CHUNG & VANDER DOELEN
ENGINEERING LTD.

GEOTECHNICAL INVESTIGATION
PROPOSED POLOCORP FERGUS SUBDIVISION – PHASE 1

968 St. David Street North
Fergus, Ontario

SUBMITTED TO:
PoloCorp Inc.
379 Queen Street South
Kitchener, Ontario
N2G 1W6

ATTENTION:
Mr. Mike Puopolo

FILE NO: 1495 / February 6, 2025

CHUNG & VANDER DOELEN
ENGINEERING LTD.

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February 6, 2025
File No.: 1495

PoloCorp Inc.
379 Queen Street South
Kitchener, Ontario
N2G 1W6

Attention: Mr. Mike Puopolo

RE: Geotechnical Investigation
Proposed Polocorp Fergus Subdivision – Phase 1
968 St. David Street North, Fergus, Ontario

We take pleasure in enclosing one (1) copy of our Geotechnical Investigation Report prepared for the above-referenced site.

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. has been retained by PoloCorp Inc. to conduct a geotechnical investigation for the proposed Phase 1 development of the Polocorp Fergus Subdivision to be located at 968 St. David Street North in Fergus, Ontario. It is planned that the development will eventually expand to potentially include the fields directly north of the site as part of the Phase 2 development; however, this report will only consider the portion of the geotechnical investigation completed on the Phase 1 lands.

It is understood that the 19.39± ha site currently being used for agricultural purposes will be developed into a residential subdivision comprised of a combination of residential single units, stacked townhouses, mixed-use units, roadways, a stormwater management facility, and a park. The proposed residential subdivision will be fully serviced with municipal water and sanitary sewer services.

According to the Draft Plan of Subdivision (Polocorp Inc., December 10, 2024), as provided in Appendix B, Phase 1 of the Polocorp Fergus Subdivision will include the construction of a 2.41± ha sized stormwater management (SWM) facility, designated as Block 23, within the southwest corner of the property and a roadway network throughout the subdivision connected to St. David Street North. Other characteristics of the future development are to include a 0.81± ha sized park (Block 25) and a 3.34± ha sized environmental feature and buffer. The existing residential dwelling located at 968 St. David Street North will be incorporated into the proposed residential subdivision (Block 22).

As of the writing of this report, no site grading plan has been provided. CVD will be pleased to review the final design and site grading plan once they are made available.

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

- Site grading operations and engineered fill construction;
- Excavation conditions;
- Groundwater control during construction;
- Foundation bearing pressures;
- Foundation soil classification for seismic design per OBC 2024;
- Site servicing;
- Pavement design and construction; and
- Estimates of infiltration rates of encountered soil deposits.

This geotechnical report should be read in conjunction with CVD's Phase 1 Preliminary Hydrogeological Investigation Report (January 2025).

2.0 FIELD AND LABORATORY WORK

Five (5) boreholes were advanced to depths of between 5.20 and 8.25 m below existing grade, and monitoring wells were installed at each borehole location (labelled Boreholes 4 to 8), between January 15 to 17, 2024. A supplemental investigation was completed, between September 9 and 12, 2024, during which eight (8) additional boreholes/monitoring wells (labelled Boreholes 106 to 113) were drilled and installed to a depth of 6.55 m below grade. The borehole/monitoring well locations are illustrated on the Borehole Location Plan, Drawing No. 1, which is included in Appendix B.

The field investigation program was conducted under the supervision of a member of our engineering team, who logged the subsurface conditions encountered at the boreholes, effected the subsurface sampling and testing, 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. Underground utilities were located prior to commencing the field work program.

The investigation was completed using a track-mounted CME-55 drill rig, equipped with standard 83 mm inner diameter hollow stem augers (HSA) operated by Davis Drilling Ltd. of Milton, Ontario. 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. The undrained shear strength of the cohesive soil deposits was determined on the slightly disturbed SPT samples using a field pocket penetrometer. The compactness condition or consistency of the soil strata has been inferred from the test results.

Soil samples collected during the borehole investigation program were examined in the field and subsequently brought to CVD’s laboratory for tactile examination to confirm field classification. Moisture content determination on all retrieved soil samples was performed.

The borehole location, temporary benchmark, and associated ground surface elevations 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 17N Projection, NAD83(CSRS)v7-2010 datum and Canada Geoid Model HT2_2010v70 (CGVD28).

The referenced temporary benchmark (TBM) is described below:

TBM:	Top of fire hydrant nut, south of northern driveway entrance to 968 St. David Street North, as shown on Drawing No. 1
Elevation:	425.17 m (Geodetic)

3.0 EXISTING SITE CONDITIONS

The property is bound by St. David Street North to the west and predominantly by agricultural lands to the north, east, and south of the subject lands. Occasional commercial properties exist southwest of the site.

The majority of the site is comprised of a cultivated agricultural field. A residential dwelling and its related structures front St. David Street North at the west side of the proposed development, and a small wetland contained mid to large sized trees exists in the southeast corner of the site. An existing residential subdivision is situated directly southeast of the southeastern corner of the site.

Generally, there is gentle decrease in grade across the site in a southeasterly direction in which ground elevations range from 427± to 420± m. No major undulations or notable topographical features exist. Ground surface elevations at the borehole locations ranged between 421.01 m to 426.95 m.

4.0 SUBSURFACE CONDITIONS

The detailed subsurface conditions encountered at the thirteen (13) boreholes are presented on the Borehole Log Sheets, Enclosures 4 to 8 & 14 to 21. The following notes are intended to amplify and comment on the subsurface data obtained. The borehole and monitoring well locations are indicated on the Borehole Location Plan, Drawing No. 1, included in Appendix B.

Enclosure A provides explanations of the various soil abbreviations and terms used on the borehole log sheets. 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.

4.1 Topsoil and Peat

Topsoil was encountered at the ground surface of twelve (12) boreholes with measured thicknesses between 180 and 300 mm. The thickness of topsoil could vary between and beyond the borehole locations.

An 800± mm thick peat deposit was encountered at the ground surface of Borehole 107.

4.2 Fine Granular Deposits

The topsoil was typically underlain by a series of fine granular deposits varying between silt, sandy silt, silty sand, and fine to medium sand, but predominantly composed of fine to medium sand. These deposits generally decrease in thickness from north to south across the property with the deposits extending to depths between at least 8.25± m (below elevation 417.36 m at Borehole 5) below ground surface (mbgs) to 0.75 mbgs (elevation 421.27 m at Borehole 113). Trace amounts of gravel, occasional gravelly seams (Boreholes 106 and 109), occasional cobbles, and occasional clayey silt seams/layers (Boreholes 4 and 111) were encountered within the deposit. Boreholes 4, 5, 106, and 108 were terminated within the fine granular deposits.

The results of five (5) grain size distribution analyses from the fine to medium sand in Boreholes 106, 108, and 111 (Enclosures 24, 25, and 27), the sand and silt in Borehole 109 (Enclosure 26), and the silt from Borehole 28 (Enclosure 28) are shown graphically on Enclosures 24 to 28.

The SPT "N"-values measured within the fine granular deposits ranged from 3 to 35 blows per 300 mm of penetration, indicating a variable very loose to dense relative density. Natural moisture contents were measured between 2 and 27%, indicating damp to saturated moisture conditions.

4.3 Clayey Silt Till and Sand and Silt Till

The aforementioned fine granular deposits were underlain by a till deposit varying from a clayey sandy silt till (Boreholes 6 to 8, 107, 109, and 111 to 113) to a sand and silt till (Borehole 110, 112, and 113). Trace to some gravel and occasional silt lenses/seams were encountered within the deposit. Boreholes 6 to 8 were terminated within the till deposit at a depth of 5.20 mbgs, and Boreholes 107 and 109 to 113 were terminated within the till deposit at a depth of 6.55 mbgs.

The SPT "N"-values measured within the till deposit ranged from 8 to 69 blows per 300 mm of penetration with the sand and silt till generally having a relative density varying from compact to very dense.

The undrained shear strength obtained on the retrieved cohesive clayey silt till samples was measured from 25 to greater than 250 kPa. Based on the above test results and the tactile examination, the clayey silt till is considered to have a stiff to hard consistency. Natural moisture contents were measured between 7 and 25%, and the plasticity of the clayey silt till layers was generally observed to be drier than the plastic limit.

4.4 Groundwater

Throughout the field investigation, groundwater conditions were monitored during advancement of boreholes, and water level readings were measured on multiple occasions following the completion of fieldwork in all of the accessible thirteen (13) installed monitoring wells

Groundwater levels were measured at depths ranging between 2.27 (Borehole 5) and 0.25 mbgs (Borehole 8), corresponding to elevations ranging between 423.62 and 420.28 m. The groundwater measurements for each monitoring well collected thus far for the investigation (February to October 2024) are summarized in Table 1 (Appendix D). It is noted that the observed groundwater table will fluctuate seasonally, such as during the spring following the period of peak snow melt, and in response to major weather events. It is possible that peak water levels could be up to 0.5 m higher than those measured in this investigation.

Figure 5, also included in Appendix D, presents an interpretation of the water table configuration and shallow groundwater flow directions across the property using the groundwater elevation measurements gathered on September 18, 2024. The water table mimics the topography of the site with shallow groundwater flowing southerly towards the southeastern portion of the property in the direction of the wetland. Additionally, groundwater appears to also flow into the existing drainage feature located within the southwestern corner of the site.

Well response tests (slug/bail tests) were completed at three (3) of the monitoring well locations (Boreholes 5 to 7) on March 11, 2024, to provide a more accurate estimate of the hydraulic conductivity (K) (or permeability) of the saturated aquifer soil strata. These tests resulted in hydraulic conductivity values ranging from 3×10^{-5} to 9×10^{-5} m/s. These results area graphically presented in Appendix C, and a summary of the data is also included in Table 1 (Appendix D).

These values are consistent with the hydraulic conductivity ranges typically associated with similar soils (Freeze & Cherry, 1979). Hydraulic conductivities calculated using the Hazen Formula from the soil grain size analyses (Enclosures 24 to 28) were similar in magnitude to those of the single well response tests.

5.0 DISCUSSION AND RECOMMENDATIONS

It is understood that the 19.39± ha site currently being used for agricultural purposes will be developed into a residential subdivision comprised of a combination of residential single units, stacked townhouses, mixed-use units, roadways, a stormwater management facility, and a park. The proposed residential subdivision will be fully serviced with municipal water and sanitary sewer services.

According to the Draft Plan of Subdivision (Polocorp Inc., December 10, 2024), as provided in Appendix B, Phase 1 of the Polocorp Fergus Subdivision will include the construction of a 2.41± ha sized stormwater management (SWM) facility, designated as Block 23, within the southwest corner of the property and a roadway network throughout the subdivision connected to St. David Street North. Other characteristics of the future development are to include a 0.81± ha sized park (Block 25) and a 3.34± ha sized environmental feature and buffer. The existing residential dwelling located at 968 St. David Street North will be incorporated into the proposed residential subdivision (Block 22).

In general, the surficial topsoil was underlain by a series of loose to compact fine granular deposits, predominantly comprised of fine to medium sand. These deposits generally decrease in thickness from north to south across the property with the deposits extending to depths between at least 8.25± mbgs (below elevation 417.36 m at Borehole 5) to 0.75 mbgs (elevation 421.27 m at Borehole 113). These fine granular deposits were underlain by stiff to hard clayey silt till and/or compact to dense sand and silt till deposits. Occasional cobbles were encountered within the deposits. Peat deposits can be found in an around the existing wetland.

More extensive loose soil conditions were occasionally encountered in the near surface soils of some of the boreholes (e.g. Boreholes 4 and 5) which are not suitable to support future house foundations in their current condition. Removal of such loose zones and replacement with engineered fill (where necessary) is considered to be a suitable and practical remedy to repair such areas.

Shallow groundwater conditions were encountered at all thirteen (13) borehole locations with the water table measured across all site visits at depths between 2.27 (Borehole 5) and 0.25 mbgs (Borehole 8), corresponding to elevations ranging between 423.62 and 420.28 m. Shallow groundwater flows southerly towards the southeastern portion of the property in the direction of the wetland. Additionally, groundwater appears to also flow into the existing drainage feature located within the southwestern corner of the site. Based on both the single well response tests and grain size analyses, the hydraulic conductivity values for the fine to medium sand deposit were calculated between 3×10^{-5} and 9×10^{-5} m/s.

It is recommended that a permanent groundwater management system (GWMS) be implemented for the development of the subdivision lands to control future groundwater levels and prevent future wet basement problems. Alternatively, the site can be raised to establish basement floor levels at least 0.6 m above high groundwater levels which will be determined through on-going monitoring as part of the CVD hydrogeological study.

Furthermore, it is recommended that any existing below-grade drains, drainage tiles or drainage tile networks be fully understood/investigated to understand how their presence (or removal) would impact the shallow groundwater system and the proposed development.

As of the writing of this report, no site grading plan has been provided. CVD will be pleased to review the final design and site grading plan once they are made available.

5.1 Site Grading and Engineered Fill Construction

As of the writing of this report, no site grading plans have been provided; however, it is anticipated that partial regrading of the site will be conducted using "cut-fill" procedures, and that more extensive "fill" operations will occur. It is recommended to construct engineered fill in areas to be raised in order to suitably support the proposed residential building structures, future roadways, and infrastructure servicing.

Inorganic on-site native soil deposits from "cut" areas may potentially be reused to construct engineered fill capable of supporting future house foundations, roadways, and municipal infrastructure servicing. The natural moisture content of the "cut" soils to be used as engineered fill should be within 3% below their optimum moisture contents in order to achieve the specified degree of compaction.

Topsoil was encountered at the ground surface of twelve (12) of the borehole locations with measured thicknesses ranging between 180± and 300± mm. Additionally, an 800± mm peat deposit was encountered at the ground surface of Borehole 107. It should be noted that the thickness of the organic soil layer could vary drastically across the site from those reported at the borehole locations. It is likely that the site has been regraded to achieve the present condition for farming, and therefore, filling of local depressions may result in fill pockets not detected by the boreholes.

Topsoil stripping operations should be conducted when the ground is not wet and will support large scale construction equipment. Over-stripping can result when the ground conditions are wet and unstable.

Fill and/or loose soil conditions were encountered at all borehole locations and extended up to depths of up to 3.0± m below existing grade. The following table provides the depth and elevation at each borehole location where non-suitable soil conditions were encountered:

Borehole No.	Topsoil Thickness (mm)	Existing Ground Elevation (m)	Thickness of Non-Suitable Soils (m)	Elevation of Suitable Soils (m)
4	300	426.9±	0.8±	426.1±
5	180	425.6±	3.0±	422.6±
6	250	424.5±	1.0±	423.5±
7	230	421.8±	1.0±	420.8±
8	300	421.0±	0.5±	420.5±
106	200	424.8±	0.5±	424.3±

Borehole No.	Topsoil Thickness (mm)	Existing Ground Elevation (m)	Thickness of Non-Suitable Soils (m)	Elevation of Suitable Soils (m)
107	800 - Peat	422.9±	1.0±	421.9±
108	250	424.7±	0.8±	423.9±
109	200	422.7±	0.6±	422.1±
110	300	422.9±	0.8±	422.1±
111	300	421.2±	0.4±	420.8±
112	200	422.3±	0.4±	421.9±
113	250	422.0±	0.9±	421.1±

It should be noted that the elevations of suitable soils shown in the above table may differ from the founding elevations provided for specific bearing capacities in section 5.3. The elevations provided in the above table are located below loose and/or organic/deleterious soils but may not necessarily be located at an elevation sufficient for higher bearing capacities

Approved on-site sand and imported coarse sand and gravel are recommended to be used to construct the engineered fill beneath the footings and floor slabs under controlled and supervised conditions. Reuse of siltier soils (e.g., sandy silt or silt) and cohesive soils should be limited to beneath pavement and landscaped areas.

