CHUNG & VANDER DOELEN
ENGINEERING LTD.

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
105 Elmira Road North
Guelph, Ontario

SUBMITTED TO:
HIP Developments
74 Grand Avenue South, Suite 201
Cambridge, Ontario
N1S 0B7

ATTENTION:
Mr. Scott Higgins

FILE NO /1755 Rev. 2**/**June 5, 2025

CHUNG & VANDER DOELEN
ENGINEERING LTD.

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June 5, 2025
File No.: 1755 Rev. 2

HIP Developments
74 Grand Avenue South, Suite 201
Cambridge, Ontario
N1S 0B7

Attention: Mr. Scott Higgins

RE: Geotechnical Investigation
Proposed Residential Development
105 Elmira Road North, Guelph, Ontario

We take pleasure in enclosing one (1) copy of our Geotechnical Investigation Report carried out at the above-referenced Site. Soil samples will be retained for a period of three (3) months and will thereafter be disposed of unless we are otherwise instructed.

If you have any questions or clarifications are required, please contact the undersigned at your convenience.

We thank you for giving us this opportunity to be of service to you.

Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

Eric Y. Chung, M.Eng., P.Eng.
Principal Engineer

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1.0 INTRODUCTION

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD) has been retained by HIP Developments to carry out a geotechnical investigation for the proposed residential building to be located at 105 Elmira Street North in Guelph, Ontario.

It is understood that the site is proposed to be developed with a 6-storey residential building with no basement. The finished floor elevation has been established at 324.30 m as per the Functional Site Grading and Servicing Plan prepared by MTE (drawing No. C2.1, dated October 22, 2024).

The purpose of this investigation was to determine the subsurface conditions at the site and, based on the findings, to make geotechnical recommendations for:

- Foundation design recommendations;
- Excavation condition;
- Groundwater control during and after construction;
- Backfilling recommendations;
- Slab-on-grade floor construction;
- Foundation soil classification for seismic design per OBC 2012;
- Foundation walls and shoring design;
- Pavement design construction; and
- Infiltration rates for soil deposits for stormwater management.

2.0 FIELD WORK

The field work was carried out in two phases. In the first phase, five (5) boreholes were advanced to depths between 10.72 and 11.13 m on May 30 and 31, 2024. In the second phase, eleven (11) boreholes were advanced to depths between 3.50 and 6.55 m on September 5 and 6, 2024. The borehole locations are indicated on the Borehole Location Plan, Drawing No. 1.

The field work was carried out under the supervision of a member of our engineering team, who logged the boreholes in the field, effected the subsurface sampling, and monitored the groundwater conditions. The boreholes were advanced using a track-mounted drilling rig, supplied, and operated by a specialized contractor. The drill rig was equipped with continuous flight augers and standard soil sampling equipment. Standard penetration tests (SPTs) in accordance with ASTM Specification D1586, were carried out at frequent intervals of depth, and the results are shown on the Borehole Logs as Penetration Resistance or “N”-values.

Five (5) Dynamic Cone Penetration testing (DCPT) were conducted in Boreholes 2, 3, 6, 7, and 8. The compactness condition or consistency of the soil strata has been inferred from these test results.

In addition, monitoring wells were installed at Boreholes 6, 9, and 13 to assess the underlying groundwater conditions and determine the depth of the groundwater table at the site.

The location and ground surface elevation of the boreholes were surveyed by CVD for the purpose of this report. The ground surface elevations were referenced to a temporary benchmark (TBM) which is shown on Drawing No. 1 and described below:

TBM: Catch basin in north-bound lane of Elmira Road, 50 m north of Willow Street intersection, as shown on Drawing No. 1

Elevation: 323.79 m

3.0 LABORATORY TESTING

Soil samples obtained from the in-situ tests were examined in the field and subsequently brought to our laboratory for visual and tactile examination to confirm field classification. Moisture content determination of all retrieved samples occurred.

In addition, two (2) grain size distribution analyses were performed on the major soil deposits to confirm field identification and provide information on soil hydraulic conductivity.

4.0 EXISTING SITE CONDITIONS

The site is a vacant, grass-covered lot located at the north corner of the intersection of Elmira Road North and Willow Road.

The ground surface gently rolls. Ground surface elevations at the borehole locations ranged between 322.70 and 323.84 m.

5.0 SUBSURFACE CONDITIONS

The detailed subsurface conditions encountered in the fifteen (15) boreholes advanced as part of this investigation are shown on the Borehole Log Sheets, Enclosures 1 to 15. The following sections provide descriptions of the major soil deposits encountered in the boreholes.

The stratigraphic boundaries shown on the borehole logs are inferred from non-continuous sampling conducted during advancement of the borehole drilling procedures and, therefore, represent transitions between soil types rather than exact planes of geologic change. The subsurface conditions will vary between and beyond the borehole locations.

In general, the surficial topsoil and discontinuous fill materials were underlain by a loose to compact sand deposit. In a portion of the site located along Elmira Road North, loose conditions within the sand deposit were encountered to a depth of up to approximately 6 m (Borehole 2). The sand was underlain by a compact to very dense sand and gravel deposit.

5.1 Topsoil

Topsoil was encountered at ground surface in Boreholes 1 to 15 with thicknesses ranging between 100 and 700 mm.

5.2 Fill

Fill materials were encountered underneath the topsoil in Boreholes 1, 3, 4, 8, 9, 10, 11, 12, 13, and 14, and extended to depths between 0.70 and 2.30 m below ground surface. The fill materials comprised of sandy silt to silty sand. Traces of gravel, clay, rootlets, and/or topsoil/organics were observed within the fill materials. Buried topsoil was encountered in Boreholes 8, 11, and 12 at the bottom of the fill layer.

The SPT "N"-values measured within the fill materials ranged from 4 to 37 blows per 300 mm of penetration, indicating a variable loose to dense compactness condition. Natural moisture contents were measured between 8 and 39%, indicating a damp to wet moisture condition. Higher moisture contents also reflect the presence of organic matter.

5.3 Sand

A sand deposit was encountered in Boreholes 1 to 15 underlying the topsoil and fill materials. Boreholes 6 to 9, 11, 12, 14, and 15 were terminated with the deposit at depths between 3.50 and 6.55 m. In Boreholes 1 to 5, 10, and 13 the deposit extended to depth between 3.0 and 8.5 m.

The fine to coarse sand contained trace to some gravel and, trace to some silt. Results of two (2) grain size distribution analyses from Boreholes 9 and 13 are shown graphically on Enclosures 16 and 17.

The SPT "N"-values measured within this deposit ranged from 4 to 28 blows per 300 mm of penetration, indicating a loose to compact compactness condition. In a portion of the site located along Elmira Road North, loose conditions were encountered to a depth of up to approximately 6 m (Borehole 2). The moisture contents of the samples collected from these deposits were measured between 2 and 22%, indicating a damp to saturated moisture condition.

5.4 Sand and Gravel

A sand and gravel deposit containing trace silt, was encountered in Boreholes 1 to 5, 10, and 13, underlying sand deposit. Boreholes 1 to 5, 10, and 13 were terminated with the deposit at depths between 5.63 and 11.13 m.

The SPT "N"-values measured within this deposit ranged from 11 blows per 300 mm of penetration to 50 blows per 50 mm of penetration, indicating a compact to very dense compactness condition. The sand and gravel was observed to be saturated during drilling.

5.5 Groundwater

Groundwater conditions were monitored during and following completion of borehole sampling. At completion of sampling and withdrawal of the drilling augers, saturated cave-in and groundwater were measured at depths between 2.44 and 3.56 m below existing grades in Boreholes1 to 5, 7, 8, and 10. Boreholes 11, 12, 14, and 15 were dry upon completion of drilling.

In addition, monitoring wells were installed in Boreholes 6, 9, and 13 to assess the underlying groundwater conditions and determine the depth of the groundwater table at the site. The following table below summarizes the water level readings in the monitoring wells.

Borehole No.	Existing Ground Elevation (m)	Date	Measured Water Level Below Existing Ground Surface (m)	Water Level Elevation (m)
6	323.06	September 16, 2024	3.19	319.87
		September 20, 2024	3.21	319.85
9	323.84	September 16, 2024	4.12	319.72
		September 20, 2024	4.13	319.71
13	323.70	September 16, 2024	3.85	319.85
		September 20, 2024	3.87	319.83

Based on field observations during drilling operations, the moisture contents of the retrieved soil samples and the water level measurement in the monitoring wells, the groundwater table is inferred at depths between 3.2± and 4.1± m below existing grades, corresponding to elevations between 319.7± and 319.9± m.

It is noted that the observed groundwater table will fluctuate seasonally and in response to major weather events.

5.6 Soil Chemistry

Four (4) soil samples were submitted to AGAT Laboratories for analysis of metals, inorganics, Petroleum Hydrocarbons (PHCs F1-F4) and Benzene-Toluene-Ethylbenzene-Xylene (BTEX). The chemical testing was conducted to initially assess the environmental quality of potential excess soil which may be generated and removed off-site during construction activities.

The following table presents the location, depth, description, and parameters analysed for each soil sample collected and submitted.

Sample I.D.	Sample Depth (mbgs)	Sample Description	Parameters Analysed
BH 6 – SA 1	0.1 to 0.6	Topsoil	metals and inorganics, PHCs (F1-F4), BTEX
BH 8 – SA 3	1.5 to 1.9	Fill; sandy silt	metals and inorganics, PHCs (F1-F4), BTEX
BH 11 – SA 1	0.3 to 0.6	Fill; sandy silt	metals and inorganics, PHCs (F1-F4), BTEX
BH 13 – SA 1	0.2 to 0.6	Fill; silty sand	metals and inorganics, PHCs (F1-F4), BTEX

mbgs– denotes metres below ground surface

The laboratory certificates of chemical analysis and results provided by AGAT Laboratories are enclosed in Appendix B.

6.0 DISCUSSION AND RECOMMENDATIONS

6.1 General

It is understood that the site is proposed to be developed with a 6-storey residential building with no basement. The finished floor elevation has been established at 324.30 m as per the Functional Site Grading and Servicing Plan prepared by MTE (drawing No. C2.1, dated October 22, 2024).

In general, the surficial topsoil and discontinuous fill materials were underlain by a loose to compact sand deposit. In a portion of the site located along Elmira Road North, loose conditions within the sand deposit were encountered to a depth of up to approximately 6 m (Borehole 2). The sand was underlain by a compact to very dense sand and gravel deposit.

Based on field observations during drilling operations, the moisture contents of the retrieved soil samples and the water level measurement in the monitoring wells, the groundwater table is inferred at depths between 3.2± and 4.1± m below existing grades, corresponding to elevations between 319.7± and 319.9± m.

6.2 Footing Foundations

Outside of the area of loose sand located adjacent to Elmira Road North, conventional strip and spread footing foundations can be used to support the proposed 6-storey residential building. Footings cast on the native compact sand deposit can be designed using a Geotechnical Reaction at SLS of 200 kPa. The SLS value given above is based on a maximum settlement of 25 mm under the footing foundations. The Factored Geotechnical Resistance at ULS is 350 kPa.

The following table summarizes the highest founding level and elevation for the footing at each borehole location:

Borehole No.	Existing Ground Elevation (m)	Highest Founding Depth (m)	Highest Founding Elevation (m)
1	322.82	1.02	321.80
4	323.61	1.01	322.60
5	323.78	0.78	323.00
7	323.08	0.28	322.80
9	323.84	1.14	322.70
10	323.74	0.84	322.90

These soil bearing pressures can be achieved provided that the founding subgrade is undisturbed during construction. In addition, the footings should be founded below any existing fill materials and former building/structure foundations, on competent native undisturbed soils. Spacing between adjacent footing steps should not be steeper than 10H to 7V.

The maximum total and differential settlements of footings designed to the above recommended soil bearing pressure are expected to be less than 25 and 20 mm, respectively, and these are considered tolerable for the structure being contemplated. The majority of the settlements will take place during construction and the first loading cycle of the building.

It is recommended that a lean concrete mat be placed over approved footing subgrade in wet or saturated areas to prevent further disturbance to the bearing soils resulting from construction activities.

Exterior footings and footings in unheated portions of the building should be provided with a soil cover of not less than 1.2 m or equivalent synthetic thermal insulation for adequate frost protection. The founding subgrade soils must be protected from frost penetration during winter construction.

