WHITESTONE

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REPORT OF GEOTECHNICAL INVESTIGATION

PROPOSED GURDWARA SIKH COMMUNITY CENTER
2345 NORTH FRENCH ROAD
SECTION 28.18, BLOCK 2, LOT 1.1
HAMLET OF GETZVILLE, TOWN OF AMHERST
ERIE COUNTY, NEW YORK

Prepared for:

GURDWARA SIKH COMMUNITY CENTER
c/o TRAUTMAN ASSOCIATES
2345 North French Road
Getzville, New York 14051

Prepared by:

WHITESTONE ASSOCIATES
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Whitestone Project No.: GR2523668.Y00
August 22, 2025

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via email

GURDWARA SIKH COMMUNITY CENTER
c/o TRAUTMAN ASSOCIATES
2345 North French Road
Getzville, New York 14051

Attention: Marisa R. Scroger, AIA, IIDA
Principal

Regarding: REPORT OF GEOTECHNICAL INVESTIGATION
PROPOSED GURDWARA SIKH COMMUNITY CENTER
2345 NORTH FRENCH ROAD
SECTION 28.18, BLOCK 2, LOT 1.1
HAMLET OF GETZVILLE, TOWN OF AMHERST
ERIE COUNTY, NEW YORK
WHITESTONE PROJECT NO.: GR2523668.Y00

Dear Ms. Scroger:

Whitestone Associates Engineering & Geology NY, PLLC (Whitestone) is pleased to submit the attached *Report of Geotechnical Investigation* for the above-referenced project. The report presents the results of Whitestone's site visit and subsurface exploration, and includes design recommendations for the proposed community center.

Whitestone appreciates the opportunity to be of service to the Gurdwara Sikh Community Center and Trautman Associates. Please contact us with any questions regarding this report.

Sincerely,

WHITESTONE ASSOCIATES, INC.

Charles B. Guzzetta, PG
Regional Manager

Ryan R. Roy, PE
Vice President

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Enclosures
Copy: Laurence W. Keller, PE, Whitestone Associates, Inc.

REPORT OF
GEOTECHNICAL INVESTIGATION
Proposed Gurdwara Sikh Community Center
2345 North French Road
Getzville, Erie County, New York

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GEOTECHNICAL INVESTIGATION
Proposed Gurdwara Sikh Community Center
2345 North French Road
Getzville, Erie County, New York

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SECTION 1.0
Summary of Findings

Whitestone Associates Engineering & Geology NY, PLLC (Whitestone) has conducted an exploration and evaluation of the subsurface conditions at the site of the proposed Gurdwara Sikh Community Center at 2345 North French Road in the Hamlet of Getzville, Town of Amherst, Erie County, New York. Based on details provided by Trautman Associates, the proposed project will include demolition of the existing residence and construction of a single-story building with a footprint of approximately 10,000 square feet. While detailed grading information has not been provided, site grade within the proposed building footprint is anticipated to be raised by up to 2.0 feet. No new retaining walls or stormwater management (SWM) areas are planned.

The geotechnical investigation included conducting a reconnaissance of the project site, advancing four borings, and collecting soil samples for laboratory testing and characterization. Site subsurface conditions generally consisted of topsoil or asphaltic concrete overlying existing fill, underlain by a natural alluvial deposit, in turn underlain by a lacustrine deposit. Groundwater was encountered in the borings at depths of 3.5 feet below ground surface (fbgs) to 7.0 fbgs.

The results of the investigation indicate the building may be supported on conventional shallow foundations bearing on the natural alluvial deposit or lacustrine deposit, and/or structural fill placed over these materials, following subgrade review by the geotechnical engineer, as specified in this report. If final grade is to be raised by more than 2.0 feet a preload and surcharge will be required to induce settlement. Existing fill was encountered to a depth of 2.5 fbgs, however, deeper fill may be encountered between the widely spaced borings and associated with the building to be demolished. Overexcavation of existing fill under footings and replacement with structural fill may be required for a portion of the building footprint. Where foundation excavation extends into the underlying fine-grained lacustrine deposit, the subgrade should be undercut by at least 8.0 inches and replaced with minus 1.0-inch crushed stone wrapped in geotextile separation fabric to provide a more stable surface for footing construction. The results of the investigation also indicate the floor slab may derive support from compacted, improved, and approved existing fill or alluvial deposit, and/or structural fill placed to restore grade. Additionally, the site conditions support the use of typical pavement sections using standard New York State Department of Transportation (NYSDOT) specified materials.

While loading from spread and strip building footings will not impact the underlying very soft lacustrine clay, areal loading, such as from raising site grade, will cause settlement due to consolidation of the lacustrine clay. Since up to 2.0 feet of fill will be placed for site grading, Whitestone recommends that the fill be placed as early as feasible in the construction process and settlement monitored. Whitestone expects that any settlement will be essentially complete within a few weeks, at which time construction of the building may proceed.

The above summary is intended to provide an overview of the geotechnical findings and recommendations and is not fully developed. Greater detail is presented in the following sections. The entire report must be read for comprehensive understanding of the information contained herein.

SECTION 2.0
Introduction

2.1 AUTHORIZATION

Marisa R. Scroger, AIA, IIDA, Principal at Trautman Associates, issued authorization to Whitestone to conduct a geotechnical investigation on the site relevant to a proposed community center at 2345 North French Road in the Hamlet of Getzville, Town of Amherst, Erie County, New York. The geotechnical investigation was conducted in general accordance with Whitestone's May 7, 2025 proposal.

2.2 PURPOSE

The purpose of this exploration and analysis was to:

- ascertain the various soil profile components at test locations;
- estimate the engineering characteristics of the proposed foundation bearing and subgrade materials;
- provide geotechnical criteria for use by the design engineers in preparing the foundation, floor slab, and pavement design;
- provide recommendations for required earthwork and subgrade preparation;
- record groundwater and/or bedrock levels (if encountered) at the time of the investigation and discuss the potential impact on the proposed construction; and
- recommend additional investigation and/or analysis, if warranted.

