Wisconsin Asphalt Paving Association [WAPA] Traffic Class II). The Driveways sections are based on occasional garbage truck, buses and delivery truck traffic (WAPA Traffic Class III).

MINIMUM PAVEMENT SECTIONS		
	Passenger Vehicle Parking	Roadways/Driveways
Portland Cement Concrete (PCC)	4 inches	6 inches
Granular Base Course	6 inches	6 inches
Flexible Pavement Section:		
Asphalt Cement Concrete (ACC)	4 inches	5 inches
Granular Base Course	6 inches	8 inches

1. All materials should meet the current WisDOT Standard Specifications for Highway and Structure Construction.
2. In areas of anticipated heavy traffic, delivery trucks, or concentrated loads (e.g. dumpster pads), a minimum concrete thickness of 7 inches is recommended, but should be evaluated further when loading conditions are known.
3. A minimum 6-inch granular base should be used below PCC pavements.
4. A minimum 1.5-inch surface course should be used on ACC pavements.

The estimated pavement sections provided in this Report are minimums for the assumed design criteria and, as such, periodic maintenance should be expected. Areas for parking of heavy vehicles, concentrated turn areas, and start/stop maneuvers could require thicker pavement sections. Final design sections should consider details such as traffic loadings, traffic volumes, the desired design life and any applicable local or City requirements. If you wish, we would be pleased to perform a detailed pavement section design using traffic volumes and American Association of State Highway and Transportation Officials (AASHTO) or ACI procedures when this information is available.

A maintenance program that includes surface sealing, joint cleaning and sealing, and timely repair of cracks and deteriorated areas will increase the pavement's service life. As an option, thicker sections could be constructed to decrease future maintenance.

The pavement base course is recommended to meet the gradation requirement of Structural Fill, as provided in Appendix D. We recommend that the pavement subgrade be sloped to discharge water to the perimeter edges of the pavement or to a catch basin/drain pipe system.



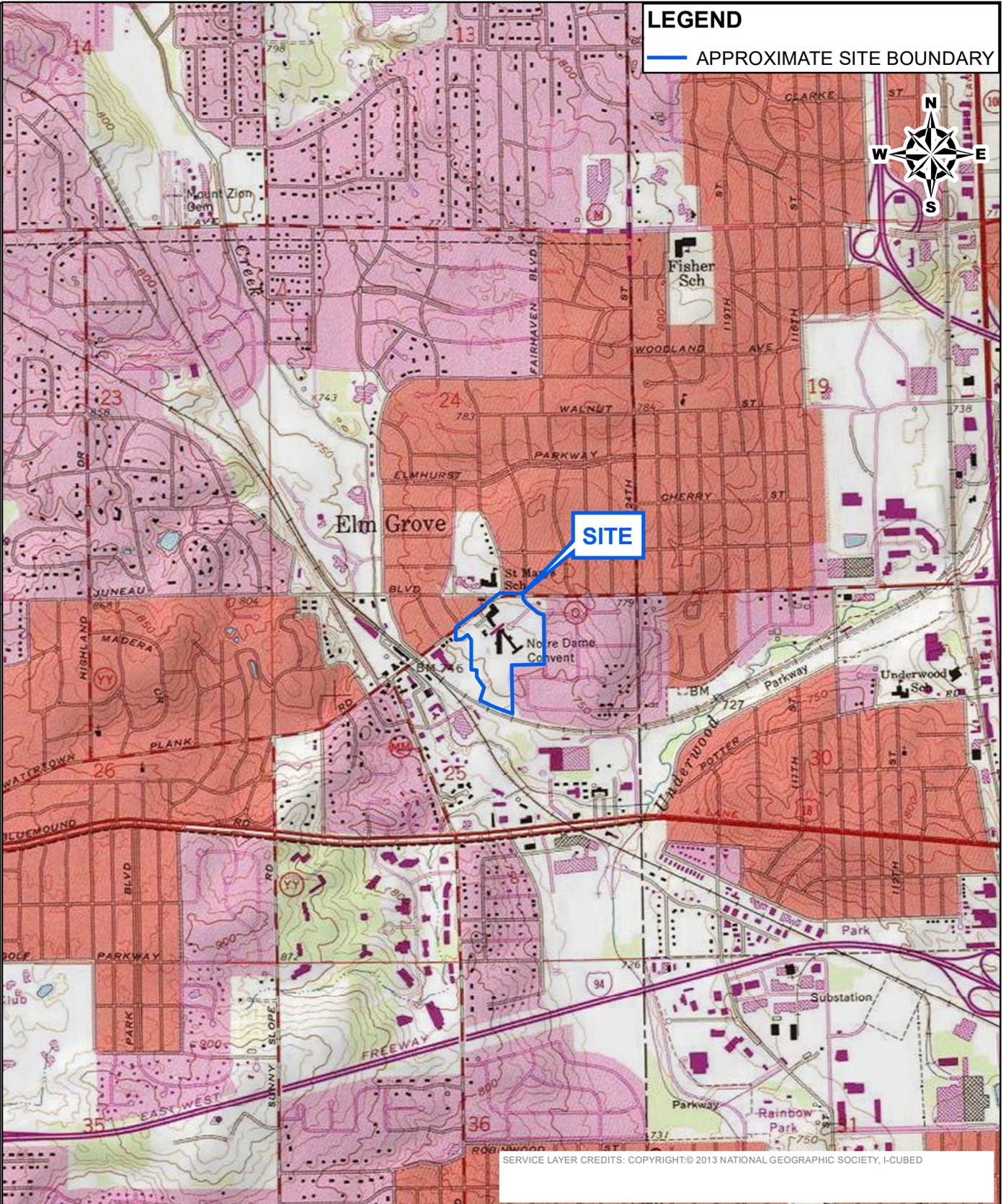
7.0 FINAL DESIGN AND CONSTRUCTION PHASE SERVICES

During construction, we recommend that GZA be retained to observe earthwork activities and geotechnical-related construction for compliance with our recommendations. These activities would include confirming that subsurface conditions encountered during construction are consistent with those anticipated, observation of general excavation work, subgrade preparation for foundations, for slab and pavement base course, foundation construction, slab and pavement base course placement and general fill placement.



FIGURES

© 2020 - GZA GeoEnvironmental, Inc. J:\1566000\156624 - Sisters of ND\Figures\20.0156624.00 Site Location (8.5x11 Portrait).mxd, May 18, 2020 - 12:08:35 AM, pamelarehbein



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SCALE IN FEET

SCHOOL SISTERS OF NOTRE DAME DEVELOPMENT
 13105 WATERTOWN PLANK ROAD
 ELM GROVE, WISCONSIN

PREPARED BY:
GZA GeoEnvironmental, Inc.
 Engineers and Scientists
 www.gza.com

PREPARED FOR:
MANDEL GROUP
 330 EAST KILBOURN AVENUE
 MILWAUKEE, WISCONSIN

SITE LOCATION MAP

PROJ MGR: JMG	REVIEWED BY: JMG	CHECKED BY: IJM	FIG 1 SHEET NO: OF
DESIGNED BY: IJM	DRAWN BY: PLT	SCALE: 1 in = 2,000 ft	
DATE: 05/18/2020	PROJECT NO: 20.0156624.00	REVISION NO:	

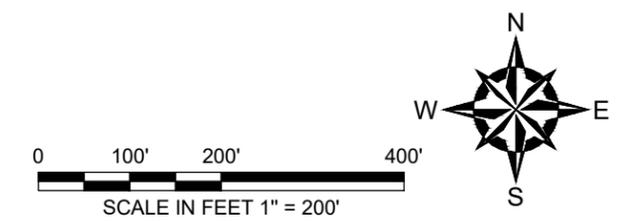
©2016 - GZA GeoEnvironmental, Inc. GZA-J:\156600T0156699\156624 SISTERS OF ND\FIGURES\20.0156624.00 SITE PLAN.DWG FIG 2 - BORING LOCATION MAY 17, 2020 PAMELA REHBEIN



LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE PARCEL BOUNDARY
- SOIL BORING
- STORM MANHOLE
- SANITARY MANHOLE
- HYDRANT

- NOTES**
1. BASE MAP DEVELOPED FROM A GOOGLE PROFESSIONAL ELECTRONIC IMAGE FILE. DIGITAL AERIAL ORTHOPHOTOGRAPHY WAS PUBLISHED BY THE U.S.G.S.
 2. THE USE OF AERIAL PHOTOGRAPHY CAN OFTEN MAKE BUILDINGS AND OTHER SITE FEATURES APPEAR TO BE OVERLAPPING AND DISTORTED WHEN OVERLAID WITH ACTUAL SITE FEATURES.
 3. THE INFORMATION ON THIS FIGURE WAS TAKEN FROM CHAPUT LAND SURVEYS, DRAWING NO. SB-EX3454-FAR, DATED MARCH 27, 2020.
 4. BEARINGS ARE REFERENCED TO THE WISCONSIN STATE PLANE COORDINATE SYSTEM (SOUTH ZONE) NAD27, IN WHICH THE NORTH LINE OF THE NE 1/4 BEARS N89°58'52"E.
 5. VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.
 6. BORING B-10 WAS NOT SURVEYED BY CHAPUT. ELEVATION WAS ESTIMATED BASED ON SITE BENCHMARKS IN THE FIELD.



NO.	ISSUE/DESCRIPTION	BY	DATE

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SCHOOL SISTERS OF NOTRE DAME DEVELOPMENT
13105 WATERTOWN PLANK ROAD
ELM GROVE, WISCONSIN

BORING LOCATION MAP

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: MANDEL GROUP 330 EAST KILBOURN AVENUE MILWAUKEE, WISCONSIN	
PROJ MGR: JDG	REVIEWED BY: JDG	CHECKED BY: IJM	FIG
DESIGNED BY: IJM	DRAWN BY: PLR	SCALE: see above	2
DATE: 6/3/2020	PROJECT NO. 20.0156624.00	REVISION NO.	
			SHEET NO.



APPENDIX A
LIMITATIONS



GEOTECHNICAL LIMITATIONS

Use of Report

GZA GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in the Proposal for Services and/or Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the contract documents, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

Standard of Care

GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in Proposal for Services and/or Report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the design has been altered in any way, GZA shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions.

GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

In conducting our work, GZA relied upon certain information made available by public agencies, Client and/or others. GZA did not attempt to independently verify the accuracy or completeness of that information. Inconsistencies in this information which we have noted, if any, are discussed in the Report.

Subsurface Conditions

The generalized soil profile(s) provided in our Report are based on widely-spaced subsurface explorations and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs. The nature and extent of variations between these explorations may not become evident until further exploration or construction. If variations or other latent conditions then become evident, it will be necessary to reevaluate the conclusions and recommendations of this report.

In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein which were made available to GZA at the time of our evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

Water level readings have been made in test holes (as described in this Report) and monitoring wells at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the level of the groundwater however occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water table encountered in the course of the work may differ from that indicated in the Report.

GZA's services did not include an assessment of the presence of oil or hazardous materials at the property. Consequently, we did not consider the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.

Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.



Compliance with Codes and Regulations

We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

Additional Services

GZA recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.