It is recommended that the footing excavations be inspected by the geotechnical engineer to ensure adequate soil bearing and proper subgrade preparation.

6.3 Ground Improvement

Ground improvement techniques could be considered to improve the engineering properties of the on-site poor/loose condition soils. Based on the soil conditions encountered in the boreholes, ground improvement technique such as stone columns could be considered. Most ground improvement techniques are proprietary design/build systems. Therefore, it is advisable to consult with a specialist contractor to determine their feasibility and cost benefits.

Stone columns are a ground improvement method where densely compacted aggregate columns are installed to increase the density of the in-place material. Stone columns can be installed in a pre-drilled hole or by using an impact/displacement method without removal of any of the on-site soil. Stone columns are typically suitable for most soil types and can be installed to depths up to 6 m or greater.

6.4 Engineered Fill Construction

The existing topsoil, fill materials, buried topsoil and otherwise deleterious materials are not considered suitable for supporting the building foundations and floor slabs of the proposed in their present condition. It is recommended to remove these poor condition soils and construct engineered fill to suitably support the future building foundations and floor slabs.

Approved onsite sand materials and/or imported well-graded sand and gravel meeting the gradational requirements of OPSS Granular B Type I is to be used to construct engineered fill under controlled and supervised conditions. The moisture content of the soil should be within 2% dry of its optimum moisture condition.

Engineered fill is to be constructed in accordance with the following procedures in order to support the future foundations and floor slabs, if adopted:

1. All existing topsoil, fill, buried topsoil and otherwise deleterious materials are to be excavated/removed to expose the underlying competent native subgrade;

2. The exposed subgrade surface is to be thoroughly recompacted by large heavy compaction equipment (10 tonne recommended) and inspected by qualified geotechnical personnel. Any loose or soft areas identified should be excavated to the level of competent soil;

3. The required grades can then be achieved by placing imported sand and gravel (OPSS Granular B Type I) in maximum 300 mm thick lifts and compacted to no less that 100% Standard Proctor maximum dry density (SPMDD) to the underside of the proposed footings and to at least 98% SPMDD for floor slab support. The moisture content of the soil requires to be within 2% dry of its optimum moisture condition to achieve the specified degree of compaction;

4. Engineered fill must be placed such that the fill pad extends horizontally outwards from all footings/foundation at least the same distance as to how thick the engineered fill pad will exist between the underside of future footings and the approved native subgrade; and

5. All fill placement and compaction operations must be supervised on a full-time basis by qualified geotechnical personnel to approve fill material and ensure the specified degree of compaction has been achieved.

Footings cast on approved engineered fill can be designed using a Geotechnical Reaction of 200 kPa at SLS and a Factored Geotechnical Resistance of 350 kPa at ULS in the areas where ground improvement is not required.

6.5 Construction Vibrations

The ground improvement techniques outlined in the section above and engineered fill construction may generate vibrations that have the potential to cause damage to nearby structures. As such, it is recommended that pre-construction condition surveys of all structures within the zone of influence of construction vibrations be carried out to visually document the existing condition and to establish a baseline in the event of unanticipated damage.

Additionally, remote vibration monitoring is recommended during construction to notify on-site personnel, via email or text message, if on-site vibrations are approaching or exceeding the safe vibration limits specified for the project. CVD would be pleased to carry out pre-construction condition surveys and set up remote vibration monitoring equipment prior to commencement of construction.

In the absence of any national or provincial guidelines, The City of Toronto Municipal Code Section 363-5.2 “Prohibited Construction Vibrations” is a commonly referenced guideline for limiting construction induced vibrations. The City of Toronto vibration limits are as follows:

Frequency of Vibration (Hz)	Vibration Peak Particle Velocity (mm/s)
Less than 4	8
4 to 10	15
Greater than 10	25

Lower vibration tolerances than indicated above may be required if existing damage or poor conditions are discovered when carrying out the pre-construction condition surveys. Crack monitors or precision survey monitoring may also be recommended.

6.6 Helical Piles

As an alternative, the proposed building could be supported with helical piles bearing on the underlying very dense sand and gravel encountered at a depth of about 10± m below existing grade. A helical pile supported foundation would allow for the building foundations to be constructed at the nominal depth required for frost protection (1.2± m).

Helical piles are typically designed and installed by a specialist subcontractor. For preliminary planning purposes, the expected capacity of a Chance SS225 helical pile unit bearing very dense sand and gravel encountered at a depth of 10± m below existing grade would be 680 kN (SLS) and 915 kN (ULS).

Pre-production compression and tension helical pile load tests are recommended to be carried out to confirm the capacity of the helical pile units.

The following soil parameters can be used for preliminary bearing capacity calculation of the helices bearing on the very dense sand and silt till:

Effective soil friction angle: 36°
Soil unit weight: 20 kN/m^3

The buoyant unit weight should be used for the bearing capacity calculation for the soils below the observed groundwater level.

6.7 Earthquake Considerations

In accordance with The Ontario Building Code 2012 (OBC), the proposed structure should be designed to resist earthquake load and effects as per OBC Subsection 4.1.8.

Based on the anticipated condition of the engineered fill materials and the underlying soil condition encountered at the boreholes, the site can be classified as a Site Class D as per OBC Table 4.1.8.4.A.

6.8 Open Cut Excavation and Groundwater Control

Excavations are expected to be in the order of 1 to 3 m deep for footing foundations, elevator pits and site servicing. The excavations will penetrate very loose to compact fill and loose to compact non-cohesive deposits. These materials are considered to be Type 3 Soils in accordance with the latest Occupational Health and Safety Act.

Above the groundwater table, excavations in the Type 3 Soils are expected to remain stable during the construction period provided that side slopes are cut to 1H : 1V from the bottom of the excavation. Where seepage or perched groundwater is encountered, side slopes should be cut to more stable angles of 3H : 1V. The side slopes should be suitably protected from erosion processes.

Uncontrollable groundwater flows are not expected to be encountered within the anticipated construction excavations. Subsurface seepage and surface water runoff into the excavations may be handled by conventional filtered sump pumping techniques, as and where required.

6.9 Floor Slab Construction

The floor slab for the proposed building can be constructed as conventional slab-on-grade on the native sand deposit. At the time of floor slab construction, once all the unsuitable fill materials are removed the exposed subgrade should be proof-rolled with a heavy roller in conjunction with an inspection by the geotechnical engineer. Any soft and/or unstable areas detected should be replaced with granular fill which should be compacted to at least 95% SPMDD. On-site inorganic soil may be reused to raise grades where necessary provided its natural moisture content is near to the optimum moisture content. The backfill should be thoroughly compacted in maximum 300 mm lifts to at least 95% SPMDD.

Following the proof-rolling of the subgrade, it is recommended that a minimum 150 mm thick layer of OPSS Granular “A” be placed and compacted to at least 100% SPMDD beneath the concrete floor slabs to provide uniform support.

The floor slabs should be separated structurally from the columns and foundation walls. Sawcut control joints should be provided at regular spacing (less than 30 times the concrete slab thickness) and to depths between one-third and one-quarter of the slab thickness.

Care should be taken to ensure that the backfill against foundation walls, interior piers/columns and concrete pits are placed in thin layers and each layer compacted to at least 95% SPMDD. These types of confined areas should be backfilled with excavated granular materials or imported granular soils such as OPSS Granular B Type I.

6.10 Lateral Earth Pressure

The unbalanced foundation walls and any other soil retaining structures should be designed to resist the lateral earth pressure acting against these walls. The following formula may be used to calculate the unfactored earth pressure distribution. The factored resistance can be calculated by using a factor of 0.8.

$P = K (\gamma H + q)$

where:

P =	Lateral earth pressure	kPa
K =	earth pressure coefficient, 0.5 for non-yielding foundation wall earth pressure coefficient, 0.3 for yielding retaining wall	
γ =	unit weight of granular backfill, compacted to 95% SPMDD	21 kN/m^3
H =	unbalanced height of wall	m
q =	surcharge load at ground surface	kPa

The backfill for the foundation walls and retaining walls should be free-draining granular materials which should have less than 8% silt particles (OPSS Granular "B" Type I). The backfill should be placed in thin layers and compacted to 95% SPMDD. Over-compaction adjacent to the foundation/retaining walls should be avoided. Compaction should be carried out with hand operated equipment within 1 m of the foundation wall or retaining wall. Weeping tiles leading to a frost-free outlet or weep holes should be installed to effect drainage behind the retaining wall.

The sliding resistance of the retaining wall footings should be checked. The unfactored horizontal resistance against sliding between cast-in-place concrete and the various soils can be calculated using a friction coefficient as follows:

Soil	Unit Weight (kN/m^3)	Friction Coefficient
Well-compacted granular backfill	21	0.45
Compact sand	19	0.30

6.11 On Site Infiltration

It is understood that the potential for an at-source storm water management feature is to be considered at the site.

The top of the infiltration feature should be located below the footing drain/weeper and at least 5 m away from the proposed building footprints. It is noted that infiltration features should have the base located at least 1.0 m above the groundwater table and that a minimum infiltration rate of 15 mm/hr is required.

Based on the results of grain size analyses and our past experience, the hydraulic conductivity and infiltration rate of the native inorganic soil types encountered at the boreholes are estimated and provided in the following table and may be used for storm water management purposes:

MATERIAL	PERMEABILITY (K) (cm/sec)	INFILTRATION RATE (mm/hr)
Sand, trace to some silt (Enclosures 16 and 17)	1×10^{-2} to 1×10^{-3}	30 to 100
Sand and Gravel	1×10^{-1}	300

6.12 Pavement Design and Construction

Based on the results of the field work, the predominant soil subgrade materials at the site will consist of native sand, or sandy silt to silty sand fill materials. The following flexible pavement structures for the access driveway(s) and potential parking areas are recommended based on the results of grain size distributions, assumed CBR values, groundwater conditions, frost susceptibility of subgrade soils and traffic volume.

Component	Light Duty Pavement (mm)	Heavy Duty Pavement (mm)
Asphaltic Concrete HL3 Asphaltic Concrete HL8	40 50	40 60
Granular “A” Base	150	150
Granular “B” Sub-base	300	400

The pavement design considers that pavement construction will be carried out during the drier time of the year and that the subgrade is stable, not heaving under construction equipment traffic.

Prior to placement of the granular subbase materials, all topsoil and other deleterious materials must be stripped from the proposed pavement areas to expose inorganic subgrade soils. The exposed subgrade surface must be thoroughly proof-rolled and recompacted by large heavy compaction equipment (10 tonne compactor is recommended) and inspected by qualified geotechnical personnel. If the subgrade is wet or unstable following proof-rolling, additional granular sub-base and/or placement of a geogrid/geotextile material may be required.

Bulk fill placed to raise site grades in pavement areas should consist of select approved inorganic fill or imported sand and gravel (OPSS Granular "B" Type I), placed in maximum 300 mm thick lifts, and compacted to no less that 95% Standard Proctor maximum dry density (SPMDD). The moisture content of the soil requires to be within 3% dry of its optimum moisture condition to achieve the specified degree of compaction.

The Granular "A" and Granular "B" materials should be produced in accordance with the current OPSS specifications and placed and uniformly compacted to at least 100% SPMDD. The placing and rolling of the asphalt mixture should conform to OPSS.MUNI 310 Table 10 and should be compacted to no less than 92% of the Marshall density (MRD). Frequent in situ density testing by this office should be carried out to verify that the specified degree of compaction is being achieved and maintained.

SS-1 or SS-1HH tack coat should be applied to all binder course surfaces and vertical surfaces (i.e., curbs, pavement joints, etc.) prior to placement of asphalt. Refer to OPSS 310 and OPSS 1101 for additional details.

It should be noted that even well compacted trench backfill could settle for some time after construction. In this regard, the surface course of the asphaltic concrete should be placed at least one (1) year after trench backfill is completed to allow any minor settlements to occur within the trench backfill. The incomplete pavement structure may not be capable of supporting construction traffic. Consequently, minor repairs of the sub-base, base and asphaltic concrete may be required prior to paving with the base course and/or the surface course asphaltic concrete.