2.3 SCOPE

The scope of the exploration and analysis included the subsurface exploration, field testing and sampling, evaluation of the subsurface materials, and a geotechnical engineering analysis. This *Report of Geotechnical Investigation* is limited to addressing the site conditions related to the physical support of the proposed construction.

2.3.1 Field Exploration

Field exploration of the project site was conducted by means of four borings, identified as B-1 through B-4, advanced with a track-mounted Geoprobe 7720DT drill rig equipped with hollow stem augers to a termination depth of 24 fbgs. The borings were backfilled with excavated soils generated from the

investigation upon completion and the surface patched with 'cold patch' asphalt, where appropriate. Test locations are shown on the *Boring Location Plan* included as Figure 1. *Records of Subsurface Exploration* for the borings are provided in Appendix A.

Test locations were based on project information provided to Whitestone at the time of the investigation, including a *Gurdwara Boring Location Plan* prepared by Tredo Engineers of Buffalo, New York. The subsurface testing was conducted in the presence of a Whitestone representative, who conducted field tests, recorded visual classifications, and collected samples of the various strata encountered. Test locations were established in the field using normal taping procedures and estimated right angles. These locations are presumed to be approximate.

Borings and Standard Penetration Tests (SPTs) were conducted in general accordance with ASTM International (ASTM) designation D1586. The Standard Penetration Resistance value (N) can be used as an indicator of the consistency of fine-grained soils and the relative density of coarse-grained soils. The N-value for various soil types can be correlated with the engineering behavior of earthworks and foundations. The soil classification information along with other pertinent information was recorded on the boring logs and included in Appendix A on the *Records of Subsurface Exploration*.

Groundwater level observations, where encountered, were recorded during and immediately following the completion of the field operations prior to backfilling the borings. Seasonal variations, temperature effects, and recent rainfall conditions may influence the levels of the groundwater, and observed levels will depend on the permeability of the soils. Groundwater elevations derived from sources other than seasonally observed groundwater monitoring wells may not be representative of true groundwater levels.

2.3.2 Laboratory Testing

Supplemental laboratory testing was conducted to determine additional, pertinent engineering characteristics of representative samples of on-site soils. The laboratory testing was conducted in general accordance with applicable ASTM standard test methods and included physical testing of the alluvial and lacustrine deposits.

Physical/Textural Analysis: Representative samples of the site soils were subjected to laboratory testing that included moisture content determination (ASTM D2216) in order to conduct supplementary engineering soil classifications and to assess possible re-use of the site soils as structural fill. The engineering classifications are useful when considered in conjunction with the additional site data to estimate properties of the soil types encountered and to predict soil behavior under construction and service loads. Sample moisture contents are shown on the *Records of Subsurface Exploration*.

SECTION 3.0
Site Description

3.1 LOCATION AND DESCRIPTION

The site is located at 2345 North French Road in the Hamlet of Getzville, Town of Amherst, Erie County, New York, Latitude 43.0342 North, and Longitude 78.7373 West. The 1.05-acre site, further identified as Section 28.18, Block 2, Lot 1.1, is developed with a single-story residence.

The square site is bounded to the north by North French Road, to the west by Hopkins Road, to the south by a residence, and to the east by a two-story residence. Access to the site is from North French Road and Hopkins Road. The site of the proposed construction is shown on the *Boring Location Plan* included as Figure 1.

3.2 EXISTING CONDITIONS

Existing Development: At the time of Whitestone's investigation, the subject site was developed with a single-story residence being used as a Sikh community center. There are a few mature trees.

Topography: Based on a review of the United States Geological Survey (*USGS) 7.5 Minute Series Clarence Center Quadrangle, New York* (2023) and on Whitestone's visual observations, the site is generally level at approximately 575 feet above North American Vertical Datum of 1988 (NAVD88).

Utilities: The site is serviced by electrical, gas, and telecommunication utilities and connected to municipal water and sewer. The utility information contained in this report is presented for general discussion only and is not intended for construction purposes.

Site Drainage: Surface run-off will generally flow to the adjacent streets and thence to catch basins that are assumed to be connected the municipal storm sewer system.

3.3 SITE GEOLOGY

According to the University of the State of New York, The State Education Department *Surficial Geologic Map of New York, Niagara Sheet* (1988), the natural subsurface soils consist of lacustrine silt and clay. A relatively thin alluvial deposit was encountered in the explorations overlying the lacustrine silt and clay. The University of the State of New York, The State Education Department *Geologic Map of New York, Niagara Sheet* (1970) indicates that the subject site is underlain, at depth, by the Upper Silurian-age Camillus, Syracuse, and Vernon Formations, consisting of shale, with minor gypsum, black shale, salt, and dolostone, part of the Akron Dolostone and Salina Group. The site is mapped by USGS as being within a karst area, however, the bedrock is not significantly calcareous.

3.4 PROPOSED CONSTRUCTION

Based on details provided by Trautman Associates, the proposed project will include demolition of the existing residence and construction of a single-story building with a footprint of approximately 10,000 square feet. While detailed grading information has not been provided, site grade within the proposed building footprint is anticipated to be raised by up to 2.0 feet. No new retaining walls or SWM areas are planned.

The proposed building will be a single-story, masonry and metal- and wood-framed structure with a ground-supported floor slab and no basement. Maximum column, wall, and floor loads are expected to be on the order of:

- columns - 50 kips;
- load bearing walls - 2.0 kips per lineal foot; and
- floor slab - 125 pounds per square foot (psf).

The scope of Whitestone's investigation and the professional advice contained in this report were generated based on the project details and loading noted herein. Revisions or additions to the design details enumerated in this report should be brought to the attention of Whitestone for additional evaluation as warranted.