APPENDIX B
BORING LOGS



CLIENT Mandel Group

PROJECT NAME School Sisters of Notre Dame

PROJECT NUMBER 20.0156624.00

PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

	ASPHALT: Asphalt
	CL: USCS Low Plasticity Clay
	CL-ML: USCS Low Plasticity Silty Clay
	CLS: USCS Low Plasticity Sandy Clay
	FILL: Fill (made ground)
	GC: USCS Clayey Gravel
	GM: USCS Silty Gravel
	GP-GM: USCS Poorly-graded Gravel with Silt
	GW: USCS Well-graded Gravel
	GW-GM: USCS Well-graded Gravel with Silt
	ML: USCS Silt
	PT: USCS Peat
	SC: USCS Clayey Sand
	SM: USCS Silty Sand
	SP: USCS Poorly-graded Sand
	SP-SM: USCS Poorly-graded Sand with Silt

**RELATIVE DENSITY/
CONSISTENCY**

Granular Soils (Sands, Gravels)

<u>N-Value</u>	<u>Relative Density</u>
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

Cohesive Soils (Clays, Some Silts)

<u>PP-Value (tsf)</u>	<u>Consistency</u>
< 0.25	Very Soft
0.25 - 0.5	Soft
0.5 - 1.0	Medium Stiff
1.0 - 2.0	Stiff
2.0 - 4.0	Very Stiff
> 4.0	Hard

MINOR COMPONENTS

<u>Percentage</u>	<u>Descriptor</u>
1 - 5	Trace
5 - 15	Little
15 - 30	Some
30 - 50	With

SOIL MOISTURE

DRY	No Free Moisture
MOIST	Wet to Touch, No Free Moisture
WET	Free Moisture

DRILLING STATISTICS

Number of Boreholes:	21
Total Length of Drilling:	500
Total Number of Samples:	163

TESTING:

Water Content:	40
Dry Density:	0
Atterberg Limits:	16
Sieve Analysis:	25
Unconfined:	0
Direct Shear:	0
Pocket Pen:	75

ABBREVIATIONS

LL	LIQUID LIMIT (%)
PI	PLASTIC INDEX (%)
W	MOISTURE CONTENT (%)
DD	DRY DENSITY (PCF)
NP	NON PLASTIC
P#200	PERCENT PASSING NO. 200 SIEVE (FINES)
PP	POCKET PENETROMETER (TSF)

TV	TORVANE
PID	PHOTOIONIZATION DETECTOR
UC	UNCONFINED COMPRESSION
ppm	PARTS PER MILLION

	Water Level at Time Drilling, or as Shown
	Water Level at End of Drilling, or as Shown
	Water Level After 24 Hours, or as Shown



GZA GeoEnvironmental, Inc.
 17975 West Sarah Lane, #100
 Brookfield, WI 53045
 (262) 754-2560

BORING NUMBER AB-01

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/21/20 **COMPLETED** 4/21/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 750.6 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	750		Surface: Grassy											
1-2.5			S-1: Upper 10": TOPSOIL: Stiff, Sandy, lean CLAY (CL), low plasticity; little Gravel, fine; trace Organics; brown, moist Lower 8": Loose, well-graded SAND (SW), fine to coarse-grained; little to some Gravel, fine; little Silt; brown, moist (possible fill)		S-1 (1-2.5)	18	2-4-3 (7)	1.0						
3-5			S-2: Upper 7": Stiff, Sandy, lean CLAY (CL), low plasticity; some Sand, fine to coarse; some Gravel, fine; brown, moist (possible fill) Lower 7": Medium dense, well-graded SAND (SW), fine to coarse-grained; little Gravel, fine; trace Silt; brown, dry		S-2 (3.5-5)	14	3-4-10 (14)	2.0						
6-7.5			S-3: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; little Gravel, fine; brown, dry		S-3 (6-7.5)	18	10-9-7 (16)		5.4	NP	NP	NP	10	
8.5-10			S-4: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; little Gravel, fine; brown, dry		S-4 (8.5-10)	16	6-9-7 (16)							
11-12.5			S-5: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some Gravel, fine; brown, dry		S-5 (11-12.5)	16	5-10-14 (24)							
13.5-15			S-6: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some Gravel, fine; trace Silt; brown, dry		S-6 (13.5-15)	14	2-8-10 (18)							
16-19-20		 	S-7: Upper 10": Dense, well-graded GRAVEL (GW), fine to coarse-grained; some Sand, fine to coarse; trace Silt; brown, dry; trace rock fragments Lower 4": Hard, lean CLAY (CL), low plasticity; little Sand, fine to coarse; little Gravel, fine to coarse; brown, dry	1	S-7 (18.5-20)	14	16-19-13 (32)	4.5						
23.5-25			S-8: Medium dense, poorly-graded SAND (SP), fine to medium-grained; brown, wet		S-8 (23.5-25)	12	2-8-11 (19)							
28.5-32			S-9: Dense, poorly-graded SAND (SP), fine to coarse-grained; trace, Silt; brown, wet	2	S-9 (28.5-32)	14	10-16-18 (34)		25.2				4	

Boring ended at 30' below ground surface and backfilled with auger cuttings and bentonite chips

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

- REMARKS**
1. Rig chatter at 17' BGS
 2. Approximately 8" of blowback in the hole
 3. Cave in at 23.5' BGS - no water



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 Brookfield, WI 53045
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BORING NUMBER AB-02

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/21/20 **COMPLETED** 4/21/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 745.6 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	745		Surface: Grassy Upper 12": Silty SAND (SM) TOPSOIL, dark brown, with rootlets		S-1 (1-2.5)	12	2-3-5 (8)	1.0		26.0	NP	21	NP	34
5	740		S-2: Medium dense, well-graded SAND with SILT (SW-SM), fine- to coarse-grained; some Gravel, fine to coarse; tanish brown, dry	1	S-2 (3.5-5)	13	8-13-15 (28)							
10	735		S-3: Medium dense, well-graded SAND with SILT (SW-SM), fine- to coarse-grained; some Gravel, fine to coarse; tanish brown, dry	2	S-3 (6-7.5)	15	7-12-10 (22)							
15	730		S-4: Medium dense, well-graded SAND with SILT (SW-SM), fine- to coarse-grained; some Gravel, fine to coarse; tanish brown, dry		S-4 (8.5-10)	12	7-9-6 (15)							
			S-5: Medium dense, well-graded SAND with SILT and GRAVEL (SW-SM), fine- to coarse-grained; tanish brown, dry		S-5 (11-12.5)	13	6-7-11 (18)							
			S-6: Medium dense, well-graded SAND with SILT and GRAVEL (SW-SM), fine- to coarse-grained; little Silt; tanish brown, dry		S-6 (13.5-15)	16	6-8-10 (18)		5.9	NP	NP	NP	10	
20			S-7: Upper 2": Medium dense, well-graded SAND with SILT and GRAVEL (SW-SM), fine- to coarse-grained; little Silt; tanish brown, dry Lower 16": Hard, lean CLAY (CL), low plasticity; trace Sand, fine; brownish gray, moist		S-7 (18.5-20)	18	10-9-11 (20)			15.6				
Boring ended at 20' below ground surface and backfilled with auger cuttings and bentonite chips														

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

REMARKS

1. Rig chatter at approximately 3' bgs.
2. Rig chatter at approximately 6' bgs.



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 Brookfield, WI 53045
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BORING NUMBER AB-03

PAGE 1 OF 1

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/21/20 **COMPLETED** 4/21/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 743.8 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
	740		S-1: TOPSOIL: Stiff, lean CLAY (CL), low plasticity; little Sand, fine to medium; trace Gravel, fine; trace Organics; brown, moist		S-1 (1-2.5)	12	1-2-2 (4)	1.5-2.0		19.6				
5			S-2: Upper 4": TOPSOIL: Stiff, lean CLAY (CL), low plasticity; little Sand, fine to medium; trace Gravel, fine; trace Organics; brown, moist Lower 12": Medium dense, well-graded SAND with SILT and GRAVEL (SW-SM), fine- to coarse-grained; tanish brown, dry		S-2 (3.5-5)	16	6-8-10 (18)	1.0						
			S-3: Medium dense, well-graded GRAVEL with SILT and SAND (GW-GM), fine- to coarse-grained; tannish brown, dry		S-3 (6-7.5)	16	6-13-11 (24)		4.9	NP	NP	NP	8	
	735		S-4: Medium dense, well-graded SAND with SILT (SW-SM), fine- to coarse-grained; some Gravel, fine to coarse; tannish brown, dry		S-4 (8.5-10)	15	4-7-8 (15)							
10			S-5: Medium dense, well-graded SAND with SILT (SW-SM), fine- to coarse-grained; some Gravel, fine to coarse; tannish brown, dry		S-5 (11-12.5)	16	9-11-10 (21)							
	730		S-6: Medium dense, well-graded SAND with SILT (SW-SM), fine- to coarse-grained; some Gravel, fine to coarse; tannish brown, dry		S-6 (13.5-15)	16	5-5-9 (14)							
15														
	725		S-7: Medium dense, well-graded SAND with SILT (SW-SM), fine- to coarse-grained; some Gravel, fine to coarse; tannish brown, wet	1	S-7 (18.5-20)	4	12-12-11 (23)							
20			Boring ended at 20' below ground surface and backfilled with auger cuttings and bentonite chips											

REMARKS

1. Rock fragment blocking tip of sampler.



GZA GeoEnvironmental, Inc.
 17975 West Sarah Lane, #100
 Brookfield, WI 53045
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BORING NUMBER AB-04

PAGE 1 OF 1

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/21/20 **COMPLETED** 4/21/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 744.8 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB
4/21/20	AD	17		10 Minutes

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
5	740		S-1: Upper 6": TOPSOIL: Stiff, lean CLAY (CL), low plasticity; little Sand, fine; trace Organics; brown, moist Lower 5": Loose, well-graded GRAVEL with SILT (GW-GM), fine- to coarse-grained; tan, dry S-2: Medium dense, well-graded SAND with SILT (SW-SM) fine- to coarse; some Gravel, fine to coarse; tan, dry		S-1 (1-2.5)	11	3-3-5 (8)	1.5						
			S-3: Medium dense, well-graded SAND with SILT and GRAVEL (SW-SM), fine- to coarse-grained; tan, dry		S-2 (3.5-5)	15	6-10-10 (20)	2						
			S-4: Dense, well-graded SAND with SILT and GRAVEL (SW-SM), fine- to coarse-grained; tan, dry		S-3 (6-7.5)	15	3-8-6 (14)							
10	735		S-5: Medium dense, poorly-graded GRAVEL with SILT and SAND (GP-GM), fine-grained; tan, dry	1	S-4 (8.5-10)	18	17-18-18 (36)							
			S-6: Dense, poorly-graded GRAVEL with SILT and SAND (GP-GM), fine-grained; reddish tan, dry		S-5 (11-12.5)	18	18-14-11 (25)		5.1	NP	NP	NP	12	
15	730		S-7: Upper 7": Medium dense, well-graded GRAVEL with SAND (GW), fine- to coarse-grained; trace Silt; reddish tan, dry Lower 7": Medium dense, well-graded GRAVEL (GW), fine- to coarse-grained; little Sand, fine to coarse; trace Silt; tanish brown, wet		S-6 (13.5-15)	18	6-18-18 (36)							
20	725		S-8: Upper 4": Medium dense, well-graded GRAVEL (GW), fine- to coarse-grained; little Sand, fine to coarse; trace Silt; tanish brown, wet Lower 8": Stiff, lean CLAY (CL), low plasticity; trace Sand, fine; brown/gray, wet		S-7 (18.5-20)	14	7-9-10 (19)	1.5						
25	720		S-9: Upper 6": Stiff, lean CLAY (CL), low plasticity; trace Sand, fine; brown/gray, wet Lower 10": Loose, poorly-graded SAND (SP), fine- to medium-grained; gray, wet		S-8 (23.5-25)	12	11-9-7 (16)	1.5-2.0						
30	715		Boring ended at 30' below ground surface and backfilled with auger cuttings and bentonite chips	2	S-9 (28.5-30)	16	5-3-4 (7)							

REMARKS
1. Rock chips present in sample. Possible cobbles. 2. Sample damaged by rock partially blocking tip of sampler.

GEOTECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ



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BORING NUMBER B-01

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/22/20 **COMPLETED** 4/22/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 752.1 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
750			S-1: TOPSOIL: Stiff, lean CLAY (CL), low plasticity; trace Gravel, fine; trace Silt; trace Organics; brown, moist		S-1 (1-2.5)	16	1-2-3 (5)	1.0-2.0						
5			S-2: Stiff, lean CLAY (CL), low plasticity; little Gravel, fine; trace Silt; brown, moist		S-2 (3.5-5)	7	1-2-5 (7)	1.0-2.0		26.5				
745			S-3: Upper 2": Stiff, lean CLAY (CL), low plasticity; little Gravel, fine; trace Silt; brown, moist Lower 9": Medium dense, well-graded GRAVEL (GW), fine to coarse-grained; with Sand, fine to coarse; little Silt; tan, moist		S-3 (6-7.5)	11	5-11-10 (21)	1.5						
10			S-4: Medium dense, Clayey SAND (SC), fine to coarse-grained; some Gravel, fine to coarse; trace Silt; tan, moist		S-4 (8.5-10)	10	9-11-10 (21)							
740			S-5: Very loose, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; tan, moist		S-5 (11-12.5)	10	1-2-1 (3)			8.5				9
15			S-6: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some Gravel, fine to coarse; tan, dry		S-6 (13.5-15)	11	3-8-10 (18)							
735			S-7: Very dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; with Gravel, fine to coarse; tan, dry		S-7 (18.5-20)	11	11-25-26 (50+)			4.2				8
20			S-8: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; with Gravel, fine to coarse; tan, wet		S-8 (23.5-25)	12	5-11-11 (22)							
730			S-9: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; trace Gravel, fine; tan, wet		S-9 (28.5-30)	12	4-4-7 (11)							
25														
725														
30														

Boring ended at 30' below ground surface and backfilled with auger cuttings and bentonite chips

2

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

- REMARKS**
1. Approximately 1-foot of blowback in the hole.
 2. Cave in at 20' BGS - no water.



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BORING NUMBER B-02

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/22/20 **COMPLETED** 4/22/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 758.1 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: 3-inches of Asphalt Concrete and approximately 9-inches of base course											
	755		S-1: Upper 10": FILL: Hard, lean CLAY (CL), low plasticity; little Gravel, fine; trace Sand, fine; gray, moist Lower 1": BURIED TOPSOIL: Very stiff, PEAT (PT); trace Sand, fine; black, moist	1	S-1 (1-2.5)	11	5-3-6 (9)	4.0-3.0						
5			S-2: FILL: Very loose, Clayey SAND (SC), fine to coarse-grained; trace Gravel, fine to coarse; white, gray, moist	2	S-2 (3.5-5)	10	1-1-2 (3)		31.7					27
			S-3: Loose, well-graded SAND (SW), fine to coarse-grained; little Gravel, fine; little Clay; brown to tan, dry to moist		S-3 (6-7.5)	15	1-3-5 (8)							
	750		S-4: Loose, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; tan, dry		S-4 (8.5-10)	12	3-4-6 (10)							
10			S-5: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; little Gravel, fine to coarse; tan, dry		S-5 (11-12.5)	15	5-7-7 (14)							
	745		S-6: Dense, poorly-graded GRAVEL with SILT and SAND (GP-GM), fine to coarse-grained; tan, dry	2	S-6 (13.5-15)	18	8-21-21 (42)		4.8	NP	NP	NP	8	
15			S-7: Dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some Gravel, fine to coarse; trace Rock fragments; tan, dry		S-7 (18.5-20)	14	10-19-22 (41)							
20			Boring ended at 20' below ground surface and backfilled with auger cuttings and bentonite chips											

REMARKS

- Boring offset 15' south due to close proximity to utilities
- Supplementary boring blind drilled to 2' bgs approximately 1' south of original boring location. Shelby tube sample taken from 2 to 4' bgs. 15" of recovery.
- Rig chatter at 13.5' BGS



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BORING NUMBER B-03

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/23/20 **COMPLETED** 4/23/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 760.7 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	760		Surface: Grassy											
			S-1: TOPSOIL: Stiff, sandy, lean CLAY (CL), low plasticity; trace Organics; brown to dark brown, moist		S-1 (1-2.5)	13	4-2-2 (4)	2.0						
5			S-2: TOPSOIL: Very stiff, sandy, lean CLAY (CL), low plasticity; trace Organics; trace Gravel, fine; brown to dark brown, moist		S-2 (3.5-5)	15	2-3-4 (7)	2.0-3.0		22.5	NP	26	NP	
	755		S-3: Upper 4": Very stiff, sandy lean CLAY (CL), low plasticity; trace Organics; trace Gravel, fine; brown to dark brown, moist		S-3 (6-7.5)	18	5-4-6 (10)	3.0						
			Lower 14": Loose, poorly-graded SAND (SP), fine to medium-grained; little to some Silt; tan, moist		S-4 (8.5-10)	18	6-6-4 (10)	2.5-1.0		19.0				
	750		S-4: Upper 14": Loose, well-graded SAND with SILT (SW-SM), fine to coarse-grained; trace Gravel, fine; tan, moist		S-5 (11-12.5)	16	5-12-11 (23)							
			Lower 4": Medium stiff, SILT (ML); little Sand, fine; tan, moist to wet		S-6 (13.-15)	18	9-9-10 (19)							
	745		S-5: Upper 10": Medium dense, well-graded SAND (SW), fine to coarse-grained; little Silt; tan, moist		S-7 (18.5-20)	16	4-11-18 (19)			5.6	NP	NP	NP	11
			Lower 6": Medium dense, clayey GRAVEL (GC), fine to coarse-grained; some Sand, fine to coarse; white and brown, moist		S-8 (23.5-25)	12	3-9-10 (19)							
	740		S-6: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some Gravel, fine to coarse; tan, moist		S-9 (28.5-30)	18	5-11-11 (22)	4.5+		15.3				
	735		S-7: Medium dense, well-graded GRAVEL with SILT and SAND (GW-GM), fine to coarse-grained; tan, moist											
			S-8: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some Gravel, fine to coarse; little Clayey seems; tan, moist											
	30		S-9: Hard, lean CLAY (CL), low plasticity; trace Gravel, fine; grayish brown, moist, but spoon tip was wet											

Boring ended at 30' below ground surface and backfilled with auger cuttings and bentonite chips

1

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

REMARKS
 1. Cave in at 25' BGS - no water



GZA GeoEnvironmental, Inc.
 17975 West Sarah Lane, #100
 Brookfield, WI 53045
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BORING NUMBER B-04

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/23/20 **COMPLETED** 4/23/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 763.8 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
	760		S-1: TOPSOIL: Stiff, sandy lean CLAY (CL), low plasticity; trace Gravel, fine; trace Organics; brown, moist to wet	1	S-1 (1-2.5)	12	2-4-4 (8)	2.0						
5			S-2: Upper 4": Medium dense, poorly-graded SAND (SP), fine to medium-grained; some Gravel, fine to coarse; trace Silt; light tan, moist Lower 10": Hard, SILT (ML), nonplastic; some Sand, fine; trace Gravel, fine; brown, moist		S-2 (3.5-5)	14	10-13-15 (28)	4.5+		11.0				60
			S-3: Dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; tan, moist		S-3 (6-7.5)	18	14-18-18 (36)							
10	755		S-4: Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; tan, moist		S-4 (8.5-10)	18	8-14-16 (30)			5.2				13
			S-5: Medium dense, poorly-graded SAND with SILT (SP-SM), fine to coarse-grained; tan, moist		S-5 (11-12.5)	17	4-12-12 (24)							
15	750		S-6: Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; tan, moist		S-6 (13.5-15)	18	5-10-11 (21)							
20	745		S-7: Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; tan, moist		S-7 (18.5-20)	15	4-9-13 (22)							

Boring ended at 20' below ground surface and backfilled with auger cuttings and bentonite chips

2

REMARKS

- Boring offset 10' north due to obstruction near surface
- Cave in at 16' BGS - no water



GZA GeoEnvironmental, Inc.
 17975 West Sarah Lane, #100
 Brookfield, WI 53045
 (262) 754-2560

BORING NUMBER B-05

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/22/20 **COMPLETED** 4/22/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 752.5 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GP

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy Upper 12": sandy lean CLAY (CL) TOPSOIL, dark brown (possible fill)		S-1 (1-2.5)	13	1-2-3 (5)	1.5						
750			S-1: TOPSOIL: Stiff, lean CLAY (CL), low plasticity; little Sand, fine; trace Organics; brown, moist (possible fill)											
5			S-2: Upper 4": Stiff, lean CLAY (CL), low plasticity; little Sand, fine; brown, moist Lower 11": Medium dense, well-graded SAND (SW), fine to coarse-grained; some Gravel, fine to coarse; trace Cobbles; trace Clay; tan, dry (possible fill)		S-2 (3.5-5)	15	8-11-9 (20)	1.5						
745			S-3: Upper 2": Medium dense, well-graded SAND (SW), fine to coarse-grained; some Gravel, fine to coarse; trace Cobbles; trace Clay; tan, dry (possible fill) Lower 16": Medium stiff, SILT (ML), nonplastic; trace Sand, fine; brown, moist		S-3 (6-7.5)	18	5-7-11 (18)			20.2				
10			S-4: Upper 6": Hard, lean CLAY (CL), low plasticity; brown, moist Lower 12": Hard, SILT (ML), nonplastic; brown, moist		S-4 (8.5-10)	18	4-12-14 (24)	4.5						
740			S-5: Upper 3": Stiff, lean CLAY (CL), low plasticity; brown, moist Lower 11": Very dense, well-graded SAND (SW), fine to coarse-grained; some Gravel, fine to coarse; tan, dry		S-5 (11-12.5)	14	16-28-24 (50+)	2.0						
15			S-6: Dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some Gravel, fine to coarse; tan, dry		S-6 (13.5-15)	14	13-18-18 (36)							
735														
20			S-7: Very dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some Gravel, fine to coarse; trace Rock fragments; tan, dry		S-7 (18.5-20)	12	14-25-26 (50+)							

Boring ended at 20' below ground surface and backfilled with auger cuttings and bentonite chips

1

REMARKS

1. Cave in at 11.5' below ground surface



GZA GeoEnvironmental, Inc.
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 Brookfield, WI 53045
 (262) 754-2560

