



CHUNG & VANDER DOELEN
ENGINEERING LTD.

**GEOTECHNICAL INVESTIGATION
PROPOSED 4-STORY OFFICE BUILDING**

430 Synder's Road East
Baden, Ontario

SUBMITTED TO:

Alder Concrete Group Ltd.
1-617 Colby Drive
Waterloo, ON
N2V 1Y9

ATTENTION:

Mr. Adam Baier, Managing Partner



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December 4, 2023

File No.: 1472

Alder Concrete Group Ltd.
1-617 Colby Drive
Waterloo, ON
N2V 1Y9

Attention: **Mr. Adam Baier, Managing Partner**

RE: Geotechnical Investigation
Proposed 4-Storey Office Building
430 Snyder's Road East, Baden, 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 Alder Concrete Group Ltd. to carry out a geotechnical investigation for the proposed redevelopment at 430 Synder's Road, Baden, Ontario.

The site is an irregular-shaped property, approximately 0.9381 hectares in area, located on the north side of Snyder's Road East in an area of commercial and residential land uses in the community of Baden. The Site is improved with a 1-storey commercial building with a partial basement, currently occupied by Allwood Cabinet Doors & Trim, a cabinet door supplier.

CVD conducted a Phase II ESA at the site and the boreholes indicated that the site is underlain by fill over peat/organic silt deposit to about 2 m deep in the presently proposed building area. Deeper organic deposit could be present towards the north and west of the property. Native loose to compact sand/silty sand extended to 5 m deep, the maximum depth of boreholes. The groundwater table was rather shallow, located at depths of 2 to 3 m below ground surface. The borehole information from the Phase II ESA is attached in Appendix "B".

It is understood that a 4-storey "V-shaped" office building located towards the intersection of Snyder's Road East and Sandhills Road will be constructed with the balance of the site being paved parking lot. The proposed building will not have a basement and the finished ground floor elevation has not been established. However, it is assumed that the finished floor would be just above the existing site grade. Storm water management will be required for the site.

The purpose of this investigation is to provide geotechnical recommendations to address the following items:

- Subsurface soil and groundwater conditions
- Foundation design recommendations and alternative foundation systems
- Excavation condition
- Groundwater control during and following construction
- Slab on grade design
- Backfilling recommendations
- Foundation soil classification for seismic design per OBC 2012
- Foundation walls and retaining wall design
- Pavement design and construction

Infiltration rates of the various soil deposits encountered during the investigation will also be provided for potential design of an at-source storm water management feature.

2.0 FIELD WORK

To investigate the subsurface conditions at the site, four (4) boreholes, designated as Boreholes 101 to 104, were advanced to depths between 8.25 and 9.75 m below ground surface on October 12, 2023. 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. Dynamic Cone Penetration tests were performed at Boreholes 101 and 104 to collect further information and confirm the density of the fine-grained deposit where disturbance to the STP "N"-values was suspected. The compactness condition or consistency of the soil strata has been inferred from these various test results.

The locations of the boreholes were established in the field by CVD. The borehole locations, associated ground surface elevations, and the temporary benchmark elevation were surveyed by CVD for the purpose of this report using a Network RTK Global Navigation Satellite System (GNSS) Receiver. The survey data was collected using The UTM Zone 17 N Projection, NAD83 (CSRS)v7-2010 datum and Canada Geoid Model HT2_2010v70 (CGVD28).

The location and elevation of the TBM is shown on Drawing No. 1 and described below:

TBM: Top of west catch basin manhole in road edge of westbound lane of Synder's Road East,
as shown on Drawing No. 1
Elevation: 356.84 m (Geodetic)

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.

Three (3) grain size distribution analyses were carried out on representative soil samples of the major soil deposits to confirm field identification. The results of the grain size distribution analyses are presented on Enclosures 5 to 7.

4.0 EXISTING SITE CONDITIONS

The site is an irregular-shaped property, located on the north side of Snyder's Road East in an area of commercial and residential land uses in the community of Baden. The Site is improved with a 1-storey commercial building with a partial basement close to towards the intersection of Snyder's Road East and Sandhills Road, currently occupied by Allwood Cabinet Doors & Trim, a cabinet door supplier. A paved parking area is located immediately west of the existing building. The balance of the site is being used for storage with gravel surface.



The ground surface is relatively flat but slopes down gently to the north and west from the existing building. The ground surface elevations at the borehole locations ranged between 356.8± and 355.0± m.

5.0 SUBSURFACE CONDITIONS

5.1 General

The detailed subsurface conditions encountered in the four (4) boreholes advanced as part of this investigation are shown on the Borehole Log Sheets, Enclosures 1 to 4. The following sections provide descriptions of the major soil deposits encountered in the boreholes. The borehole information from the Phase II ESA is attached in Appendix "B".

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.

5.2 Pavement

Asphalt pavement was encountered at ground surface at all four (4) borehole locations with measured thicknesses of 50 to 80 mm over granular bases with measured thicknesses ranging between 50 and 150 mm.

5.3 Fill

A layer of fill was encountered underlying the asphalt pavement and extended to depths between 1.15 m and 3.05 m below ground surface. The fill materials generally comprised of varying amounts of sand and silt with trace amounts of gravel and clay, and occasional organic inclusions. The lower portion of the 3.05 m thick fill in Borehole 104 contained wood fragments, similar to an organic deposit.

The SPT "N"-values measured within fill materials ranged from 2 to 21 blows per 300 mm of penetration, indicating a variable very loose to compact compactness condition. The measured water content of the samples collected from this fill layer ranged between 9 and 31%, thus indicating a moist to wet moisture condition.

5.4 Peat and Organic Silt

A deposit of peat was encountered below the fill materials in Boreholes 101 and 102 and extended to depths of 2.6 and 2.0 m, respectively. It is noted that the lower portion of fill in Borehole 104 contained wood fragments, similar to an organic deposit. Further, the environmental boreholes from the Phase II ESA also encountered organic deposit to the west of the existing building and in the yard area.



The SPT "N"-values measured within this deposit yielded 3 blows per 300 mm of penetration, indicating a very loose condition. The measured water content of the samples collected from this organic deposit ranged between 62 and 242%, thus indicating a saturated moisture condition and highly compressible.