SECTION 4.0
Subsurface Conditions

Details of the subsurface materials encountered in the borings are presented on the *Records of Subsurface Exploration* in Appendix A of this report. The subsurface soil conditions encountered in the test locations consisted of the following generalized strata in order of increasing depth.

4.1 SUBSURFACE SOIL CONDITIONS

Surface Cover Materials: Borings B-1 and B-2 encountered 2.0 inches of asphaltic concrete at the ground surface, with 22 inches of granular subbase. Borings B-3 and B-4 encountered 10 inches of topsoil at the ground surface.

Existing Fill: Beneath the surface cover materials, borings B-3 and B-4 encountered existing fill, consisting of brown to black, loose to medium dense, sandy silt to silty sand, cinders, asphalt fragments. The existing fill extended to depths of 2.0 fbgs and 2.5 fbgs.

Alluvial Deposit: Beneath the surface cover materials or existing fill, the borings encountered an alluvial deposit, consisting of brown to gray, loose to medium dense, silty sand (USCS: SM) to sandy silt (USCS: ML). SPT N-values recorded within the alluvial deposit were variable, ranging from 4.0 blows per foot (bpf) to 15 bpf. The alluvial deposit extended to depths of 3.5 fbgs to 7.0 fbgs.

Lacustrine Deposit: Beneath the alluvial deposit, the borings encountered a lacustrine deposit, consisting of reddish-brown to gray-brown to gray, very soft (surficially stiff to very stiff), silty clay, occasional silt partings (USCS: CL). SPT N-values recorded within the lacustrine deposit were variable, ranging from weight of hammer for 24 inches of split-spoon sampler penetration to 23 bpf. The borings terminated in the lacustrine deposit at a depth of 24 fbgs.

4.2 GROUNDWATER

Groundwater was encountered in the borings at depths of 3.5 fbgs to 7.0 fbgs during drilling activities. The groundwater appears to be perched on the relatively impermeable lacustrine deposit. Additionally, static and perched/trapped water conditions generally will fluctuate seasonally and following periods of precipitation.

SECTION 5.0
Conclusions and Recommendations

5.1 GENERAL

While loading from spread and strip building footings will not impact the underlying very soft lacustrine clay, areal loading, such as from raising site grade, will cause settlement due to consolidation of the lacustrine clay. Since up to 2.0 feet of fill will be placed for site grading, Whitestone recommends that the fill be placed as early as feasible in the construction process and settlement monitored. Whitestone expects that any settlement will be essentially complete within a few weeks, at which time construction of the building may proceed. If final grade is to be raised by more than 2.0 feet a preload and surcharge will be required to induce settlement. The preload and surcharge will likely need to remain in place on the order of four to eight weeks. Consideration could also be given to using lightweight fill to reduce the preload and surcharge needed.

The results of the investigation indicate the building may be supported on conventional shallow foundations bearing on the natural alluvial deposit or lacustrine deposit, and/or structural fill placed over these materials, following subgrade review by the geotechnical engineer, as specified in this report. Existing fill was encountered to a depth of 2.5 fbgs, however, deeper fill may be encountered between the widely spaced borings and associated with the building to be demolished. Overexcavation of existing fill under footings and replacement with structural fill may be required for a portion of the building footprint. Where foundation excavation extends into the underlying fine-grained lacustrine deposit, the subgrade should be undercut by at least eight inches and replaced with minus 1.0-inch crushed stone wrapped in geotextile separation fabric to provide a more stable surface for footing construction. The results of the investigation also indicate the floor slab may derive support from compacted, improved, and approved existing fill or alluvial deposit, and/or structural fill placed to restore grade. Additionally, the site conditions support the use of typical pavement sections using standard NYSDOT specified materials.

5.2 SITE PREPARATION AND EARTHWORK

Surface Cover Stripping and Demolition: Prior to stripping operations, utilities should be identified and secured. The existing building and pavements to be demolished and stripped should be removed from within and at least 5.0 feet beyond the limits of the proposed building and pavement areas. Given the size of the site and the configuration of the proposed and existing buildings, existing structural elements, such as foundation walls, and concrete foundations, walls or slabs encountered during excavations, should be removed entirely. Tree/shrub removal should include the removal of stumps and root material. Root structures will require removal in excess of the few inches of topsoil typically encountered at the ground surface. The demolition contractor should be required to conduct earthwork in accordance with the recommendations in this report, including backfilling any excavation, etc. with structural fill. Fill or backfill placed within the proposed building area during demolition operations should be placed as structural fill in accordance with Section 5.2, 5.3, and 5.11 of this report.

Surface Preparation/Proofrolling: Prior to placing fill or subbase materials to raise or restore grades to the desired subgrade elevations, the existing exposed soils should be compacted to a firm surface with several passes in two perpendicular directions of a minimum 10-ton vibratory roller. The surface should then be proofrolled with a loaded tandem axle truck in the presence of the geotechnical engineer to help identify soft or loose pockets that may require removal and replacement, or further evaluation. Proofrolling should be conducted after a suitable period of dry and non-freezing weather to reduce the likelihood of degrading an otherwise stable subgrade. Should construction be attempted in the winter or when temperatures are below freezing, Whitestone should be contacted for alternative surface preparation recommendations. Fill or backfill should be placed and compacted in accordance with Section 5.3.

Weather Performance Criteria: The site soils are moisture sensitive and will soften when exposed to water. Every effort should be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations and prepared subgrades to rainfall. Accordingly, excavation and fill placement procedures should be conducted during favorable weather conditions. Overexcavation of wet or disturbed soils and replacement with controlled structural fill per Section 5.3 of this report may be required prior to resuming work on subgrade soils.

Subgrade Protection and Maintenance: The site soils are moisture sensitive and will degrade if exposed to inclement weather, freeze-thaw cycles, or repeated construction traffic. However, if properly protected and maintained as recommended herein, the site soils will provide adequate support for the proposed construction. The site contractors should employ appropriate means and methods to protect the subgrade, including but not limited to the following:

- sealing exposed subgrade soils on a daily basis with a smooth drum roller operated in static mode;
- regrading the site as needed to maintain positive drainage away from open earthwork construction areas and to prevent standing water;
- removing wet surficial soils and ruts immediately; and
- limiting exposure to construction traffic and precipitation especially following inclement weather and subgrade thawing.

