Azure Group

December 13, 2024

2381792 Ontario Limited
646 Canyon Street, Mississauga,
ON L5H 4L9

Attention: Mr. Haider Al-Dabbagh

Re: Geotechnical Investigation Report
for the Proposed Residential Development at
490, 496 and 508 Walkers Line, Burlington, Ontario

Dear Sir:

Azure Group Inc. (Azure) was retained by 2381792 Ontario Limited. (The Client) to conduct a Geotechnical Assessment at the property 490, 496 and 508 Walkers Line, Burlington, Ontario (the "Site"). Azure thereby retained in partnership HLV2K Engineering Limited (HLV2K) to complete the Geotechnical Assessment. The purpose of this investigation was to assess the subsurface conditions at the site and provide Geotechnical engineering advice and recommendations.

Based on the information given by the client, it is our understanding that the proposed development consists of 16 townhouses. The townhouses are 3-storey over half basement and garage.

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CLOSURE

This report has been prepared for the benefit of 2381792 Ontario Limited. (The Client), and their clients.

Any other person or entity without the express written consent of Azure Group Inc. (Azure) and the client may not rely upon the report. Any use that a party makes of this report, or any reliance on decisions made based on it, are the responsibility of such parties. Azure accepts no liability and no responsibility whatsoever for damages, if any, suffered by any party as a result of decisions made or actions based on this report.

An environmental site characterization is a limited sampling of a site. The conclusions given herein are based on information gathered at the specific locations and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on the soil and groundwater conditions, as well as the history of the subject property reflecting natural, construction, and other activities. In addition, analyses have been carried out for a limited number of chemical parameters, and it should not be inferred that other chemical species are not present.

Due to the nature of the investigation and the limited data available, Azure cannot warrant against undiscovered environmental liabilities. No other warranty or representation, either expressed or implied, is included or intended in this report. Should any conditions at the site be encountered, which differ from those at the sampling locations and/or additional site information become available, Azure requests that this information be brought to our attention so that we may re-assess the conclusions presented herein. It should also be noted that current environmental Regulations, Guidelines, Policies, Standards, Protocols and Objectives are subject to change, and such changes, when put into effect, could alter the conclusions and recommendations noted throughout this report.

We trust this is satisfactory. Should any queries arise, please feel free to contact this office.

Yours truly,

AZURE GROUP INC.

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Ontario Designated Consulting Engineer
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Revised

GEOTECHNICAL INVESTIGATION REPORT
FOR THE PROPOSED RESIDENTIAL DEVELOPMENT AT
490, 496 & 508 WALKER'S LINE, BURLINGTON, ONTARIO

Client:

Azure Group

6751 Professional Court, Suite 201 & 202
Mississauga, Ontario L4V 1Y3

Prepared by:

HLV2K Engineering Limited
4-2179 Dunwin Drive, Mississauga, ON L5L 1X2

Project No. 2300843AG

December 13, 2024

HLV2K ENGINEERING LIMITED

December 13, 2024, Reference No. 2300843AG

Azure Group
6751 Professional Court, Suite 201 & 202
Mississauga, Ontario L4V 1Y3

Attention: Samantha Desgrosseilliers, BSc.Env.Sc.
Email: samantha@azuregroup.ca

Dear Ms. Desgrosseilliers,

RE: Geotechnical Investigation Report
For the Proposed Residential Development
At 490, 496 & 508 Walker's Line, Burlington, Ontario

Enclosed is a copy of geotechnical investigation report related to the above noted site.

For and on behalf of HLV2K Engineering Limited

Irfan Ahmad Khokhar, Ph.D., P.Eng., C.Eng.
Vice President and Principal

Executive Summary

HLV2K Engineering Limited (HLV2K) was retained by Azure Group (the Client) to provide the geotechnical investigation report for the proposed residential development located at 490, 496 & 508 Walker's Line, Burlington, Ontario.

Based on the information given by the client, it is our understanding that the proposed development consists of 16 townhouses. The townhouses are 3-storey over half basement and garage.

HLV2K does not have any structural information regarding the proposed development.

The purpose of this investigation was to assess the subsurface conditions at the site and provide geotechnical engineering advice and recommendations.

HLV2K Engineering Limited completed a geotechnical investigation for the proposed development at the site. This investigation was carried out by drilling eleven (11) boreholes (BH1 to BH3 & BH6 to BH13) spread on the whole site to a maximum depth of 10m below the existing ground surface. Based on the field investigation and laboratory testing, geotechnical findings and geotechnical engineering recommendations are provided in this report. The approximate locations of these boreholes (BH1 to BH3 & BH6 to BH13) are shown on Drawing 1A and the borehole logs from the investigation are attached in Appendix B.

A top layer of asphalt 50mm thick was encountered in BH6, underlain by 100mm granular base. A layer of 200 to 300 mm thick topsoil was encountered at borehole locations (BH1 to BH3 & BH7 to BH13). Asphalt/Topsoil quantities should not be calculated from the borehole information, as large variations in depth may exist around the borehole.

Native materials were encountered underlying the topsoil & fill/disturbed native material in all the boreholes. The native materials were generally non-cohesive in nature (i.e., very loose to very dense, silty sand till to sandy silt till, trace to some clay, trace to some gravel) to maximum explored depth ranging from 1.7m to 3.9m below existing ground surface.

Bedrock (weathered shale) were encountered underlying the native material in all borehole locations (BH1 to BH3 & BH6 to BH13) to maximum explored depth ranging from 2.3m to 10m below existing ground surface. Three Boreholes (BH1 to BH3) were advanced into the bedrock ranging depth of 4.6 to 10m by air rotary.

Based on the borehole information, the bedrock is suitable to support by conventional spread and strip footings founded on sound shale for a geotechnical reaction of 400kPa at the Serviceability Limit States (SLS), and for a factored geotechnical resistance of 600kPa at the Ultimate Limit States (ULS). The footing should extend 0.6 meters into the sound shale bedrock. The geotechnical reactions and factored geotechnical resistances including the corresponding highest founding elevations at the borehole locations are summarized in Table 4.1. The recommended founding levels and geotechnical reactions for the proposed structures would need to be confirmed by HLV2K.

During drilling and at completion of drilling, the short-term ground water was observed in borehole BH1 & BH3, the groundwater level was observed varied between 3.3m to 4.4m below the existing ground surface. Upon completion of the drilling, monitoring well was installed by the client at the location of BH1 to BH3. Based on the water table reading obtained on December 18, 2023, the groundwater level was observed varied between 3.1m to 6.4m below the existing ground surface. Groundwater level measurements were made by Azure Group (the Client) at different times to observe water level fluctuations in the monitoring wells and presented in Table 3.4. HLV2K conducted three percolation tests above the bedrock and above groundwater table to estimate the percolation rate.

Perched water may be encountered in excavated areas during wet seasons. A perched water condition can occur due to the accumulation of surface water in the more pervious fill overlying less pervious deposit, or at the interface of fill and native soils, especially during wet periods. Note that the groundwater level can vary and is subject to seasonal fluctuations and in response to major weather events. The depth of groundwater table can also be influenced by the presence of underground features such as utility trenches, and this may affect the construction procedures, costs and schedules.

Groundwater problems are anticipated during excavation and installation of foundations below the existing ground surface. A positive dewatering system will be required to deal with water problems during the construction. We recommend carrying out a hydrogeological investigation report to assess the dewatering requirements.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). As a general rule, the excavations in Type 1 and 2 soils can be carried out without support using side slopes 1H:1V, while the bottom 1.2 m of the excavation can be cut vertically and could retain the wall for a short period of time. The excavation in Type 3 soil can be carried out maintaining the side slopes not steeper than 1H:1V. The excavations in Type 4 soils will require minimum flatter side slopes of 3H to 1V. These slopes should be visually monitored for any movement especially if workers are present within the excavation. These temporary slopes should only be utilized for a short duration. If an excavation contains more than one type of soil, the soil shall be classified as the type with the highest number among the types present.

The existing topsoil present on the site is not suitable for supporting the slab-on-grade. In order to have maintenance free floor slab, we recommend that all topsoil, and surficial softened native soils are removed and the base thoroughly proof rolled. The fill required to raise the grade can consist of inorganic soil, placed in shallow lifts and compacted to 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

The select inorganic fill and native soils free from topsoil and organics can be used as general construction backfill where it can be compacted with appropriate compactors. Loose lifts of soil, which are to be compacted, should not exceed 200 mm. Majority of the on-site inorganic fill is not considered suitable for backfilling, imported fill materials with suitable moisture (preferably granular) must be used to replace the existing fill under the slab-on-grade and in trenches.

Based on the borehole information, the subject site for the proposed residential development can be classified as Class 'D' for seismic site response according to Table 4.1.8.4.A of OBC 2012 provided the footings will be supported on undisturbed native deposits. Consideration could be given to conduct an earthquake site assessment with the use of in-situ testing of the seismic characteristics (i.e. Geophysical testing – Multi-channel Analysis of Surface Waves-MASW) which can lead to an improved site classification (i.e. from Class D to Class C).

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1 INTRODUCTION

HLV2K Engineering Limited (HLV2K) was retained by Azure Group (the Client) to carry out a geotechnical investigation for the proposed residential development at 490, 496 & 508 Walker's Line, Burlington, Ontario (the Site). The approximate location of the proposed residential development is shown on Drawings 1 and 1A.

This work was conducted in accordance with our proposal 2300843AG dated October 31, 2023. Authorization to Proceed (ATP) was issued to HLV2K November 13, 2023.

The site is currently vacant and covered by grass and tree coverage, along with one existing heritage property.

Based on the information provided to us by the client, it is our understanding that the proposed development consists of 16 townhouses. The townhouses are 3-storey over half basement and garage.

The purpose of this investigation was to assess the subsurface conditions at the site and from the findings in the boreholes provide geotechnical engineering recommendations for the following:

a) Subsoil and groundwater conditions across the site.

b) Comments on the re-use of the existing materials for structural fill.

c) Comments on excavations and dewatering

d) Recommend allowable safe net bearing pressures for the design of foundations.

e) Recommend perimeter and underfloor drainage systems.

f) Comments on earthquake considerations.

g) Comments on floor slab construction.

h) Comments on frost susceptibility of the native soils.

i) Comments on asphalt/paving design.

This report is provided based on the terms of reference presented above and, in the text, and on the assumption that the design will be in accordance with the applicable codes and standards. If there is any change in the design features relevant to the geotechnical analyses, or if any question arises concerning the geotechnical aspects of the codes and standards, HLV2K should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of HLV2K can be relied upon.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. The format and contents are guided by client specific needs and economics and do not conform to generalized standards for services. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for Azure Group (the Client). and their architects, consultants, contractors, and designers. Third party use of this report without HLV2K's consent is prohibited. The limitation conditions presented in Appendix A form an integral part of the report and they must be considered in conjunction with this report.

2 FIELD AND LABORATORY WORK

Borehole locations for this investigation were surveyed and marked on the ground by the client personnel in accordance with their requirements. Prior to drilling operations, underground utilities were cleared at the borehole locations by the public utilities' companies.

For this geotechnical investigation, eleven boreholes (BH1 to BH3 & BH6 to BH13) were drilled to depths varying from 3.1 m to10 m below the existing ground surface on December 7, 2023, and December 8, 2023. The boreholes were advanced by a drilling sub-contractor under the supervision of HLV2K personnel. HLV2K conducted three percolation tests above the bedrock and above groundwater table to estimate the percolation rate, and BH4, and BH5 were conducted by the client for the purpose of environmental investigation. Although the client kept drilling in BH1 to BH3 in order to reach underground water by using an air rotary system, the HLV2K representative experienced auger refusal in BH6 to BH13.The boreholes were advanced by utilizing continuous flight solid stem augers. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N (63.5 kg) and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method (ASTM D1586). The number of blows of the hammer required to drive the sampler into the relatively undisturbed ground by a vertical distance of 300 mm (12 inches) was recorded as SPT 'N' value of the soil which indicated the consistency of cohesive soils or compactness of non-cohesive soils. The results of SPT are shown in the Record of Boreholes. The samples were logged in the field and returned to the HLV2K laboratory for detailed examination by the project engineer and for laboratory testing. The approximate borehole locations are shown on Drawing 1A.

Water level observations were made during drilling and at the completion of the drilling operations. Upon completion of drilling, each borehole was backfilled in accordance with current regulations.

The locations of the boreholes were established in the field by Azure Group (the Client). The borehole elevation survey was not part of HLV2K' scope and Azure Group have provided surface elevations for each borehole. Note, these elevations are approximate only, for relating borehole soil stratigraphy and should not be used or relied on for other purposes.