5.5 Fine Granular Deposits

The fill materials, peat and organic materials were underlain by fine granular deposits varying in composition from sand to sandy silt to silty sand and extended to depths between 8.25 and 9.75 m. Three (3) grain size distribution analyses were conducted on samples retrieved from Boreholes 102, 103 and 104 and the results are graphically presented on Enclosures 5, 6 and 7.

The SPT "N"-values measured within these deposits ranged from 4 to 31 blows per 300 mm. Dynamic cone penetration tests confirmed that the lower "N"-values were disturbed due to hydrostatic pressure during sampling. Based on the above, the fine granular deposits are considered to lie in a typically compact to dense compactness condition. Natural moisture contents were measured between 15 and 26%, indicating a wet to saturated moisture condition.

5.6 Groundwater

Groundwater conditions were monitored during and following completion of borehole sampling. Wet cave-ins were observed at depths between 2.15 and 2.75 m below ground surface.

Three (3) monitoring wells were installed at Boreholes 1, 2 and 3 during the Phase II EAS. The table below summarizes the water level readings in the monitoring wells taken on July 4, 2023.

Borehole No.	Ground Surface Elevation (m)	Date	Water Level Below Existing Ground Surface (m)	Water Level Elevation (m)
1	356.31	July 4, 2023	2.58	353.73
2	356.75	July 4, 2023	3.04	353.71
3	356.61	July 4, 2023	2.91	353.70

The groundwater is considered to lie at depths of $2.6 \pm$ m to $3.0 \pm$ m below existing grades, corresponding to elevations between $353.70 \pm$ and $353.73 \pm$ m in July 2023 during the Phase II EAS. Based on the observed groundwater levels and natural moisture contents, the groundwater table appeared to rise $0.5 \pm$ m to $354.2 \pm$ m during the recent geotechnical investigation in October 2023.

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



6.0 DISCUSSION AND RECOMMENDATIONS

6.1 General

It is understood that a 4-storey "V-shaped" office building located towards the intersection of Snyder's Road East and Sandhills Road will be constructed with the balance of the site being paved parking lot. The proposed building will not have a basement and the finished ground floor elevation has not been established. However, it is assumed that the finished floor would be just above the existing site grade. Storm water management will be required for the site.

In general, the topsoil and fill materials extended to depths between 1.15 m and 3.05 m below ground surface. The fill materials in Boreholes 101 and 102 were underlain by peat deposit and extended to depths of 2.6 and 2.0 m, respectively. All the above soil units were underlain by generally compact to dense fine granular deposits to depths between 8.25 and 9.75 m.

The groundwater is considered to lie at depths of $2.6\pm$ m to $3.0\pm$ m below existing grades, corresponding to elevations between $353.70\pm$ and $353.73\pm$ m in July 2023 during the Phase II EAS. Based on the observed groundwater levels and natural moisture contents, the groundwater table appeared to rise $0.5\pm$ m to $354.2\pm$ m during the recent geotechnical investigation in October 2023.

Due to the presence of fill, peat and organic soils, replacing these materials with well compacted engineered fill is a viable procedure to support building foundation and floor slab. **The vertical and horizontal extents of the peat/organic deposit uncovered at Boreholes 101 and 102 will need to be established. A more thorough test pit investigation is recommended when the existing building is demolished.**

6.2 Footing Foundations

Conventional strip and spread footing foundations can be used to support the proposed office building. Footings cast on competent native fine granular deposits can be designed using a Geotechnical Reaction at SLS of 150 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 250 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)
101	356.34	3.04	353.30
102	356.54	2.14	354.40
103	356.83	2.13	354.70
104	356.51	3.11	353.40



These soil bearing pressures can be achieved provided that the founding subgrade is undisturbed during construction. The majority of the settlements will take place during construction and the first loading cycle of the building.

In addition, the footings should be founded below any existing fill and organic materials, building foundations and utility trenches, 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.

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

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

6.3 Engineered Fill Construction

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

Imported well-graded sand and gravel fill (similar to the gradational requirements of OPSS Granular B, Type I) should be used to construct the engineered fill under controlled and supervised conditions. The moisture content of fill soil to construct engineered fill requires to be within 3% drier of the optimum moisture condition in order to achieve 100% Standard Proctor Maximum Dry Density (SPMDD).

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

1. All existing topsoil, fill materials, organic deposits, loose native soils and otherwise deleterious materials are to be excavated/removed to the approximate elevations (given in the table in Section 6.2) 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. Due to anticipated wet/saturated subgrade condition, the initial lift to raise the grade will require coarse pit run sand and gravel, 450 to 600 mm thick and be statically rolled in order to stabilize and "bridge" the prepared subgrade;
4. The required grades can then be achieved by placing approved excavated soils or imported Granular "B" in maximum 300 mm thick lifts and compacted to no less than 100% SPMDD to the underside of the proposed footings. Above the footing level, the fill should be compacted to at least 95% SPMDD for floor slab support. The moisture content of the soil is required to be within 3% dry of its optimum moisture condition to achieve the specified degree of compaction;
5. Engineered fill must be placed such that the fill pad extends horizontally outwards from all footings/foundation at least the same distance as how thick the engineered fill pad will exist between the underside of future footings and the approved native subgrade; and
6. 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.

Foundations supported on approved engineered fill constructed in accordance with the procedures given above can be designed to 150 kPa at SLS and 250 kPa at ULS.

Vibration could be generated from various construction equipment, such as compactors and rollers which could be harmful to potential surrounding structures and buildings during construction. Peak particle velocity (PPV) of ground motion is widely accepted as the best descriptor of potential for vibration damage to structures. The safe vibration limit can be set to 8 to 25 mm/s PPV, depending on the sensitivity of any potential surrounding structures to vibration.

Vibration monitoring can be carried out to measure the PPV of ground motion from vibration generated from typical compaction equipment at the beginning of the project in the potentially critical areas. This will set criteria and establish the type of equipment to be used for this project. A pre-construction condition survey could be conducted to document the condition of the existing structures within the possible zone of influence.