5.3 STRUCTURAL FILL AND BACKFILL

Imported Fill Material: Imported material placed as structural fill or backfill to raise elevations or restore design grades should consist of clean, relatively well-graded sand or gravel with a maximum particle size of 3.0 inches and up to 15 percent, by weight, of material finer than a #200 sieve. Imported material should be free of clay lumps, organics, and deleterious material. Imported material should be approved by a qualified geotechnical engineer prior to delivery to the site.

On-Site Material Reuse: Portions of the existing fill and alluvial deposit will generally be suitable for selective reuse as structural backfill materials, provided that moisture contents are controlled within 3.0 percent of the optimum moisture content, material larger than 3.0 inches is removed, and any deleterious material encountered is discarded. The site soils have a relatively high fines content. Prior to reuse, drying may be necessary or mixing with more granular materials. In addition, on-site soil reuse should not be attempted during inclement weather or in damp conditions. Reuse of the on-site soils will be contingent on careful inspection by the owner's geotechnical engineer during construction. The lacustrine deposit is not suitable for reuse as structural fill material.

Submerged Fill: In the wet (flooding, perched water, or groundwater), consideration should be given to placing an open-graded, 1.0-inch crushed stone to provide a working mat, expedite dewatering efforts and enable subsequent placement of structural fill or backfill in the dry. Prior to placing submerged fill materials, free water and disturbed materials should be removed to the extent recommended by the geotechnical engineer. A fines barrier geotextile, such as *Mirafi 140N* or equivalent, should be placed at the base and sides of the overexcavation to separate the crushed stone from underlying and adjacent soils. The fabric also should be placed on top of the crushed stone prior to subsequent fill placement, if fill soils with a substantial amount of fines are to be used to restore grade.

Compaction and Placement Requirements: Fill and backfill should be placed in loose lifts no more than 12 inches thick when compacted with a vibratory roller compactor weighing at least 1.0 ton, and 8.0 inches when compacted with a plate compactor. Fill and backfill should be compacted to 95 percent of the maximum dry density within 3.0 percent of the optimum moisture content, as determined by ASTM D1557 (Modified Proctor).

Structural Fill Testing: A sample of the imported fill material or on-site material proposed for reuse as structural fill or backfill should be submitted to the owner's geotechnical engineer for analysis and approval at least one week prior to its use. The placement of fill and backfill should be monitored by a qualified engineering technician, such that the specified material and lift thicknesses are properly installed. A sufficient number of in-place density tests should be conducted, such that the specified compaction is achieved throughout the height of the fill or backfill.

5.4 GROUNDWATER CONTROL

Groundwater was encountered within the borings during this investigation at depths of 3.5 fbgs to 7.0 fbgs, generally perched on the relatively impermeable lacustrine deposit. Shallower perched/trapped water may be encountered during construction above non-permeable layers. As such, construction phase dewatering may consist of removing surface water runoff, infiltrating water, or trapped water at this site. Whitestone anticipates that construction phase dewatering could include installing temporary sump pits and filtered pumps within trenches and excavations.

Proper grading and drainage should be incorporated into the site design and construction phase grading to discourage ponding of surface runoff. Every effort should be made to maintain drainage of surface run-off away from construction areas by grading. The contractor should limit exposure of excavations and prepared subgrades to rainfall. Overexcavation of wet soils and replacement with controlled structural fill per Section 5.3 of this report may be required prior to resuming work on disturbed subgrade soils.

5.5 FOUNDATIONS

Shallow Foundation Design Criteria: The results of the investigation and engineering analyses indicate that the proposed structure may be supported on conventional spread and continuous wall footings designed to bear on the properly inspected and approved alluvial deposit or lacustrine deposit, and/or structural fill placed over these materials, provided the subgrade is properly evaluated and prepared in accordance with Sections 5.2, 5.3, and 5.11 of this report. Existing fill was encountered to a depth of 2.5 fbgs, however, deeper fill may be encountered between the widely spaced borings and associated with the building to be demolished. Overexcavation of existing fill under footings and replacement with structural fill may be required for a portion of the building footprint. Where foundation excavation extends into the underlying fine-grained lacustrine deposit, the subgrade should be undercut by at least 8.0 inches and replaced with minus 1.0-inch crushed stone wrapped in geotextile separation fabric (*Mirafi 140N*, or similar) to provide a more stable surface for footing construction. The subgrade should be reviewed by the geotechnical engineer, as specified in this report prior to fill placement or structural support. Foundations bearing within these materials may be designed to impart a maximum net allowable bearing pressure of 3,000 psf. Regardless of loading conditions, new foundations should be sized no less than minimum dimensions of 24 inches for continuous wall footings and 36 inches for isolated column footings.

Foundation subgrades should be reviewed by the geotechnical engineer. Foundation subgrades in fine-grained soils should be compacted with a roller operated in static mode in the presence of the geotechnical engineer to densify any disturbed soils. The fine-grained soils are susceptible to disturbance by vibrations from compaction equipment and other construction activity. Compaction should therefore only be attempted under the direction of the geotechnical engineer, such that underlying firm and stable, fine-grained materials do not become disturbed by the compaction process. A smooth bladed bucket would be appropriate for excavation of fine-grained soils. The recommended layer of crushed stone and geotextile separation fabric over fine-grained soils exposed in the bottom of foundation excavations will reduce the likelihood of disturbance and provide a working surface for formwork and reinforcing steel placement.