As well as visual examination in the laboratory, soil samples were tested for water content determinations. Grain size analyses were carried out on selected soil samples as presented in Table 2.1. The results of the laboratory tests are presented on the borehole logs, and also on Drawings 2 & 2a.

Table 2.1: Sample Details for Grain Size Analyses and Atterberg Limits

Sample No.	Approximate Depth Below the Existing Ground Surface (m)	Approximate Geodetic Elevation (m)	Type of Test	Lab Results
BH6-Granular	0.05 – 0.15	92.8 – 92.7	SA	Drawing 2
BH3-SS3	1.5 – 2.1	91.6 - 91.0	MH	Drawing 2a
BH12- SS4	2.3 – 2.9	89.6 – 89.0	MH	Drawing 2a

Notes: -MH stands for sieve and hydrometer grain size analyses
-SA stands for sieve analysis only

The results of grain size analyses and Atterberg Limits are presented on subject referenced drawings.

3 RESULTS OF THE INVESTIGATION

The site is located 490, 496 & 508 Walker's Line, Burlington, Ontario. The site key plan and the borehole locations are presented on Drawings 1 and 1A. Notes on sample descriptions and the general features of fill material and native soils are presented on Drawing 1B. Detailed subsurface conditions are presented on borehole log sheets, attached as Appendix B.

Details of the subsurface conditions encountered at the borehole locations are provided on the borehole logs following the text of this report. The borehole logs indicate the subsurface conditions only at the borehole locations. Note the material boundaries indicated on the attached sheets are approximate and based on visual observations. These boundaries typically represent a transition from one material type to another and should not be regarded as an exact plane of geological change. It should be pointed out that the subsurface conditions will vary across this site.

3.1 Subsurface Conditions

The subsurface soil and groundwater conditions are summarized as follows.

3.1.1 Asphalt

A top layer of asphalt 50mm thick was encountered in BH6, underlain by 100mm granular base. Asphalt quantity should not be calculated from the borehole information, as large variations in depth may exist around the borehole. The Encountered Pavement Structure, and results are summarized in Table 3.1.

Table 3.1: Encountered Pavement Structure

Borehole #	Surface Elevation (m)	Asphalt Thickness (mm)	Granular Thickness (mm)
BH6	92.8	50	100

3.1.2 Topsoil

A layer of 200 to 300 mm thick topsoil was encountered at borehole locations (BH1 to BH3 & BH7 to BH13). It should be noted that topsoil quantities should not be calculated from the borehole information, as large variations in depth may exist between and beyond boreholes.

3.1.3 Native Soils

Native materials were encountered underlying the topsoil & fill/disturbed native material in all the boreholes. The native materials were generally non-cohesive in nature (i.e., very loose to very dense, silty sand till to sandy silt till, trace to some clay, trace to some gravel) to maximum explored depth ranging from 1.7m to 3.9m below existing ground surface.

The grain-size distribution of selected soil samples is enclosed in Drawing 2 & 2a, and results are summarized in Table 3.2.

Table 3.2: Summary of Grain-Size Distribution

Sample No.	Depth Below the Existing Ground Surface (m)	Sieve and Hydrometer Test Results			
		Gravel %	Sand %	Silt %	Clay %
BH6-Granular	0.05 – 0.15	58	37	5	
BH3-SS3	1.5 – 2.1	-	46	32	12
BH12- SS4	2.3 – 2.9	12	34	38	16

3.2 Bedrock (Shale)

Bedrock (weathered shale) were encountered underlying the native material in all borehole locations (BH1 to BH3 & BH6 to BH13) to maximum explored depth ranging from 2.3m to 10m below existing ground surface. The Inferred Depth and results are summarized in Table 3.3.

Table 3.3: Inferred Depth and Elevation of Shale Bedrock Surface

Borehole No.	Inferred Depth of Shale Bedrock Surface (Weathered) (mbgs)	Approximate Geodetic Elevation (m)
BH1	2.3	89.8
BH2	2.5	89.8
BH3	2.7	90.4
BH6	2.6	90.2
BH7	2.7	90.0
BH8	2.7	89.8
BH9	2.6	89.8
BH10	2.6	89.6
BH11	2.6	90.0
BH12	2.8	89.1
BH13	2.8	89.3

3.3 Groundwater Conditions

During drilling and at completion of drilling, the short-term ground water was observed in borehole BH1 & BH3, the groundwater level was observed varied between 3.3m to 4.4m below the existing ground surface. Perched water may be encountered in excavated areas during wet seasons. A perched water condition can occur due to the accumulation of surface water in the more pervious fill overlying less pervious deposit, or at the interface of fill and native soils, especially during wet periods. Note that the groundwater level can vary and is subject to seasonal fluctuations and in response to major weather events. The depth of

groundwater table can also be influenced by the presence of underground features such as utility trenches, and this may affect the construction procedures, costs and schedules. The possibility of groundwater level fluctuations at the site should be considered when designing and developing the construction plans for the project.

The monitoring wells were installed at selected borehole locations (BH1 to BH3) by the client. Groundwater level measurements were made at different times to observe water level fluctuations in the monitoring wells and presented in Table 3.4.

Table 3.4: Summary of Groundwater Level Observation in the Installed Monitoring Wells

MW ID	Borehole Depth (mbgs)	Groundwater Level Observations
		18-DEC-2024
		Depth (mbgs)
BH1	8.4	3.1
BH2	10	6.4
BH3	7.6	4.2

Based on the water table reading obtained on December 18, 2023, the groundwater level was observed at 3.1m to 6.4m below the existing ground surface. Groundwater level readings provided by the Client.

Perched water may be encountered in excavated areas during wet seasons. A perched water condition can occur due to the accumulation of infiltrated water in the more pervious fill overlying less pervious deposit, or at the interface of fill and native soils, especially during wet periods. We recommend carrying out a hydrogeological investigation report to assess the dewatering requirements.

It must be noted that the ground water levels may fluctuate seasonally based on the amount of precipitation and surface runoff, and wet soils may be encountered to about 0.6 m higher than the water levels noted due to capillary rise in fine cohesionless soils. It should be noted that excavations carried through and below the water bearing cohesionless soils (sand, silt), will experience loosening and sloughing of the sides and unstable excavation base thus requiring relatively flatter excavation slopes.

4 DISCUSSION AND RECOMMENDATIONS

The following section of the report provides our interpretation of the factual geotechnical data obtained during our field evaluation and is intended for the guidance of the design engineer only. Where comments are made on aspects of construction, they are provided only to highlight those aspects which could affect the design of the project. Contractors bidding on or undertaking the work should make their own interpretation of the subsurface information provided as it affects their proposed construction methods, equipment selection, scheduling, safety and the like.

4.1 Foundations

4.1.1 Footings founded on Bedrock (Shale)

The proposed structures can be supported by conventional spread and strip footings founded on Bedrock (Shale) for a geotechnical reaction of 400kPa at the Serviceability Limit States (SLS), and for a factored geotechnical resistance of 600kPA at the Ultimate Limit States (ULS). The footing should extend 0.6 meters into the shale bedrock The geotechnical reactions and factored geotechnical resistances including the

corresponding highest founding elevations at the borehole locations are summarized in Table 4.1. The recommended founding levels and geotechnical reactions for the proposed structures would need to be confirmed by HLV2K at the time of construction.

The bearing pressures and the highest founding elevations are given in the following Table 4.1.

Table 4.1: Bearing Values & Founding Levels of Footings on Bedrock.

BH No.	Material	Geotechnical Reaction at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Depth below Existing Grade (m)	Founding Level at or Below Elevation (m)
BH1	Bedrock (Shale)	400	600	3	89.1
BH2	Bedrock (Shale)	400	600	3	89.3
BH3	Bedrock (Shale)	400	600	3	90.1
BH6	Bedrock (Shale)	400	600	3	89.8
BH7	Bedrock (Shale)	400	600	3	89.7
BH8	Bedrock (Shale)	400	600	3	89.5
BH9	Bedrock (Shale)	400	600	3	89.4
BH10	Bedrock (Shale)	400	600	3	89.2
BH11	Bedrock (Shale)	400	600	3	89.6
BH12	Bedrock (Shale)	400	600	3	88.9
BH13	Bedrock (Shale)	400	600	3	89.1

4.1.2 Other Comments on Foundations

Variations in the soil conditions are expected in between the borehole locations, and during construction, the soil bearing pressures should be confirmed by the Geotechnical Engineer.

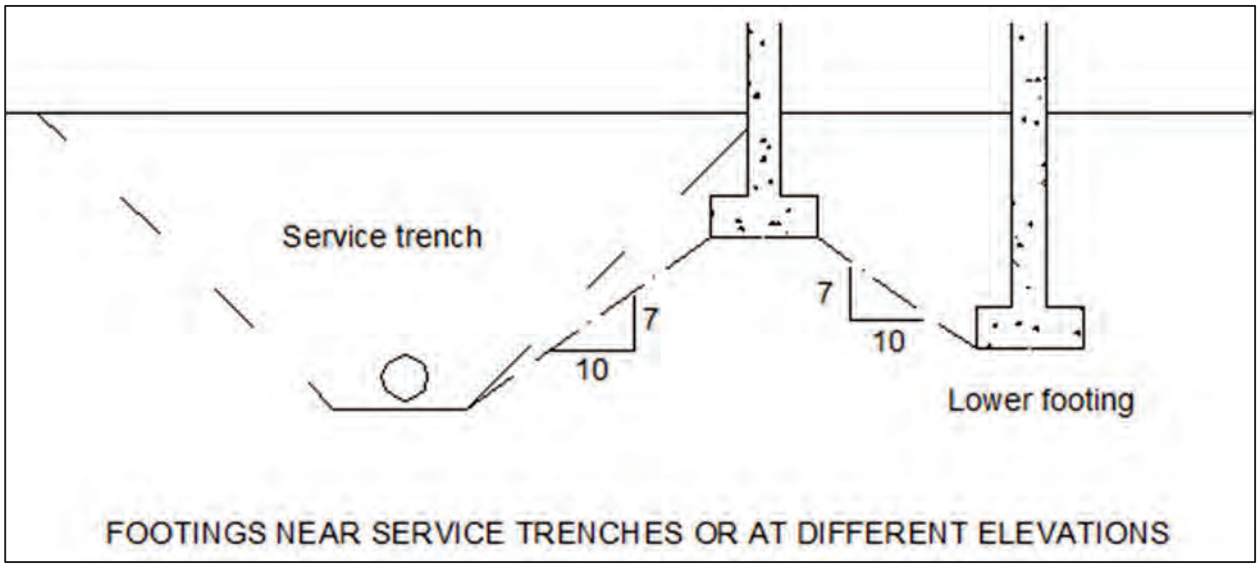
The base of all footings must be inspected by this office to ensure of their placement on the competent native soil.

It is noted that native soils tend to weather rapidly and deteriorate on exposure to the atmosphere or surface water. Hence, foundation bases which remain open for an extended period of time should be protected by a skim coat of lean concrete, with a minimum thickness of 50mm.

Footings designed to the specified bearing capacity at the serviceability limit states (SLS) are expected to settle less than 25 mm total and 19 mm differential.

In the vicinity of the existing buried utilities, footings must be lowered to undisturbed native soils, or alternatively the services must be structurally bridged.

Where it is necessary to place footings at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing. Footings close to underground services should also be set back from the services based on this slope limitation as shown in the following Figure.



FOOTINGS NEAR SERVICE TRENCHES OR AT DIFFERENT ELEVATIONS

During winter construction, foundations and slab (if applicable) on grade must not be poured on frozen soil. Foundations must be adequately protected at all times from cold weather and freezing conditions.

Design frost protection depth for the general area is 1.2m. Therefore, for frost protection, new footings should have a permanent earth cover of at least 1.2m or be provided with an equivalent thickness of extruded rigid exterior-grade polystyrene insulation. In case of rip-rap (rock fill), only one-half of the rock fill thickness should be assumed to be effective in providing frost protection.

The recommended bearing capacities and the corresponding founding elevations would need to be confirmed by the representative of HLV2K during construction. It should be noted that the recommended bearing capacities have been calculated by HLV2K from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by HLV2K to validate the information for use during the construction stage. In this regard, HLV2K should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, HLV2K will assume no responsibility for interpretation of the recommendations in the report.

