PRELIMINARY GEOTECHNICAL INVESTIGATION REPORT FOR

PROPOSED MULTI-STOREY RESIDENTIAL DEVELOPMENT AT

424 Churchill Avenue North

OTTAWA, ON

DST File No: 02103035.000

July 2021

Prepared for:

GSI Group Cold Storage Ltd.

DST, a division of Englobe

2150 Thurston Drive, Suite 203
Ottawa, Ontario, K1G 5T9
Phone: 1 (877) 378-3745
Fax: 1 (888) 979-6772
Email: ottawa@dstgroup.com

TABLE OF CONTENTS

1. INTRODUCTION 1
2. SITE AND PROJECT DESCRIPTION 1
3. SCOPE OF WORK 2
4. FIELD INVESTIGATION AND LABORATORY TESTING 3
4.1 Geotechnical Drilling Fieldwork 3
4.2 Geotechnical Laboratory Testing 4
5. DESCRIPTION OF SUBSURFACE CONDITIONS 4
5.1 Asphalt Pavement 5
5.2 FILL 5
5.3 Native Sandy Silt 5
5.4 Bedrock 5
5.5 Groundwater 6
6 DISCUSSION AND RECOMMENDATIONS 7
6.1 Site Preparation 8
6.1.1 Interference with Existing Underground Utilities 9
6.1.2 Interference with Existing Foundations 9
6.1.3 Subgrade Preparation for Footings 9
6.2 Excavations 10
6.2.1 Sloped Excavations 10
6.2.2 Engineered Shoring 11
6.3 Temporary Construction Dewatering 12
6.4 Foundations 12
6.4.1 Footings on Rock 13
6.4.2 Lean Mix Concrete 14
6.5 Frost Protection 14
6.6 Seismic Site Classification 14
6.7 Lateral Earth Pressures 15
6.7.1 Static Conditions 15

6.7.2 Dynamic Conditions 16
6.8 Floor Slabs 17
6.9 Resistance to Foundation Uplift 18
6.10 Corrosion Potential of Soils 19
6.11 Permanent Drainage 21
6.12 Backfill 21
6.12.1 Engineered Fill 21
6.12.2 Exterior Foundation Wall Backfill 22
6.13 Underground Utilities 22
6.13.1 Bedding and Cover 22
6.13.2 Trench Backfill 23
7 MONITORING DURING CONSTRUCTION 24
8 CLOSURE 24

List of Tables

Table 4-1: Summary of Borehole Stratigraphy

Table 5-1: Summary of Rock Core Tests

Table 5-2: Summary of Monitoring Well Observations

Table 6-1: Recommended Lateral Earth Pressure Coefficients for Static Conditions

Table 6-2: Recommended Lateral Earth Pressures under Dynamic Conditions

Table 6-3: Corrosion Parameter Results

Table 6-4: Additional Requirement for Concrete Subjected to Sulphate Attack

Table 6-5: Recommended Minimum Pavement Sections

Appendices

Appendix A Limitations of Report
Appendix B Site Location Map, Borehole Location Plan, and Fence Diagram
Appendix C List of Symbols and Definitions for Geotechnical Sampling and Borehole Logs
Appendix D Geotechnical Laboratory Test Results
Appendix E Rock Core Photographs
Appendix F Fotenn Development Options Report

1. INTRODUCTION

DST, a division of Englobe (DST) is pleased to present the findings of our Preliminary Geotechnical Investigation for the proposed Multi-Storey Residential Development (Project) at 424 Churchill Avenue North in Ottawa, Ontario (Site).

DST was retained by GSI Group Cold Storage Ltd. (Client) to carry out a preliminary geotechnical investigation, to evaluate the subsurface conditions at the Site of the proposed Multi-Storey Residential Development. This Preliminary Geotechnical Investigation was undertaken in conjunction with a Phase II Environmental Site Assessment (ESA) by DST, whose results is presented under a separate cover.

The field investigation included the drilling of three boreholes at the Site, advanced in accordance with both geotechnical and the Phase II ESA requirements. It is understood that the Project is currently in the concept design stage and consists of a **proposed six-storey residential building with up to two underground levels**. DST has not been provided with any structural drawings of the proposed building, or any civil/architectural drawings of the proposed Project at the Site. Therefore, it important to emphasize that the general recommendations in this report should be considered as preliminary in nature at this stage.

This report is prepared for the sole use of the Client. The use of the report, or any reliance on it by any third party, is the responsibility of such third party. This report is subject to the limitations shown in Appendix A. It is understood that the Project will be performed in accordance with all applicable codes and standards present within its jurisdiction. DST should be retained to conduct a well-targeted Supplementary Geotechnical Investigation once the proposed development details are available.

2. SITE AND PROJECT DESCRIPTION

The Site is located at a municipal address of 424 Churchill Avenue North in Ottawa, Ontario. The location of the Site is shown on Figure 1 entitled ‘Site Location Map’ provided in Appendix B. The Site is currently occupied with a one-storey commercial building with associated asphalt parking lot and entrances, as shown on Figure 2. The existing topography of the Site slopes downwards approximately 0.3 m to the east and south towards the adjacent streets. There is also a steep slope along the north perimeter of the Site dropping approximately 6 m from the Site down to Danforth Avenue.

DST's understanding of the proposed Project is based on the Development Options Report by Fotenn dated March 5, 2021, which is included in Appendix F. DST understands the Project will consist of the design and construction of a new residential mid-rise structure. The structure is proposed to consist of a six-storey residential structure, with below grade parking with access via Danforth Avenue on the North side of the Site. Based on the existing grades of the Site and Danforth Avenue, **DST anticipates the proposed building will have up to two underground levels**, with footings at an approximate depth of 7.0 meters below existing ground surface (mbgs) of the Site. The anticipated depth of the underground levels and footings are displayed in the Fence Diagram provided as Figure 3 in Appendix B.

3. SCOPE OF WORK

DST's scope of the work was carried out as outlined in a "Proposal for Combined Phase I/II Environmental Site Assessment and Preliminary Geotechnical Investigation", dated March 15, 2021, which generally consisted of the follow activities:

- DST retained a subcontractor to provide both public and private underground utility clearances;
- DST retained a geotechnical drilling subcontractor to drill three boreholes with depths ranging from approximately 10.0 to 12.8 mbgs.
    - All boreholes were advanced through the overburden using hollow stem augers.
    - Two of the boreholes were continued into the bedrock using pneumatic drilling techniques for environmental purposes.
    - One borehole was advanced into the bedrock using wireline diamond coring techniques.
- DST supervised the geotechnical drilling subcontractor and logged recovered samples of the subsoils from each borehole;
- DST performed geotechnical laboratory testing consisting of two unconfined compressive strength (UCS) tests on intact bedrock cores, moisture contents on all collected soil samples, and submittal of one groundwater sample for standard corrosion package laboratory analysis; and
- DST prepared this preliminary geotechnical investigation report based on the results of the field investigation and laboratory testing.

4. FIELD INVESTIGATION AND LABORATORY TESTING

4.1 Geotechnical Drilling Fieldwork

The drilling component of this preliminary geotechnical investigation was performed on April 21 and 22, 2021. The drilling consisted of the advancement of three boreholes, labelled as boreholes MW21-01 through MW21-03. Boreholes were drilled to depths ranging from approximately 10.0 to 12.8 mbgs. The locations of the boreholes are shown on the Figure 2 'Borehole Location Plan' provided in Appendix B.

A geotechnical drilling subcontractor, CCC Geotechnical and Environmental Drilling Ltd., was retained to perform the drilling. All boreholes were drilled using a truck mounted drill rig. The boreholes were advanced through the overburden using hollow-stem augers. Boreholes MW21-01 and MW21-03 was advanced through the bedrock using pneumatic drilling methods for environmental purposes for the Phase II ESA performed in conjunction with this investigation. Borehole MW21-02 was advanced through the bedrock using wireline diamond coring methods. Monitoring wells were installed in all boreholes, with screens sealed into the bedrock. The monitoring wells were backfilled with a combination of bentonite hole-plug and silica sand as necessary and a protective flush mount covering was placed at the ground surface and sealed using an asphalt cold patch.

Overburden soil samples were collected using a standard 50 mm outside diameter split-spoon sampler driven by an automatic Standard Penetration Test (SPT) hammer. The compaction of the cohesionless soil was assessed using recorded SPT N-values.

The subsurface conditions encountered in the boreholes were described by DST field staff based on the samples that were recovered. The recovered soil and rock core samples were labelled and submitted to DST's Ottawa geotechnical laboratory for further visual review and geotechnical laboratory testing on selected soil samples. One groundwater sample was sent to an external certified environmental laboratory for standard corrosion package testing.

The locations of the boreholes are provided in the Borehole Location Plan provided in Appendix B and the subsoil conditions encountered at the borehole location are displayed in the Fence Diagram provided in Appendix B and described in the Borehole Logs provided in Appendix C.

4.2 Geotechnical Laboratory Testing

The laboratory testing component of this preliminary investigation consisted of the determination of moisture contents on all recovered soil samples and unconfined compressive strength tests on two representative rock core samples collected. The results of the laboratory testing are presented on the Borehole Logs provided in Appendix C and as Laboratory Test Results provided in Appendix D.

In addition, one groundwater sample was collected from the newly installed MW21-02 and submitted to a certified environmental laboratory for standard corrosion package testing. The results of the corrosion testing are discussed in Section 6.10.

5. DESCRIPTION OF SUBSURFACE CONDITIONS

The subsoil conditions encountered within the DST borehole locations are briefly discussed in the following subsections with a graphical representation of each location presented in Figure 3 as well as on the Borehole Logs provided in Appendix C. A summary of the boreholes drilled at this Site with soil layers encountered in each borehole is presented in Table 5-1 below.

Table 5-1: Summary of Borehole Stratigraphy

Borehole ID	Approximate Asphalt Thickness (mm)	Approximate FILL Thickness (m)	Native Sandy Silt Depth (mbgs)	Limestone Bedrock Depth (mbgs)	
				Heavily Weathered	Slightly Weathered to Intact
MW21-01	140	320	0.5 – 1.2	Could not be verified(1)	
MW21-02	120	360	0.5 – 1.0	1.0 – 1.5	1.5 – 10.0
MW21-03	140	160	0.3 – 0.8	Could not be verified(1)	

Note (1): MW21-01 and MW21-03 were advanced through bedrock using pneumatic drilling methods. Therefore, rock core samples could not be collected to confirm bedrock type and quality at these locations.

It is important to note that the soil descriptions presented below and in the Borehole Logs represent the soils encountered at the test locations only. They may vary between and beyond

borehole locations. This is especially true in previously excavated and/or filled areas such as near the existing building and existing and/or former utility trenches.

5.1 Asphalt Pavement

All borehole locations were drilled within the paved parking area on the north side of the Site. The surficial covering at these locations consisted asphalt pavement with thicknesses ranging from approximately 120 to 140 mm.

It is important to note that the thickness and descriptions of the asphalt noted above are for planning purposes only. They should not be used for quality assessments or quantity take-offs.

5.2 FILL

FILL soils associated with the parking lot pavement was encountered below the asphalt in all borehole locations. The FILL material consisted of silty sand with trace to some gravel. The thickness of the FILL encountered was approximately 0.3 m (MW21-01), 0.4 m (MW21-02), and 0.2 m (MW21-03).

The FILL material was described as brown in color and damp. The natural moisture content of this material varied between 5 and 8 % based on laboratory testing. The recorded SPT N-values of this FILL layer were 7 and 11, indicating the FILL is in a generally loose to compact condition.

5.3 Native Sandy Silt

Underlying the FILL material at all borehole locations was a native sandy silt deposit. This deposit extended to different depths ranging between 1.2 mbgs in MW21-01, 1.0 mbgs in MW21-02, and 0.8 mbgs in MW21-03.

The sandy silt deposit was described as brown in color and damp . The natural moisture content of this deposit varied between 4 and 20 % based on laboratory testing. The recorded SPT N-values for this native deposit were 6 and 11, indicating a generally loose to compact deposit.

5.4 Bedrock

Auger refusal was encountered in all boreholes at depths ranging from approximately 0.9 mbgs (MW21-03) to 1.4 mbgs (MW21-01 and MW21-02). Boreholes MW21-01 and MW21-03 were continued into the bedrock using pneumatic drilling methods for environmental purposes for the

Phase II ESA performed in conjunction with this investigation. Therefore, bedrock type and quality could not be confirmed at these locations.

MW21-02 was advanced into bedrock using HQ size wireline diamond coring methods. The upper ~0.5 m of the bedrock consisted of highly weathered and fractured limestone. The slightly weathered to intact portions of the bedrock consisted predominantly of grey, limestone becoming fresh with depth, and medium to thickly bedded. The measured Rock Quality Designation (RQD) ranged from 37 to 93% indicating variable quality bedrock with depth from poor to good/excellent quality . Borehole MW21-02 was terminated within the limestone bedrock at a depth of 10.0 mbgs.

Unconfined compressive strength (UCS) tests were conducted on two rock cores collected at depths of approximately 7.5 mbgs (MW21-02 RC5) and 9.1 mbgs (M21-02 RC6). The compressive strength test results are provided in the following table.

Table 5-1: Summary of Rock Core UCS Tests

Borehole No.	Depth (m)	Unconfined Compressive Strength (MPa)
MW21-02 RC5	7.5 – 7.6	152.7
MW21-02 RC6	9.1 – 9.2	141.1

5.5 Groundwater

DST installed a total of three monitoring wells, one at each borehole location. Water level readings were recorded by DST personnel at the well locations. The following table provides the details of the well construction and groundwater level readings.

Table 5-2: Summary of Monitoring Well Observations

Monitoring Well No.	Location of Screen (mbgs)	Groundwater Level (mbgs)
MW21-01	8.1 to 11.1	6.5 (April 29, 2021)
MW21-02	7.0 to 10.0	6.8 (April 30, 2021)
MW21-03	9.8 to 12.8	6.9 (April 29, 2021)

Monitoring well details and water level measurements are shown on the borehole logs provided in Appendix C.

It should be noted that groundwater levels are subject to seasonal fluctuations and response to precipitation, flooding, and snowmelt events. Typically, they are at their highest during the spring thaw. It should be noted that perched water may be present with the FILL material and at the overburden/bedrock interface.

DST did not carry out a Hydrogeological Investigation for this Site, since it was not part of our current mandate. However, a Hydrogeological Investigation is recommended to assess the groundwater infiltration expected during construction and to assess whether a permit to take water (PTTW) will be required.

6 DISCUSSION AND RECOMMENDATIONS

Based on the results of geotechnical field investigation and laboratory testing performed at the three borehole locations on this Site, the following preliminary discussion and recommendations are provided to assist the Client and their Designers with the foundation design for the proposed Project. The recommendations provided within this report are based on our understanding of the proposed Project which is summarized above in Section 2 and are general in nature. If any of these understandings change, then DST should be contacted to assess the implications of those changes on the recommendations provided herein.

Based on the soil conditions encountered in the three boreholes, and assuming that they are representative of the soil conditions across the Site, the most important geotechnical considerations for the design of the foundations for the proposed Project are expected to be the following:

- **Preliminary Geotechnical Investigation:** It is understood that this Project is currently in the concept design stage. Therefore, it important to emphasize that this report should be considered as preliminary in nature. DST should be retained to conduct a Supplementary Geotechnical Investigation once the proposed development details are available.
- **Preliminary Seismic Site Classification:** In the absence of conceptual building design and proposed footing elevations for the proposed development , a conservative seismic “Site Class C” may be assumed at the current pre-design stage. However, for anticipated footings on rock, a higher “Site Class B or A ” would be expected, subject to the satisfactory results of geophysical testing. A higher Site Class A or B typically provides significant cost savings for the design and construction of the multi-storey structures. Considering that the conceptual

design for the proposed underground levels has not yet been defined, the Owner and Designers should consider the potential benefits of the enhancement in Site Class with all proposed foundations resting on relatively competent bedrock capable of supporting the proposed six storey building.