Footings should be designed such that the maximum toe pressure due to the combined effect of vertical loads (including soil weight) and overturning moment does not exceed the recommended maximum allowable bearing pressure. In addition, positive contact pressure should be maintained throughout the base of the footings such that no uplift or tension exists between the base of the footings and the supporting soil. Uplift loads should be resisted by the weight of the concrete footing. Side friction should be neglected when proportioning the footings, and lateral resistance should be provided by friction resistance at the base of the footings. A coefficient of friction (ultimate) against sliding of 0.3 is recommended for use in the design of concrete foundations bearing within the site soils or imported structural fill.

Foundation Inspection/Overexcavation Criteria: Whitestone recommends that the suitability of the bearing materials along new footing bottoms be reviewed by a geotechnical engineer prior to placing concrete for the footings. Special attention should be given to any areas of the site underlain by soft/loose conditions. In the event that isolated areas of unsuitable materials are encountered in footing excavations, overexcavation and replacement of the materials or deeper foundation embedment may be necessary to provide a suitable footing subgrade. Overexcavation to be restored with structural fill should extend at least 1.0 foot laterally beyond footing edges for each vertical foot of overexcavation. Lateral overexcavation may be eliminated if grade is restored with lean concrete.

Settlement: Whitestone estimates post construction settlements of new building foundations will be on the order of less than 1.0 inch, if the recommendations outlined in this report are properly implemented. Differential settlements of new building foundations should be less than 0.5 inches.

Footing Embedment Depths: Perimeter wall footings and exterior spread footings should bear at a minimum depth of 4.0 feet below adjacent exterior grades, or the depth required by local building codes, to provide protection from frost penetration. Interior footings not subject to frost action (including during construction) may be placed at a depth of 18 inches below the slab subgrade but should not be placed on existing fill.

5.6 FLOOR SLAB

Whitestone anticipates that the properly inspected, approved, and improved existing fill or natural alluvial deposit, and/or compacted structural fill will be suitable for support of the proposed floor slab provided these materials are properly evaluated, compacted, and proofrolled in accordance with Sections 5.2, 5.3, and 5.11 of this report during favorable weather conditions. Areas that are, or become, softened or disturbed as a result of wetting and/or repeated exposure to construction traffic or contain objectionable materials should be removed and replaced with compacted structural fill. The properly prepared on-site soils are expected to yield a minimum subgrade modulus (k) of 150 psi/in.

A minimum 12-inch-thick layer of NYSDOT *733-04 Subbase Course, Type 2* (or approved equivalent) should be placed below the floor slab to provide a uniform granular base. A moisture vapor barrier should be installed beneath the floor slab in accordance with flooring manufacturer's recommendations. A moisture vapor barrier should also be installed if the floor supports moisture-sensitive equipment.

5.7 PAVEMENT DESIGN CRITERIA

General: Whitestone anticipates that the properly inspected, approved, and improved existing fill or natural alluvial deposit, and/or compacted structural fill placed to raise or restore design elevations will be suitable for support of the proposed pavements, provided these materials are properly evaluated, compacted, and proofrolled in accordance with Sections 5.2, 5.3, and 5.11 of this report during favorable weather conditions.

Design Criteria: A California Bearing Ratio value of 8.0 has been assigned to the properly prepared subgrade soils for pavement design purposes. This value was correlated with pertinent soil support values and assumed traffic loads to prepare flexible and rigid pavement designs per the AASHTO *Guide for the Design of Pavement Structures*.

Design traffic loads were assumed based on typical volumes for similar facilities and correlated with 18-kip equivalent single axle loads (ESAL) for a 20-year life. Estimated maximum pavement loads of 30,000 ESALs and 75,000 ESALs were used for the standard-duty and heavy-duty pavement areas, respectively. These values assume the pavements primarily will accommodate both automobile and limited heavier truck traffic, with the heavier truck traffic designated to the main drive lanes. Actual loading experienced is anticipated to be less than these values.

Pavement Sections: Pavement components should meet material specifications from NYSDOT *Standard Specifications* specified below. The recommended flexible pavement section is tabulated below:

FLEXIBLE PAVEMENT SECTION			
Layer	**Material**	**Standard-Duty Thickness (inches)**	**Heavy-Duty Thickness (inches)**
Asphalt Top Course	NYSDOT 12.5 mm F3 Top Course WMA, 70 Series Compaction (Superpave); PG 64S-22	1.5	1.5
Asphalt Binder Course	NYSDOT 19 mm F9 Binder Course WMA, 70 Series Compaction (Superpave); PG 64S-22	2.0	3.5
Granular Subbase	NYSDOT Type 2 Subbase	12.0	12.0

A rigid concrete pavement should be used to provide suitable support at areas of high traffic or severe turns, such as at the trash enclosure and ingress/egress locations. The recommended rigid pavement is tabulated below:

RIGID PAVEMENT SECTION		
Layer	**Material**	**Thickness (inches)**
Surface	4,000 psi air-entrained concrete	6.0 [1]
Granular Subbase	NYSDOT Type 2 Subbase	12.0

Note[1]: The outer edges of concrete pavements are susceptible to damage as trucks move from rigid pavement to adjacent flexible pavement. Therefore, the thickness at the outer 2.0 feet of the rigid concrete pavement should be 12 inches. The concrete should be reinforced with at least one layer of 6.0-inch by 6.0-inch W5.4/W5.4 welded wire fabric (ASTM A185).

Additional Design Considerations: The pavement section thickness design presented in this report is based on the design parameters detailed herein and are contingent on proper construction, inspection, and maintenance. Additional pavement thickness may be required by local code. The design is contingent on achieving the minimum soil support value in the field. To accomplish this requirement, subgrade soil and

supporting fill or backfill should be placed, compacted, and evaluated in accordance with Sections 5.2, 5.3, and 5.11 of this report. Proper drainage should be provided for the pavement structure, including appropriate grading and surface water control.

The performance of the pavement also will depend on the quality of materials and workmanship. Whitestone recommends that NYSDOT standards for materials, workmanship, and maintenance be applied to this site. Project specifications should include verifying that the installed asphaltic concrete material composition is within tolerance for the specified materials and that the percentage of air voids of the installed pavement is within specified ranges for the respective materials.