BORING NUMBER B-06

PAGE 1 OF 1

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/22/20 **COMPLETED** 4/22/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 755.4 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	753		Surface: 2-inches of Asphalt Concrete											
4	750		S-1: Upper 4": Loose, well-graded SAND (SW), fine to coarse-grained; some Gravel, fine to coarse; little Silt; tan, dry (base course) Lower 9": Very stiff, lean CLAY (CL), low plasticity; little Sand, fine; trace Organics; dark brown, moist (Possible Buried Topsoil)		S-1 (1-2.5)	13	4-1-3 (4)	2.5		21.7				33
5	750		S-2: Stiff, lean CLAY (CL), low plasticity; some Sand, fine to coarse; brown, moist (Possible Fill)		S-2 (3.5-5)	12	1-1-2 (3)	1.5		21.7				33
10	745		S-3: Upper 10": Medium dense, well-graded SAND (SW), fine to coarse-grained; some Gravel, fine to coarse; trace Silt; brown, dry Lower 4": Hard, silty CLAY (CL-ML), low plasticity; trace Sand, fine; brown, moist		S-3 (6-7.5)	14	5-14-7 (21)	4.5						
10	745		S-4: Interbedded Medium dense, silty SAND (SM), fine to medium-grained; brown, moist AND		S-4 (8.5-10)	16	3-7-10 (17)	2.0-3.0						
10	745		Very stiff, SILT (ML); little to trace Sand, fine to medium; brown, moist		S-5 (11-12.5)	17	6-10-15 (25)							
15	740		S-6: No recovery	1	S-6 (13.5-15)	0	10-15-17 (32)							
20	735		S-7: Dense, well-graded GRAVEL with SILT and SAND (GW-GM), fine to coarse-grained; tan, dry	2	S-7 (18.5-20)	10	6-21-17 (38)		3.7		NP	NP	NP	8
25	730		S-8: Dense, well-graded GRAVEL with SILT and SAND (GW-GM), fine to coarse-grained; tan, dry		S-8 (23.5-25)	13	10-21-23 (44)							
30	730		S-9: Medium dense, well-graded GRAVEL with SILT and SAND (GW-GM), fine to coarse-grained; wet, tannish brown		S-9 (28.5-30)	8	4-13-16 (29)		8.0		NP	NP	NP	5
Boring ended at 30' below ground surface and backfilled with auger cuttings and bentonite chips														

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REMARKS	1. Rig chatter at 13' 2. Rig chatter at 17' 3. Cave in at 18.5' BGS - no water
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BORING NUMBER B-07

PAGE 1 OF 1

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/23/20 **COMPLETED** 4/23/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW/MBB **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 758.2 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
5	755		S-1: TOPSOIL: Very stiff, lean CLAY (CL), low plasticity; little Gravel, fine; little Sand, fine to coarse; trace Organics; brown, moist S-2: Upper 12": Stiff, lean CLAY (CL), low plasticity; little Gravel, fine; little Sand, fine to coarse; brown, moist Lower 3": Very loose, poorly-graded SAND (SP), fine to medium-grained; trace Silt; tan, moist S-3: Loose, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; trace Gravel, fine; tan, moist	1	S-1 (1-2.5)	12	5-5-6 (11)	3.0-3.5						
10	750		S-4: Upper 3": Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; trace Gravel, fine; tan, moist Lower 11": Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some to with Gravel, fine; tannish brown, moist		S-2 (3.5-5)	15	3-1-1 (2)	1.5		17.7				
15	745		S-5: Dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some to with Gravel, fine; tannish brown, moist		S-3 (6-7.5)	15	4-3-4 (7)							
20	740		S-6: Dense, well-graded GRAVEL with SILT and SAND (GW-GM), fine to coarse-grained; little Clayey intervals; white, brown, tan, moist		S-4 (8.5-10)	14	3-6-6 (12)							
25	735		S-7: Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; brown, moist	2	S-5 (11-12.5)	18	6-12-19 (31)			7.3				7
30	730		S-8: Upper 5": Stiff SILT (ML); little Sand, fine; brown, moist Lower 13": Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; brown, moist		S-6 (13.5-15)	18	17-22-18 (40)							
			S-9: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; tan, wet		S-7 (18.5-20)	16	6-6-7 (13)							
					S-8 (23.5-25)	18	9-12-13 (25)	2.0						
					S-9 (28.5-30)	11	4-8-10 (18)							

Boring ended at 30' below ground surface and backfilled with auger cuttings and bentonite chips

REMARKS

- Boring offset 15' south due to a bush in the way
- Rig chatter at 18.5-20' bgs



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BORING NUMBER B-08

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/23/20 **COMPLETED** 4/23/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 760.5 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	760		Surface: Grassy											
			S-1: TOPSOIL: Stiff, lean CLAY (CL), low plasticity; little Sand, fine; trace Gravel, fine; trace organics; brown to dark brown, moist		S-1 (1-2.5)	16	1-1-2 (3)	1.5-2.0						
			S-2: FILL: Medium stiff, lean CLAY (CL), low plasticity; little Sand, fine to coarse (increasing sand with depth); little Gravel, fine; trace Organics; brown to dark brown, moist		S-2 (3.5-5)	8	2-2-2 (4)	0.5-1.0	17.1	NP	17	NP		
5	755		S-3: FILL: Stiff, lean CLAY (CL), low plasticity; little Sand, fine to coarse ; little Gravel, fine; trace Organics; brown to dark brown, moist; rock in shoe		S-3 (6-6.9)	10	4-50/4-(50+)	1.5-2.0						
			S-4: Upper 3": FILL: Stiff, lean CLAY (CL), low plasticity; little Sand, fine to coarse ; little Gravel, fine; trace Organics; brown to dark brown, moist Lower 13": Medium dense silty SAND (SM), fine-grained; tan, moist		S-4 (8.5-10)	16	5-5-6 (11)	2.0						
10	750		S-5: Medium dense silty SAND (SM), fine-grained; tan, moist		S-5 (11-12.5)	16	4-5-6 (11)		7.3				39	
			S-6: Upper 7": Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; trace Gravel, fine; tan, moist Lower 8": Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; tan, moist		S-6 (13.5-15)	15	4-9-7 (16)							

Boring ended at 15' below ground surface and backfilled with auger cuttings and bentonite chips

1

REMARKS
 1. Cave in at 11' BGS - no water

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BORING NUMBER B-09

PAGE 1 OF 1

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/21/20 **COMPLETED** 4/21/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 752.4 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
750			S-1: TOPSOIL: Stiff to very stiff, silty CLAY (CL-ML), low plasticity; little Sand, fine; trace Organics; brown, moist		S-1 (1-2.5)	11	2-3-3 (6)	1-2.5						
5			S-2: Medium dense, well-graded SAND (SW), fine to coarse-grained; with Gravel, fine to coarse; little Silt; tan and brown, moist (possible fill)		S-2 (3.5-5)	16	4-9-11 (20)	2.0						
745			S-3: Dense, well-graded GRAVEL (GW), fine to coarse-grained; with Sand, fine to coarse; rock fragments; tan and brown, dry		S-3 (6-7.5)	16	13-16-26 (42)							
10			S-4: Upper 2": Medium dense, well-graded GRAVEL (GW), fine to coarse-grained; with Sand, fine to coarse; tan and brown, dry Lower 13": Medium stiff, SILT (ML), nonplastic; light brown, wet		S-4 (8.5-10)	15	10-10-12 (22)	0.5-1.0						
740			S-5: Upper 3": Medium stiff, SILT (ML), nonplastic; light brown, wet Lower 15": Very stiff, lean CLAY (CL), low plasticity; silty seams; brownish gray, moist	1	S-5 (11-12.5)	18	3-5-9 (14)	0.5-3.0						
15			S-6: Very stiff, lean CLAY (CL), low plasticity; Silty seams; brownish gray, moist		S-6 (13.5-15)	18	2-2-2 (4)	1.5-3.0	39.8	32	19	13		
735			S-7: Upper 4": Very stiff, lean CLAY (CL), low plasticity; Silty seams; brownish gray, moist Lower 14": Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; tan, moist		S-7 (18.5-20)	18	5-11-13 (24)	3.0						
20			S-8: Upper 3": Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; tan, moist Middle 12": Medium stiff, SILT (ML), nonplastic; brown, wet Lower 3": Very stiff, lean CLAY (CL), low plasticity; little Sand, medium to coarse; brown, moist		S-8 (23.5-25)	18	6-11-11 (22)	0.5-2.0						
730			S-9: Upper 10": Dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; tan, wet Lower 4": Dense, well-graded GRAVEL with SILT and SAND (GW-GM), fine to coarse-grained; tan, wet		S-9 (28.5-30)	14	3-13-18 (31)							
725			Boring ended at 30' below ground surface and backfilled with auger cuttings and bentonite chips											

REMARKS
 1. Supplementary boring blind drilled to 10.5' bgs approximately 1' east of original boring location. Shelby tube sample taken from 10.5 to 12.5' bgs. 23" of recovery. Tube was damaged at the bottom.

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BORING NUMBER B-10

PAGE 1 OF 1

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/22/20 **COMPLETED** 4/22/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY MBB **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 757 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
755			S-1: TOPSOIL: Soft to medium stiff, lean CLAY (CL), low plasticity; little Sand, medium to coarse; trace Organics; brown, moist		S-1 (1-2.5)	13	5-2-3 (5)	0.25-1.0						
5			S-2: Upper 5": TOPSOIL: Very stiff, lean CLAY (CL), low plasticity; little Sand, medium to coarse; trace Organics; brown, moist Lower 11": Medium dense, well-graded SAND (SW), fine to coarse-grained; some Gravel, fine to coarse; tan, dry		S-2 (3.5-5)	16	2-3-8 (11)	3.0						
750			S-3: Medium dense, silty GRAVEL with SAND (GM), fine to coarse-grained; tan, dry		S-3 (6-7.5)	10	6-12-11 (23)			4.9	NP	NP	NP	13
10			S-4: Dense, silty GRAVEL with SAND (GM), fine to coarse-grained; tan, dry	1	S-4 (8.5-10)	18	10-18-14 (32)							
745			S-5: Interbedded Stiff, lean CLAY (CL), low plasticity; brown, moist AND stiff, SILT (ML); brown, moist	2	S-5 (11-12.5)	16	3-8-12 (20)	1.5		21.4				
15			S-6: Interbedded Very stiff, lean CLAY (CL), low plasticity; brownish gray, moist AND stiff, SILT (ML), nonplastic; brownish gray, moist		S-6 (13.5-15)	16	3-6-11 (17)	3.0-1.5						
740			S-7: Upper 11": Interbedded Very stiff, lean CLAY (CL), low plasticity; brownish gray, moist AND stiff, SILT (ML); brownish gray, moist Lower 4": Medium dense, poorly-graded SAND (SP), fine to medium-grained; trace Silt; brown, dry		S-7 (18.5-20)	15	3-10-10 (20)	3.0-1.5						
20			Boring ended at 20' below ground surface and backfilled with auger cuttings and bentonite chips	3										

REMARKS	1. Rig chatter at 8.5-10' 2. Rig chatter at 11-12.5' 3. Cave in at 17' BGS - water at 16.5' BGS
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BORING NUMBER B-11