6.4 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 consistency and compactness condition of the underlying soil deposits encountered at the boreholes and our experience of the upper 30 of soil deposit in the general area of the site, the site can be classified as a Site Class D as per OBC Table 4.1.8.4.A (Page B4-24) due to the presence of peat sand organic silt.



6.5 Construction and Ground Water Control

Excavations are generally expected to be in the order of 2 to 3 m deep for installing site servicing and foundation construction. The excavations will generally penetrate fill, organic soil and fine granular deposits. These materials are considered to be Type 3 Soils in accordance with the latest Occupational Health and Safety Act provided that the groundwater is adequately controlled.

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. The side slopes may require to be cut back to flatter inclinations where saturated soils are encountered. 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 sump pumping techniques, as and where required. The sump pits should be filtered.

It is further 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.

6.6 Floor Slab Construction

At the time of floor slab construction, 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 imported granular fill which should be compacted 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.

A modulus of subgrade reaction (k_s) of 80 MN/m³ may be used for the design of the floor slabs assuming a well compacted Granular "B" engineered fill subgrade.

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 to 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 imported granular soils such as OPSS Granular B Type I, which have less than 8% silt particles.

Moisture migration from the underlying soils through the concrete slab-on-grade will take place via "capillary action" and "diffusion" (due to vapour pressure differential). Although the Granular "A" layer will provide a capillary break, the low permeance of the concrete slab and floor coverings will result in



100% humidity under the concrete slab and, consequently, the moisture in the concrete will increase over time. The potential effect of the soil moisture should be considered in selecting the floor coverings. A vapour retarder material (such as a 15-mil poly, ASTM E-1745) can be placed to reduce soil moisture migration. Reference is made to ACI 302.

6.7 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 the following unit weight and friction coefficient:

Soil	Unit Weight (kN/m ³)	Friction Coefficient
Native Fine Granular Deposits	20	0.35
Well Compacted Engineered Fill	21	0.45



6.8 Site Servicing

It is anticipated that water and sewer servicing will generally be in the range of 1.5 to 2.5 m deep. Trenching can be carried out using conventional open cut procedures. Open cut excavation and groundwater control recommendations are outlined in Section 6.5.

6.8.1 Pipe Bedding

The native deposits and engineered fill will generally provide suitable subgrade support to sewer and watermain servicing.

Any loose, unstable and/or organic soils encountered at the pipe invert should be sub-excavated and replaced with well compacted Granular "A" which should be placed in 150 mm thick layers and compacted to at least 95% Standard Proctor Maximum Dry Density (SPMDD). The support of pipes in these areas can also be achieved with non-shrinkable fill if poor soil is encountered at the subgrade level and fully removed.

The bedding requirements for the services should be in accordance with Ontario Provincial Standard Drawings OPSD - 802 for flexible and rigid pipes. The bedding shall be a Class "B" and consist of at least 150 mm thick Granular "A" compacted to at least 95% SPMDD. Granular "A" should be used to backfill around the pipe to at least 150 mm above the top of the pipe.

Particular attention should be given to ensure material placed beneath the haunches of the pipe is adequately compacted. Recycled asphalt will not be allowed to be used in Granular "A" bedding material.

6.8.2 Trench Backfill

Excavated inorganic materials are considered suitable for reuse as trench backfill. If necessary, potential mixing of drier and wetter excavated soils in proper ratios can be done to produce a suitable mixture near the material's optimum moisture content in order to achieve the required compaction specification. Conversely, judicious addition of water may be required if the soils are significantly drier than their optimum moisture content in order to facilitate suitable compaction.

The backfill should be placed in thin layers, 300 mm thick or less dependant on the demonstrated success of compaction based on in-situ density test results. Other types of materials such as organic soils, overly wet soils, and frozen materials (if work is carried out in the winter months) should not be used for backfilling. All backfill should be compacted to at least 95% SPMDD.

Backfilling operations should follow closely after excavation so that only a minimal length of trench slope is exposed at any one time so as to minimize potential problems. This will potentially minimize over-wetting of the subgrade material. Particular attention should be given to make sure frozen material is not used as backfill should construction extend into the winter season.



Frequent inspections by experienced geotechnical personnel should be carried out to examine and approve backfill material, to carefully inspect placement, and to verify that the specified degree of compaction has been obtained by in situ density testing.

6.9 Access Driveway and Paved Parking Areas

Based on the results of the field work, the predominant subgrade materials at the site will consist fill overlying highly compressible organic soils or engineered subgrade fill.

The in-situ soil comprising highly compressible organic material (peat and organic silt) encountered on site is not considered suitable for conventional pavement structure support without remedial action or placement of a geosynthetic geogrid material. Two options for pavement support are recommended as follows:

- Option 1 Removal of the highly compressible organic soils and replacement with approved inorganic subgrade fill, constructed per Section 6.3 Engineered Fill Construction. Delay paving until all construction work is completed.
- Option 2 Utilizing a mechanically stabilized pavement structure incorporating geogrid. However, it should be noted that although this method will provide subgrade stabilization, above typically acceptable settlements may still occur due to decomposition and long-term secondary compression of the organic soils.

The following flexible pavement structures are recommended based on the results of grain size distribution, assumed CBR values, groundwater conditions, frost susceptibility of subgrade soils and traffic volume.

	Component Thickness (mm)	
Pavement Component	Option 1 Removal and Replacement	Option 2 Mechanically Stabilized
HL3 Surface Asphaltic Concrete	40	40
HL4 Binder Asphaltic Concrete	50	50
Granular "A" Base Course	150	150
Granular "B" Sub-Base Course	300	750
Approved Inorganic Subgrade Fill	±1.0 – 1.2 m	N/A
Install Tensar NX850-FG Geogrid With 0.9 m Overlap	N/A	✓



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 or bulk fill materials to raise site grades, 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.

Cognizant of the very loose to loose fill and native soils encountered in the boreholes, extensive proof-rolling to densify the subgrade soils will be required. If the subgrade is wet or unstable after proof-rolling, placement of a geogrid material, or sub-excavation and replacement with approved inorganic fill or additional granular sub-base material may be required.