The prepared earth subgrade and final pavement surfaces should be graded to direct water runoff away from buildings, sidewalks, and other similar pertinent structures. Positive drainage outlets should be provided at all low points of the prepared earth subgrade, such as stub drains extended from the catch-basins. Systematic drainage of the granular base materials will promote the longevity of the pavement structures.

7.0 GEO-ENVIRONMENTAL CONSIDERATIONS

Excess soil may be generated and removed off-site during the construction activities associated with the proposed site works. The management of excess soil is now governed by Ontario Regulation 406/19 (O. Reg. 406/19), MECP document titled "On-Site and Excess Soil Management Regulation". In accordance with the regulation, the Project Leader is responsible for the handling, storage, reuse, transportation, and removal of all soil. Furthermore, the analytical results must be disclosed with and approved by the owner(s) of the receiving site before exporting the soil.

If the anticipated volume of excess soil generated during construction activities is greater than 2,000 m^3, the following is required for on-site and excess soil management:

- Planning Documentation
  - Assessment of Past Use
  - Sampling and Analysis Plan
  - Excess Soil Characterization Report
  - Excess Soil Destination Report
- Tracking
- Registry
- Record Keeping

Four (4) soil samples were collected and submitted as part of this geotechnical investigation to provide preliminary environmental quality of potential excess soils, which can be used to assist with the preparation and implementation of the above-noted Planning Documentation. It is noted that the soil conditions may differ between and beyond the sample locations. If any impacted soils are discovered during construction, CVD should be contacted for further sampling and testing to determine the limit of the impacted soils.

Any soils identified during construction to have been environmentally impacted are to be separately stockpiled and analysed to determine the appropriate measures for handling and disposal. Waste characterization testing (TCLP) to classify the material for disposal as prescribed in O.Reg. 347/558 is required. Leachate analysis (mSPLP) is to be carried out if the excess soil is to be disposed to receiving sites under O.Reg. 406/19.

Similarly, groundwater encountered during construction works must also be suitably assessed and handled.

7.1 Applicable Regulatory Standards

The Soil, Ground Water and Sediment Standards for Use Under the New Soil Rules and Excess Soil Quality Standards established in accordance with the O. Reg. 406/19 as amended were consulted in the assessment of the soil at the project site.

The analytical results for soils were compared to the following O. Reg. 406/19 regulatory standards:

- Table 1 (Full Depth Background Site Condition Standards) for Residential/Parkland/Institutional/ Industrial/Commercial/Community Property Use (Table 1 RPIICC ESQS)
- Table 2.1 (Full Depth Generic Excess Soil Quality Standards in a Potable Ground Water Condition) for Residential/Parkland/Institutional Property Use (Table 2.1 RPI ESQS)
- Table 2.1 (Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition) for Industrial/Commercial/Community Property Use (Table 2.1 ICC ESQS)

7.2 Handling of Excess Soil

In support of on-site and excess soil management, an initial chemical testing program was conducted as part of this geotechnical investigation. Four (4) soil samples were collected and submitted to AGAT Laboratories for analysis of metals and inorganics, Petroleum Hydrocarbons (PHCs) F1 to F4, and Benzene, Toluene, Ethylbenzene and Xylene (BTEX).

The table below outlines a summary of the samples submitted for chemical analysis and all exceedances:

Sample	Table 1	Table 2.1 RPI	Table 2.1 ICC	Exceedance Parameter(s)
BH 6 – SA 1	✓	✓	✓	-
BH 8 – SA 3	**Exceeds**	**Exceeds**	**Exceeds**	**EC**
BH 11 – SA 1	✓	✓	✓	-
BH 13 – SA 1	✓	✓	✓	-

✓- Meets applicable standard for all parameters analyzed

The measured concentrations met Table 1 and 2.1 RPI/ICC ESQS except elevated electrical conductivity (EC) and/or sodium adsorption ratio (SAR). The elevated EC and SAR are likely related to the historical and current use of de-icing salt. It is noted that the parameters related to de-icing salt are non-health related, and elevated levels are relevant to soils that must support plant growth.

Under O. Reg. 406/19, excess soil with salt exceedances can only be considered for beneficial reuse in the following circumstances:

- The excess soil is finally placed at one of the following locations:
  - Where it is reasonable to expect that the soil will be affected by the same chemicals (SAR) as a result of continued application of a substance for the safety of vehicular or pedestrian traffic under conditions of snow or ice
  - At an industrial or commercial property use and to which non-potable standards would be applicable
  - At least 1.5 metres below the surface of the soil
- The excess soil is not finally placed at any of the following locations:
  - Within 30 metres of a waterbody
  - Within 100 metres of a potable water well or area with an intended property use that may require a potable water well
  - At a location that will be used for growing crops or pasturing livestock unless the excess soil is placed 1.5 metres or greater below the soil surface (at a Stratified Site)

It is noted that the soil conditions may differ between and beyond the sample locations. If environmentally impacted soil is encountered during construction, the soil should be segregated, stockpiled and CVD should be contacted for further assessment of the impacted soils.

The results and laboratory certificates of chemical analysis provided by AGAT Laboratories of Mississauga are enclosed in Appendix “B”. A comparison of the soil chemistry results to the applicable regulatory standard is included in Appendix “C”.

CVD further recommends that a disposal plan for excess soils be established to manage the quantity, as well as where and how the excess soils can be disposed of off-site.

8.0 CLOSURE

The Limitations of Report, as quoted in Appendix A, is an integral part of this report.

We trust that the information presented in this report is complete within our terms of reference. If there are any further questions concerning this report, please do not hesitate to contact our office.

Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

Nandou Zhao, M.Eng., P.Eng.
Manager - Geotechnical Services

Eric Y. Chung, M.Eng., P.Eng.
Principal Engineer

APPENDIX A

LIMITATIONS OF REPORT

APPENDIX "A"

LIMITATIONS OF REPORT

The conclusions and recommendations given in this report are based on information determined at the testhole locations. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Soils Engineer be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the testholes.

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

The benchmark and elevations mentioned in this report were obtained strictly for use in the geotechnical design of the project and by this office only, and should not be used by any other parties for any other purposes.

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

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

This report does not reflect the environmental issues or concerns unless otherwise stated in the report.

APPENDIX B

SOIL CHEMISTRY RESULTS (AGAT LABORATORIES)

AGAT Laboratories

5835 COOPERS AVENUE
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CLIENT NAME: CHUNG AND VANDER DOELEN
311 VICTORIA STREET NORTH
KITCHENER, ON N2H5E1
(519) 742-8979
ATTENTION TO: Joel Rudd
PROJECT: 1755
AGAT WORK ORDER: 24T197350
SOIL ANALYSIS REVIEWED BY: Sukhwinder Randhawa, Inorganic Team Lead
TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor
DATE REPORTED: Sep 25, 2024
PAGES (INCLUDING COVER): 13
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.*
- *This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

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Certificate of Analysis

AGAT WORK ORDER: 24T197350

PROJECT: 1755

CLIENT NAME: CHUNG AND VANDER DOELEN

ATTENTION TO: Joel Rudd

SAMPLING SITE:715 Willow Road, Guelph, Ontario

SAMPLED BY:JR

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2024-09-16 **DATE REPORTED: 2024-09-25**

						SAMPLE DESCRIPTION:	BH6-SA1	BH8-SA3	BH11-SA1	BH13-SA1
						SAMPLE TYPE:	Soil	Soil	Soil	Soil
						DATE SAMPLED:	2024-09-05	2024-09-05	2024-09-06	2024-09-06
Parameter	Unit	G / S: A	G / S: B	G / S: C	RDL		6146396	6146398	6146399	6146400
Antimony	µg/g	1.3	7.5	40	0.8		<0.8[<A]	<0.8[<A]	<0.8[<A]	<0.8[<A]
Arsenic	µg/g	18	18	18	1		5[<A]	5[<A]	5[<A]	6[<A]
Barium	µg/g	220	390	670	2.0		53.3[<A]	63.1[<A]	67.2[<A]	94.9[<A]
Beryllium	µg/g	2.5	4	8	0.5		<0.5[<A]	<0.5[<A]	0.6[<A]	0.7[<A]
Boron	µg/g	36	120	120	5		7[<A]	8[<A]	6[<A]	6[<A]
Boron (Hot Water Soluble)	µg/g	NA	1.5	2	0.10		0.22[<B]	0.15[<B]	0.18[<B]	0.28[<B]
Cadmium	µg/g	1.2	1.2	1.9	0.5		0.5[<A]	<0.5[<A]	<0.5[<A]	0.6[<A]
Chromium	µg/g	70	160	160	5		16[<A]	16[<A]	21[<A]	24[<A]
Cobalt	µg/g	21	22	80	0.8		5.6[<A]	6.9[<A]	7.5[<A]	8.8[<A]
Copper	µg/g	92	140	230	1.0		18.9[<A]	16.6[<A]	13.8[<A]	16.6[<A]
Lead	µg/g	120	120	120	1		28[<A]	12[<A]	25[<A]	26[<A]
Molybdenum	µg/g	2	6.9	40	0.5		1.2[<A]	0.7[<A]	<0.5[<A]	0.5[<A]
Nickel	µg/g	82	100	270	1		11[<A]	13[<A]	12[<A]	15[<A]
Selenium	µg/g	1.5	2.4	5.5	0.8		<0.8[<A]	<0.8[<A]	<0.8[<A]	<0.8[<A]
Silver	µg/g	0.5	20	40	0.5		<0.5[<A]	<0.5[<A]	<0.5[<A]	<0.5[<A]
Thallium	µg/g	1	1	3.3	0.5		<0.5[<A]	<0.5[<A]	<0.5[<A]	<0.5[<A]
Uranium	µg/g	2.5	23	33	0.50		0.95[<A]	1.22[<A]	0.54[<A]	0.96[<A]
Vanadium	µg/g	86	86	86	2.0		27.6[<A]	28.4[<A]	33.7[<A]	40.7[<A]
Zinc	µg/g	290	340	340	5		115[<A]	73[<A]	106[<A]	114[<A]
Chromium, Hexavalent	µg/g	0.66	8	8	0.2		<0.2[<A]	<0.2[<A]	<0.2[<A]	<0.2[<A]
Cyanide, WAD	µg/g	0.051	0.051	0.051	0.040		<0.040[<A]	<0.040[<A]	<0.040[<A]	<0.040[<A]
Mercury	µg/g	0.27	0.27	0.27	0.10		<0.10[<A]	<0.10[<A]	<0.10[<A]	<0.10[<A]
Electrical Conductivity (2:1)	mS/cm	0.57	0.7	1.4	0.005		0.182[<A]	1.51[>C]	0.170[<A]	0.132[<A]
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	2.4	5	12	N/A		0.133[<A]	0.052[<A]	0.056[<A]	0.055[<A]
pH, 2:1 CaCl2 Extraction	pH Units				NA		7.30	7.33	7.25	6.88

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24T197350

PROJECT: 1755

CLIENT NAME: CHUNG AND VANDER DOELEN

ATTENTION TO: Joel Rudd

SAMPLING SITE:715 Willow Road, Guelph, Ontario

SAMPLED BY:JR

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2024-09-16 **DATE REPORTED: 2024-09-25**

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use, B Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - RP, C Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