Any shortfall of fill material required for engineered fill operations may be made with similarly graded imported soils. It is recommended that any proposed borrow source materials be tested prior to importing in order to ensure that the environmental quality of the imported fill meets all environmental approval criteria and to ensure that the natural moisture content of the fill is suitable for compaction. Should similarly graded soils not be able to meet the requirements for use as engineered fill, imported Granular B may be considered for such purposes.

Due to the shallow depth of the water table across the site (0.2± to 2.0± mbgs during the spring), it is recommended that engineered fill construction be conducted during the summer and early fall months when drier warmer weather conditions typically exist as the onsite soils are sensitive to moisture and will become difficult to handle and compact to the specified degree of compaction when wet.

The on-site finer grained and cohesive deposits are considered to be frost-susceptible. Constructing engineered fill, backfilling footings, foundation walls and service trenches using finer-grained soils during the winter months is not advisable, unless suitable weather conditions prevail, the soils are at suitable moisture content, and strict procedures are followed and monitored on a full-time basis by the geotechnical engineer.

The on-site soils are generally susceptible to softening and deformation when exposed to excessive moisture and construction traffic. As a result, it is imperative that the grading/filling operations are

planned and maintained to direct surface water run-off to low points and then be positively drained by suitable means. During periods of wet weather, construction traffic should be directed along the designated construction routes so as not to disturb and rut the exposed subgrade soil. Temporary construction roads consisting of clear crushed material (such as crushed stone or recycled concrete) may be required during poor weather conditions such as wet spring or fall.
The following procedures are recommended for the construction of engineered fill to support future building foundations, roadways, and municipal infrastructure servicing:

1. All topsoil, peat, fill materials, deleterious materials and very loose to loose inorganic native soil should be stripped from building envelope and roadway areas. The inorganic native soil may be carefully segregated and salvaged for potential reuse purposes to construct engineered fill;

2. The exposed subgrade surface should be thoroughly recompacted using large heavy compaction equipment (smooth drum for granular based materials and sheepsfoot for cohesive soils) if it can support such equipment and remaining stable. Careful review and guidance by the geotechnical engineer are recommended should the subgrade become unstable. All prepared subgrade areas are to be inspected by qualified geotechnical personnel prior to placement of fill. Any soft spots encountered during the recompaction process should be excavated to the level of competent soil;

3. The required grades can then be achieved by placing approved inorganic on-site soil or imported fill in maximum 200 to 300 mm thick loose lifts which are to be thoroughly compacted to at least 100% Standard Proctor maximum dry density (SPMDD). The moisture content of the fill materials should be within 3% below their optimum moisture contents in order to achieve the specified degree of compaction;

4. The engineered fill used to support the future building, infrastructure servicing and roadway pavements must be placed such that the fill pad extends horizontally outwards at least a distance equal to the depth of fill to be placed;

5. Inorganic onsite soils may be considered as suitable engineered fill material provided the natural moisture content of the soil is within 3% below the optimum moisture content in order to achieve the specified degree of compaction. Overly wet and organic materials may be placed in non-structural areas and beyond stormwater management areas where 90% SPMDD is considered adequate. Overly wet inorganic soil may potentially be mixed with drier soils to produce a suitable moisture content to allow appropriate compaction to occur;

6. Adequate earth cover must be provided to protect engineered fill from freezing if left over the winter months; and

7. 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 degrees of compaction have been achieved.

Vibration could be generated from various construction equipment during construction, such as compactors and rollers which could be harmful to surrounding structures and buildings. 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 frequency of vibrations and the sensitivity of surrounding structures to vibration.

Due to the relatively isolated location of the site, it is unlikely that any critical or susceptible infrastructure will be affected by the site grading operations. However, if deemed necessary, vibration monitoring can be performed. 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 potentially critical areas. This will set criteria and establish the type of equipment to be used for this project. It is also recommended that a pre-construction condition survey be conducted to document the condition of the existing structures within the possible zone of influence.

5.2 Site Servicing

The subdivision will be municipally serviced with watermain and sewers. According to the Centre Wellington Development Manual (June 2024), it is anticipated that municipal servicing will generally lie 1.2± to 2.4± m below finished grades. The sanitary sewer obvert should be located a minimum of 2.4 m below final road grade, the storm sewer obvert should be located 1.2 m below final road grade and adequately compacted, and the top of the watermain pipe should be located 2.0 m below finished grade.

5.2.1 Groundwater Control and Open Cut Excavation

Excavations are expected to be in the order of 1± to 3.5± m deep for foundations and site servicing. The excavations will penetrate topsoil, potentially peat/organics, native loose to compact fine granular deposits, and native stiff to hard clayey silt till and/or compact to very dense sand and silt till. Provided the groundwater is controlled/lowered below the excavation depths, these materials are considered to be Type 3 Soils in accordance with the latest Occupational Health and Safety Act.

Above the groundwater table, uncontrollable groundwater is not expected within the anticipated depths of excavation, and 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. Surface run-off which inadvertently enters the excavation can be controlled by using conventional filtered sump pumping techniques, as and where required.

Even though a site grading plan has not yet been provided, it is expected that groundwater control will be required for at least some of the footing excavations since excavations will be carried out below the groundwater table within the higher conductive fine granular soils (hydraulic conductivity ranging from 3×10^{-5} to 9×10^{-5} m/s), and the fine granular soils will become “quick” and lose their integrity to support loads. The groundwater level must be lowered and controlled to at least 600 mm below the excavation level to facilitate excavation and construction of footings and floor slabs.

Depending on whether the excavation is conducted in an area where the water table is located below the fine granular deposits within the clayey silt till or sand and silt till, it may be possible to control by pumping from filtered sump pits (possibly together with drainage ditches and intercept ditches). It is recommended that CVD be retained to review the design grades and evaluate the need for dewatering. Depending on the depth of sewer and footing excavation below the groundwater table, well-point dewatering could be required to pre-drain the fine granular soil prior to excavation.

In wet to saturated subgrade conditions, it will be necessary to excavate below founding level and pour a 50 to 75 mm thick mud slab of lean concrete to protect the founding soil from disturbance during the installation of reinforcing steel bars and form work.

5.2.2 Pipe Bedding

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 both the 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.

5.2.3 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, 200 to 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, boulders, 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.

Regarding the clayey silt till deposits, it has been our experience that excavated cohesive soils should be broken into smaller pieces (less than 150 mm diameter) before returning into the trench as backfill. This will eliminate "wedging" problems and reduce long term settlement. Particular attention must be made to backfilling the laterals where the trenches are narrow and against the manholes and catch-basins. Thinner lifts and additional compaction must be applied.

Frequent inspection 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.

5.3 Footing Foundations

Conventional strip and spread footing foundations can be used to support the proposed buildings of the proposed residential subdivision; it should be noted that this current geotechnical investigation is insufficient and not intended for detailed building design purposes.

Depending on the final design and size of the proposed medium density blocks (Block 19 and 20) and other larger structures, it will be necessary to conduct a geotechnical investigation at those lots in order to provide a detailed, site and project specific report for the design and construction of the proposed development.

Based on the thirteen (13) widely spaced boreholes, footings cast on native competent stiff to hard clayey silt till, compact to dense sand and silt till, or compact fine granular deposits can be designed using net Geotechnical Reactions at SLS and Factored Geotechnical Resistances at ULS as provided in the following table which summarizes the highest founding level and elevation for the footing at the relevant borehole locations:

Borehole No.	Existing Ground Elevation (m)	Highest Founding Depth (m)	Highest Founding Elevation (m)
SLS = 100 kPa; ULS = 150 kPa			
4	426.94	0.94	426.00±
5	425.61	3.01	422.60±
107	422.93	1.03	421.90±
109	422.66	0.86	421.80±
SLS = 150 kPa; ULS = 250 kPa			
6	424.53	1.03	423.50±
7	421.82	1.02	420.80±

Borehole No.	Existing Ground Elevation (m)	Highest Founding Depth (m)	Highest Founding Elevation (m)
8	421.01	1.11	419.90±
106	424.80	0.90	423.90±
108	424.74	0.84	423.90±
110	422.92	0.82	422.10±
111	421.24	0.64	420.60±
112	422.30	0.50	421.80±
113	422.02	0.92	421.10±

Higher soil bearing capacities may be available for footings founded at elevations lower than those cited above, through a site and project specific geotechnical evaluation.

Footings founded on approved engineered fill can be designed to a net Geotechnical Reaction of 150 kPa at SLS and Factored Geotechnical Resistance of 250 kPa at ULS.

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 topsoil, fill, or other deleterious materials on competent undisturbed soils. Spacing between adjacent footing steps should not be steeper than 10H to 7V.

It should be noted that due to the relatively high groundwater table (elevations 420.20± to 423.60± m), unless engineered fill (see Section 5.1) is used to raise the grade, the majority of the footing excavations are anticipated to contact wet to saturated fine granular soils. To this end, it is recommended that a 50 to 75 mm thick protective concrete slab should be poured and allowed to set on the prepared subgrade to further protect it from disturbance by construction traffic and the elements. Basements should be suitably founded at least 0.6 m above the high groundwater table. A permanent groundwater management system (GWMS) could be utilized to control future groundwater levels and prevent future wet basement problems.

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.

The footing excavations should be inspected by the geotechnical engineer to ensure adequate soil bearing and proper subgrade preparation.

5.4 Lateral Earth Pressure

House basement walls and other soil retaining structures should be designed to resist the lateral earth pressure acting against these walls. The following formula may be used for these calculations. 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
Well-Compacted Granular Backfill	21	0.45
Fine to Medium Sand	20	0.35
Silt	19	0.30
Clayey Silt Till and Sand and Silt Till	20	0.40

It should be noted that the soils encountered during the investigation were variable in composition and are not all are considered to be free-draining materials (i.e., clayey silt till). A drainage core layer should be installed against basement walls in accordance with OBC requirements. The basement walls should be damp-proofed.

A perimeter drainage system is required to ensure hydrostatic pressure does not build up in the backfill against the foundation wall. The perimeter weeping tile system is to be installed at the base of the footing to direct the collected waters to sump pump installations or the storm sewer.

5.5 Earthquake Considerations

In accordance with The Ontario Building Code 2024 (OBC), the proposed structure should be designed to resist earthquake load and effects as per OBC Subsection 4.1.8.

Based on the condition of the underlying soil encountered at the boreholes, and the fact that any loose/soft soils will be removed, and our experience with the local soil conditions up to a depth of 30 m, the site can be overall be classified as **Site Class D** as per OBC Table 4.1.8.4B.

5.6 Pavement Design

The earth subgrade soil is generally expected to consist of fine granular deposits (sand, silt) and cohesive clayey silt till soils. Cognizant of the traffic volume and the subgrade soils, the following pavement component thicknesses (per Centre Wellington Development Manual, June 2024) are considered suitable for industrial roads:

Pavement Component	Local Road Component Thickness (mm)	Collector Road Component Thickness (mm)
HL3 Surface Asphaltic Concrete HL4 Binder Asphaltic Concrete	40 50	50 60
Granular “A” Base Course	150	150
Granular “B” Type II Sub-base Course	450	600
Granular Base Equivalency (GBE)	**630**	**770**

Note: GBE denotes Granular Base Equivalency which is calculated using factors of 2 for asphaltic concrete, 1 for Granular “A” base and 0.67 for Granular “B” sub-base

The pavement design considers that road construction will be carried out during the drier time of the year and that the subgrade is stable, not heaving under construction equipment traffic. If the subgrade is wet or unstable, additional granular sub-base may be required.

The subgrade should be prepared in accordance with the recommendations provided in Sections 5.1 and 5.2 prior to placement of the granular base layers.

The base and sub-base 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 a minimum of 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 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 so as 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.

Due to the relatively high low depth of the wet to saturated soil conditions found throughout the site (0.2± to 2.3± mbgs), longitudinal sub-drains with positive drainage outlets are recommended to be installed at the subgrade level along the edges of the roadway construction to enhance the performance of the pavement.

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 structure. The prepared earth subgrade and final pavement surfaces should be graded to direct water runoff away from buildings, sidewalks, and other similar pertinent structures. The roadway subgrade should be free of depressions and should have a 2% slope from the crown to the edge of the pavement.

5.7 Infiltration Rates of On-Site Soils

It is understood that a stormwater management (SWM) facility is planned to be constructed in the southwestern corner of the site (Block 23). If an infiltration feature is to be included in the development of the property, it should be located below the footing drain/weeper and at least 5 m away from the proposed building footprints. Additionally, the infiltration features should have the base located at least 1.0 m above the groundwater table, and 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	Hydraulic Conductivity (K) (cm/sec)	Infiltration Rate (mm/hr)
Fine to Medium Sand (Enclosures 24, 25, and 27)	3×10^{-3} to 9×10^{-3}	75 to 150
Sandy Silt to Sand and Silt (Enclosure 26)	3×10^{-5} to 1×10^{-4}	10 to 20
Silt (Enclosure 28)	1×10^{-5}	3 to 5
Clayey Silt Till	1×10^{-6}	<1

Due to the predominantly clayey silt till soils (Boreholes 7, 112, and 113), and the high water table in the area (depths of 0.2± to 1.6± mbgs, corresponding to elevation between 420.8± and 421.6± m across all seasons), the SWM facility might need to be either raised sufficiently above the water table or redesigned to be feasible.

5.8 Handling of Excess Soils

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

No testing was conducted during this geotechnical investigation; however, soil sampling and analysis may be required as per the above-noted MECP document and/or as per the requirement of the receiving site owner(s), depending on the volume of excess soil generated during construction. The analytical results and environmental assessment findings must be disclosed to the receiving site owner(s) and approval by the receiving site owner(s) be obtained prior to exporting/transferring the materials.

If any impacted soils are discovered during construction, CVD should be contacted for sampling and testing to determine the limit of the impacted soils.

6.0 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.

LICENSED PROFESSIONAL ENGINEER
E.Y. CHUNG
8345506
Feb. 6, 2025
PROVINCE OF ONTARIO

Yaroslav Chudin, E.I.T.
Geotechnical Engineering Intern

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.