- **Stability of North Slope:** As discussed in section 2.0, there is an existing approximately 6.0 m high slope running along the north side of the property and sloping downward to Danforth Ave. DST's current understanding of the preliminary Site layout is that the parking garage will be founded at approximately 7.0 mbgs, and therefore this slope will be completely excavated as part of the proposed construction. As such, DST has not recommended a slope stability assessment for the existing slope. However, if this is not the case and the slope could possibly remain during and after the proposed construction, then the stability of this Slope should be assessed. It is anticipated that new retaining walls or an exposed building foundation wall will be used in this location. Further geotechnical consultation is recommended during design stage of the project to assess the preferred options.

- **Undermining Adjacent Roadways:** Designers and Contractors involved in the early works for the proposed development should plan out the approximate excavation area and compare them to the location of the adjacent streets to ensure the pavement structures are not undermined during construction. If space or property line restrictions are encountered, then Engineered Shoring may be necessary to provide adequate support to the adjacent roadways.

- **Hydrogeological Investigation:** The recorded water levels in the newly installed monitoring wells were found to range from 6.5 to 6.9 mbgs. Given that excavations are expected to extend to an approximate depth of 7 mbgs, groundwater will be encountered during excavation. However, it is important to note that a Hydrogeological Investigation was not included in the scope of work for this investigation. A Hydrogeological Investigation is recommended to assess the groundwater infiltration expected during construction and to assess whether a permit to take water (PTTW) will be required.

6.1 Site Preparation

All existing surficial materials, overburden soils, and foundation elements associated with the existing building on site, should be completely removed from within the footprint of the new structure to expose the limestone bedrock.

The Site surrounding the excavation should be graded in the early stages of construction to provide for positive control of surface water and directing it away from the excavation and subgrades. Appropriate provisions should be made for collection and disposal of storm water and runoff including an adequate pumping system, if necessary.

6.1.1 Interference with Existing Underground Utilities

Designers should review the proposed excavation locations and compare them to the location of any existing underground utilities. Existing utilities that are excavated or exposed or impacted as a result of the proposed construction will need to be supported and/or rerouted around the building.

6.1.2 Interference with Existing Foundations

There are existing foundation elements present in the ground which correspond to the existing building on Site. Investigation of the depths of these foundations by means of test pits was not part of DST's scope of work. It is understood that the existing building and associated foundation elements will be excavated and removed from Site prior to the commencement of construction. There will likely be existing deeper fill soils present surrounding these foundations.

6.1.3 Subgrade Preparation for Footings

Subgrade preparation for footings founded on rock will involve the removal of all overburden soils and weathered bedrock to expose competent limestone bedrock. Any pieces of rock that can be easily manipulated by conventional excavation equipment should be removed, as directed by the Geotechnical Engineer. Final subgrade surfaces should be brushed and/or air blown clean, and dry. The exposed bedrock surface should be examined and approved by the Geotechnical Engineer to confirm the competency of foundation to support the design bearing pressures.

Confirmation of bedrock quality during construction will require the Contractor to perform probing of the bedrock using 50 mm diameter drill holes drilled to a depth of 1.5 m within the footings. These holes will need to be reviewed by the Geotechnical Engineer to confirm that no significant mud seams or voids exist. If mud seams are found, localized areas of the footings may need to be lowered below the mud seam, or footing sizes increased to lower design bearing pressures accordingly. The locations of these probe holes should be selected under the direction of the Geotechnical Engineer during construction. Contractors should plan for one probe per pad footing and a minimum or 1 probe every 6 m in strip footings.

Designers and Contractors should make some allowance for additional excavation of fractured rock to achieve a sound bedrock subgrade to the satisfaction of the Geotechnical Engineer. It is recommended that a unit price item for additional rock excavation and replacement with lean mix concrete fill be incorporated into the tender documents.

6.2 Excavations

Based on DST's current understanding of the Project, we anticipate that the excavations will extend to an approximate depth of 7 mbgs, based on the grade difference between the Site and Danforth Avenue to the north. Excavations will extend through the overburden soils and weathered bedrock surface and into the limestone bedrock.

As the overburden soils and weathered bedrock encountered at the borehole locations extend to shallow depths ranging from 0.9 to 1.4 mbgs, it is anticipated that sloped excavations can be used. However, if deeper layers of overburden soils or weathered bedrock are encountered at the time of construction, designers will need to assess the Site geometry and space limitations to determine if Engineered shoring is required.

6.2.1 Sloped Excavations

All excavations must be undertaken in accordance with the requirements of the Occupational Health and Safety Act of Ontario (OHSA), Regulations for Construction O.Reg. 213/91, as amended. The comments within this subsection are intended to be in addition to, and not a replacement of the OHSA requirements.

The existing FILL material and native soils would be considered as a "Type 3 Soil" according to the OHSA regulations. However, if they become wet, muddy, is below the water table, or shows signs of seepage, they would be considered as a "Type 4 Soil".

According to the OHSA, excavations which penetrate through multiple soil types should be considered as having the highest soil type.

For excavations into bedrock, there is an upper weathered rock zone that will require back sloping depending on the degree of weathering. The bedrock quality and Site-specific requirements need to be assessed during construction by the Geotechnical Engineer. For planning purposes, a weathered bedrock is recommended to be treated as a "Type 2 Soil". Sound rock, if encountered in excavations would generally be self-supporting, however, as a precautionary measure, it should be back-sloped at 10V:1H.

Excavation of the bedrock may require a combination of hoe ramming, blasting, and line drilling. These operations will impart vibrations on the surrounding structures. It is recommended that a pre-construction survey be performed on the surrounding structures and roadways prior to construction, and that vibration monitoring be completed throughout the bedrock excavation process.

All rock excavations should be scaled, to remove loose rock fragments to ensure safe working conditions. All rock faces should be reviewed by a Geotechnical Engineer to look for loose pieces and wedge failures. Rock bolting for worker safety may be necessary depending on the layout and field condition at that time.

The stability of the excavation side slopes will be highly dependent on the Contractor's methodology. No surface surcharges should be placed closer to the edge of the excavation than a distance equal to twice the depth of the excavation, unless an excavation support system has been designed to accommodate such a surcharge.

Designers and Contractors should plan out the approximate excavation area and compare them to the location of the adjacent streets to ensure the pavement structures are not undermined during construction. If space or property line restrictions are encountered, then Engineered Shoring may be necessary to provide adequate support to the adjacent roadways.

6.2.2 Engineered Shoring

Engineered Shoring systems through soil often include (but are not limited to): soldier piles and lagging, interlocking sheet piles, secant and/or tangent walls, permanent diaphragm walls, etc. The appropriate method should be selected by the Project Designers and Contractors considering the space restrictions, estimated costs, and availability of materials. Engineered Shoring systems must be designed by a Professional Engineer taking into consideration the following Site-specific aspects:

- Lateral earth pressures;
- Hydraulic pressures of the groundwater;
- Loads from any adjacent structures, or infrastructure being retained;
- Seismic loadings;
- Freeze-thaw action on the face of the excavations;
- Expansion and contraction of shoring elements;
- Pre-stressing loads or post tensioning loads on tie backs;

- Possible surcharge loads throughout construction (i.e., trucks, equipment, stockpiles, etc.);
- Vibrations induced by construction processes; and
- Compatibility with the design of proposed waterproofing and drainage systems for the sub-surface levels.

Soldier piles and sheet piling, if used would require predrilling to provide sufficient embedment to achieve toe fixity. It is expected that the Engineered Shoring systems would need to be provided with tie-back rock anchors to ensure their lateral stability. It is recommended that the Client retain Contractors and Designers who have significant experience with deep excavations performed under similar soil conditions. Shop drawings should be submitted to the Designers and reviewed by the Geotechnical Engineer well in advance of mobilization.

The preliminary lateral earth pressure parameters to assist Designers and Contractors with shoring designs through soil are discussed in Section 6.7 below.

6.3 Temporary Construction Dewatering

As discussed in Section 5.6, a monitoring well was installed at each borehole location. The water levels recorded on April 29 and 30, 2021 were found to range from 6.5 to 6.9 mbgs. Given that excavations are expected to extend to an approximate depth of 7 mbgs, groundwater will be encountered during excavation. It is important to note however that a Hydrogeological Investigation was not included in the scope of work for this investigation. A Hydrogeological Investigation is recommended to assess the expected groundwater infiltration expected during construction and to assess whether a permit to take water (PTTW) will be required.

Water quantities will depend on seasonal conditions, depths of excavations, presence and lateral extents of fractured rock zones, and the duration that excavations are left open. Existing utility trenches which join or intersect the excavations may act as a drain and supply off-Site surface water into the excavations. These should be plugged at the outset of construction in an attempt to mitigate this possibility.

6.4 Foundations

It important to note that at the time of this geotechnical investigation, the Project is still considered in the concept design stage, and DST has not been provided with the proposed foundation details. Based on the concept plans for the Site, DST is anticipating the foundations will be founded at an approximate depth of 7 mbgs.

Based on the results of the boreholes and a footing depth of 7 mbgs, it is recommended the footing be founded on the sound limestone bedrock.

All foundation subgrades must be approved by the Geotechnical Engineer.

6.4.1 Footings on Rock

For conventional pad and strip footings founded on sound limestone bedrock, a preliminary factored bearing resistance of 1000 kPa under Ultimate Limit States (ULS) conditions is recommended. This includes for a geotechnical resistance factor of $\Phi = 0.5$.

There is no corresponding design bearing pressure recommended under Serviceability Limit State (SLS) conditions for bedrock as settlement under the ULS condition is expected to be minimal. Designers should limit footing dimensions to a minimum of 1.0 m for pad footings, and 0.5 m for strip footings regardless of the bearing pressure being used.

Higher bearing resistances may be achievable, but it would require additional Geotechnical Investigation to confirm the bedrock quality across the Site.

Subgrade preparation for footings founded on rock will involve the removal of all soils and weathered rock surface to expose sound bedrock. Any pieces of rock that can be easily manipulated by conventional excavation equipment should be removed, as directed by the Geotechnical Engineer. Final subgrade surfaces should be brushed and/or air blown clean, and dry. The exposed surface should be examined by the Geotechnical Engineer to assess its competency.

Confirmation of bedrock quality during construction will require probing of the bedrock at footing locations using 50 mm diameter holes drilled to a depth of 1.5 m within the footprint of footings. These holes will need to be reviewed by the Geotechnical Engineer to confirm that no significant mud seams or voids exist. If mud seams are found, localized areas of the footings may need to be lowered below the mud seam, or footing sizes increased to lower design bearing pressures accordingly. The locations of these probe holes should be provided under the direction of the Geotechnical Engineer during construction.

Designers and Contractors should make allowance for additional excavation of fractured rock to achieve a sound bedrock subgrade to the satisfaction of the Geotechnical Engineer. It is recommended that a unit price item for additional rock excavation and replacement with lean mix concrete fill be incorporated into the tender documents.

6.4.2 Lean Mix Concrete

If the grade is required to be raised between the approved sound bedrock subgrade and the design footing elevation, then it is recommended to be performed with lean mix concrete, as opposed to with granular fill soils. If lean mixed concrete is used below any footings it must extend a minimum of 0.3 m beyond the edge of the footing and then downward at a 1H:1V. Recommended design bearing pressures on lean mix concrete would be the same as those for the bedrock, provided that the underlying subgrade has been approved by the Geotechnical Engineer.

6.5 Frost Protection

The sound limestone bedrock on this Site is not considered frost susceptible. However, the overburden soils and weathered bedrock are considered frost susceptible. Therefore, any footings founded at shallow depths (entrance canopy footings, signs, etc.) must be provided with adequate frost protection. Depending on the location geometry of retaining walls, and garage entrance, the footings in these areas may also require a frost protection detail but this would need to be assessed as designs are advanced further.

Footings founded within the overburden or weathered bedrock must be provided with a minimum of 1.5 m of earth cover if the structure is heated, and 1.8 m of earth cover for unheated or isolated structures in the Ottawa area. If the required earth cover is not achievable, an equivalent insulation detail would be required in order to provide adequate protection against frost action. Where soil cover cannot be provided, an insulation detail should be designed or approved by a Geotechnical Engineer. Contractors must be aware that this detail may be such that the insulation may need to be placed below the footing and then the footing poured on top, and therefore pre-approval is recommended to ensure excavations and backfill are properly planned.

Should construction take place during winter, surfaces that support foundations or Engineered Fill must be protected by Contractors against freezing for the entire duration of construction or until adequate soil cover is in place. Backfill soils should not be placed in a frozen condition or placed on frozen subgrades.

6.6 Seismic Site Classification

In accordance with the Ontario Building Code (OBC-2012), structures designed under Part Four of the Code must be designed to resist a minimum earthquake force.

In the absence of conceptual building design and proposed footing elevations for the proposed development , a conservative seismic "Site Class C" may be assumed at the current pre-design stage. However, for anticipated footings on rock, a higher "Site Class B or A " would be expected, subject to the satisfactory results of geophysical testing. A higher Site Class A or B typically provides significant cost savings for the design and construction of the multi-storey structures. Considering that the conceptual design for the proposed underground levels has not yet been defined, the Owner and Designers should consider the potential benefits of the enhancement in Site Class with all proposed foundations resting on relatively competent bedrock capable of supporting the proposed six storey building.

6.7 Lateral Earth Pressures

The following preliminary lateral earth pressure parameters are provided to assist Contractors and Designers with the design of both permanent basement walls and temporary Engineered Shoring systems, if used. Designers will need to review if hydrostatic pressures are to be included in the earth pressure calculations based on the permanent drainage designs.

6.7.1 Static Conditions

The following Rankine earth pressure coefficients are being provided to assist Designers.

Table 6-1: Recommended Lateral Earth Pressure Coefficients for Static Conditions

Soil	Bulk Density 'Y' (kN/m^3) *	Angle of Internal Friction, φ' (degrees)	Undrained Shear Strength, Su (kPa)	Rankin Earth Pressure Coefficients**		
				K_a	K_o	K_p
Existing Uncontrolled Cohesionless FILL	20	30	0	0.33	0.50	3.00
Native loose to compact Sandy Silt	20	30	0	0.33	0.50	3.00
New Compacted Granular Backfill OPSS "Granular B, Type II"	22	35	0	0.27	0.43	3.69

* *Only the bulk unit weight is being presented, Designers will need to assess whether bulk, saturated, and/or submerged unit weights should be used based on their design conditions.*

** *Assumes level/flat backfill surface. If Engineered Shoring is used, then Designers should refer to CFEM-2006 for design assistance and the Geotechnical Engineer should be retained to perform shoring design review.*

For yielding retaining walls, the active earth pressure coefficients, Ka, is recommended to be used. For non-yielding permanent walls, such as basement walls, the at-rest, Ko, is recommended to be used for design. The resultant of the applicable static or at-rest force is assumed to act at 1/3H above the base of the wall where H is the Height of the wall.

6.7.2 Dynamic Conditions

Below grade walls subjected to lateral forces due to seismic forces can be designed using the pseudo-static approach using the Mononobe-Okabe equations, shown in Section 24.9 of CFEM-2006. In these formulas, there are both geotechnical and geometric components.

The total active thrust under seismic loading (Pae) is recommended to be expressed as follows:

$$P_{ae} = ½ K_{ae} \gamma H^2 \times (1- k_v)$$

Where: H = Height of the wall, Kae = horizontal component of active earth pressure coefficient including effects of earthquake loading,

kv = Vertical component of the earthquake acceleration typically a range of 2/3 x kh to 1/3 kh is considered but a value closer to 2/3 x kh is recommended

kh = Horizontal component of the earthquake acceleration, typically Peak Ground Acceleration (PGA) or a factor thereof is used. The Site Class-adjusted NBCC-2015 PGA for the Site is 0.273 g at Site Class C, where g is the acceleration due to gravity, and the probability of exceedance per annum is 0.000404. This value was determined using the 2015 National Building Code Seismic Hazard Calculation document and can be found attached in Appendix F.