5.8 RETAINING WALLS/BELOW GRADE WALLS

Proposed site retaining walls were not indicated at this time. Whitestone should be notified if retaining walls or structures resisting lateral earth pressures are planned. The following recommendations are provided for preliminary planning of any retaining walls, below-grade walls, and other structures reliant on granular materials to provide adequate drainage. However, the parameters are not directly applicable to the design of mechanically stabilized earth (MSE) retaining walls, which require proprietary design methods for the selected earth retention system.

Lateral Earth Pressures: Retaining/below-grade walls should be capable of withstanding active and at-rest earth pressures. With an active earth pressure coefficient (K_a) of 0.33 and assuming a level backfill and an assumed maximum backfill soil unit weight of 140 pounds per cubic foot (pcf), an equivalent fluid pressure of 46 psf per foot of wall height should be used in design of retaining/below-grade walls which are free to rotate.

Retaining/below-grade walls and wall corners typically are restrained from lateral movement and should be designed using at-rest earth pressures. A coefficient of at-rest earth pressure (K_o) of 0.5, for a level backfill, is recommended for retaining/below-grade walls designed to resist at-rest earth pressures, which assume no lateral movement. With an assumed maximum total unit weight of backfill of approximately 140 pcf, an equivalent fluid pressure of 70 psf of wall height should be used in design of restrained retaining/below-grade wall and wall corners. A coefficient of friction of 0.3 against sliding can be used for concrete on the existing site soils. Additional lateral earth pressures from a sloped backfill or any temporary or long-term surcharge loads also should be included in the design. Retaining wall design should include a global stability analysis.

Backfill Criteria: Whitestone recommends that granular soils be used to backfill behind retaining walls. The granular backfill materials should consist of clean, relatively well-graded sand or gravel with a maximum particle size of 3.0 inches and up to 15 percent, by weight, of material finer than a #200 U.S. Standard sieve.

Whitestone recommends that backfill directly behind any walls be compacted with light, hand-held compactors. Heavy compactors and grading equipment should not be allowed to operate within a zone of influence measured at a 45-degree angle from the base of the walls during backfilling to avoid developing excessive temporary or long-term lateral soil pressures.

Wall Drainage: Positive drainage should be provided at the base of the below-grade walls. Where wall drainage is not provided, the wall should be designed to withstand full hydrostatic pressure. All below grade walls should also include a minimum 18 inches of open graded stone backfill immediately adjacent to the wall. Geotextile separation fabric should be placed between the open graded stone and the site soils.

Whitestone should be notified if any retaining structures or design considerations requiring lateral earth pressure estimations are proposed. Specific recommendations for temporary retaining structures are beyond Whitestone's scope of services.

5.9 SEISMIC AND LIQUEFACTION CONSIDERATIONS

The subsurface conditions are most consistent with a Site Class D, as defined by the *New York State Building Code*. Based on the type of building (single-story), seismic zone, and soil profile, liquefaction considerations are not expected to have a substantial impact on design.

5.10 EXCAVATIONS

The existing fill and alluvial deposit are, at a minimum, consistent with Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA), which require a maximum unbraced excavation angle of 1.5:1 (horizontal to vertical). The underlying lacustrine deposit encountered during this investigation typically is, at a minimum, consistent with Type B Soil Conditions as defined by OSHA, which require a maximum unbraced excavation angle of 1:1 (horizontal to vertical). Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA), such that safe excavation methods and/or shoring and bracing requirements are implemented.

5.11 SUPPLEMENTAL POST INVESTIGATION SERVICES

Construction Phase Evaluation of Inaccessible Areas: A portion of the building footprint was inaccessible during Whitestone's subsurface investigation because of the presence of the existing building. Whitestone recommends further reviewing the condition of the site soils for foundation, floor slab, and pavement support, and/or re-use as structural fill by means of a supplemental test pit evaluation following demolition and either prior to or during the early stages of construction to identify areas requiring removal and possible uncontrolled conditions, deleterious materials, or existing fill not disclosed by the borings conducted during this exploration.

Demolition and Construction Inspection and Monitoring: The owner's geotechnical engineer with specific knowledge of the site subsurface conditions and design intent should conduct inspection, testing, and consultation during construction as described in previous sections of this report. Monitoring and testing should also be conducted to confirm that the existing building is properly demolished, any encountered underground structures, such as the building foundations, are properly backfilled, the existing surface cover materials are properly removed, and suitable materials, used for controlled fill, are properly placed and compacted over suitable subgrade soils. The proofrolling of all subgrades prior to foundation, floor slab, and pavement support should be witnessed and documented by the owner's geotechnical engineer. Whitestone should review settlement data following placement of site grading fill.

SECTION 6.0
General Comments

Supplemental recommendations may be required upon finalization of construction plans or if significant changes are made to the characteristics or location of the proposed structure. Soil bearing conditions should be checked at the appropriate time for consistency with those conditions encountered during Whitestone's geotechnical investigation.

The recommendations presented herein should be utilized by a qualified engineer in preparing the project plans and specifications. The engineer should consider these recommendations as minimum physical standards, which may be superseded by local and regional building codes and structural considerations. These recommendations are prepared for the sole use of Gurdwara Sikh Community Center and Trautman Associates for the specific project detailed and should not be used by any third party. These recommendations are relevant to the design phase and should not be substituted for construction specifications.

The possibility exists that conditions between borings may differ from those at specific test locations, and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may alter soil and rock conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered.

Whitestone assumes that a qualified contractor will be employed to conduct the construction work, and that the contractor will be required to exercise care to ensure excavations are conducted in accordance with applicable regulations and good practice. Particular attention should be paid to avoid damaging or undermining adjacent buildings/properties and maintaining slope stability.