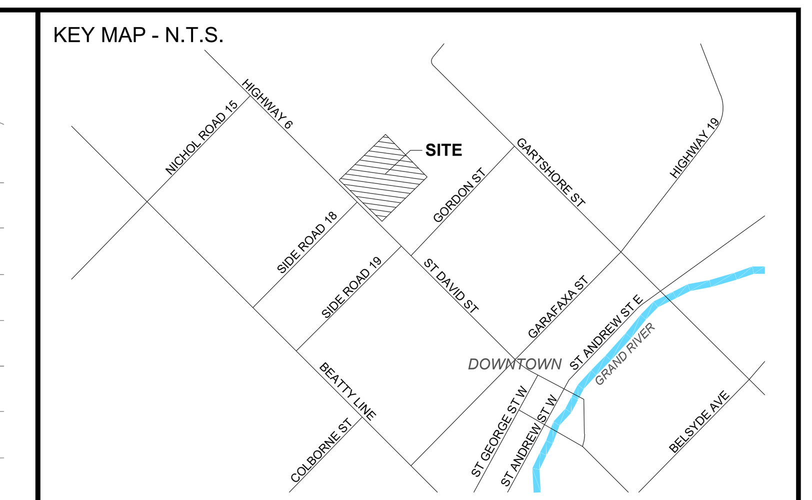
Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. CHUNG & VANDER DOELEN ENGINEERING LIMITED accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or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

Draft Plan of Subdivision (Polocorp, December 10, 2024) & Drawing No. 1 – CVD Borehole Location Plan



DRAFT PLAN OF SUBDIVISION

PT OF LOT 17, CONCESSION 16
IN THE FORMER GEOGRAPHIC TWP OF NICHOL
CENTRE WELLINGTON

POLOCORP INC.

20 0 20 40 60 80 100
SCALE = 1:1400 (metric)

LAND USE SCHEDULE

DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
Single Detached	1-10	62-88	8.006
Street Townhouses	11-18	80-118	6.185
Medium Density	19, 20	71-102	1.617
Mixed Use	21	8-14	0.338
Existing House	22	-	0.330
Stormwater Management Facility	23	-	2.412
Trail	24	-	0.417
Parkland	25	-	0.806 (5.2%)
Pedestrian Walkway	26, 27	-	0.077
Environmental Feature & Buffer	28	-	3.340
MTO Allowance	29, 30	-	0.527
Roads	-	-	3.502
TOTAL		221-323	19.389

SALEABLE FRONTAGE	LENGTH	UNIT SMALL	UNIT LARGE
Single Detached	1,014.5m	36' (11.0m)	50' (15.2m)
Street Townhouses	830.0m	18' (5.5m)	27' (8.3m)
TOTAL	1,844.5m		

DENSITY	
Gross Area (ha)	19.389 ha (47.91 ac)
Developable Area (ha)	15.477 ha (38.25 ac)
Net Density (upha)	14.3 - 20.9 upha
Net People-Jobs (3.05 per unit)	43.6 - 63.8 P/J pha

LEGEND

Wetland Limit
Wetland 30m Buffer

INFORMATION REQUIRED

UNDER SECTION 51 (17) OF THE PLANNING ACT, R.S.O. 1990. c.P.13 AS AMENDED
INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,g, j AND I ARE AS SHOWN ON THE DRAFT PLAN.
(h) Municipal Water Supply
(i) Sandy Loam
(k) Municipal Sanitary and Storm Sewers

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

, O.L.S.
Surveying Inc.

XX XX, 2024
DATE

OWNER'S CERTIFICATE

I HEREBY CONSENT TO THE FILING OF THIS PLAN BY POLOCORP INC., IN DRAFT FORM

MIKE PUOPOLO
Polocorp Inc.

DATE

APPROVALS

REGIONAL MUNICIPALITY OF
WATERLOO APPROVAL BLOCK

DRAFT
FOR DISCUSSION PURPOSES ONLY

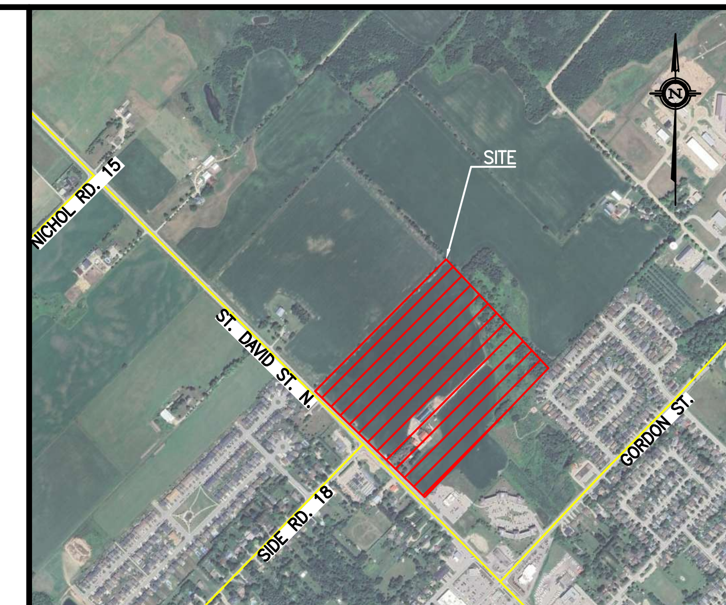
APPROVED: DATE:

REVISIONS

DATE	BY	DESCRIPTION

POLOCORP
379 Queen Street South, Kitchener | N2T 1W6 | 519-745-3249 | polocorpinc.com

DATE: December 10, 2024	SCALE 1:4000 (metric)
PROJECT: 1012 (Fergus)	DRAWN BY: GFE



KEY PLAN **SOURCE:** Google Earth

LEGEND

- **TBM: Top of fire hydrant nut, south of northern driveway entrance to 968 St. David Street North. Elev.: 425.17 m (Geodetic)**
- **Borehole and Monitoring Well Location (January 2024)**
- **Borehole and Monitoring Well Location (September 2024)**
- **Site Boundary**

Image Ref.: Google Earth; Retrieved: May 1, 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).

BOREHOLE LOCATION PLAN

Polocorp Fergus Subdivision - Phase 1

968 St. David Street North
Fergus, Ontario

CHUNG & VANDER DOELEN ENGINEERING LTD.

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

Drawn By: YC	Date: January 2025	File No.: 1495
Checked By: EYC	Scale: 1:4000	Drawing No.: 1

APPENDIX C

Single Well Response Test Analysis Charts

CHUNG & VANDER DOELEN
ENGINEERING LTD.
311 Victoria Street North
Kitchener / Ontario / N2H 5E1
519-742-8979

Response Test - Water Level Data and Analysis

Project: Polocorp Fergus Subdivision

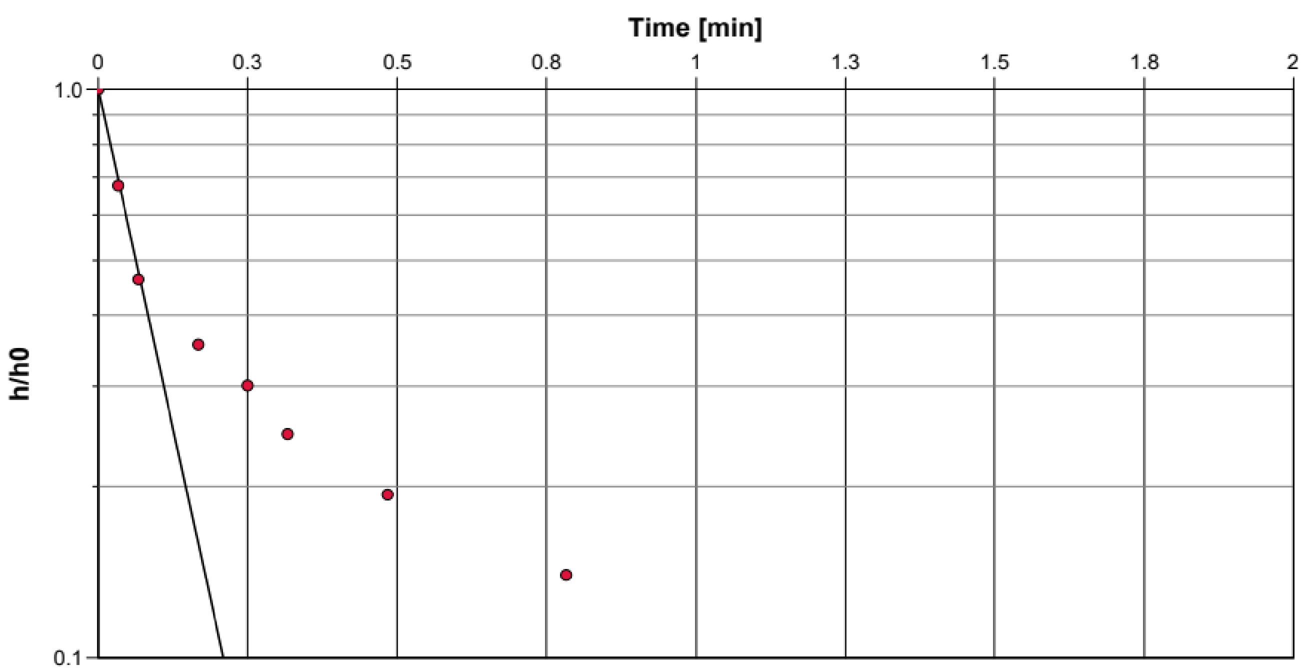
Number: 1495

Client: Polocorp Inc.

Location: 968 St. David Street North & 6581 Highway 6, Fergus, ON | Response Test: BH 5

Test Conducted by: Y.C.	Test Date: 2024-03-11	Aquifer Thickness: 6.20 m
Water level at t=0 [m]: 2.09	Static Water Level [m]: 1.99	Water level change at t=0 [m]: 0.09

	Time [min]	Water Level [m]	WL Change [m]
1	0	2.087	0.093
2	0.0333	2.057	0.063
3	0.0667	2.037	0.043
4	0.1667	2.027	0.033
5	0.25	2.022	0.028
6	0.3167	2.017	0.023
7	0.4833	2.012	0.018
8	0.7833	2.007	0.013
9	1.1167	2.002	0.008
10	1.55	2.00	0.006



Calculation using Bouwer & Rice

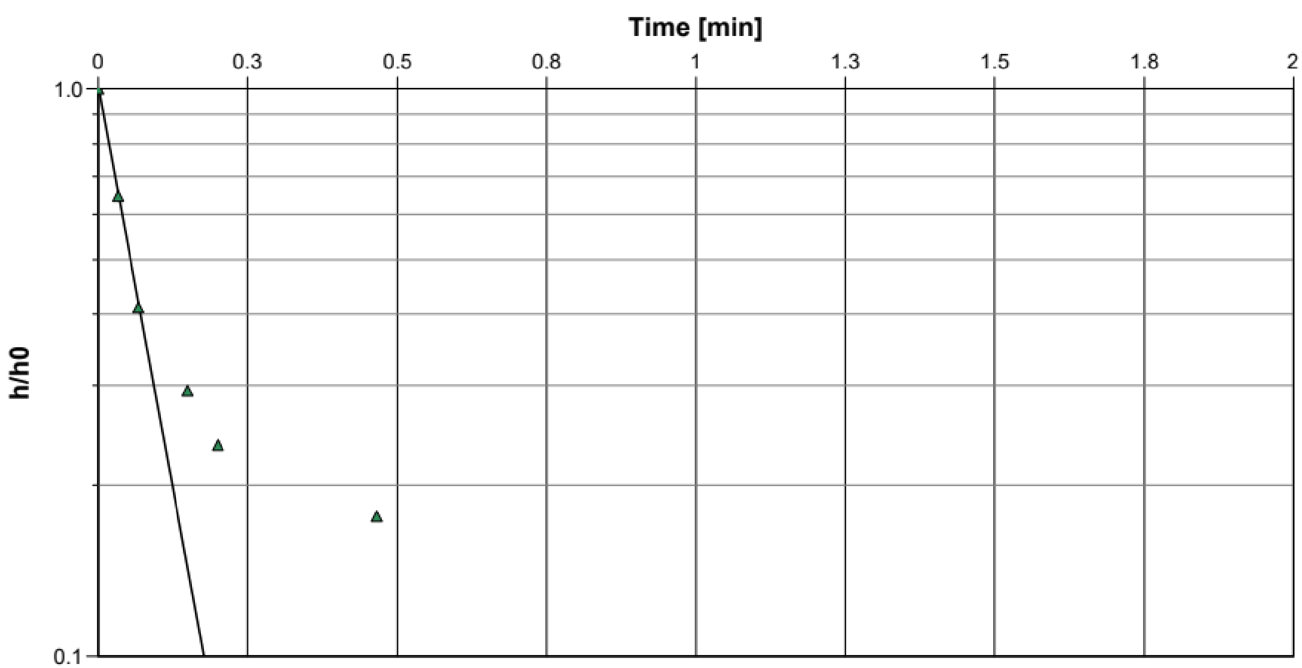
Observation Well	Hydraulic Conductivity [m/s]
BH 5	8.69×10^{-5}

CHUNG & VANDER DOELEN
ENGINEERING LTD.
311 Victoria Street North
Kitchener / Ontario / N2H 5E1
519-742-8979

Response Test - Water Level Data and Analysis	Page 3 of 4
Project: Polocorp Fergus Subdivision	
Number: 1495	
Client: Polocorp Inc.	

Location: 968 St. David Street North & 6581 Highway 6, Fergus, ON	Response Test: BH 6	
Test Conducted by: Y.C.	Test Date: 2024-03-11	Aquifer Thickness: 3.10 m
Water level at t=0 [m]: 1.65	Static Water Level [m]: 1.56	Water level change at t=0 [m]: 0.08

	Time [min]	Water Level [m]	WL Change [m]
1	0	1.646	0.085
2	0.0333	1.616	0.055
3	0.0667	1.596	0.035
4	0.15	1.586	0.025
5	0.2	1.581	0.02
6	0.4667	1.576	0.015



Calculation using Bouwer & Rice	
Observation Well	Hydraulic Conductivity [m/s]
BH 6	8.91×10^{-5}

CHUNG & VANDER DOELEN
ENGINEERING LTD.
311 Victoria Street North
Kitchener / Ontario / N2H 5E1
519-742-8979

Response Test - Water Level Data and Analysis

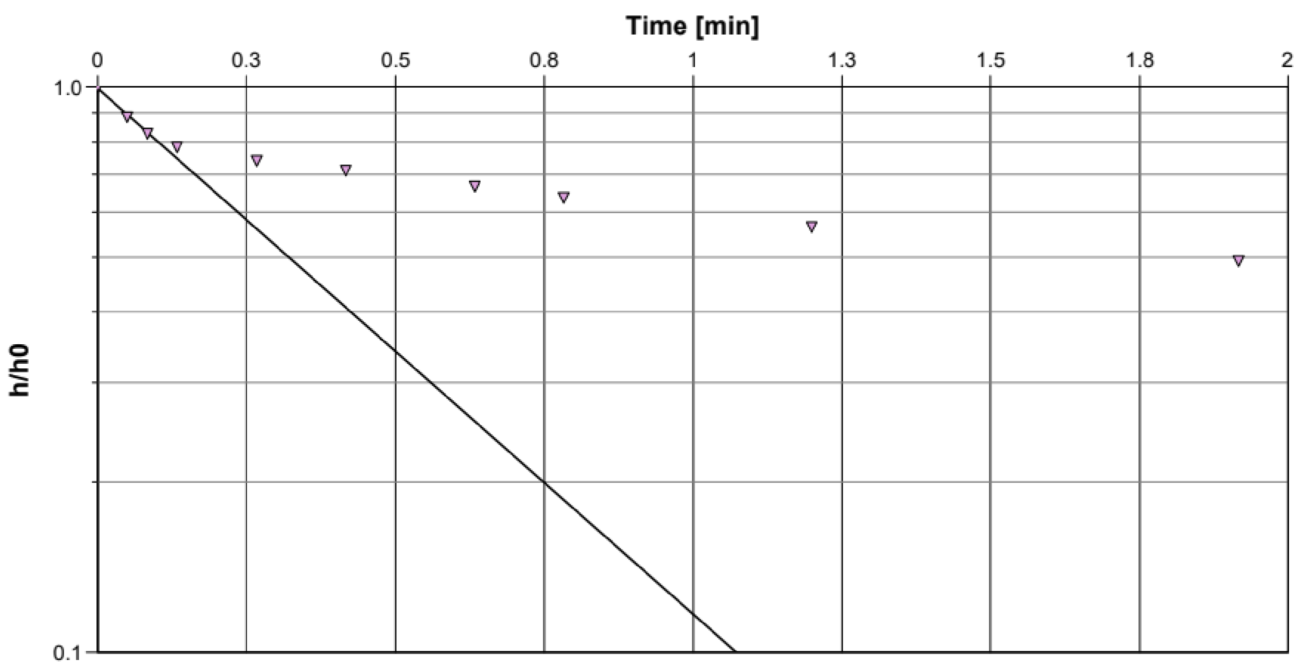
Project: Polocorp Fergus Subdivision

Number: 1495

Client: Polocorp Inc.