For passive earthquake pressure (Ppe) the following equation can be used:

$$P_{pe} = ½ K_{pe} \gamma H^2 \times (1- k_v)$$

Where: Kpe = horizontal component of passive earth pressure coefficient including effects of earthquake loading

The above equation includes both the active pressures under static (Pa) as well as the increased force due to seismic forces. The active force under static conditions is assumed to act at a point of (0.3 x H) above the base and the seismic force is assumed to act near (0.6 x H) above the

base, where H is the height of the wall. Therefore, the point of application for Pae may be calculated from the following:

$$h = [(0.33HxP_a) + (0.6H \times P_e)]/ P_{ae}$$

The following soil parameters are presented to assist Designers in designing retaining walls for this Site under seismic conditions using the pseudo-static approach.

Table 6-2: Recommended Lateral Earth Pressures under Dynamic Conditions

Soil	Bulk Density* 'Y' (kN/m^3)	Effective Angle of Internal Friction, φ' (degrees)	Effective Cohesion, C' (degrees)	Mononobe-Okabe Earth Pressure Coefficients**	
				K_{ae}	K_{pe}
Existing Uncontrolled Cohesionless FILL	20	30	0	0.61	2.34
Native loose to compact Sandy Silt	20	30	0	0.61	2.34
New Compacted Granular Backfill OPSS "Granular B, Type II"	22	35	0	0.51	2.98

* *Only the bulk unit weight is being presented, Designers will need to assess whether bulk, saturated, and/or submerged unit weights should be used based on their design conditions.*

** *Assumes level/flat backfill surface. If Engineered Shoring is used, then Designers should refer to CFEM-2006 for design assistance and the Geotechnical Engineer should be retained to perform shoring design review.*

6.8 Floor Slabs

Based on the design traffic condition in the proposed underground parking lot, designers will need to decide what type of floor will be necessary in the parking garage. Typical options would be a free-floating slab on grade, or alternatively a structural slab.

DST was not provided with any design criteria for floor slab loadings and traffic loadings for the floor slab of the parking garage, therefore we have assumed that floor slabs are lightly loaded with no heavy racking or process machinery that require specific support.

A typical floor slab loading for a lightly loaded slab on grade would be a maximum value of 24 kPa,. If larger slab loadings are envisioned, then DST should be retained to perform additional consulting in regard to design of the floor slab. For design purposes and based upon a properly prepared subgrade surface covered with 200 mm of Ontario Provincial Standard Specification (OPSS) 1010 'Granular A', a typical preliminary modulus of subgrade reaction appropriate for the slab design would be approximately 25,000 kN/m^3 on Engineered Fill and compacted to 100 percent of its Standard Proctor Maximum Dry Density (SPMDD). Alternative values would require additional analysis and testing.

A capillary moisture barrier consisting of a layer of either 19 mm clear stone or an OPSS 1010 'Granular A' at least 200 mm thick should underlie the slab. This layer should be compacted to 100 percent of its SPMDD and placed on approved subgrade surfaces.

If floor coverings are to be used, vapour barriers are also recommended to be incorporated beneath the slab. Floor toppings may be impacted by curing and moisture conditions of the concrete. Floor finish manufacturer's specifications and requirements should be consulted and procedures outlined in the specifications should be followed.

Subgrade preparation below floor slabs will involve the removal of all soils and weathered bedrock to expose the intact sound limestone bedrock. Any pieces of rock that can be easily manipulated by conventional excavation equipment should be removed, as directed by the Geotechnical Engineer. Final subgrade surfaces should be brushed and/or air blown clean, and dry. The exposed bedrock surface should be examined and approved by the Geotechnical Engineer.

Any new fill used to raise the grade between the approved bedrock subgrade and the floor slab should be considered as Engineered Fill and should be placed in strict conformance with the requirements in Section 6.12.1.

6.9 Resistance to Foundation Uplift

Resistance to foundation uplift or overturning forces can be provided by considering the dead weight of the structures and backfill soils, increasing the dead weight of the structure using additional concrete elements, or with the use of additional rock anchors.

In the case that grouted rock anchors are considered, rock anchors may be designed based on a frictional stress between grout and intact limestone bedrock. Based upon typical published values and conservative approach, DST recommends that a conservative allowable working stress value

of 600 kPa be used to calculate the length of the required bond zone. The bond zone must be entirely within "sound bedrock" which is below the weathered zone.

Designing in accordance with the Limit States Design (LSD) method, Designers may take the approach that working stress value is approximately equivalent to the SLS value. The ULS and SLS must be based upon both performance and structural criteria. However, based upon typical published values, the unfactored ULS values may be as high as 750 kPa to more than 1000 kPa. As per CFEM-2006, a geotechnical resistance factor of Φ=0.3 should be applied to the empirical unfactored ULS values. Higher stress values may be available; however, performance load testing in the field will be required to prove the capacities. If performance testing is carried out at the outset of the Project, then a resistance factor of Φ=0.4 could be applied.

In order to mobilize the shear stress in the rock, the load at the top of the anchor must be properly transferred through the upper bedrock to the bond zone to prevent progressive grout fail and ensure proper performance. Therefore, a “free length” is required through the foundation element, the weathered rock zone, and down to the bond zone.

The mass of rock mobilized by a rock anchor may be assumed to be based upon a 60-degree cone drawn upward from a point located at the lower one-third point of the bond zone and spaced such that the theoretical cones do not overlap. Designers should review the spacing of anchors and take into account of any overlapping cones (i.e. avoid doubling-up on rock mass calculations for overlapping cones). The bulk unit weight of bedrock may be assumed to be approximately 26 kN/m3. The corresponding buoyant unit weight would be approximately 16 kN/m3. It is recommended that Designers consider the water level to be near the subgrade elevation, and therefore, use submerged unit weights for the rock mass calculations.

6.10 Corrosion Potential of Soils

Analytical testing was carried out on one groundwater sample collected from the borehole MW21-02 location to determine corrosion potential of the Site groundwater. The selected groundwater sample was tested for pH, resistivity, chlorides, sulphides, and sulphates. The test results are summarized in the following table.

Table 6-3: Corrosion Parameter Results

Parameter	Tested Value (MW21-02)
pH	7.92
Chloride (mg/L)	1800
Sulphate (mg/L)	210
Resistivity (Ohm-cm)	160
Sulphide (mg/L)	<0.020
Redox Potential (mV)	284

The American Water Works Association (AWWA) publication 'Polyethylene Encasement for Ductile-Iron Pipe Systems' ANSI/AWWA C105/A21.5-10 dated October 1, 2010 assigns points based on the results of the above tests. A soil that has a total point score of 10 or more is considered to be potentially corrosive to ductile iron pipe. Based on the results obtained for the sample submitted, the Site groundwater, is considered to be corrosive to ductile iron pipe based on the low resistivity value of the groundwater sample collected from MW21-02.

The analytical results of the groundwater sample was compared with applicable Canadian Standards association (CSA Standards A23.1-04) standards and are given in Table 6-4 below.

Table 6-4: Additional Requirement for Concrete Subjected to Sulphate Attack

Class of Exposure	Degree of Exposure	Sulphate (SO_4) in Groundwater Sample (mg/L)	Cementing Material to be used
S-1	Very Severe	> 10,000	HS or HSb
S-2	Severe	1,500 – 10,000	HS or HSb
S-3	Moderate	150 – 1,500	MS, MSb, LH, HS, or HSb

The sulphate concentration detected in the groundwater sample collected from MW21-02 was 210 mg/L, as shown in Table 6-3. As per Table 6-4 above, this indicates a "moderate" risk for sulphate attack on concrete material. Therefore, sulphate resistance concrete is required for concrete substructures on this Site.

6.11 Permanent Drainage

It is important to note however that a Hydrogeological Investigation was not included in the scope of work for this investigation. A Hydrogeological Investigation is recommended to assess the expected groundwater infiltration expected under permanent conditions and to provide detailed recommendations regarding a permanent drainage system. The following recommendation should be treated as preliminary.

Under floor drainage is recommended for this structure based as the groundwater level is anticipated to be above the basement floor slab.

A perimeter drainage system around the proposed building is also recommended. The drains should be connected to a frost-free outlet for year-round drainage. Perimeter drains should not be tied to the under-floor drainage system.

6.12 Backfill

All new fill soils that underlie floor slabs, are in building interiors, or other structural applications is considered as Engineered Fill and must be treated as such.

6.12.1 Engineered Fill

For this Project, Engineered Fill may be required to raise the grade between the approved intact limestone bedrock subgrade and floor slabs, and for interior foundation wall backfill. Engineered Fill must meet the strict requirements as shown below:

- The proposed material must be tested for grain size and Proctor and reviewed and approved by the Geotechnical Engineer before being considered as Engineered Fill. Typically, a crushed well-graded material such as an OPSS 1010 Granular “A” or “Granular B Type II” type material is suitable. However, other suitable granular materials may be proposed and considered depending on the Site-specific conditions;
- Prior to placing any Engineered Fill, all unsuitable fill materials must be removed, and the subgrade approved by the Engineer. Any deficient areas should be repaired prior to placement;
- Engineered Fill should be placed in maximum loose lifts of 300 mm and adequately compacted to achieve 100% of its Standard Proctor Maximum Dry Density (SPMDD). Engineered Fill must have full-time compaction testing by geotechnical personnel.

6.12.2 Exterior Foundation Wall Backfill

The backfill placed against exterior foundations should be a free draining granular material meeting the grading requirements of an OPSS 1010 “Granular B, Type I” or “Granular B, Type II”. Exterior foundation backfill should be placed and compacted as outlined below:

- Backfill should not be placed in a frozen condition, or place on a frozen subgrade;
- Backfill should be placed and compacted in maximum loose lift thickness compatible with the selected construction equipment, but not thicker than 0.3 m
- In landscaped areas the upper 0.3 m of backfill below landscape details should be a low permeable soil to reduce surface water infiltration;
- Backfill should be placed uniformly on both sides of the foundation walls to avoid build-up of unbalanced lateral pressures, or alternatively wait until basement wall are tied together with the floor above before backfilling the exterior foundation wall.
- For backfill that would underlie paved areas, sidewalks or exterior slabs-on-grade, each lift should be uniformly compacted to achieve 98 % percent of its SPMDD.
- For backfill on the building exterior that would underlie landscaped areas, each lift should be uniformly compacted to at least 95 % of its SPMDD.
- Exterior grades should be sloped away from the foundation wall, and roof drainage downspouts should be placed so that water flows away from the foundation wall.
- Entrance slabs should be placed founded on frost walls or alternatively have insulation details developed to prevent frost heaving at the building entrances;
- In areas where the building backfill underlies a pavement, sidewalk, or other hard landscaping, the excavation should have a frost taper incorporated to prevent differential heaving around the building.

6.13 Underground Utilities

The recommendations within this section are intended to be a supplement to, and not a replacement of the most recent local municipal requirements.

6.13.1 Bedding and Cover

The following are recommendations for service trench bedding and cover materials:

- Bedding for buried utilities should consist of an OPSS 1010 "Granular A" material and placed in accordance with municipal requirements, assuming the subgrade soils are not allowed to become disturbed;
- The use of clear stone is not recommended for use as pipe bedding. The voids in the stone may result in a low gradient water flow and infiltration of fines from the surrounding soils and cover materials, causing settlement and loss of support to pipes and structures;
- The cover material should be a service sand material or an OPSS 1010 "Granular A". The dimensions should comply with pertinent specification section;
- The bedding, springline, and cover should be compacted to at least 95% of its SPMDD;
- Compaction equipment should be used in such a way that the utility pipes are not damaged during construction.

6.13.2 Trench Backfill

Backfill above the cover for buried utilities should be in accordance with the following recommendations:

- For service trenches underlying pavement areas, the backfill should be placed and compacted in uniform lift thickness compatible with the selected compaction equipment and not thicker than 300 mm. Each lift should be compacted to a minimum of 98% of its SPMDD;
- The backfill placed in the upper 0.3 m below the pavement subgrade elevation should be compacted to a minimum of 100% of its SPMDD;
- Excavation backfill should attempt to match texture of the existing adjacent soils. If imported materials are used, side slopes with frost tapers are recommended. Frost tapers should be a back-slope of 10H:1V through the frost zone, (i.e.,1.8 m from finished grade);
- During backfilling, care should be taken to ensure the backfill proceeds in equal stages simultaneously on both sides of the pipe;
- No frozen material should be used as backfill; neither should the trench base be allowed to freeze.

The quality and workmanship in the construction is as important as the compaction standards themselves. It is imperative that the guidelines for the compaction be followed for the full depth of the trench to achieve satisfactory performance.

7 MONITORING DURING CONSTRUCTION

DST requests to be retained once the building design details are finalized to conduct a full Geotechnical Investigation for the proposed development. Following issue of the final Geotechnical Report, DST requests to also be retained once the plans and specifications are finalized to review the documents and ensure the recommendations to be provided in the final Geotechnical report are adequately addressed.

The recommendations presented in this report are based on the assumption that an adequate level of construction monitoring by qualified geotechnical personnel during construction will be provided. Based on our understanding of the scope of the Project, an adequate level of construction monitoring is considered to be as follows:

- Review and approval of all footing subgrades by geotechnical personnel;
- Confirmation of bedrock quality during construction using 1.5 m probe holes within the footings. These holes will need to be reviewed by the Geotechnical Engineer to confirm that no significant mud seams or voids exist.
- Review and approval of subgrades below the floor slab;
- Laboratory testing and pre-approval of fill soils that are proposed to be used on Site;
- Full time compaction testing of Engineered Fill and part time compaction testing of exterior foundation wall backfill;
- Periodic testing of concrete;
- Vibration and settlement monitoring of adjacent Structures;
- Performance and proof testing or rock anchors;

An important purpose of providing an adequate level of monitoring is to check that recommendations, based on data obtained at the discrete borehole locations, are relevant to other areas of the Site.

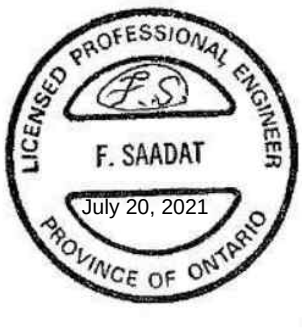
8 CLOSURE

A description of limitations which are inherent in carrying out Site investigation studies is given in Appendix A and forms an integral part of this report.

We trust this report meets your present requirements. Should you have any questions, please do not hesitate to contact our office.

Sincerely,

For DST, a division of Englobe



Ryan Vanden Tillaart P.Eng.
Geotechnical Engineer

Farbod Saadat, Ph.D., P.Eng.
Senior Geotechnical Project Manager

APPENDIX A
LIMITATIONS OF REPORT

LIMITATIONS OF REPORT
GEOTECHNICAL STUDIES

The data, conclusions and recommendations which are presented in this report, and the quality thereof, are based on a scope of work authorized by the Client. Note that no scope of work, no matter how exhaustive, can identify all conditions below ground. Subsurface and groundwater conditions between and beyond the boreholes may differ from those encountered at the specific locations tested, and conditions may become apparent during construction which were not detected and could not be anticipated at the time of the site investigation. Conditions can also change with time. It is recommended practice that DST, a division of Englobe be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the boreholes.

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 details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid. Unless otherwise noted, the information contained herein in no way reflects on environmental aspects of either the site or the subsurface conditions.

The comments given in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of boreholes may not be sufficient to determine all the factors that may affect construction methods and costs, e.g. 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 conclusion as to how the subsurface conditions may affect their work.

Any results from an analytical laboratory or other subcontractor reported herein have been carried out by others, and DST, a division of Englobe cannot warranty their accuracy. Similarly, DST cannot warranty the accuracy of information supplied by the Client.