4.1.3 Construction Considerations

Because of the powdery and silty/clayey nature of the shale bedrock when excavated, there is some potential for fouling of drainage systems unless the excavation base is well cleaned and sumps/pumps are filtered and periodically backwashed. A skim coat concrete mud slab of minimum 50 mm in thickness (5 MPa compression strength) is placed under conventional footings in order to mitigate this problem. For slabs foundations, the skim coat is limited to 50 mm under the assumption that it will sustain some cracking/structural disconnection which is necessary in order to relieve the sub-slab groundwater pressures, allowing seepage through the mud slab into the subslab drainage layer.

All foundation bases will need to be inspected by HLV2K Engineering Limited prior to pouring concrete or placing the mud slab.

4.2 Floor Slab and Permanent Drainage

Based on the anticipated lowest basement level (2.5m below existing grade), the basement slab subgrade is expected to consist of generally very dense sandy silt till to silty sand till, non cohesive soils and Bedrock (Shale). The slab subgrade should be assessed by a geotechnical engineer and disturbed/soft/wet subgrade areas should be sub excavated and replaced with imported Granular A and/or Granular B Type 2. The imported granular material must meet the specifications defined in OPSS-1010-13. The existing fill free from topsoil and organics may be used to raise the grade, provided it is confirmed by a qualified geotechnical professional from HLV2K at the time construction. The fill required to raise the grade must be placed in shallow lifts (each lift not more than 200 mm) and compacted to at least 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

It is necessary that the basement floor slab be provided with a capillary moisture barrier and drainage layer. This is provided by placing the slab on a minimum layer of 19 mm clear stone (OPSS 1004) compacted by vibration to a compact state. Regardless of the approach to slab construction, the floor slabs that are to have bonded floor finishes (such as tiles with adhesives) should be provided with a capillary moisture and vapour barrier. The floor manufacturers have specific requirements for vapor barrier; therefore, the floor designer/architect must ensure that a provision of appropriate vapour barrier conforming to specific floor finish product requirements is incorporated in the project specifications. Adequate testing must be carried out to ensure acceptable levels of moisture/relative humidity in the concrete slab prior to the installation of floor finish(es). Studies indicate that a provision of 200 mm thick 19 mm clear stone base (OPSS 1004) under the slab helps provide a good capillary moisture break provided the granular base is positively drained. However, this provision does not replace the floor manufacturers' specific requirement(s) for a vapour barrier.

A moisture barrier consisting of at least 200 mm thick layer of well compacted 19 mm clear crushed stone is recommended to place directly under the floor slab. The stone bed would act as a barrier and prevent capillary rise of moisture from the subgrade to the floor slab. This moisture barrier has been proven to be effective for conventional floor surfaces such as carpet, vinyl tile and ceramic tile. However, if special floor coverings such as sheet P.V.C. with heat sealed seams, as is used in gymnasiums, is considered, either a high efficiency vapour barrier or venting may be required to prevent moisture accumulating between the concrete floor and the P.V.C. flooring.

The estimated modulus of subgrade reaction (ks) equal to 20 MN/m3 may be used for the design of slab-on-grade supported on native or structural fill soils, provided that the construction is in accordance with the recommendations provided herein. If structural fill (Granular A or B Type II) having minimum thickness of

300 mm, this value can be increased to 30 MN/m3. The estimated value provided above may need to be adjusted based on the structure size and locations of detail design.

The floor slabs should not be tied to any load-bearing walls or columns unless they have been designed accordingly. Contraction/expansion joints should be provided for the slabs as required by the structural engineer.

If the floor slab is more than about 200 mm higher than the exterior grade, then perimeter drainage is considered to be necessary.

To assist in maintaining a dry basement from seepage, it is recommended that exterior grades around the building be sloped away at a 2 percent gradient or more, for a distance of at least 1.2 m. Where the structure is made directly against a shored excavation, a perimeter drainage system is provided by forming a drained cavity with prefabricated drain core material such as Miredrain 2000 (Mirafi) or Terradrain 20 (Terrafix) which can be incorporated between the shoring and the cast-in-place concrete foundation wall. The composite drainage board then discharge to the drainage layer beneath the lowest floor slab through ports made in the foundation wall above the footing level. The subfloor drainage system directs the discharge water to the building stormwater sump. A conceptual underfloor drainage is shown on Drawing 3. It should be note that upon completion of the detailed design of the below grade structure, the underfloor drainage system design shall be reviewed and finalized.

In addition to the perimeter drainage, a provision of a sub-floor drainage system is installed beneath the basement floor slab is also recommended. The sub-floor drainage system should consist of perforated pipes surrounded by granular filter consisting of a free draining material consisting of 19 mm clear stone (OPSS 1004) wrapped in filter fabric (Terrafix 270R or equivalent or OPSS HL 8 Course Aggregate) located at a maximum spacing of 3.5 m on centres (refer to attached Drawing 4 – Perimeter and Under Floor Drainage).

The perimeter and sub-floor drains should outlet to a suitable discharge point under gravity flow or connected to a sump pit(s) located in the lowest level of the basement, and the water be pumped up to a suitable discharge point. The size of the sump should be adequate to accommodate anticipated water seepage. A duplex pumping arrangement (main pump with a provision of a backup pump) on emergency backup power is recommended. The pumps should have sufficient capacity to accommodate the anticipated maximum peak water flow. The sub-drain installation and outlet must confirm to the plumbing code requirements.

The subfloor drainage system is a critical structural element at this site, since it keeps water pressure from acting on the basement floor slab. As such the storm sump that ensures the performance of this system must have duplexed pump arrangement on emergency power, as noted above, for 100 percent pumping redundancy.

The under-slab vapour retarder specifications, selection and installation shall conform to ASTM EI745 and ASTM E1643. The moisture vapour measurement tests shall conform to RH: ASTM F2170, RH: ASTM F2420 and Calcium Chloride: ASTM F1869. The Surface Applied Moisture Vapour Barrier system shall meet the guidelines established in ASATM F3010-13.

4.3 Excavations, Backfill and Ground Water Control

Excavations can be carried out with a heavy hydraulic backhoe. Considering topsoil and/or disturbed material removal, it is anticipated that the excavation will be extended to about 0.4 m below the existing

grade. Based on the borehole information, Groundwater problems are not anticipated for the installation of foundations below the existing ground surface. Any seepage, which may occur during wet periods through fill, can be removed by conventional pumping from sumps for excavation.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). As a general rule, the excavations in Type 1 and 2 soils can be carried out without support using side slopes 1H:1V, while the bottom 1.2m of the excavation can be cut vertically and could retain the wall for a short period of time. The excavation in Type 3 soil can be carried out maintaining the side slopes not steeper than 1H:1V. The excavations in Type 4 soils will require minimum flatter side slopes of 3H to 1V. These slopes should be visually monitored for any movement especially if workers are present within the excavation. These temporary slopes should only be utilized for a short duration. If an excavation contains more than one type of soil, the soil shall be classified as the type with the highest number among the types present.

The existing native soil (free of topsoil) can be used as general construction backfill where it can be adequately compacted with suitable type compactors. Loose lifts of soil, which are to be compacted, should not exceed 200 mm. Noted that the excavated soils are subject to moisture content increase during wet weather which would make these materials too wet for adequate compaction. Stockpiles should therefore be compacted at the surface or be covered with tarpaulins to help minimize moisture intake.

Imported granular fill, which can be compacted with handheld equipment, should be used in confined areas. The excavated soils are not considered to be free draining. Where free draining backfill is required, imported granular fill such as OPSS Granular B should be used.

Stockpiles should be placed well away from the edge of excavation and their height should be controlled so that they do not surcharge the sides of the excavation. Surface drainage should be controlled to prevent flow of surface water into the excavations. Excavation safety and stability of temporary construction slopes and lateral support systems are the contractor's responsibility.

During winter construction, concrete and/or fill must not be placed on frozen fill or soil. Subgrades and foundations must be placed adequately protected at all times from cold weather and freezing conditions.

Based on the borehole information, it is understood that there may be some ground water seepage in the excavation in some areas (depending upon the depth of excavation). This seepage will likely emanate from the perched ground water generally present within the earth fill materials and/or from the ground water seepage from very moist/wet silty deposit. The perched ground water seepage emanating from above the static ground water table should diminish slowly and can be controlled by continuous pumping from filtered sumps at the base of the excavation. The amount of seepage is expected to increase with the depth of excavation. For excavations extending into the underlying very moist and wet silty deposit, and/or below the prevailing ground water level, it will be necessary to lower the ground water level and maintain it below the excavation base (at least 1.0 m) prior to and during the subsurface construction. Without lowering water level, the subgrade in wet permeable soil zones will become weak and lose its integrity to support.

All excavations should be inspected, evaluated and approved by the Geotechnical Engineer who is familiar with the findings of this investigation. Immediately after the approval, a minimum 50 m thick skim coat of concrete of minimum compressive strength of 2 MPa (i.e. mud slab) can be placed in the excavations for ease of construction.

4.4 Earth Pressures

The lateral earth pressures acting on retaining walls or underground structures may be calculated from the following expression:

$$p = K(\gamma h + q)$$

where p = Lateral earth pressure in kPa acting at depth h

K = Earth pressure coefficient equal to 0.4 for vertical walls and horizontal Granular B backfill used for permanent construction. Water pressure must be considered, if continuous wall drains are not used.

γ = Unit weight of backfill, a value of 20.5 kN/m^3 may be assumed

h = Depth to point of interest in meters

q = Equivalent value of surcharge on the ground surface in kPa

The above expression assumes that the perimeter drainage system prevents the build up of any hydrostatic pressure behind the wall.

4.5 Earthquake Considerations

Based on the borehole information, the subject site for the proposed residential development can be classified as Class 'D' for seismic site response according to Table 4.1.8.4.A of OBC 2012 provided the footings will be supported on undisturbed native deposits.

Consideration could be given to conduct an earthquake site assessment with the use of in-situ testing of the seismic characteristics (i.e., Geophysical testing – Multi-channel Analysis of Surface Waves-MASW) which can lead to an improved site classification (i.e., from Class D to Class C).

4.6 Underground Utility Trenches

As a part of the site development, a network of utility trenches needs to be constructed.

4.6.1 Trenching

It is expected that in most cases the trenches will be excavated through loose to compact fill/disturbed native and/or soft to firm clayey silt to silty clay.

Groundwater is anticipated to be a problem for excavating utility trenches to approximate depth of 3 m from the existing grades. Any cut below the groundwater level (positive dewatering system such as well points or educators or deep wells will be required. Otherwise, it will result in an unstable excavation base and flowing sides. The groundwater table must be lowered one meter below the lowest excavation level. Test pit should be carried out in this area prior to the excavation to further explore the groundwater and seepage conditions. A specialized dewatering contractor should install the dewatering system.

4.6.2 Bedding

The undisturbed native deposits or engineered fill will provide adequate support for the utility pipes and allow the use of normal Class B type bedding.

The recommended minimum thickness of granular bedding below the invert of the pipes is 150 mm. The thickness of the bedding may, however, have to be increased depending on the pipe diameter or in

accordance with local standards or if wet or weak subgrade conditions such are encountered, especially when the soil at the trench base level consists of wet, dilatant silts, sandy silts and soft to firm clayey silt to silty clay. The bedding material should consist of well graded granular material such as Granular 'A' or equivalent. After installing the pipe on the bedding, a granular surround of approved bedding material, which extends at least 300 mm above the obvert of the pipe, or as set out by the local authority, should be placed.

To avoid the loss of soil fines from the subgrade, uniformly graded clear stone should not be used unless, below the granular bedding material, a suitable, approved filter fabric (geotextile) is placed. The geotextile should extend along the sides of the trench and should be wrapped all around the poorly graded bedding material.

4.6.3 Backfilling of Trenches

The existing native soil (free of topsoil) can be used as general construction backfill where it can be adequately compacted with suitable type compactors.

The backfill should be placed in maximum 200 mm thick layers at or near (±2%) of the optimum water content and each layer should be compacted to at least 95% SPMDD to within 1.5 m to final subgrade. In the upper 1 m, the degree of compaction should be minimum 98% SPMDD, except for landscape area. Unsuitable materials such as organic soils, boulders, cobbles, frozen soils, etc. should not be used for backfilling.

The on-site excavated soils should not be used in confined areas (e.g. around catch basins and laterals under roadways) where heavy compaction equipment cannot be operated. The use of imported granular fill together with an appropriate frost taper would be preferable in confined areas and around structures, such as catch basins.

4.6.4 Stripping, Sub-excavation and Grading

The final subgrade should be cambered or otherwise shaped properly to facilitate rapid drainage and to prevent the formation of local depressions in which water could accumulate.