Location: 968 St. David Street North & 6581 Highway 6, Fergus, ON	Response Test: BH 7	
Test Conducted by: Y.C.	Test Date: 2024-03-11	Aquifer Thickness: 1.50 m
Water level at t=0 [m]: 1.20	Static Water Level [m]: 0.51	Water level change at t=0 [m]: 0.69

	Time [min]	Water Level [m]	WL Change [m]
1	0	1.199	0.69
2	0.05	1.119	0.61
3	0.0833	1.079	0.57
4	0.1333	1.049	0.54
5	0.2667	1.019	0.51
6	0.4167	0.999	0.49
7	0.6333	0.969	0.46
8	0.7833	0.949	0.44
9	1.2	0.899	0.39
10	1.9167	0.849	0.34
11	2.6333	0.819	0.31
12	3.3833	0.799	0.29
13	3.9667	0.789	0.28
14	4.5167	0.779	0.27
15	5.1333	0.769	0.26



Calculation using Bouwer & Rice		
Observation Well	Hydraulic Conductivity [m/s]	
BH 7	2.81×10^{-5}	

APPENDIX D

Table 1 – Summary of Groundwater Levels and Elevations & Figure 5 – Water Table Contours Interpretation (September 18, 2024)

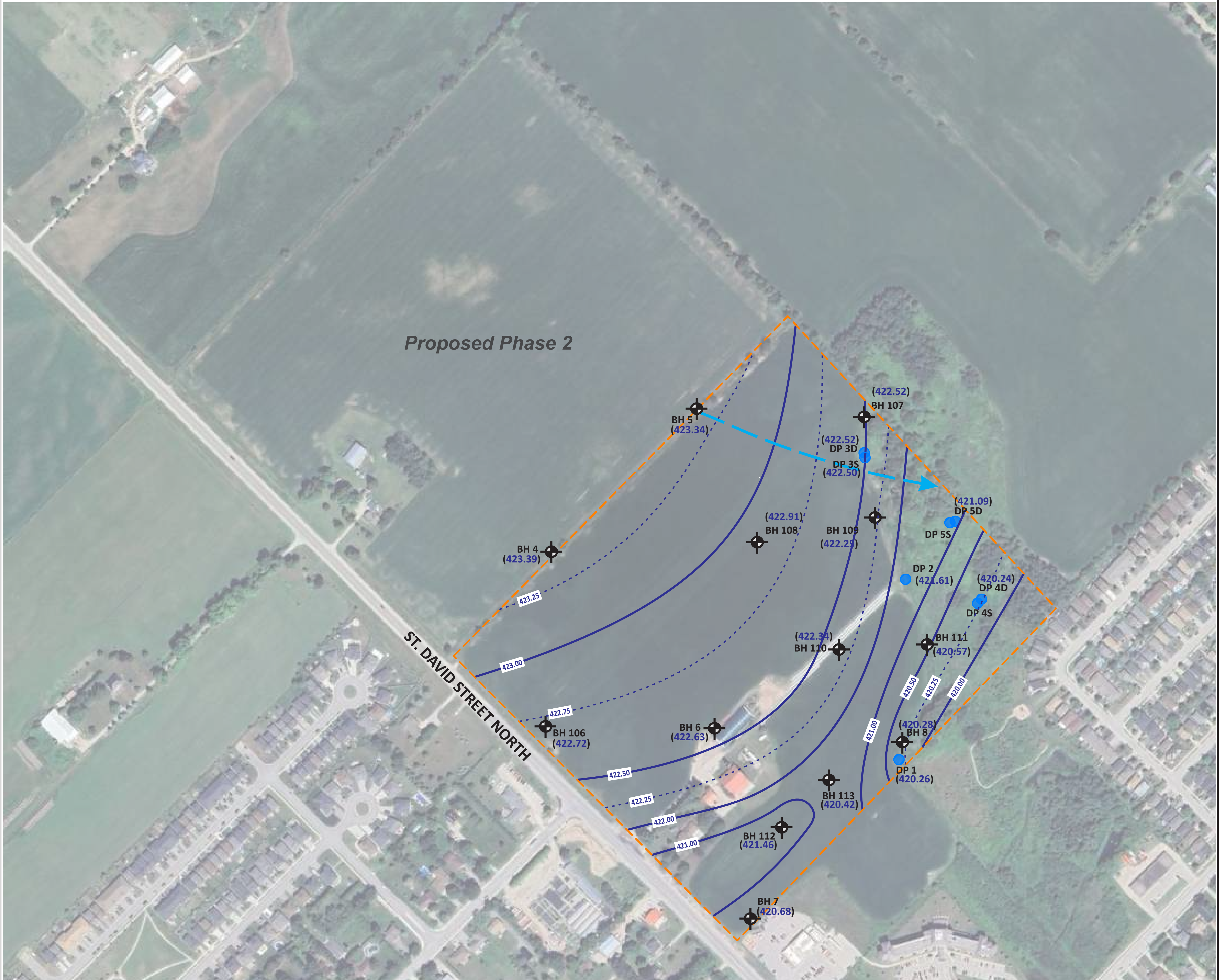
Table 1 - Summary of Water Levels, Elevations & Fluctuations

968 St. David Street North, Fergus
CVD Engineering Ltd.

Project: 1495

Well	Ground Elevation (mASL)	Top Pipe Elevation (mASL)	Pipe Length (m)	Hydraulic Conductivity (m/s)	Water Level (m Below Ground)							Water Elevation (m Above Sea Level)							Fluctuation Relative to February 6, 2024 (m)			
					10-Nov-23	12-Dec-23	06-Feb-24	11-Mar-24	22-Jul-24	12-Sep-24	18-Sep-24	10-Nov-23	12-Dec-23	06-Feb-24	11-Mar-24	22-Jul-24	12-Sep-24	18-Sep-24	11-Mar-24	22-Jul-24	12-Sep-24	18-Sep-24
BH 4	426.94	428.13	1.18	-			3.61	3.48	3.39		3.56			423.34	423.46	**423.56**		423.39	0.13	0.22		0.05
BH 5	425.61	426.87	1.26	9×10^{-5}			2.10	1.99	2.02		2.27			423.51	**423.62**	423.59		423.34	0.11	0.09		-0.17
BH 6	424.53	425.53	1.00	9×10^{-5}			1.62	1.56	1.66		1.90			422.91	**422.97**	422.87		422.63	0.06	-0.04		-0.27
BH 7	421.82	422.97	1.15	3×10^{-5}			0.41	0.51	0.71		1.14			**421.41**	421.31	421.12		420.68	-0.10	-0.30		-0.74
BH 8	421.01	422.12	1.11	-			0.44	0.25	0.52		0.73			420.58	**420.76**	420.50		420.28	0.18	-0.08		-0.29
BH 106	424.80	425.74	0.94	-						2.07	2.08						**422.73**	422.72				
BH 107	422.93	423.89	0.96	-						0.40	0.41						**422.53**	422.52				
BH 108	424.74	425.68	0.94	-						1.82	1.83						**422.92**	422.91				
BH 109	422.66	423.64	0.98	-						0.40	0.41						**422.26**	422.25				
BH 110	422.92	423.97	1.05	-						0.57	0.58						**422.35**	422.34				
BH 111	421.24	422.19	0.95	-						0.60	0.67						**420.64**	420.57				
BH 112	422.30	423.29	0.99	-						0.74	0.83						**421.56**	421.46				
BH 113	422.02	422.87	0.85	-						1.53	1.60						**420.49**	420.42				
DP 1 In	420.06	421.62	1.56	-	-0.33	-0.38	-0.34	-0.39	-0.36		-0.20	420.39	420.44	420.40	**420.45**	420.42		420.26				
DP 1 Out	420.06	421.62	1.56	-	-0.23	-0.20		-0.27	-0.23		-0.17	420.28	420.26		**420.32**	420.29		420.22				
DP 2 In	421.71	423.09	1.37	-	1.69	0.45	-0.01	-0.06	-0.06		0.10	420.02	421.26	421.73	421.77	**421.78**		421.61				
DP 2 Out	421.71	423.09	1.37	-	-0.08	-0.06		-0.08	-0.06			421.79	421.77		**421.79**	421.78						
DP 3S In	422.86	424.48	1.62	-					0.27		0.36					**422.59**		422.50				
DP 3S Out	422.86	424.48	1.62	-																		
DP 3D In	422.88	424.42	1.54	-	0.57	0.29	0.26	1.23	0.27		0.36	422.31	422.59	**422.62**		422.61		422.52				
DP 3D Out	422.88	424.42	1.54	-					-1.54							**424.42**						
DP 4S In	421.27	422.54	1.28	-						-0.15	-0.14						**421.42**	421.41				
DP 4S Out	421.27	422.54	1.28	-						-0.16	-0.16						**421.43**	421.43				
DP 4D In	421.29	422.71	1.42	-						1.28	1.05						420.01	**420.24**				
DP 4D Out	421.29	422.71	1.42	-						-0.11	-0.11						**421.41**	421.41				
DP 5S In	421.64	422.77	1.13	-						0.39							**421.25**					
DP 5S Out	421.64	422.77	1.13	-																		
DP 5D In	421.60	423.00	1.39	-						0.48	0.51						**421.13**	421.09				
DP 5D Out	421.60	423.00	1.39	-																		

Notes:
1) All Elevations Referenced to Geodetic Survey by CVD.
2) Bolded elevations represent the maximum water table aquifer elevation measured at each monitoring well throughout all seasons.
3) Negative water level indicates that water level is above ground.
4) : Monitoring well/piezometer dry
5) Negative fluctuation indicates drop in water level relative to baseline.



LEGEND

- Property Boundary
- CVD Monitoring Well Location
- CVD Drive-Point Piezometer Location
- (424.19) Water Table Elevation (mASL) - September 18, 2024
- 424.50 Interpreted Groundwater Contour (mASL)
- Interpreted Shallow Groundwater Flow Direction

N

0 50 100 m

Scale 1:4000

Image Reference: Google Earth; Retrieved: May 1, 2024

Figure 5:
Water Table Interpretation (September 18, 2024)

Hydrogeological Assessment
Polocorp Fergus Subdivision - Phase 1

968 St. David Street North & 6581 Highway 6
Fergus, ON

CHUNG & VANDER DOELEN
ENGINEERING LTD.
311 VICTORIA STREET NORTH
KITCHENER / ONTARIO / N2H 2E1 / 519-742-8979

Drawn By: YC / PD	Date: Janaury 2025	File No.: 1495

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	**Cohesionless Soil**
DTPL- Drier than plastic limit	Damp
APL- About plastic limit	Moist
WTPL- Wetter than plastic limit	Wet
MWTPL- Much wetter than plastic limit	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

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Enclosure A

FILE No: 1495

BOREHOLE No. 4

Client:	**PoloCorp Inc.**
Project:	**Proposed Residential Subdivision**
Location:	**968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA

Machine:	**CME-55 Track**
Method:	**Solid Stem Auger**
Size:	**152 mm O.D.**
Date:	**Jan 16 - 24** TO **Jan 16 - 24**

SOIL LITHOLOGY

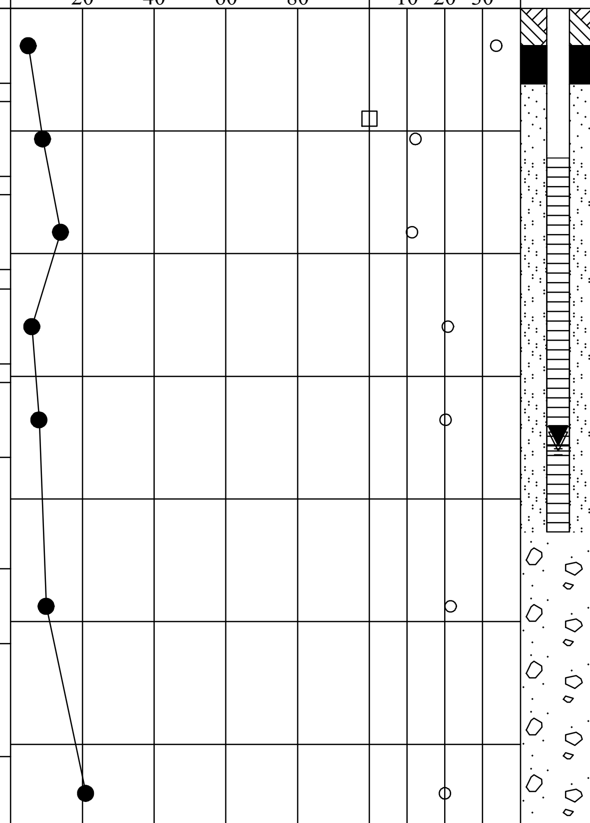
Ground Elevation: **426.94 m**

ELEV./DEPTH (m)	DESCRIPTION
	300 mm TOPSOIL
426.64 / 0.30	firm to stiff, brown CLAYEY SANDY SILT trace gravel, trace topsoil DTPL
425.89 / 1.05	loose to compact, brown Fine SAND trace gravel, trace silt moist ---------- saturated ---------- silt seam, trace clay
420.24 / 6.70	End of Borehole

SAMPLE

SAMPLE ID	TYPE	N-VALUE
1	SS	5
2	SS	9
3	SS	14
4	SS	6
5	SS	8
6	SS	10
7	SS	21

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)



REMARKS

DEPTH (m)	REMARKS
0.0	above-ground steel casing set in concrete
0.5	bentonite seal/50 mm I.D. PVC riser
1.0	3.05 m long, 50 mm I.D. PVC screen with sandpack
3.5	water level in monitoring well measured at 3.61 m depth on February 6, 2024, and measured at 3.56 m depth on September 18, 2024

PROJECT MANAGER: **EYC**

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FILE No: 1495

BOREHOLE No. 5

Client:	**PoloCorp Inc.**
Project:	**Proposed Residential Subdivision**
Location:	**968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA

Machine:	**CME-55 Track**
Method:	**Hollow Stem Auger**
Size:	**83 mm I.D.**
Date:	**Jan 16 - 24** TO **Jan 16 - 24**

Ground Elevation: **425.61 m**

ELEV./DEPTH (m)	SOIL LITHOLOGY – DESCRIPTION	SAMPLE ID	TYPE	N-VALUE	WATER CONTENT (%)	REMARKS
425.43 / 0.18	180 mm TOPSOIL	1	SS	5		above-ground steel casing set in concrete; bentonite seal/50 mm I.D. PVC riser; 3.05 m long, 50 mm I.D. PVC screen with sandpack
	loose, orangey brown SANDY SILT trace topsoil moist to wet	2	SS	4		
423.76 / 1.85		3	SS	5		
	loose to compact, brown Fine SAND trace silt wet to saturated	4	SS	7		water level in monitoring well measured at 2.10 m depth on February 6, 2024, and measured at 2.27 m depth on September 18, 2024
		5	SS	9		
		6	SS	9		
		7	SS	12		
	---------- silt seam, trace clay	8	SS	13		
417.36 / 8.25	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

PROJECT MANAGER: **EYC**

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FILE No: 1495

BOREHOLE No. 6

Client:	**PoloCorp Inc.**
Project:	**Proposed Residential Subdivision**
Location:	**968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA

Machine:	**CME-55 Track**
Method:	**Hollow Stem Auger**
Size:	**83 mm I.D.**
Date:	**Jan 15 - 24** TO **Jan 15 - 24**

SOIL LITHOLOGY — Ground Elevation: **424.53 m**

ELEV./ DEPTH (m)	DESCRIPTION
424.28 / 0.25	250 mm TOPSOIL
423.58 / 0.95	loose to compact, orangey brown SILTY SAND, moist
420.58 / 3.95	moist ---------- compact, brown Fine to Medium SAND trace gravel, trace silt saturated
419.88 / 4.65	compact to loose, brown SILT, trace to some sand trace clay, occ. sand seams saturated
419.33 / 5.20	stiff, grey CLAYEY SILT trace sand, APL
	End of Borehole

SAMPLE

SAMPLE ID	TYPE	N-VALUE
1	SS	6
2	SS	12
3	SS	18
4	SS	20
5	SS	15
6	SS	11
7	SS	8

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

REMARKS

- above-ground steel casing set in concrete
- bentonite seal/50 mm I.D. PVC riser
- water level in monitoring well measured at 1.62 m depth on February 6, 2024, and measured at 1.90 m depth on September 18, 2024
- 3.05 m long, 50 mm I.D. PVC screen with sandpack

PROJECT MANAGER: **EYC**

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FILE No: 1495

BOREHOLE No. 7

Client: **PoloCorp Inc.**
Project: **Proposed Residential Subdivision**
Location: **968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA
Machine: **CME-55 Track**
Method: **Hollow Stem Auger**
Size: **83 mm I.D.**
Date: **Jan 15 - 24** TO **Jan 15 - 24**

SOIL LITHOLOGY — Ground Elevation: **421.82 m**

ELEV./ DEPTH (m)	DESCRIPTION	SAMPLE ID	TYPE	N-VALUE
421.59 / 0.23	230 mm TOPSOIL			
420.92 / 0.90	very loose to compact, brown SANDY SILT, trace gravel trace topsoil, wet to saturated	1	SS	3
419.97 / 1.85	compact, brown Fine SAND trace gravel, trace silt saturated	2	SS	11
		3	SS	12
416.62 / 5.20	stiff to hard, grey CLAYEY SANDY SILT DTPL	4	SS	50
		5	SS	53
		6	SS	29
	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): 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

REMARKS
above-ground steel casing set in concrete; bentonite seal/ 50 mm I.D. PVC riser
water level in monitoring well measured at 0.41 m depth on February 6, 2024, and measured at 1.14 m depth on September 18, 2024
1.50 m long, 50 mm I.D. PVC screen with sandpack

PROJECT MANAGER: **EYC**

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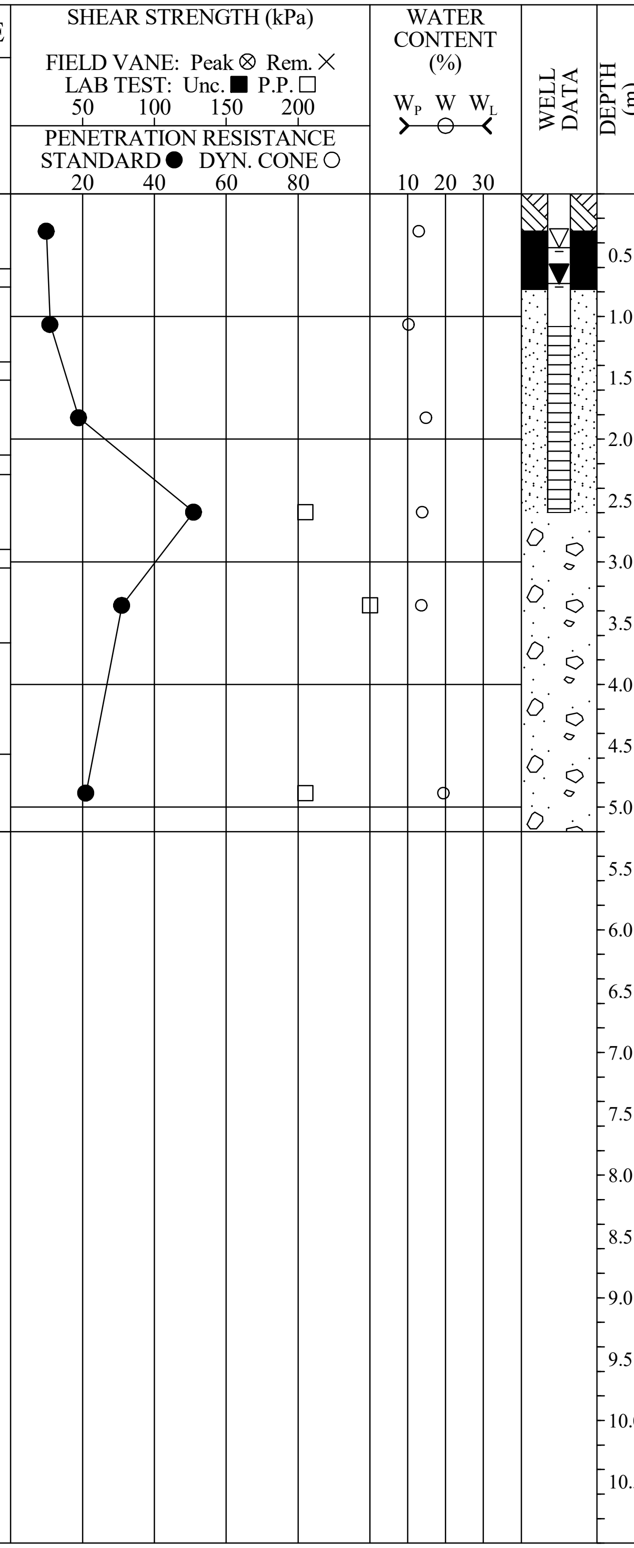
Enclosure No.: 8
Sheet 1 of 1

FILE No: 1495 BOREHOLE No. 8

Client:	**PoloCorp Inc.**	**EQUIPMENT DATA**	
Project:	**Proposed Residential Subdivision**	Machine:	**CME-55 Track**
Location:	**968 St. David Street North, Fergus, Ontario**	Method:	**Hollow Stem Auger**
		Size:	**83 mm I.D.**
		Date:	**Jan 15 - 24** TO **Jan 15 - 24**

Ground Elevation: **421.01 m**

ELEV./DEPTH (m)	DESCRIPTION	SAMPLE ID	TYPE	N-VALUE
	300 mm TOPSOIL			
420.71 / 0.30	compact, brown SILTY SAND, trace gravel moist to wet	1	SS	10
419.96 / 1.05	compact to very dense, brown Fine to Medium SAND trace gravel, trace silt occ. clay seams saturated	2	SS	11
		3	SS	19
418.61 / 2.40	hard to very stiff, grey CLAYEY SILT some sand trace gravel occ. silt seams DTPL	4	SS	51
		5	SS	31
		6	SS	21
415.81 / 5.20	End of Borehole			



REMARKS

- above-ground steel casing set in concrete; bentonite seal/ 50 mm I.D. PVC riser
- water level in monitoring well measured at 0.44 m depth on February 6, 2024, and measured at 0.73 m depth on September 18, 2024
- 1.50 m long, 50 mm I.D. PVC screen with sandpack

PROJECT MANAGER: **EYC**

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Enclosure No.: 14

FILE No: 1495

BOREHOLE No. 106

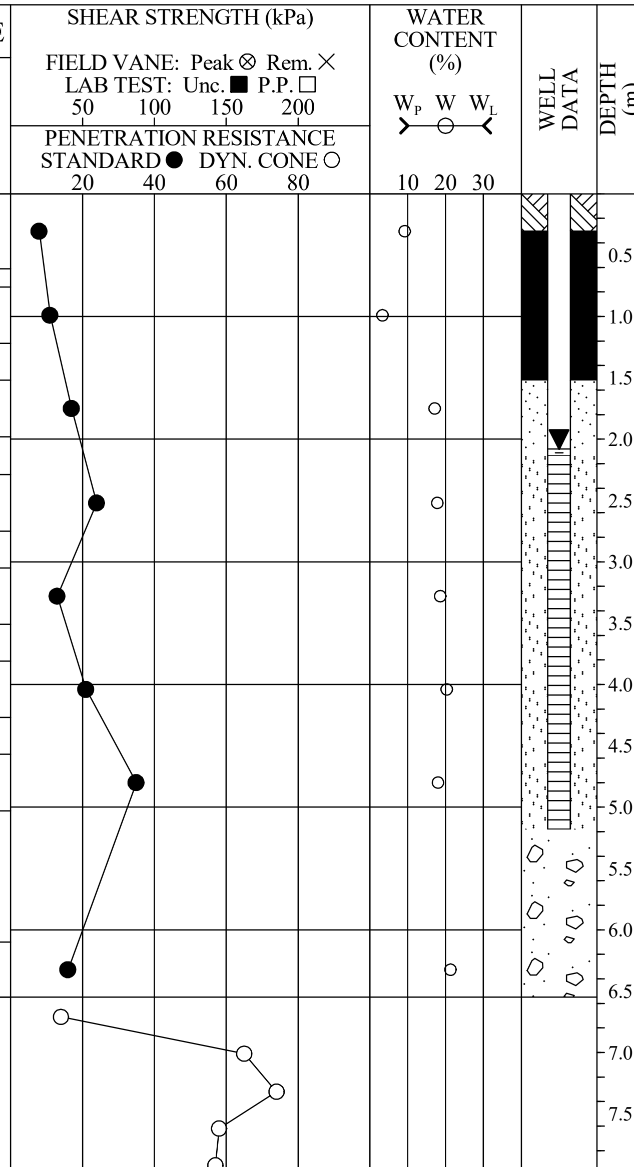
Client:	**PoloCorp Inc.**
Project:	**Proposed Residential Subdivision**
Location:	**968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA

Machine:	**CME-55 Track**
Method:	**Hollow Stem Auger**
Size:	**83 mm I.D.**
Date:	**Sep 09 - 24** TO **Sep 09 - 24**

Ground Elevation: **424.80 m**

ELEV./ DEPTH (m)	DESCRIPTION	SAMPLE ID	TYPE	N-VALUE	REMARKS
424.60 / 0.20	200 mm TOPSOIL				above-ground steel casing set in concrete
424.00 / 0.80	loose, brown SANDY SILT, trace clay trace topsoil, wet	1	SS	8	0.5: bentonite seal/50 mm I.D. PVC riser
	compact to dense, brown Fine to Medium SAND trace silt moist to wet ---------- saturated ---------- gravelly seam ----------	2	SS	11	
		3	SS	17	1.5: 3.05 m long, 50 mm I.D. PVC screen with sandpack
		4	SS	24	2.0: water level in monitoring well measured at 2.08 m depth on September 18, 2024
		5	SS	13	
		6	SS	21	
		7	SS	35	
418.25 / 6.55		8	SS	16	6.5: DCPT conducted from 6.55± to 8.10± m depth
	End of Borehole				



PROJECT MANAGER: **EYC**

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Enclosure No.: 15

FILE No: 1495

BOREHOLE No. 107

Client: **PoloCorp Inc.**

Project: **Proposed Residential Subdivision**

Location: **968 St. David Street North, Fergus, Ontario**

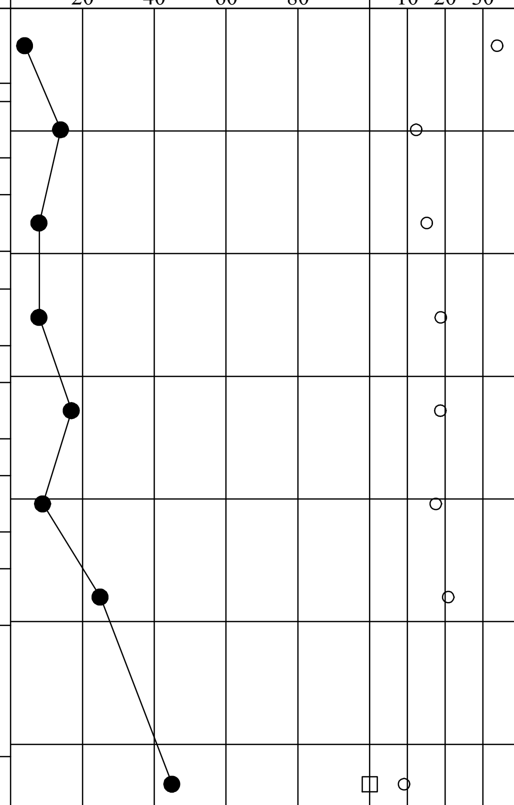
EQUIPMENT DATA

Machine: **CME-55 Track**
Method: **Hollow Stem Auger**
Size: **83 mm I.D.**
Date: **Sep 09 - 24** TO **Sep 09 - 24**

SOIL LITHOLOGY — Ground Elevation: **422.93 m**

ELEV./ DEPTH (m)	DESCRIPTION	SAMPLE ID	TYPE	N-VALUE
	800 mm PEAT	1	SS	4
422.13 / 0.80	gravelly ---------- loose to compact, orangey brown SILTY SAND trace gravel, occ. silty sand seams wet to saturated	2	SS	14
		3	SS	8
420.73 / 2.20	loose to compact, brown Fine to Medium SAND trace gravel, trace silt saturated	4	SS	8
		5	SS	17
418.98 / 3.95	brown ---------- loose to compact, grey SILT trace to some sand, trace clay occ. to freq. clayey silt seams occ. cobbles saturated	6	SS	9
		7	SS	25
417.43 / 5.50	hard, brown CLAYEY SANDY SILT TILL trace gravel DTPL	8	SS	45
416.38 / 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:
- above-ground steel casing set in concrete
- water level in monitoring well measured at 0.41 m depth on September 18, 2024
- bentonite seal/50 mm I.D. PVC riser
- 3.05 m long, 50 mm I.D. PVC screen with sandpack