APPENDIX B

Site Location Map

Borehole Location Plan

Fence Diagram

Note

1. This drawing shall be read in conjunction with the associated technical report.

0	07/20/2021	Original	RVT
Revision	Date	Issue	Approval

Client: **GSI Group Cold Storage Ltd.**

Site: **424 Churchill Avenue North, Ottawa, ON**

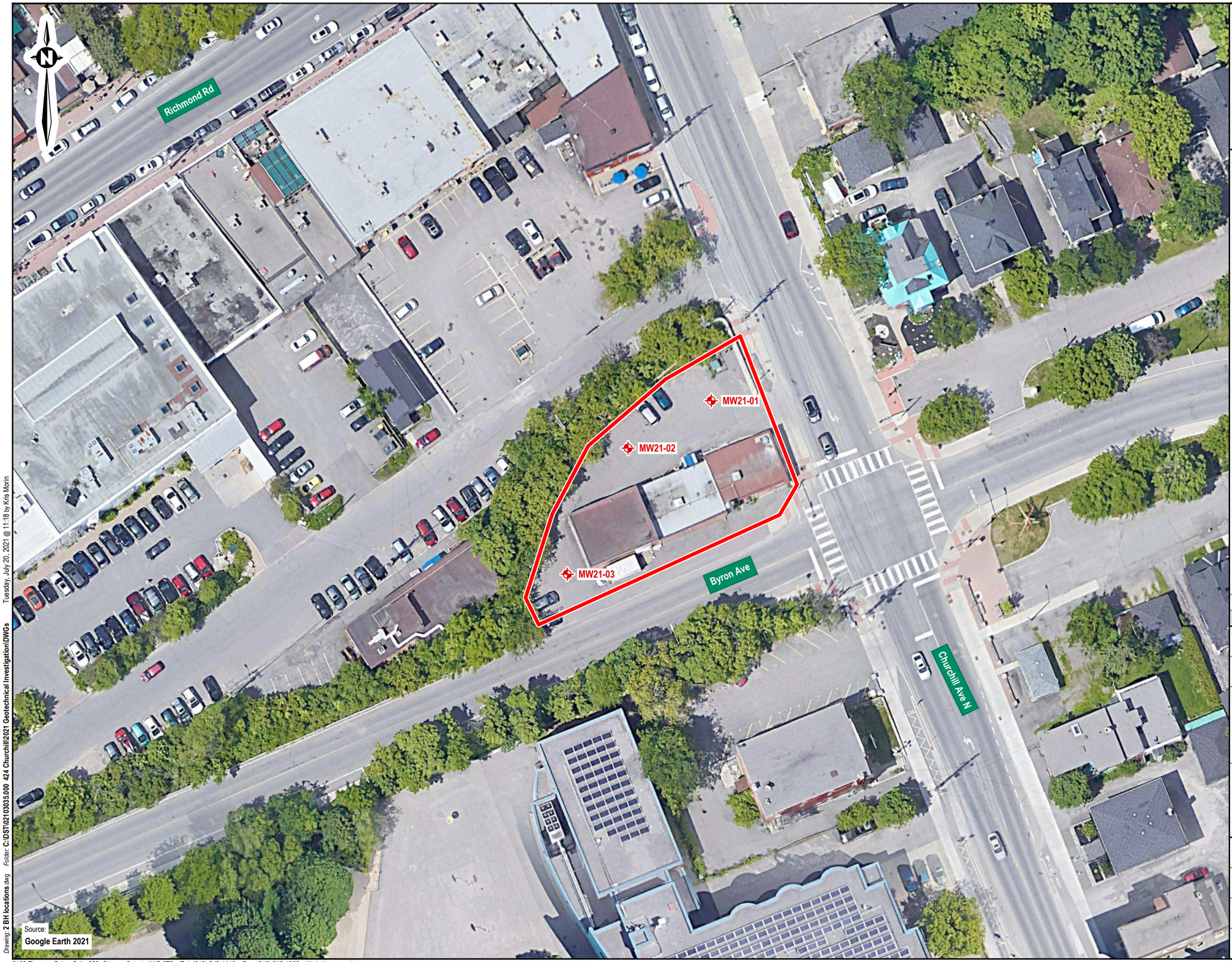
DST consulting engineers a division of Englobe

Report Title: **Preliminary Geotechnical Investigation**

Drawing Title: **Site Location Map**

Designed By	Date
R.V.T	May 2021
Drawn By	Project No.
K.M.	02103035.000
Approved By	Figure No.
R.V.T.	1
Scale	
As shown	

2150 Thurston Drive, Suite 203, Ottawa, Ontario K1G 5T9 Tel: (613) 748-1415 Fax: (613) 748-1356 Website: www.dstgroup.com



DST consulting engineers
a division of Englobe

Note

1. This drawing shall be read in conjunction with the associated technical report.

Legend

- Approximate site limits
- Approximate location of borehole / monitoring well

1:600

0 10 20 30 m

0 1:1 5 cm

Scale accurate when printed at 100% using paper size ANSI full bleed B (11.0 x 17.0 Inches)

Revision	Date	Issue	Approval
0	07/20/2021	Original	RVT

Client
GSI Group Cold Storage Ltd.

Site
424 Churchill Avenue North, Ottawa, ON

Report Title
Preliminary Geotechnical Investigation

Drawing Title
Borehole Location Plan

Designed By	Scale
R.V.T	As shown
Drawn By	**Date**
K.M.	May 2021
Approved By	**Project No.**
R.V.T.	02103035.000

Figure No. 2

Drawing: **2 BH locations** *.dwg* *Folder:* **C:\DST\02103035.000 424 Churchill\2021 Geotechnical Investigation\DWGs** Tuesday, July 20, 2021 @ 11:18 by Kris Morin

2150 Thurston Drive, Suite 203, Ottawa, Ontario K1G 5T9 Tel: (613) 748-1415 Fax: (613) 748-1356 Website: www.dstgroup.com

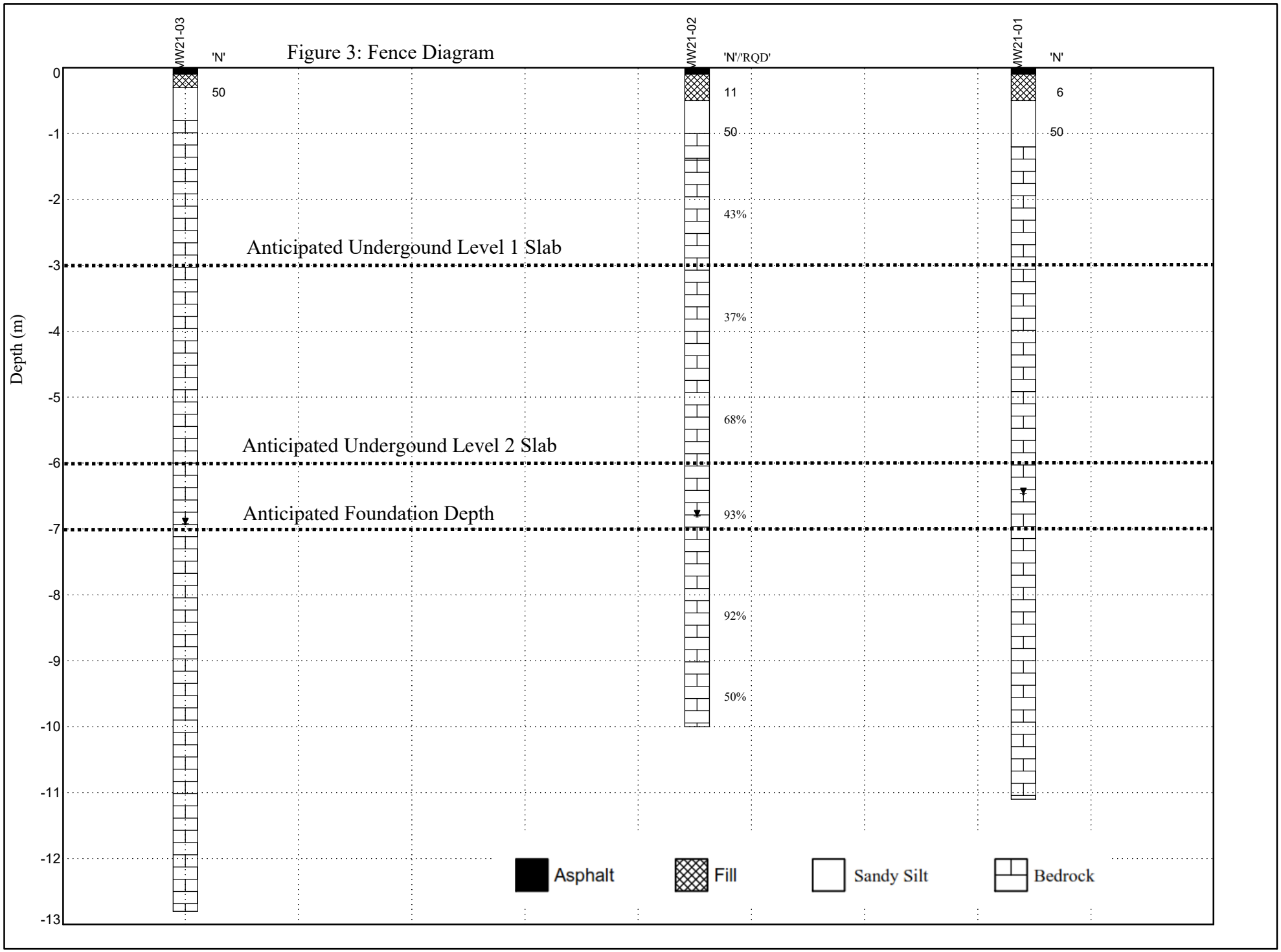


Figure 3: Fence Diagram
MW21-03
'N'
50
MW21-02
'N'/'RQD'
11
50
43%
37%
68%
93%
92%
50%
MW21-01
'N'
6
50
Anticipated Undergound Level 1 Slab
Anticipated Undergound Level 2 Slab
Anticipated Foundation Depth
Depth (m)
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
-13
Asphalt
Fill
Sandy Silt
Bedrock

APPENDIX C
LIST OF SYMBOLS AND DEFINITIONS FOR GEOTECHNICAL SAMPLING
BOREHOLE LOGS

LIST OF SYMBOLS AND DEFINITIONS FOR GEOTECHNICAL SAMPLING AND COMMON LITHOLOGIES

The following is a reference sheet for commonly used symbols and definitions within this report and in any figures or appendices, including borehole logs and test results. Symbols and definitions conform to the standard proposed by the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) wherever possible. Discrepancies may exist when comparing to third-party results using the Unified Soil Classification System (USCS).

PART A – SOILS

Standard Penetration Test (SPT) 'N'

The number of blows required to drive a 50-mm (2 in) split barrel sampler 300 mm (12 in). The standard hammer has a mass of 63.5 kg (140 lbs) and is dropped vertically from a height of 760 mm (30 in). Additional information can be found in ASTM D1586-11 and in §4.5.2 of the CFEM 4th Ed.

For penetration less than 300 mm, 'N' is recorded with the penetration that was achieved.

Non-Cohesive Soils

The relative density of non-cohesive soils relates empirically to SPT 'N' as follows:

Relative Density	'N'
Very Loose	0 – 4
Loose	4 – 10
Compact	10 – 30
Dense	30 – 50
Very Dense	> 50

Cohesive Soils

The consistency and undrained shear strength of cohesive soils relates empirically to SPT 'N' as follows:

Consistency	Undrained Shear Strength (kPa)	'N'
Very Soft	< 12	0 – 2
Soft	12 – 25	2 – 4
Firm	25 – 50	4 – 8
Stiff	50 – 100	8 – 15
Very Stiff	100 – 200	15 – 30
Hard	> 200	> 30

PART B – ROCK

The following parameters are used to describe core recovery and to infer the quality of a rockmass.

Total Core Recovery, TCR (%)

The total length of solid drill core recovered, regardless of the quality or length of the pieces, taken as a percentage of the length of the core run.

Solid Core Recovery, SCR (%)

The total length of solid, full-diameter drill core recovered, taken as a percentage of the length of the core run.

Rock Quality Designation, RQD (%)

The sum of the lengths of solid drill core greater than 100 mm long, taken as a percentage of the length of the core run. RQD is commonly used to infer the quality of the rockmass, as follows:

Rockmass Quality	RQD (%)
Very Poor	< 25
Poor	25 – 50
Fair	50 – 75
Good	75 – 90
Excellent	> 90

Weathering

The terminology used to describe the degree of weathering for recovered rock core is defined as follows, as suggested by the *Geological Society of London*:

Completely weathered: All rock material is decomposed and/or disintegrated to soil. The original mass structure is largely intact.

Highly weathered: More than half the rock material is decomposed and/or disintegrated to soil. Fresh or discolored rock is present either as a discontinuous framework or as core stone.

Moderately weathered: Less than half the rock material is decomposed and/or disintegrates to soil. Fresh or discolored rock is present ether as a continuous framework or as core stone.

Slightly weathered: Discoloration indicates weathering of rock material and discontinuity of surfaces. All the rock material may be discolored by weathering and may be somewhat weaker than its fresh condition.

Fresh: No visible signs of weathering.

PART C – SAMPLING SYMBOLS

Symbol	Description
SS	Split spoon sample
TW	Thin-walled (Shelby Tube) sample
PH	Sampler advanced by hydraulic pressure
WH	Sampler advanced by static weight
SC	Soil core

PART D – IN-SITU AND LAB TESTING

SOIL NAMING CONVENTIONS

Particle sizes are described as follows:

Particle Size Descriptor		Size (mm)
Boulder		> 300
Cobble		75 – 300
Gravel	Coarse	19 – 75
	Fine	4.75 – 19
Sand	Coarse	2.0 – 4.75
	Medium	0.425 – 2.0
	Fine	0.075 – 0425
Silt		0.002 – 0.075
Clay		< 0.002

The principle constituent of a soil is written in uppercase. The minor constituents of a soil are written according to the following convention:

Descriptive Term	Proportion of Soil (%)
Trace	1 – 10
Some	10 – 20
(ey) or (y)	20 – 35
And	35 – 50

Eg.: A soil comprising 65% Silt, 21% Sand and 14% Clay would be described as a: Sandy SILT, Some Clay

MW21-01

DST consulting engineers
a division of Englobe

DST Project No. 02103035.000
Client GSI Group Cold Storage Ltd.
Project Preliminary Geotechnical Investigation
Address 424 Churchill Avenue North, Ottawa, ON

Date April 21, 2021
Method Hollow Stem Auger & Pneumatic Drilling

Depth (m)	Elevation (m)	Water level (mREL)	Well construction	Depth (m) / Elevation (m)	Symbol	Material Description	Sample #	Sample Type	'N' Value/RQD %	CCGD / PID Reading: CCGD	CCGD / PID Reading: PID	Analysis: PAHs	Analysis: PHCs	Analysis: Metals	Analysis: VOCs	Analysis: pH	Remarks
0				0		ASPHALT - (140 mm thickness)	GS1										
				0.1		FILL - Silty sand, trace gravel, loose, brown, damp											
0.5				0.5		SANDY SILT - trace gravel, compact, brown, damp	SS1		6	25 ppm	0 ppm						
1.0							SS2		50+	210 ppm	1 ppm		✓		✓		
1.5				1.2		BEDROCK - Borehole advanced into bedrock using Tri-cone air drilling methods (bedrock type and quality could not be confirmed)											
2.0																	
2.5																	
3.0																	
3.5																	
4.0																	
4.5																	
5.0																	
5.5																	
6.0																	
6.5		▼															Groundwater level at 6.5 mbgs on April 30, 2021.
7.0																	
7.5																	
8.0																	
8.5																	
9.0																	
9.5																	
10.0																	
10.5																	
11.0				11.1		End of Borehole at 11.1 m.											
11.5																	
12.0																	
12.5																	

MW21-02

DST consulting engineers
a division of Englobe

DST Project No. 02103035.000
Client GSI Group Cold Storage Ltd.
Project Preliminary Geotechnical Investigation
Address 424 Churchill Avenue North, Ottawa, ON