6146396-6146400 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

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PROJECT: 1755

CLIENT NAME: CHUNG AND VANDER DOELEN

ATTENTION TO: Joel Rudd

SAMPLING SITE:715 Willow Road, Guelph, Ontario

SAMPLED BY:JR

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2024-09-16

DATE REPORTED: 2024-09-25

						SAMPLE DESCRIPTION:	BH6-SA1	BH8-SA3	BH11-SA1	BH13-SA1
						SAMPLE TYPE:	Soil	Soil	Soil	Soil
						DATE SAMPLED:	2024-09-05	2024-09-05	2024-09-06	2024-09-06
Parameter	**Unit**	**G / S: A**	**G / S: B**	**G / S: C**	**RDL**		**6146396**	**6146398**	**6146399**	**6146400**
Benzene	µg/g	0.02	0.02	0.02	0.02		<0.02[<A]	<0.02[<A]	<0.02[<A]	<0.02[<A]
Toluene	µg/g	0.2	0.2	0.2	0.05		<0.05[<A]	<0.05[<A]	<0.05[<A]	<0.05[<A]
Ethylbenzene	µg/g	0.05		0.05	0.05		<0.05[<A]	<0.05[<A]	<0.05[<A]	<0.05[<A]
m & p-Xylene	µg/g				0.05		<0.05	<0.05	<0.05	<0.05
o-Xylene	µg/g				0.05		<0.05	<0.05	<0.05	<0.05
Xylenes (Total)	µg/g	0.05	0.091	0.091	0.05		<0.05[<A]	<0.05[<A]	<0.05[<A]	<0.05[<A]
F1 (C6 to C10)	µg/g	25			5		<5[<A]	<5[<A]	<5[<A]	<5[<A]
F1 (C6 to C10) minus BTEX	µg/g	25	25	25	5		<5[<A]	<5[<A]	<5[<A]	<5[<A]
F2 (C10 to C16)	µg/g	10	10	26	10		<10[<A]	<10[<A]	<10[<A]	<10[<A]
F3 (C16 to C34)	µg/g	240	240	240	50		<50[<A]	<50[<A]	<50[<A]	<50[<A]
F4 (C34 to C50)	µg/g	120	2800	3300	50		<50[<A]	<50[<A]	<50[<A]	<50[<A]
Gravimetric Heavy Hydrocarbons	µg/g	120			50		NA[B]	NA[B]	NA[B]	NA[B]
Moisture Content	%				0.1		11.3	26.8	15.7	21.8
Surrogate	**Unit**		**Acceptable Limits**							
Toluene-d8	% Recovery		60-140				113	91	105	87
Terphenyl	%		60-140				82	85	96	79

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Certificate of Analysis

AGAT WORK ORDER: 24T197350

PROJECT: 1755

CLIENT NAME: CHUNG AND VANDER DOELEN

ATTENTION TO: Joel Rudd

SAMPLING SITE:715 Willow Road, Guelph, Ontario

SAMPLED BY:JR

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2024-09-16 **DATE REPORTED: 2024-09-25**

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use, B Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - RP, C Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

6146396-6146400 Results are based on sample dry weight.
The C6-C10 fraction is calculated using Toluene response factor.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.
Quality Control Data is available upon request.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

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Exceedance Summary

AGAT WORK ORDER: 24T197350

PROJECT: 1755

CLIENT NAME: CHUNG AND VANDER DOELEN

ATTENTION TO: Joel Rudd

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
6146398	BH8-SA3	ON 406/19 T2.1 IC	O. Reg. 153(511) - Metals & Inorganics (Soil)	Electrical Conductivity (2:1)	mS/cm	1.4	1.51
6146398	BH8-SA3	ON 406/19 T2.1 RP	O. Reg. 153(511) - Metals & Inorganics (Soil)	Electrical Conductivity (2:1)	mS/cm	0.7	1.51
6146398	BH8-SA3	ON T1 S RPI/ICC	O. Reg. 153(511) - Metals & Inorganics (Soil)	Electrical Conductivity (2:1)	mS/cm	0.57	1.51

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Quality Assurance

CLIENT NAME: CHUNG AND VANDER DOELEN

AGAT WORK ORDER: 24T197350

PROJECT: 1755

ATTENTION TO: Joel Rudd

SAMPLING SITE:715 Willow Road, Guelph, Ontario

SAMPLED BY:JR

Soil Analysis

RPT Date: Sep 25, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	6146396	6146396	<0.8	<0.8	NA	< 0.8	102%	70%	130%	99%	80%	120%	72%	70%	130%
Arsenic	6146396	6146396	5	5	0.0%	< 1	125%	70%	130%	108%	80%	120%	105%	70%	130%
Barium	6146396	6146396	53.3	57.6	7.8%	< 2.0	106%	70%	130%	106%	80%	120%	102%	70%	130%
Beryllium	6146396	6146396	<0.5	<0.5	NA	< 0.5	121%	70%	130%	114%	80%	120%	133%	70%	130%
Boron	6146396	6146396	7	7	NA	< 5	97%	70%	130%	109%	80%	120%	104%	70%	130%
Boron (Hot Water Soluble)	6142997		1.62	1.60	1.2%	< 0.10	111%	60%	140%	108%	70%	130%	110%	60%	140%
Cadmium	6146396	6146396	0.5	0.5	NA	< 0.5	109%	70%	130%	104%	80%	120%	102%	70%	130%
Chromium	6146396	6146396	16	18	NA	< 5	117%	70%	130%	115%	80%	120%	122%	70%	130%
Cobalt	6146396	6146396	5.6	6.3	11.8%	< 0.8	128%	70%	130%	118%	80%	120%	120%	70%	130%
Copper	6146396	6146396	18.9	18.6	1.6%	< 1.0	98%	70%	130%	104%	80%	120%	94%	70%	130%
Lead	6146396	6146396	28	30	6.9%	< 1	107%	70%	130%	115%	80%	120%	107%	70%	130%
Molybdenum	6146396	6146396	1.2	0.9	NA	< 0.5	124%	70%	130%	105%	80%	120%	108%	70%	130%
Nickel	6146396	6146396	11	12	8.7%	< 1	117%	70%	130%	105%	80%	120%	99%	70%	130%
Selenium	6146396	6146396	<0.8	<0.8	NA	< 0.8	113%	70%	130%	114%	80%	120%	112%	70%	130%
Silver	6146396	6146396	<0.5	<0.5	NA	< 0.5	102%	70%	130%	113%	80%	120%	97%	70%	130%
Thallium	6146396	6146396	<0.5	<0.5	NA	< 0.5	110%	70%	130%	107%	80%	120%	99%	70%	130%
Uranium	6146396	6146396	0.95	1.03	NA	< 0.50	115%	70%	130%	108%	80%	120%	103%	70%	130%
Vanadium	6146396	6146396	27.6	30.1	8.7%	< 2.0	130%	70%	130%	111%	80%	120%	116%	70%	130%
Zinc	6146396	6146396	115	123	6.7%	< 5	107%	70%	130%	110%	80%	120%	116%	70%	130%
Chromium, Hexavalent	6146396	6146396	<0.2	<0.2	NA	< 0.2	91%	70%	130%	88%	80%	120%	76%	70%	130%
Cyanide, WAD	6142531		<0.040	<0.040	NA	< 0.040	107%	70%	130%	87%	80%	120%	105%	70%	130%
Mercury	6146396	6146396	<0.10	<0.10	NA	< 0.10	110%	70%	130%	105%	80%	120%	110%	70%	130%
Electrical Conductivity (2:1)	6142649		0.019	0.022	NA	< 0.005	92%	80%	120%	NA			NA		
Sodium Adsorption Ratio (2:1) (Calc.)	6142649		0.187	0.190	1.6%	NA									
pH, 2:1 CaCl2 Extraction	6142701		5.66	5.49	3.1%		101%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

O. Reg. 153(511) - Metals & Inorganics (Soil)									
Electrical Conductivity (2:1)	6142169		0.068	0.073	7.1%	< 0.005	92%	80%	120%
pH, 2:1 CaCl2 Extraction	6146400	6146400	6.88	7.08	2.9%	NA	101%	80%	120%

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

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Quality Assurance

CLIENT NAME: CHUNG AND VANDER DOELEN

AGAT WORK ORDER: 24T197350

PROJECT: 1755

ATTENTION TO: Joel Rudd

SAMPLING SITE:715 Willow Road, Guelph, Ontario

SAMPLED BY:JR

Soil Analysis (Continued)

RPT Date: Sep 25, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

AGAT Laboratories

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Quality Assurance

CLIENT NAME: CHUNG AND VANDER DOELEN

AGAT WORK ORDER: 24T197350

PROJECT: 1755

ATTENTION TO: Joel Rudd

SAMPLING SITE:715 Willow Road, Guelph, Ontario

SAMPLED BY:JR

Trace Organics Analysis

RPT Date: Sep 25, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PHCs F1 - F4 (Soil)															
Benzene	6146400	6146400	<0.02	<0.02	NA	< 0.02	70%	60%	140%	79%	60%	140%	107%	60%	140%
Toluene	6146400	6146400	<0.05	<0.05	NA	< 0.05	97%	60%	140%	97%	60%	140%	87%	60%	140%
Ethylbenzene	6146400	6146400	<0.05	<0.05	NA	< 0.05	89%	60%	140%	94%	60%	140%	80%	60%	140%
m & p-Xylene	6146400	6146400	<0.05	<0.05	NA	< 0.05	90%	60%	140%	93%	60%	140%	81%	60%	140%
o-Xylene	6146400	6146400	<0.05	<0.05	NA	< 0.05	92%	60%	140%	90%	60%	140%	82%	60%	140%
F1 (C6 to C10)	6146400	6146400	<5	<5	NA	< 5	97%	60%	140%	88%	60%	140%	85%	60%	140%
F2 (C10 to C16)	6146400	6146400	< 10	< 10	NA	< 10	95%	60%	140%	109%	60%	140%	96%	60%	140%
F3 (C16 to C34)	6146400	6146400	< 50	< 50	NA	< 50	94%	60%	140%	127%	60%	140%	128%	60%	140%
F4 (C34 to C50)	6146400	6146400	< 50	< 50	NA	< 50	63%	60%	140%	90%	60%	140%	102%	60%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

QC Exceedance

CLIENT NAME: CHUNG AND VANDER DOELEN

AGAT WORK ORDER: 24T197350

PROJECT: 1755

ATTENTION TO: Joel Rudd

RPT Date: Sep 25, 2024		REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Sample Id	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
			Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)										
Beryllium	6146396	121%	70%	130%	114%	80%	120%	133%	70%	130%

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

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http://www.agatlabs.com

Method Summary

CLIENT NAME: CHUNG AND VANDER DOELEN

AGAT WORK ORDER: 24T197350

PROJECT: 1755

ATTENTION TO: Joel Rudd

SAMPLING SITE:715 Willow Road, Guelph, Ontario

SAMPLED BY:JR

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, WAD	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	SEGMENTED FLOW ANALYSIS
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6075	modified from MSA PART 3, CH 14 and SM 2510 B	PC TITRATE
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6075	modified from EPA 9045D, MCKEAGUE 3.11 E3137	PC TITRATE

AGAT Laboratories

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TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: CHUNG AND VANDER DOELEN

AGAT WORK ORDER: 24T197350

PROJECT: 1755

ATTENTION TO: Joel Rudd

SAMPLING SITE:715 Willow Road, Guelph, Ontario

SAMPLED BY:JR

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Toluene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Ethylbenzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
m & p-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
o-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Xylenes (Total)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
F1 (C6 to C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID

AGAT Laboratories

Have feedback? Scan here for a quick survey!

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: Chung & Vander Doelen Engineering Ltd.
Contact: Joel Rudd
Address: 311 Victoria St. N, Kitchener, ON
Phone: ____ Fax: ____
Reports to be sent to:
1. Email: joel.rudd@cvdengineering.com
2. Email: nandou.zhao@cvdengineering.com

Project Information:

Project: 1755
Site Location: 715 Willow Road, Guelph, Ontario
Sampled By: JR
AGAT Quote #: ____ PO: ____
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐
Company:
Contact:
Address:
Email:

Regulatory Requirements:

(Please check all applicable boxes)

☑ Regulation 153/04 Table T1 PRIICC *Indicate One*
☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture *(Check One)* ☐ Coarse ☐ Fine

☑ Regulation 406 Table T2.1 PRI/IC *Indicate One*
☐ Regulation 558
☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm
Region
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
Indicate One

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☐ No

Laboratory Use Only

Work Order #: 24T197350
Cooler Quantity: 1 wet ice
Arrival Temperatures: 4.5 | 4.3 | 5.9
Custody Seal Intact: ☐ Yes ☐ No ☑ N/A
Notes: L I J

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Sample Matrix Legend

GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs	VOC	PAHs	PCBs	PCBs: Aroclors ☐	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Regulation 406 SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Regulation 406 Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Corrosivity: ☐ Moisture ☐ Sulphide	Potentially Hazardous or High Concentration (Y/N)
1. BH6 - SA1	2024-09-05	AM PM	3	S			☑		☑									
2. BH8 - SA3	2024-09-05	AM PM	3	S			☑		☑									
3. BH11 - SA1	2024-09-06	AM PM	3	S			☑		☑									
4. BH13 - SA1	2024-09-06	AM PM	3	S			☑		☑									
5.		AM PM																
6.		AM PM																
7.		AM PM																
8.		AM PM																
9.		AM PM																
10.		AM PM																
11.		AM PM																