Bulk fill placed to raise site grades should comprise 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 than 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" (OPSS Granular "B" Type II) materials should be produced in accordance with the current OPSS specifications and placed and uniformly compacted to at least 100% SPMDD. The asphaltic concrete should be placed and compacted in accordance with OPSS Form 310 and to at least 92% of the Marshall Density (MRD). Frequent in-situ density testing by this office should be carried out to verify that the specified degrees of compaction are being achieved and maintained.

It should be noted that even well-compacted trench backfill could settle for a period of 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 and/or longitudinal sub-drains extended from the catch-basins. Systematic drainage of the granular base materials will promote the longevity of the pavement structures.



6.10 Infiltration Rate of Native Soil Deposits

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 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)
Silty Sand (Enclosure 5)	2×10^{-3}	30
Fine Sand (Enclosure 6 & 7)	4×10^{-3}	50
Sand and Silt	1×10^{-4}	15

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 O.Reg. 406/19, MECP document entitled "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. To support off-site removal of excess soil, the following is required:

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

CVD has recently completed a Phase II ESA at the site. The report contains additional soil quality and environmental testing results.

CVD 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.



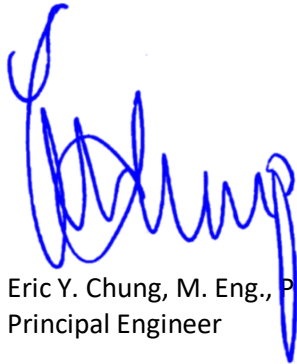
8.0 CLOSURE

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.



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

Borehole Logs from Phase II ESA





LEGEND

Approximate Site Boundary



APEC-1: Oil/Water Separator



APEC-2: Fill Material



APEC-3: Historical Automotive Repair



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BOREHOLE LOCATION PLAN

430 SNYDER'S ROAD EAST

BADEN, ONTARIO

Date: July 2023

Scale: NTS

File No.: 1218

Figure: 2

FILE No: 1218**BOREHOLE No. BH1**Client: **Alder Concrete Group Ltd.**Project: **Phase II ESA**Location: **430 Snyder's Road East, Baden****EQUIPMENT DATA**Machine: **Dietrich D50T**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Jun 30 - 23 TO Jun 30 - 23**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				W _p W W _L ↔ ○ ↔					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30					
Ground Elevation: 356.31 m																
356.11 0.20	50 mm of ASPHALT 150 mm of GRANULAR BASE														flushmount casing set in concrete	
	SANDY SILT FILL trace gravel, trace clay dark brown, moist	0.5		1	SS	13										0.5
1.0			2	SS	4										1.0	
354.79 1.52		ORGANIC SILT trace sand, trace shells black	1.5													
354.48 1.83	SILTY SAND brown, wet	2.0		3	SS	2									2.0	
354.18 2.13	SAND trace silt, trace gravel brown, saturated	2.5		4	SS	7										2.5
		3.0													3.0	
		3.5		5	SS	11										
		4.0													4.0	
351.74 4.57	END OF BOREHOLE	4.5														4.5
															4.5	
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FILE No: 1218**BOREHOLE No. BH2**Client: **Alder Concrete Group Ltd.**Project: **Phase II ESA**Location: **430 Snyder's Road East, Baden****EQUIPMENT DATA**Machine: **Dietrich D50T**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Jun 30 - 23 TO Jun 30 - 23**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				W _p W W _L ↔ ○ ↔					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30					
Ground Elevation: 356.75 m																
356.52 0.23	75 mm of ASPHALT 150 mm of GRANULAR BASE														flushmount casing set in concrete	
	SAND AND GRAVEL FILL trace silt brown, moist	0.5		1	SS	5	●									
356.15 0.60	SILTY SAND brown, moist															
		1.0		2	SS	7	●								bentonite seal/50 mm I.D. PVC riser	
		1.5														
		2.0		3	SS	12	●								3.0 m long, 50 mm I.D. PVC screen with sandpack	
		2.5														
	----- saturated	3.0														
		3.5		4	SS	16	●									
		4.0														
		4.5		5	SS	18	●									
352.18 4.57	END OF BOREHOLE														water level in monitoring well at a depth of 3.04 m on July 4, 2023	
															Soil samples field screened for head space VOC concentrations using MiniRAE 3000 PID. Soil vapour readings were not registered above 0.0 ppm unless otherwise noted.	
															monitoring well installed in BH2 at 4.57 m	

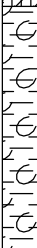
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FILE No: 1218**BOREHOLE No. BH3**Client: **Alder Concrete Group Ltd.**Project: **Phase II ESA**Location: **430 Snyder's Road East, Baden****EQUIPMENT DATA**Machine: **Dietrich D50T**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Jun 30 - 23 TO Jun 30 - 23**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □				W _p W W _L					
							PENETRATION RESISTANCE				↔ ○ ↔					
							50	100	150	200	20	40				60
	Ground Elevation: 356.61 m															
356.39 0.23	75 mm of ASPHALT 150 mm of GRANULAR BASE														flushmount casing set in concrete	
	SILT FILL trace sand, trace gravel, trace clay dark brown, moist	0.5		1	SS	8	●									
		1.0		2	SS	3	●								bentonite seal/50 mm I.D. PVC riser	
		1.5														
354.93 1.68	ORGANIC SILT trace sand, trace shells black			3	SS	3	●								3.0 m long, 50 mm I.D. PVC screen with sandpack	
354.63 1.98	SILTY SAND brown, saturated	2.0														
		2.5		4	SS	15	●									
		3.0													water level in monitoring well at a depth of 2.91 m on July 4, 2023	
		3.5														
		4.0													Soil samples field screened for head space VOC concentrations using MiniRAE 3000 PID. Soil vapour readings were not registered above 0.0 ppm unless otherwise noted.	
		4.5														
352.04 4.57	END OF BOREHOLE														monitoring well installed in BH3 at 4.57 m	