Date April 21, 2021
Method Hollow Stem Auger & Wireline Diamond coring

Depth (m)	Elevation (m)	Water level (mREL)	Well construction	Depth (m) Elevation (m)	Symbol	Material Description	Sample #	Sample Type	'N' Value/RQD %	CCGD / PID Reading: CCGD	CCGD / PID Reading: PID	Analysis: PAHs	Analysis: PHCs	Analysis: Metals	Analysis: VOCs	Analysis: pH	Remarks
0				0		ASPHALT - (120 mm thickness)	GS1										
				0.1		FILL - Sand, some gravel, compact, brown, damp												
0.5				0.5		SANDY SILT - trace gravel, compact, brown, damp,	SS1		11	360 ppm	1 ppm							
							SS2		50+	710 ppm	3 ppm		✓		✓	✓	
1.0				1		LIMESTONE - highly weathered and fractured, grey											
				1.4		Auger refusal encountered at 1.4 mbgs											
1.5						LIMESTONE - poor quality based on RQD, slightly weathered, strong, medium to thickly bedded											
2.0							RC1		43								
2.5																	
3.0																	
3.5							RC2		37								
4.0				3.8		- 0.1m thick shale bed											
4.5				4.5		- fair quality based on RQD, fresh											
5.0							RC3		68								
5.5																	
6.0				6.1		- excellent quality based on RQD											
6.5		▼					RC4		93								Groundwater level at 6.8 mbgs on April 29, 2021.
7.0																	
7.5							RC5		92								
8.0																	
8.5																	
9.0				9		- fair quality based on RQD											
9.5							RC6		50								
10.0						End of Borehole at 10.0 m.											
10.5																	
11.0																	
11.5																	
12.0																	
12.5																	

MW21-03

DST consulting engineers
a division of Englobe

DST Project No. 02103035.000
Client GSI Group Cold Storage Ltd.
Project Preliminary Geotechnical Investigation
Address 424 Churchill Avenue North, Ottawa, ON

Date April 22, 2021
Method Hollow Stem Auger & Pneumatic Drilling

Depth (m)	Elevation (m)	Water level (mREL)	Well construction	Depth (m) / Elevation (m)	Symbol	Material Description	Sample #	Sample Type	'N' Value/RQD %	CCGD / PID Reading: CCGD	CCGD / PID Reading: PID	Analysis (Submitted for laboratory analysis): PAHs	PHCs	Metals	VOCs	pH	Remarks
0				0		ASPHALT - (140 mm thickness)	GS1										
				0.1		FILL - Silty sand, trace gravel, brown, compact, damp	SS1		50+	5 ppm	0 ppm		✓		✓		
0.5				0.3		SANDY SILT - trace gravel, brown, compact, damp											
1.0				0.8		BEDROCK - Borehole advanced into bedrock using Tri-cone air drilling methods (bedrock type and quality could not be confirmed)											
1.5																	
2.0																	
2.5																	
3.0																	
3.5																	
4.0																	
4.5																	
5.0																	
5.5																	
6.0																	
6.5																	
7.0		▼															Groundwater level at 6.9 mbgs on April 30, 2021.
7.5																	
8.0																	
8.5																	
9.0																	
9.5																	
10.0																	
10.5																	
11.0																	
11.5																	
12.0																	
12.5						End of Borehole at 12.8 m.											

APPENDIX D
GEOTECHNICAL LABORATORY TEST RESULTS

DST, a division of Englobe
203-2150 THURSTON DRIVE
OTTAWA , ONTARIO K1G 5T9
T: 1.877.300.4800
F: 1.888.979.6772
ottawalab@dstgroup.com
www.dstgroup.com

Moisture Content Test Results

DST Ref. No.: 02103035	**Date:** May 11, 2021.
Project: 424 Churchill Avenue North	**Client:** GSI Group Cold Storage Ltd.

Sample ID	Mass of Tare (g)	Mass of Wet & Tare (g)	Mass of Dry & Tare (g)	Mass of Wet Sample (g)	Mass of Dry Sample (g)	Mass of Water (g)	% MC
MW21-01 (SS1A)	13.6	62.8	59.6	49.2	46.0	3.2	6.96
MW21-01 (SS1B)	13.6	61.8	55.6	48.2	42.0	6.2	14.76
MW21-01 (SS2)	13.5	35	33.5	21.5	20.0	1.5	7.50
MW21-02 (GS1)	13.6	56.2	53.2	42.6	39.6	3.0	7.58
MW21-02 (SS1)	13.6	40	36.2	26.4	22.6	3.8	16.81
MW21-02 (SS2)	13.5	29.0	28.4	15.5	14.9	0.6	4.03
MW21-03 (GS1)	13.7	36.1	35.0	22.4	21.3	1.1	5.16
MW21-03 (SS1)	13.5	54.1	52.7	40.6	39.2	1.4	3.57

Stantec Consulting Ltd
2781 Lancaster Rd, Suite 100 A&B
Ottawa, ON K1B 1A7
Tel: (613) 738-6075
Fax: (613) 722-2799

Stantec

May 11, 2021
File: 122411080

Attention: **DST Consulting Engineers, File #02103035**

Reference: **ASTM D7012, Method C, Unconfined Compressive Strength of Intact Rock Core**

The following table summarizes two rock core compressive strength results.

Location	Compressive Strength (MPa)	Description of Break
10-MW21-2 RC-5	152.7	Well-formed cones at both ends
10-MW21-2 RC-6	141.1	Well-formed cones at both ends

Sincerely,

Stantec Consulting Ltd

Brian Prevost

Brian Prevost
Laboratory Supervisor
Tel: 613-738-6075
brian.prevost@stantec.com

APPENDIX E
ROCK CORE PHOTOGRAPHS

consulting engineers a division of Englobe	Rock Core Photographs 424 Churchill Ave. N, Ottawa, ON	Project No.: 02103035.000

RC1-1.4m

RC1-2.9m

RC2-2.9m

RC2-4.5m

Rock Core Photo No.: 1	Borehole: MW21-02 (RC1 & RC2)	Depth: 1.4 to 4.5 m

RC3-4.5m

RC3-6.0m

RC4-6.0m

RC4-7.4m

Rock Core Photo No.: 2	Borehole: MW21-02 (RC3 & RC4)	Depth: 4.5 to 7.4 m

consulting engineers a division of Englobe	Rock Core Photographs 424 Churchill Ave. N, Ottawa, ON	Project No.: 02103035.000

RC5-7.4m

RC5/RC6-8.9m

RC6-10.0m

Rock Core Photo No.: 3	Borehole: MW21-02 (RC5 & RC6)	Depth: 7.4 to 10.0 m

APPENDIX F

Fotenn Development Options Report

FOTENN

424 Churchill Avenue North

Development Options Report
March 5, 2021

FOTENN

Prepared for David Ho

Prepared by Fotenn Planning + Design
396 Cooper Street, Suite 300
Ottawa, ON K2P 2H7

March 2021

Development Options Report
424 Churchill Avenue North

March 5, 2021

Mr. David Ho (ho.david@gmail.com)

RE: Development Options Report for 424 Churchill Avenue North

Dear Mr. Ho,

Further to our discussions, Fotenn has reviewed the policy and regulatory context of your property located at 424 Churchill Avenue North (the "subject property"). The review includes analysis of the following policy and regulatory documents of the City of Ottawa:

- City of Ottawa Official Plan (2003, as amended);
- Draft New Official Plan 2021 - 2046 (ongoing);
- Richmond Road/Westboro Secondary Plan (2009);
- Richmond Road/Westboro Community Design Plan (2013);
- Transit-Oriented Development Guidelines (2007);
- Brownfields Redevelopment Program (2015); and,
- City of Ottawa Comprehensive Zoning By-law (2008-250).

The intent of this report is to provide you with background information on the context of the property as well as an analysis of the applicable policies and regulations that will determine the feasibility of redeveloping the site. In more specific terms, Fotenn has evaluated redevelopment opportunities on the property considering as-of-right zoning permissions and the highest and best building form permitted by City of Ottawa policy and guidelines in determining the recommend development approach for the site. Fotenn has evaluated the property's existing use as a dry-cleaning facility and context near Westboro Village, and as such this report contains specific recommendations in considering these factors.

Following careful review of applicable policies and guidelines, Fotenn prepared a Concept Plan depicting a redevelopment option of 424 Churchill Avenue. This concept makes the most of the development potential of this site based on existing planning policy. Based on permitted as-of-right zoning and other various reasons outlined later in this summary, Fotenn is recommending a six-storey, 56-unit residential building. Although Traditional Mainstreet policies within the Official Plan can support up to nine-storeys, the Richmond Road/Westboro Secondary Plan is the more area-specific policy document and permits a mid-rise building to a maximum height six-storeys for this site. Regardless, zoning is applicable law, and this site is permitted a 24 metre maximum building height.

Fotenn did considered high-rise development at this location, however for reasons including the parcel size, grade changes, parking constraints, lack of frontage along the Traditional Mainstreet, and ensuring adequate transition to properties within the surrounding lower-density residential neighbourhoods, it is our opinion that a mid-rise development is more appropriate and reasonable. This position would support a nine-storey building however it was not felt that the additional time, effort, and expenses required to achieve the additional floors through an Official Plan Amendment (OPA) was warranted.

If you have additional questions or require clarification on this report, please do not hesitate to contact us.

Sincerely,

Lisa Dalla Rosa, MCIP RPP
Senior Planner

1.0
Summary of Findings

The following is a summary of the findings and recommendations from the policy and regulatory review conducted by Fotenn.

- The subject property is designated as a Traditional Mainstreet in the City of Ottawa Official Plan. A designation focused on major elements of the rapid transit network and is identified as a target area for intensification. While the actual Traditional Mainstreet (TM) is Richmond Road, and the lands at 424 Churchill do not have frontage along the TM, the Official Plan contains policies which allow for properties on side streets to be considered within that designation depending on site circumstances and proximate to the actual mainstreet. Further the site has a Traditional Mainstreet zoning, which can only apply to "*areas designated Traditional Mainstreet in the Official Plan*".

- At the time of writing this report, the draft new Official Plan (November 2020) contains policies which would not significantly affect the redevelopment potential of the property.

- Policies within the Traditional Mainstreet designation support mid-rise building heights up to 9-storeys, however as the subject property is located within the Richmond Road/Westboro Secondary Plan, redevelopment of the property would be subject to the policies of the Secondary Plan. The Richmond Road/Westboro Secondary Plan states that building heights up to 6-storeys are permitted at the subject property.

  The property is not identified within a specified planning-sector as described in the Richmond Road/Westboro Secondary Plan, however Fotenn considers the defined edges of those planning sectors to be open to interpretation as they do not follow specific edge conditions, such as roads or property boundaries. The policies in the Westboro Village planning sector are translated in the Traditional Mainstreet zoning applicable to this site and for that reason 424 Churchill should be considered within the Westboro Village planning sector in the Richmond Road/Westboro Secondary Plan.

- Sections 2.5.1 and 4.11 of the Official Plan contain policies and directions for urban design and compatibility of development. Traditional Mainstreets are designated as Design Priority Areas, and development applications are subject to review by the Urban Design Review Panel (UDRP).

- The subject property is zoned Traditional Mainstreet in the City of Ottawa Comprehensive Zoning By-law 2008-250 with a permitted building height up to 24 metres, which generally accommodates a seven to eight storey building depending on floor to ceiling heights. Considering the zoning permissions, and the unique conditions of the property it is Fotenn's opinion, the subject property is appropriate for a mid-rise development. A mid-rise building is defined as a building ranging from five to nine storeys in height.

- Constraints including the irregular lot shape, the grade change, hydro lines and parking requirements have a limiting factor on the scale of development achievable on this site, and as such, Fotenn has prepared a concept plan for a six-storey, 56-unit residential building.

- As the planning policy supports a higher building, exploring increased height with an architect is suggested. Their expertise in building layouts, unit design and parking configuration could result in increased development potential for the parcel.

- Additional height above the permissions of the Zoning By-law will require an Official Plan Amendment (OPA) as an increase would exceed what is permitted in the Secondary Plan. Note that, Section 37 contributions would be required for developments that propose any increase in height and/or density deemed suitable by the City through a rezoning process.

- Fotenn has developed a concept plan for a residential building based on the existing zoning and recommends redevelopment of the property with variances for reduced parking space, corner side yard setbacks and 6th floor building stepback requirements.

- A residential only building is recommended to achieve the maximum potential for Gross Floor Area (GFA) and building height. The demand for non-residential uses (retail, restaurant, …) on this site is diminished considering the nearby well-established commercial and retail uses along Richmond Road. Further, the area of the building would not provide a typical or usable floor plate size for an office use.

- Vehicle access to the site is proposed via Danforth Avenue to take advantage of the unique topography of the site, its location and design will need to be verified by a transportation engineer once traffic volumes are established.

- Fotenn has considered the potential contamination of the site due to its current use and has included information within the report regarding remediation of the site. Should you proceed with redevelopment of the property, a Phase I and likely a Phase II Environmental Site Assessment will need to be completed. The site would undergo a change of use, so a Record of Site Condition (RSC) will also be required.

- To encourage redevelopment of sites which may contain potential contamination, the City of Ottawa has implemented the Brownfields Redevelopment Program which offers grants and financial incentives to property owners to help offset the cost of clean-up. This property is located within a Priority Area, so you may be eligible for these grants or financial incentives.

- The property is unique and therefore presents several constraints, including potential site contamination, an irregular lot shape, and a significant slope towards the north and western portions of the site. Considering these, Fotenn recommends engaging sub-consultants, including an architect, surveyors, civil engineers and environmental consultants, as early as possible should you wish to proceed with redevelopment of the site. Their experience and expertise will assist in refining the concept and turning it into a viable redevelopment project.

Fotenn is confident in our analysis of the policy and regulatory framework as presented, but any redevelopment is subject to the City of Ottawa's planning approval process. A pre-consultation meeting is recommended with City staff to confirm the findings of this report and the support for a development inline with the prepared concept. If there is a desire to move forward with a planning application Fotenn recommends a consulting team be assembled to prepare a Site Plan Application. Depending on the final design, a Zoning By-law Amendment or Minor Variance application might also be required to permit development, seeking relief from specific zoning provisions. An Official Plan Amendment would be required should you wish to exceed the building heights permitted in the Zoning By-law. Applications are subject to a public process and would require several additional studies and plans, a list of which will be provided as part of the Pre-Application Consultation meeting.

2.0
Site Context and Surrounding Area

2.1 Subject Site

The subject property, municipally known as 424 Churchill Avenue North, is a generally triangular lot bounded by Danforth Avenue to the north, Churchill Avenue North to the east, and Byron Avenue to the south (Figure 1). The subject property has an area of approximately 1,007 square metres with approximately 25.31 metres of frontage along the east side of Churchill Avenue North, and slopes downwards towards the north. The property is an irregularly shaped lot which currently contains a single-storey commercial building operating as a laundromat and dry cleaner with surface parking to the south of the building. The subject property has a significant grade change to the northern and western portions of the site and hydro poles and lines running along Churchill Avenue, all of which should be considered in a redevelopment concept. The site is located approximately 100 metres south the area known as Westboro Village along Richmond Road, a mainstreet which is generally characterised by low- to mid-rise commercial and retail buildings, and some high-rise residential buildings.

Figure 1: Context Map of 424 Churchill Avenue North, subject property indicated

2.2 Site Context

North: Immediately north of the subject property is Danforth Avenue, across which are single and two-storey commercial buildings along Churchill Avenue North and the north and south sides of Richmond Road, with surface parking to the rear (facing this property). It should be noted that there is an approximately 1-storey drop from the parking lot of this site to Danforth Avenue. A masonry retaining wall is evident on the south side of Danforth Avenue. Richmond Road is 100 metres north of the site and functions as a mainstreet, supporting a broad range of uses and varying buildings types. Further north is a neighbourhood generally containing low-rise residential buildings, with sporadic commercial buildings located along either side of Churchill Avenue North.

East: Immediately east of the subject property is Churchill Avenue North. Opposite Churchill Avenue North are generally low-rise commercial and residential uses, and the Byron Avenue multi-use pathway. Further east is a neighbourhood generally containing low-rise residential buildings.