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Joel Rudd	2024-09-16	12:00 PM		Sept/16	3:25pm
					Page ____ of ____
					No:

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

APPENDIX C

COMPARISON OF THE SOIL CHEMISTRY RESULTS TO THE APPLICABLE REGULATORY CRITERIA

ANALYTICAL RESULTS FOR SOIL

Ontario Regulation 406/19 (as amended) - Excess Soil Quality Standards

		T1 RPIICC[1]	T2.1 RPI[2]	T2.1 ICC[3]	BH6-SA1	BH8-SA3	BH11-SA1	BH13-SA1
Metals & Inorganics	Antimony (Sb)	1.3	7.5	40	<0.8	<0.8	<0.8	<0.8
	Arsenic (As)	18	18	18	5	5	5	6
	Barium (Ba)	220	390	670	53.3	63.1	67.2	94.9
	Beryllium (Be)	2.5	4	8	<0.5	<0.5	0.6	0.7
	Boron (B)	36	120	120	7	8	6	6
	Boron, Hot Water Soluble	-	1.5	2	0.22	0.15	0.18	0.28
	Cadmium (Cd)	1.2	1.2	1.9	0.5	<0.5	<0.5	0.6
	Chromium (Cr)	70	160	160	16	16	21	24
	Cobalt (Co)	21	22	80	5.6	6.9	7.5	8.8
	Copper (Cu)	92	140	230	18.9	16.6	13.8	16.6
	Lead (Pb)	120	120	120	28	12	25	26
	Molybdenum (Mo)	2	6.9	40	1.2	0.7	<0.5	0.5
	Nickel (Ni)	82	100	270	11	13	12	15
	Selenium (Se)	1.5	2.4	5.5	<0.8	<0.8	<0.8	<0.8
	Silver (Ag)	0.5	20	40	<0.5	<0.5	<0.5	<0.5
	Thallium (Tl)	1	1	3.3	<0.5	<0.5	<0.5	<0.5
	Uranium (U)	2.5	23	33	0.95	1.22	0.54	0.96
	Vanadium (V)	86	86	86	27.6	28.4	33.7	40.7
	Zinc (Zn)	290	340	340	115	73	106	114
	Chromium, Hexavalent - Cr(VI)	0.66	8	8	<0.2	<0.2	<0.2	<0.2
	Cyanide	0.051	0.051	0.051	<0.040	<0.040	<0.040	<0.040
	Mercury (Hg)	0.27	0.27	0.27	<0.10	<0.10	<0.10	<0.10
	Electrical Conductivity (EC)	0.57	0.7	1.4	0.182	1.51	0.17	0.132
	Sodium Adsorption Ratio (SAR)	2.4	5	12	0.133	0.052	0.056	0.055
	pH	-	-	-	7.3	7.33	7.25	6.88
BTEX	Benzene	0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02
	Ethylbenzene	0.05	0.05	0.05	<0.05	<0.05	<0.05	<0.05
	Toluene	0.2	0.2	0.2	<0.05	<0.05	<0.05	<0.05
	Xylenes (Total)	0.05	0.091	0.091	<0.05	<0.05	<0.05	<0.05
Petroleum Hydrocarbons (F1-F4)	F1 (C6-C10)	25	25	25	<5	<5	<5	<5
	F2 (C10-C16)	10	10	26	<10	<10	<10	<10
	F3 (C16-C34)	240	240	240	<50	<50	<50	<50
	F4 (C34-C50)	120	2800	3300	<50	<50	<50	<50
	F4G-SG (GHH-Silica)	120	2800	3300	NA	NA	NA	NA

NOTES:

[1] Table 1: Full Depth Background Site Condition Standards for Residential / Parkland / Institutional / Industrial / Commercial / Community Uses

[2] Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition (Volume Independent) for Residential / Parkland / Institutional Uses

[3] Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition (Volume Independent) for Industrial / Commercial / Community Uses

1. Units = ug/g (exluding pH/EC/SAR)

2."-" = Parameter not included in chemical analysis

3. Test results exceed Table 1 RPIICC ESQS

4. Test results exceed Table 2.1 RPI ESQS

5. Test results exceed Table 2.1 ICC ESQS

APPENDIX D

FUNCTIONAL SITE GRADING AND SERVICING PLAN PREPARED BY MTE

MTE FILE PATH: P:\P\54937\102\54937-102-C2

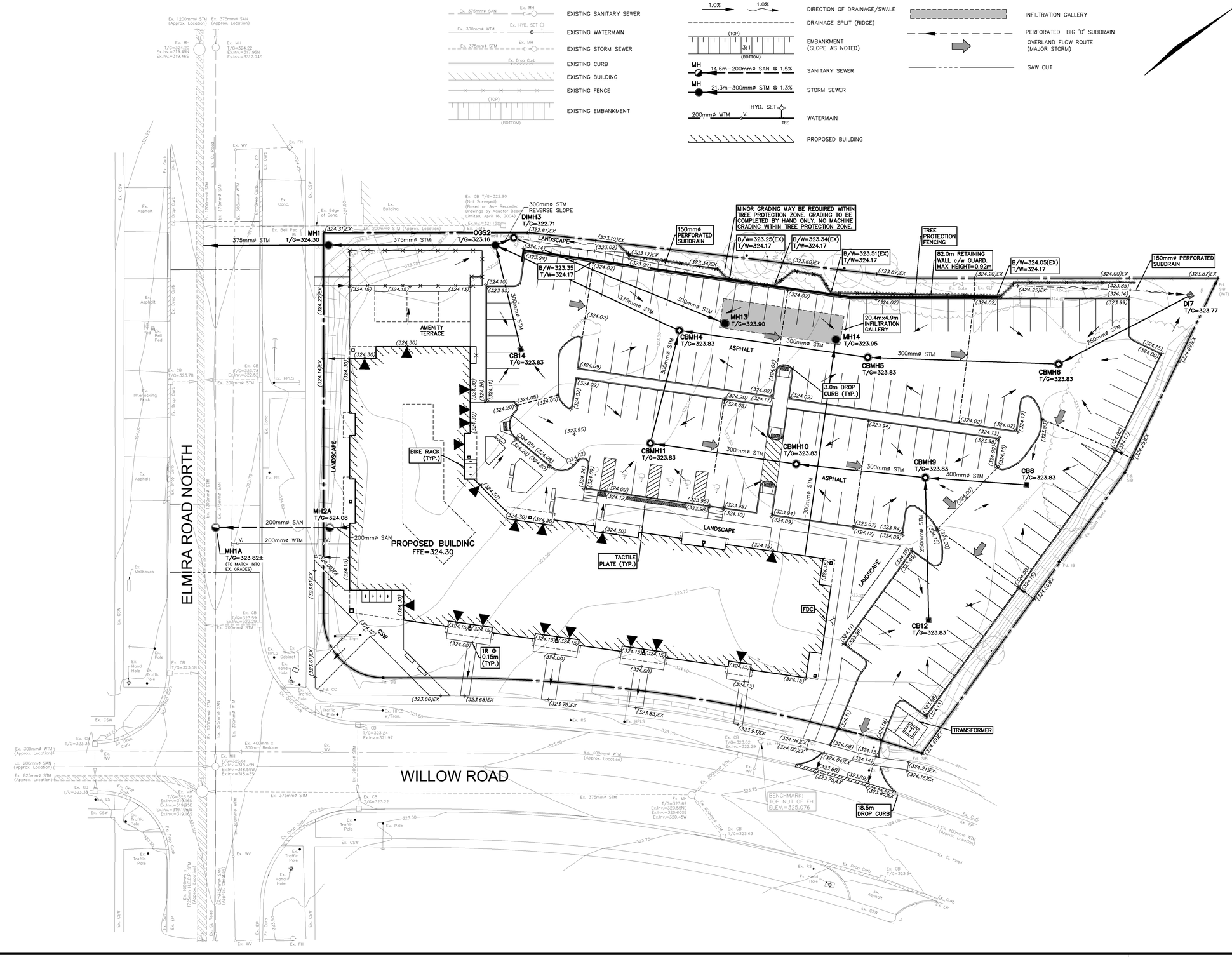
January 16, 2025 – 10:58:06 AM – Plotted By: Gemma Cabral-Gushue

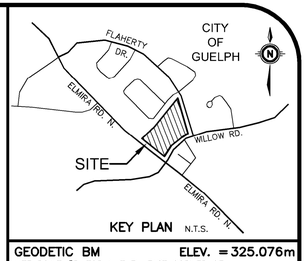
LEGEND OF EXISTING FEATURES

- SITE BOUNDARY
- EXISTING SPOT ELEVATIONS/CONTOURS
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING STORM SEWER
- EXISTING CURB
- EXISTING BUILDING
- EXISTING FENCE
- EXISTING EMBANKMENT

LEGEND OF PROPOSED FEATURES

- PROPOSED SPOT ELEVATIONS
  EX =MAINTAIN EXISTING
  T/G =TOP OF CASTING/GRATE
  INV =INVERT ELEVATION
  FFE =FINISHED FLOOR ELEVATION
- DIRECTION OF DRAINAGE/SWALE
- DRAINAGE SPLIT (RIDGE)
- EMBANKMENT (SLOPE AS NOTED)
- SANITARY SEWER
- STORM SEWER
- WATERMAIN
- PROPOSED BUILDING
- MAN DOOR
- CONCRETE CURB
- RETAINING WALL
- INFILTRATION GALLERY
- PERFORATED BIG 'O' SUBDRAIN
- OVERLAND FLOW ROUTE (MAJOR STORM)
- SAW CUT





GEODETIC BM ELEV. = 325.076m
MTE POINT #5, TOP NUT FH EAST CORNER OF SITE, ALONG WILLOW ROAD

SITE BENCHMARK ELEV. = m

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

NOTE:

1. **PROPERTY LINE IS APPROXIMATE ONLY AND SHOULD NOT BE USED FOR DETERMINING SETBACKS OR LAYOUT.**
2. **EXISTING TOPOGRAPHICAL INFORMATION PROVIDED BY MTE DATED MARCH 13 2024.**
3. **INVERTS DENOTED WITH "±" ARE TAKEN FROM AS-RECORDED PLAN AND PROFILE DRAWINGS COMPLETED BY AQUAFOR BEECH LIMITED, DATED APRIL 16, 2004, AND ARE CONSIDERED APPROXIMATE ONLY. CONTRACTOR TO FIELD VERIFY AND REPORT ANY DISCREPANCIES TO ENGINEER.**

No.	REVISION	BY	YYYY-MM-DD
8.			
7.			
6.			
5.			
4.			
3.			
2.	ISSUED FOR DPA/ZBA	JPL	2025-01-16
1.	ISSUED FOR SPA PRE-CONSULTATION	JPL	2024-11-15

MTE
Engineers, Scientists, Surveyors
519-743-6500

LICENSED PROFESSIONAL ENGINEER
C. A. DAHMER
100227364
2025-01-16
PROVINCE OF ONTARIO

CLIENT
HIP DEVELOPMENTS INC.
74 GRAND AVENUE SOUTH – SUITE 201 CAMBRIDGE

PROJECT
105 ELMIRA ROAD NORTH
GUELPH

DRAWING
FUNCTIONAL SITE GRADING & SERVICING PLAN

Project Manager J. LERCH	Project No. 54937-102
Design By MLW	Checked By CAD
Drawn By DAC/TXT	Checked By MLW
Surveyed By MTE	Drawing No. C2.1
Date Oct.22/24	
Scale 1:300	Sheet 2 of 2

ENCLOSURES

Soil Abbreviations and Terms Used on Record of Borehole Sheets

TERMINOLOGY DESCRIBING COMMON SOIL TYPES:

Topsoil	-	mixture of soil and humus capable of supporting vegetation
Peat	-	mixture of visible and invisible fragments of decayed organic matter
Till	-	unstratified glacial deposit which may range from clay to boulders
Fill	-	soil materials identified as being placed anthropologically

CLASSIFICATION (UNIFIED SYSTEM)

Clay	<0.002mm		
Silt	0.002 to .075mm		
Sand	0.075 to 4.75mm		
		Fine	0.075 to 0.425 mm
		Medium	0.425 to 2.0 mm
		Coarse	2.0 to 4.75 mm
Gravel	4.75 to 75mm		
		Fine	4.75 to 19 mm
		Coarse	19 to 75 mm
Cobbles	75 to 300mm		
Boulders	>300mm		

TERMINOLOGY

Soil Composition	**% by Weight**
"traces"	<10%
"some"(eg. some silt)	10-20%
Adjective (eg. sandy)	20-35%
"and"(eg. sand and gravel)	35-50%

Standard Penetration Resistance (SPT): Standard Penetration Resistance ('N' Values) refers to the number of blows required to advance a standard (ASTM D1586) 51 mm Ø (2 inch) split-spoon sampler by the use of a free falling, 63.5 Kg (140lbs) hammer. The number of blows from the drop weight is recorded for every 15 cm (6 inches). The hammer is dropped from a distance of 0.76m (30 inches) providing 474.5 Joules per blow. When the sampler is driven a total of 45 cm (18 inches) into the soil, the standard penetration index ('N' Value) is the total number of blows for the last 30 cm (12 inches).