Owing to the clayey (i.e. impervious) nature of the subsoil at some locations of the site, proper cambering and allowing the water to escape towards the sides (where it can be removed by means of subdrains) is considered to be beneficial for this project. Otherwise, any water collected in the granular sub-base materials could be trapped thus causing problems due to softened subgrade, differential frost heave, etc. For the same reason damaging the subgrade during and after placement of the granular materials by heavy construction traffic should be avoided. If the moisture content of the local material cannot be maintained at ±2% of the optimum moisture content, imported granular material may need to be used.

Any fill required for regarding the site or backfill should be select, clean material, free of topsoil, organic or other foreign and unsuitable matter. The fill should be placed in thin layers and compacted to at least 95% of its SPMDD. The degree of compaction should be increased to 98% within the top 1.0 m of the subgrade, or as per Region Standards. The compaction of the new fill should be checked by frequent field density tests.

4.6.5 Construction

Once the subgrade has been inspected and approved, the granular base and sub-base course materials should be placed in layers not exceeding 200 mm (uncompacted thickness) and should be compacted to at least 100% of their respective SPMDD. The grading of the material should conform to current OPS Specifications.

The placing, spreading and rolling of the asphalt should be in accordance with OPS Specifications or, as required by the local authorities.

Frequent field density tests should be carried out on both the asphalt and granular base and sub-base materials to ensure that the required degree of compaction is achieved.

4.6.6 Drainage

All paved surfaces should be sloped to provide satisfactory drainage towards catch basins. Installation of full-length subdrains on all roads is recommended. The subdrains should be properly filtered to prevent the loss of (and clogging by) soil fines.

4.7 Pavements

The pavement structures presented in Table 4.2 can be used for the design of proposed parking areas and access roadways during construction under ideal or non-ideal subgrade conditions.

The explored fill generally extended not more than 0.4 m in the boreholes. The subgrade is expected to consist of earth fill materials and/or native soils depending upon the proposed grades of parking structure. The zone of influence of the pavement subgrade is generally estimated within 1 m below the underside of the granular sub-base.

4.7.1 Ideal Conditions

Under ideal conditions, the zone of the pavement subgrade within 1 m below the underside of the granular sub-base must be compacted to at least 95% of its Standard Proctor Maximum Dry Density (SPMDD) with moisture content 2 to 3% drier than its optimum and then the compaction should be increased to 98% of SPMDD in the upper 0.6 m of the subgrade.

4.7.2 Non-Ideal Conditions

If the roads are to be constructed during the wet seasons and if the subgrade is unsuitable then either the top 0.6m of the subgrade should be replaced with drier, compacted, select subgrade material meeting as OPSS 1010 or the top 0.8 m of the subgrade should be replaced with granular material meeting the specifications defined in OPSS-1010-13. This will be assessed at the time of access roadways construction and parking area.

The existing fill within 0.6 m from the underside of sub-base must be excavated and assessed its stability and suitability according to ideal/non-ideal conditions criteria stipulated by the local authority having jurisdiction over the project site. Depending upon evaluation either the excavated material will be re-used or if found to be unsuitable replaced with select subgrade /granular materials.

In preparation of the subgrade, prior to placement of the granular sub-base and base materials, the subgrade must be proof rolled to determine its stability and suitability for access road construction and parking area by a qualified geotechnical professional.

The recommended pavement structures provided in Table 4.2 are based upon an estimate of the subgrade soil properties determined from visual examination and textural classification of the soil samples. Consequently, the recommended pavement structures should be considered for preliminary design purposes only. A functional design life of eight to ten years has been used to establish the pavement recommendations. This represents the number of years to the first rehabilitation, assuming regular maintenance is carried out. If required, a more refined pavement structure design can be performed based on specific traffic data and design life requirements and will involve specific laboratory tests to determine

frost susceptibility and strength characteristics of the subgrade soils, as well as specific data input from the client.

Table 4.2: Recommended Pavement Structure Thickness

Pavement Layer	Compaction Requirements	Light Duty Parking (Cars)	Heavy Duty Parking (Delivery Trucks)
Asphaltic Concrete	92 to 96.5% Maximum Relative Density	40 mm OPSS HL 3 40 mm OPSS HL 8	50 mm OPSS HL 3 75 mm OPSS HL 8
OPSS Granular A Base (or 20mm Crushed Limestone)	100% SPMDD*	150 mm	150 mm
OPSS Granular B	100% SPMDD	200 mm	350 mm

* Denotes Standard Proctor Maximum Dry Density, ASTM-D698
The subgrade must be compacted to 98% SPMDD for at least the upper 300 mm unless accepted HLV2K.

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure uniform subgrade moisture and density conditions are achieved.

Alternatively, consideration should be given to the use of rigid Portland Cement Concrete pavement where there is intense truck use, parking and turning of vehicles. The following Table 4.3 provides the minimum recommended rigid pavement structure.

Table 4.3: Minimum Rigid Concrete Pavement Structure

Pavement Layer	Compaction Requirements	Heavy Duty Pavement
Portland Cement Concrete (CAN3-CSA A23.1) - Class C-2	CAN3-CSA A23.1	225 mm
Base Course: Granular A (OPSS 1010) or 19 mm Crusher Run Limestone	100% Standard Proctor Maximum Dry Density (ASTM-D698)	150 mm

It must be noted that this structure does not provide full protection of the subgrade from frost penetration; therefore, the pavement slabs must be separated from the building structure.

Control of surface water is an important factor in achieving a good pavement life. The need for adequate subgrade drainage cannot be over-emphasized. The subgrade must be free of depressions and sloped (preferably at a minimum grade of two percent) to provide effective drainage toward subgrade drains. Grading adjacent to the pavement areas should be designed to ensure that water is not allowed to pond adjacent to the outside edges of the pavement. Continuous pavement subdrains should be provided along both sides of the driveway/access routes and drained into respective catch basins to facilitate drainage of the subgrade and granular materials. The subdrain invert should be maintained at least 0.3 m below subgrade level. Subdrains should also be provided at all catch basins within the parking area.

Concrete should be proportioned, mixed, placed and cured in accordance with the requirements of CSA Standard CAN/CSA-A23.1-19 for class C-2 exposure, with the following key requirements:

minimum 28-day compressive strength: 32 MPa

air entrainment: 5 to 8 %

maximum water/cementing material ratio: 0.45

Concrete should be placed and spread in a manner which avoids segregation. It should be consolidated with a vibratory screed or internal vibrators. Consolidation close to form edges must be given special consideration.

Concrete should be finished to a thickness tolerance of 0 to plus 10 mm. Concrete must be cured adequately to provide durability and strength. Curing can be accomplished by wet blankets, sprinkling, plastic sheets and curing compounds. Curing should begin immediately after loss of bleed water.

Concrete pavement should be provided with joints to control stresses and prevent the formation of irregular cracks. Recommended joint spacing is 24 to 30 times slab thickness to a maximum dimension of about 4.0m. We would also recommend that load transfer dowels be placed at 50 mm spacing at the joints.

Sawed joints should be cut before random cracking occurs in the slab, usually within 6 to 18 hours after concrete placement. The maximum thickness (aperture) of control joints should 6 mm, while the depth of control joints should be about 1/4th of the slab thickness.

The pavement should be closed to traffic until a minimum flexural strength of 2 MPa is attained or an approximate compressive strength of 20 MPa. This minimum strength is generally reached when the concrete can be saw cut without ravelling.

Additional comments on the construction of parking areas and access roadways are as follows:

1. Removal of all fill for pavement is not necessary. As part of the subgrade preparation, proposed parking areas and access roadways should be stripped fill at least in the upper 0.8 m below subgrade and surficially softened native soils and the base then should be thoroughly proof rolled by using a loaded truck. Unstable areas or areas with excessive organic materials should be further sub-excavated. The fill required to raise the grade can consist of inorganic soil, placed in shallow lifts and compacted to minimum 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

2. The locations and extent of sub-drainage required within the paved areas should be reviewed by this office in conjunction with the proposed lot grading. Assuming that satisfactory crossfalls in the order of two percent have been provided, subdrains extending from and between catch basins may be satisfactory. In the event that shallower crossfalls are considered, a more extensive system of sub-drainage may be necessary and should be reviewed by HLV2K.

3. The above pavement structure considers that construction will be carried out during the dry period of the year. If the subgrade becomes excessively wet or rutted during construction activities, additional sub-base material or placement of geogrids may be required. The need for additional sub-base material and/or placement of geogrids including filter fabric to stabilize the base is best determined during construction. It is recommended that the existing subgrade be heavily proof rolled prior to placement and any areas showing excessive deflection be replaced prior to placing the granular sub-base material.

4. It is recommended that HLV2K be retained to review the final pavement structure designs and drainage plans prior to construction to ensure that they are consistent with the recommendations.

4.8 Engineered Fill and Sub-Excavation

In the areas where earth fill is required for site grading purposes, engineered fill can be used and similarly, if the area under consideration need to be raised, engineered fill can be used.

Prior to the placement of the engineered fill, all of the existing fill, the loose possible fill/disturbed soil, and surficial softened native soils must be removed, and the exposed surface proof rolled. Any soft spots revealed during proof rolling must be sub-excavated and re-engineered. The depths of sub-excavation required for the construction of engineered fill will be assessed by a geotechnical professional at the time of excavation.

General guidelines for the placement and preparation of engineered fill are presented on Appendix "C". A geotechnical reaction of 100 to 150 kPa (2000 to 3000 psf) at the Serviceability Limit States (SLS) and factored geotechnical resistances of 150 to 225 kPa at the Ultimate Limit States (ULS) can be used on engineered fill, provided that all requirements on Appendix "C" are adhered to. To reduce the risk of improperly placed engineered compacted fill, full-time supervision of the contractor is essential. Despite full time supervision, it has been found that contractors frequently bulldoze loose fill into areas and compact only the surface. The inspector, either busy on other portions of the site or absent during "off hours" will be unaware of this condition. For this reason, we cannot guarantee the performance of the engineered fill, and this guarantee must be the responsibility of the contractor. The owner and his representatives must accept the risk involved in the use of engineered fill and offset this risk with the monetary savings of avoiding deep foundations/soil improvement. This potential problem must be recognized and discussed at a pre-construction meeting. Procedures can then be instigated to reduce the risk of settlement resulting from un-compacted fill.

The following is a recommended procedure for engineered fill:

1. Prior to site work involving engineered fill, a site meeting to discuss all aspects must be convened. The surveyor, contractor, design engineer and geotechnical engineer must attend the meeting. At this meeting, the limits of the engineered fill will be defined. The contractor must make known where all fill material will be obtained, and samples must be provided to the geotechnical engineer for review, and approval before filling begins.

2. Detailed drawings indicating the lower boundaries as well as the upper boundaries of the engineered fill must be available at the site meeting and be approved by the geotechnical engineer.

3. The building footprint and base of the pad, including basements, garages (if applicable), etc. must be defined by offset stakes that remain in place until the footings and service connections are all constructed. Confirmation that the footings are within the pad, service lines are in place, and that the grade conforms to drawings, must be obtained by the owner in writing from the surveyor and HLV2K Engineering Limited. Without this confirmation no responsibility for the performance of the structure can be accepted by HLV2K Engineering Limited. Survey drawing of the pre, and post fill location and elevations will also be required.

4. The area must be stripped of all topsoil and fill materials. Subgrade must be proof rolled. Soft spots must be dug out. The stripped native subgrade must be examined and approved by HLV2K Engineering Limited engineer prior to placement of fill.

5. The approved engineered fill must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Granular Fill preferred. Engineered fill should not be placed (where it will support footings) during the winter months. Engineered fill compacted to 100% SPMDD will settle under its own weight approximately 0.5% of the fill height and the structural engineer must be aware of this settlement. In addition to the settlement of the fill, additional settlement due to consolidation of the underlying soils from the structural and fill loads will occur.

6. Full-time geotechnical inspection by HLV2K Engineering Limited during placement of engineered fill is required. Work cannot commence or continue without the presence of the HLV2K representative.

7. The fill must be placed such that the specified geometry is achieved. Refer to sketches for minimum requirements. Take careful note that the projection of the compacted pad beyond the footing at footing level is a minimum of 2 m. The base of the compacted pad extends 2 m plus the depth of excavation beyond the edge of the footing.

8. A geotechnical reaction of 100 to 150 kPa (2000 to 3000 psf) may be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested, and footings should be provided with nominal steel reinforcement.