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FILE No: 1218**BOREHOLE No. BH4**Client: **Alder Concrete Group Ltd.**Project: **Phase II ESA**Location: **430 Snyder's Road East, Baden****EQUIPMENT DATA**Machine: **Dietrich D50T**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Jun 30 - 23 TO Jun 30 - 23**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				W _p W W _L ↔ — ○ — ↔ 10 20 30					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80									
	Ground Elevation: 355.68 m															
355.30 0.38	75 mm of ASPHALT 300 mm of GRANULAR BASE			1	SS	16										
355.07 0.61	CLAYEY SILT TILL grey, moist	0.5														
	ORGANIC SILT trace sand, trace shells black	1.0		2	SS	3										bentonite seal
354.16 1.52	END OF BOREHOLE	1.5														Soil samples field screened for head space VOC concentrations using MiniRAE 3000 PID. Soil vapour readings were not registered above 0.0 ppm unless otherwise noted.
		2.0														
		2.5														
		3.0														
		3.5														
		4.0														
		4.5														

bentonite seal

Soil samples field screened for head space VOC concentrations using MiniRAE 3000 PID. Soil vapour readings were not registered above 0.0 ppm unless otherwise noted.

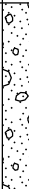
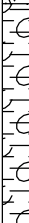
PROJECT MANAGER: **D.W.****CHUNG & VANDER DOELEN
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FILE No: 1218**BOREHOLE No. BH5**Client: **Alder Concrete Group Ltd.**Project: **Phase II ESA**Location: **430 Snyder's Road East, Baden****EQUIPMENT DATA**Machine: **Dietrich D50T**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Jun 30 - 23 TO Jun 30 - 23**

SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)				WELL DATA	DEPTH (m)	REMARKS				
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80							W _p W W _L ↔ — ○ — ↔			
354.97 0.03	Ground Elevation: 354.97 m																				
	50 mm of TOPSOIL																				
	SILTY SAND trace gravel, trace clay brown, moist	0.5		1	SS	17															
354.27 0.70																					
	ORGANIC SILT trace sand, trace shells black	1.0		2	SS	2										bentonite seal					
353.45 1.52																					
	END OF BOREHOLE	1.5														Soil samples field screened for head space VOC concentrations using MiniRAE 3000 PID. Soil vapour readings were not registered above 0.0 ppm unless otherwise noted.					
		2.0																			
		2.5																			
		3.0																			
		3.5																			
		4.0																			
		4.5																			

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FILE No: 1218**BOREHOLE No. BH6**Client: **Alder Concrete Group Ltd.**Project: **Phase II ESA**Location: **430 Snyder's Road East, Baden****EQUIPMENT DATA**Machine: **Dietrich D50T**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Jun 30 - 23 TO Jun 30 - 23**

SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)				WELL DATA	DEPTH (m)	REMARKS
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80						
							W _p	W	W _L								
Ground Elevation: 355.10 m																	
354.40 0.70	SAND AND GRAVEL trace silt brown, moist	0.5		1	SS	20											
	ORGANIC SILT trace sand, trace shells black	1.0		2	SS	2											
353.58 1.52	END OF BOREHOLE	1.5															
		2.0															Soil samples field screened for head space VOC concentrations using MiniRAE 3000 PID. Soil vapour readings were not registered above 0.0 ppm unless otherwise noted.
		2.5															
		3.0															
		3.5															
		4.0															
		4.5															

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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
AS	Auger Sample	BS	Bulk Sample	VANE	Peak & Remolded shear
		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



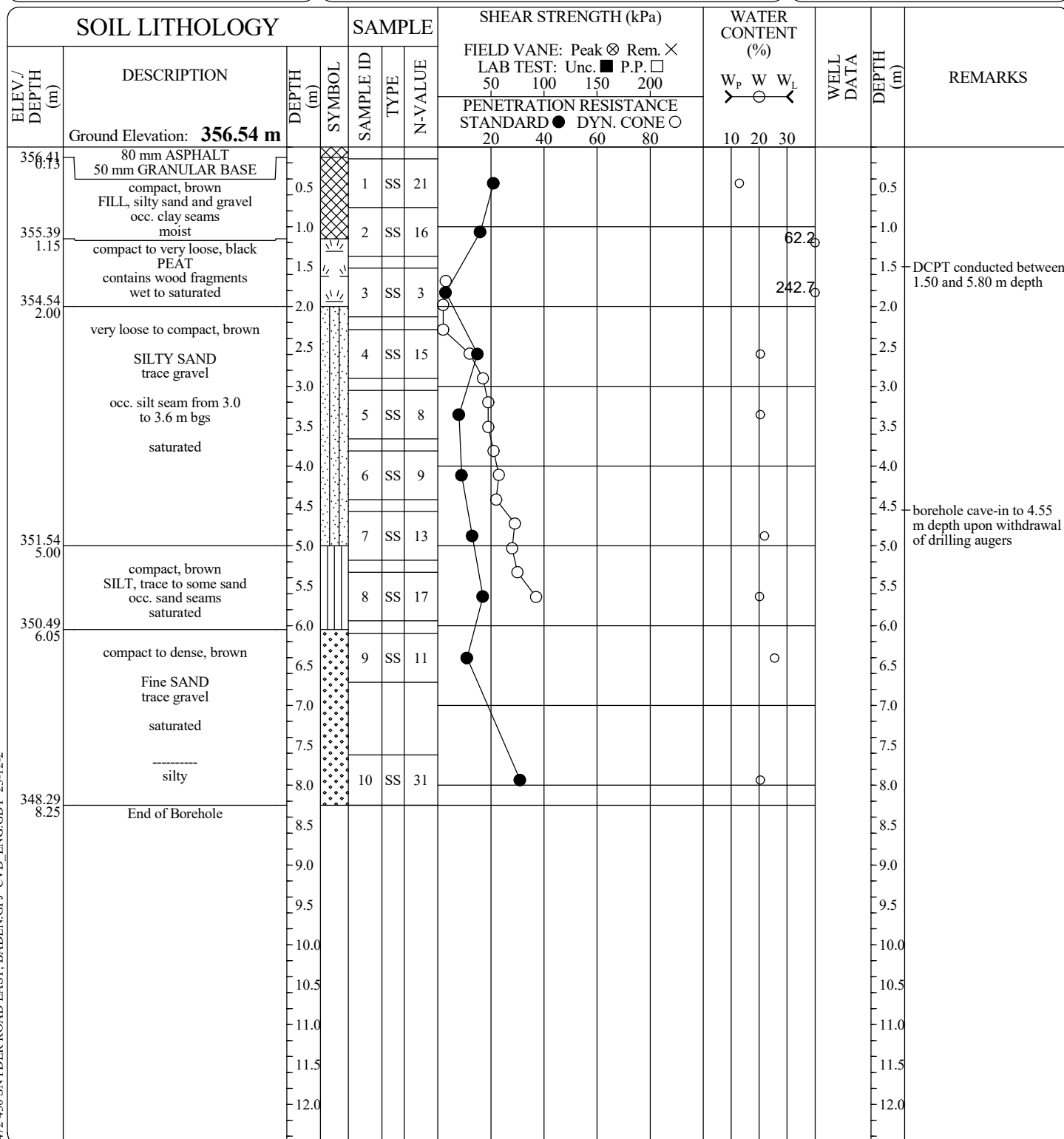
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ENGINEERING LTD.