South: Immediately south of the subject property is Byron Avenue which intersects with Churchill Avenue North, a stop-light controlled intersection. South across Byron Avenue are institutional buildings, one containing the Westboro Masonic Hall, and the other containing the Churchill Public and Churchill Alternative schools. Further south is the Bluesfest School of Music and Art, and a low-rise neighbourhood, with both commercial and residential uses located along Churchill Avenue North. A six-storey mixed-use building with approximately 75 residential units is currently going through the Site Plan approval process diagonally across from the subject site (south-east corner of Churchill Avenue North and Byron Place).

West: Immediately west of the subject property is a two-storey commercial building, accessed via Danforth Avenue. There is natural vegetation in the form of trees, scrub on the property that buffers this development. Further west are commercial properties with frontage along Richmond Road, and a low-rise residential neighbourhood through to Roosevelt Avenue. Further west of is mid- to high-rise mixed-use buildings along Richmond Road and a low-rise residential neighbourhood.

2.3 Site Photos

A site visit was conducted on February 18, 2021 to understand the existing conditions and context of the property.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>View North-East from Byron Avenue</td><td>View West from Churchill Avenue North
Danforth Avenue seen in the bottom right</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>View North-West from Byron Avenue</td><td>View East from Byron Avenue</td></tr>
</table>

3.0
Policy and Regulatory Review

3.1 City of Ottawa Official Plan (2003, as amended)

3.1.1 Traditional Mainstreets

The City of Ottawa Official Plan designates 424 Churchill Avenue North a Traditional Mainstreet as described on **Schedule B, Urban Policy Plan** (Figure 2). This designation identifies streets that offer significant opportunities for intensification through medium-density and mixed-use development, particularly along streets that are well-served by transit. Traditional Mainstreets generally have pre-1945 characteristics and are set within a tightly knit urban fabric, and redevelopment is generally promoted in a fashion that locates buildings close to the street and is more supportive of walking, cycling and transit. Policies which apply to the Traditional Mainstreet designation state that:

- Generally, the Traditional Mainstreet designation applies to lots with frontage along the Mainstreet to a depth of 200 metres, however the boundary may also be varied, depending on site circumstance and lot configuration, to also include properties on abutting side streets that exist within the same corridor (**Policy 3.6.3.3**);
- A broad range of uses is permitted within the Traditional Mainstreet designation, including retail and service commercial uses, offices, residential and institutional uses which may be mixed in individual buildings or occur side by side in separate buildings (**Policy 3.6.3.5**);
- New gas bars, service stations, automobile sales and drive-through facilities are generally not permitted on Traditional Mainstreets to protect and enhance the pedestrian environment (**Policy 3.6.3.8**);
- Surface parking will not be permitted between the building and the street (**Policy 3.6.3.9**);
- Redevelopment and infill are encouraged with the Traditional Mainstreet designation to optimize the use of land through intensification, in a building format that encloses and defines the street edge with active frontages that provide direct pedestrian access to the sidewalk (**Policy 3.6.3.10**); and,
- Generally, mid-rise building heights are encouraged, however secondary plans may identify circumstances where different building heights are permitted (**Policy 3.6.3.11**).

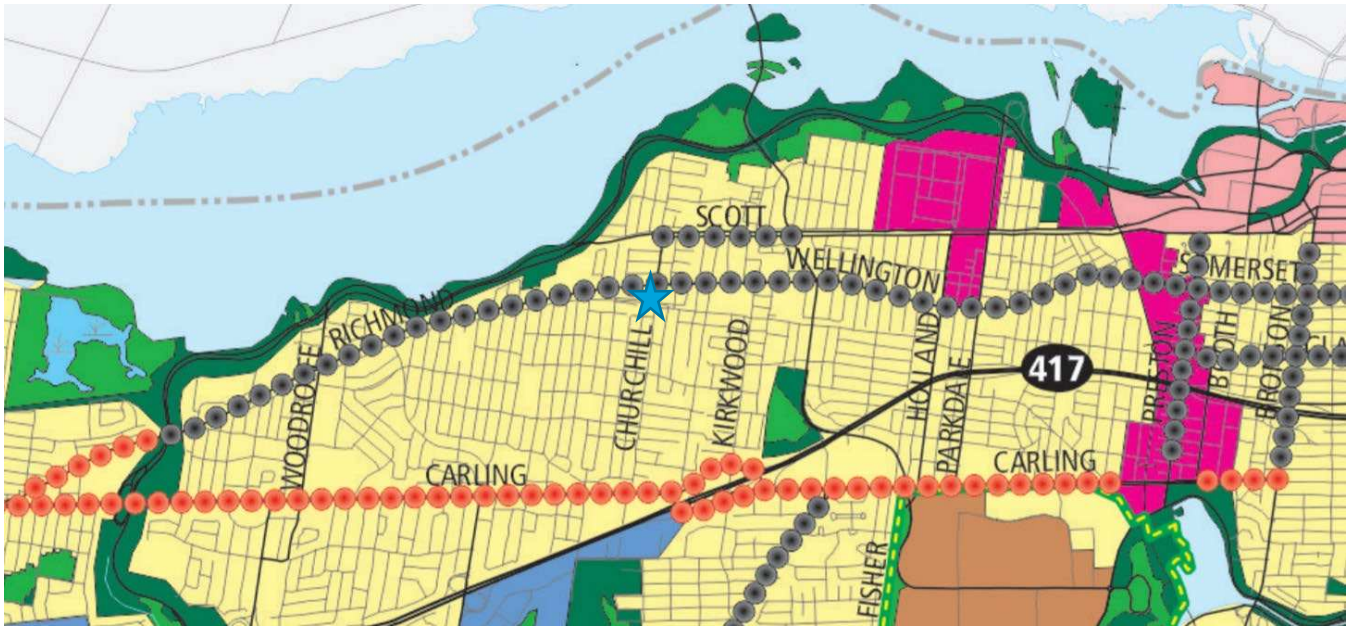


Figure 2: Schedule B Urban Policy Plan, subject property indicated

The policies contained in Section 3.6.3 of the Official Plan are supportive of mixed-use or residential development at 424 Churchill Avenue North.

3.1.2 Design Objectives & Principles and Urban Design & Compatibility

Section 2.5.1 of the Official Plan provides objectives and policies for achieving compatibility between form and function when introducing new development into existing areas. Compatible development means development that, although not necessarily the same as or like existing buildings in the vicinity, nonetheless enhances an established community and coexists without causing undue adverse impact on surrounding properties; it "fits well" within its physical context and "works well" among those functions that surround it.

The following Design Objectives, which are intended to influence Ottawa's built environment as it grows, are applicable to the subject property and proposed development:

- Enhances the sense of community by creating and maintaining places with their own identity;
- Defines quality public and private spaces through development;
- Creates places that are safe, accessible and are easy to get to, and move through;
- Ensures that new development respects the character of existing areas; and
- Considers adaptability and diversity by introducing new residential land uses in a compact built form that contributes to the range of housing choices and transportation options in the area.

Similar to Section 2.5.1 of the Official Plan, **Section 4.11** outlines a set of criteria that can be used to objectively measure the compatibility of a development proposal. At the scale of neighbourhoods or individual properties, consideration for views, design, massing, and amenity space, among others, are key factors for assessing the relationship between new and existing development. Traditional Mainstreets are recognized as 'Design Priority Areas' and are required to participate in an enhanced review by the Ottawa Urban Design Review Panel (UDRP) to understand how the proposed development will contribute to the Design Objectives and achieve good urban design.

3.1.3 Development of Contaminated Sites

The current use of the subject property is a dry-cleaning facility, thus likely considered a contaminated site. A contaminated site is defined in the Official Plan as *"a site where the environmental condition of the property may have potential for adverse effects on human health, ecological health or the natural environment."* Prior to development on these sites, the City requires that any contamination issues be identified, and the site be suitable, or be made suitable for the proposed development. **Section 4.8.4** contains policies related to potentially contaminated site and state:

- The applicant is required to document previous uses of a property that may be adversely impacting the property to assist in the determination of the potential for site contamination (**Policy 4.8.4.1**);
- The City will require the completion of a Phase I Environmental Site Assessment (ESA), which documents the previous uses of the property and provides an assessment of the actual or potential soil or groundwater contamination on the site (**Policy 4.8.4.2**);
- Should the Phase 1 ESA indicate the property may be contaminated, a Phase 2 ESA will be completed, which provides a sampling and analysis of the property to confirm and delineate the presence of soil or groundwater contamination at the site or confirm the absence of contamination at the site (**Policy 4.8.4.3**);
- A property that has been identified through the City's development review process as potentially contaminated due to previous or existing uses and where the City determines that there is a proposed change in land use to a more sensitive use, the City will:
    - Require (as a condition of development approval) that the property be suitable or has been made suitable for the proposed use by filing a Record of Site Condition (RSC) signed by a qualified person and establish conditions of development approval (**Policy 4.8.4.4**); and,
- Where an RSC has been made a condition of planning approval, a building permit may be issued to a property on a phased basis to allow for site assessment and remediation/risk management (**Policy 4.8.4.5**).

3.2 Draft New Official Plan (ongoing)

On November 20, 2020, the City of Ottawa released a draft of a new Draft Official Plan which is expected to be adopted by City Council in the Fall of 2021. The new Official Plan applies policy direction to a 25-year planning horizon from 2021 to 2046. Policies as they relate to the subject property are summarized below, which generally state:

- The subject property is located within the Inner Urban Transect Area, along a Minor Corridor (Churchill Avenue North) with the Transforming Overlay, where policies are supportive of intensification and new built forms which promote walkability, transit use, and enhanced public realm.
- Inner Urban Transect areas are characterized by both urban and suburban elements. The draft OP sees it continue to develop as a mixed-use environment, where a full range of services are location within a walking distance from home to support the growth of 15-minute neighborhoods.
- Corridors are planned to facilitate higher density of development, greater degree of mixed land-use and an increased level of street transit service than abutting neighbourhoods, with lower densities than nearby Hubs
- Building heights between four and six storeys are permitted along Minor Corridors in the Inner Urban Transect Area.
- The Transforming Overlay supports regeneration by providing additional guidance on the desired built-form, and public realm interface in areas that are well-suited to change more rapidly over the life of the Plan.

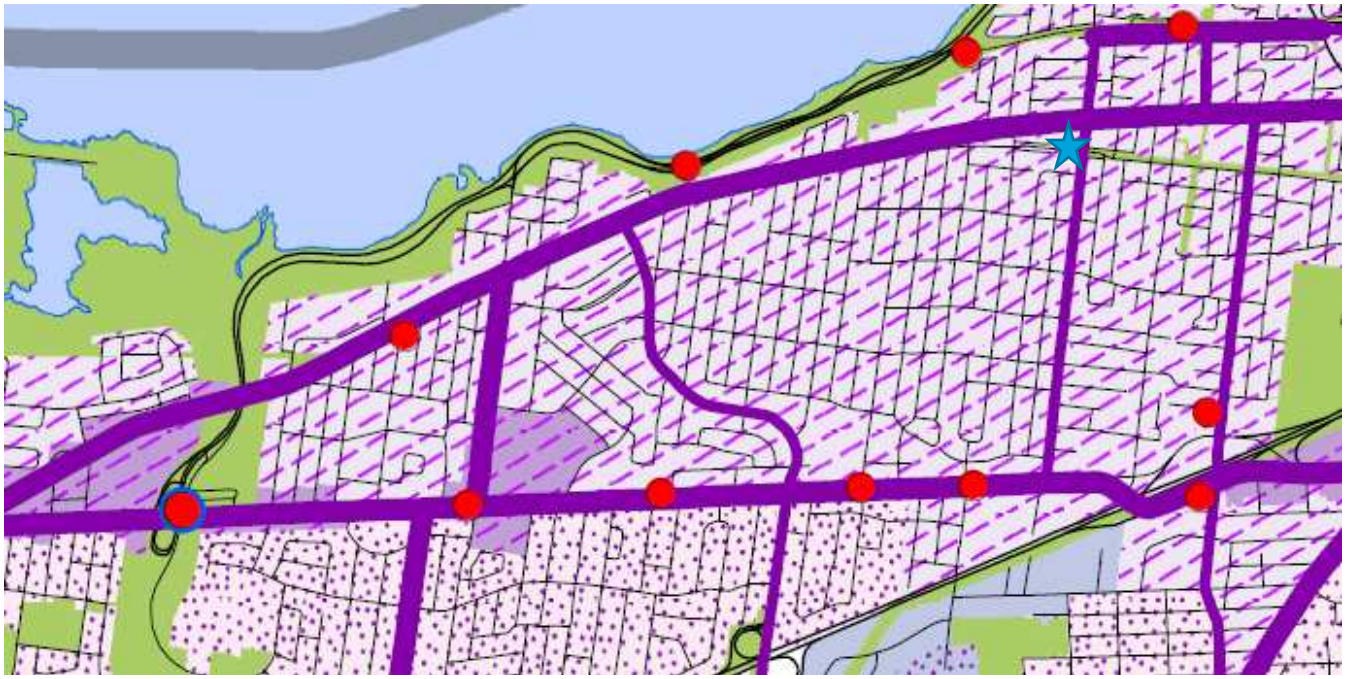


Figure 3: Draft New Official Plan Inner Urban Transect Area, subject property indicated

The Richmond Road/Westboro Secondary Plan (discussed in the next section) is proposed to be carried over with no significant changes as part of the new Official Plan.

3.3 Richmond Road/Westboro Secondary Plan (2009)

The subject property is located within the Richmond Road/Westboro Secondary Plan (SP) area, which is bounded on the north by the Ottawa River, on the east by Island Park Drive, on the south by Byron Avenue and on the west by Cleary Avenue. The SP plan area as well as the planning sectors are described on Schedule A (Figure 3). The plan was approved by City Council in July 2009 and is based on the Richmond Road/Westboro Community Design Plan.

Figure 4: Schedule A, SP Area, subject property indicated

The objectives of the plan are to:

- Encourage infill/intensification at a human scale that is compatible with the existing community on appropriate key potential redevelopment sites
- Preserve, enhance and add to the green space network that provides access to the Ottawa River and serves local community needs, and,
- Define the distinct urban character of each sector of Richmond Road.

Principles for intensification include:

- Preserve the scale and character of established residential neighbourhoods and minimize any adverse impacts of intensification;
- Preserve and enhance the human scale (generally four to six storeys) of the Westboro Village traditional mainstreet, Richmond Road;
- Achieve compatible infill and intensification by:
    - conforming to the maximum recommended building height ranges for each sector, where buildings higher than six-storeys will be limited to sites that are compatible with adjacent uses, such as the Ottawa River Parkway open space, have deeper lots, or have other natural or manmade separations enabling impacts associated with such development to be mitigated and where lesser heights abutting existing lower rise buildings can be provided; and,
    - Conforming to the Richmond Road/Westboro CDP design guidelines respecting built form, setbacks, relationship of the building to the adjacent neighbourhood's character, and other criteria aimed at achieving compatible intensification/ infill development while minimizing impacts on adjacent residential neighbourhoods.

While it appears that the subject property is not located within a specified planning sector as described in Schedule A (Figure 3), those outlines are fluid, not following roads and/or other defining edges. As such, the subject site should be considered within the Westboro Village planning sector. Policies applicable to this planning sector seek to:

- Reinforce the existing traditional mainstreet character of Westboro Village;

- Maintain a sense of human scale in Westboro Village by providing for mixed-use buildings, generally in the four- to six-storey range, with a minimum of two-storeys, with buildings located close to the street;
- Encourage mixed use, including a continuity of ground floor retail/restaurant uses with residential and office uses on the upper floors.

The Richmond Road/Westboro Secondary plan is supportive of mixed-use development and intensification of underutilized sites and supports building heights between four- and six-storeys at the subject property (Figure 4).