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CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/23/20 **COMPLETED** 4/23/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY MBB **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 756.6 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
755			S-1: TOPSOIL: Soft to stiff, lean CLAY (CL), low plasticity; trace Sand, fine; trace Gravel, fine; trace Organics; brown, moist		S-1 (1-2.5)	15	1-2-3 (5)	0.5-2.0						
5			S-2: Upper 5": TOPSOIL: Stiff, lean CLAY (CL), low plasticity; trace Sand, fine; trace Gravel, fine; trace Organics; brown, moist Lower 8": Loose, Clayey SAND (SC), fine-grained; trace Silt; brown, moist		S-2 (3.5-5)	13	2-2-2 (4)							
750			S-3: Loose, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; brown, moist		S-3 (6-7.5)	16	1-3-3 (6)							
10			S-4: Upper 5": Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; brown, moist Lower 9": Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some Gravel, fine to coarse; tan, dry		S-4 (8.5-10)	14	3-11-7 (18)							
745			S-5: Dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; with Gravel, fine to coarse; tan, dry; rock in shoe	1	S-5 (11-12.5)	14	10-20-15 (35)							
15			S-6: Medium dense, silty SAND (SM), fine to medium-grained; brown, moist; rock in shoe	2	S-6 (13.5-15)	1	7-10-11 (21)							
740			S-7: Upper 10": Stiff, Clayey SAND (SC), fine to coarse-grained; some Silt; brown, wet Lower 8": Very stiff, SILT (ML), nonplastic; brown, wet	3	S-7 (18.5-20)	18	6-6-9 (15)	1.0-2.5		21.1				
735			S-8: Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; little Gravel, fine to coarse; brown, moist		S-8 (23.5-25)	18	8-12-13 (25)							
730			S-9: Medium dense, silty SAND (SM), fine to medium-grained; brown, wet		S-9 (28.5-30)	15	6-10-12 (22)							
30			Boring ended at 30' below ground surface and backfilled with auger cuttings and bentonite chips											

- REMARKS**
- Rig chatter at 11-12.5'
 - Rig chatter at 13.5-15'
 - Rig chatter at 18.5-20'
 - Cave in at 18.5' BGS - water at 14' BGS



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BORING NUMBER B-12

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/24/20 **COMPLETED** 4/24/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 761.1 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)	
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
0			Surface: Grassy												
760			S-1: Very stiff, lean CLAY (CL), low plasticity; trace Gravel, fine; trace Sand, fine; brown, moist		S-1 (1-2.5)	14	2-2-2 (4)	2.5-3.0							
			S-2: Very stiff, lean CLAY (CL), low plasticity; little to trace Sand, fine, increasing towards bottom of sample; trace Gravel, fine brown, moist		S-2 (3.5-5)	11	3-2-4 (6)	3-3.5		20.3				74	
5			S-3: Upper 2": Very stiff, sandy lean CLAY (CL), low plasticity; brown, moist Lower 3": Medium dense, well-graded GRAVEL (GW), fine to coarse-grained; some Sand, fine to coarse; rock fragments present; trace Silt; tan, dry		S-3 (6-7.5)	5	7-10-7 (17)	3.0							
755			S-4: Medium dense, silty SAND (SM), fine to coarse-grained; with Gravel, fine to coarse; little clayey chunks; dark tan, moist to dry		S-4 (8.5-10)	14	4-6-6 (12)								
10			S-5: Loose, silty SAND (SM), fine to coarse-grained; some Gravel, fine to coarse; brownish tan, moist		S-5 (11-12.5)	18	6-5-5 (10)			7.0	NP	NP	NP	13	
750			S-6: Loose, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some Gravel, fine to coarse; little Clayey pockets; trace Silt; brownish tan, moist		S-6 (13.5-15)	15	3-4-6 (10)								
15			Boring ended at 15' below ground surface and backfilled with auger cuttings and bentonite chips												

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REMARKS
 1. Cave in at 10.5' BGS - no water



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BORING NUMBER B-13

PAGE 1 OF 1

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/22/20 **COMPLETED** 4/22/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW/MBB **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 753.6 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
1-5	750		S-1: Upper 11": TOPSOIL: Stiff to very stiff, lean CLAY (CL), low plasticity; trace Gravel, fine; trace Sand, fine; trace Organics; brown, moist Lower 5": Loose, well-graded SAND (SW), fine to coarse-grained; little Gravel, fine; tan, moist S-2: Loose, silty SAND (SM), fine to coarse-grained; little Gravel, fine; tan, moist		S-1 (1-2.5) S-2 (3.5-5)	16 12	2-2-2 (4) 4-4-6 (10)	1.0-2.5						
5-7	745		S-3: Dense, silty SAND (SM), fine to coarse-grained; some Gravel, fine to coarse; tan, dry		S-3 (6-7.5)	16	8-16-16 (32)		6.4	NP	NP	NP	18	
7-11	740		S-4: Dense, silty SAND (SM), fine to coarse-grained; with Gravel, fine to coarse; gray, dry		S-4 (8.5-10)	14	11-26-20 (46)							
11-15	735		S-5: Very stiff to hard, SILT (ML), nonplastic; tan to red, moist (clayey seam in center)	1	S-5 (11-12.5)	16	4-6-11 (17)	3.0-4.5						
15-20	730		S-6: Medium dense, Silty SAND (SM), fine-grained; tan, wet		S-6 (13.5-15)	18	4-13-15 (28)							
20-31	725		S-7: Upper 6": Medium dense, Silty SAND (SM), fine-grained; brown, wet transitioning to very stiff SILT (ML); brown, wet Lower 11": Very stiff, lean CLAY (CL), low plasticity; gray, wet S-8: Upper 5": Soft, lean CLAY (CL), low plasticity; gray, wet Lower 13": Soft, SILT (ML), nonplastic; little Sand, fine; gray, wet		S-7 (18.5-20) S-8 (23.5-25)	17 18	6-5-8 (13) 7-13-11 (24)	2.0-3.5 0.5		19.4			50	
31-30			S-9: Upper 3": Very stiff, lean CLAY (CL), low plasticity; trace Silt; gray, moist Lower 12": Very soft, SILT (ML), nonplastic; little Sand, fine; gray, wet Boring ended at 30' below ground surface and backfilled with auger cuttings and bentonite chips	2	S-9 (28.5-30)	15	5-8-8 (16)	3.0-0.25						

REMARKS	1. Rig chatter at 11.5' BGS 2. Cave in at 15' below ground surface
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 17975 West Sarah Lane, #100
 Brookfield, WI 53045
 (262) 754-2560

BORING NUMBER B-14

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/23/20 **COMPLETED** 4/23/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 754.0 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
			S-1: Upper 10": TOPSOIL: Very stiff, sandy, lean CLAY (CL), low plasticity; trace Organics; trace Gravel, fine, brown, moist Lower 2": Loose, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some Gravel, fine to coarse; tan, moist		S-1 (1-2.5)	12	3-2-3 (5)	3.5						
	750		S-2: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; some to with Gravel, fine to coarse; tanish brown, moist		S-2 (3.5-5)	14	4-8-11 (19)							
5			S-3: Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; with Gravel, fine to coarse; tanish brown, moist; clay in shoe		S-3 (6-7.5)	16	13-21-25 (46)							
	745		S-4: Dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; with Gravel, fine to coarse; tanish brown, moist		S-4 (8.5-10)	15	9-11-8 (19)							
10			S-5: Very stiff, sandy, lean CLAY (CL), low plasticity; brown, moist; sample was disturbed due to spoon pushing stone		S-5 (11-12.5)	10	7-11-16 (27)	3.0						
	740		S-6: Hard, lean CLAY (CL), low plasticity; little Sand, fine; brown transitioning to brownish gray, moist		S-6 (13.5-15)	16	4-7-9 (16)	4.5						
15			Boring ended at 15' below ground surface and backfilled with auger cuttings and bentonite chips											

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ

REMARKS
 1. Cave in at 11.5' BGS - no water



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BORING NUMBER B-15

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/24/20 **COMPLETED** 4/24/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 756.0 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

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DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
755			S-1: Stiff to very stiff, sandy, lean CLAY (CL), low plasticity; trace Gravel, fine; trace Organics; brown, moist (Topsoil)		S-1 (1-2.5)	18	2-2-3 (5)	1.5-3.0						
			S-2: Stiff to very stiff, sandy, lean CLAY (CL), low plasticity; trace Gravel, fine; trace Organics; brown, moist (Topsoil)		S-2 (3.5-5)	14	1-2-2 (4)	2.0		17.0				
5			S-3: Loose, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; tan, moist		S-3 (6-7.5)	16	1-3-3 (6)							
			S-4: Medium dense, poorly-graded SAND with SILT (SP-SM), fine to medium-grained; tan, moist		S-4 (8.5-10)	16	4-6-6 (12)			9.3				10
10			S-5: Poor recovery likely due to rock in spoon. Material in spoon was likely blowback, but is same material as above		S-5 (11-12.5)	3	7-11-14 (25)							
			S-6: Very stiff SILT (ML); trace Gravel, fine; brown, transitioning to gray, moist		S-6 (13.5-15)	16	4-19-21 (40)	2.5-3.0						
15			Boring ended at 15' below ground surface and backfilled with auger cuttings and bentonite chips											

R E M A R K S	1. Cave in at 11.5' BGS - no water
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BORING NUMBER B-16

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/23/20 **COMPLETED** 4/23/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 752.4 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB

GROUND WATER LEVELS (ft, bgs):

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)	
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
0			Surface: Grassy												
750			S-1: Very stiff, sandy, lean CLAY (CL), low plasticity; trace Gravel, fine; trace Organics; brown, moist (topsoil)		S-1 (1-2.5)	10	1-2-2 (4)	2.5							
5			S-2: Upper 3": Stiff, sandy, lean CLAY (CL), low plasticity; trace Gravel, fine; trace Organics; brown, moist (topsoil) Lower 12": Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; with Gravel, fine to coarse; tan, dry to moist		S-2 (3.5-5)	15	8-12-18 (30)	1.5							
745			S-3: Very dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; with Gravel, fine to coarse; possible Cobbles, rock fragments in spoon; tan, dry to moist		S-3 (6-7.5)	8	9-40-17 (50+)								
10			S-4: Upper 4": Medium dense, well-graded SAND with SILT (SW-SM), fine to coarse-grained; with Gravel, fine to coarse; tan, dry to moist Lower 14": Very stiff, sandy, lean CLAY (CL), low plasticity; trace Gravel, fine; brown, moist; seam of Stiff SILT (ML); brown, moist		S-4 (8.5-10)	18	7-4-8 (12)	3.5 - 1.5							
740			S-5: Very stiff, lean CLAY (CL), low plasticity; trace Sand, fine; trace Gravel, fine; seams of softer Silt (1.5 pocket pen); brown, moist		S-5 (11-12.5)	18	5-7-8 (15)	2.0 - 4.5		29.4					
15			S-6: Upper 15": Very stiff, lean CLAY (CL), low plasticity; gray, brown, moist Lower 3": Medium stiff SILT (ML); gray, brown, moist		S-6 (13.5-15)	18	3-4-9 (13)	3.5- 2.5, 0.5							
735			S-7: Very stiff, lean CLAY (CL), low plasticity; gray, brown, moist; seams of Silt		S-7 (18.5-20)	18	3-5-4 (9)	3.5		22.1					
20			Boring ended at 20' below ground surface and backfilled with auger cuttings and bentonite chips												