9. All excavations must be done in accordance with the Occupational Health and Safety Regulations of Ontario.

10. After completion of the pad a second contractor may be selected to install footings. All excavations must be backfilled under full time supervision by HLV2K to the same degree as the engineered fill pad. Surface water cannot be allowed to pond in excavations or to be trapped in clear stone backfill. Clear stone backfill can only be used with the approval of HLV2K.

11. After completion of compaction, the surface of the pad must be protected from disturbance from traffic, rain and frost.

12. If there is a delay in construction, the engineered fill pad must be inspected and accepted by the geotechnical engineer. The location of the structure must be reconfirmed that it remains within the pad.

4.9 Geotechnical Review

It is recommended that the project design drawings be submitted to HLV2K for review for compatibility with site subsurface conditions and the recommendations contained in this report.

5 GENERAL COMMENTS

The recommended bearing capacities (Geotechnical Reaction) and the corresponding founding elevations would need to be confirmed by the representative of HLV2K during construction. It should be noted that the recommended bearing capacities have been calculated by HLV2K from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by HLV2K to validate the information for use during the construction.

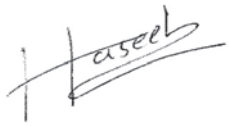
In this regard, HLV2K should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, HLV2K will assume no responsibility for interpretation of the recommendations in the report.

The comments given in this report are intended only for the guidance of design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc., would be much greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

The information in this report in no way reflects on any of the environmental aspects of the soil condition at the site and has not been specifically addressed in this report, since this aspect was beyond the scope and terms of reference.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

For and on behalf of HLV2K Engineering Limited



Haseeb Hasan, M.Eng.
Geotechnical Specialist





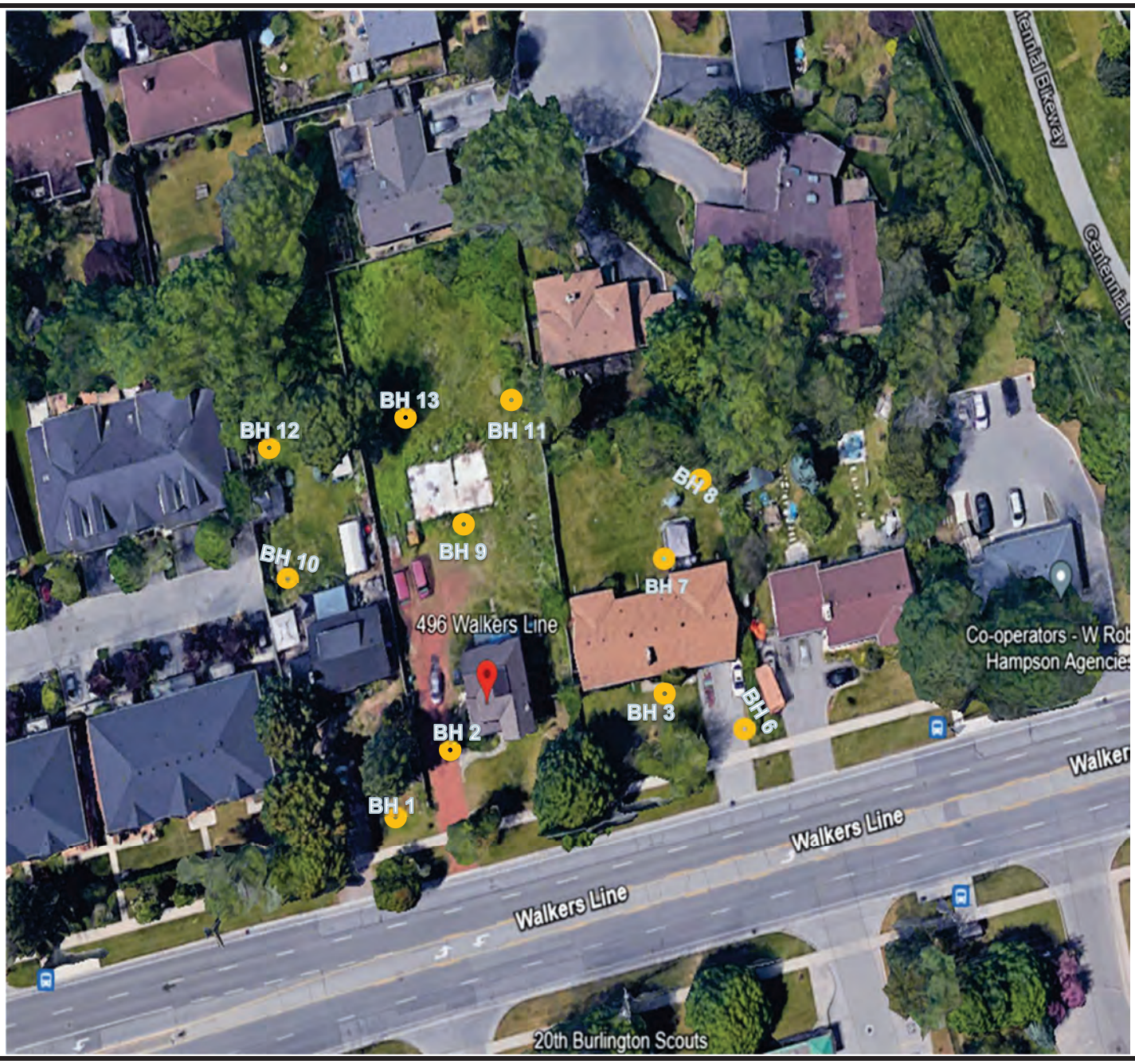
Irfan Khokhar, Ph.D., P.Eng.
Principal Geotechnical Engineer

DRAWINGS



SITE LOCATION PLAN

Drawn By: AS	**Project:** **Geotechnical Investigation Report** **Proposed Residential Development** **At 490, 496, 508 Walker's Line, Burlington, Ontario**	Date: February 27, 2024
Approved By: IK		Project No: 2300843AG
HLV2K ENGINEERING LIMITED	Client: **Azure Group**	Drawing No 1



BOREHOLE LOCATION PLAN

Drawn By: AS	**Project:** **Geotechnical Investigation Report** **Proposed Residential Development** **At 490, 496, 508 Walker's Line, Burlington, Ontario**	Date: February 27, 2024
Approved By: IK		Project No: 2300843AG
HLV2K ENGINEERING LIMITED	Client: **Azure Group**	Drawing No 1A

Drawing 1B: Notes on Sample Descriptions

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by HLV2K Engineering Limited also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

0.002 0.006 0.02 0.06 0.2 0.6 2.0 6.0 20 60 200

EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

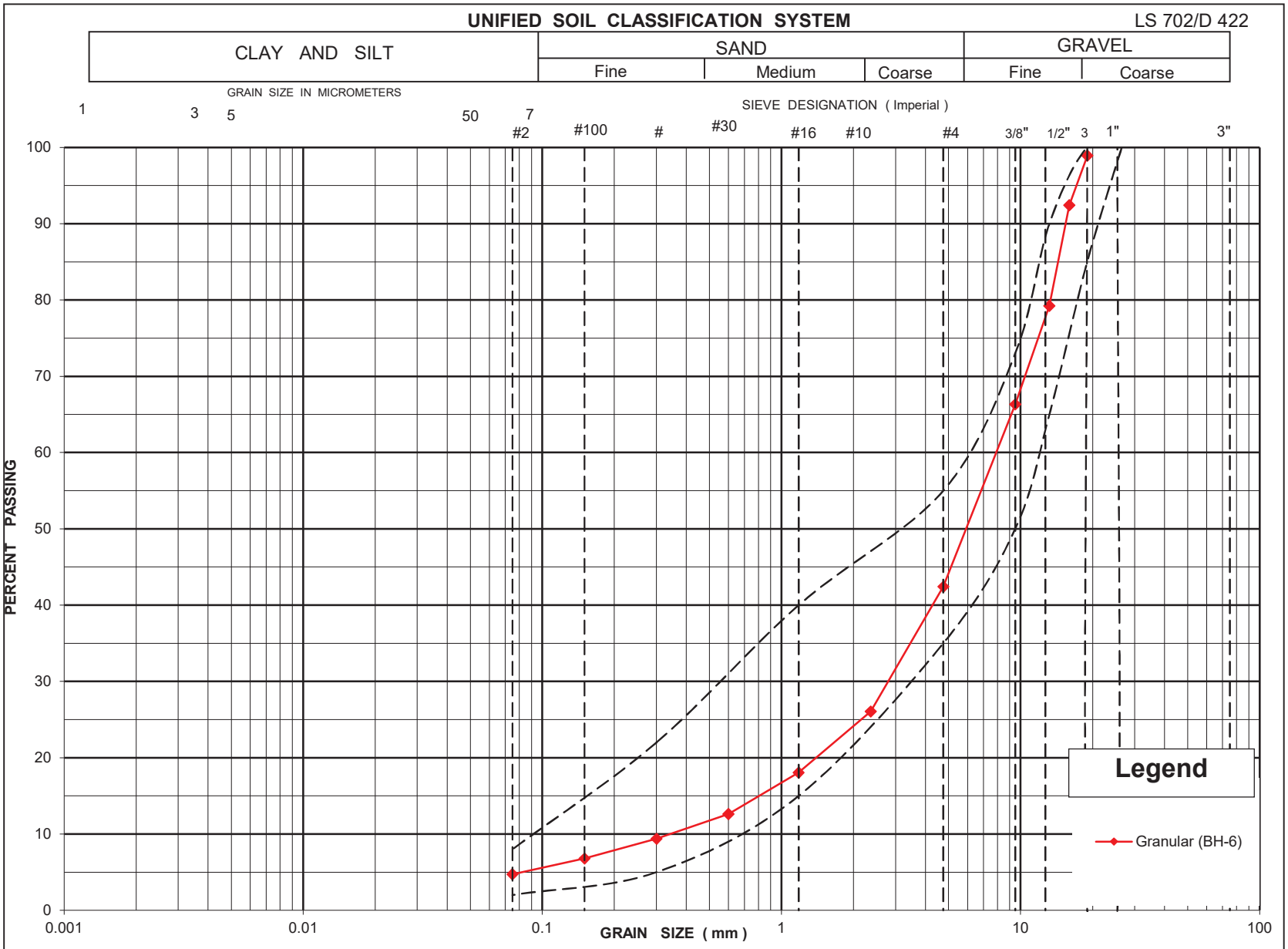
UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc.; none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advice of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