Whitestone recommends that the services of the geotechnical engineer be engaged to test and evaluate the materials in the footing excavations prior to concreting in order to determine that the materials will support the bearing pressures. Monitoring and testing also should be conducted to check that suitable materials are used for controlled fills and that they are properly placed and compacted over suitable subgrade.

The exploration and analysis of the foundation conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the foundation design. The recommendations submitted for the proposed construction are based on the available soil information and the design details furnished by Trautman Associates. Deviations from the noted subsurface conditions encountered during construction should be brought to the attention of the geotechnical engineer.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties, express or implied, are made.

WHITESTONE

FIGURE 1
Boring Location Plan

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LEGEND

B-1 — BORING LOCATION

REFERENCE

THIS PLAN IS BASED ON A 6/11/24 GOOGLE EARTH IMAGE.

ALL LOCATIONS ARE APPROXIMATE.

PROJECT #:	GR2523668.Y00
DESIGNED BY:	MR
DATE:	8/13/25
SCALE:	1" = 30'
PROJ. MGR.:	CG
FIGURE:	1

DRAWING TITLE:
BORING LOCATION PLAN

CLIENT:
GURDWARA SIKH COMMUNITY CENTER
c/o TRAUTMAN ASSOCIATES

PROJECT:
PROPOSED GURDWARA SIKH COMMUNITY CENTER
2345 NORTH FRENCH ROAD
GETZVILLE, ERIE COUNTY, NEW YORK

WHITESTONE
116 GRUNER ROAD, BUFFALO, NY 14227
716.770.0078 WHITESTONEASSOC.COM

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APPENDIX A
Records of Subsurface Exploration

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-1

Page 1 of 1

Project:	Proposed Gurdwara Sikh Community Center	**WAI Project No.:**	GR2523668.Y00
Location:	2345 North French Road, Getzville, Erie County, New York	**Client:**	Gurdwara Sikh Community Center
Surface Elevation:	± NS feet Above NAVD88	**Date Started:**	7/9/2025
Termination Depth:	24.0 feet bgs	**Date Completed:**	7/9/2025
Proposed Location:	Building	**Logged By:**	FM
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	EE
		Equipment:	Geoprobe 7720DT

Water Depth | Elevation (feet bgs) | (ft NAVD88)		Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)	
During:	7.0 | --		
At Completion:	-- | --	**At Completion:**	-- | --
24 Hours:	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							PAVEMENT		2" Asphalt	
0.5 - 2	S-1	X	4 - 2 - 2	4	4		GRAVEL		22" Granular Subbase	
						2.0				
2 - 4	S-2	X	1 - 1 - 3 - 4	12	4				Gray-Brown, Medium Stiff, Sandy Silt (ML)	w/c = 19.0%
4 - 6	S-3	X	5 - 5 - 4 - 4	12	9	5.0	ALLUVIAL DEPOSIT		Gray-Brown, Loose, Silty Sand (SM)	w/c = 21.5%
6 - 8	S-4	X	7 - 7 - 4 - 6	17	11	7.0			As Above, Medium Dense (SM)	w/c = 16.5%
									Gray-Brown, Stiff, Silty Clay, Occ. Silt Partings (CL)	w/c = 25.3%
8 - 10	S-5	X	3 - 4 - 7 - 8	18	11				As Above (CL)	w/c = 24.7%
						10.0				
10 - 12	S-6	X	1 - 2 - 3 - 3	20	5				As Above, Reddish-Brown, Medium Stiff (CL)	w/c = 30.8%
						15.0				
15 - 17	S-7	X	WOH/24"	24	-		LACUSTRINE DEPOSIT		As Above, Very Soft (CL)	w/c = 48.9%
						20.0				
20 - 22	S-8	X	WOR /12" - WOH /12"	24	-				As Above (CL)	w/c = 49.4%
22 - 24	S-9	X	WOH/24"	24	-				As Above (CL)	w/c = 44.0%
						25.0			Boring Log B-1 Terminated at Depth of 24 feet below ground surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-2

Page 1 of 1

Project:	Proposed Gurdwara Sikh Community Center	**WAI Project No.:**	GR2523668.Y00
Location:	2345 North French Road, Getzville, Erie County, New York	**Client:**	Gurdwara Sikh Community Center

Surface Elevation:	± NS feet Above NAVD88	**Date Started:**	7/10/2025		**Water Depth | Elevation** (feet bgs) | (ft NAVD88)		**Cave-In Depth | Elevation** (feet bgs) | (ft NAVD88)
Termination Depth:	24.0 feet bgs	**Date Completed:**	7/10/2025				
Proposed Location:	Building	**Logged By:**	FM	**During:**	5.0 | --		
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	EE	**At Completion:**	-- | --	**At Completion:**	-- | --
		Equipment:	Geoprobe 7720DT	**24 Hours:**	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							PAVEMENT		2" Asphalt	
0.5 - 2	S-1		6 - 1 - 1	2	2		GRAVEL		22" Granular Subbase	
2 - 4	S-2		3 - 4 - 6 - 7	12	10				Gray-Brown, Medium Dense, Silty Sand (SM)	w/c = 17.7%
4 - 6	S-3		3 - 4 - 5 - 4	12	9	5.0	ALLUVIAL DEPOSIT		As Above, Loose (SM)	w/c = 22.1%
6 - 8	S-4		2 - 4 - 3 - 4	17	7	7.0			As Above (SM)	w/c = 20.7%
									Brown, Medium Stiff, Silty Clay, Occ. Silt Partings (CL)	w/c = 25.6%
8 - 10	S-5		2 - 4 - 6 - 9	13	10				As Above, Stiff (CL)	w/c = 25.0%
10 - 12	S-6		11 - 12 - 11 - 9	19	23	10.0			As Above, Stiff to Very Stiff (CL)	w/c = 29.9%
						15.0				
15 - 17	S-7		1/18" - 1	15	1		LACUSTRINE DEPOSIT		As Above, Reddish-Brown, Very Soft (CL)	w/c = 46.8%
						20.0				
20 - 22	S-8		WOH/24"	24	-				As Above, Reddish-Brown and Gray (CL)	w/c = 50.7%
22 - 24	S-9		WOH/18" - 1	24	-				As Above (CL)	w/c = 44.3%
						25.0			Boring Log B-2 Terminated at Depth of 24 feet below ground surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-3