REMARKS
 1. Cave in at 14.5' BGS - no water

GEO TECH WITH REMARKS AND ELEV - GINT STD US LAB.GDT - 6/3/20 14:27 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ



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BORING NUMBER EB-01

CLIENT Mandel Group
PROJECT NUMBER 20.0156624.00
DATE STARTED 4/21/20 **COMPLETED** 4/21/20
DRILLING CONTRACTOR GeoServe
DRILLING METHOD HSA
LOGGED BY AJW **CHECKED BY** JDG
DRILL RIG Geoprobe 7822DT

PROJECT NAME School Sisters of Notre Dame
PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI
GROUND ELEVATION 743.3 ft. **HOLE SIZE** 4-1/4" inches

DATE	TIME	DEPTH	CASING	STAB
4/21/20	AD	18		10 Minutes

DEPTH (ft)	Elevation (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS	SAMPLE TYPE NUMBER (Depth Interval)	RECOVERY (inches)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			Surface: Grassy											
5	740		S-1: TOPSOIL: Medium stiff, sandy SILT (ML), low plasticity; little Clay; trace Gravel, fine; trace Organics; brown, moist S-2: Upper 6": Medium stiff, sandy SILT (ML), low plasticity; little Clay; trace Gravel, fine; trace Organics; brown, moist Lower 12": Medium dense, well-graded SAND (SW) fine- to coarse; some Gravel, fine to coarse; trace Silt; brown to tan, dry S-3: Medium dense, well-graded SAND with SILT (SW-SM) fine- to coarse; some Gravel, fine to coarse; dark tan to brown, dry		S-1 (1-2.5)	9	1-2-2 (4)	1.0						
10	735		S-4: Medium dense, well-graded SAND with SILT (SW-SM) fine- to coarse; little Gravel, fine to coarse; brown to dark tan, dry		S-2 (3.5-5)	14	10-11-12 (23)	2.0						
15	730		S-5: Medium dense, well-graded SAND with SILT and GRAVEL (SW-SM), fine- to coarse-grained; trace to little Silt; brown and tan, dry		S-3 (6-7.5)	14	5-11-10 (21)							
15	730		S-6: Medium dense, well-graded GRAVEL with SILT and SAND (GW-GM), fine- to coarse-grained; brown and tan, dry	1	S-4 (8.5-10)	11	10-14-10 (24)			4.6	NP	NP	NP	9
20	725		S-7: Medium dense, well-graded GRAVEL with SILT and SAND (GW-GM), fine- to coarse-grained; brown, wet		S-5 (11-12.5)	12	14-11-10 (21)							
25	720		S-8: Hard, silty CLAY (CL-ML), low plasticity; trace to little Sand, fine; grayish brown, wet -Multiple silty seams present in sample.		S-6 (13.5-15)	15	12-14-15 (29)							
30	715		S-9: Hard, silty CLAY (CL-ML), low plasticity; trace to little Sand, fine; grayish brown, wet	2	S-7 (18.5-20)	9	6-7-11 (18)							
30	715		S-9: Hard, silty CLAY (CL-ML), low plasticity; trace to little Sand, fine; grayish brown, wet		S-8 (23.5-25)	14	7-6-9 (15)	4.0						
30	715		S-9: Hard, silty CLAY (CL-ML), low plasticity; trace to little Sand, fine; grayish brown, wet		S-9 (28.5-30)	4	15-38-45 (50+)	4.0						

Boring ended at 30' below ground surface and backfilled with auger cuttings and bentonite chips

- REMARKS**
1. Rock chips present in sampler. Possible cobbles.
 2. High blow counts likely due to rock blocking sampler.

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APPENDIX C

LABORATORY TESTING RESULTS



GZA GeoEnvironmental, Inc.
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 Brookfield, WI 53045
 (262) 754-2560

TABULATION OF LABORATORY DATA

CLIENT Mandel Group

PROJECT NAME School Sisters of Notre Dame

PROJECT NUMBER 20.0156624.00

PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI

Boring Number	Sample Number	Depth (ft)	Natural Moisture %	Dry Unit Weight (pcf)	Sieve Data: Percent Passing By Weight					Atterberg Limits			USCS Classification	Unconfined Compress Strength (psf)
					3/4"	No. 4	No. 10	*No. 40	No. 200	LL	PL	PI		
AB-01	S-3	6-7.5	5.4			88	75	37	10	NP	NP	NP	SW-SM	
AB-01	S-9	28.5-32	25.2						4					
AB-02	S-1	1-2.5	26.0						34	NP	21	NP	SM	
AB-02	S-6	13.5-15	5.9		100	84	71	25	10	NP	NP	NP	SW-SM	
AB-02	S-7	18.5-20	15.6											
AB-03	S-1	1-2.5	19.6											
AB-03	S-3	6-7.5	4.9		81	46	34	16	8	NP	NP	NP	GW-GM	
AB-04	S-5	11-12.5	5.1		78	49	35	19	12	NP	NP	NP	GP-GM	
B-01	S-2	3.5-5	26.5											
B-01	S-5	11-12.5	8.5						9					
B-01	S-7	18.5-20	4.2						8					
B-02	S-2	3.5-5	31.7						27					
B-02	S-6	13.5-15	4.8		73	47	40	18	8	NP	NP	NP	GP-GM	
B-03	S-2	3.5-5	22.5							NP	26	NP		
B-03	S-4	8.5-10	19.0											
B-03	S-7	18.5-20	5.6		93	67	51	22	11	NP	NP	NP	SW-SM	
B-03	S-9	28.5-30	15.3											
B-04	S-2	3.5-5	11.0						60					
B-04	S-4	8.5-10	5.2						13					
B-05	S-3	6-7.5	20.2											
B-06	S-2	3.5-5	21.7						33					
B-06	S-7	18.5-20	3.7		78	50	37	19	8	NP	NP	NP	GW-GM	
B-06	S-9	28.5-30	8.0		89	48	30	19	5	NP	NP	NP	GW	
B-07	S-2	3.5-5	17.7											
B-07	S-5	11-12.5	7.3						7					
B-08	S-2	3.5-5	17.1							NP	17	NP		

GZA LAB SUMMARY - GINT STD US LAB.GDT - 6/2/20 11:51 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ



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 17975 West Sarah Lane, #100
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 (262) 754-2560

TABULATION OF LABORATORY DATA

CLIENT Mandel Group

PROJECT NAME School Sisters of Notre Dame

PROJECT NUMBER 20.0156624.00

PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI

Boring Number	Sample Number	Depth (ft)	Natural Moisture %	Dry Unit Weight (pcf)	Sieve Data: Percent Passing By Weight					Atterberg Limits			USCS Classification	Unconfined Compress Strength (psf)
					3/4"	No. 4	No. 10	*No. 40	No. 200	LL	PL	PI		
B-08	S-5	11-12.5	7.3						39					
B-09	S-6	13.5-15	39.8							32	19	13		
B-10	S-3	6-7.5	4.9		86	52	42	25	13	NP	NP	NP	GM	
B-10	S-5	11-12.5	21.4											
B-11	S-7	18.5-20	21.1											
B-12	S-5	11-12.5	7.0		100	87	73	30	13	NP	NP	NP	SM	
B-13	S-3	6-7.5	6.4		94	68	54	38	18	NP	NP	NP	SM	
B-13		28.5-30												
B-15	S-2	3.5-5	17.0											
B-15	S-4	8.5-10	9.3						10					
B-16	S-5	11-12.5	29.4											
B-16	S-7	18.5-20	22.1											
EB-01	S-6	13.5-15	4.6		70	46	35	17	9	NP	NP	NP	GW-GM	

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Maximum Values:	39.8		100	88	75	38	74	32	26					
Minimum Values:	3.7		70	46	30	16	4	0	0					
Average Value:	14.7		86	61	48	24	20	2	5					
Number of Tests Performed:	40	0	11	12	12	12	25	16	16	16				0

GZA LAB SUMMARY - GINT STD US LAB.GDT - 6/2/20 11:51 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ



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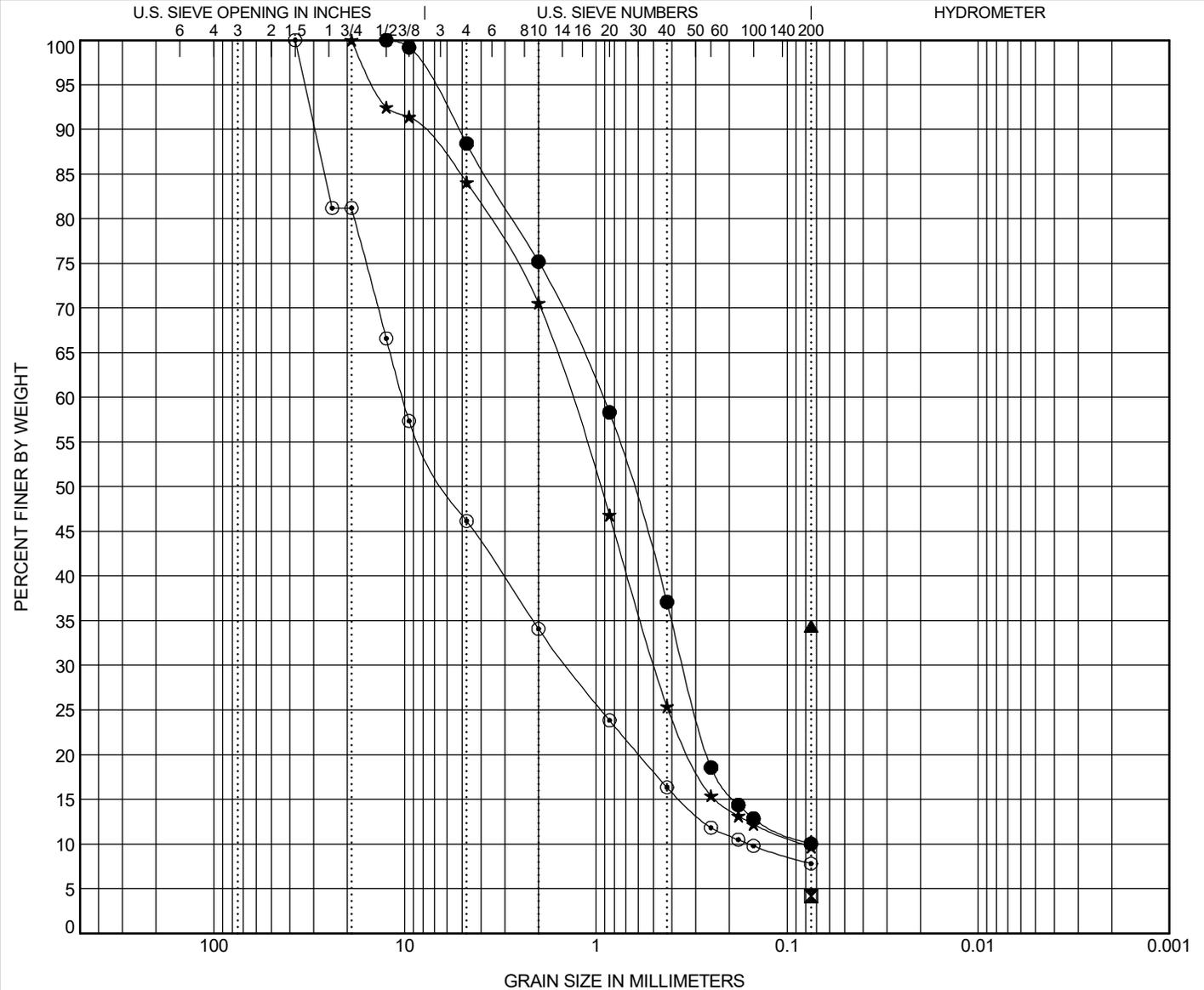
GRAIN SIZE DISTRIBUTION