UNIFIED SOIL CLASSIFICATION SYSTEM

LS 702/D 422



HLV2K ENGINEERING LIMITED

GRAIN SIZE DISTRIBUTION

Drawing No : 2

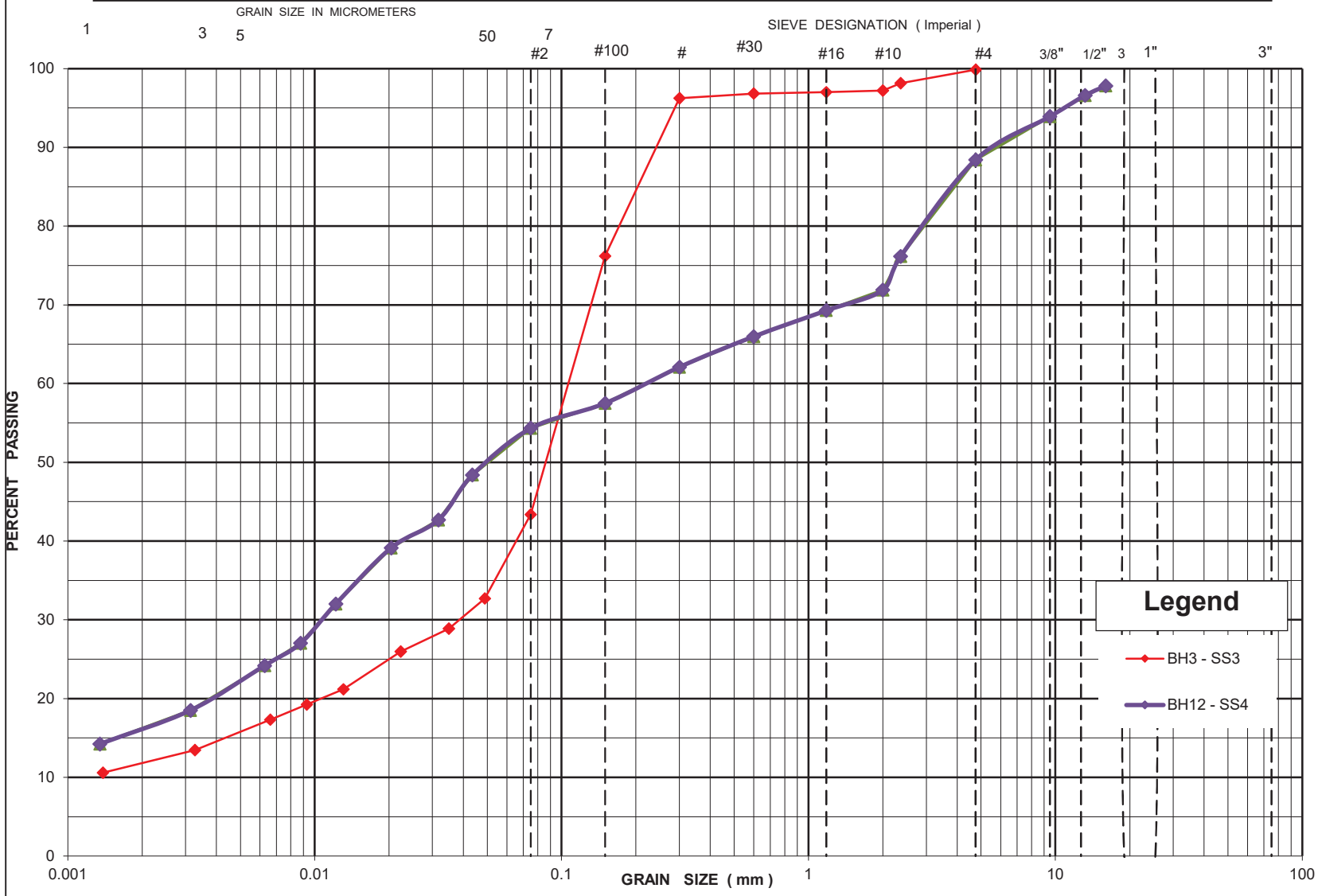
PROJECT # : 2300843AG

DATE : January 08, 2024

UNIFIED SOIL CLASSIFICATION SYSTEM

LS 702/D 422

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



HLV2K ENGINEERING LIMITED

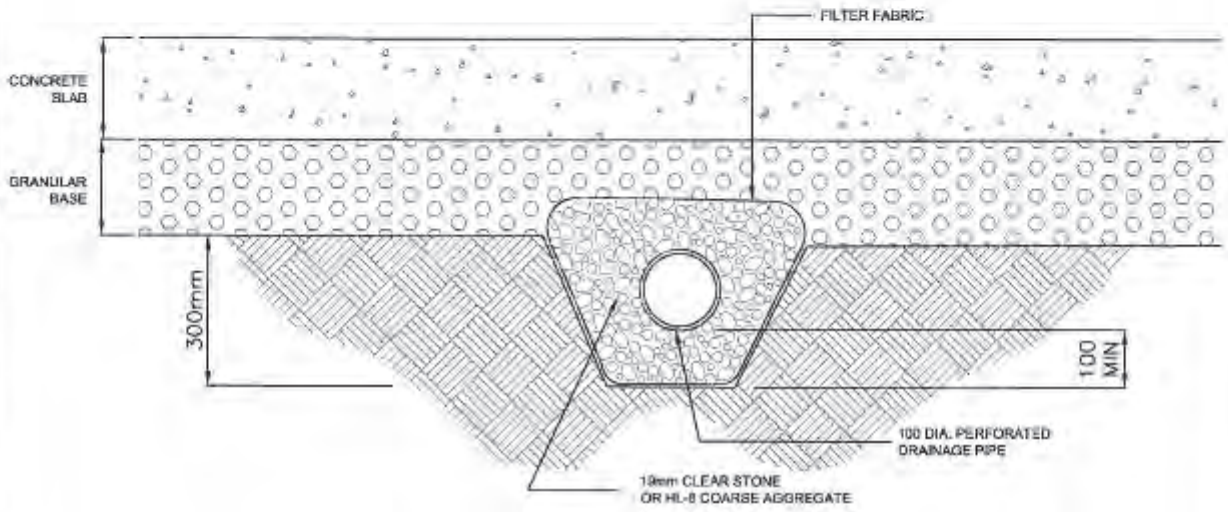
GRAIN SIZE DISTRIBUTION

Drawing No : 2a

PROJECT # : 2300843AG

DATE : January 08, 2024

Drawing 3



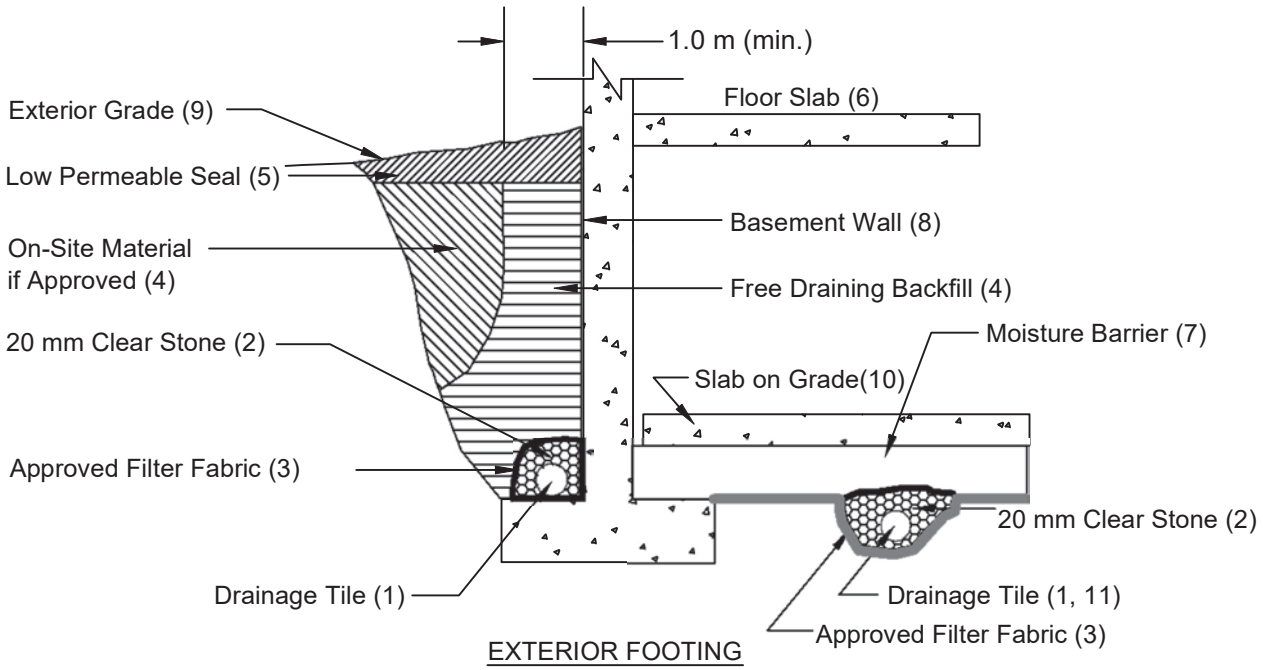
SUBDRAINAGE TRENCH DETAIL

HLV2K ENGINEERING LIMITED
Consulting Engineers

Title:

BASEMENT FLOOR SUBDRAINS

Drawing No. 4



EXTERIOR FOOTING

Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter fabric (Terrafix 270R or equivalent).
4. Free Draining backfill - OPSS Granular B or equivalent compacted to the specified density. Do not use heavy compaction equipment within 450 mm (18") of the wall. Use hand controlled light compaction equipment within 1.8 m (6') of wall. The minimum width of the Granular 'B' backfill must be 1.0 m.
5. Low permeable backfill seal - compacted clay, clayey silt or paved with concrete/asphalt or equivalent. If original soil is free-draining, seal may be omitted. Maximum thickness of seal to be 0.5 m.
6. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.
7. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
8. Basement wall to be damp proofed for parking garage and water proofed for finished basement.
9. Exterior grade to slope away from building.
10. Typically slab on grade is not structurally connected to the wall or footing. However, if it is connected to the wall, it should be designed accordingly.
11. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab.
12. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
13. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
14. Do not connect the underfloor drains to perimeter drains.
15. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

DRAINAGE AND BACKFILL RECOMMENDATIONS
Basement with Underfloor Drainage

(not to scale)

APPENDICES

Appendix A:
Limitations of Report

Limitations of Report

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to HLV2K Engineering Limited. at the time of preparation. Unless otherwise agreed in writing by HLV2K Engineering Limited, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the testhole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the testhole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of testholes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. HLV2K Engineering Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time. Any user of this report specifically denies any right to claims against the Consultant, Sub-Consultants, their officers, agents and employees in excess of the fee paid for professional services.

Appendix B:
Borehole Logs

HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH1

PROJECT: Geotechnical Investigations
CLIENT: Azure Group
PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario
DATUM:
BH LOCATION:

DRILLING DATA
Method: Solid Stem Auger & Air Rotary
Diameter: 150mm
Date: Dec-07-2023

REF. NO.: 2300843AG
DRAWING NO.: 1

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
92.1											
0.0 / 91.9	**Topsoil:**200mm										
0.2	**Silty Sand Till to Sandy Silt Till:** trace to some clay, trace to some gravel, brown, very moist to moist, loose to very dense		1	SS	7		92				
1			2	SS	13		91				
2 / 89.8			3	SS	50 / 280mm		90				
2.3	**Bedrock:** weathered shale, red						89	W. L. 88.9 m Dec 18, 2023			
3							88				
4							87				
5							86				
6							85				
7							84				
8 / 83.7											
8.4	**End of Borehole:** borehole terminated at 8.4 m Upon completion: 1) Cave-in: open 2) Water: 3.3mbgs 3) Monitoring well installed upon completion										

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
$+^3$, $\times^3$: Numbers refer to Sensitivity
○ $^{\varepsilon}$=3% Strain at Failure

HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH2

PROJECT: Geotechnical Investigations
CLIENT: Azure Group
PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario
DATUM:
BH LOCATION:

DRILLING DATA
Method: Solid Stem Auger & Air Rotary
Diameter: 150mm
Date: Dec-07-2023

REF. NO.: 2300843AG
DRAWING NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
92.3					
0.0 / 92.0	**Topsoil:**300mm				
0.3	**Silty Sand Till to Sandy Silt Till:** trace to some clay, trace to some gravel, brown, very moist to wet, loose to very dense	1	SS	5	92
		2	SS	11	91
		3	SS	50 / 430mm	
89.8		4	SS	50 / 50mm	90
2.5	**Bedrock:** weathered shale, red				89
					88
					87
					86
					85
					84

W. L. 85.9 m
Dec 18, 2023

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ε=3% Strain at Failure

LOG OF BOREHOLE BH2

PROJECT: Geotechnical Investigations

CLIENT: Azure Group

PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario

DATUM:

BH LOCATION:

DRILLING DATA

Method: Solid Stem Auger & Air Rotary

Diameter: 150mm

Date: Dec-07-2023

REF. NO.: 2300843AG

DRAWING NO.: 2

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Bedrock: weathered shale, red(Continued)						83				
10 82.3											
10.0	**End of Borehole:** borehole terminated at 10m Upon completion: 1) Cave-in: open 2) Water: dry 3) Monitoring well installed upon completion										

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ $^{\varepsilon_f}$=3% Strain at Failure

HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH3

PROJECT: Geotechnical Investigations
CLIENT: Azure Group
PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario
DATUM:
BH LOCATION:

DRILLING DATA
Method: Solid Stem Auger & Air Rotary
Diameter: 150mm
Date: Dec-07-2023

REF. NO.: 2300843AG
DRAWING NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
93.1												
0.0 / 92.8	**Topsoil:**300mm						93					
0.3	**Silty Sand Till to Sandy Silt Till:** trace to some clay, trace to some gravel, brown, wet to very moist, loose to very dense		1	SS	7							
1			2	SS	8		92					
2			3	SS	12		91					46 32 12
90.5			4	SS	50 / 380mm							
2.7	**Bedrock:** weathered shale, red						90					
3												
4							89					
						W. L. 88.9 m Dec 18, 2023						
5							88					
6							87					
7							86					
85.5												
7.6	**End of Borehole:** borehole terminated at 7.6m Upon completion: 1) Cave-in: open 2) Water: 4.4mbgs 3) Monitoring well installed upon completion											

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε_f=3% Strain at Failure

LOG OF BOREHOLE BH6

PROJECT: Geotechnical Investigations
CLIENT: Azure Group
PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario
DATUM:
BH LOCATION:

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-08-2023

REF. NO.: 2300843AG
DRAWING NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
92.8 / 0.0	**Asphalt:** 50mm					
92.7 / 0.1	**Granular Fill:** sand and gravel, trace silt, loose					
92.6 / 0.2	**Silty Sand Till to Sandy Silt Till:** trace to some clay, trace to some gravel, brown, moist to very moist, loose to very dense	1	SS	7		92
		2	SS	15		
		3	SS	50 / 550mm		91
		4	SS	50 / 200mm		
90.2 / 2.6	**Bedrock:** weathered shale, red					90
88.7 / 4.1	**End of Borehole:** borehole terminated at 4.1m Upon completion: 1) Cave-in: open 2) Water: dry					89

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED
● QUICK TRIAXIAL
+ FIELD VANE & Sensitivity
× LAB VANE

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR	SA	SI	CL
		58	37		(5)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH7

PROJECT: Geotechnical Investigations
CLIENT: Azure Group
PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario
DATUM:
BH LOCATION:

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-08-2023

REF. NO.: 2300843AG
DRAWING NO.: 7

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT (w_P w w_L) WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"							
92.7												
0.0 / 92.5	**Topsoil:**200mm											
0.2	**Silty Sand Till to Sandy Silt Till:** trace to some clay, trace to some gravel, brown, very moist to moist, very loose to very dense		1	SS	3		92					
1			2	SS	5							
			3	SS	18		91					
2			4	SS	50 / 200mm		90					
90.0												
2.7	**Bedrock:** weathered shale, red						89					
3												
4 88.7												
4.0	**End of Borehole:** borehole terminated at 4m Upon completion: 1) Cave-in: open 2) Water: dry											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH8

PROJECT: Geotechnical Investigations
CLIENT: Azure Group
PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario
DATUM:
BH LOCATION:

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-08-2023

REF. NO.: 2300843AG
DRAWING NO.: 8

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
92.5												
0.0 / 92.2	**Topsoil:**300mm											
0.3	**Silty Sand Till to Sandy Silt Till:** trace to some clay, trace to some gravel, brown, wet to moist, loose to very dense		1	SS	5		92	○ at 20	○ at 20			
			2	SS	12			○ at 20	○ at 20			
			3	SS	50 / 200mm		91	○ at 20	○ at 20			
			4	SS	50 / 50mm				○ at 10			
89.8							90					
2.7	**Bedrock:** weathered shale, red						89					
88.2												
4.3	**End of Borehole:** borehole terminated at 4.3m Upon completion: 1) Cave-in: open 2) Water: dry											

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ 3=3% Strain at Failure

HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH9

PROJECT: Geotechnical Investigations
CLIENT: Azure Group
PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario
DATUM:
BH LOCATION:

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-08-2023

REF. NO.: 2300843AG
DRAWING NO.: 9

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
92.4												
0.0 / 92.1	**Topsoil:**300mm											
0.3	**Silty Sand Till to Sandy Silt Till:** trace to some clay, trace to some gravel, brown, wet to very moist, loose to very dense		1	SS	5		92		○			
1			2	SS	10				○			
							91					
2			3	SS	15				○			
			4	SS	50 / 75mm		90		○			
89.8												
2.6	**Bedrock:** weathered shale, red											
3							89					
4												
88.1												
4.3	**End of Borehole:** borehole terminated at 4.3m Upon completion: 1) Cave-in: open 2) Water: dry											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
$+^3$, $\times^3$: Numbers refer to Sensitivity
○ ε_f=3% Strain at Failure

HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH10

PROJECT: Geotechnical Investigations
CLIENT: Azure Group
PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario
DATUM:
BH LOCATION:

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-08-2023

REF. NO.: 2300843AG
DRAWING NO.: 10

SOIL PROFILE			SAMPLES											
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT w_P w w_L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
92.2								SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 10 20 30			
0.0	**Topsoil:**300mm						92					
91.9			1	SS	4							
0.3	**Silty Sand Till to Sandy Silt Till:** trace to some clay, trace to gravel, brown, very moist, loose to very dense		2	SS	11		91					
			3	SS	50 / 430mm		90					
			4	SS	50 / 125mm							
89.6							89					
2.6	**Bedrock:** weathered shale, red											
88.0							88					
4.2	**End of Borehole:** borehole terminated at 4.2m Upon completion: 1) Cave-in: open 2) Water: dry											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; $\circ^{\varepsilon=3\%}$ Strain at Failure

HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH11

PROJECT: Geotechnical Investigations
CLIENT: Azure Group
PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario
DATUM:
BH LOCATION:

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-08-2023

REF. NO.: 2300843AG
DRAWING NO.: 11

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
92.6												
0.0	**Topsoil:**300mm											
92.3			1	SS	2							
0.3	**Silty Sand Till to Sandy Silt Till:** trace to some clay, trace to some gravel, brown, wet to very moist, very loose to very dense						92					
1			2	SS	9							
							91					
2			3	SS	10							
			4	SS	50 / 125mm							
90.0							90					
2.6	**Bedrock:** weathered shale, red											
3												
4							89					
88.2												
4.4	**End of Borehole:** borehole terminated at 4.4m Upon completion: 1) Cave-in: open 2) Water: dry											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ε=3% Strain at Failure

HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH12

PROJECT: Geotechnical Investigations
CLIENT: Azure Group
PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario
DATUM:
BH LOCATION:

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-08-2023

REF. NO.: 2300843AG
DRAWING NO.: 12

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
91.9												
0.0 / 91.6	**Topsoil:**300mm											
0.3	**Silty Sand Till to Sandy Silt Till:** trace to some clay, trace to some gravel, brown, wet to very moist, very loose to very dense		1	SS	2							
			2	SS	15		91					
			3	SS	16		90					
			4	SS	50 / 50mm							12 34 38 16
89.1												
2.8	**Bedrock:** weathered shale, red						89					
							88					
87.6												
4.3	**End of Borehole:** borehole terminated at 4.3m Upon completion: 1) Cave-in: open 2) Water: dry											

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ $^{\varepsilon}$=3% Strain at Failure

HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH13

PROJECT: Geotechnical Investigations
CLIENT: Azure Group
PROJECT LOCATION: 490, 496 & 508 Walker's Line, Burlington, Ontario
DATUM:
BH LOCATION:

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-08-2023

REF. NO.: 2300843AG
DRAWING NO.: 13

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
92.1											
0.0	**Topsoil:**300mm						92				
91.8			1	SS	2						
0.3	**Silty Sand Till to Sandy Silt Till:** trace to some clay, trace to some gravel, brown, wet to very moist, very loose to very dense		2	SS	10		91				
1			3	SS	50 / 550mm						
2			4	SS	50 / 125mm		90				
89.3											
2.8	**Bedrock:** weathered shale, red						89				
3											
4 88.1											
4.0	**End of Borehole:** borehole terminated at 4m Upon completion: 1) Cave-in: open 2) Water: dry										

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

Appendix C:

General Requirements for Engineered Fill

GENERAL REQUIREMENTS FOR ENGINEERED FILL

Compacted imported soil that meets specific engineering requirements and is free of organics and debris and that has been continually monitored on a full-time basis by a qualified geotechnical representative is classified as engineered fill. Engineered fill that meets these requirements and is bearing on suitable native subsoil can be used for the support of foundations.

Imported soil used as engineered fill can be removed from other portions of a site or can be brought in from other sites if suitable. In general, most of Ontario soils are too wet to achieve the 100% Standard Proctor Maximum Dry Density (SPMDD) and will require drying and careful site management if they are to be considered for engineered fill. Imported non-cohesive granular soil is preferred for all engineered fill. For engineered fill, HLV2K Engineering Limited (HLV2K) recommends use of OPSS Granular 'B' sand and gravel fill material only.

Adverse weather conditions such as rain make the placement of engineered fill to the required degree of density difficult or impossible; engineered fill should not be placed during freezing conditions, i.e. normally not between December 15 and April 1 of each year. If the project demands placement of engineered fill in winter (December 15- April1) it can be placed only under the following conditions:

- All frozen material and or snow must be removed before placement of engineered fill on a daily basis
- Only Granular B Type 2 or Granular A (including crushed concrete or crushed limestone)
- The fill placement must be supervised on a full time basis by a geotechnical consultant

The location of the foundations on the engineered soil pad is critical and certification by a qualified surveyor that the foundations are within the stipulated boundaries is mandatory. Since layout stakes are often damaged or removed during fill placement, offset stakes must be installed and maintained by the surveyors during the course of fill placement so that the contractor and engineering staff are continually aware of where the engineered fill limits lie. Foundations placed within the engineered soil pad must be backfilled with the same conditions and quality control as the original pad.

To perform satisfactorily, engineered fill requires the cooperation of the designers, engineers, contractors and all parties must be aware of the requirements. The minimum requirements are as follows, however, the geotechnical report must be reviewed for specific information and requirements.

1. Prior to site work involving engineered fill, a site meeting to discuss all aspects must be convened. The surveyor, contractor, design engineer and geotechnical engineer must attend the meeting. At this meeting, the limits of the engineered fill will be defined. The contractor must make known where all fill material will be obtained and samples must be provided to the geotechnical engineer for review, and approval before filling begins.

2. Detailed drawings indicating the lower boundaries as well as the upper boundaries of the engineered fill must be available at the site meeting and be approved by the geotechnical engineer.

3. The building footprint and base of the pad, including basements, garages, etc. must be defined by offset stakes that remain in place until the footings and service connections are all constructed. Confirmation that the footings are within the pad, service lines are in place, and that the grade conforms to drawings, must be obtained by the owner in writing from the surveyor and HLV2K Engineering Limited. Without this confirmation no responsibility for the performance of the structure can be accepted by HLV2K Engineering Limited. Survey drawing of the pre and post fill location and elevations will also be required.

4. The area must be stripped of all topsoil and fill materials. Subgrade must be proof rolled. Soft spots must be dug out. The stripped native subgrade must be examined and approved by an HLV2K engineer prior to placement of fill.

5. The approved engineered fill must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Granular Fill preferred. Engineered fill should not be placed (where it will support footings) during the winter months. Engineered fill compacted to 100% SPMDD will settle under its own weight approximately 0.5% of the fill height and the structural engineer must be aware of this settlement. In addition to the settlement of the fill, additional settlement due to consolidation of the underlying soils from the structural and fill loads will occur and should be evaluated prior to placing the fill.

6. Full-time geotechnical inspection by HLV2K during placement of engineered fill is required. Work cannot commence or continue without the presence of HLV2K representative.

7. The fill must be placed such that the specified geometry is achieved. Refer to sketches for minimum requirements. Take careful note that the projection of the compacted pad beyond the footing at footing level is a minimum of 2 m. The base of the compacted pad extends 2 m plus the depth of excavation beyond the edge of the footing.

8. The allowable bearing pressure provided in the accompanying report may be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested and footings must be provided with nominal steel reinforcement.

9. All excavations must be done in accordance with the Occupational Health and Safety Regulations of Ontario.

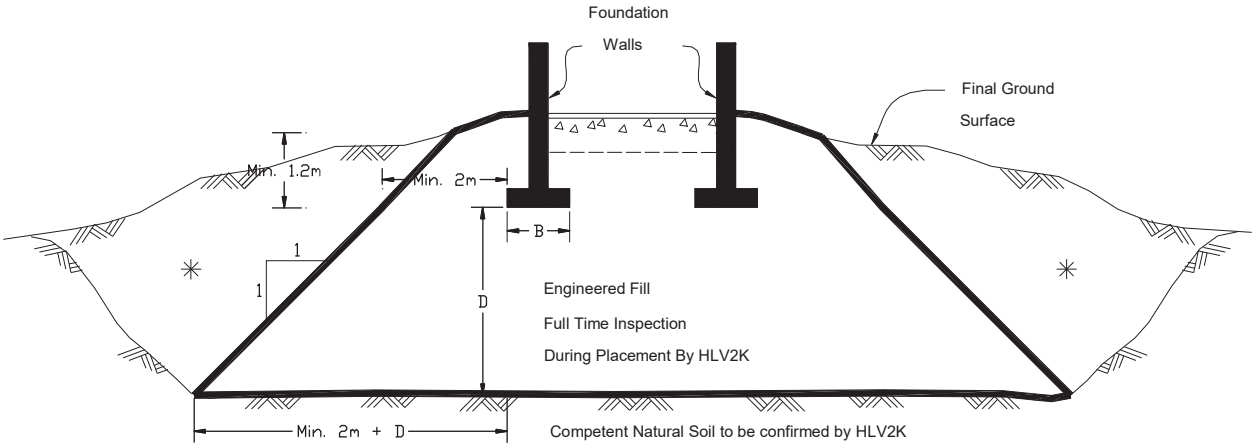
10. After completion of the pad a second contractor may be selected to install footings. The prepared footing bases must be evaluated by engineering staff from HLV2K Engineering Limited prior to footing concrete placements. All excavations must be backfilled under full time HLV2K Engineering Limited supervision by HLV2K to the same degree as the engineered fill pad. Surface water cannot be allowed to pond in excavations or to be trapped in clear stone backfill. Clear stone backfill can only be used with the approval of HLV2K Engineering Limited.