PROJECT MANAGER: **EYC**

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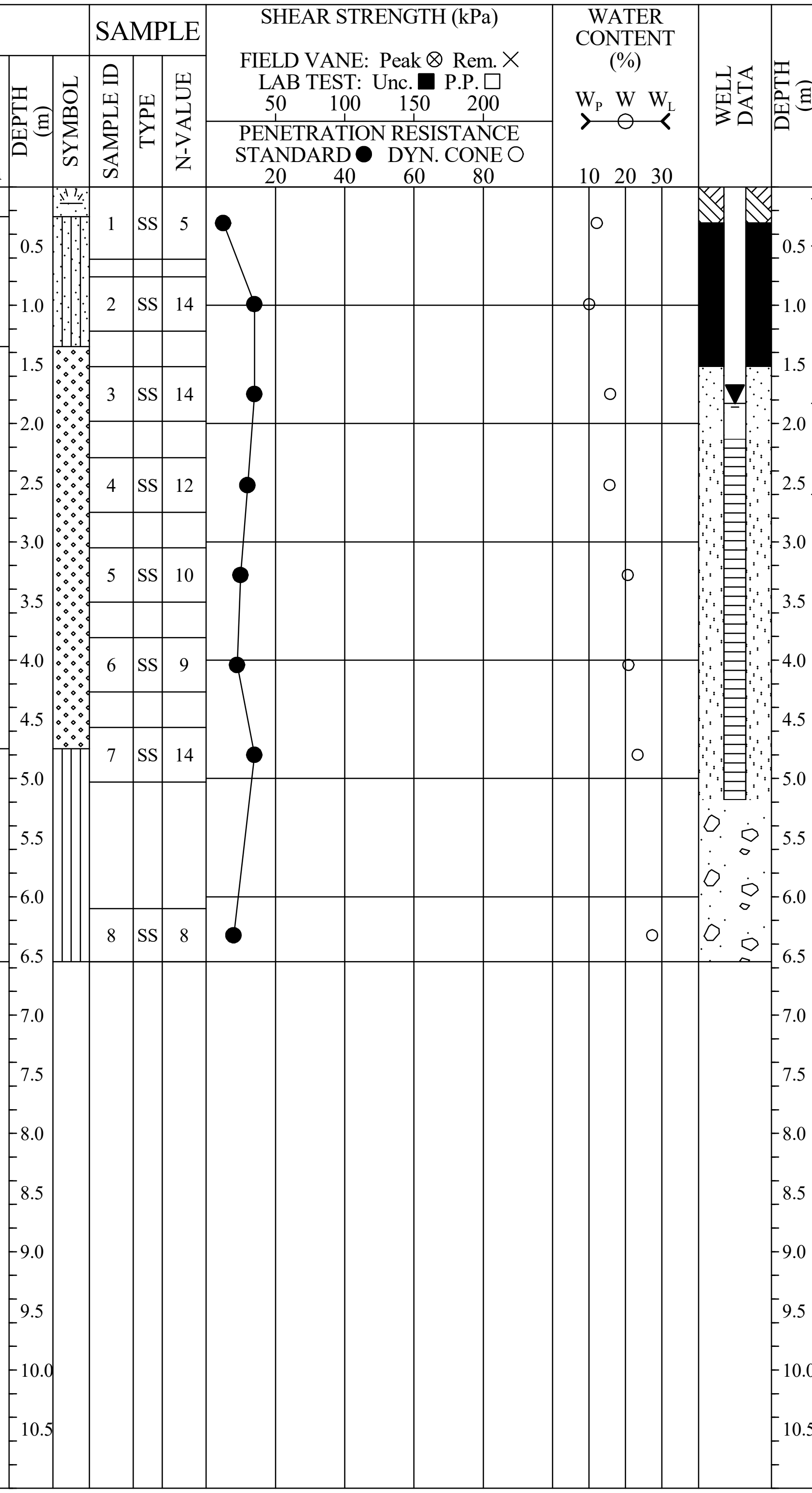
FILE No: 1495 BOREHOLE No. 108

Client: **PoloCorp Inc.**
Project: **Proposed Residential Subdivision**
Location: **968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA
Machine: **CME-55 Track**
Method: **Hollow Stem Auger**
Size: **83 mm I.D.**
Date: **Sep 09 - 24** TO **Sep 09 - 24**

Ground Elevation: **424.74 m**

ELEV./ DEPTH (m)	DESCRIPTION	SAMPLE ID	TYPE	N-VALUE	WATER CONTENT (%)	REMARKS
424.49 / 0.25	250 mm TOPSOIL					above-ground steel casing set in concrete
423.39 / 1.35	loose to compact, brown SANDY SILT occ. clay silt seams moist	1	SS	5		bentonite seal/50 mm I.D. PVC riser (0.5)
		2	SS	14		
419.99 / 4.75	loose to compact, brown Fine to Medium SAND trace gravel, trace silt wet to saturated	3	SS	14		water level in monitoring well measured at 1.83 m depth on September 18, 2024
		4	SS	12		3.05 m long, 50 mm I.D. PVC screen with sandpack
		5	SS	10		
		6	SS	9		
418.19 / 6.55	loose to compact, brown SILT trace sand, trace clay occ. clayey silt seams saturated ---------- grey	7	SS	14		
		8	SS	8		
	End of Borehole					



PROJECT MANAGER: **EYC**

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FILE No: 1495

BOREHOLE No. 109

Client: **PoloCorp Inc.**

Project: **Proposed Residential Subdivision**

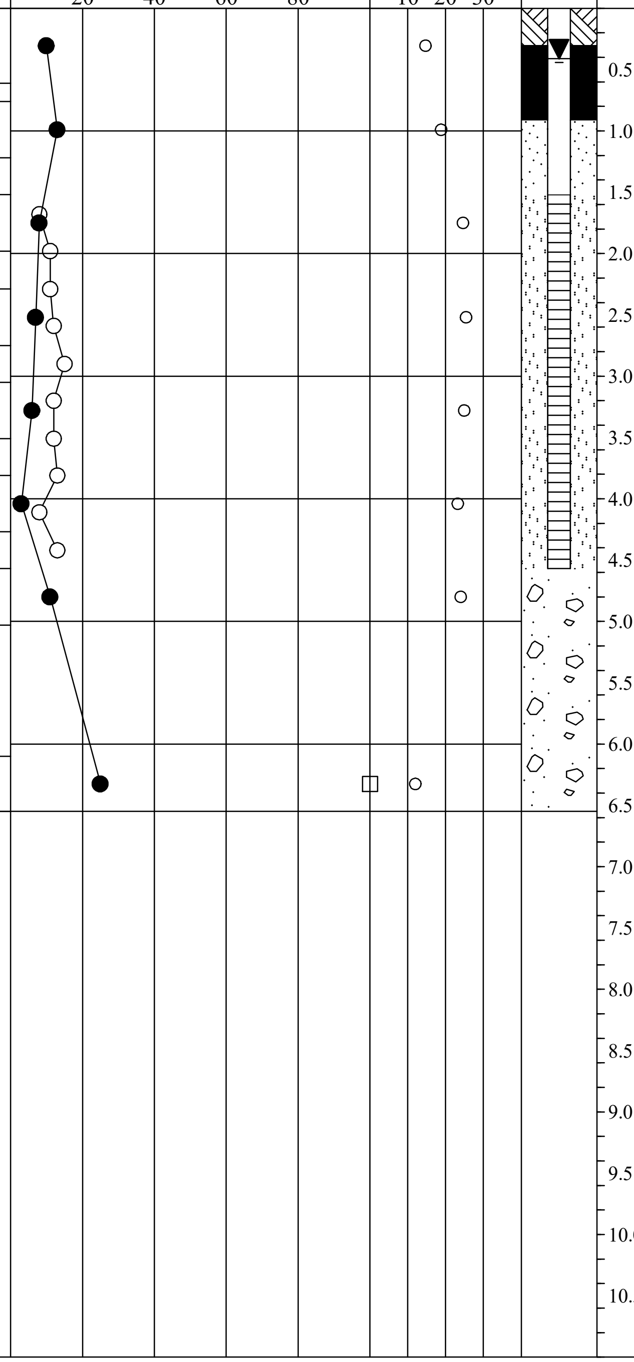
Location: **968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA

Machine: **CME-55 Track**
Method: **Hollow Stem Auger**
Size: **83 mm I.D.**
Date: **Sep 09 - 24** TO **Sep 09 - 24**

Ground Elevation: **422.66 m**

ELEV./DEPTH (m)	DESCRIPTION	SAMPLE ID	TYPE	N-VALUE	REMARKS
422.46 / 0.20	200 mm TOPSOIL				above-ground steel casing set in concrete
421.86 / 0.80	compact, brown to grey SANDY SILT, trace clay trace topsoil, saturated	1	SS	10	water level in monitoring well measured at 0.41 m depth on September 18, 2024
419.76 / 2.90	loose to compact, brown SAND AND SILT trace clay saturated ---------- some gravel	2	SS	13	bentonite seal/50 mm I.D. PVC riser
		3	SS	8	DCPT conducted from 1.50± to 4.55± m depth
		4	SS	7	3.05 m long, 50 mm I.D. PVC screen with sandpack
417.16 / 5.50	brown ----------- very loose to compact, grey SILT trace to some sand trace clay occ. clayey silt lenses/seams saturated	5	SS	6	
		6	SS	3	
		7	SS	11	
416.11 / 6.55	very stiff, grey CLAYEY SANDY SILT TILL trace to some gravel DTPL	8	SS	25	
	End of Borehole				



PROJECT MANAGER: **EYC**

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FILE No: 1495

BOREHOLE No. 110

Client: **PoloCorp Inc.**

Project: **Proposed Residential Subdivision**

Location: **968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA

Machine: **CME-55 Track**
Method: **Hollow Stem Auger**
Size: **83 mm I.D.**
Date: **Sep 10 - 24** TO **Sep 10 - 24**

SOIL LITHOLOGY

Ground Elevation: **422.92 m**

ELEV./ DEPTH (m)	DESCRIPTION
	300 mm TOPSOIL
422.62 / 0.30	loose to compact, brown SANDY SILT to SAND AND SILT trace clay, trace topsoil saturated
420.77 / 2.15	brown ---------- loose to compact, grey SILT trace to some sand trace gravel, trace clay occ. clayey silt seams saturated
418.52 / 4.40	compact to very dense, grey SAND AND SILT TILL trace gravel, trace clay moist
416.37 / 6.55	End of Borehole

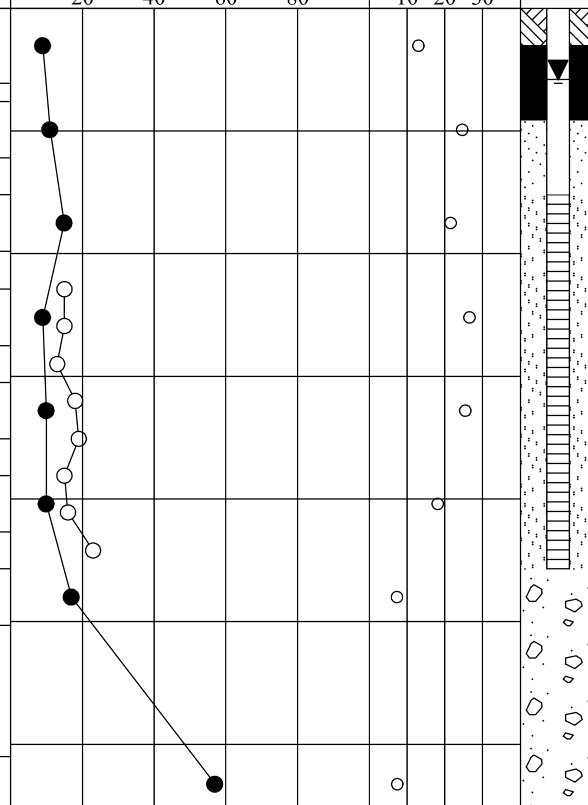
SAMPLE

SAMPLE ID	TYPE	N-VALUE
1	SS	9
2	SS	11
3	SS	15
4	SS	9
5	SS	10
6	SS	10
7	SS	17
8	SS	57

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

- above-ground steel casing set in concrete; bentonite seal/50 mm I.D. PVC riser
- water level in monitoring well measured at 0.58 m depth on September 18, 2024
- 3.05 m long, 50 mm I.D. PVC screen with sandpack
- DCPT conducted from 2.15± to 4.55± m depth

PROJECT MANAGER: **EYC**

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FILE No: 1495

BOREHOLE No. 111

Client: **PoloCorp Inc.**

Project: **Proposed Residential Subdivision**

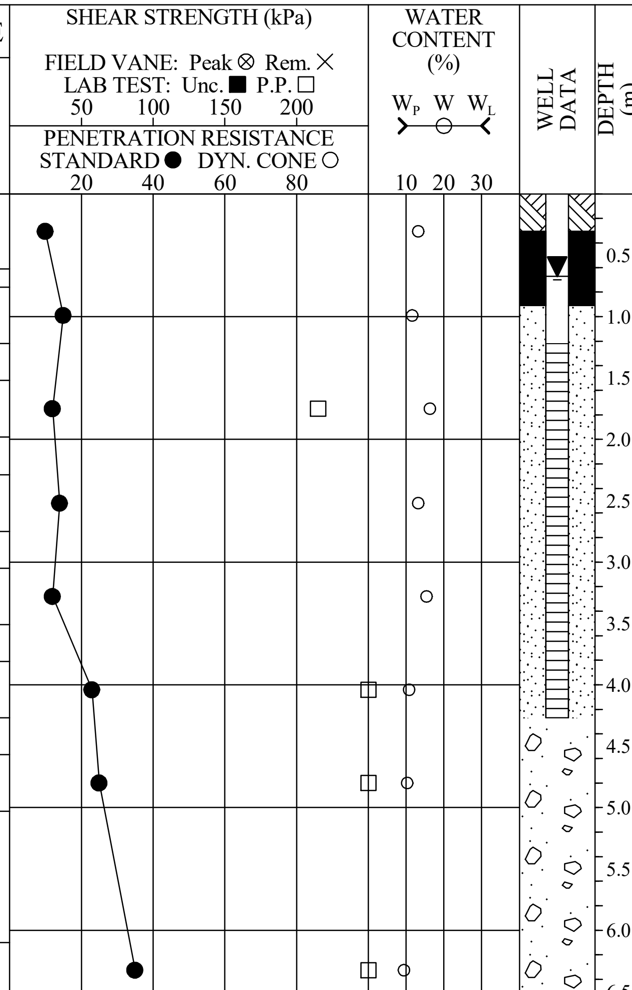
Location: **968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA

Machine: **CME-55 Track**
Method: **Hollow Stem Auger**
Size: **83 mm I.D.**
Date: **Sep 10 - 24** TO **Sep 10 - 24**