CLIENT Mandel Group

PROJECT NAME School Sisters of Notre Dame

PROJECT NUMBER 20.0156624.00

PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● AB-01	6.0	WELL-GRADED SAND with SILT(SW-SM)					NP	NP	NP	1.74	12.39
☒ AB-01	28.5										
▲ AB-02	1.0	SILTY SAND(SM)					NP	21	NP		
★ AB-02	13.5	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)					NP	NP	NP	2.18	16.68
◎ AB-03	6.0	WELL-GRADED GRAVEL with SILT and SAND(GW-GM)					NP	NP	NP	1.24	64.62
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● AB-01	6.0	12.5	0.926	0.347		11.6	78.4	10.0			
☒ AB-01	28.5	0.075						4.1			
▲ AB-02	1.0	0.075						34.4			
★ AB-02	13.5	19	1.366	0.493	0.082	15.9	74.4	9.7			
◎ AB-03	6.0	37.5	10.276	1.423	0.159	53.8	38.4	7.8			

GRAIN SIZE - GINT STD US LAB.GDT - 6/2/20 11:53 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ



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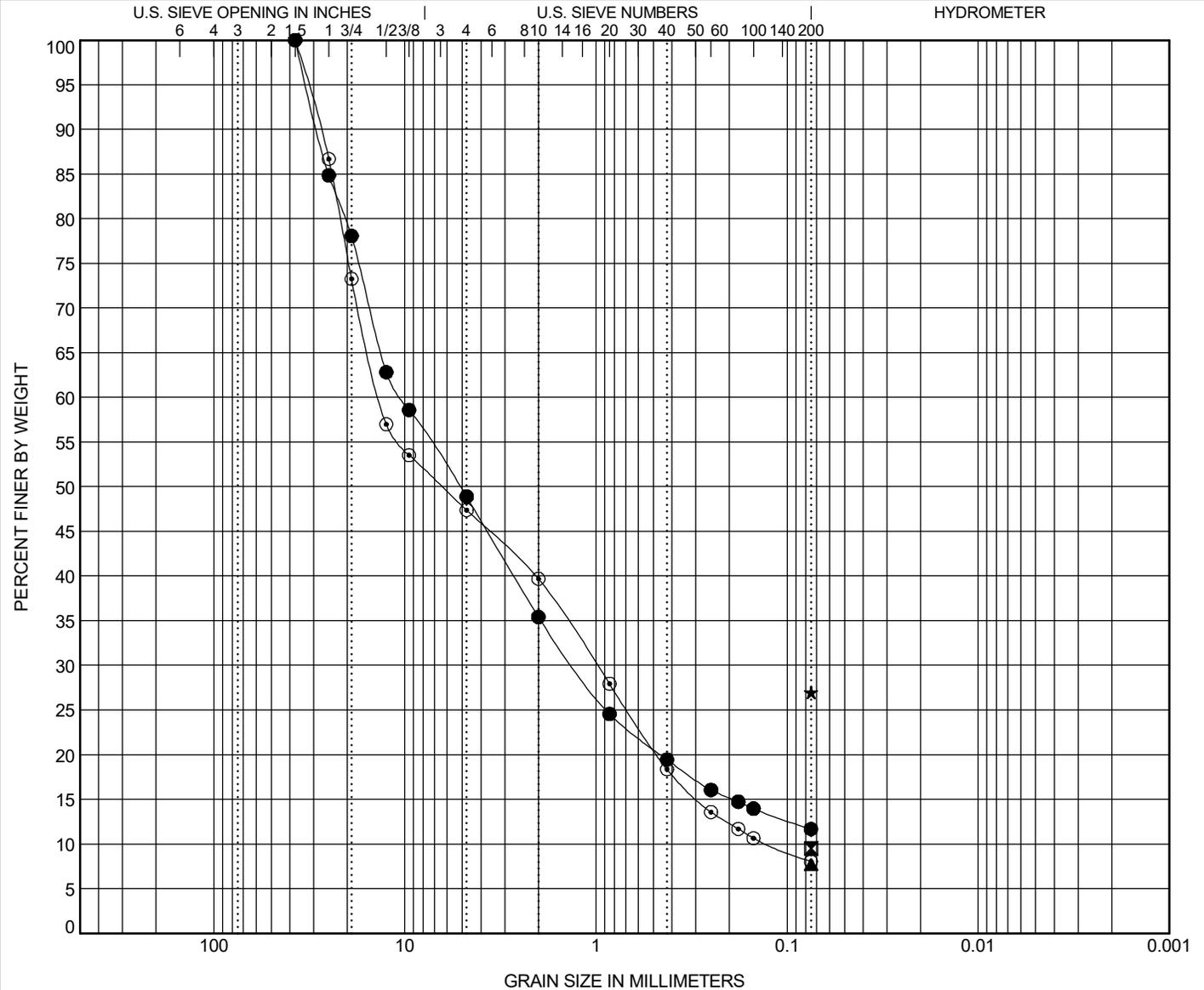
GRAIN SIZE DISTRIBUTION

CLIENT Mandel Group

PROJECT NAME School Sisters of Notre Dame

PROJECT NUMBER 20.0156624.00

PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● AB-04	11.0	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)					NP	NP	NP	3.61	229.46
☒ B-01	11.0										
▲ B-01	18.5										
★ B-02	3.5										
◎ B-02	13.5	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)					NP	NP	NP	0.57	106.78
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● AB-04	11.0	37.5	10.413	1.306		51.1	37.2	11.7			
☒ B-01	11.0	0.075						9.5			
▲ B-01	18.5	0.075						7.7			
★ B-02	3.5	0.075						26.9			
◎ B-02	13.5	37.5	13.509	0.988	0.127	52.6	39.3	8.0			

GRAIN SIZE - GINT STD. US LAB. GDT. - 6/2/20 11:53 - J:\GEO\TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ



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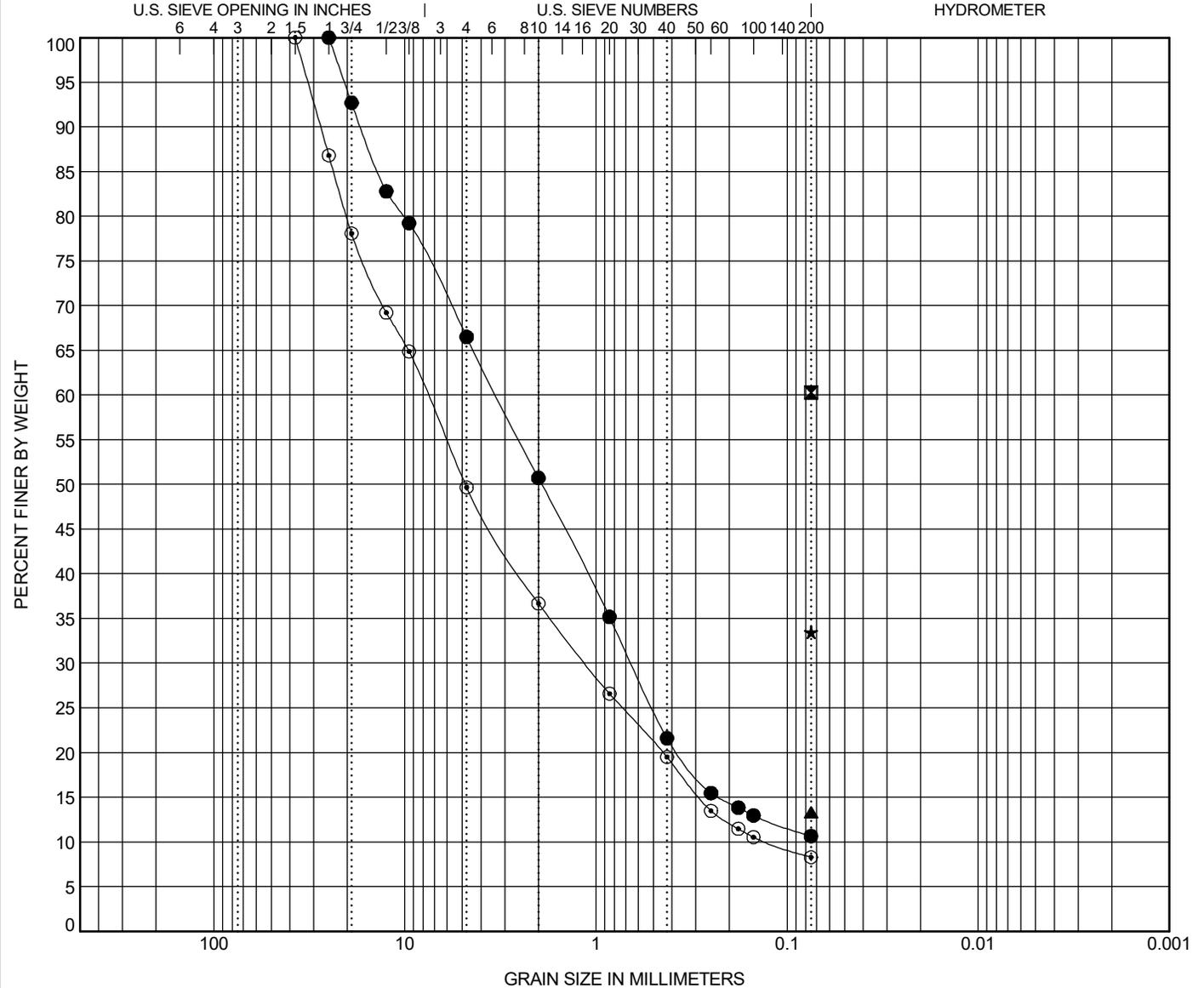
GRAIN SIZE DISTRIBUTION

CLIENT Mandel Group

PROJECT NAME School Sisters of Notre Dame

PROJECT NUMBER 20.0156624.00

PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● B-03	18.5	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)					NP	NP	NP	2.07	53.84
☒ B-04	3.5										
▲ B-04	8.5										
★ B-06	3.5										
◎ B-06	18.5	WELL-GRADED GRAVEL with SILT and SAND(GW-GM)					NP	NP	NP	1.33	59.64
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● B-03	18.5	25	3.326	0.653		33.5	55.9	10.6			
☒ B-04	3.5	0.075						60.3			
▲ B-04	8.5	0.075						13.3			
★ B-06	3.5	0.075						33.4			
◎ B-06	18.5	37.5	7.609	1.136	0.128	50.3	41.4	8.3			

GRAIN SIZE - GINT STD. US LAB. GDT. - 6/2/20 11:53 - J:\GEO TECH PROJECTS\GINT PROJECT DATABASES\20.0156624.00 SCHOOL SISTERS OF NOTRE DAME (APRIL 2020).GPJ