Dynamic Cone Penetration Resistance (DCPT): Dynamic Cone Penetration Resistance is similar to a SPT with the 474.5 Joule/blow impulse provided by the free falling hammer where the split-spoon sampler is replaced by a 51 mm Ø, 60˚ conical point and the number of blows is recorded continuously for every 30 cm (12 inches).

COHESIVE SOILS CONSISTENCY

	(kPa)	**(P.S.F.)**	**Nominal 'N' Value**
Very Soft	<12	<250	0-2
Soft	12-25	250-500	2-4
Firm	25-50	500-1000	4-8
Stiff	50-100	1000-2000	8-15
Very Stiff	100-200	2000-4000	15-30
Hard	>200	>4000	>30

RELATIVE DENSITY OF COHESIONLESS SOIL

	'N' Value
Very Loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

MOISTURE CONDITIONS:

Cohesive Soil
DTPL- Drier than plastic limit
APL- About plastic limit
WTPL- Wetter than plastic limit
MWTPL- Much wetter than plastic limit

Cohesionless Soil
Damp
Moist
Wet
Saturated

SAMPLE TYPES AND ADDITIONAL FIELD TESTS

SS	Split Spoon Sample (obtained from SPT)	**GS**	Grab Sample	**PP**	Pocket Penetrometer
		BS	Bulk Sample	**VANE**	Peak & Remolded shear
AS	Auger Sample	**TW**	Thin Wall Sample or Shelby Tube	**DMT**	Flat Plate Dilatometer

LABORATORY TESTS

SG	Specific Gravity	**S**	Sieve Analysis	**W**	Water Content
H	Hydrometer	**P**	Field Permeability	**K**	Lab Permeability
W_p	Plastic Limit	**W_l**	Liquid Limit	**I_p**	Plasticity Index
GSA	Grain Size Analysis	**C**	Consolidation	**UNC**	Unconfined compression

CHUNG & VANDER DOELEN
ENGINEERING LTD.

Enclosure A

Enclosure No.: 1
Sheet 1 of 1

FILE No: 1755

BOREHOLE No. 1

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **May 30 - 24** TO **May 30 - 24**

SOIL LITHOLOGY

Ground Elevation: **322.82 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)
322.59	230 mm TOPSOIL	0
0.23	loose to compact dark brown silty sand FILL moist	0.5
321.92		1.0
0.90	compact, brown fine to medium SAND	1.5
	damp to moist	2.0
		2.5
	-------	3.0
	medium to coarse	3.5
		4.0
		4.5
		5.0
317.32		5.5
5.50	compact to very dense brown SAND AND GRAVEL trace silt saturated	6.0
		6.5
		7.0
		7.5
		8.0
		8.5
		9.0
		9.5
		10.0
		10.5
312.07		11.0
10.75	End of Borehole	11.5
		12.0

SAMPLE ID	TYPE	N-VALUE
1	SS	22
2	SS	14
3	SS	18
4	SS	24
5	SS	18
6	SS	13
7	SS	11
8	SS	19
9	SS	18
10	SS	45/ 50 mm
11	SS	50/ 80 mm

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

REMARKS

- water level at 3.08 m bgs upon withdrawal of drilling augers
- borehole caved to 3.66 m upon withdrawal of drilling augers

PROJECT MANAGER: **CS**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

FILE No: 1755

BOREHOLE No. 2

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **May 31 - 24** TO **May 31 - 24**

Ground Elevation: **322.70 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE	REMARKS
322.47	230 mm TOPSOIL					
0.23	compact to loose brown fine to medium SAND damp to moist	0.5	1	SS	25	
		1.0	2	SS	25	
		1.5	3	SS	13	dynamic cone penetration testin from 1.5 to 6.0 m
		2.0				
		2.5	4	SS	6	water level at 2.44 m bgs upon withdrawal of drilling augers
	-------	3.0				borehole caved to 3.05 m upon withdrawal of drilling augers
	loose to compact medium to coarse	3.5	5	SS	5	
		4.0				
		4.5	6	SS	7	
		5.0	7	SS	4	
		5.5				
		6.0				
316.00		6.5	8	SS	10	
6.70	compact to very dense brown SAND AND GRAVEL trace silt saturated	7.0				
		7.5				
		8.0	9	SS	13	
		8.5				
		9.0				
		9.5	10	SS	12	
		10.0				
311.98		10.5				
10.72	End of Borehole		11	SS	50/ 50 mm	
		11.0				
		11.5				
		12.0				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

PROJECT MANAGER: **CS**

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Kitchener, Ontario N2H 5E1
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FILE No: 1755

BOREHOLE No. 3

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **May 31 - 24** TO **May 31 - 24**

Ground Elevation: **323.37 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE
323.14	230 mm TOPSOIL				
0.23	loose to compact dark brown silty sand FILL moist	0.5	1	SS	6
322.57					
0.80	loose to compact brown fine to medium SAND damp to moist	1.0	2	SS	23
		1.5			
		2.0	3	SS	9
		2.5	4	SS	15
	------- loose to compact medium to coarse	3.0			
		3.5	5	SS	12
		4.0	6	SS	17
		4.5			
		5.0	7	SS	4
		5.5			
		6.0			
		6.5	8	SS	11
		7.0			
		7.5			
		8.0	9	SS	11
314.87					
8.50	compact brown SAND AND GRAVEL trace silt saturated	8.5			
		9.0			
		9.5	10	SS	21
		10.0			
		10.5			
312.24		11.0	11	SS	13
11.13	End of Borehole	11.5			
		12.0			

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

REMARKS

- dynamic cone penetration testin from 3.0 to 6.0 m
- water level at 3.08 m bgs upon withdrawal of drilling augers
- borehole caved to 3.96 m upon withdrawal of drilling augers

PROJECT MANAGER: **CS**

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FILE No: 1755

BOREHOLE No. 4

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **May 30 - 24** TO **May 30 - 24**

Ground Elevation: **323.61 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE
323.36	230 mm TOPSOIL				
0.25	loose to compact dark brown silty sand FILL moist	0.5	1	SS	13
322.71		1.0	2	SS	19
0.90	compact, brown fine to medium SAND damp to moist	1.5	3	SS	13
		2.0	4	SS	12
		2.5			
	-------	3.0	5	SS	22
	medium to coarse	3.5			
		4.0	6	SS	19
		4.5			
		5.0	7	SS	18
318.11		5.5			
5.50	compact to very dense brown SAND AND GRAVEL trace silt saturated	6.0			
		6.5	8	SS	30
		7.0			
		7.5			
		8.0	9	SS	26
		8.5			
		9.0			
		9.5	10	SS	39
		10.0			
		10.5			
312.48		11.0	11	SS	80
11.13	End of Borehole	11.5			
		12.0			

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

REMARKS

- water level at 3.56 m bgs upon withdrawal of drilling augers
- borehole caved to 3.87 m upon withdrawal of drilling augers

PROJECT MANAGER: **CS**

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FILE No: 1755

BOREHOLE No. 5

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **May 30 - 24** TO **May 30 - 24**

SOIL LITHOLOGY

Ground Elevation: **323.78 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)
323.43	350 mm TOPSOIL	0
0.35	compact, brown fine to medium SAND damp to moist ---	0.5 – 3.0
	medium to coarse	3.0 – 4.5
319.28		4.5
4.50	compact to very dense brown SAND AND GRAVEL trace silt saturated	4.5 – 10.5
313.06		10.5
10.72	End of Borehole	10.72

SYMBOL

SAMPLE

SAMPLE ID	TYPE	N-VALUE
1	SS	9
2	SS	18
3	SS	15
4	SS	10
5	SS	20
6	SS	28
7	SS	30
8	SS	41
9	SS	11
10	SS	11
11	SS	50/ 50 mm

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

REMARKS

water level at 3.56 m bgs upon withdrawal of drilling augers
borehole caved to 3.97 m upon withdrawal of drilling augers

PROJECT MANAGER: **CS**

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FILE No: 1755

BOREHOLE No. 6

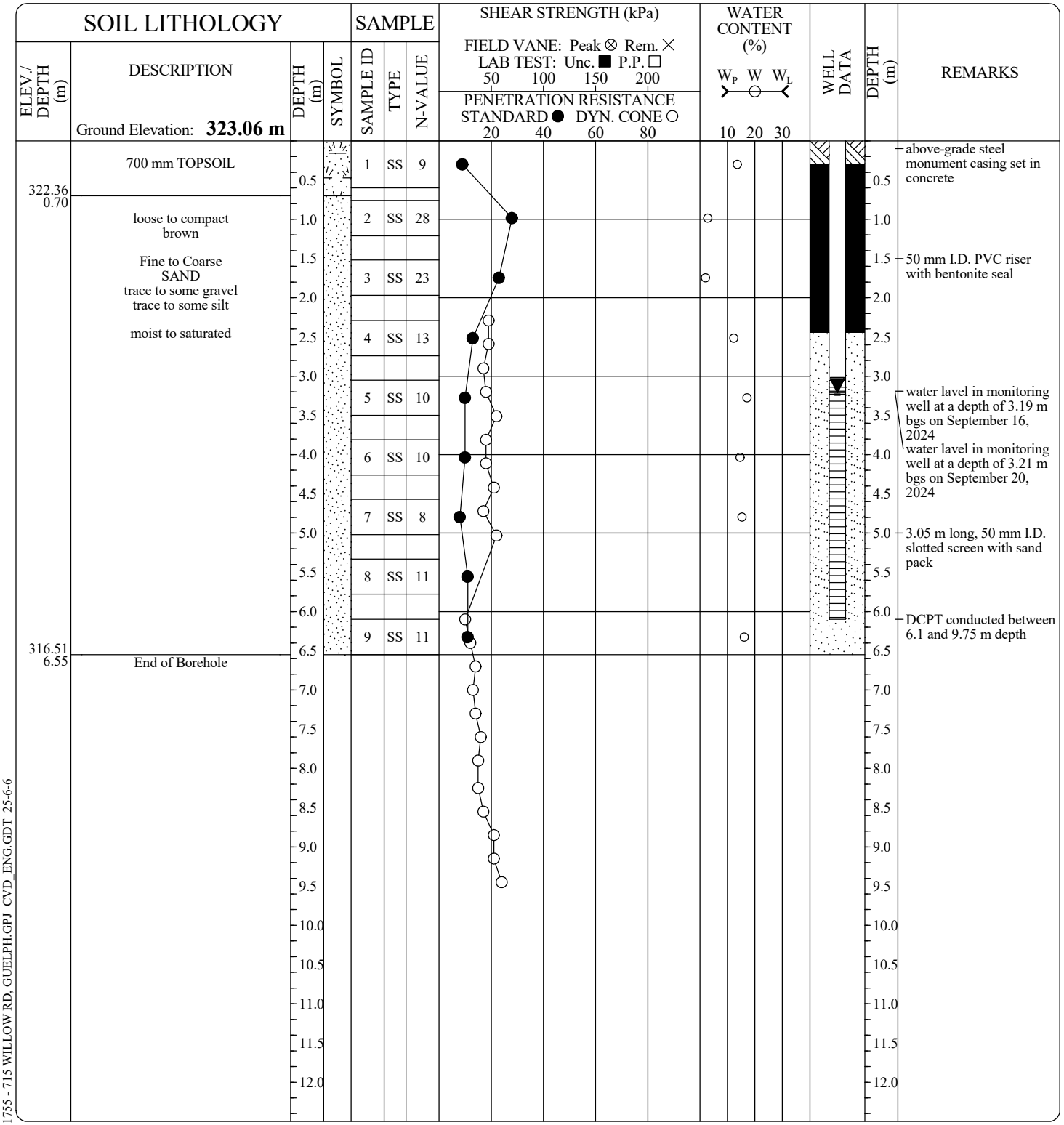
Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **Sep 05 - 24** TO **Sep 05 - 24**