Enclosure A

FILE No: 1472**BOREHOLE No. 101**Client: **Alder Concrete Group Ltd.**Project: **Proposed 4-Storey Office Building**Location: **430 Snyder's Road East, Baden, Ontario****EQUIPMENT DATA**Machine: **CME 75 Truck**Method: **Hollow Stem Auger**Size: **83 mm I.D.**Date: **Oct 12 - 23 TO Oct 12 - 23**

SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □				PENETRATION RESISTANCE					
							50	100	150	200	STANDARD ● DYN. CONE ○					
							20	40	60	80	10	20	30			
Ground Elevation: 356.34 m																
356.14 0.20	50 mm ASPHALT 150 mm GRANULAR BASE															
	loose, dark brown to grey FILL, sandy clayey silt trace to some gravel occ. sand lenses, moist	0.5		1	SS	8										
		1.0		2	SS	5										
354.84 1.50		1.5														
	very loose, black PEAT contains wood fragments wet to saturated	2.0		3	SS	3							89.1			
		2.5														
353.74 2.60		2.5		4	SS	3										
	very loose to compact brown	3.0														
	SANDY SILT to SAND AND SILT	3.5		5	SS	12										
	saturated	4.0		6	SS	11										
		4.5														
		5.0		7	SS	11										
		5.5														
		6.0		8	SS	15										
350.34 6.00		6.5		9	SS	11										
	compact, brown Fine to Medium SAND trace silt saturated	7.0														
349.19 7.15		7.5														
	compact, brown	8.0		10	SS	16										
	SILT some sand	8.5														
	saturated	9.0														
347.69 8.65		9.5		11	SS	14										
	compact, brown Fine to Medium SAND trace silt saturated	10.0														
346.59 9.75	End of Borehole	10.5														
		11.0														
		11.5														
		12.0														

water level at 2.15 m
depth upon withdrawal of
drilling augersborehole cave-in to 3.35
m depth upon withdrawal
of drilling augersDCPT conducted between
9.45 and 11.90 m depthPROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: 1472**BOREHOLE No. 102**Client: **Alder Concrete Group Ltd.**Project: **Proposed 4-Storey Office Building**Location: **430 Snyder's Road East, Baden, Ontario****EQUIPMENT DATA**Machine: **CME 75 Truck**Method: **Hollow Stem Auger**Size: **83 mm I.D.**Date: **Oct 12 - 23 TO Oct 12 - 23**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: 1472**BOREHOLE No. 103**Client: **Alder Concrete Group Ltd.**Project: **Proposed 4-Storey Office Building**Location: **430 Snyder's Road East, Baden, Ontario****EQUIPMENT DATA**Machine: **CME 75 Truck**Method: **Hollow Stem Auger**Size: **83 mm I.D.**Date: **Oct 12 - 23 TO Oct 12 - 23**