SOIL LITHOLOGY — Ground Elevation: **421.24 m**

ELEV./DEPTH (m)	DESCRIPTION	SAMPLE ID	TYPE	N-VALUE	Remarks
	300 mm TOPSOIL				above-ground steel casing set in concrete; bentonite seal/50 mm I.D. PVC riser
420.94 / 0.30	compact, orangey brown SANDY SILT trace gravel, trace clay moist	1	SS	10	water level in monitoring well measured at 0.67 m depth on September 18, 2024
		2	SS	15	
419.89 / 1.35	stiff, brown CLAYEY SILT, trace gravel trace sand, occ. silt seams DTPL	3	SS	12	3.05 m long, 50 mm I.D. PVC screen with sandpack
419.09 / 2.15	compact, brown Fine to Medium SAND trace to some gravel trace silt saturated	4	SS	14	
		5	SS	12	
417.89 / 3.35	brown silt seam ---------- stiff to hard, grey CLAYEY SANDY SILT TILL trace to some gravel trace sand occ. silt lenses DTPL	6	SS	23	
		7	SS	25	
		8	SS	35	
414.69 / 6.55	End of Borehole				



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FILE No: 1495

BOREHOLE No. 112

Client: **PoloCorp Inc.**

Project: **Proposed Residential Subdivision**

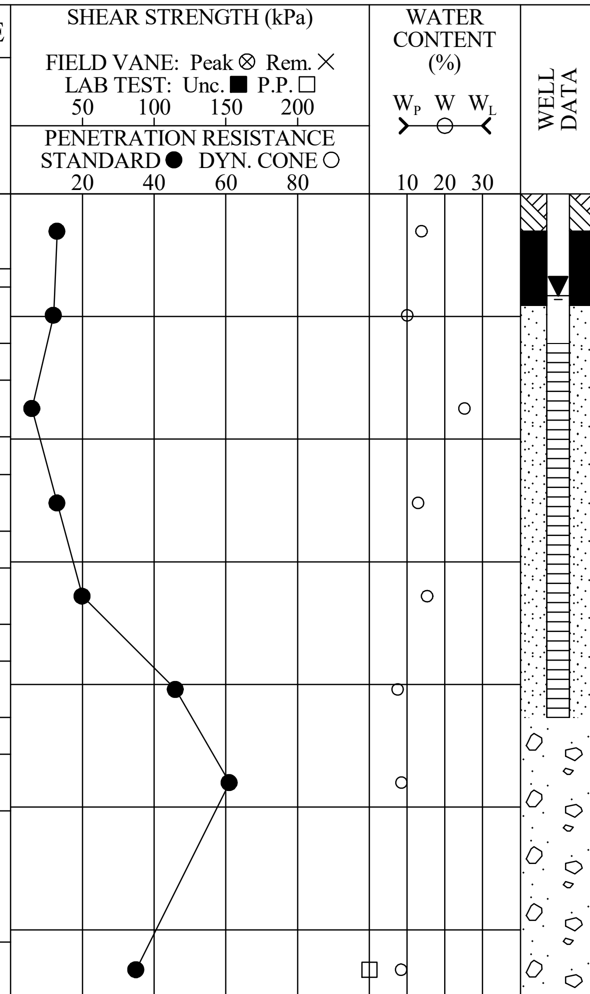
Location: **968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA

Machine: **CME-55 Track**
Method: **Hollow Stem Auger**
Size: **83 mm I.D.**
Date: **Sep 10 - 24** TO **Sep 10 - 24**

Ground Elevation: **422.30 m**

ELEV./ DEPTH (m)	DESCRIPTION (SOIL LITHOLOGY)	SAMPLE ID	TYPE	N-VALUE	REMARKS
422.10 / 0.20	200 mm TOPSOIL				above-ground steel casing set in concrete
421.50 / 0.80	compact, orangey brown SAND AND SILT, trace gravel trace clay, wet to saturated	1	SS	13	bentonite seal/50 mm I.D. PVC riser; water level in monitoring well measured at 0.83 m depth on September 18, 2024
419.40 / 2.90	loose to compact, brown SILT trace gravel, trace sand trace clay saturated	2	SS	12	
		3	SS	6	3.05 m long, 50 mm I.D. PVC screen with sandpack
		4	SS	13	
416.80 / 5.50	compact to very dense, grey SANDY SILT TILL to SAND AND SILT TILL some gravel trace clay occ. clayey silt seams moist to wet	5	SS	20	
		6	SS	46	
		7	SS	61	
415.75 / 6.55	hard, brown CLAYEY SANDY SILT TILL trace gravel DTPL	8	SS	35	
	End of Borehole				



PROJECT MANAGER: **EYC**

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Enclosure No.: 21
Sheet 1 of 1

FILE No: 1495 BOREHOLE No. 113

Client:	**PoloCorp Inc.**
Project:	**Proposed Residential Subdivision**
Location:	**968 St. David Street North, Fergus, Ontario**

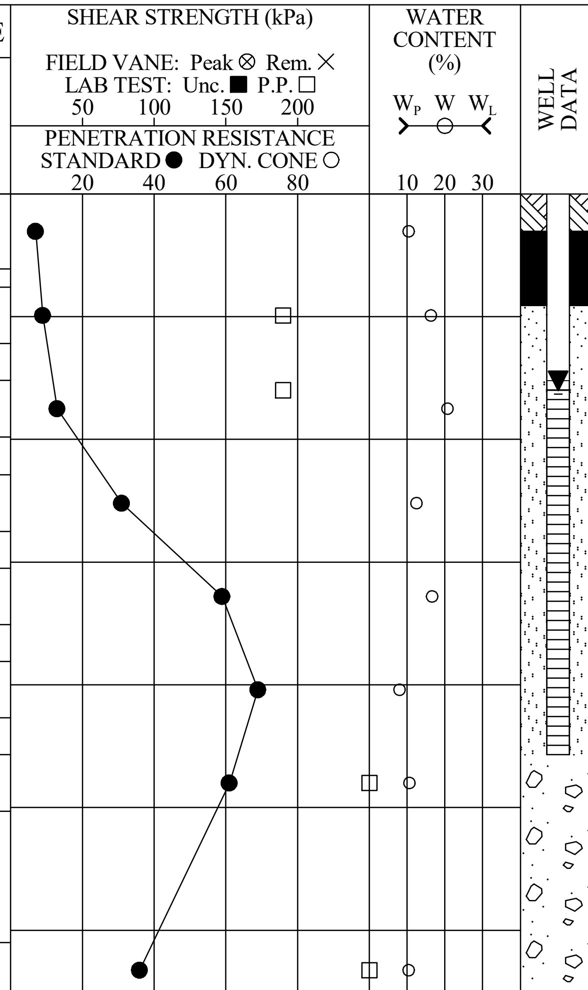
EQUIPMENT DATA

Machine: **CME-55 Track**
Method: **Hollow Stem Auger**
Size: **83 mm I.D.**
Date: **Sep 10 - 24** TO **Sep 10 - 24**

SOIL LITHOLOGY

Ground Elevation: **422.02 m**

ELEV./ DEPTH (m)	DESCRIPTION	SAMPLE ID	TYPE	N-VALUE
421.77 / 0.25	250 mm TOPSOIL			
421.27 / 0.75	loose, brown SANDY SILT, trace gravel trace topsoil, trace clay, moist	1	SS	7
419.87 / 2.15	stiff, mottled brown CLAYEY SANDY SILT trace gravel occ. saturated sand seams DTPL	2	SS	9
		3	SS	13
417.62 / 4.40	dense to very dense, grey SANDY SILT TILL to SAND AND SILT TILL trace to some gravel trace clay occ. saturated sand seams occ. clayey silt seams moist to wet	4	SS	31
		5	SS	59
		6	SS	69
415.47 / 6.55	hard, grey CLAYEY SANDY SILT TILL trace gravel occ. sand lenses DTPL	7	SS	61
		8	SS	36
	End of Borehole			



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

REMARKS

- above-ground steel casing set in concrete
- 0.5 – bentonite seal/50 mm I.D. PVC riser
- 1.0 – 3.05 m long, 50 mm I.D. PVC screen with sandpack
- 1.5 – water level in monitoring well measured at 1.60 m depth on September 18, 2024

PROJECT MANAGER: **EYC**

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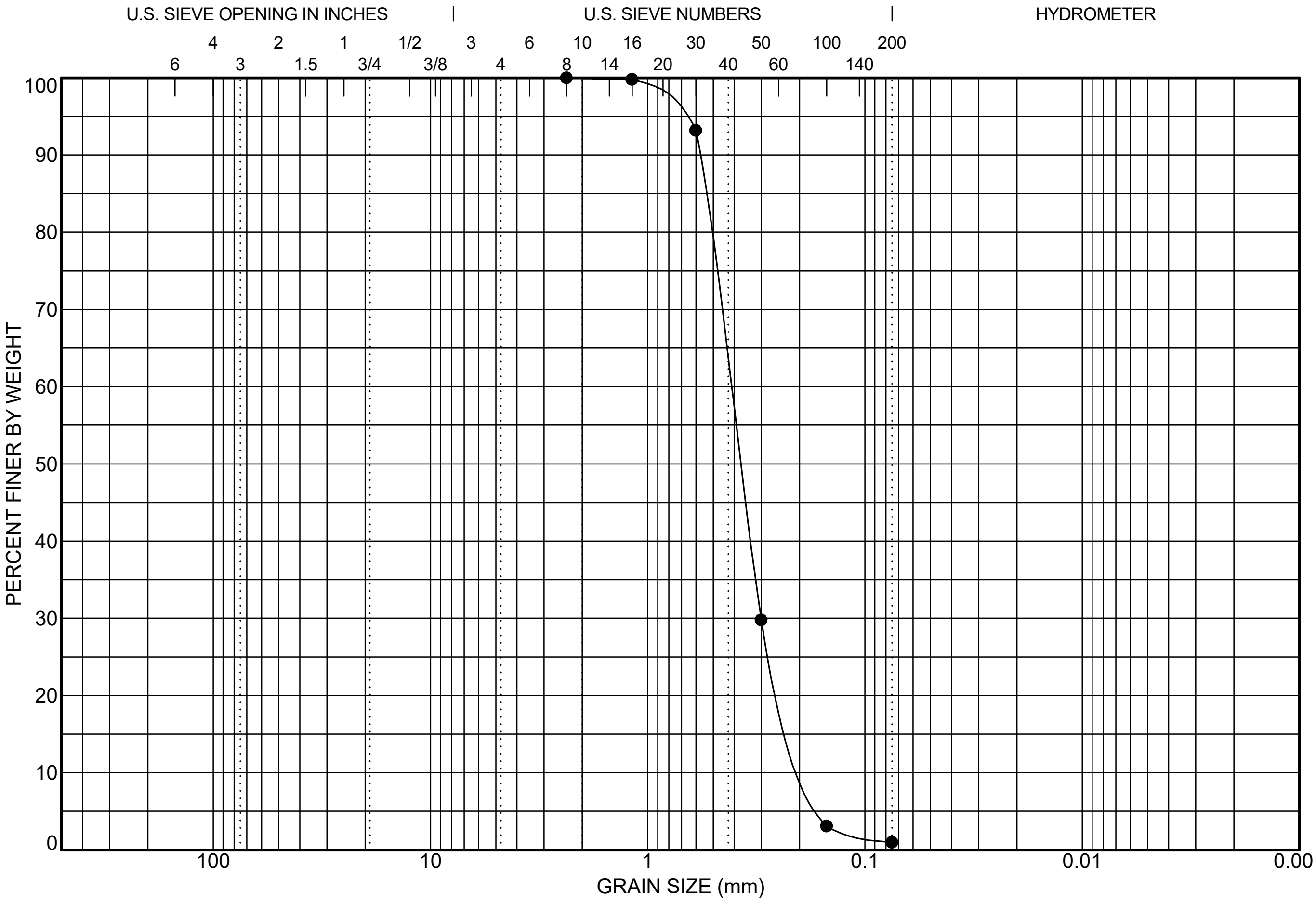

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
			1.21	2.33	2.36	0.417	0.301	0.179	0.0	99.0	1.0	

Date: Sep. 25 - 2024
Client: PoloCorp Inc.
Contractor:
Source:
Sampled From: BH 106 - SA 5, 3.05 to 3.50 m depth
Sample No.: 106-5
Date Sampled: Sep. 09 - 2024
Sampled By: RS
Lab No.: 1035
Date Tested: Sep. 25 - 2024
Type of Material: Fine to Medium Sand, trace silt

Sieve Size (mm)	Percent Passing	No Specifications

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e-mail: info@cvdengineering.com

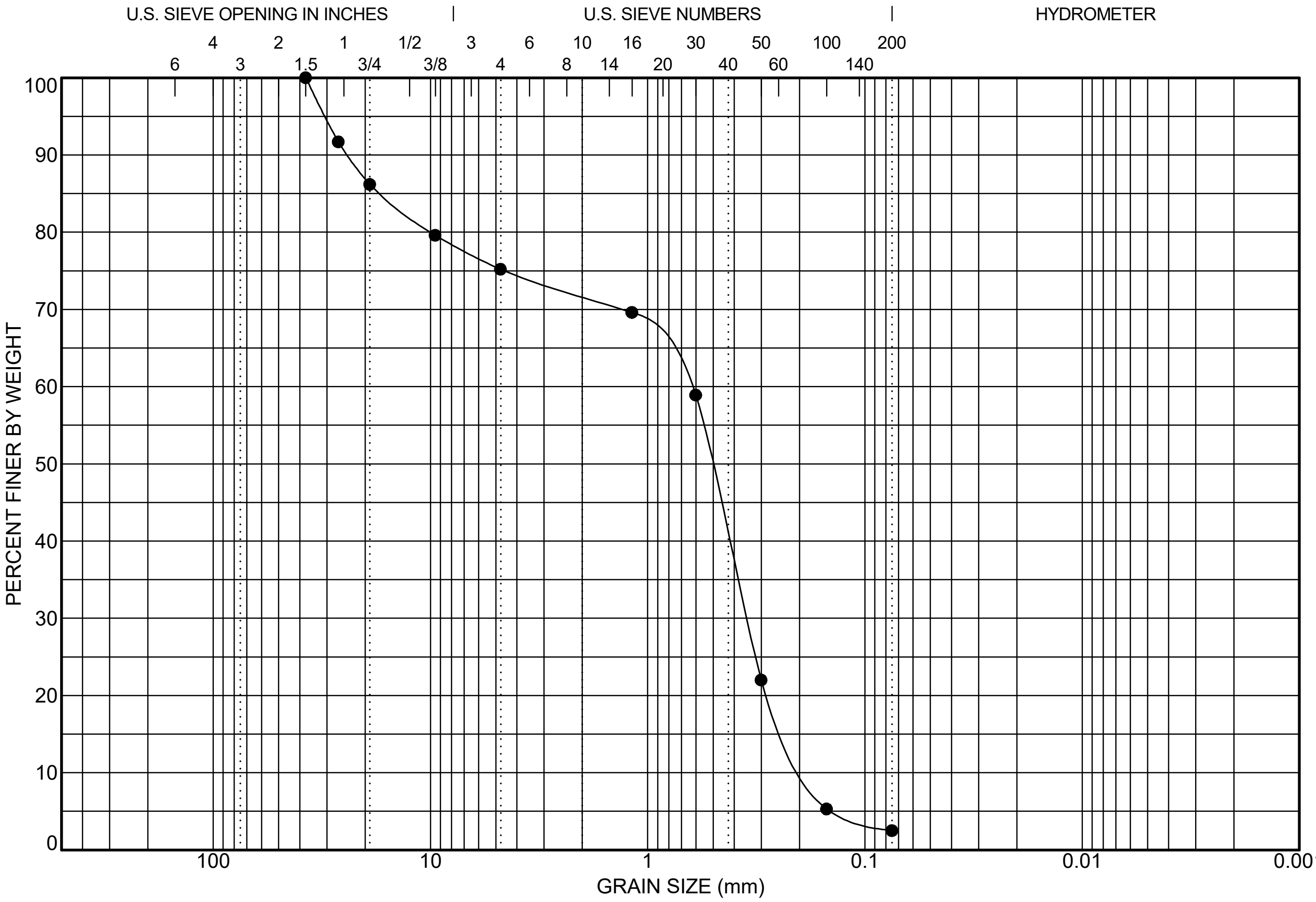
GRAIN SIZE DISTRIBUTION

Project: Proposed Residential Subdivision

Location: 968 St. David Street North, Fergus, Ontario

File No.: 1495

Enclosure No.: 24



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
			1.04	3.53	37.5	0.643	0.349	0.182	24.8	72.7	2.5	