PROJECT MANAGER: **CS**

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FILE No: 1755

BOREHOLE No. 7

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **Sep 05 - 24** TO **Sep 05 - 24**

Ground Elevation: **323.08 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE
322.93 / 0.15	150 mm TOPSOIL					
	compact brown Fine to Coarse SAND trace to some gravel trace silt mois to saturated	0.5		1	SS	17
		1.0		2	SS	13
		1.5		3	SS	16
		2.0				
		2.5		4	SS	22
		3.0				
		3.5		5	SS	15
		4.0		6	SS	11
		4.5				
		5.0		7	SS	19
		5.5				
		6.0				
316.53 / 6.55	End of Borehole	6.5		8	SS	10
		7.0				
		7.5				
		8.0				
		8.5				
		9.0				
		9.5				
		10.0				
		10.5				
		11.0				
		11.5				
		12.0				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

REMARKS
wet cave-in at 3.35 m depth upon withdrawal of drilling augers

PROJECT MANAGER: **CS**

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FILE No: 1755

BOREHOLE No. 8

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **Sep 05 - 24** TO **Sep 05 - 24**

Ground Elevation: **323.26 m**

ELEV./ DEPTH (m)	DESCRIPTION	SAMPLE ID	TYPE	N-VALUE
323.11 / 0.15	150 mm TOPSOIL			
	loose dark brown FILL, sandy silt trace gravel contains organics moist	1	SS	20
	----- buried topsoil layer	2	SS	4
320.96 / 2.30		3	SS	5
	compact brown Fine to coarse SAND trace to some gravel trace to some silt moist to saturated	4	SS	18
		5	SS	14
		6	SS	8
		7	SS	7
		8	SS	11
		9	SS	10
316.71 / 6.55	End of Borehole			

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

REMARKS
DCPT conducted between 0 and 27 m depth
wet cave-in at 3.65 m depth upon withdrawal of drilling augers

PROJECT MANAGER: **CS**

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FILE No: 1755

BOREHOLE No. 9

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **Sep 05 - 24** TO **Sep 05 - 24**

Ground Elevation: **323.84 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE
323.74 / 0.10	100 mm TOPSOIL				
	dense, brown FILL, silty sand some gravel moist	0.5	1	SS	37
322.79 / 1.05		1.0	2	SS	35
	compact brown Medium to Coarse SAND trace to some gravel trace to some silt moist to saturated	1.5	3	SS	16
		2.0			
		2.5	4	SS	19
		3.0			
		3.5	5	SS	23
		4.0			
		4.5			
		5.0	7	SS	14
		5.5			
		6.0			
317.29 / 6.55	End of Borehole	6.5	8	SS	13
		7.0			
		7.5			
		8.0			
		8.5			
		9.0			
		9.5			
		10.0			
		10.5			
		11.0			
		11.5			
		12.0			

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)	REMARKS
0.5	above-grade steel monument casing set in concrete
1.5	50 mm I.D. PVC riser with bentonite seal
3.0	3.05 m long, 50 mm I.D. slotted screen with sand pack
4.0	water lavel in monitoring well at a depth of 4.12 m bgs on September 16, 2024
4.5	water lavel in monitoring well at a depth of 4.13 m bgs on September 20, 2024

PROJECT MANAGER: **CS**

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Sheet 1 of 1

FILE No: 1755

BOREHOLE No. 10

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **Sep 05 - 24** TO **Sep 05 - 24**

SOIL LITHOLOGY

Ground Elevation: **323.74 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)
323.59 / 0.15	150 mm TOPSOIL	0
	compact, brown FILL, sandy silt trace gravel. trace rootlets moist	0.5
323.04 / 0.70		1.0
	compact brown Fine to Coarse SAND trace to some gravel trace silt moist to saturated	1.5
		2.0
		2.5
		3.0
		3.5
		4.0
		4.5
		5.0
318.44 / 5.30	dense brown SAND AND GRAVEL trace silt saturated	5.5
		6.0
317.19 / 6.55	End of Borehole	6.5
		7.0
		7.5
		8.0
		8.5
		9.0
		9.5
		10.0
		10.5
		11.0
		11.5
		12.0

SYMBOL

SAMPLE

SAMPLE ID	TYPE	N-VALUE
1	SS	24
2	SS	23
3	SS	19
4	SS	15
5	SS	21
7	SS	13
9	SS	30

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

REMARKS

wet cave-in at 3.65 m depth upon withdrawal of drilling augers

PROJECT MANAGER: **CS**

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FILE No: 1755

BOREHOLE No. 11

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **Sep 06 - 24** TO **Sep 06 - 24**

Ground Elevation: **323.52 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE
323.27	250 mm TOPSOIL					
0.25	compact, brown FILL, sandy silt trace gravel trace clay moist	0.5		1	SS	17
	---- buried topsoil	1.0		2	SS	16
321.67		1.5		3	SS	15
1.85	compact brown Fine to Medium SAND trace gravel trace silt moist	2.0				
		2.5		4	SS	17
		3.0		5	SS	16
320.02		3.5				
3.50	End of Borehole					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

REMARKS

Borehole open and dry upon withdrawal of drilling augers

PROJECT MANAGER: **CS**

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FILE No: 1755

BOREHOLE No. 12

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **Sep 06 - 24** TO **Sep 06 - 24**

Ground Elevation: **323.57 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE
323.32	250 mm TOPSOIL					
0.25	loose to compact dark brown FILL, silty sand trace gravel trace clay moist	0.5		1	SS	9
		1.0		2	SS	10
	--- buried topsoil	1.5		3	SS	9
321.27		2.0				
2.30	compact, brown Fine to Medium SAND trace gravel trace silt moist	2.5		4	SS	21
		3.0		5	SS	17
320.07		3.5				
3.50	End of Borehole	4.0				
		4.5				
		5.0				
		5.5				
		6.0				
		6.5				
		7.0				
		7.5				
		8.0				
		8.5				
		9.0				
		9.5				
		10.0				
		10.5				
		11.0				
		11.5				
		12.0				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

REMARKS

Borehole open and dry upon withdrawal of druilling augers

PROJECT MANAGER: **CS**

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FILE No: 1755

BOREHOLE No. 13

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **Sep 06 - 24** TO **Sep 06 - 24**

Ground Elevation: **323.70 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE
323.50	200 mm TOPSOIL					
0.20	compact brown FILL, silty sand trace clay moist	0.5		1	SS	12
322.35		1.0		2	SS	12
1.35	compact brown Fine to Medium SAND trace gravel trace to some silt	1.5		3	SS	12
		2.0				
		2.5		4	SS	20
320.70		3.0				
3.00	moist dense to very dense brown SAND AND GRAVEL trace silt moist to saturated	3.5		5	SS	50/ 75 mm
		4.0		6	SS	47
		4.5				
		5.0		7	SS	39
318.07		5.5		8	SS	50/ 75 mm
5.63	End of Borehole	6.0				
		6.5				
		7.0				
		7.5				
		8.0				
		8.5				
		9.0				
		9.5				
		10.0				
		10.5				
		11.0				
		11.5				
		12.0				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

REMARKS

- above-grade steel monument casing set in concrete
- 50 mm I.D. PVC riser with bentonite seal
- 3.05 m long, 50 mm I.D. slotted screen with sand pack
- water lavel in monitoring well at a depth of 3.85 m bgs on September 16, 2024
- water lavel in monitoring well at a depth of 3.87 m bgs on September 20, 2024

PROJECT MANAGER: **CS**

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FILE No: 1755

BOREHOLE No. 14

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **Sep 06 - 24** TO **Sep 06 - 24**

Ground Elevation: **323.64 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE
323.44	200 mm TOPSOIL					
0.20	loose brown FILL, sandy silt trace caly trace gravel contains organics moist	0.5		1	SS	7
		1.0		2	SS	9
		1.5		3	SS	8
321.49		2.0				
2.15	compact, brown Fine to Medium SAND trace silt moist	2.5		4	SS	15
		3.0		5	SS	18
320.14		3.5				
3.50	End of Borehole					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

REMARKS

Borehole open and dry upon withdrawal of druilling augers

PROJECT MANAGER: **CS**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

FILE No: 1755

BOREHOLE No. 15

Client: **HIP Developments**

Project: **Proposed Residential Development**

Location: **105 Elmira Road North, Guelph, Ontario**

EQUIPMENT DATA

Machine: **CME 55**
Method: **Holllow Stem Auger**
Size: **108 mm I.D.**
Date: **Sep 06 - 24** TO **Sep 06 - 24**

SOIL LITHOLOGY

Ground Elevation: **322.98 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE
322.73	250 mm TOPSOIL					
0.25	compact brown Fine to Coarse SAND trace to some gravel trace to some silt moist to saturated	0.5 1.0 1.5 2.0 2.5 3.0		1 2 3 4 5	SS SS SS SS SS	12 8 14 19 19
319.48						
3.50	End of Borehole	3.5				
		4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)
0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0

REMARKS

Borehole open and dry upon withdrawal of druilling augers

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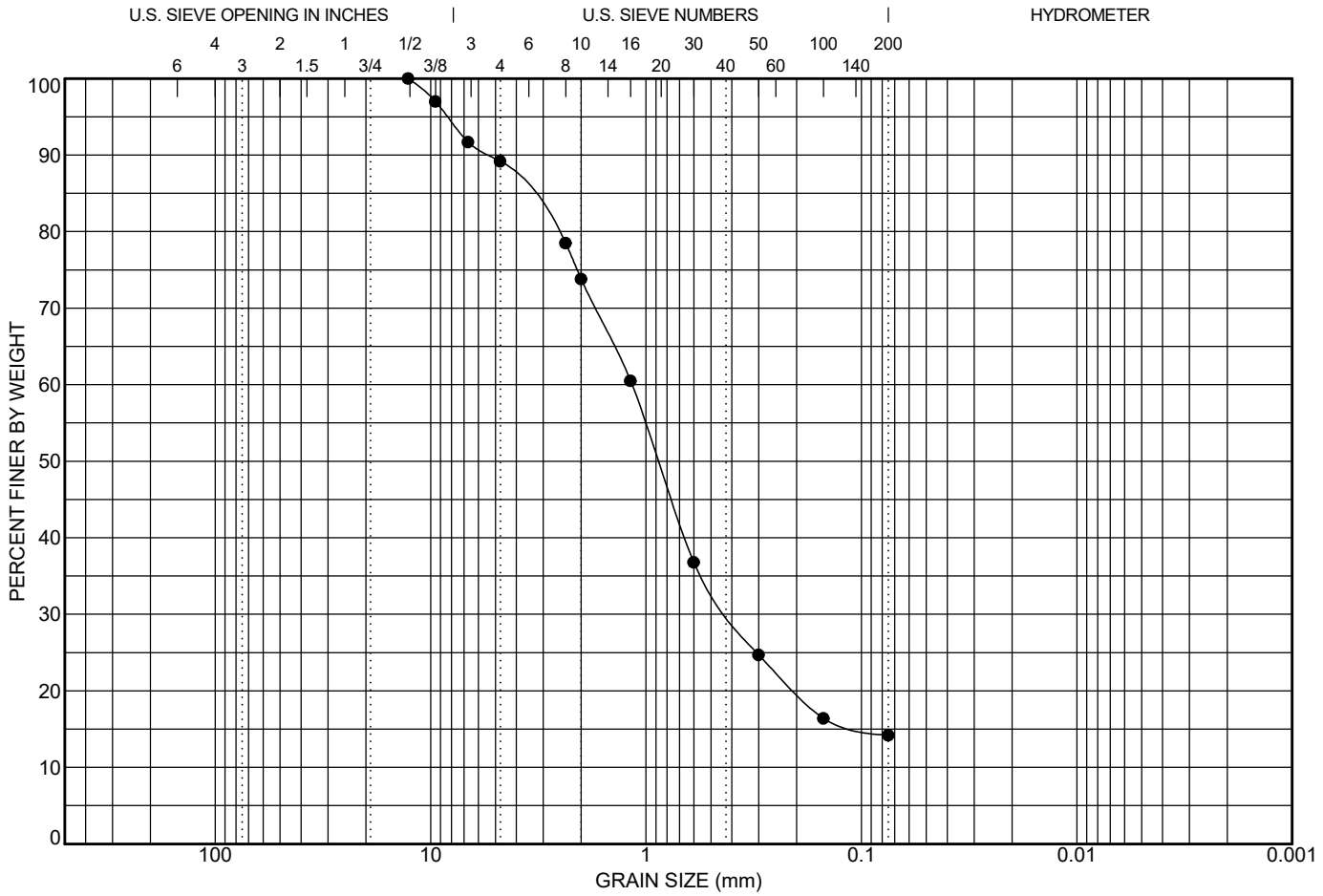