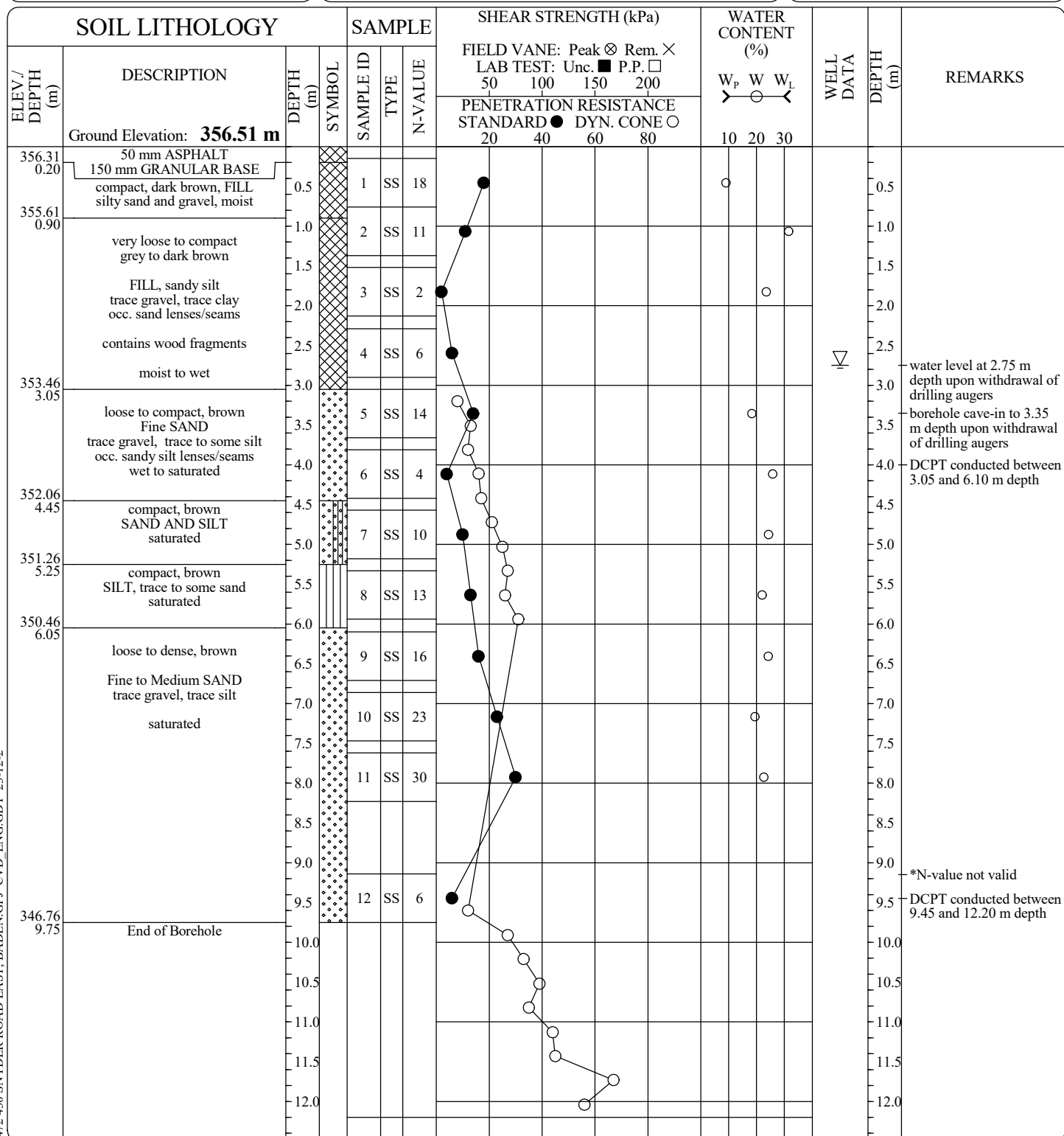
SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				W _p W W _L ↗ ○ ↖					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30					
356.63 0.20	50 mm ASPHALT 150 mm GRANULAR BASE															
355.33 1.50	loose to very loose, dark brown FILL, gravelly silty sand contains topsoil moist	0.5		1	SS	7	●						○			
		1.0		2	SS	3	●						○			
	loose to compact, brown Fine SAND trace to some silt moist to saturated	1.5														
		2.0		3	SS	9	●						○			
		2.5														
		3.0		4	SS	15	●							○		
		3.5														
		4.0		5	SS	15	●								○	
	Fine to Medium SAND trace gravel, trace silt	4.5														
		5.0		6	SS	11	●								○	
5.5																
6.0			7	SS	18	●								○		
351.33 5.50	compact, brown SILT trace to some sand occ. sand seams saturated	6.5		8	SS	22	●							○		
7.0																
350.33 6.50	compact, brown Fine SAND some silt occ. silty sand seams saturated	7.5		9	SS	25	●							○		
8.0															○	
348.58 8.25	End of Borehole	8.5														
		9.0														
		9.5														
		10.0														
		10.5														
		11.0														
		11.5														
		12.0														

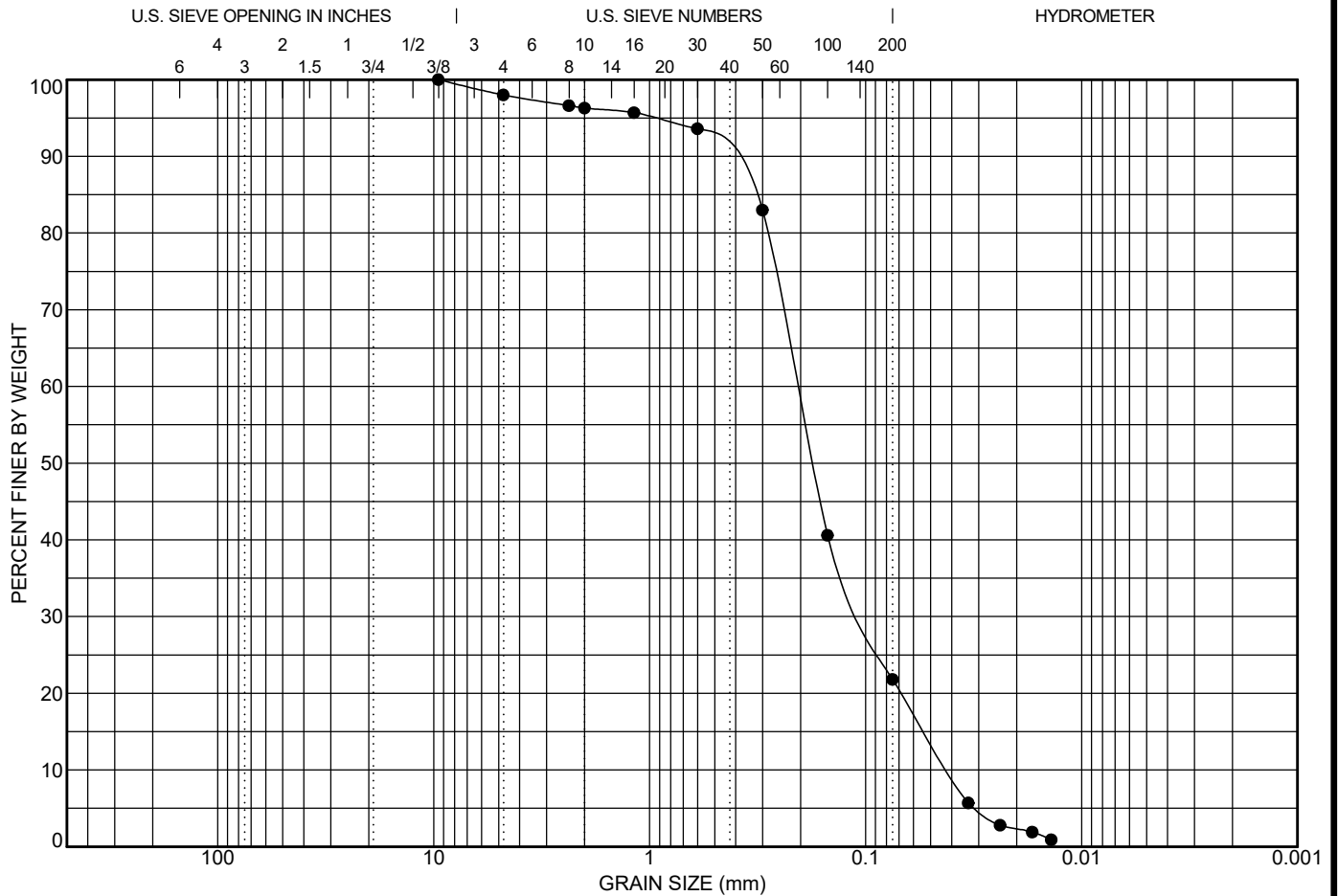
water level at 2.15 m depth upon withdrawal of drilling augers