Figure 5: Schedule C2, Maximum Permitted Building Heights, subject property indicated

3.4 Richmond Road/Westboro Community Design Plan

The subject property is located within the Richmond Road/Westboro Community Design Plan (CDP) area. This CDP was approved by City Council on July 9, 2007 and seeks to develop a vision for Richmond Road/Westboro as an attractive and viable place for all who shop, work or live in the area. The information in this CDP informed the development of the Richmond Road/Westboro Secondary Plan.

Section 3.2 describes the land uses within the CDP area; the subject property's existing conditions is shown as "Reinforced Village Mainstreet Character" (Figure 5). Further, **Section 3.5** describes the existing zoning applicable to the policy area and describes the area of Westboro Village generally zoned as CN- Neighbourhood Linear Commercial, TM- *Traditional Mainstreet*, which supports a wide variety of retail, restaurant and community uses, where building heights of 24 metres (or eight storeys) are permitted.

Section 6.0 describes the land use strategy and appropriate building scales within the CDP area. As described on **Schedule C2** (Figure 6), the subject property is located within the Neighbourhood Linear Commercial Zone (CN) and is permitted building heights of "8 to 6 storeys". This height does differ from the approved Secondary Plan but does mirror the maximum height currently permitted in the zoning.

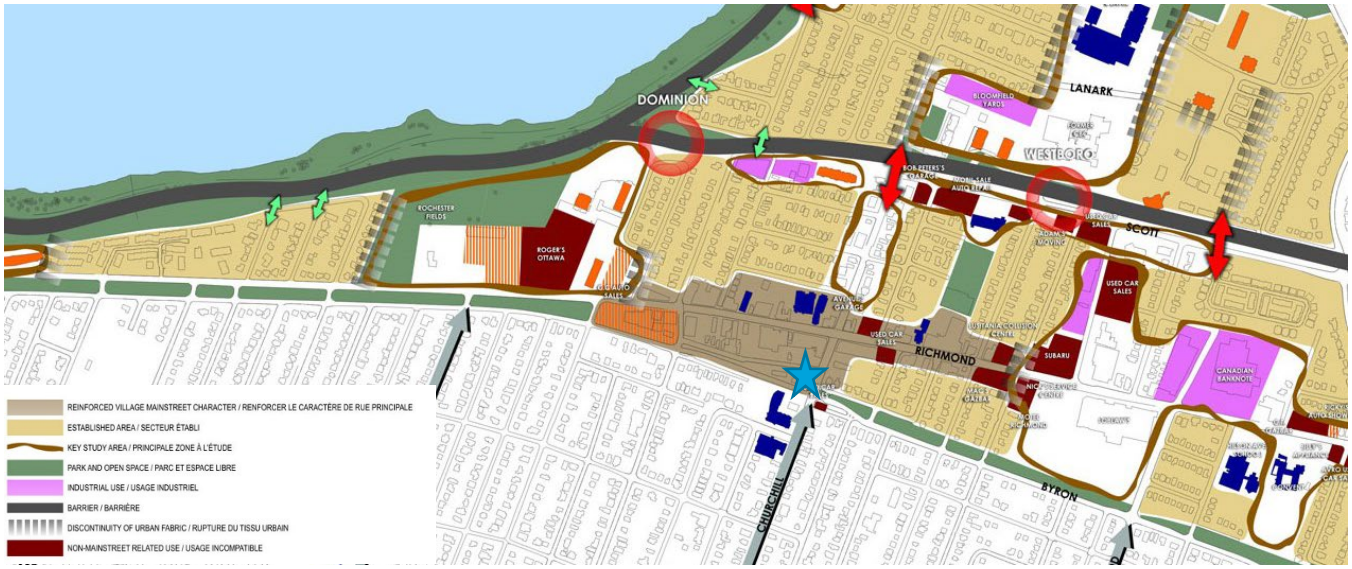


Figure 6: Map 3, Existing Conditions, subject property indicated

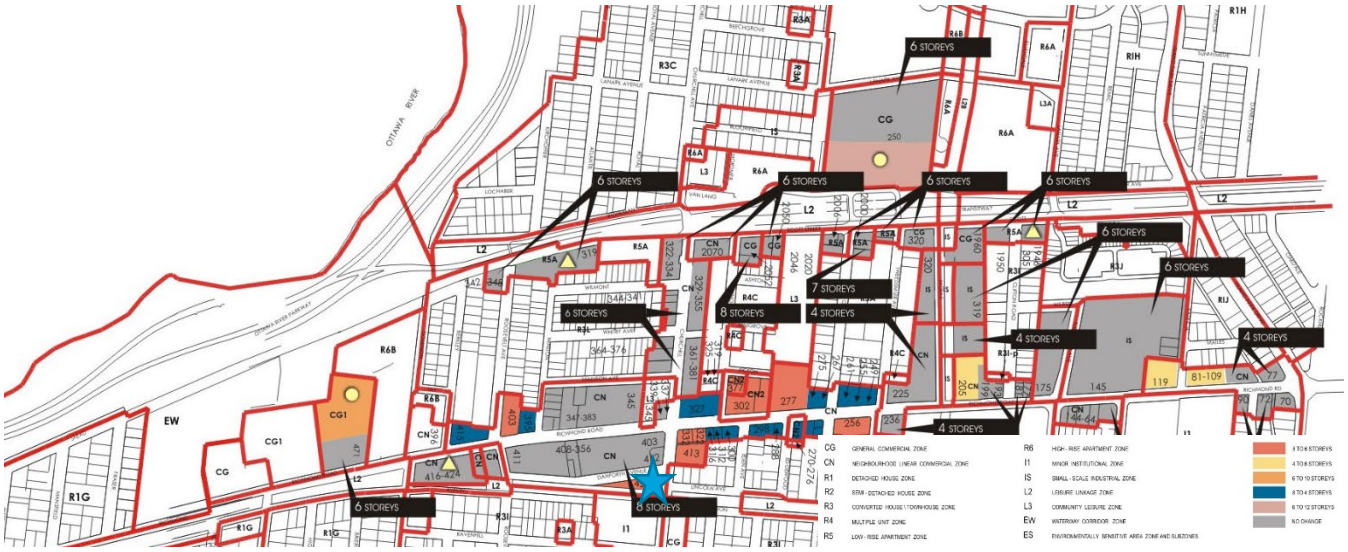


Figure 7: Schedule C2, Land Use Strategy, subject property indicated

The CDP reinforces the theme of promoting mixed uses along Traditional Mainstreets, where building forms will consist of a ground floor commercial use, such as retail or restaurants, and office uses in some areas, and upper floors consisting of residential uses. The CDP recommends conforming to the Official Plan policies for maximum building heights for Traditional Mainstreets.

3.5 City of Ottawa Zoning By-law (2008-250)

The subject property is zoned TM H(24) in the City's Comprehensive Zoning By-law (2008-250) a Traditional Mainstreet, with a maximum height of 24 metres (Figure 9).

Figure 9: Zoning Map, subject property indicated

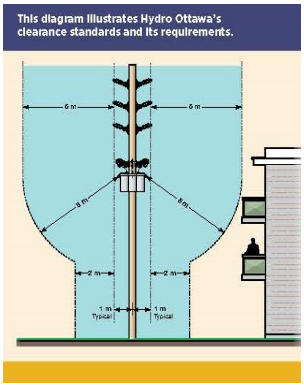
Traditional Mainstreet zoning is intended to accommodate a broad range of uses including retail, service commercial, office, residential and institutional uses, including mixed-use buildings in areas **designated Traditional Mainstreet** in the Official Plan. These areas foster and promote compact, mixed-use, pedestrian-oriented development that provide for access by multiple modes of transportation, while adhering to development standards which ensure that street continuity, scale and character is maintained, and that the uses are compatible and complement surrounding land uses.

The table below describes zoning provisions and permissions as they relate to the subject property.

Zoning Provision	**TM H(24)**
Permitted Residential Uses:	apartment dwelling, low rise and mid-rise bed and breakfast dwelling units group home, home-based business home-based day care retirement home retirement home, converted rooming house several non-residential uses are permitted on the site, with office and residential uses are permitted on the entirety of the ground floor.
Min. Lot Width (m)	No minimum
Min. Lot Area (m²)	No minimum
Max. Front Setback (m)	2m, however for any part of a building above 15 metres a minimum front yard setback of 2 metres must be provided

Min. Corner Side Yard Setbacks (m)	3 m, except for any part of a building above 15 metres for which an additional 2 metre setback must be provided
Min. Rear Yard Setback (m)	(iii) for residential use building: 7.5 metres (iv) all other cases: No minimum
Min. Width of Landscaped Area	No Minimum, except that where a yard is provided and not used for required driveways, aisles, parking or loading spaces, the whole yard must be landscaped
Min. Building Height	6.7 metres for 20 metres from the front lot line
Max. Building Height (m)	**24m** Note: where the building height is greater than four-storeys or 15 metres, at and above the fourth storey or 15 metres whichever is the lesser a building must be setback a minimum of 2 metres more than the provided setback from the front lot line and from the corner side lot line.
Max. Floor Space Index	No Maximum
Notes	Storage must be completely enclosed in a building.
	A maximum of one private approach may be provided for each property having a lot frontage of 45 metres or less.
	The façade facing the main street must include at least one active entrance serving each residential or non-residential use occupying any part of the ground floor For non-residential uses, a minimum of 50% of the ground floor façade facing the main street, measured from the average grade to a height of 4.5 metres, must comprise transparent windows and active entrances.
Parking Requirements (Sec. 101, 103, 106, 111)	
Area X of Schedule 1A	**Residential Parking Requirements** 0.5 per dwelling unit, less the first 12 dwelling units **Retail Store Parking Requirements** 1.25 per 100 m^2 of gross floor area **Visitor Parking** 0.1 spaces/unit of visitor parking, less the first 12 units to a maximum of 30 visitor spaces
Max. Parking near Rapid Transit Station (Section 103, Table 103)	**Residential:** 1.75 per dwelling unit (combined total of resident and visitor parking) **Retail Store:** 3.6 per 100m^2 of gross floor area
Bicycle Parking	**Residential:** 0.5/dwelling unit **Retail:** 1 per 250 m^2 of gross floor area

Amenity Space Requirements (Sec. 137)	
Mid-Rise Apartment and Mixed-Use Building	**Total** 6m^2 per dwelling unit, and 10% of the gross floor area of each rooming unit **Communal** A minimum of 50% of the required total amenity area shall be communal

Other Notes	
Hydro Setbacks	The subject property is affected by hydro poles located at the north west corner of the site and a high voltage power line running along the western portion of the site along Churchill Avenue North. A plan of survey will be required to confirm exact implications of hydro poles. Primary hydro poles base requires a setback of 2.0 metres, and from a high voltage power line, the setback may be 5 metres for that portion of the building affected by the line, as shown in the diagram below. 

3.6 Transit Oriented Development Guidelines (2007)

In September 2007, City Council approved design guidelines to address Transit-Oriented Development. The guidelines apply to all development throughout the City that is located within 600 metres walking distance of a rapid transit stop or station and provide guidance for the proper development of these strategically located properties. The guidelines address six elements of urban design including: land use, layout, built form, pedestrians and cyclists, vehicles and parking, and streetscape and environment.

While the document contains many guidelines, the following apply to the subject property and should be considered when developing a concept plan:

- Provide transit-supportive land uses within a 600-metre walking distance of a rapid transit station;
- Create a multi-purpose destination for both transit users and local residents through providing a mix of different land uses that support a vibrant area community and enable people to meet many of their daily needs locally, thus reducing the need to travel. Elements include a variety of different housing types, employment, local services and amenities that are consistent with the policy framework of the Official Plan and the City's Zoning By-law;
- Locate buildings close to each other and along the front of the street to encourage ease of walking between buildings and to public transit;
- Locate the highest density and mixed uses (apartments, offices, etc.) immediately adjacent and as close as possible to the transit station;
- Step back buildings higher than four or five-storeys to maintain a more human scale along the sidewalk and to reduce shadow and wind impacts on the public street;
- Create a highly visible building through distinctive design features that can be easily identified and located;
- Locate buildings in reference to the front property line in a manner that is intended to define the street edge;
- Provide architectural variety on the lower storeys of buildings to provide visual interest to pedestrians;
- Provide amenities and services within grade-separated linkages to generate activities and enhance security;
- Propose a reduced number of parking spaces/provide no more than the required number of spaces to minimize surface parking and encourage transit use; and,
- Encourage underground parking or parking structures over surface parking lots.

3.7 Brownfields Redevelopment Program (2015)

Through the Ottawa Brownfields Community Improvement Program (CIP), the City of Ottawa offers financial incentives to encourage the redevelopment of brownfields within the City's urban area boundary, with highest priority placed on redevelopment of brownfields in the Central Area, Mixed Use Centres, along Mainstreets, and within 600 metres of existing or planned rapid transit stations. The subject property is located within the described Priority Area, and may be eligible for grants and funding provided within the CIP, including the:

- Environmental Site Assessment Grant Program: This grant is equivalent to 50% of the cost of an eligible environmental site assessment, remedial action plan or risk assessment to a:
  - maximum grant of $15,000 per study;
  - maximum of two studies per property, per project; and,
  - maximum total grant of $25,000 per property, per project.
- Property Tax Assistance Program: This program suspends a municipal property tax increase for up to three years.
- Building Permit Fee Grant Program: This program applies to sites within the Priority Area and provides a grant equivalent to 30% of the building permit fee.
- Development Charge Reduction Program: This program applies to sites within the Priority Area and provides up to 50% deferment of eligible item costs towards development charges.

Funding limits under the Ottawa Brownfields CIP state that the total of all grants, property tax assistance and development charge reduction provided in respect of particular lands and buildings specified in the above-noted programs shall not exceed 50% of the cost of rehabilitating said lands and buildings.

4.0
Concept Plan

In understanding the policies, regulations, opportunities, and constraints detailed above, a Concept Plan has been prepared to demonstrate a potential development option for the site. The Fotenn proposes a six-storey, 56-unit residential building with approximately 4,588m^2 of Gross Floor Area (GFA) and 20 underground parking spaces.

Appendix A contains the following plans:

- 424 Churchill Ave N, Ottawa – Concept Plan, 1-5 Typical Floor
- 424 Churchill Ave N, Ottawa – Concept Plan, 6th Floor
- 424 Churchill Ave N, Ottawa – Concept Plan, Schematic UDG Plan

The following assumptions were made when developing the Concept Plan.

- Parking garage access is provided off Danforth Avenue, taking advantage of the significant slope towards the west. This will remove the need for a ramp, as this access will be approximately level with the underground parking level.
- The proposed the building has been setback 1 meter from the front property line to accommodate the required 5-meter hydro line clearance along Churchill Ave. A survey will be required to accurately locate the poles and lines to verify building placement.
- Unit yields were calculated by applying an 85% building efficiency and an average unit size of 70 m^2 (753 ft^2).
- The GFA excludes common areas such as hallways, stairwells and elevators, lobbies, etc.
- Retention of existing vegetation to the rear of the site to act as a naturalized buffer.

The concept also assumes the City will support and approve variances to the zoning. These adjustments are required given the size and irregular shape of the parcel. They will allow for a slightly more efficient floorplate, including:

- Corner side yard setback reduction to 0 m from 3 m along Danforth Avenue.
  - This street essentially works as a service street/driveway for the businesses fronting onto Richmond Rd and has generous 20m ROW.
- Corner side yard setback reduction to 1 m from 3 m along Byron Avenue.
- Building stepback requirement applicable at 15 metre (5th floor) building height is reduced to 1 m from 2 m
- Minimum parking space requirement reduction to 20 spaces from 26 spaces

It should be noted that Fotenn did not benefit from any survey information to confirm grades and building elevations, as such the design of the ramp from Danforth Street may impact the parking design and yield of available parking spaces. The Concept Plan is a high-level analysis and much architectural detailing will be required to fully resolve the building and underground parking structure.

The zoning by-law requires 334 m^2 of amenity area for residents, where 50% of it be provided as communal space. Amenity space is generally in the form of private balconies and larger communal amenity areas such as a terrace or gym space. The Concept Plan does not fully realize this amenity space, however some of the required communal amenity space may be located either at-grade or as rooftop terrace space.