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
					12.7	1.163	0.406		10.8	75.0	14.2	

Date: Oct. 16 - 2024
Client: HIP Developments
Contractor:
Source:
Sampled From: BH 9 - SA 5; 3.05 to 3.5 m depth
Sample No.: 9-5
Date Sampled: Sep. 05 - 2024
Sampled By: JR
Lab No.: 1115
Date Tested: Oct. 08 - 2024
Type of Material: Sand, some silt, some gravel

Sieve Size (mm)	Percent Passing	No Specifications

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Fax: 519-742-7739
e-mail: info@cvdengineering.com

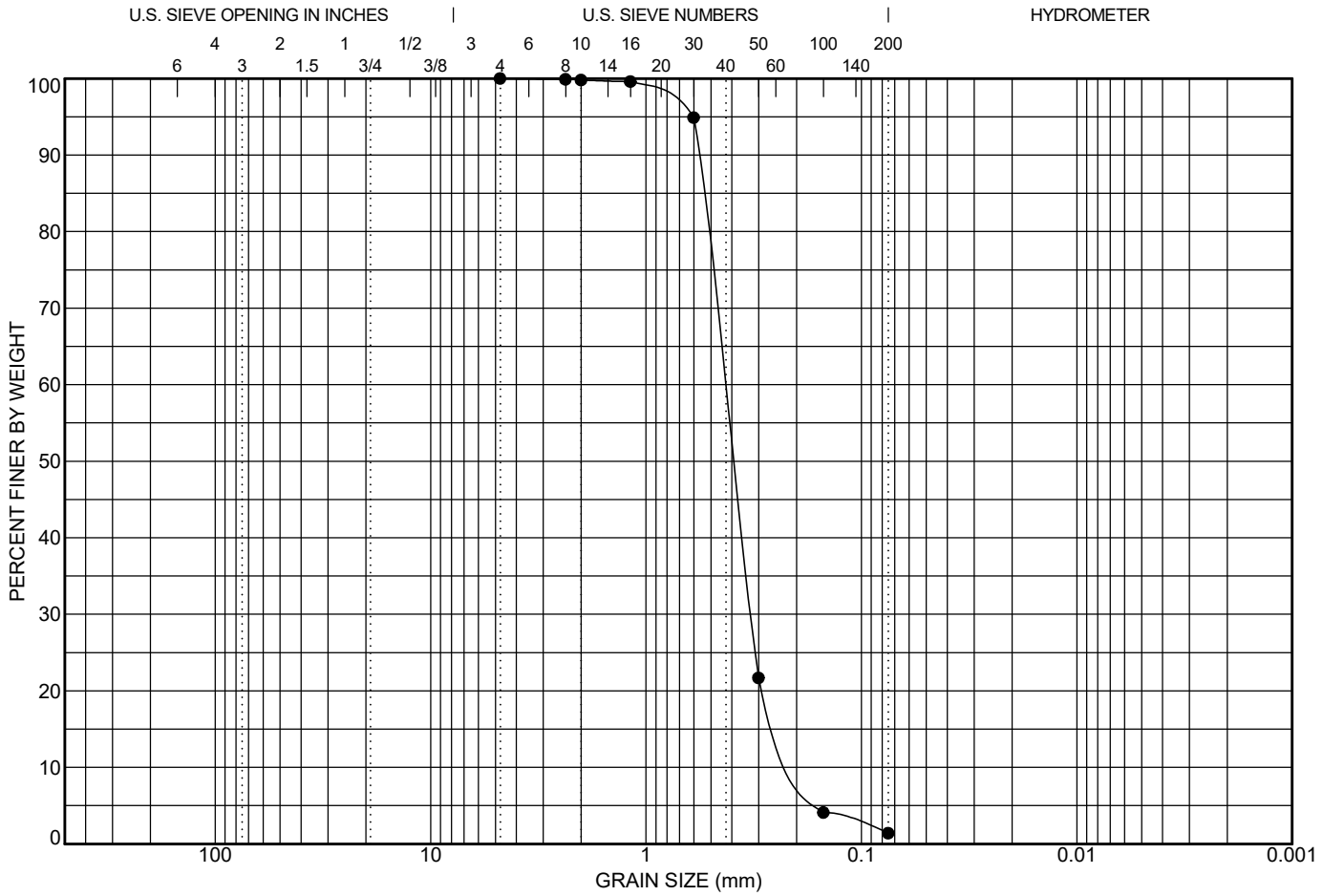
GRAIN SIZE DISTRIBUTION

Project: Proposed Residential Development

Location: 105 Elmira Road North, Guelph, Ontario

File No.: 1755

Enclosure No.: 16



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
			1.29	2.28	4.75	0.431	0.325	0.189	0.0	98.6	1.4	

Date: Oct. 16 - 2024
Client: HIP Developments
Contractor:
Source:
Sampled From: BH 13 - SA 4; 2.29 to 2.74 m depth
Sample No.: 13-4
Date Sampled: Sep. 05 - 2024
Sampled By: JR
Lab No.: 1116
Date Tested: Oct. 08 - 2024
Type of Material: Sand, trace silt

Sieve Size (mm)	Percent Passing	No Specifications

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e-mail: info@cvdengineering.com

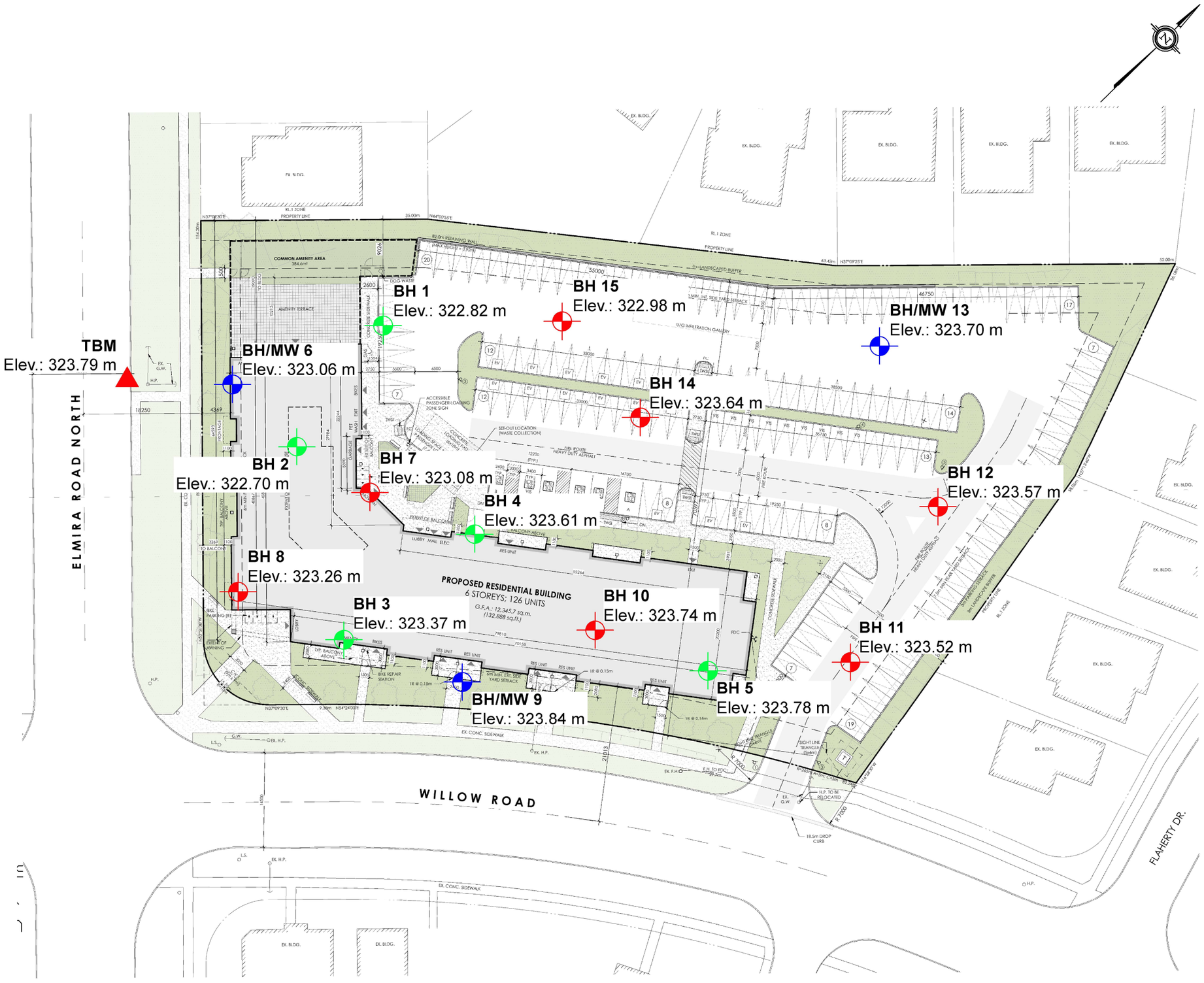
GRAIN SIZE DISTRIBUTION

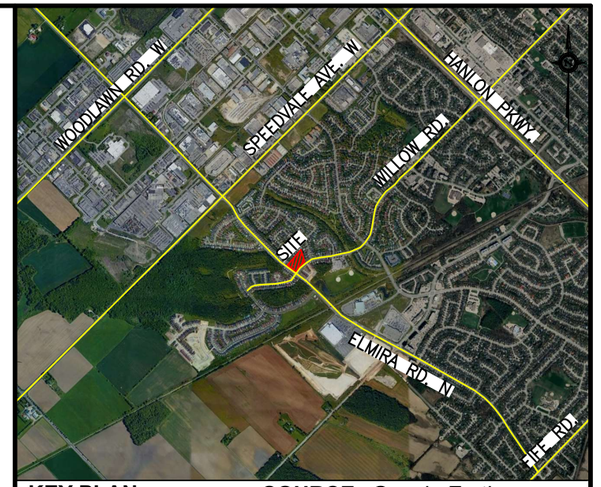
Project: Proposed Residential Development

Location: 105 Elmira Road North, Guelph, Ontario

File No.: 1755

Enclosure No.: 17





KEY PLAN **SOURCE:** Google Earth

LEGEND

- **TBM: Catch basin in northbound lane of Elmira Road North, 50 m north of intersection with Willow Street. Elev.: 323.79 m (Geodetic)**
- **Borehole Location - May 2024**
- **Borehole Location - September 2024**
- **Borehole and Monitoring Well Location - September 2024**

Elev. Ref.: *The borehole locations and associated ground surface elevations were surveyed using a Network RTK Global Navigation Satellite System (GNSS) Receiver. The survey data was collected using UTM Zone 17N Projection, NAD83(CSRS)v7-2010 datum and Canada Geoid Model HT2_2010v70 (CGVD28).*

DWG. Ref.: *ABA Architects Inc.; "105 Elmira Road"; "Site Plan"; Project No. 2024-069; Drawing Number: SP-1; 2025-06-02*

BOREHOLE LOCATION PLAN

Proposed Residential Development

105 Elmira Road North
Guelph, Ontario

CHUNG & VANDER DOELEN ENGINEERING LTD.

311 VICTORIA STREET NORTH
KITCHENER / ONTARIO / N2H 5E1 / 519-742-8979

Drawn By: JR/YC	Date: June 2025	File No.: 1755
Checked By: EYC	Scale: N.T.S.	Drawing No.: 1