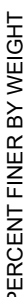
borehole cave-in to 4.55 m depth upon withdrawal of drilling augers

PROJECT MANAGER: **EYC**
**CHUNG & VANDER DOELEN
ENGINEERING LTD.**

311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

FILE No: 1472**BOREHOLE No. 104**Client: **Alder Concrete Group Ltd.**Project: **Proposed 4-Storey Office Building**Location: **430 Snyder's Road East, Baden, Ontario****EQUIPMENT DATA**Machine: **CME 75 Truck**Method: **Hollow Stem Auger**Size: **83 mm I.D.**Date: **Oct 12 - 23 TO Oct 12 - 23**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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COBBLES

LLDate:

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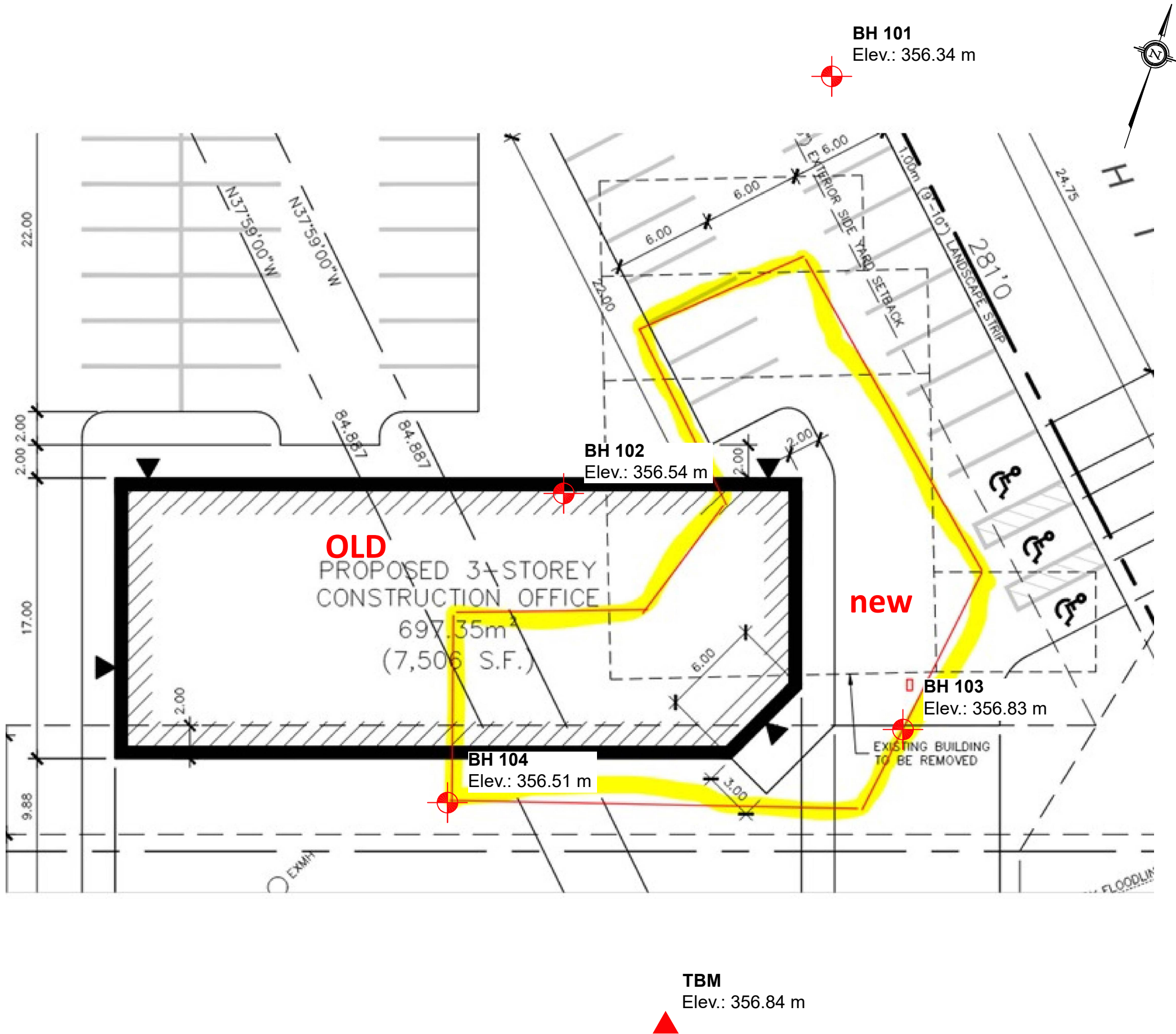
GRAIN SIZE DISTRIBUTION

Project: Proposed 4-Storey Office Building

Location: 430 Snyder's Road East, Baden, Ontario

File No.: 1472

Enclosure No.: 6



KEY PLAN SOURCE: Google Earth

LEGEND

 **TBM: Top of west catch basin manhole in road edge of westbound lane of Snyder's Road East.**
Elev.: 356.84 m (Geodetic)

 **Borehole Location**

DWG Ref.: Provided by Alder Concrete Group.
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).

BOREHOLE LOCATION PLAN

Proposed 4-Storey Office Building

430 Snyder's Road East
Baden, Ontario

 **CHUNG & VANDER DOELEN**
ENGINEERING LTD.

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

Drawn By: BC	Date: December, 2023	File No.: 1472
Checked By: EYC	Scale: N.T.S.	Drawing No.: 1