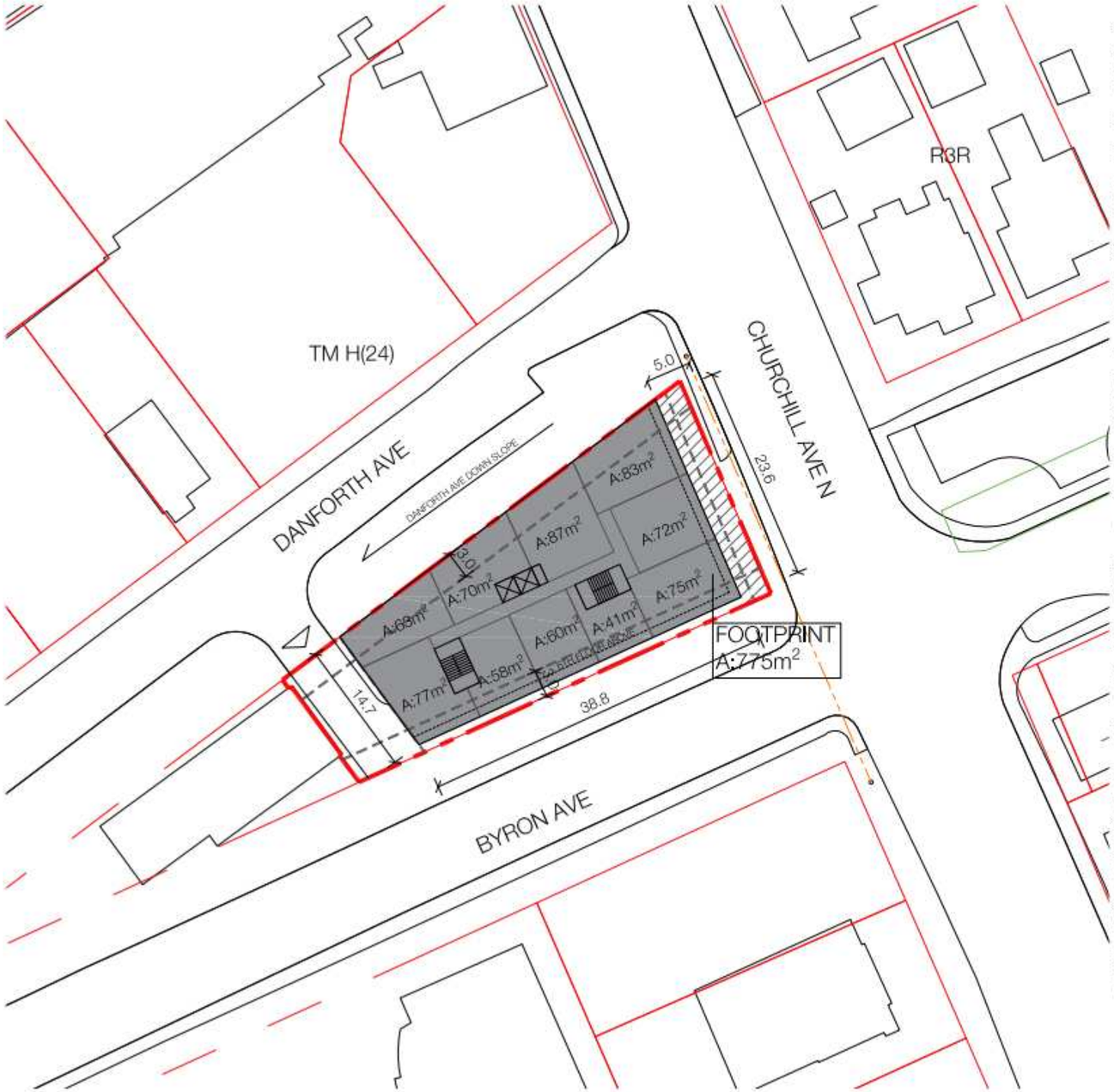
5.0 Conclusion

Upon review and analysis of the relevant planning policy and regulatory documents of the City of Ottawa, Fotenn believes the subject property is best suited for 6 storey, residential building. While the existing zoning does permit commercial and higher heights after preparing a concept it was clear that even with variances the unique shape and location of 424 Churchill Avenue North should accommodate a low-mid-rise building. The area already contains a significant amount of commercial and retail along Richmond Road, which is better suited to support these types of uses. Regardless the building make-up, height size can be explored further as a design for the redevelopment is refined. Note that non-residential uses require greater floor to ceiling heights along with in increased parking requirements.

Fotenn did contemplate the development of a high-rise building (10 or more storeys) for this site, however it is quite difficult to achieve without major concessions in terms of design and functionality. There would also be additional requirements for planning approvals from the municipality. Increasing the number of units presents a challenge in terms of accommodating additional parking spaces and amenity area needs for residents.

Fotenn is supportive of a mid-rise (up to 9 storey) development at 424 Churchill Avenue North, so investigating increased height and development potential with an architect is suggested. Their expertise in building layouts, unit design and parking configuration could result in increased development potential beyond the 6-storey, 56-unit concept option.

APPENDIX 1
Concept Plan – 424 Churchill Avenue North



SITE INFORMATION

ZONING	TM H(24)
SITE AREA	
Total Site Area:	1,006m²
HEIGHT	Permitted
Residential:	8 Storeys (24m)
FSI	No Maximum

PARKING RATES	REQUIRED
Residential:	0.5 p/unit*
Retail:	1.25p/100m²
Visitor:	0.1p/unit**

*except for first 12 dwelling units
**except for first 12 units to a max of 30 visitor spaces

AMENITIES RATE	
Required	6m² / unit

SETBACKS	F.Y.	S.Y.	R.Y.
	0m	3m	7.5m

Additional 2m stepback above 15m in height.

DEVELOPMENT STATISTICS

RESIDENTIAL UNITS
Apartment: ~56
Assumes an 85% efficiency

HEIGHT	Proposed
Residential:	6 Storeys (18m)
GFA	Residential
	3,899m²
TOTAL BUILDING AREA	Residential
	4,588m²

PARKING	Required	Provided
Residential:	22	16
Visitor:	4	4
Total:	26	20

AMENITIES	
Required	6m² x 56 = 334m²
Provided	TBD

NOTES

1. Assumes typical Residential floor height of 3m.

2. For the purpose of this concept, an average of 70m² (753sf) unit size is used to calculate approximate total number of units.

3. *GFA: as defined in City of Ottawa Zoning Bylaw means the total area of each floor whether located above, at or below grade, measured from the interiors of outside walls, but excluding areas dedicated for uses such as mechanical and electrical rooms, common hallways, corridors, staircases and elevators, interior amenities, bicycle storage and parking. Assume 85% efficiency for Apartment buildings. Areas are approximate. Building includes interior amenity areas for the residents.

4. The base plan (lot lines, existing roads and surrounding areas) is based on the City's Open Data and aerial images. The site area is approximate and all dimensions need to be confirmed by a legal survey.

5. This concept is part of a development concept report and should be interpreted as per findings and descriptions of such report. This concept may require minor variances for setback reduction, parking, heights, etc.

424 CHURCHILL AVE N OTTAWA
CONCEPT PLAN
1-5 TYPICAL FLOOR

LEGEND
PROPOSED BUILDING
5m BUFFER FROM HYDRO LINES
PROPERTY BOUNDARY
SETBACKS
EXISTING HYDRO LINE

0 5m 10m 20m

No.	REVISION	DATE	BY
3	CONCEPT PLAN	2021.03.02	RP
2	CONCEPT PLAN	2021.03.01	RP
1	BASE PLAN	2021.02.22	LC

CLIENT
DAVID HO

FOTENN
Planning + Design
398 Cooper Street, Suite 300, Ottawa ON K2P 2H7
613.730.5709 www.fotenn.com

DESIGNED	RP
REVIEWED	RP
DATE	2021.02.25

P1

SITE INFORMATION

ZONING	TM H (24)
SITE AREA	
Total Site Area:	1,006m²
HEIGHT	Permitted
Residential:	8 Storeys (24m)
FSI	No Maximum

PARKING RATES	REQUIRED
Residential:	0.5 p/unit*
Retail:	1.25p/100m²
Visitor:	0.1p/unit**

*except for first 12 dwelling units
**except for first 12 units to a max of 30 visitor spaces

AMENITIES RATE	
Required	6m² / unit

SETBACKS	F.Y.	S.Y.	R.Y.
	0m	3m	7.5m

Additional 2m stepback above 15m in height.

DEVELOPMENT STATISTICS

RESIDENTIAL UNITS
Apartment: ~56
Assumes an 85% efficiency

HEIGHT	Proposed
Residential:	6 Storeys (18m)

GFA	Residential
	3,899m²

TOTAL BUILDING AREA	Residential
	4,588m²

PARKING	Required	Provided
Residential:	22	16
Visitor:	4	4
Total:	26	20

AMENITIES	
Required	6m² x 56 = 334m²
Provided	TBD

NOTES

1. Assumes typical Residential floor height of 3m.

2. For the purpose of this concept, an average of 70m² (753sf) unit size is used to calculate approximate total number of units.

3. *GFA: as defined in City of Ottawa Zoning Bylaw means the total area of each floor whether located above, at or below grade, measured from the interiors of outside walls, but excluding areas dedicated for uses such as mechanical and electrical rooms, common hallways, corridors, staircases and elevators, interior amenities, bicycle storage and parking. Assume 85% efficiency for Apartment buildings. Areas are approximate. Building includes interior amenity areas for the residents.

4. The base plan (lot lines, existing roads and surrounding areas) is based on the City's Open Data and aerial images. The site area is approximate and all dimensions need to be confirmed by a legal survey.

5. This concept is part of a development concept report and should be interpreted as per findings and descriptions of such report. This concept may require minor variances for setback reduction, parking, heights, etc.

424 CHURCHILL AVE N OTTAWA

CONCEPT PLAN
6th FLOOR

LEGEND
- PROPOSED BUILDING
- 3m BUFFER FROM HYDRO LINES
- PROPERTY BOUNDARY
- SETBACKS
- EXISTING HYDRO LINE

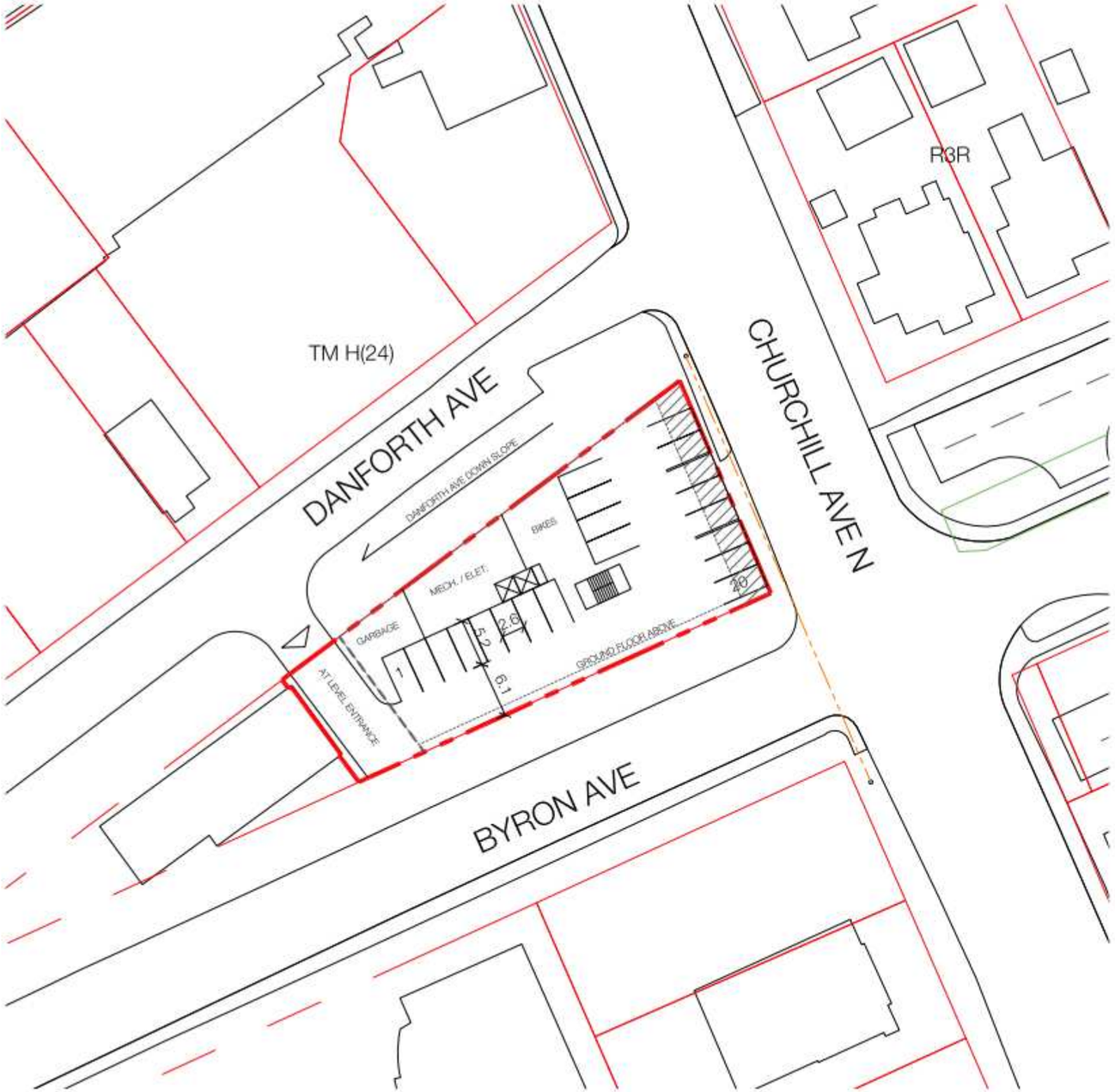
No.	REVISION	DATE	BY
3	CONCEPT PLAN	2021.03.02	RP
2	CONCEPT PLAN	2021.03.01	RP
1	BASE PLAN	2021.02.22	LC

CLIENT
DAVID HO

FOTENN
Planning + Design
396 Cooper Street, Suite 300, Ottawa ON K2P 2H7
613.730.5709 www.fotenn.com

DESIGNED	RP
REVIEWED	RP
DATE	2021.02.26

P2



NOTES

1. Assumes typical Residential floor height of 3m.

2. For the purpose of this concept, an average of 70m² (753sf) unit size is used to calculate approximate total number of units.

3. 'GFA: as defined in City of Ottawa Zoning Bylaw means the total area of each floor whether located above, at or below grade, measured from the interiors of outside walls, but excluding areas dedicated for uses such as mechanical and electrical rooms, common hallways, corridors, staircases and elevators, interior amenities, bicycle storage and parking. Assume 85% efficiency for Apartment buildings. Areas are approximate. Building includes interior amenity areas for the residents.

4. The base plan (lot lines, existing roads and surrounding areas) is based on the City's Open Data and aerial images. The site area is approximate and all dimensions need to be confirmed by a legal survey.

5. This concept is part of a development concept report and should be interpreted as per findings and descriptions of such report. This concept may require minor variances for setback reduction, parking, heights, etc.

424 CHURCHILL AVE N OTTAWA

CONCEPT PLAN
SCHEMATIC UDG PLAN

LEGEND

PROPOSED BUILDING
3m BUFFER FROM HYDRO LINES
PROPERTY BOUNDARY
SETBACKS
EXISTING HYDRO LINE

No.	REVISION	DATE	BY
3	CONCEPT PLAN	2021.03.02	RP
2	CONCEPT PLAN	2021.03.01	RP
1	BASE PLAN	2021.02.22	LC

CLIENT
DAVID HO

FOTENN
Planning + Design
396 Cooper Street, Suite 300, Ottawa ON K2P 2H7
613.730.5709 www.fotenn.com

DESIGNED	RP
REVIEWED	RP
DATE	2021.02.26

P3