Date: Sep. 25 - 2024
Client: PoloCorp Inc.
Contractor:
Source:
Sampled From: BH 108 - SA 4, 2.30 to 2.75 m depth
Sample No.: 108-4
Date Sampled: Sep. 09 - 2024
Sampled By: RS
Lab No.: 1038
Date Tested: Sep. 25 - 2024
Type of Material: Gravelly Sand, trace silt

Sieve Size (mm)	Percent Passing	No Specifications

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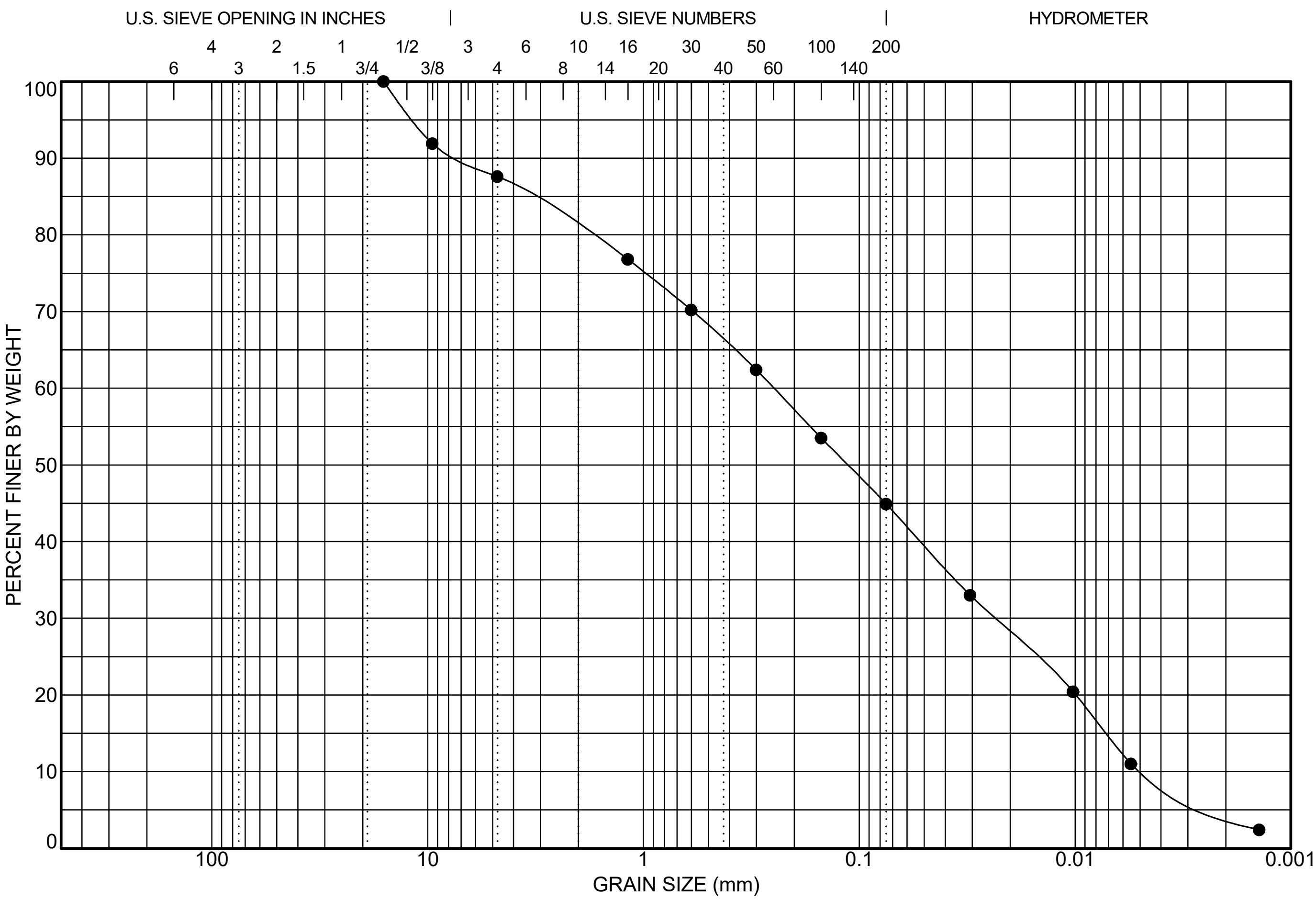
GRAIN SIZE DISTRIBUTION

Project: Proposed Residential Subdivision

Location: 968 St. David Street North, Fergus, Ontario

File No.: 1495

Enclosure No.: 25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
			0.48	53.05	16	0.249	0.024	0.005	12.4	42.7	44.9	

Date: Sep. 25 - 2024
Client: PoloCorp Inc.
Contractor:
Source:
Sampled From: BH 109 - SA 4, 2.30 to 2.75 m depth
Sample No.: 109-4
Date Sampled: Sep. 09 - 2024
Sampled By: RS
Lab No.: 1037
Date Tested: Sep. 25 - 2024
Type of Material: Sand and Silt, some gravel, trace clay

Sieve Size (mm)	Percent Passing	No Specifications

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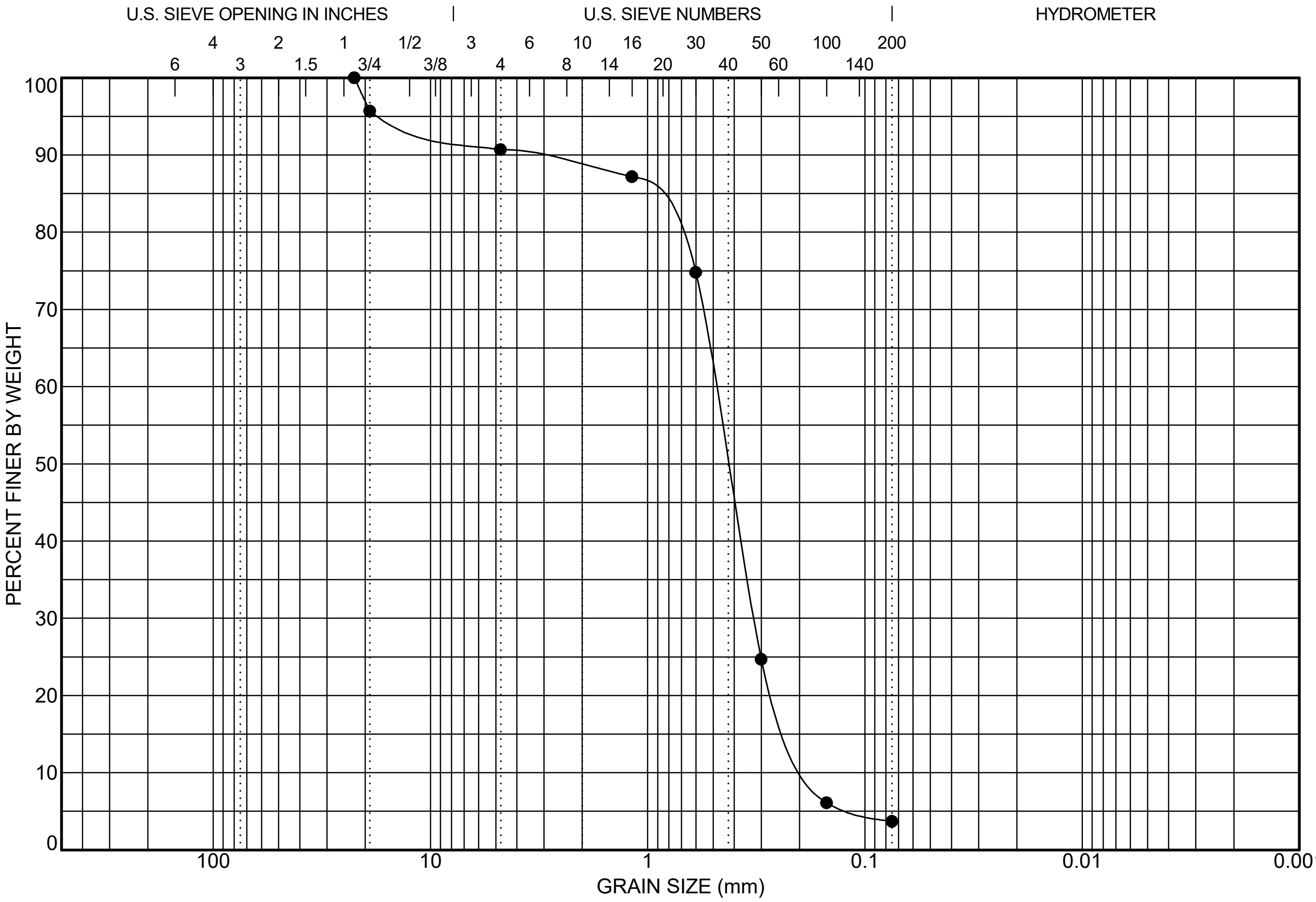
GRAIN SIZE DISTRIBUTION

Project: Proposed Residential Subdivision

Location: 968 St. David Street North, Fergus, Ontario

File No.: 1495

Enclosure No.: 26



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
			1.23	2.82	22.4	0.489	0.323	0.173	9.3	87.0	3.7	

Date: Sep. 25 - 2024
Client: PoloCorp Inc.
Contractor:
Source:
Sampled From: BH 111 - SA 4, 2.30 to 2.75 m depth
Sample No.: 111-4
Date Sampled: Sep. 10 - 2024
Sampled By: RS
Lab No.: 1036
Date Tested: Sep. 25 - 2024
Type of Material: Fine to Medium Sand, trace gravel, trace silt

Sieve Size (mm)	Percent Passing	No Specifications

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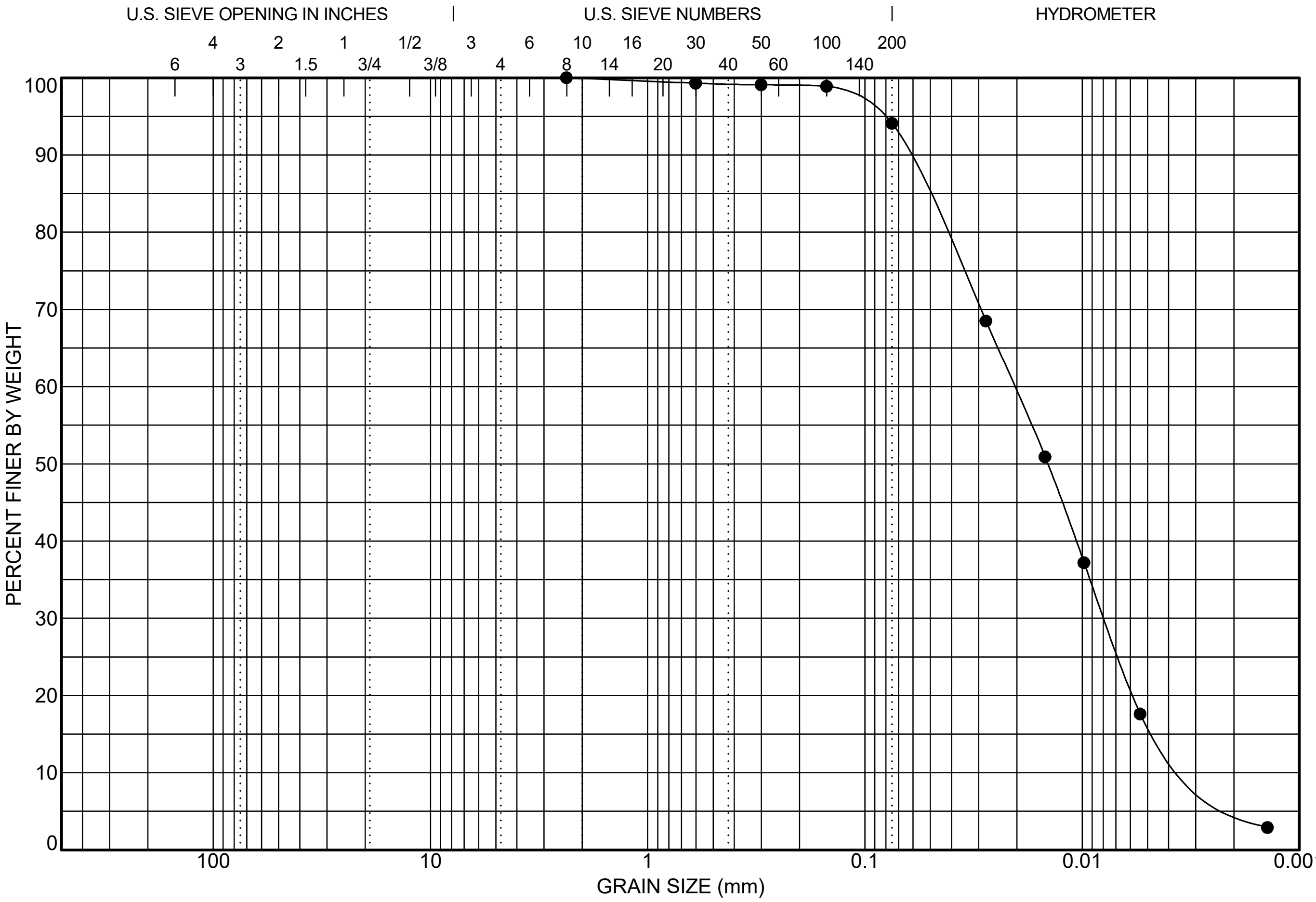
GRAIN SIZE DISTRIBUTION

Project: Proposed Residential Subdivision

Location: 968 St. David Street North, Fergus, Ontario

File No.: 1495

Enclosure No.: 27



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
			1.13	7.62	2.36	0.02	0.008	0.003	0.0	5.9	94.1	

Date: Sep. 25 - 2024
Client: PoloCorp Inc.
Contractor:
Source:
Sampled From: BH 112 - SA 4, 2.30 to 2.75 m depth
Sample No.: 112-4
Date Sampled: Sep. 10 - 2024
Sampled By: RS
Lab No.: 1039
Date Tested: Sep. 25 - 2024
Type of Material: Silt, trace sand, trace clay

Sieve Size (mm)	Percent Passing	No Specifications

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GRAIN SIZE DISTRIBUTION

Project: Proposed Residential Subdivision

Location: 968 St. David Street North, Fergus, Ontario

File No.: 1495

Enclosure No.: 28