Page 1 of 1

Project:	Proposed Gurdwara Sikh Community Center	**WAI Project No.:**	GR2523668.Y00
Location:	2345 North French Road, Getzville, Erie County, New York	**Client:**	Gurdwara Sikh Community Center

Surface Elevation:	± NS feet Above NAVD88	**Date Started:**	7/9/2025	**Water Depth | Elevation (feet bgs) | (ft NAVD88)**	**Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)**
Termination Depth:	24.0 feet bgs	**Date Completed:**	7/9/2025		
Proposed Location:	Building	**Logged By:**	FM	**During:** 3.5 | --	
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	EE	**At Completion:** -- | --	**At Completion:** -- | --
		Equipment:	Geoprobe 7720DT	**24 Hours:** -- | --	**24 Hours:** -- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1	X	1 - 2 - 3 - 4	10	5		TS		10" Topsoil	
							EXISTING FILL		Brown, Loose, Sandy Silt (FILL)	
						2.0				
2 - 4	S-2	X	3 - 5 - 5 - 5	12	10		ALLUVIAL DEPOSIT		Brown to Gray, Medium Dense, Silty Sand (SM)	w/c = 20.6%
						3.5 ▼				
4 - 6	S-3	X	4 - 5 - 8 - 10	12	13	5.0			Brown, Stiff, Silty Clay, Occ. Silt Partings (CL)	w/c = 24.0%
6 - 8	S-4	X	7 - 9 - 12 - 13	15	21				As Above, Very Stiff (CL)	w/c = 25.3%
8 - 10	S-5	X	4 - 4 - 4 - 3	24	8				As Above, Medium Stiff to Stiff (CL)	w/c = 31.8%
						10.0				
10 - 12	S-6	X	WOH/18" - 1	24	-				As Above, Very Soft (CL)	w/c = 44.3%
							LACUSTRINE DEPOSIT			
						15.0				
15 - 17	S-7	X	WOH/24"	24	-				As Above (CL)	w/c = 44.4%
						20.0				
20 - 22	S-8	X	WOH/24"	24	-				As Above, Brown and Gray (CL)	w/c = 40.3%
22 - 24	S-9	X	WOH/24"	24	-				As Above (CL)	w/c = 42.2%
						25.0			Boring Log B-3 Terminated at Depth of 24 feet below ground surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

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RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-4

Project:	Proposed Gurdwara Sikh Community Center	**WAI Project No.:**	GR2523668.Y00
Location:	2345 North French Road, Getzville, Erie County, New York	**Client:**	Gurdwara Sikh Community Center

				Water Depth | Elevation (feet bgs) | (ft NAVD88)	Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)
Surface Elevation:	± NS feet Above NAVD88	**Date Started:**	7/10/2025		
Termination Depth:	24.0 feet bgs	**Date Completed:**	7/10/2025		
Proposed Location:	Building	**Logged By:**	FM	**During:** 6.0 | --	
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	EE	**At Completion:** -- | --	**At Completion:** -- | --
		Equipment:	Geoprobe 7720DT	**24 Hours:** -- | --	**24 Hours:** -- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1	X	3 - 5 - 6 - 6	15	11		TS		10" Topsoil	
							EXISTING FILL		Brown to Black, Medium Dense, Silty Sand, Cinders, Asphalt (FILL)	
						2.5				
2 - 4	S-2	X	4 - 8 - 7 - 8	13	15		ALLUVIAL DEPOSIT		Brown to Gray, Medium Dense, Silty Sand (SM)	w/c = 17.9%
4 - 6	S-3	X	6 - 8 - 6 - 4	12	14	5.0			As Above (SM)	w/c = 19.7%
						6.0 ▼				
6 - 8	S-4	X	3 - 4 - 6 - 8	12	10				Gray-Brown, Stiff, Silty Clay (CL)	w/c = 24.9%
8 - 10	S-5	X	3 - 5 - 9 - 11	16	14				As Above (CL)	w/c = 26.5%
						10.0				
10 - 12	S-6	X	10 - 9 - 4 - 4	16	13				As Above, Reddish-Brown to Gray (CL)	w/c = 32.9%
						15.0	LACUSTRINE DEPOSIT			
15 - 17	S-7	X	1/18" - 1	19	1				As Above, Reddish-Brown, Very Soft (CL)	w/c = 44.8%
						20.0				
20 - 22	S-8	X	WOH/18" - 1	24	-				As Above (CL)	w/c = 46.9%
22 - 24	S-9	X	WOH/18" - 1	24	-				As Above (CL)	w/c = 43.7%
						25.0			Boring Log B-4 Terminated at Depth of 24 feet below ground surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

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APPENDIX B
Supplemental Information (USCS, Terms & Symbols)

WHITESTONE

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UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

GRADATION*

% FINER BY WEIGHT

TRACE..... 1% TO 10%
LITTLE..... 10% TO 20%
SOME..... 20% TO 35%
AND..... 35% TO 50%

COMPACTNESS*
Sand and/or Gravel

RELATIVE DENSITY

LOOSE. ..... 0% TO 40%
MEDIUM DENSE.... 40% TO 70%
DENSE..... 70% TO 90%
VERY DENSE..... 90% TO 100%

CONSISTENCY*
Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

VERY SOFT..... LESS THAN 250
SOFT..... ..... 250 TO 500
MEDIUM..... 500 TO 1000
STIFF..... 1000 TO 2000
VERY STIFF..... 2000 TO 4000
HARD..... GREATER THAN 4000

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*

L:\Geotechnical Forms and References\Reports\USCSTRMSSYM - Buffalo.docx

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whitestoneassoc.com

GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	Qu (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		