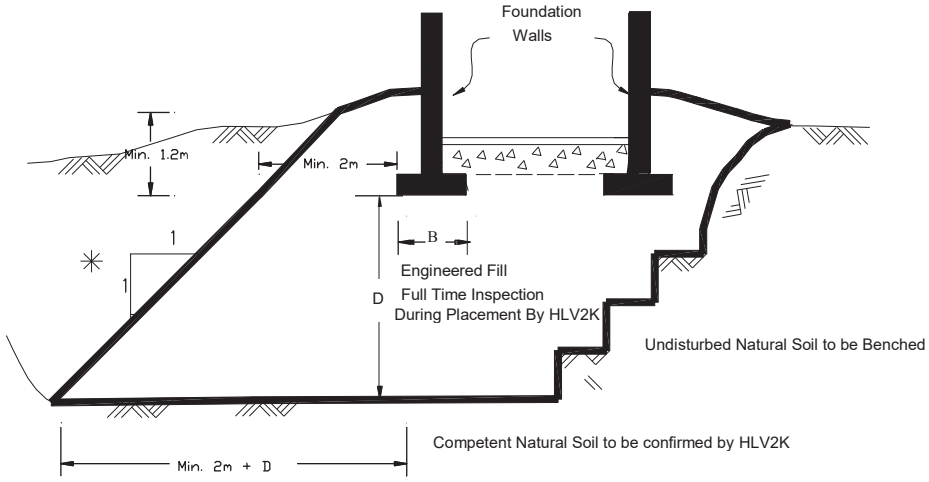
11. After completion of compaction, the surface of the pad must be protected from disturbance from traffic, rain and frost. During the course of fill placement, the engineered fill must be smooth-graded, proof rolled and sloped/crowned at the end of each day, prior to weekends and any stoppage in work in order to promote rapid runoff of rainwater and to avoid any ponding surface water. Any stockpiles of fill intended for use as engineered fill must also be smooth-bladed to promote runoff and/or protected from excessive moisture take up.

12. If there is a delay in construction, the engineered fill pad must be inspected and accepted by the geotechnical engineer. The location of the structure must be reconfirmed that it remains within the pad.

13. The geometry of the engineered fill as illustrated in these General Requirements is general in nature. Each project will have its own unique requirements. For example, if perimeter sidewalks are to be constructed around the building, then the projection of the engineered fill beyond the foundation wall may need to be greater.

14. These guidelines are to be read in conjunction with HLV2K Engineering Limited report attached.





✳ Backfill in this area to be as per the HLV2K report

Appendix D:

Proposed Site Plan Provided by the Client



SITE PLAN LEGEND

- ENTRANCE / EXIT
- PROPERTY LINE
- BY-LAW SET BACKS
- FIRE DEP. ACCESS DRIVEWAY
- PTD. WHEELCHAIR SIGN ON ASPHALT
- V — VISITORS PARKING
- X / AX.X — ELEVATION MARK
- X / AX.X — BUILDING SECTION MARK
- MH — MANHOLE (SEE CIVIL DRAWINGS)
- CB — CATCH BASIN (SEE CIVIL DRAWINGS)
- SWMT — STORM WATER MANAGEMENT TANK (SEE CIVIL DRAWINGS)

HATCH IDENTIFICATION MARKER LEGEND

- NEW PAVERS
- CONC. SIDEWALK
- RIVER STONE
- LANDSCAPED AREA
- COMMON OUTDOOR AMENITY AREA
- PAINTED LINES NO PARKING AREA
- NEW ASPHALT

1 / A1.1 SITE PLAN (TOWN HOUSE, MAINTAIN HERITAGE BLDNG)
0 2 4 10m

SITE STATISTICS

PROJECT NAME: 496 WALKER'S LINE DEVELOPMENT
PROJECT ADDRESS: 490-508 WALKER'S LINE
MUNICIPALITY: BURLINGTON
EXISTING ZONING CATEGORIES:
- **RM2 RESIDENTIAL MEDIUM DENSITY ZONE**
- **RM2-189 RESIDENTIAL MEDIUM DENSITY ZONE**
- **RZ.1 RESIDENTIAL LOW DENSITY ZONE**

REZONE/NEW ZONING CATEGORY: RM2 RESIDENTIAL MEDIUM DENSITY ZONE

ITEM	BY-LAW REQ.	PROVIDED	SOURCE
TOTAL # OF UNITS	N/A	16 TOWNHOUSES + 1 DETACHED	
UNITS AT FRONT		8 X (3 BEDROOM)	
UNITS AT REAR		8 X (3 BEDROOM)	
HERITAGE BUILDING		1 DETACHED HOUSE AT FRONT	
LOT WIDTH	45 m	69.80 m	SECTION 9.1, TABLE 2.9.1
LOT AREA	0.4 ha	0.4043 ha	SECTION 9.1, TABLE 2.9.1
FRONT YARD	9 m abutting a street having a deemed width of 30 m or greater	7.0 m	SECTION 9.1, TABLE 2.9.1 Footnote (a)
REAR YARD	9 m	17.4 m	SECTION 9.1, TABLE 2.9.1
SIDE YARD	4.5 m	2.7 m	SECTION 9.1, TABLE 2.9.1
STREET SIDE YARD	6 m	N/A	SECTION 9.1, TABLE 2.9.1
YARD ABUTTING R1, R2, R3 ZONE	9 m	varies (3.1 m - 17.4 m)	SECTION 9.1, TABLE 2.9.1
DENSITY: MINIMUM MAXIMUM	25 units/ha 40 units/ha	42 units/ha	ZONING BY-LAW, PART 2 SECTION 9.1, TABLE 2.9.1 Footnote (a)
AMENITY AREA: TOWNHOUSES: HERITAGE BUILDING: TOTAL:	16 u. x 3 bed. x 25 sm =1,200 sm 1 u. x 3 bed. x 25 sm = 75 sm 1,275 sm	LANDSCAPE (EXCLUDING COMMON OUTDOOR AMENITY AREA): 602.84 sm COMMON OUTDOOR AMENITY AREA: 339.55 sm BALCONIES / DECK / SIDE YARD - 116.05 sm TOTAL: 1,108.44 sm	SECTION 9.1, TABLE 2.9.1
PRIVACY AREA	20 sm per unit	TOWNHOMES VARIES: from 5.57 sm TO 5.92 sm per unit DESIGNATED BUILDING: 11.51 sm	SECTION 9.1, TABLE 2.9.1
LANDSCAPED AREA	6 m abutting a street having a deemed width greater than 26 m	7 m	SECTION 9.2
LANDSCAPED BUFFER	6 m abutting R1, R2, R3 zones	varies (0 m - 5.57 m)	SECTION 9.2
MAX. BUILDING HEIGHT	2 STOREYS	TOWNHOMES: 3 STOREY OVER BASEMENT (13m) HERITAGE HOUSE: 3 STOREY OVER BASEMENT	ZONING BY-LAW, PART 1 SUBSECTION 2.31; TABLE 2.31.1
GROSS FLOOR AREA		TOTAL: 3,263.4 sm 3,020.8 sm NEW + 242.6 sm EX. HERITAGE HOUSE TOWNHOUSES: 12 X 185.8 sm = 2,229.6 sm GFA 4 X 197.8 sm = 791.2 sm GFA HERITAGE BUILDING = ± 242.6 sm (INCL. FINISHED ATTIC, EXCL. BASEMENT)	
FLOOR AREA RATIO	N/A	TOTAL FLOR AREA GROSS BUILDING: 3,701.39 sm TOWNHOUSES: 3,369.36 sm HERITAGE BUILDING = 332.03 sm 3,844.43 sm /4,043 sm = 0.92	

PARKING REGULATIONS

ITEM	BY-LAW REQ.	PROVIDED	SOURCE
RESIDENTIAL PARKING SPACES	2 SPACES PER UNIT 2 x 17 = 34 SPACES	34 SPACES / 17 UNITS = 2.0 SPACES PER UNIT	SUBSECTION 2.25, TABLE 1.2.6
VISITOR PARKING SPACES	0.25 SPACES PER UNIT 0.25 x 17 = 4.25 SPACES	5 SPACES / 17 UNITS = 0.29 SPACES PER UNIT	SUBSECTION 2.25, TABLE 1.2.6
TOTAL PARKING SPACES	39 SPACES	39 SPACES (INCL. 1 B.F.)	SUBSECTION 2.25, TABLE 1.2.6
REQUIRED NUMBER OF B.F. SPACES (EXCL. 20% OF RES. UNITS)	5 TO 50 SPACES: 1 DESIGNATED ACCESSIBLE PARKING SPACE.	1 SPACE	SUBSECTION 2.26; TABLE 1.2.7
PARKING SPACE DIMENSIONS (m)	MINIMUM WIDTH OF 2.75 m AND A MINIMUM AREA OF 16.5 sq.m.	3.0 m WIDTH x 5.5 m DEPTH = 16.5 sq.m AREA RESIDENTIAL UNITS 2.75 m WIDTH x 6 m DEPTH = 16.5 sq.m AREA VISITORS PARKING	SUBSECTION 2.26 (1) (a)
INTERNAL PRIVATE GARAGE DIMENSIONS (m)	6.0 m DEPTH x 3.0 m WIDTH x 2.0 m HEIGHT	6.0 m DEPTH x 3.0 m WIDTH x 2.0 m HEIGHT	SUBSECTION 2.26 (1) (a)
B.F. PARKING SPACE DIMENSIONS (m)	6.0 m DEPTH x 3.0 m WIDTH x 2.0 m HEIGHT	6.0 m DEPTH x3.0 m WIDTH x 2.0 m HEIGHT	SUBSECTION 2.26 (9) (b)

REVISIONS

NO.	DATE	PARTICULAR
1	2023.06.12	ISSUED FOR CLIENT'S REVIEW
2	2023.07.26	EXISTING DWG ISSUED FOR REFERENCE
3	2023.08.09	PER MEETING W/CITY FOR CLIENT'S REVIEW
4	2023.08.10	ISSUED FOR PRE-CON
5	2023.08.31	ISSUED FOR CLIENT'S REVIEW
6	2023.09.20	MODIFIED PER CLIENT REQ.
7	2023.11.22	MODIFIED PER CLIENT REQ. (ELEVATOR)
8	2024.01.12	MODIFIED PER CLIENT REQUEST
9	2024.02.07	MODIFIED PER CLIENT REQUEST
10	2024.03.01	ISSUED FOR CLIENT REVIEW
11	2024.03.06	ISSUED FOR CONSULTANT COORD.
12	2024.03.21	ISSUED FOR CONSULTANT COORD.
13	2024.04.03	ISSUED FOR CONSULTANT COORD.
14	2024.04.05	ISSUED FOR CONSULTANT COORD.
15	2024.05.03	ISSUED FOR CONSULTANT COORD.
16	2024.09.13	ISSUED FOR CONSULTANT COORD.
17	2024.09.26	ISSUED FOR CONSULTANT COORD.
18	2024.10.21	ISSUED FOR CLIENT REVIEW
19	2024.11.06	ISSUED FOR CONSULTANTS COORD.

NOTES:

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Reproduction of drawings and related documents in whole or in part is forbidden without written permission of The Ventin Group.

All dimensions and measurements must be Checked and Verified by the General Contractor

KEY PLAN:

CLIENT:
2381792 ONTARIO LTD.

PROJECT:
22335

496 WALKERS LINE DEVELOPMENT

490-508 WALKERS LINE, BURLINGTON

ORIGINAL PAGE SIZE ARCH D - 24" x 36"
KEY TO DETAIL LOCATION:
A / B - A - DETAIL NO. B - DETAIL NO. ORIGIN

+VG ARCHITECTS
THE VENTIN GROUP LTD

CN N

SITE PLAN

A1.1

DRAWN BY : XX CHECKED BY : XX

Plot Date: Nov 08, 2024 - 9:20am By: Jose Campos Filename: C:\Users\Jose Campos\OneDrive - The Ventin Group\Desktop\Jose\Projects\Walker's Line\490-508 Walker's line - 2024.11.06.dwg