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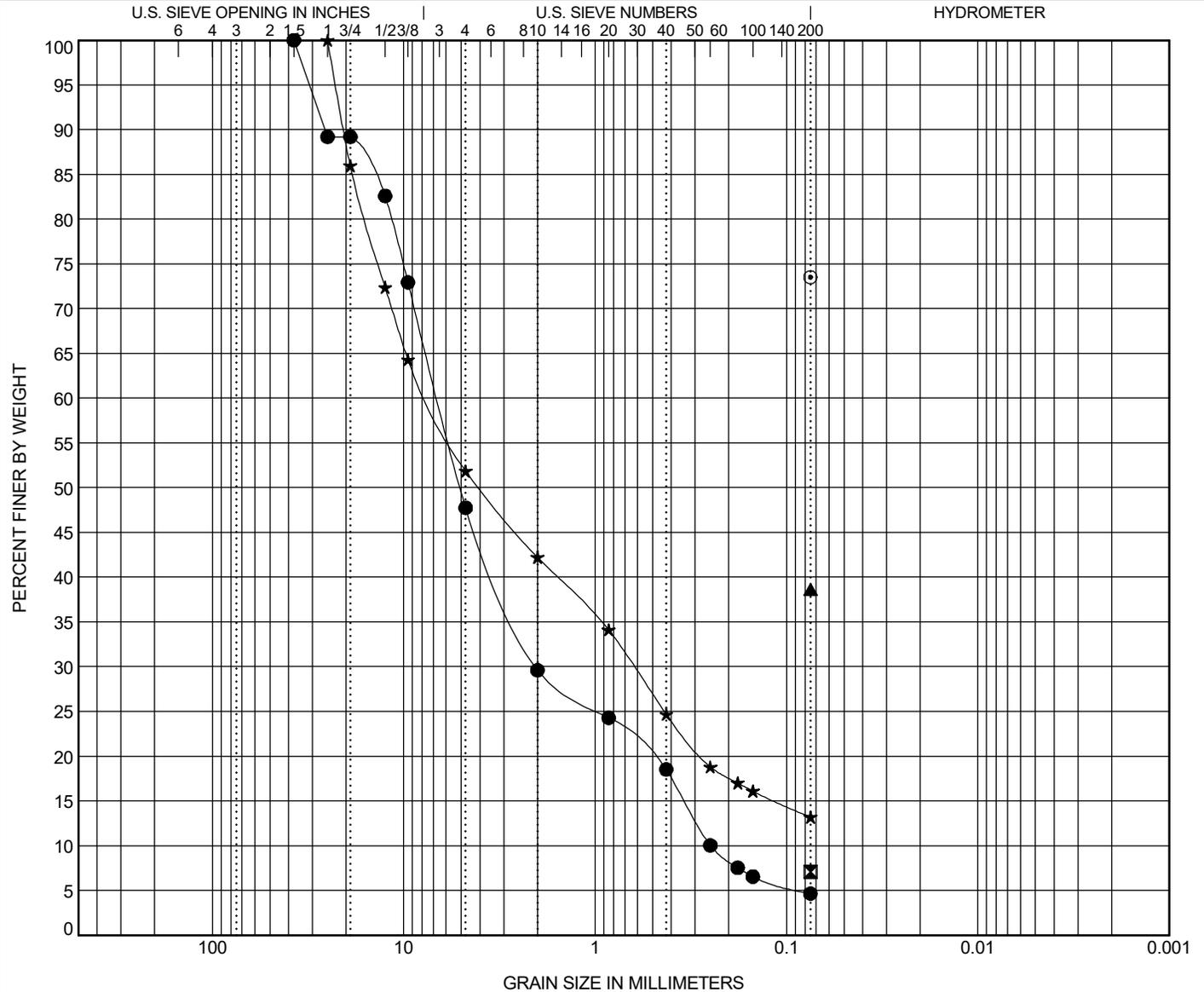
GRAIN SIZE DISTRIBUTION

CLIENT Mandel Group

PROJECT NAME School Sisters of Notre Dame

PROJECT NUMBER 20.0156624.00

PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● B-06	28.5	WELL-GRADED GRAVEL with SAND(GW)					NP	NP	NP	2.51	26.70
☒ B-07	11.0										
▲ B-08	11.0										
★ B-10	6.0	SILTY GRAVEL with SAND(GM)					NP	NP	NP		
◎ B-12	3.5										
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● B-06	28.5	37.5	6.655	2.039	0.249	52.3	43.1	4.6			
☒ B-07	11.0	0.075						7.0			
▲ B-08	11.0	0.075						38.6			
★ B-10	6.0	25	7.475	0.628		48.1	38.7	13.2			
◎ B-12	3.5	0.075						73.5			

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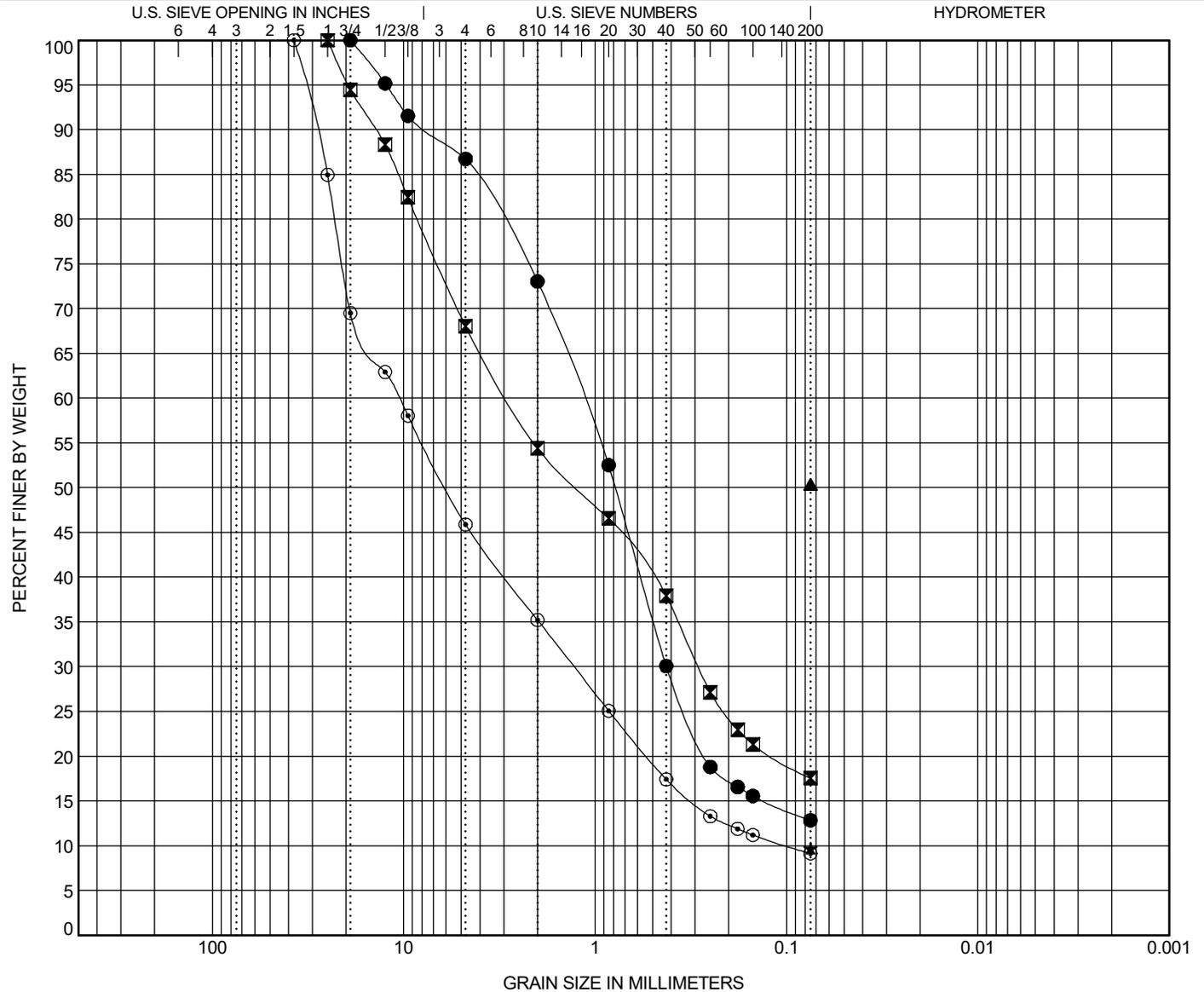
GRAIN SIZE DISTRIBUTION

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PROJECT NAME School Sisters of Notre Dame

PROJECT NUMBER 20.0156624.00

PROJECT LOCATION 13105 Watertown Plank Rd., Elm Grove, WI



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● B-12	11.0	SILTY SAND(SM)					NP	NP	NP		
■ B-13	6.0	SILTY SAND with GRAVEL(SM)					NP	NP	NP		
▲ B-13	23.5										
★ B-15	8.5										
⊙ EB-01	13.5	WELL-GRADED GRAVEL with SILT and SAND(GW-GM)					NP	NP	NP	1.56	105.20
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● B-12	11.0	19	1.161	0.424		13.3	73.9	12.8			
■ B-13	6.0	25	2.854	0.288		31.9	50.5	17.5			
▲ B-13	23.5	0.075						50.4			
★ B-15	8.5	0.075						9.7			
⊙ EB-01	13.5	37.5	10.603	1.29	0.101	54.1	36.8	9.1			

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APPENDIX D

RECOMMENDED USE AND GRADATION REQUIREMENTS FOR FILL MATERIALS



**APPENDIX D
RECOMMENDED USE AND GRADATION REQUIREMENTS
FOR FILL MATERIALS**

**School Sisters of Notre Dame Development
Elm Grove, Wisconsin**

USE OF FILL MATERIALS

Structural Fill: As pavement base course, raising Site grades.

Coarse Aggregate: As floor slab base course.

General Fill: Used to raise Site grades.

GRADATION REQUIREMENTS

Structural Fill shall be free from ice and snow, roots, sod, rubbish and other deleterious or organic matter. It shall be a crushed stone aggregate conforming to the requirements of the WisDOT Standard Specifications for Highway and Structure Construction and the following gradation requirements:

Sieve Size	Percent Finer By Weight
1 inch	100
3/8-inch	40-75
No. 4	25-60
No. 10	15-45
No. 200	3-12

Coarse Aggregate shall be free from ice and snow, roots, sod, rubbish and other deleterious or organic matter. It shall conform to the requirements of the WisDOT Standard Specifications for Highway and Structure Construction, and the following gradation requirements:

Sieve Size	Percent Finer By Weight
1½ inches	100
1 inch	90-100
¾-inch	20-55
3/8-inch	0-15
No. 4	0-5

General Fill that are sufficient for use above the water table may be classified as GW, GP, GM, GC, SW, SP, SM, or CL in accordance with the Unified Soil Classification System (USCS) (ASTM D2487, *Standard Practice for Classification of Soils for Engineering Purposes [Unified Soil Classification System]*). Fill materials that are near the water table should consist of imported, well-graded, granular material that has minimal water sensitivity. Fill materials should be selected based on proximity to the water table and use. Fill materials are recommended to be natural soil free from ice and snow, roots, sod, rubbish and other deleterious or organic matter. The maximum particle size of fill is recommended to be $\frac{2}{3}$ of the loose lift thickness except in the top 12 inches of General Fill, which is recommended to have a maximum 3-inch particle size. An experienced geotechnical engineer should review and approve General Fill materials prior to use.